SOURCES AND DYNAMICS OF FECAL COLIFORM BACTERIA IN UNIVERSITY LAKE

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FINAL REPORT

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Abstract

During the period between July 2005 and July 2006 field and lab examinations were conducted to define the sources and dynamics of Fecal Coliform (FC) bacteria in University Lake. The goal of the project was to provide site-specific recommendations towards the restoration of acceptable water quality in University Lake. University Lake is located on the Chester Creek waterway in Anchorage Alaska. It is a water body that has been defined as water quality limited by the Alaska Department of Environmental Conservation, being in violation of the drinking water quality standard of FC. During the biweekly water quality sampling events at the inlet (UL-1), outlet (UL-2) and storm drain (UL-s) outfall of University Lake we found that FC loading is highest at the inlet versus the outlet. Both average and maximum FC values were higher at UL-1 than UL-2. We found that FC concentration decreased on average 68% from the UL-1 to UL-2 over a 7 day period that also corresponded to the determined average lake residence time. We also determined University Lake is more effective in removing FC load during ice covered conditions, (85% FC load removed) than during ice free condition (35% load removed). We did not find a positive correlation between flow and FC concentration at the inlet, suggesting that the re-suspension theory does explain FC input. We also determined that Chester Creek is the dominant source of FC to University Lake. Secondary contributors include intermittent high overland input, direct water fowl input and extended survivability of FC in Lake water and sediments. We therefore recommend source tracking to determine specific source of FCs to Chester Creek and University Lake. In order to improve the water quality in University Lake, the load of FC at the inlet must be significantly lowered. Possible management practices may include increased street sweeping, restoration of riparian areas, increased education and increased sediment removal from sedimentation basins.

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Introduction

Due to non-attainment of the Fecal Coliform (FC) Bacteria standard, University Lake is listed as a Category 5 waterbody on Alaska's most recent Integrated Water Quality Monitoring and Assessment Report. In order to promote its recovery, the ADEC is currently finalizing a TMDL for the entire Chester Creek watershed, including University Lake. In its current form, the TMDL stipulates that the recovery will be accomplished primarily through implementation of BMPs, most notably through increased street sweeping and increased public education. Although these BMPs may indeed serve to decrease the fecal coliform levels, their relative effectiveness is difficult to predict due to the fact that the sources and dynamics of fecal coliform populations within the lake are poorly understood. Provided with a better understanding of fecal coliform sources within University Lake, watershed managers would be able to develop a more effective recovery plan directed specifically at the primary contributors. Moreover, through a more thorough understanding of the fecal coliform dynamics within the lake, watershed managers would be able to develop a monitoring strategy intended to maximize the relevant information provided while minimizing the sampling effort. Although the original listing and the subsequent TMDL represented the crucial first steps towards the recovery of University Lake, developing site-specific knowledge regarding the sources and dynamics of fecal coliforms in the lake represents the final step prior to implementation and assessment of appropriate BMPs.

Methods

Please refer to the Quality Assurance Project Plan as well as appendices (where noted in the text) at the end of this document for a detailed description of the laboratory methods.

Results

Data Validation and Completeness

All criteria for measurement of data were followed as outlined in the QAPP. The following shows that the number of samples collected was near or exceeded the number projected and data collection was complete. The number of samples collected at the storm drain outfall (UL-S) was less than projected. Water does not flow continuously from the storm drain, therefore samples could only be collected when water was flowing. The number of samples collected for the Lake Sediment Survivability study also fell below the projected number. Unfortunately, our *in situ* mesocosms were vandalized and the study had to be halted early.

Site Name	Location	# FC Samples	Total Samples Projected	Total Samples obtained	
Bi-weekly Lake FC Input and Output Sampling Events					
•	Inlet to University	3	78	100	
UL-1	lake				
UL-2	Outlet to	3	78	103	
	University Lake				
UL-S	Storm drain outfall	3	78	54	
	in University Lake				
Field Sediment and	Water Column associa	tion at Transects at Ur	niversity Lake		
	University Lake	Four Locations Per	36	36	
TR-1	Inlet Side	transect, 3 Depths			
		per location			
TR-2	University Lake	Four Locations Per	36	32	
	Middle	transect, 3 Depths			
		per location			

TR-3	University Lake Outlet Side	Four Locations Per transect, 3 Depths per location	36	31
Lake Sediments Sur-	vivability			
	University Lake bottom	54	54	42, with 3 replicates per sample.

Fecal Coliform Inputs and Outputs

The concentration of fecal coliforms (FC) regularly exceeded the standard for drinking water quality designated by the Alaska Department of Environmental Conservation for Chester Creek (Table 1). This standard states that the geometric mean of FC samples obtained within a 30 day period may not exceed 20 colony forming units (CFU)/100ml, and that no more than 10% of samples gathered over a 30 day period may exceed 40 CFU/100ml. The geometric mean was calculated by using a minimum of 3 or more countable (relevant) plates +/- 15 days of any sample date. The Standard Method (SM 9222-D) outlined in the QAPP dictates what is countable saying that Petri plates containing less than 20 or greater than 80 colonies be treated as uncountable (less than 20 indicates too small a sample size and greater than 80 results in unacceptable variability due to counting errors and competition for nutrients limiting colony growth). This resulted in less than 30% of all plates being available for analysis.

Figures 1 and 2 show the 30-day geometric means calculated over the entire year at each site and originates from the fecal coliform data set in Appendix 1. Any time a geometric mean was calculated at either site it violated the standard. The fewer geometric means calculated at the UL-2 site versus the UL-1 site is directly related to the low number of relevant observations as seen in Table 1. At UL-2, data points were generated neither between 9-20-05 and 11-22-05 nor in 2006 (Figure 2). In contrast, data points were generated within those time spans at site UL-1 (Figure 1). Note also that the FC concentration exceeded the standards more often at the inlet to University lake (UL-1) than the outlet (UL-2) (Table 1).

Site	Number of	Number of	Percent of	Number of	Number of	Percent of
	Exceedances	Relevant	individual	Exceedances of	Relevant	individual
	of Standard	Observations	Exceedance	Standard	Observations	Exceedance
Geometric Mean >20 CFU/100ml (30 days)		10% samples > 40	CFU/100ml (30 da	ays)		
UL-1	27	32	84%	30	36	83%
UL-2	11	19	58%	16	22	73%
Relevant observations are those samples that fall within the 20-80 colonies per plate range.						

Table 1.	Fecal	Coliform	Regulatory	Compliance	at UL-1	and UL-2



Figure 1: Geometric 30 day mean, UL-1

Geometric mean was based on 3 or more countable measurements at a given site within any 30 day period.



Figure 2: Geometric 30 day Mean UL-2

Geometric mean was based on 3 or more countable measurements at a given site within any 30 day period.

The inability to use data that fell outside the countable plate range negatively impacts our ability to fully understand the University Lake system. The loss of 70% of data therefore made using the SM 9222D limited in its usefulness, and ineffective in describing what is occurring at the inlet and outlet of University Lake. Therefore, the FC data were re-evaluated to include data previously excluded as uncountable.

The following methodology was employed for the purposes of re-evaluation. Counts that were below the 20 colonies per plate minimum were assigned the number counted; for example if there were 2 CFUs from the 50ml dilution, it was recorded as 4 CFU/100ml. For counts that were above the 80 colonies per plate maximum, the plate was counted a minimum of 3 times to obtain the CFU. However, some plates were uncountable due to lack of distinct, separate colonies. These were recorded as too numerous to count (TNTC). For each site, on each sampling date, the average FC CFU/100 ml was determined using the replicates for which a number could be calculated. If all three of the replicates from a site on a given day were TNTC, the CFU/100 ml was calculated by assigning the maximum value of 80 CFU to the highest dilution filtered. For example, 20ml filtered, multiplied by 80 CFU= 400 CFU/100ml. Although the value calculated in this manner is an estimated minimum number of FC, it was used in the re-analysis, as there was clearly an exceedance of the water quality standard. This new method of data evaluation increased the number of samples at UL-1 table 1 from 32 to 100 and UL-2 from 19 to 103.

The average number of FC/100 ml was greater at UL-1 than UL-2 (Table 2). The maximum number of FC at UL-1 was nearly twice the maximum at UL-2. High concentrations of fecal coliforms were also found in a storm drain (UL-S) that drains into University lake, with a maximum of 800 CFU/100 ml (Table 2).

Site	# Samples	Min. FC/100ml	Max. FC/100ml	Avg. FC/100ml
UL-1 Inlet	100	0	310	54
UL-2 Outlet	103	0	190	25
UL-S Storm drain	54	0	800	65
Bi-	weekly samplin	ng occurred from 7-14	4-05 through 6-12-	06

Table 2: Summary of fecal coliform data from all counted plates during regular sampling.

The data were also analyzed based on presence or absence of ice. The lake was iced over from 11-8-05 through 5-2-06 and ice free from 7-1-05 to 11-2-05 and from 5-11-06 to 6-12-06. To determine if the presence or absence of ice impacts FC concentration, a probability test for each site and condition was conducted as described by Novotny (2002). The method and calculations are presented in appendix 2.

The probability of obtaining a particular FC concentration at the same site appears to change between seasons. There was a higher probability of obtaining the 20 CFU/100ml regulatory standard at all 3 sites when the lake was free of ice (Figure 3) compared to when it was iced over (Figure 4),. Also, the probability of obtaining any particular concentration of FC is greater at UL-1 than UL-2 regardless of ice condition. This increased probability between the sites is greatest when the lake is iced over, confirming that seasonal variation occurs at the sites. The difference in probability between UL-1 and UL-2 occurs because the FC concentrations are significantly higher at UL-1 than UL-2 (t = X, α =0.05; appendix 3).



Figure 3: Probablity of Obtaining FC/100ml Summer



Figure 4: Probability of Obtaining FC/100 in Winter

There were two "event-driven" samplings conducted within the sampling period. The first took place on 9-13-05 (during a period of heavy rain), and second on 12-8-05 (during a melt event). The first event sampled overland flow at 5 locations around the lake. These 5 samples were taken from the newly formed rivulets created from the heavy precipitation. Rather than use the membrane filtration method as described in the QAPP, a Multiple-tube method utilizing the average most probable number (MPN) was employed to enumerate FC (authors et al., 1994: appendix 10). This change was made due to soil suspended in the water which clogged the membrane filters. The average FC was 281/g.

During the second event, UL-1, UL-2, and UL-S were sampled after a large shift in temperature caused increased runoff due to snow melt. The concentration of FC was determined using membrane filtration The result was a large change in concentration of FC at the storm drain (appendix 2), and no real noticeable change at the inlet or outlet.

The FC and water quality data were evaluated over the entire year as well as between ice-free and iced-over conditions using the Pearson r-correlation method to determine correlations between water quality parameters and FC concentrations. Only the significantly identified correlations that impact FC concentration are evaluated. Stage, the descriptor used for stream flow, and temperature correlated loosely with FC during ice free conditions (Table 3) at both UL-1 and UL-2, while temperature correlated loosely with FC at UL-1 only. The negative correlation between FC and stage during ice free conditions at UL-1 suggests that the load (FC/day) of FC coliform is constant and does support the re-suspension theory (the theory that at high stage, FCs in the sediment would be resuspended in the water column thus giving a positive correlation between stage and FC). This is in contrast to UL-2, were a positive correlation between stage and FC was observed. This was likely due to a decrease in residence time during high stage (vs. low) and thus decreased time for FC to settle out of the water column. Figures 5 and 6 depict the identified water quality parameters that impact FC concentration in graphical form.

	Year	FC	Stage	Temp.	pН
Site			U	1	1
UL-1	FC	1	I.	I	1
	Stage	47	1		
	Temp.	.29	.40	1	
	PH	18	09	.02	1
	DO	.31	<mark>58</mark>	<mark>66</mark>	21
UL-2	FC	1			
	Stage	.008	1		
	Temp	.27	<mark>.60</mark>	1	
	PH	37	17	.14	1
	DO	.002	<mark>72</mark>	46	.33
UL-1	ice free	FC	Stage	Temp.	pН
	FG				
	FC				
	Stage	58	1		
	Temp	.57	<mark>/1</mark>	1	
	PH	41	05	15	1
	DO	02	38	40	.17
UL-2	FC	1			
	Stage	. <mark>51</mark>	1		
	Temp	.13	40	1	
	PH	<mark>63</mark>	80	.33	1
	DO	14	<mark>78</mark>	10	<mark>.55</mark>
TTT 1	• •	F C	<u></u>	T	11
UL-I	iced	FC	Stage	Temp.	рн
	over				
	FC	1			
	Stage	- 40	1		
	Temp	08	.11	1	
	PH	10	48	27	1
	DO	.02	.55	16	67
UL-2	FC	1			
	Stage	.14	1		
	Temp	03	.39	1	
	PH	33	28	.08	1
	DO	27	<mark>56</mark>	<mark>63</mark>	.20
Correlation c	coefficients	greater or less th	an .5 and5 a	re highlighted	

Table 3: Correlation of fecal coliform and water quality parameters





Source Contributors.

We identified three main contributors of FC into University Lake.. The main contributor of FC is Chester Creek (Table 4). The second is direct input from waterfowl and the third is over land flow from the park.

The direct input from waterfowl was estimated by using an established bird density of 39 birds/km² (including Loons & Grebes, Geese, Swans, Ducks, Raptors, Sandhill cranes, Shorebirds, Gulls & Terns) as described in Murphy et al. (2001). Given that University Lake is 38.6 acres, or $1.56 \times 10^{-1} \text{ km}^2$, it is estimated that birds would therefore contribute 2.69 x 10^6 FC per day, or less than 0.1% of the input measured at UL-1. Bird fecal coliform density and feces discharge calculations were taken from Schueler and Holland 2000,

The third main contributor of FC to University Lake is over land flow that occurs during rain events. Even though over land flow contains extremely high FC concentrations and does impact UL-1 concentration over a short period, it is limited to the length and intensity of a precipitation event. The lack of known or estimated daily volume inputs and the intermittent nature of overland flow makes it a minor player in the yearly loading.

Mass Balance.

Given the sources of contributors of FC into University Lake, it was important to confirm that FC input at UL-1 was the main factor determining FC output at UL-2 (appendix 7). This was tested using binominal analysis of FC data that was paired 7 days apart (one lake residence time) at UL-1 and UL-2. (see appendix 7 for method description and calculations). This test showed that the relative increase or decrease of FC at UL-1 would correspond over the period of one lake residence time to an increase or decrease, respectively, at UL-2. It also found that the magnitude of FC change experienced at UL-1 over one lake residence time was the same as the magnitude of FC change experienced at UL-2. It is then valid to create a mass balance of FC using only input at UL-1 and output at UL-2. We were able to determine the mass balance of University Lake over the seasons (Table 4). Over the entire year an estimated input of FC into University Lake from Chester Creek was 5.0×10^{12} and the estimated output of FC was 2.27×10^{12} . A 35% reduction in the FC load occurred at UL-1 from ice free to iced conditions, while a 82% reduction occured at UL-2 during the same period. During ice free conditions there is a 35% reduction in load between UL-1 and UL-2, while during iced-over conditions there is a decrease of 83%. The overall reduction between UL-1 and UL-2 for the entire year is 53%.

	Average	Average	L	oad
UL-1	flow cfs	FC/100ml	FC/sec	FC/day
ice free	15.523	54	237226	2.05e10
iced over	9.878	55	153754	1.33e10

Table 4: Fecal conform mass loading into and out of University La	ake
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UL-2

ice free	15.069	36	153525	1.33e10
iced over	9.067	13	27254	2.35e9

Description of University Lake Physical and Hydrologic Setting

University Lake is located in the U.S. Geological Survey (USGS) Anchorage A-8 NE quadrangle (1:25,000-scale) in south-central Alaska. Surficial deposits of glacial, glacioestuarine, and glacialalluvial origin dominate most of the A-8 NE quadrangle. During the latter part of Wisconsinan glaciation, surficial deposits were emplaced by advances and retreat of glacial ice. Glacial deposits at University Lake are a result of several glacial advances and retreats into mountains to the north and east, and local glaciers in nearby mountain valleys (Schmoll et al., 1996).

Surficial deposits at University Lake are comprised of mostly of glacialalluvial and related alluvial deposits, specifically Nunaka Valley channel deposits (Schmoll et al., 1996). Nunaka Valley channel deposits were deposited in a series of relatively short catastrophic outburst floods from the breakout of Eagle River that had been blocked by the Elmendorf glacier and its massive moraine (Schmoll et al., 1996). Nunaka Valley deposits occur in a broad meandering channel system. The channel system splits into two main channels. South Fork Chester Creek, while underfit, presently occupies the southeasterly channel. Nunaka Valley channel deposits are partially visible along the east side of University Lake (Schmoll et al., 1996).

University Lake lies within the Anchorage lowland physiographic province. Southwest-trending low relief hills composed of glacial drift dominate the terrain. A gently sloping alluvial fan formed by Chester Creek interrupts these hills. A narrow south-trending swath of stream alluvium crosses University Lake at the west side of the East lobe (Schmoll et al., 1996).

A USGS Surficial Geology of Anchorage and Vicinity, Alaska, from 1972 shows the location of present day University Lake as a gravel pit (Schmoll and Dobrovolny, 1972). South Fork Chester Creek is located south of the gravel pit and appears to be channelized. An interview with a local gravel pit operator suggested that prior to the mid-1970s University Lake was a gravel pit, and that Rogers Brothers Construction from Seattle, WA and Babbler Construction from Portland, OR used gravel from the University Lake area and operated an asphalt plant nearby. After gravel mining operations ceased, South Fork Chester Creek was diverted into the gravel pit and the modern day inlet and outlet were established (pers. com. H. Lang, 2006).

Figure 7 is the bathymetric map of University Lake generated from data gathered on 9-2-05 (raw data is included in Appendix 4). The lake is separated into two major lobes. The eastern lobe is a deep basin into which Chester Creek flows. The eastern lobe is connected to the western lobe through a narrow, shallow section. The western lobe is a basin of moderate depth from which Chester creek flows out. From the bathymetry of the lake we estimated the lake to contain 5,600,000 cubic feet of water. Given the strong relationship of flow to stage (Table 5; raw data in appendix 3) we estimated the residence time of the lake to be 6.8 days +/- 1.8 days (see appendix 4 for bathymetry and residence time calculations)

Site	Regression equation	r ²
UL-1	CFS= 2.6393(stage inch.)-6.3975	.84
UL-2	CFS=3.5713(stage inch.)-24.974	.83

Table 5: Linear regression of discharge and stage for UL-1 and UL-2



Figure 7: University Lake Bathymetry

Whole-Lake Sampling: University Lake Flow and Mixing Characteristics

Three whole lake sampling events were conducted on University Lake. These events occurred on 9-2-05, 2-10-06, and on 5-23-06. On 9-2-05 there was an average of 68 CFU/100ml within the lake. No trend in FC concentration was seen with depth or transect location, indicating that the lake is fully mixed. The results from 9-2-05 are in contrast to the that seen on both 2-10-06 and 5-23-06, where we obtained an average FC concentration of <1 CFU/100ml, and FC were only detected within 2 feet the bottom of the lake. Appendix 5 shows the raw condensed data for the whole lake sampling events. It is important to keep in mind that the lake had only been ice-free for two weeks when the last sampling event occurred and that spring breakup was a slow and gradual occurrence.

Fecal Coliform Survivability in Water Column and Sediments

Two survivability studies were conducted during this project, a laboratory study and an *in-situ* field study. Both the studies confirmed that coliform bacteria are able to survive in Chester Creek water and sediments for prolonged periods of time at both 4C and 16C (Table 6 and Fig. 8). In general, coliforms persisted for longer at 4C than at 16C, likely due to decreased metabolic activity and lower predator activity (under non-sterile conditions).

Туре	Temp	Regression equation.	r ²	Half-Life
	_			(days)
Non-sterile water.	4c	Y=0303x+6.538	.947	22.9
Non-sterile	16c	Y=05x+5.889	.618	13.9
Sediment.				
Sterile Sediment.	4c	Y=0249x+7.0115	.969	27.83
Sterile Sediment.	16c	Nonlinear-	.915	
		Y=5e-5x3-		
		.0037x2+.0719x+7.0596		
Sterile water	4c	Y=0035x+141.45	.713	<mark>198</mark>
Sterile water	16c	Y=0017x+70.298	.281	<mark>407.6</mark>
Significant	departure	from literature reported values	s are highlig	ghted.

Table 6: *Escherichia coli* half-lives during laboratory incubations at varying temperatures.

The *in-situ* survivability study was modified from the original plan outlined in the QAPP. The departures from the QAPP included; 1) deployment of microcosms at one site instead of three, 2) using 10 grams of sediment instead of 50 grams because of scaling, and 3) using the 3 tube MPN method rather than the spread plate technique (appendix 10). *The in situ* field results also showed an extended survivability of FC in University lake sediment. The half-life of fecal coliforms was 69 days; greater than most other literature reported values.



Errors bars represent the standard deviation of the mean for each point. .

Conclusions

University Lake acts as a sink for FC; it is capable of removing over half of the yearly FC load from Chester Creek. University Lake is a more efficient sink during iced over conditions than ice free conditions. This could be due to decreased mixing under ice allowing for increased settling, or a decreased input from overland sources as the lake is isolated from those inputs by ice cover. The latter is less likely as the data indicate the dominant input of FC into University Lake is Chester Creek and that the FC observed at UL-1 was the identified factor for FC observed at UL-2 (appendix 7). It is clearly demonstrated that both the inlet and outlet of University Lake exceed the water quality standard (Table 1, Figures 5 and 6), and that FC concentrations at the inlet regularly exceeded those at the outlet. These findings combined with the fact that the lake is a sink for FC leads to the conclusion that, in order to improve the water quality downstream of University Lake, there needs to be a decrease in FC concentrations at the inlet, thus those upstream of the lake in Chester Creek

Recommendations

Microbial source tracking is important to determine the contribution of different sources of FC to the Chester Creek watershed, including the inlet and outlet to University Lake. Source knowledge is important for determining what actions are best able to decrease the FC load into the creek as well as the lake. With the current study, no direct corrective measures toward specific sources can be recommended. The following are more general recommendations to help meet the standard.

- Review the Water Quality Standard designated for Chester Creek and consider changing the standard to that for contact recreational use rather than drinking water use. This is proposed because the high exceedance of the regulatory standard indicates that it may be an unrealistic classification, and FC concentrations in Chester Creek are due to its location in a highly urbanized area.
- Increased street sweeping, increased maintenance of storm drain settling basins and public education may reduce inlet loads sufficiently to decrease outlet concentrations such that Chester Creek comes into compliance with the regulatory standard.
- Decrease overland flow contributions by restoring and maintaining riparian vegetation areas around and upstream of University Lake.
- Increase University Lake sink capacity by dredging the western lobe of University lake, thereby increasing settling time for FC out of the water column.

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Appendix 1:Fecal Coliform Data.

Date U-1 indicates zero FC/10ml mean fortomic Ave. FC/10ml Ave. FC/10ml 7/142005 20ml 10 0 n 50 6.8.915 64 73 7/142005 20ml 0 y 10 78.40324 310 183 7/152005 50ml 102 0 n 10 78.40324 69 49 8/32005 50ml 100 10 78.40324 69 49 8/32005 20ml 2 y 18 64.91928 115 55 8/32005 20ml 2 y 18 54.91928 15 55 8/32005 20ml 1 0 n 16 54.91928 15 5 8/142005 50ml 1 y 52 56.0707 52 66 8/142005 50ml 2 n 49 53.2061 28 33 8/142005 50ml 2 n	Chester Creek		FC plate count	Other Bacteria	Countable		geometric	countable	all counted
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Date	UL-1	1	indicates zero		FC/100ml	mean fc/100ml	Ave. FC/100ml	Ave.FC/100ml
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7/14/2005	20ml	10	0	n	50	69 9015	84	72
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7/14/2005	2011I	10	0	11	119	00.0915	04	13
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7/14/2005	100ml	59	0	У	50			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7/14/2005	20ml	50	0	У	30	70 40004	210	100
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7/19/2005	20ml	52	5	У	310	78.40324	310	163
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7/19/2005	5000	trite		n	160			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7/19/2005	100mi	thtc	0	n	80	70 40004	00	40
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/3/2005	20mi	2	0	n	10	78.40324	69	49
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8/3/2005	50ml	52	0	У	110			
BB22005 20ml 30 0 y 150 78.86406 74 74 BP42005 20ml 23 5 y 44 BP42005 20ml 23 5 y 44 BP442005 50ml 100 115 54.91928 115 5 BP42005 20ml 3 0 n 15 54.91928 15 5 BP42005 20ml 100ml 1mtc n 80 1 160 1 5 54.957677 52 66 66 220ml 8 1 n 40 53.22061 28 33 3 2232005 50ml 16 50 73 33 33 2232005 50ml 14 28 58.1016 50 73 33 33 3222005 20ml 85 74 44 3222005 14.5 68.4 3222005 14.5 68.4 3222005 14.5 68.4 3222005 14.5 68.4 3222005 14.5 68.4 3222005 14.5 69.4	8/3/2005	100ml	28	2	У	28			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/9/2005	20ml	30	0	У	150	78.86406	74	74
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/9/2005	50ml	24	2	У	48			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/9/2005	100ml	24	0	У	24			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/14/2005	20ml	23	5	У	115	54.91928	115	355
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/14/2005	50ml	tntc		n	160			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/14/2005	100ml	tntc		n	80			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/16/2005	20ml	3	0	n	15	54.91928	15	5
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/16/2005	50ml	0	0	n	0			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/16/2005	100ml	1	0	n	1			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/23/2005	20ml	19	0	n	95	54.05767	52	66
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/23/2005	50ml	26	1	У	52			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/23/2005	100ml	51	7	у	51			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/29/2005	20ml	8	1	n	40	53.22061	28	33
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/29/2005	50ml	16	2	n	32			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	8/29/2005	100ml	28	4	У	28			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	9/13/2005	20ml	17		'n	85	58,1016	50	73
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/13/2005	50ml	25		v	50			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/13/2005	100ml	85		'n	85			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/20/2005	20ml	2		n	10	74,10795	114.5	69.4
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/20/2005		3		n	6			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/20/2005		44		v	44			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/20/2005	20ml	37		y	185			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	9/20/2005	50ml	51		y n	100			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/4/2005		1		n n	102	11 52900	10	0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/4/2005	20111 50ml	5		11 D	10	44.52699	10	0
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/4/2005	100ml	5			0			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/4/2005	20ml	9			9	00.00001	22	26
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/11/2005	20111 50ml	9		11 D	40	20.93031	23	20
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10/11/2005	100ml	23	1	11	10			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10/11/2005	20ml	23	1	у	23	24 20002	21	12
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10/18/2005	20ml	2	4	n –	0	24.30003	21	15
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10/18/2005	100ml		2	11	21			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10/25/2005	20ml	21	1/	y n	10	24 30083	10	12
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/25/2005	20ml	2	0		0	24.30003	19	12
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	10/25/2005	100ml	4	0	11	0			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10/23/2005	20ml	19	17	У	19	04 75050	20	20
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/1/2005	20ml	9	0	n	40	24.75059	30	28
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/1/2005	50ml	10	2	n	32			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11/1/2005	20ml	30	19	У	30	40 40050	100	110
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11/8/2005	20mi	12		n	60	42.40859	160	119
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11/8/2005	50mi	86		n	172			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/8/2005	TUUMI	124	04	n	124	50 75 400	400	400
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11/15/2005	20mi	56	31	n	280	58.75433	193	193
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/15/2005	50ml	53	28	n	106			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/15/2005	100ml	tntc		n				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/22/2005	20ml	16	24	У	80	72.88777	64	69
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/22/2005	50ml	28	20	У	56			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/22/2005	100ml	72	tntc	n	72			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/29/2005	20ml	14	45	У	70	57.99081	49	51
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/29/2005	50ml	17	tntc	n	34			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11/29/2005	100ml	49	58	n	49			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12/6/2005	20ml	18	28	У	90	53.65855	78	82
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12/6/2005	50ml	54	86	n	108			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	12/6/2005	100ml	48	46	n	48			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12/8/2005	20ml	4	1	n	20	50.37445	48	27
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12/8/2005	50ml	24	19	У	48			
12/13/2005 20ml 10 7 n 50 50.37445 48 49 12/13/2005 50ml 37 25 y 74 74 74 74 74 76	12/8/2005	100ml	13		n	13			
12/13/2005 50ml 37 25 y 74 12/13/2005 100ml 22 5 y 22 12/20/2005 20ml 6 5 n 30 41.99778 41 37 12/20/2005 50ml 22 17 y 44 44 44 41 37 12/20/2005 100ml 38 33 y 38 38 40.61839 0	12/13/2005	20ml	10	7	n	50	50.37445	48	49
12/13/2005 100ml 22 5 y 22 12/20/2005 20ml 6 5 n 30 41.99778 41 37 12/20/2005 50ml 22 17 y 44 44 44 46.61839 0 12/27/2005 100ml 38 33 y 38 38 40.61839 0	12/13/2005	50ml	37	25	У	74			
12/20/2005 20ml 6 5 n 30 41.99778 41 37 12/20/2005 50ml 22 17 y 44 44 44 44 44 44 45 46	12/13/2005	100ml	22	5	ÿ	22			
12/20/2005 50ml 22 17 y 44 12/20/2005 100ml 38 33 y 38 12/27/2005 20ml nd 40.61839 0	12/20/2005	20ml	6	5	n	30	41.99778	41	37
12/20/2005 100ml 38 33 y 38 12/27/2005 20ml nd 40.61839 0	12/20/2005	50ml	22	17	У	44			
12/27/2005 20ml nd 40.61839 0	12/20/2005	100ml	38	33	У	38			
	12/27/2005	20ml	nd				40.61839	0	

12/27/2005	50ml	nd						
12/27/2005	100ml	nd						
1/17/2006	20ml	13	10	n	65	81.42481	34	37
1/17/2006	50ml	17	15	v	34			
1/17/2006	100ml	11	4	'n	11			
1/31/2006	20ml	30	31		105	69 54414	105	105
1/21/2006	20ml	59 toto	51	у	195	09.34414	195	195
1/31/2000	100	trito						
1/31/2006	100mi	thtc		n				
2/7/2006	20ml	8	4	n	40	69.54414	59.5	53
2/7/2006	50ml	28	9	У	56			
2/7/2006	100ml	63	13	v	63			
2/14/2006	20ml	10	1	,	50	88 27830	16	28
2/14/2000	20ml	10	1		50	00.27003	10	20
2/14/2006	50mi	9	2	n	18			
2/14/2006	100ml	16	2	n	16			
3/15/2006	20ml	140	8	n	0	53	1	1
3/15/2006	50ml	tntc		n				
3/15/2006	100ml	toto		n				
3/29/2006	20ml	2		n	10	53	53	26
3/23/2000	20ml	2			10	55	55	20
3/29/2006	50mi	8	_	n	16			
3/29/2006	100ml	53	1	У	53			
4/13/2006	20ml	nd		n		28.19574		
4/13/2006	50ml	nd		n				
4/13/2006	100ml	nd		n				
5/2/2006	20ml	0		n	0	15	15	٩
5/2/2000	20ml	0	4		10	10	15	3
5/2/2000	50111	0	-		12			
5/2/2006	100ml	15	5	У	15			
5/11/2006	20ml	0		n	0	15	0	0
5/11/2006	50ml	0		n	0			
5/11/2006	100ml	0	1	n	0			
E/22/2006	20ml	nd			0		15	21
5/22/2000	20111	10			90		15	21
5/22/2006	50mi	13		n	26			
5/22/2006	100ml	15	2	n	15			
6/12/2006	20ml	18		n	90	65.87868	66	74
6/12/2006	50ml	35		v	70			
6/12/2006	100ml	62	5	v	62			
Chester Cre	ok	EC plate count (ther Bacteria	,	Countable	geometric	countable	all counted
Dete		Fo plate could C	Juliel Dacteria		Countable	yeometric mean fa/100ml		
Date	UL-2				FC/100mi	mean tc/100mi	Ave. FC/100mi	Ave FC/100mi
7/14/2005	20ml	5	0	n	25	73.3178	28	19
7/14/2005	50ml	3	0	n	6			
7/14/2005	100ml	28	0	v	28			
					-			
7/19/2005	20ml	3	0	'n	15	77 37876	86	40
7/19/2005	20ml	3	0	'n	15	77.37876	86	40
7/19/2005 7/19/2005 7/19/2005	20ml 50ml	3 43	0 0	n y	15 86	77.37876	86	40
7/19/2005 7/19/2005 7/19/2005	20ml 50ml 100ml	3 43 18	0 0 0	n y n	15 86 18	77.37876	86	40
7/19/2005 7/19/2005 7/19/2005 8/3/2005	20ml 50ml 100ml 20ml	3 43 18 25	0 0 0 1	n y n y	15 86 18 125	77.37876 99.76719	86	40 100
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005	20ml 50ml 100ml 20ml 50ml	3 43 18 25 48	0 0 0 1	n y n y y	15 86 18 125 96	77.37876 99.76719	86 111	40 100
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005	20ml 50ml 100ml 20ml 50ml 100ml	3 43 18 25 48 tntc	0 0 0 1	n y n y y n	15 86 18 125 96 80	77.37876 99.76719	86 111	40 100
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/3/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml	3 43 18 25 48 tntc 0	0 0 1	n y n y n n	15 86 18 125 96 80 0	77.37876 99.76719 65.18262	86 111 96	40 100 32
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml	3 43 18 25 48 tntc 0 48	0 0 1	n y n y y n n	15 86 18 125 96 80 0 96	77.37876 99.76719 65.18262	86 111 96	40 100 32
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48	0 0 1 0 0	n y n y n y y	15 86 18 125 96 80 0 96	77.37876 99.76719 65.18262	86 111 96	40 100 32
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml	3 43 18 25 48 tntc 0 48 1	0 0 1 0 0 0	n y n y n y n y n	15 86 18 125 96 80 0 96 1	77.37876 99.76719 65.18262	86 111 96	40 100 32
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml	3 43 18 25 48 tntc 0 48 1 3	0 0 1 0 0 0 0	n y n y y n y n n y n n	15 86 18 125 96 80 0 96 96 1 15	77.37876 99.76719 65.18262 58.05836	86 111 96 15	40 100 32 8
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 3	0 0 1 0 0 0 0 0	n yn yy n y n n n n	15 86 18 125 96 80 0 96 1 15 6	77.37876 99.76719 65.18262 58.05836	86 111 96 15	40 100 32 8
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005	20mi 50mi 100mi 20mi 50mi 20mi 50mi 100mi 20mi 50mi 100mi	3 43 18 25 48 tntc 0 48 1 3 3 2	0 0 1 0 0 0 0 0 0	n yn yyn n yn n n n n	15 86 18 125 96 80 0 96 1 15 6 2	77.37876 99.76719 65.18262 58.05836	86 111 96 15	40 100 32 8
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005	20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi	3 43 18 25 48 tntc 0 48 1 3 3 2 20	0 0 1 0 0 0 0 0 0 0	, , , , , , , , , , , , , , , , , , ,	15 86 18 125 96 80 0 96 1 15 6 2 100	77.37876 99.76719 65.18262 58.05836 48.42681	86 111 96 15 73	40 100 32 8 73
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 3 2 20 26	0 0 1 0 0 0 0 0 0 0 0 0	, n	15 86 18 125 96 80 0 96 1 15 6 2 100 52	77.37876 99.76719 65.18262 58.05836 48.42681	86 111 96 15 73	40 100 32 8 73
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68	0 0 1 0 0 0 0 0 0 0 0 0 0	, n y n y y n n y n n n y y y	15 86 18 125 96 80 0 96 1 15 6 2 100 52	77.37876 99.76719 65.18262 58.05836 48.42681	86 111 96 15 73	40 100 32 8 73
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 20 26 68	0 0 1 0 0 0 0 0 0 0 0 0 0 1 3	, n y n y y n n y n n n y y y	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 85	77.37876 99.76719 65.18262 58.05836 48.42681	86 111 96 15 73	40 100 32 8 73
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/23/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 3	0 0 1 0 0 0 0 0 0 0 0 0 0 1 3 1	, n y n y y n n y n n n y y y n	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 15	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086	86 111 96 15 73 30	40 100 32 8 73 28
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005 8/16/2005 8/16/2005 8/23/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 50ml 50ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20	0 0 1 0 0 0 0 0 0 0 0 0 1 3 1 1	, n y n y y n n y n n n y y y n y	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 15 40 40	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086	86 111 96 15 73 30	40 100 32 8 73 28
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 20	0 0 1 0 0 0 0 0 0 0 0 0 0 1 3 1 1 0	, n y n y y n n y n n n n y y y n y y	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 15 40 20	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086	86 111 96 15 73 30	40 100 32 8 73 28
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 20 4	0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 3 1 1 0 0 0	,	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 15 40 20 20 20 20	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 51.1086	86 111 96 15 73 30 23	40 100 32 8 73 28 15
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 20 20 4 1	0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 3 1 1 1 0 0 2	, n y n y y n n y n n n y y y n y y n n	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 15 40 20 20 2	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 51.1086	86 111 96 15 73 30 23	40 100 32 8 73 28 15
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005 8/29/2005	20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml 100ml 20ml 50ml	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 26 68 3 20 20 4 1 23	0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 3 1 1 0 0 0 2 1	, ח	15 86 18 125 96 80 0 96 1 15 6 2 100 52 68 15 40 20 20 2 2 3	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 51.1086	86 111 96 15 73 30 23	40 100 32 8 73 28 15
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7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005 8/29/2005 8/29/2005 9/13/2005 9/13/2005 9/13/2005 9/13/2005 9/20/2005 9/20/2005 9/20/2005 10/4/2005 10/4/2005 10/11/2005 10/11/2005 10/18/2005	20mi 50mi 100mi 20mi 50mi 20mi 20mi 50mi 20mi 20mi 20mi 20mi 20mi 20mi 20mi 2	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 20 4 1 23 28 95 169 1 9 35 169 1 9 35 169 1 9 35 18 77 2 0 5 0 2 5 5 12 13	0 0 0 0 0 0 0 0 0 0 0 0 1 3 1 1 0 0 2 1	, ח	$\begin{array}{c} 15\\ 86\\ 18\\ 125\\ 96\\ 80\\ 0\\ 96\\ 1\\ 15\\ 6\\ 2\\ 100\\ 52\\ 68\\ 15\\ 40\\ 20\\ 20\\ 2\\ 23\\ 140\\ 190\\ 169\\ 5\\ 18\\ 35\\ 90\\ 154\\ 10\\ 0\\ 5\\ 0\\ 4\\ 5\\ 25\\ 24\\ 13\\ \end{array}$	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 51.1086 64.54479 91.0414 73.41662	86 111 96 15 73 30 23 140 95 5 5 13	40 100 32 8 73 28 15 166 60 5 3 21
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005 8/29/2005 8/29/2005 9/13/2005 9/13/2005 9/13/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 10/4/2005 10/4/2005 10/11/2005 10/11/2005 10/18/2005	20mi 50mi 100mi 20mi 20mi 50mi 20mi 20mi 20mi 20mi 20mi 20mi 20mi 2	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 26 68 3 20 20 4 1 23 28 95 169 1 9 5 169 1 9 5 18 77 2 0 5 5 5 5 12 13 0	0 0 0 1 0 0 0 0 0 0 0 1 3 1 1 0 0 2 1	, ח	$\begin{array}{c} 15\\ 86\\ 18\\ 125\\ 96\\ 80\\ 0\\ 96\\ 1\\ 15\\ 6\\ 2\\ 100\\ 52\\ 68\\ 15\\ 40\\ 20\\ 20\\ 2\\ 23\\ 140\\ 190\\ 169\\ 5\\ 18\\ 35\\ 90\\ 154\\ 10\\ 0\\ 5\\ 0\\ 4\\ 5\\ 25\\ 24\\ 13\\ 0\\ \end{array}$	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 64.54479 91.0414 73.41662	86 111 96 15 73 30 23 140 95 5 5 5 5 13 0	40 100 32 8 73 28 15 166 60 5 3 21 0
7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005 8/29/2005 9/13/2005 9/13/2005 9/13/2005 9/13/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 10/4/2005 10/4/2005 10/11/2005 10/11/2005 10/18/2005 10/18/2005	20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi 100mi 20mi 50mi	3 43 18 25 48 tntc 0 48 1 3 3 20 20 26 68 3 20 20 4 1 23 28 95 169 1 9 35 18 77 2 0 5 0 2 5 5 12 13 0 0	0 0 0 0 0 0 0 0 0 0 1 3 1 1 0 0 2 1	, ח אַר אַאַר ט אַר עיש אַר עיש אַאַר אַאַר אַאַר אַאַר אַר אַר אַר אַר	$\begin{array}{c} 15\\ 86\\ 18\\ 125\\ 96\\ 80\\ 0\\ 96\\ 1\\ 15\\ 6\\ 2\\ 100\\ 52\\ 68\\ 15\\ 40\\ 20\\ 20\\ 2\\ 23\\ 140\\ 190\\ 169\\ 5\\ 18\\ 35\\ 90\\ 154\\ 10\\ 0\\ 5\\ 0\\ 4\\ 5\\ 25\\ 24\\ 13\\ 0\\ 0\end{array}$	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 64.54479 91.0414 73.41662	86 111 96 15 73 30 23 140 95 5 5 5 13 0	40 100 32 8 73 28 15 166 60 5 3 21 0
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7/19/2005 7/19/2005 7/19/2005 8/3/2005 8/3/2005 8/3/2005 8/9/2005 8/9/2005 8/14/2005 8/14/2005 8/14/2005 8/14/2005 8/16/2005 8/16/2005 8/23/2005 8/23/2005 8/23/2005 8/23/2005 8/29/2005 8/29/2005 9/13/2005 9/13/2005 9/13/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 9/20/2005 10/4/2005 10/4/2005 10/11/2005 10/11/2005 10/18/2005 10/18/2005 10/18/2005	20mi 50mi 100mi 20mi 100mi 20mi 100mi 20mi 100mi 20mi 100mi 20mi 100mi 20mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 100mi 1	3 43 18 25 48 tntc 0 48 1 3 3 2 20 26 68 3 20 20 4 1 23 28 95 169 1 9 5 169 1 9 5 169 1 9 5 5 5 5 12 13 0 0 0	0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	, n y n y y n n y n n y n n y n n y n n y y n n y y n n y y n n y y n	$\begin{array}{c} 15\\ 86\\ 18\\ 125\\ 96\\ 80\\ 0\\ 96\\ 1\\ 15\\ 6\\ 2\\ 100\\ 52\\ 68\\ 15\\ 40\\ 20\\ 20\\ 2\\ 23\\ 140\\ 190\\ 169\\ 5\\ 18\\ 35\\ 90\\ 154\\ 10\\ 0\\ 5\\ 25\\ 24\\ 13\\ 0\\ 0\end{array}$	77.37876 99.76719 65.18262 58.05836 48.42681 51.1086 64.54479 91.0414 73.41662	86 111 96 15 73 30 23 140 95 5 5 5 5 13 0 Final Repo	40 100 32 8 73 28 15 166 60 5 3 21 0 xrt

10/25/2005	100ml	0		n	0		6	2
11/1/2005	50ml	3		n	6		0	2
11/1/2005	100ml	1		n	1			
11/8/2005	20ml	1		n	5		4	3
11/8/2005	50mi 100ml	0		n	0			
11/15/2005	20ml	3		n	15		6	9
11/15/2005	50ml	3		n	6			
11/15/2005	100ml	6	-	n	6	00 00075		
11/22/2005	20ml	25 56	/ 10	У	125	93.82675	99	99
11/22/2005	100ml	59	16	y V	59			
11/29/2005	20ml	3		'n	15		7	11
11/29/2005	50ml	5	7	n	10			
11/29/2005	100ml	7	1	n	/		0	2
12/6/2005	50ml	4	2	n	8		0	5
12/6/2005	100ml	2	2	n	2			
12/8/2005	20ml	0		n	0		0	0
12/8/2005	50ml	0		n	0			
12/0/2005	20ml	5		n	25	50 7937	51.5	43
12/13/2005	50ml	30	10	y	60	0011001	0110	10
12/13/2005	100ml	43	7	ý	43			
12/20/2005	20ml	0		n	0	50.7937	7	6
12/20/2005	50mi	5 7	6	n	10			
12/27/2005	20ml	,	0	n	,			
12/27/2005	50ml			n				
12/27/2005	100ml			n	_		2	0
1/17/2006	20mi 50ml	1		n	5		2	3
1/17/2006	100ml	2		n	2			
1/31/2006	20ml	5		n	25		25	11
1/31/2006	50ml	3	1	n	6			
1/31/2006	100ml 20ml	1	2	n	1		2	1
2/7/2006	50ml	0	1	n	0		2	
2/7/2006	100ml	2	0	n	2			
2/14/2006	20ml	0		n	0		3	2
2/14/2006	50ml	2	1	n	4			
3/15/2006	20ml	0	3	n	0		1	1
3/15/2006	50ml	0	6	n	0			
3/15/2006	100ml	1	10	n	1			
3/29/2006	20ml	2	2	n	10	28.98275	31	34
3/29/2006	100ml	20	2	y V	40 21			
4/13/2006	20ml	nd		'n	0	28.98275	0	
4/13/2006	50ml	nd		n	0			
4/13/2006	100ml	nd		n	0		2	1
5/2/2006	50ml	0		n	0		2	1
5/2/2006	100ml	2		n	2			
5/11/2006	20ml	0		n	0		0	0
5/11/2006	50ml	0	4	n	0			
5/22/2006	20ml	nd	2	n	0		3	3.5
5/22/2006	50ml	2		n	4			
5/22/2006	100ml	3	0	n	3	47	47	
6/12/2006	20mi 50ml	2	0	n	10	17	17	14
6/12/2006	100ml	17	5	v	17			
Chester	Creek	FC plate count	Other Bacteria	Countable	Geome	tric	countable	all counted
Date	UL-S1				mean fc/100ml	FC/100ml	Ave. FC/100ml	Ave FC/100ml
7/14/2005	20ml	nd						
7/14/2005	50ml	nd						
7/14/2005	100ml	nd	-					
7/19/2005	20ml	13	56	У		65	65	102
7/19/2005	50mi 100ml	thto		n n		80		
8/3/2005	20ml	nd						
8/3/2005	50ml	nd						
8/3/2005	100ml	nd						
	20	54						
8/9/2005	20ml	nd nd						
8/9/2005 8/9/2005 8/9/2005	20ml 50ml 100ml	nd nd nd						
8/9/2005 8/9/2005 8/9/2005 8/14/2005	20ml 50ml 100ml 20ml	nd nd nd nd						

8/14/2005	100ml	nd					
8/16/2005	20ml	nd					
8/16/2005	50ml	nd					
8/16/2005	100ml	nd					
8/23/2005	20ml	nd					
8/23/2005	50ml	nd					
8/23/2005	100ml	nd					
8/29/2005	20mi 50ml	na					
8/29/2005	50mi	nd					
0/29/2005	100ml	thu		n	800	800	800
9/13/2005	20ml	thtc		n	000	000	000
9/13/2005	50ml	tntc		n			
9/20/2005	20ml			n		nd	
9/20/2005	50ml			n			
9/20/2005	100ml			n			
9/20/2005	20ml			n			
9/20/2005	50ml			n			
10/4/2005	20ml			n		nd	
10/4/2005	50ml			n			
10/4/2005	100ml			n			
10/11/2005	20ml			n		nd	
10/11/2005	50ml			n			
10/11/2005	100ml			n			
10/18/2005	20ml	87	2	n	435	435	435
10/18/2005	50ml	tntc		n			
10/18/2005	100ml	179	1	n	179		
10/25/2005	20ml	22		У	110	109	100.3333
10/25/2005	50ml	58	_	У	108		
10/25/2005	100ml	83	5	n	83		
11/1/2005	20ml			n		nd	
11/1/2005	50mi			n			
11/1/2005	100mi	0		n	0	0	0
11/0/2005	20ml	0		n	0	0	0
11/8/2005	100ml	0		n	0		
11/0/2005	20ml	0		n	0	0	0
11/15/2005	50ml	0		n	0	0	0
11/15/2005	100ml	0		n	0		
11/22/2005	20ml	6	3	n	30	18	17
11/22/2005	50ml	2	Õ	n	4		
11/22/2005	100ml	18	5	v	18		
11/29/2005	20ml	2	3	'n	10	6	6
11/29/2005	50ml	3	1	n	6		
11/29/2005	100ml	1		n	1		
12/6/2005	20ml	0		n	0	1	1
12/6/2005	50ml	1		n	2		
12/6/2005	100ml	1		n	1		
12/8/2005	20ml	tntc		n	400	400	400
12/8/2005	50ml	tntc		n			
12/8/2005	100ml	tntc		n			
12/13/2005	20ml	0		n	0	0	0
12/13/2005	50mi	0		n	0		
12/13/2005	20ml	U		n	0	400	400
12/20/2005	20ml	thto		n		400	400
12/20/2005	100ml	thto		n			
12/27/2005	20ml	nd		n			
12/27/2005	50ml	nd		n			
12/27/2005	100ml	nd		n			
1/17/2006	20ml	nd		n			
1/17/2006	50ml	nd		n			
1/17/2006	100ml	nd		n			
1/31/2006	20ml	nd		n			
1/31/2006	50ml	nd		n			
1/31/2006	100ml	nd		n			
2/7/2006	20ml	0		n	0	0	0
2/7/2006	50ml	0	3	n	0		
2/7/2006	100ml	0		n	0		
2/14/2006	20ml	0		n	0	1	1
2/14/2006	50ml	0		n	0		
2/14/2006	100ml	1		n	0		
3/15/2006	20ml	nd		n			
3/15/2006	50ml	nd		n			
3/13/2000	100ml	10	4	п 	1/5	115	220
3/29/2000 3/20/2006	∠0IIII 50ml	29 1/7	2	у	140 20/	140	220
3/20/2000	100ml	toto	3	n	234		
JIZYIZUUO 1/13/2006	20ml	nd		n			
4/13/2006	50ml	nd		n			
4/13/2006	100ml	nd		n			

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5/2/2006	20ml	0		n	()	0	0
5/2/2006	50ml	0		n	0)		
5/2/2006	100ml	0		n	()		
5/11/2006	20ml	0		n	0	1	0	0
5/11/2006	50ml	0		n	0)		
5/11/2006	100ml	0		n	0)		
5/22/2006	20ml	nd		n				
5/22/2006	50ml	nd		n				
5/22/2006	100ml	nd		n				
6/12/2006	20ml	1		n	5		4	4
6/12/2006	50ml	2		n	2			
6/12/2006	100ml	4	1	n	4	Ļ		

Appendix 2: Calculating the Probability of Attaining FC/100ml during Summer and Winter Season (Novotny, 2002)

kUL-1 all co	unted plates				UL-2 all cou	unted plates				UL-SD all cour	nted plates	5		
		m	n=18, sample	S				n=18 sample	S				n=6	
Ave.FC/100)ml log(ave) N	∕l= rar	nk p(m*100/n+1) 1-р	Ave FC/100)ml log(ave) N	∕l=rar	nkp(m*100/n+1) 1-p	Ave FC/100ml	log(ave)	M=ranl	<p(m*100 n+1)<="" td=""><td>1-р</td></p(m*100>	1-р
73	1.863323	14	73.68421	26.31579	9 19	1.278754	10	52.63158	47.36842		0()		,	
183	2.262451	17	89.47368	10.52632	2 40	1.60206	14	73.68421	26.31579	102	2.0086	4	57.14286	42.85714
49	1.690196	10	52.63158	47.36842	2 100	2	17	89.47368	10.52632					
74	1.869232	15	78.94737	21.05263	3 32	1.50515	13	68.42105	31.57895					
355	2.550228	18	94.73684	5.263158	8 8	0.90309	7	36.84211	63.15789					
5	0.69897	2	10.52632	89.47368	3 73	1.863323	16	84.21053	15.78947					
66	1.819544	11	57.89474	42.10526	5 28	1.447158	12	63.15789	36.84211					
33	1.518514	9	47.36842	52.63158	3 15	1.176091	9	47.36842	52.63158					
73	1.863323	13	68.42105	31.57895	5 166	2.220108	18	94.73684	5.263158	800	2.90309	6	85.71429	14.28571
69.4	1.841359	12	63.15789	36.84211	60	1.778151	15	78.94737	21.05263					
8	0.90309	3	15.78947	84.21053	3 5	0.69897	6	31.57895	68.42105					
26	1.414973	7	36.84211	63.15789) 3	0.477121	4	21.05263	78.94737					
13	1.113943	5	26.31579	73.68421	21	1.322219	11	57.89474	42.10526	435	2.638489	5	71.42857	28.57143
12	1.079181	4	21.05263	78.94737	0	#NUM!	1	5.263158	94.73684	100.3333	2.001445	3	42.85714	57.14286
28	1.447158	8	42.10526	57.89474	2	0.30103	3	15.78947	84.21053					
0	#NUM!	1	5.263158	94.73684	0	#NUM!	1	5.263158	94.73684	0		1	14.28571	85.71429
21	1.322219	6	31.57895	68.42105	5 3.5	0.544068	5	26.31579	73.68421					
74	1.869232	16	84.21053	15.78947	7 14	1.146128	8	42.10526	57.89474	4	0.60206	2	28.57143	71.42857
ul1			n=15		ul2			n=15		Uls			n=12	
Ave FC/100)ml log(ave) M	∕l=rar	k p(m*100/n+1) 1-р	Ave FC/100)ml log(ave) M	∕l=rar	nkp(m*100/n+1) 1-р	Ave FC/100ml	log(ave)	M=ranl	<pre><p(m*100 n+1)<="" pre=""></p(m*100></pre>	1-p
119	2.075547	13	81.25	18.75	3	0.477121	6	37.5	62.5	0		1	7.692308	92.30769
193	2.285557	14	87.5	12.5	9	0.954243	10	62.5	37.5	0		1	7.692308	92.30769
69	1.838849	11	68.75	31.25	99	1.995635	15	93.75	6.25	17	1.230449	9	69.23077	30.76923
51	1.70757	9	56.25	43.75	11	1.041393	11	68.75	31.25	6	0.778151	8	61.53846	38.46154
82	1.913814	12	75	25	3	0.477121	6	37.5	62.5	1	0	6	46.15385	53.84615
	kUL-1 all co Ave.FC/100 73 183 49 74 355 5 66 33 73 69.4 8 26 13 12 28 0 21 74 8 0 21 74 ul1 Ave FC/100 119 193 69 51 82	Ave.FC/100ml log(ave) N 73 1.863323 183 2.262451 49 1.690196 74 1.869232 355 2.550228 5 0.69897 66 1.819544 33 1.518514 73 1.863323 69.4 1.841359 8 0.90309 26 1.414973 13 1.113943 12 1.079181 28 1.447158 0 #NUM! 21 1.322219 74 1.869232 ul1 Ave FC/100ml log(ave) N 119 2.075547 193 2.285557 69 1.838849 51 1.70757 82 1.913814	kUL-1 all counted plates Ave.FC/100ml log(ave) M= rar 73 1.863323 14 183 2.262451 17 49 1.690196 10 74 1.869232 15 355 2.550228 18 5 0.69897 2 66 1.819544 11 33 1.518514 9 73 1.863323 13 69.4 1.841359 12 8 0.90309 3 26 1.414973 7 13 1.113943 5 12 1.079181 4 28 1.447158 8 0 #NUM! 1 21 1.322219 6 74 1.869232 16 ul1 Ave FC/100ml log(ave) M=ran 119 2.075547 13 193 2.285557 14 69 1.838849 11 51 1.70757 9 82 1.913814 12	kUL-1 all counted plates m n=18, sample Ave.FC/100ml log(ave) M= rank p(m*100/n+1 73 1.863323 14 73.68421 183 2.262451 17 89.47368 49 1.690196 10 52.63158 74 1.869232 15 78.94737 355 2.550228 18 94.73684 5 0.69897 2 10.52632 66 1.819544 11 57.89474 33 1.518514 9 47.36842 73 1.863323 13 68.42105 69.4 1.841359 12 63.15789 8 0.90309 3 15.78947 26 1.414973 7 36.84211 13 1.113943 5 26.31579 12 1.079181 4 21.05263 28 1.447158 8 42.10526 0 #NUM! 1 5.263158 21 1.322219 6 31.57895 74 1.869232 16 84.21053 ul1 n=15 Ave FC/100ml log(ave) M=rank p(m*100/n+1 119 2.075547 13 81.25 193 2.285557 14 87.5 69 1.838849 11 68.75 51 1.70757 9 56.25 82 1.913814 12 75	m n=18, samples Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p 73 1.863323 14 73.68421 26.31579 183 2.262451 17 89.47368 10.52632 49 1.690196 10 52.63158 47.36842 74 1.869232 15 78.94737 21.052632 355 2.550228 18 94.73684 5.263158 5 0.69897 2 10.52632 89.47368 66 1.819544 11 57.89474 42.10526 33 1.518514 9 47.36842 52.63158 73 1.863323 13 68.42105 31.57896 66 1.819544 11 57.8947 84.21052 69.4 1.841359 12 63.15789 36.84211 8 0.90309 3 15.78947 84.21053 12 1.079181 4 21.05263 78.94737 28 1.447158 8 42.10526 57.8947 0 #NUM! 1 5.263158	UL-2 all col m n=18, samples Ave.FC/100ml log(ave) M= rank $p(m^*100/n+1)$ 1-p Ave FC/100 73 1.863323 14 73.68421 26.31579 19 183 2.262451 17 89.47368 10.52632 40 49 1.690196 10 52.63158 47.36842 100 74 1.869232 15 78.94737 21.05263 32 355 2.550228 18 94.73684 5.263158 8 5 0.69897 2 10.52632 89.47368 73 66 1.819544 11 57.89474 42.10526 28 33 1.518514 9 47.36842 52.63158 15 73 1.863323 13 68.42105 31.57895 166 69.4 1.841359 12 63.15789 36.84211 60 8 0.90309 3 15.78947 84.21053 5 26 1.414973 7 36.84211 63.15789 3 13 1.1324	kUL-1 all counted plates UL-2 all counted plates m n=18, samples Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M 73 1.863323 14 73.68421 26.31579 19 1.278754 183 2.262451 17 89.47368 10.52632 40 1.60206 49 1.690196 10 52.63158 47.36842 100 2 74 1.869232 15 78.94737 21.05263 32 1.50515 355 2.550228 18 94.73684 5.263158 8 0.90309 5 0.69897 2 10.52632 89.47368 73 1.863323 66 1.819544 11 57.89474 42.10526 28 1.447158 33 1.518514 9 47.36842 52.63158 15 1.176091 73 1.863323 13 68.42105 31.57895 166 2.220108 69.4 1.841359 12 63.1578	kUL-1 all counted plates UL-2 all counted plates m n=18, samples Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank 73 1.863323 14 73.68421 26.31579 19 1.278754 10 183 2.262451 17 89.47368 10.52632 40 1.60206 14 49 1.690196 10 52.63158 47.36842 100 2 17 74 1.869232 15 78.94737 21.05263 32 1.50515 13 355 2.550228 18 94.73684 5.263158 8 0.90309 7 5 0.69897 2 10.52632 89.47368 73 1.863323 16 66 1.819544 11 57.89474 42.10526 28 1.447158 12 33 1.518514 9 47.36842 52.63158 15 1.176091 9 73 1.86323 13 68.42105 31.57	kUL-1 all counted plates n =18, samples n=18 sample Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1 5 6.6 1.819544 11 57.89474 42.10526 28 1.447158 12 63.15789 3 1.518514 9 47.36842 52.63158 15 1.76091 9 47.36842 66 1.819544 11 57	UL-2 all counted plates n =18 samples n =18 samples Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1-p 73 1.863323 14 73.68421 26.31579 19 1.278754 10 52.63158 47.36842 183 2.262451 17 89.47368 10.52632 40 1.60026 14 73.68421 26.31579 49 1.690196 10 52.63158 47.36842 100 2 17 89.47368 10.52633 5 0.69897 2 10.52632 89.47368 5 1.663323 16 84.2105 31.578947 66 1.819544 11 57.89474 42.10526 28 1.447158 12 63.15789 36.84211 60 1.778151 15 78.94737 21.05263 69.4 1.814359 12 63.15789 3 0.477121 4 21.05263 58.42105	KUL-1 all counted plates UL-2 all counted plates In=18 samples In=18 samples Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1-p Ave FC/100ml 73 1.863323 14 73.68421 26.31579 19 1.278754 10 52.63158 47.36842 26.31579 102 49 1.690196 10 52.63158 47.36842 26.3158 8 0.90309 7 36.84211 63.15789 36.84211 63.15789 38.84211 53.55 2.50328 13 68.42105 31.57895 166 2.20108 18 94.73684 5.263158 800 73 1.863323 13 68.42105 31.57895 166 2.220108 18 94.73684 5.263158 800 73 1.863323	kUL-1 all counted plates UL-2 all counted plates UL-2 all counted plates UL-SD all counted plates UL-SD all counted plates Ave.FC/100ml log(ave) M= rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank p(m*10	kUL-1 all counted plates UL-2 all counted plates UL-3 all counted plates UL-SD all counted plates Ave, FC/100ml log(ave) M = rank p(m*100/n+1) n = n=18, samples n=18 samples n=18 samples Ave, FC/100ml log(ave) M = rank p(m*100/n+1) 1/2 N = Rank p(m*100/n+1) 1/p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1/p 1/p Ave FC/100ml log(ave) M=rank p(m*10/n+1) 1/p 1/p Ave FC/100ml log(ave) M=rank p(m*10/n+1) 1/p 1/p Ave FC/100ml log(ave) M=rank p(m*10/n+1) 1/p 1/p <	kull-1 all counted plates UL-2 all counted plates n=18, samples n=18 n=18 n=18 n=16 Ave,FC/100ml log(ave) M=rank p(m*100/n+1) 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1-p 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1-p 1-p Ave FC/100ml log(ave) M=rank p(m*100/n+1) 1-p <td< td=""></td<>

12/8/2005	27	1.431364	5	31.25	68.75	0	#NUM!	1	6.25	93.75	400	2.60206	11	84.61538	15.38462
12/13/2005	49	1.690196	8	50	50	43	1.633468	14	87.5	12.5	0		1	7.692308	92.30769
12/20/2005	37	1.568202	6	37.5	62.5	6	0.778151	9	56.25	43.75	400	2.60206	11	84.61538	15.38462
1/17/2006	37	1.568202	6	37.5	62.5	3	0.477121	6	37.5	62.5				0	100
1/31/2006	195	2.290035	15	93.75	6.25	11	1.041393	11	68.75	31.25				0	100
2/7/2006	53	1.724276	10	62.5	37.5	1	0	2	12.5	87.5	0		1	7.692308	92.30769
2/14/2006	28	1.447158	4	25	75	2	0.30103	5	31.25	68.75	1	0	6	46.15385	53.84615
3/15/2006	1	0	1	6.25	93.75	1	0	2	12.5	87.5				0	100
3/29/2006	26	1.414973	3	18.75	81.25	34	1.531479	13	81.25	18.75	220	2.342423	10	76.92308	23.07692
5/2/2006	9	0.954243	2	12.5	87.5	1	0	2	12.5	87.5	0		1	7.692308	92.30769

Appendix 3: Statistical analysis of all counted plates by season

Analysis of variance via use of the F-test was conducted on data to determine proper Student t-test to employ for testing population differences. The variance of concentrations comparisons in which population variances that are not equal are noted in bold. T-test determination of populations that are not equal are highlighted. All tests were conducted at the α =.05

	UL-2 summer	UL-2 winter		UL-2 summer	UL-2 winter
Mean	36.07692	12.7451	Mean	36.07692308	12.7451
Variance	2407.367	665.5137	Variance	2407.366516	665.5137
Observations	52	51	Observations	52	51
Df	51	50	Hypothesized Mean Dif	ference0	
F	3.617306		df	78	
P(F<=f) one-tail	5.58E-06		t Stat	3.028707833	
F Critical one-tail	1.596737		P(T<=t) one-tail	0.001664597	
			t Critical one-tail	1.664625415	
			P(T<=t) two-tail	0.003329195	
			t Critical two-tail	1.990847522	
F-Test Two-Sample	ofor Variances		t-Test: Two-Sample As	suming Equal Variances	
F-Test Two-Sample	e for Variances		t-Test: Two-Sample As	suming Equal Variances	
F-Test Two-Sample	e for Variances	ul-2 36.07602	t-Test: Two-Sample Ass summer	Suming Equal Variances	UL-2 36.07692
F-Test Two-Sample summer Mean Variance	e for Variances <u>ul-1</u> 54.13462 3560 276	<i>ul-2</i> 36.07692 2407 367	t-Test: Two-Sample Ass <u>summer</u> Mean Variance	Suming Equal Variances UL-1 54.13461538 3560 275641	<u>UL-2</u> 36.07692 2407 367
F-Test Two-Sample summer Mean Variance Observations	e for Variances <u>ul-1</u> 54.13462 3560.276 52	<i>ul-2</i> 36.07692 2407.367 52	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations	uming Equal Variances <u>UL-1</u> 54.13461538 3560.275641 52	<u>UL-2</u> 36.07692 2407.367 52
F-Test Two-Sample summer Mean Variance Observations	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass summer Mean Variance Observations Pooled Variance	<i>UL-1</i> 54.13461538 3560.275641 52 2983 821078	<i>UL-2</i> 36.07692 2407.367 52
F-Test Two-Sample summer Mean Variance Observations Df	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51 1.478909	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations Pooled Variance Hypothesized Mean Dif	Suming Equal Variances UL-1 54.13461538 3560.275641 52 2983.821078 ference0	UL-2 36.07692 2407.367 52
F-Test Two-Sample summer Mean Variance Observations Df F P(F<=f) one-tail	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51 1.478909 0.082869	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations Pooled Variance Hypothesized Mean Dif df	Suming Equal Variances UL-1 54.13461538 3560.275641 52 2983.821078 ference0 102	<u>UL-2</u> 36.07692 2407.367 52
F-Test Two-Sample <u>summer</u> Mean Variance Observations Df F P(F<=f) one-tail F Critical one-tail	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51 1.478909 0.082869 1.591971	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations Pooled Variance Hypothesized Mean Dif df t Stat	Suming Equal Variances UL-1 54.13461538 3560.275641 52 2983.821078 ference0 102 1.685631094	<u>UL-2</u> 36.07692 2407.367 52
F-Test Two-Sample <u>summer</u> Mean Variance Observations Df F P(F<=f) one-tail F Critical one-tail	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51 1.478909 0.082869 1.591971	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations Pooled Variance Hypothesized Mean Dif df t Stat P(T<=t) one-tail	Suming Equal Variances UL-1 54.13461538 3560.275641 52 2983.821078 ference0 102 1.685631094 0.047461911	<u>UL-2</u> 36.07692 2407.367 52
F-Test Two-Sample <u>summer</u> Mean Variance Observations Df F P(F<=f) one-tail F Critical one-tail	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51 1.478909 0.082869 1.591971	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations Pooled Variance Hypothesized Mean Dif df t Stat P(T<=t) one-tail t Critical one-tail	UL-1 54.13461538 3560.275641 52 2983.821078 ference0 102 1.685631094 0.047461911 1.659930149	<u>UL-2</u> 36.07692 2407.367 52
F-Test Two-Sample <u>summer</u> Mean Variance Observations Df F P(F<=f) one-tail F Critical one-tail	e for Variances <u>ul-1</u> 54.13462 3560.276 52 51 1.478909 0.082869 1.591971	<i>ul-2</i> 36.07692 2407.367 52 51	t-Test: Two-Sample Ass <u>summer</u> Mean Variance Observations Pooled Variance Hypothesized Mean Dif df t Stat P(T<=t) one-tail t Critical one-tail P(T<=t) two-tail	UL-1 54.13461538 3560.275641 52 2983.821078 ference0 102 1.685631094 0.047461911 1.659930149 0.094923821	<u>UL-2</u> 36.07692 2407.367 52

t-Test: Two-Sample Assuming Unequal Variances

F-Test Two-Sample for Variances

F-Test Two-Sample for Variances

t-Test: Two-Sample Assuming Equal Variances

	UL-1 summer	UL-1 winter		UL-1 summer	UL-1 winter
Mean	54.13461538	54.62222222	Mean	54.13462	54.62222
Variance	3560.275641	2912.10404	Variance	3560.276	2912.104
Observations	52	45	Observations	52	45
Df	51	44	Pooled Variance	3260.07	
F	1.222578449		Hypothesized Mean Dif	ference0	
P(F<=f) one-tail	0.249019071		df	95	
F Critical one-tail	1.629828716		t Stat	-0.04194	
			P(T<=t) one-tail	0.483315	
			t Critical one-tail	1.661051	
			P(T<=t) two-tail	0.966631	
			t Critical two-tail	1.98525	

F-Test Two-Sample for Variances

t-Test: Two-Sample Assuming Unequal Variances

winter	ul-1	ul-2	Winter	UL-1	UL-2
Mean	54.62222222	12.74509804	Mean	54.62222	12.7451
Variance	2912.10404	665.5137255	Variance	2912.104	665.5137
Observations	45	51	Observations	45	51
Df	44	50	Hypothesized Mean Dif	ference0	
F	4.375723488		df	61	
P(F<=f) one-tail	4.90788E-07		t Stat	<mark>4.74888</mark>	
F Critical one-tail	1.618360557		P(T<=t) one-tail	6.41E-06	
			t Critical one-tail	1.670219	
			P(T<=t) two-tail	1.28E-05	
			t Critical two-tail	1.999624	

Appendix 4: University Lake Bathymetry data, Volume and Residence time calculations.

		GPS	position			GPS position			
Name, Local	Depth (ft)	East	North	Name, Local	Depth	East	North		
107A	10.7	349307	6786630	40A	4	349186	6786683		
109	10.9	349423	6786683	43	4.3	349263	6786744		
113	11.3	349616	6786744	44	4.4	349608	6786710		
124A	12.4	349261	6786644	45	4.5	349376	6786778		
128	12.8	349620	6786906	47	4.7	349676	6786786		
133A	13.3	349205	6786630	47A	4.7	349315	6786759		
16	16	349224	6786643	53	5.3	349369	6786661		
170	17	349574	6786834	54	5.4	349613	6786715		
174	17.4	349677	6786808	63A	6.3	349320	6786713		
180	18	349595	6786869	64	6.4	349343	6786676		
188	18.8	349608	6786818	67	6.7	349429	6786833		
194	19.4	349660	6786885	70	7	349418	6786731		
195A	19.5	349251	6786628	73	7.3	349387	6786830		
196	19.6	349556	6786792	75	7.5	349479	6786862		
20	2	349345	6786729	77	7.7	349540	6786910		
204	20.4	349650	6786824	82	8.2	349552	6786778		
205	20.5	349662	6786859	90A	9	349263	6786699		
21	2.1	349409	6786779	93A	9.3	349232	6786681		
212	21.2	349667	6786832	95	9.5	349512	6786791		
25	2.5	349501	6786837	96	9.6	349381	6786644		
30	3	349435	6786794	99	9.9	349292	6786805		
32	3.2	349442	6786821	39	3.9	349494	6786890		
38	3.8	349523	6786846						

Appendix 4 continued, volume and residence time calculations.

	Volume – Model type (CF output val	ue)	1) Inverse distance 4500000	2) Universal Krieging 5200000	3) Normal Krieging 7200000	Average Volume 5600000
Quartile	CFS cubic feet per second	CFD cubic feet per day	Resid	lence time		SD(y)
1	7.284	629337.6	7.2 days	8.3 days	11.4 days	2.226
2	10.194	880761.6	5.1 days	5.9 days	8.2 days	1.590
3	12.587	1087517	4.1 days	4.8 days	6.6 days	1.288
Standard De	eviation, SD(i)		1.537	1.776	2.460	ave sd(i,y), 1.81

Average Lake Volume: 5600000, divide by average CFD= Residence time of 6.8 +/- 1.8 day variance

Appendix 5 Whole lake sampling events, fecal coliform data.

The depths were not uniform from site to site nor date to date: A notes near surface, B notes mid water column, C notes near lake bottom.

	events	1			2	3	
		9/2/2	005	2/1	0/2006	5/23	3/2006
sample location		F	C/100n	nl	FC/100ml	Depth ft	FC/100ml
name		Depth ft		Depth ft			
NS11	а	1	*	2	0	1	0
	b	3	0	4	0	2	0
	С	5	40	5	0	3	0
NS12	а	1	*	2	0	2	0
	b	2	38	4	0		*
	С	4	28	5	0	5	10
NS13	а	1	13	3	2	2	*
	b	4	43	6	0	5	0
	С	8	50	9	0	10	0
NS14	а	1	23	3	0	2	0
	b	4	100	6	0	5	0
	С	8	78	9	0	8	1
NS21	а	1	105	2	0	2	0
	b	3	55	4	0	5	0
	С	5	198	8	0	8	0
NS22	а	1	40	2	0	2	0
	b	6	75	4	0	7	0
	С	12	40	8	0	12	0
NS23	а	1	43	5	0	2	0
	b	7	75	10	0	9	2
	С	14	70	15	0	16	0

NS24	а	1	15	5	0	2	0
	b	2	*	10	5	5	0
	С	4	103	15	0	nd	0
EW1	а	1	40	4	0	2	0
	b	7	53	10	0	10	0
	С	14	270	18	0	18	
EW2	а	1	92.5	1	0	2	0
	b	4	*	2	0	4	0
	С	6	75	4	0		0
EW3	а	1	40	2	0	2	0
	b	2	*	3	*	4	*
	С	3.4	*		*		*
EW4	а	1	90	2	0	2	0
	b	2	83	4	0	5	0
	С	3	67.5	6	0		*
	average		68.1		0.205882		0.433333

* No data was obtained from this depth.

Date	9/2/2005												
Transect	NS1-1												
Coordinates	61.18703												
	149.802												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
	234	7.68	5.3	1	1	7.55	143.6	12.4			nd		40
				2	3	7.56	140.6	12.3			0	0	40
				3	5	7.56	140.8	11.2			16	40	40

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Date Transect Coordinates	2/10/2006 NS1-1 61.18703 149.802												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		6.9		1	2	6.95	136.4			21	0	0	50
				2	4	6.94	132.2				0	0	20
				3	5	6.94	130.4	1.3	12		0	0	20
Date	5/23/2006												
Transect	NS1-1												
Coordinates	61.18703												
	149.802												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		7.5		1	2	8.34		12.6	13.6		0	0	50
				2	5	8.31		11.6	13.6		0	0	100
				3	7	8.25		nd	nd		0	0	50
Date Transect	9/2/2005 NS1-2												
Coordinates	61.18652												
	149.082												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100	ml Sample dilution
	150	4.92	3.5	1	1	7.94	143.4	12.5			nd		40
				2	2	7.98	142.5	12.3			15	38	40
				3	4	7.96	142.1	12			11	28	40

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Date Transect	2/10/2006 NS1-2												
Coordinates	61.18652												
	149.082												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml Sa	mple dilution
		6.9		1	2			0.8	12.78	20.5	0	0	50
				2	4	7.15	130.4	0.8	11.18		0	0	20
				3	5	7.14		1	13.32		0	0	20
Date	5/23/2006												
Transect	NS1-2												
Coordinates	61.18652												
	149.082												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml Sa	mple dilution
		5.4		1	2	8.27		12.8	13.6		0	0	50
				2									
				3	5	8.21		11.3	13.2		5	10	50
Date	9/2/2005												
Transect	NS1-3												
Coordinates	61.18557												
	149.8017												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO ma/l	Ice thickne	ss FC pla	te FC/100ml	Sample dilution
	373	12.25	5.4	1	1	7.81	143.5	12.2			5	12.5	40
				2	4	7.71	143.2	11.9			17	42.5	40
				3	8	7.61	132.1	11.4			20	50	40

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Date Transect Coordinates	2/10/2006 NS1-3 61.18557 149.8017												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice thickness	FC plate	FC/100ml S	ample dilution
		10		1	3	7.18	131.6	0.8	12.14	18	1	2	50
				2	6	7.19	132.8	0.8	11.76		0	0	20
				3	9	7.11	137.3	1.1	10.02		0	0	20
Date Transect Coordinates	5/23/2006 NS1-3 61.18557 149 8017												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO ma/l	Ice thickness	FC plate	EC/100ml S	ample dilution
		10.3		1	2	8.24		13	14.2		nd		50
				2	5	8.38		11.5	14.5		0	0	100
				3	10	8.24		10	15.1		0	0	50
Date Transect Coordinates	9/2/2005 NS1-4 5 61.18595 149.8015												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO ma/l	Ice Depth F	C plate	-C/100ml Sam	ple dilution
	335	11.00	5.9	1	1	7.8	145.9	12.5	0,1		9	23	40
				2	4	7.73	143.7	11.9			40	100	40
				3	8	7.57	134.7	11.3			31	78	40

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Date Transect Coordinates	2/10/2006 NS1-4 61.18595 149.8015												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
		11.2		1	3	7.24	132	0.6	12.06	22	0	0	50
				2	6	7.26					0	0	20
				3	9	7.2	135.8	1.8	8.73		0	0	20
Date	5/23/2006												
Transect	NS1-4												
Coordinates	61.18595												
	149.8015												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
	-	11		1	2	8.3		12.5	13.5	-	0	0	50
				2	5	8.39		11.6	14.7		0	0	100
				3	8	8.26		nd			1	1	100
Data	0/2/2005												
Transact	9/2/2005 NG2 1												
Coordinatos	61 19920												
Coordinates	140 7056												
	149.7900												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO ma/l	Ice Depth	FC plate	FC/100ml S	ample dilution
	221	7.26	5.5	1	1	7.43	142	12.1	_ • …g/i		42	105	40
		0	0.0	2	3	7.56	139	10.9			22	55	40
				3	5	7.79	138.6	10.5			_ <u>_</u> 79	198	40
				-	-								

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Date Transect Coordinates	2/10/2006 NS2-1 61.18839 149.7956												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
		10		1	2	7.45	130.6	0.8	12.6	19	0	0	50
				2	4	7.47	128.9				0	0	20
				3	8	7.26	139.7	1.4	7.2		0	0	20
Date	5/23/2006												
Transect	NS2-1												
Coordinates	61.18839												
	149.7956												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
		9.3		1	2	8.02		11.2	13.4		0	0	. 50
				2	5	7.9		10.1	13.4		0	0	100
				3	8	8.01		9.8	13.7		0	0	50
				-	-						-	-	
Date	9/2/2005												
Transect	NS2-2												
Coordinates	61.18839												
	149.7956												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
	500	16.41	6.2	1	1	7.72	144.4	11.7	-	-	16	40	40
				2	6	7.64	142.2	11			30	75	40
				3	12	7.57	136	11			16	40	40

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Date Transect Coordinates	2/10/2006 NS2-2 61.18839 149.7956												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
		9.9		1	2	7.42	128.7	0.9	12.56	15.5	0	0	50
				2	4	7.44	130.6				0	0	20
				3	8	7.48	130.9	1	11.84		0	0	20
Date Transect Coordinates	5/23/2006 NS2-2 61.18839 149.7956												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
		13		1	2	8.05		11.6	13.6		0	0	50
				2	7	8.01		10.1	13.8		0	0	100
				3	12	7.96		8.7	14.1		0	0	50
Date Transect Coordinates	9/2/2005 NS2-3 61.18739 149.7955												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	ample dilution
	593	19.47	7	1	1	7.6	144.5	12.9			17	43	40
				2	7	7.62	142.5	10.8			30	75	40
				3	14	7.6	141.5	10.3			28	70	40

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Date Transect Coordinates	2/10/2006 NS2-3 61.18739 149.7955												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		17.7		1	5	7.49		0.7	14.4	18	0	0	50
				2	10						0	0	20
				3	15	7.48		1	13.7		0	0	20
Date Transect Coordinates	5/23/2006 NS2-3 61.18739 149.7955												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
	•	17.9		1	2	8.02		11.7	13.5		0	0	. 50
				2	9	7.99		10.2	14.4		2	2	100
				3	16	7.95		7.9	11.6		0	0	50
Date Transect Coordinates	9-25 NS2-4												
	149.7952												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
	173	5.68	5.68	1	1	7.68	144.9	12.1			6	15	40
				2	2	7.62	144.9	12.1			nd		40
				3	4	7.63	141.1	11			41	103	40

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Date Transect Coordinates	2/10/2006 NS2-4 61.18654 149.7952												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		18.3		1	5	7.58	130.5	0.8	15	15	0	0	50
				2	10	7.56	128.3				1	5	20
				3	15	7.55	128.4	1.1	14.5		0	0	20
Date Transect	5/23/2006 NS2-4												
Coordinates	61.18654												
	149.7952												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		8.1		1	2	7.98		11.2	13.7		0	0	50
				2	5	7.95		10.1	13.8		0	0	100
				3	nd	nd		nd	nd				
Date	9/2/2005												
Transect	FW1-1												
Coordinates	61.1875												

149.7942

Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	Sample dilution
582	19.11	7.2	1	1	7.67	143	12.5			16	40	40
			2	7	7.6	140.2	10.3			21	53	40
			3	14	7.59	141.3	10.3			108	270	40

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Date Transect Coordinates	2/10/2006 EW1-1 61.1875 149.7942												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml Sa	ample dilution
		19.5		1	4	7.52	128.6	0.9	12.76	15	0	0	50
				2	10	7.5	128.4				0	0	20
				3	18	7.28	137.2	1	14.13		0	0	20
Date	5/23/2006												
Transect	EW1-1												
Coordinates	61.1875												
	149.7942												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml Sa	ample dilution
		20		1	2	8.23		12.2	13.6		0	0	50
				2	10	8.11		8.5	13.8		0	0	100
				3	18	7.81		7.1	8.1		0	0	50
Date Transect Coordinates	9/2/2005 EW1-2 61.18758 149.7966												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml Sa	ample dilution
	242	7.94	7.1	1	1	7.68	146.3	12.1	5	•	37	92.5	40
				2	4	7.63	143.4	11.1			nd		40
				3	6	7.61	139.6	10.5			30	75	40

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Date Transect Coordinates	2/10/2006 EW1-2 61.18758 149.7966												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	Sample dilution
		4.7		1	1	7.51	129.5	0.9	12.63	16.5	0	0	50
				2	2	7.48	127.9				0	0	20
Date Transect Coordinates	5/23/2006 EW1-2 61.18758 149.7966			3	4	7.47	128.1	0.9	12.47		0	0	20
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml S	Sample dilution
		4.7		1	2	8.25		10.4	13.5		0	0	50
				2 3	4	8.18		nd	nd		0	0	50
Date Transect Coordinates	9/2/2005 EW1-3 61.18687 149.7997 Depth cm 105	depth ft 3.45	Secch D. ft bottom	sample 1 2 3	depth 1 2 3 4	ph 8.03 8.01 8.36	cond 135.9	Temp C 12.9 12.6 12.3	DO mg/l	Ice Depth	FC plate 16 nd	FC/100ml S 40	Sample dilution 40 40
				5	3.4	0.00	131	12.3			nu		40

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Date Transect Coordinates	2/10/2006 EW1-3 61.18687 149.7997												
	Depth cm	depth ft 4.2	Secch D. ft	sample 1 2 3	depth 2 3	ph 7.43	cond 128.1	Temp C 0.8	DO mg/l 11.95	Ice Depth 18.5	FC plate 0 nd	FC/100ml 0 nd	Sample dilution 50
Date Transect Coordinates	5/23/2006 EW1-3 61.18687 149.7997												
	Depth cm	depth ft 4.2	Secch D. ft	sample 1 2 3	depth 2 4	ph 8.29 8.36	cond	Temp C 12.5 nd	DO mg/l 14.5 nd	Ice Depth	FC plate 0 0	FC/100ml 0 0	Sample dilution 50 50
Date Transect	9/2/2005 EW1-4												
oooramates	149.8033	denth ft	Secch D ft	sample	denth	nh	cond	Temp C	DO ma/l	Ice Denth	FC plate	FC/100ml	Sample dilution
	179	5.88	5	1 2 3	1 2 3	8.05 7.79 7.82	150.1 150.1 148.1	12.9 12.6 12.5	Domyn		36 33 27	90 83 67.5	40 40 40 40

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Date Transect Coordinates	2/10/2006 EW1-4 61.18591 149.8033												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		8.6		1	2	7.53	128.1	0.7	13.02	21 in	0	0	50
				2	4	7.45	129.4	0.7			0	0	20
				3	6	7.41	131.2	0.9			0	0	20
Date	5/23/2006												
Transect	EW1-4												
Coordinates	61.18591												
	149.8033												
	Depth cm	depth ft	Secch D. ft	sample	depth	ph	cond	Temp C	DO mg/l	Ice Depth	FC plate	FC/100ml	Sample dilution
		6.5		1	2	8.36		12.5	13.5		0	0	50
				2	5	8.26		11.6	14.7		0	0	50
				3									

Appendix 6A. Fecal Coliform Survivability Lab Data.

Chester Creek Water Sterilized.

Temperature, 4c

 Date
 7/5/05
 7/14/05
 7/22/05
 7/28/05
 8/4/05
 8/10/05
 8/19/05
 8/25/05
 9/6/05
 9/22/05
 9/28/05
 10/6/05
 10/14/05
 10/20/05 10/25/05
 11/6/05
 11/18/05 11/22/05
 12/1/05 12/15/05

 Replicate A
 4.70E+057.10E+052.73E+052.57E+052.40E+051.93E+052.02E+051.80E+051.63E+051.11E+058.70E+04
 1.58E+05
 9.60E+04
 1.01E+051.01E+059.80E+04
 7.70E+041.47E+05
 9.20E+046.50E+04

 Replicate B
 5.30E+053.50E+053.70E+053.40E+052.58E+05
 2.16E+051.88E+051.62E+052.80E+05
 1.91E+05
 2.15E+05
 1.23E+051.25E+051.49E+05
 1.32E+051.57E+05
 9.60E+045.80E+04

 Replicate C
 2.21E+052.79E+051.74E+051.75E+051.28E+051.06E+045.80E+041.11E+057.00E+044.30E+043.20E+04
 5.60E+04
 5.10E+04
 3.40E+045.00E+04
 4.00E+043.50E+04
 2.30E+05

Average. 4.07E+054.46E+052.72E+052.57E+052.09E+051.50E+051.44E+051.69E+051.40E+051.05E+051.33E+05 1.21E+05 8.60E+049.20E+041.24E+05 8.30E+041.13E+05 9.40E+041.18E+05 Log Average 5.609594 5.649659 5.435101 5.410496 5.319453 5.174641 5.156852 5.227887 5.147161 5.022566 5.1238525.13033385.08158734.9344985 4.963788 5.0916674.9190781 5.0530784.9731279 5.070653

Temperature, 16c

 Date
 7/5/05
 7/14/05
 7/22/05
 7/28/05
 8/4/05
 8/10/05
 8/19/05
 8/25/05
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 9/22/05
 9/28/05
 10/6/05
 10/14/05
 10/20/05
 11/6/20
 11/18/20
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 Average
 8.53E+058.03E+051.13E+061.26E+061.07E+067.60E+041.00E+067.23E+057.83E+051.08E+069.94E+051.39E+06
 8.50E+05
 7.07E+056.77E+058.73E+058.73E+059.93E+05
 3.26E+053.64E+05

 Log Average 5.931119 5.904896 6.054358 6.100371 6.028029
 65.859338 5.893947 6.034762 5.997386 6.14405555.92941895.8492146 5.830375
 5.94118
 5.94118 5.9970955.5136614 5.561101

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Chester Creek Sediment

Temperature, 4c

Day	0	9	16	24	37	53
Replicate, a	4.10E+061	.69E+062.	02E+061.	74E+062.	60E+057.	40E+04
Replicate b	3.70E+061	.07E+066.	20E+052.	70E+052.	95E+05	
Replicate c	4.70E+064	.90E+059.	60E+059.2	20E+05		
Replicate d	2.80E+06					
Replicate e	5.00E+06					
sum	4.06E+061	.08E+061.	20E+069.	77E+052.	78E+057.	40E+04
log of ave	6.6085266	.0347626.	0791815.	9897465.	4432634	.869232

Temperature, 16c

Day	0	9	16	24	37	
Replicate a	a4.10E+061.	69E+054.	60E+047.	40E+044.	80E+03	
Replicate b	03.70E+063.4	40E+043.	.80E+044.	90E+038.	50E+04	
Replicate of	4.70E+065.	50E+04	1.	23E+044.	30E+03	
Replicate of	d2.80E+06					
Replicate e	e5.00E+06					
sum	4.06E+068.	60E+044.	20E+043.	04E+043.	14E+04	
log of ave	6.6085264.	9344984	.6232494	.4828744	.496468	

53

Chester Creek Sterilized Sediment.

Temperature, 4c

Day	0	7	12	19	33	47	Tempe	erature, 1	6c						
Replicate	a1.23E+075.10	E+064.9	0E+064.5	0E+061.2	3E+067.2	0E+05									
Replicate	b1.25E+074.30	E+065.0	0E+062.9	0E+061.7	3E+06		day		0	7	12	19	33	47	
Replicate	c8.30E+065.50	E+067.0	0E+063.8	0E+061.4	6E+06		Replicat	te a 1.23E-	+07 1.22	2E+07 3.0	3E+07 4.2	21E+07 1.3	60E+07 1	.95E+07	
Replicate	d1.52E+07						Replicat	te b 1.25E-	+07 2.04	4E+07 3.1	5E+07 2.2	25E+07			
Replicate	e1.39E+07						Replicat	te c 8.30E-	+06 2.89	9E+07 3.4	4E+07 2.4	46E+07			
. top oato							Replicat	te d 1.52E-	+07						
sum	1.23E+074.97	E+065.6	3E+063.7	3E+061.4	7E+067.2	0E+05	Replicat	te e 1.39E-	+07						
log of ave	7 091086 69	606567	5076565	7209761	6830158	57332	2 1.18E+07								
log of avo	1.001000.00	00000.1	00.000.0		000010.0		sum	1.23E-	+07 2.0	5E+07 3.2	1E+07 2.9	97E+07 1.3	0E+07 1	.95E+07	

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Appendix 6B. Fecal Coliform Survivability Field Data.

Raw data for in-field study, subsequent analysis was done on data after it was normalized to CFU/100ml water assuming total recovery of coliform into receiving water and Log transformed (Woomer P. 1994)¹.

		Positive						Positive results		
		results at 10 ⁻²	MON					at 10 ⁻²		A
Dav	Trial	dilutions	Number		п	21/	Trial	dilutions	Numbor	MDN
12/16/2005	1	200	83	Average with	1/28	ay /2006	1	210	147	
12/10/2000	2	320	919		1/20/	2000	2	2,1,0	147	
	3	2.1.0	147				3	1.0.0	42	
	4	2.0.0	83				4	2.1.1	0	
	5	2.0.0	83				5	1.0.0	42	
	6	2,0,0	83				6	0,2,0	0	
	Day 0	, ,	1398	233			Day 44		378	63
12/19/2005	1	3,2,0	919		2/14/	2005	1	nd		
	2	2,1,1	188.5				2	nd		
	3	3,0,1	382				3	nd		
	4	2,0,0	83				4	nd		
	5	1,0,1	58				5	nd		
	6	3,1,0	425				6	nd		
	Day 3		2055.5	342.5			Day 61			
12/23/2005	1	1,0,0	42		5/2/2	2006	1	0,0,0	0	
	2	1,1,0	74				2	0,1,1	0	
	3	1,0,0	42				3	1,0,1	58	
	4	2,0,0	83				4	1,0,0	42	
	5	2,1,0	147				5	0,0,0	0	
	0 Davi 7	0,0,0	0	64.6			0	0,0,0	100	40.0
40/00/0005	Day 7	200	388	64.6			Day 138		100	16.6
12/29/2005	2	3,0,0	230 42		C	ontrol				
	2	2,0,0	42		dav	data	MDN			
	4	200	83		0	1/28/200	6 0			
	5	0,0,0	0		4	2/1/200	S 0			
	6	110	74		9	2/9/200	5 0			
	Day 13	.,.,0	429	71.5	35	3/15/200	6 0			
1/13/2006	1	2,0,0	83							
	2	1,0,0	42							
	3	1,0,0	42							
	4	2,0,0	83							
	5	0,0,0	0							
	6	0,0,0	0							
	Day 29		250	41.6						

Appendix 7A: Impacts of fecal coliform concentrations at UL-1 on UL-2: Method description

We surveyed the relative increase and decrease of FC at the UL-1 and UL-2 site over a 7 day period. The assumption is that if the lake residence time is 6.8 day +-1.8 there would be an anticipated correlation in relative increase and decrease of FC after 7 days between the UL-1 and UL-2. This will also tell us if changes in FC concentration at the Inlet will impact the concentrations seen out the Outlet. Data sets collected 7 days apart were extracted from the whole data set. This resulted in 15 data set pairs that could be tested. We used binominal analysis ,in which a 1 was assigned when an increase in the averaged FC from all counted plates over a 7 day period was observed and a 0 when a decrease was observed. Each 7 day pair period was assigned the appropriate value for both UL-1 and UL-2. If an increase in FC was seen at UL-1 between days 0 and 7 and an increase would be was?seen at UL-2 between days 7 and 14, then these match. We found there to be 13 matching pairs

The probability of p (matches)=.77 and q (mismatchs) =.23 with n=13 and X=2 is found by P(X)= $n(n-1)/2 p^2 q^{n-2}$ Which relates to a 4.4x10⁻⁶ probability that it is by chance (Zar 1999)²

The magnitude of increase and decrease for these pairings was then analyzed. At each site the absolute difference between average FC of all counted plates at time 1 and the average FC of all counted plates at time 2 was calculated and repeated for each time step. This absolute change was then normalized by the average FC value of all counted plates at each of those sites for the specified sample dates. This places the magnitude of increase and decrease in perspective of FC concentrations observed at each site. The magnitude data at UL-1 and UL-2 sites were compared to each other using the students t-test two tailed with α = .05 assuming unequal variance. Variance of deviation at the sites was determined unequal after testing the variance using the F test with α = .05

The null hypothesis is that the magnitudes of change in FC at UL-1 and UL-2 are equal; the alternate hypothesis is that the magnitudes of change are different. The t- test statistic found was -1.54 which is less than the critical value of 2.11 therefore we do not find that the magnitude of change is different.

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The magnitude of change in FC load between UL-1 and UL-2 after 1 lake residence time is the same, showing that load changes at UL-2 are dependent upon or predicted by changes at UL-1.

Appendix 7B: Impacts of fecal coliform concentrations at UL-1 on UL-2: Calculations

This data also demonstrates the capacity of University Lake to act as a sink over the period of one lake residence time. The only data point in non agreement is 8-

Iced over 89% 92% 49% 84% 94% 48% 88% 78%

average

16 to 8-22 which coincided with a heavy rain event on 8-21 indicating influence from the storm drain.

Davs	Incentration	n, between UL	-1 and UL-2 aller /		
Dates	ul-1 ul-	2 1-(ul2/ul1)		
8-2,8-8	49	32 `	, 35%		
8-16,8-22	5	28*-460%			
10-4,10-11	8	3	63%	Ice fre	e
10-11,10-18	26	21	19%	35%	
10-18-10-25	13	0	100%	63%	
10-25,11-1	12	2	83%	19%	
11-1,11-8	28	3	89%	100%	
11-8,11-15	119	9	92%	83%	
11-15,11-22	193	99	49%	89%	
11-22,11-29	69	11	84%	89%	
11-29,12-6	51	3	94%	77%	
12-6,12-13	82	43	48%	19%	
8-8,8-13	74	8	89%	83%	
8-22,8-29	66	15	77%	<mark>66%</mark>	<mark>Average</mark>
10-11,10-18	26	21	19%		
10-18,10-25	13	0	100%		
10-25,11-1	12	2	83%		
11-1,11-8	28	3	89%		
11-8,11-15	119	9	92%		
11-15,11-22	193	99	49%		
11-22,11-29	69	11	84%		
11-29,12-6	51	3	94%		
12-6,12-13	82	43	48%		
12-13,12-20	49	6	88%		
			73%Average		

Reduction of FC concentration, between UL-1 and UL-2 after 7

UL1	Inlet					UL2	outlet					UL-SD				
_		Aver.	D.O	Discharge	Stage (Aver.	D.O	Discharg				Temp.	Aver.	D.O
Date:	рН	Temp (C)	mg/l	(CFS)	inch)		рН	Temp	mg/l	e CFS	stage		ph	С	Temp	mg/l
7/14/2005	7.92	11.1					8.54	17.3								
7/19/2005		15.8						17.1								
7/28/2005							8.29	15.9								
8/2/2005	7.43	12.8					7.6	10.4								
8/4/2005	7.72	13.8					7.62	12.8								
8/8/2005	7.81	11.3					7.88	18								
8/13/2005	7.92	12.3					8.19	16.3								
8/16/2005	7.83	10.4					7.96	15								
8/19/2005							7.8	13.5								
8/22/2005	9.7	7.79					7.68	13.8								
8/25/2005	7.67	11.9					7.61	13.4								
8/29/2005	7.46	8.9					7.54	12.1								
9/6/2005							7.4	10.5								
9/9/2005	7.1	11.5					7.22	9.8								
9/13/2005	7.48	8.3					7.09	10.4								
9/20/2005	7.48	7.5		20.85	8.5					19.52	11.625					
9/27/2005	7.38	6.7			9.125		6.73	8.7			11.75					
10/4/2005	7.96	4.7	11.72	17.69	9		7.49	7.2	9.11	18.29	11.625					
10/11/2005	8.5	4.3	14.42	16.27	9		8.1	4.8	12.35	13.66	11.375					
10/18/2005	7.51	4.45	13.86	18.09975	9 7/8		7.23	4	13.12	17.3985	11 3/4					
10/25/2005	7.86	1.85	14.62	13.438	8.25		7.51	4.05	12.94	13.25	11 1/4					
11/1/2005	8.03	1.9	16.72		6 7/8		8.18	2.1	15.4	9.72	10 5/8					
11/8/2005	7.97	1.8	16.18	7.122822	5 1/4		8.02	1.6	15.27	6.038	8.5					
11/15/2005	8.04	2.8	15.8	6.77175	5 1/8		8.04	2.8	15.8	5.47	8 3/4					
11/22/2005	7.65	1.7	16.43		7 1/8		7.32	1.5	14.6	11.41	9.5					
11/29/2005	7.8	0.9	17.3		7		8.11	0.8	15.41	10.329						
12/6/2005					6 3/8		7.59	0.7	16.07	9.892	9 3/4					

Appendix 8: Water Quality Parameter Data

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12/13/2005	7.45	0.8	17.26		7	7.74	1.5	14.32 10.0	0075 9 7/8			
12/20/2005	8.04	0.9	16.66	11.22225	6 5/8	7.73	1.5	14.51	8 1/2			
1/17/2006	7.84	0.8			5	8.06	0.8	14.53	8 1/2			
1/31/2006	7.53	0.75	16.68			7.25	0.85	16.46	8			
2/7/2006	7.96	1.6	17.1		5 3/8	8.12	0.75	15.48	8 1/2			
2/14/2006	7.86	1	15.14			7.94	0.9	15.63				
2/21/2006												
3/15/2006	8.01	1.2	15.32		5 1/4	7.89	1	15.76	8 1/2			
3/29/2006	7.88	2.6	16.95		5 3/4	8.36	1.5	14.58	9 1/4	8.08.8/1.0	0.9	8.92
5/2/2006	7.91	4.7	16.31		6 5/8	7.79	5.1	13.28	10	8.371.9/1.8	1.85	9.58
5/11/2006	7.74	7	15.01		7 1/2	8.03	8.75	14.96	10 5/8	7.888.7/8.7	8.7	13.18
5/22/2006	8.01	9.7	13.73		6 3/8	8.41	13.05	14.56	10 1/2			
										13.4/13.		
6/12/2006	7.49	8.05	13.49		7 1/8	7.58	12.75	13.41	11	7.634	13.4	13.21

Appendix 9: Relative percent different (RPD) for fecal coliform sampling from

countable plates.

The sample dates that had two or more countable plates as dictated by the SM 9222-d across the three sites were checked for precision using

the RPD method outlined in the QAPP. Samples are only identified by letter and not by sample id.

		Samples 1	that contai	ned count	table plates	5					
RPD	А	В	С	D	⁻ C	Lo	og A	Log B	Log C	Log D	Log E
7/14/	/2005	28	50	118			1.44715	8 1.6989	2.071882	2	-
8/3/	/2005	110	28	125	96		2.04139	3 1.44715	8 2.09691	1.982271	
8/9/	/2005	150	48	24	96		2.17609	1 1.68124	1 1.380211	1.982271	
8/16/	/2005	100	52	68			:	2 1.71600	1.832509)	
8/23/	/2005	52	51	40	20		1.71600	3 1.7075	1.60206	5 1.30103	5
8/29/	/2005	28	23				1.44715	8 1.36172	.8		
9/13/	/2005	50	140				1.6989	7 2.14612	.8		
9/20/	/2005	44	185	35	154		1.64345	3 2.26717	2 1.544068	3 2.187521	
10/25/	/2005	19	110	108			1.27875	4 2.04139	2.033424	Ļ	
11/22/	/2005	80	56	125	112	59	1.9030	9 1.74818	2.09691	2.049218	1.770852
12/13/	/2005	74	22	60	43		1.86923	2 1.34242	.3 1.778151	1.633468	5
12/20/	/2005	44	38				1.64345	3 1.57978	34		
2/7/	/2006	56	63				1.74818	8 1.79934	1		
3/29/	/2006	53	40	21			1.72427	6 1.6020	6 1.322219	9	
6/12/	/2006	70	62	17			1.84509	8 1.79239	2		

		Countable Sa	ample					
Date		RPD A-B	RPD B-C	RPD C-A	RPD D-A	RPD D-B	Sum RPD	RPD Ave
	7/14/2005	0.367119	9 0.600077	7 1.249409			2.216605	0.738868
	8/3/2005	i 1.21173 ⁻	0.263823	3 1.110325	0.967578	1.138307	4.691764	0.938353
	8/9/2005	1.304379	9 0.77957	0.156417	0.935662	1.064441	4.240469	0.848094
	8/16/2005	1.07642	5 0.683171	0.788806			2.548403	0.849468
	8/23/2005	0.71846	0.73945	5 0.56772	0.163486	0.165904	2.355027	0.471005
	8/29/2005	0.477572	2 1.361728	3			1.8393	0.91965
	9/13/2005	0.58267	7 2.146128	3			2.728805	1.364403
	9/20/2005	0.483959	9 1.456901	l 0.512889	1.329539	1.16964	4.952928	0.990586
1	0/25/2005	0.04905	3 1.043348	3 1.261271			2.353672	0.784557

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11/22/2005	0.945514	0.657495	1.145365	1.086191	1.128491	4.963056	0.992611
12/13/2005	1.033262	0.202792	0.75318	0.566159	0.73127	3.286663	0.657333
12/20/2005	0.663206	1.579784				2.242989	1.121495
2/7/2006	0.733769	1.799341				2.533109	1.266555
3/29/2006	0.761018	0.697756	0.190246			1.649019	0.549673
6/12/2006	0.859588	1.792392				2.651979	1.32599

Appendix 10: Multiple tube fermentation method and results.

This project utilized two different variations of the multiple tube fermentation method (most probable number (MPN) outlined in Woomer P.1994. The MPN method is conducted by taking a sample of sediment and subjecting that to a serial dilution series. Replicate samples are taken from each individual dilution and transferred to lauryl tryptose (LT) broth and allowed to incubate at 37C for 24-48 hours. The LT tube was examined for gas production in the Durham tub. If positive for gas production, a sample from the tube was used to inoculate a tube of EC broth, or tube containing MUG, and allowed to incubate for 24 hours at 44.4 C. Positive indication for FC would be either gas production in the EC tube, or florescence of the MUG tube under a UV lamp. Number of double positives tube results at each dilution level was recorded and the MPN for the sequence of positive results was determined from specific MPN tables.

1. The first MPN employed was for the 1st event-driven sampling, during which the rivulets around University Lake were analyzed. It was necessary and appropriate to use this method because the high sediment content of the water would have clogged and disputed the membrane filters.

The MPN test used in this event was the was two replicate test per dilution using the gas production/ UV reaction . The sample dilution series employed was of 5^{-1} , 5^{-2} , 5^{-3} , 5^{-4} , 5^{-5} , 5^{-6}

2. A second MPN was used to measure FC in lake sediment during the whole lake sampling events and in the field survivability study. The QAPP had outlined that the Spread Plate Technique would be used, however use of the MPN method allowed for a greater number of replicates to be tested on each sample, and thus provided greater accuracy of obtaining the total coliform count.

The MPN test used in these tests followed the LT and EC gas production as outlined in Woomer R. 1994 but varied on dilution series tested. The sediment analysis conducted on the whole lake sampling tested the sample in the series dilution at 10^{-1} , 10^{-2} , 10^{-3} , 10^{-4} dilution , with 3 replicates being generated from each dilution. The in field study used the same dilution series, but only tested the 10^{-2} , 10^{-3} , and 10^{-4} dilution, again with 3 replicates being generated from each tested dilution.

Results of Rivulet and Whole Lake Sampling.

		Test.		
lake sed.	event 1	Modified plate	' ,	
9/3/2005	5Location	dilution plate	F	C/gram
	NS23		13	65
	NS14		30	150
	NS12		20	100
	NS13		3	15
	EW2	Tntc		
	EW1		17	85
	NS24	Tntc		
				70Average
		Multiple Tube		
lake sed.	event 2	3 reps, Gas/Ga	as	
2/10/2006	Blocation	4 (1/10) dilutio	ons	MPN fc/gram
	NS23	0,0,0,0		0
	NS23	1,0,1,0		67
	EW4	1,1,0,0		74
	EW4	2,2,1,0		442
				145.75Average
		Multiple tube		
Rivulet		2 reps, Gas/U	/	
9/13/2005	5Location	6 (1/5) diltuion	S	MPN fc/gram
	Canoe 1	2,2,2,2,0,0		1016
	Canoe 2	2,2,2,0,0,0		202
	Island	2,2,1,0,0,0		81
	Inlet	2,1,1,0,0,0		28
	Sandbar	2,2,1,0,0,0		81
				281.6Average

Appendix 11. Transfer Log.

Dete	Time	Site	Sample	Sample	Complex	Mathad	Notoo
Date	Time	U U	U	туре	Sampler	ivietnoa	Notes
7/14/2005		111 -1	111-1	FC	neamer, Maciei	Grah	Temp pH Cloudy light rain
1/14/2003			01-1		Heather	Orab	
7/14/2005		UL-1	U1-2	FC	Maciej	Grab	Temp. pH, Cloudy light rain
					Heather,		
7/14/2005		UL-1	U1-3	FC	Maciej	Grab	Temp. pH, Cloudy light rain
					Heather,		
7/14/2005		UL-2	U2-1	FC	Maciej	Grab	Temp. pH, Cloudy light rain
7/14/2005		111 2	112.2	FC	Heather,	Croh	Tomp pH. Cloudy light roin
7/14/2005		UL-2	02-2	гu	Heather	Grab	
7/14/2005		UI -2	U2-3	FC	Maciei	Grab	Temp. pH. Cloudy light rain
.,			020		Heather.	0.00	
7/19/2005		UL-1	U1-1	FC	Maciej	Grab	Temp, partly cloudy
					Heather,		
7/19/2005		UL-1	U1-2	FC	Maciej	Grab	Temp, partly cloudy
7/40/0005				50	Heather,	Qual	To see a settle structure
7/19/2005		UL-1	01-3	FC	Naciej	Grab	Temp, party cloudy
7/19/2005		111-2	112-1	FC	neamer, Maciei	Grah	Temp partly cloudy
1/10/2000		022	02 1		Heather.	Olab	
7/19/2005		UL-2	U2-2	FC	Maciej	Grab	Temp, partly cloudy
					Heather,		
7/19/2005		UL-2	U2-3	FC	Maciej	Grab	Temp, partly cloudy
					Heather,	- ·	
7/19/2005		UL-S	US-1	FC	Maciej	Grab	Temp, partly cloudy, Storm drain is flowing.
7/10/2005		2-111	119-2	FC	Heather, Maciei	Grah	Temp, partly cloudy. Storm drain is flowing
7/13/2003		01-0	03-2		Heather	Grab	Temp, party cloudy, Storm drain is nowing.
7/19/2005		UL-S	US-3	FC	Maciej	Grab	Temp, partly cloudy, Storm drain is flowing.
					Heather,		
8/2/2005	2:15	UL-1	U1-1	FC	Maciej	Grab	Temp. pH, Cloudy light rain
0/0/0005	0.45				Heather,	<u> </u>	
8/2/2005	2:15	UL-1	01-2	FC	Maciej	Grab	Temp. pH, Cloudy light rain
8/2/2005	2.15	111 -1	111-3	FC	Heather, Maciei	Grah	Temp pH Cloudy light rain
0/2/2003	2.10		01-5		Heather	Clab	
8/2/2005	1:43	UL-2	U2-1	FC	Maciej	Grab	Temp. pH, Cloudy light rain
					Heather,		
8/2/2005	1:43	UL-2	U2-2	FC	Maciej	Grab	Temp. pH, Cloudy light rain
					Heather,	- ·	
8/2/2005	1:43	UL-2	U2-3	FC	Maciej	Grab	Temp. pH, Cloudy light rain
8/8/2005	12.48	111_1	111-1	FC	Heather, Maciei	Grah	Temp pH
0/0/2003	12.40		01-1		Heather	Clab	
8/8/2005	12:48	UL-1	U1-2	FC	Maciej	Grab	Temp. pH
•					Heather,		
8/8/2005	12:48	UL-1	U1-3	FC	Maciej	Grab	Temp. pH
					Heather,	- ·	
8/8/2005	11:38	UL-2	U2-1	FC	Maciej	Grab	Temp. pH
8/8/2005	11.38	111-2	112-2	FC	Heather, Maciei	Grah	Temp pH
0,0/2000	11.00	56-2	52-2		Heather	5100	
8/8/2005	11:38	UL-2	U2-3	FC	Maciei	Grab	Temp. pH
			-		Heather,		
8/13/2005	5:10pm	UL-1	U1-1	FC	Maciej	Grab	Temp. pH, Clear Sunny
a (1 a /=					Heather,		
8/13/2005	5:10pm	UL-1	U1-2	FC	Maciej	Grab	Temp. pH, Clear Sunny

8/13/2005	5:10nm	111_1	111-3	FC	Heather, Maciei	Grah	
0/13/2003	5. ropin		01-5		Heather,	Glab	
8/13/2005	5:00pm	UL-2	U2-1	FC	Maciej Heather.	Grab	Temp. pH, Clear Sunny
8/13/2005	5:00pm	UL-2	U2-2	FC	Maciej	Grab	Temp. pH, Clear Sunny
8/13/2005	5:00pm	UL-2	U2-3	FC	Heather, Maciej	Grab	Temp. pH, Clear Sunny
8/16/2005	5:26pm	UL-1	U1-1	FC	Heather, Maciei	Grab	Temp, pH, cloudy
0/40/0005	5.00			50	Heather,	Qual	
8/16/2005	5:26pm	UL-1	01-2	FC	Naciej Heather,	Grab	Temp. pн, cloudy
8/16/2005	5:26pm	UL-1	U1-3	FC	Maciej Hoothor	Grab	Temp. pH, cloudy
8/16/2005	5:10pm	UL-2	U2-1	FC	Maciej	Grab	Temp. pH, cloudy
8/16/2005	5:10pm	UL-2	U2-2	FC	Heather, Maciej	Grab	Temp. pH, cloudy
9/16/2005	5:10pm	111 2	112.2	FC	Heather,	Croh	
0/10/2005	5. TOPITI	0L-2	02-3	FC	Heather,	Glab	
8/22/2005	3:36pm	UL-1	U1-1	FC	Maciej Heather	Grab	Temp. pH, Cloudy
8/22/2005	3:36pm	UL-1	U1-2	FC	Maciej	Grab	Temp. pH, Cloudy
8/22/2005	3:36pm	UL-1	U1-3	FC	Heather, Maciej	Grab	Temp. pH, Cloudy
8/22/2005	2.24nm	111 2	112.1	FC	Heather,	Grah	Tomp pH Cloudy
0/22/2003	5.24pm	01-2	02-1	FC	Heather,	Glab	
8/22/2005	3:24pm	UL-2	U2-2	FC	Maciej Heather.	Grab	Temp. pH, Cloudy
8/22/2005	3:24pm	UL-2	U2-3	FC	Maciej	Grab	Temp. pH, Cloudy
8/29/2005	11:35am	UL-1	U1-1	FC	Heather, Maciej	Grab	Temp. pH,
8/29/2005	11:35am	UI -1	U1-2	FC	Heather, Maciei	Grab	Temp. pH.
0/00/0005	44.05			- 0	Heather,	0.4	
8/29/2005	11:35am	UL-1	U1-3	FC	Maciej Heather,	Grab	Temp. pH,
8/29/2005	12:02pm	UL-2	U2-1	FC	Maciej	Grab	Temp. pH,
8/29/2005	12:02pm	UL-2	U2-2	FC	Maciej	Grab	Temp. pH,
8/29/2005	12:02pm	UL-2	U2-3	FC	Heather, Maciei	Grab	Temp. pH.
0/12/2005	1.04000		114.4		Heather,	Croh	
9/13/2005	1.04pm		01-1	FC	Heather,	Glab	
9/13/2005	1:04pm	UL-1	U1-2	FC	Maciej Heather	Grab	Temp. pH, clear
9/13/2005	1:04pm	UL-1	U1-3	FC	Maciej	Grab	Temp. pH, clear
9/13/2005	12:12pm	UL-2	U2-1	FC	Heather, Maciej	Grab	Temp. pH, clear
9/13/2005	12·12nm	111-2	112-2	FC	Heather, Maciei	Grah	Temp pH clear
3/13/2003	12.12011		02-2		Heather,	Grab	
9/13/2005	12:12pm	UL-2	U2-3	FC	Maciej Heather.	Grab	Temp. pH, clear
9/13/2005		UL-S	US-1	FC	Maciej	Grab	No sample taken
9/13/2005		UL-S	US-2	FC	Heather, Maciej	Grab	No sample taken
9/13/2005		UL-S	US-3	FC	Heather, Maciei	Grab	No sample taken
0/00/2000	1.42				Heather,	0	
9/20/2005	1:18pm	UL-1	U1-1	FC	Heathor	Grab	Flow, Stage, Lemp. pH, Elow, Stage, Temp. pH
3/20/2003	плорш		01-2		n ieau iei,	Jiau	n iow, olaye, remp. pri,

Heather,	
9/20/2005 1:18pm UL-1 U1-3 FC Maciej Grab Flow, Stage, Temp. pH, Heather.	
9/20/2005 1:18pm UL-1 U1-4 FC Maciej Grab Flow, Stage, Temp. pH,	
Heather, 9/20/2005 1:18pmUL-1 U1-5 FC Maciej Grab Flow, Stage, Temp. pH,	
Heather, 9/20/2005 12:33pm UL-2 U2-1 FC Maciej Grab Flow, Stage, Temp. pH , error on pH meter	
9/20/2005 12:33pm UL-2 U2-2 FC Maciej Grab Flow, Stage, Temp. pH , error on pH meter	
9/20/2005 12:33pm UL-2 U2-3 FC Maciej Grab Flow, Stage, Temp. pH , error on pH meter	
9/20/2005 12:33pm UL-2 U2-4 FC Maciej Grab Flow, Stage, Temp. pH , error on pH meter	
Heather, 9/20/200512:33pmUI -2 U2-5 FC Maciei Grab Flow Stage Temp pH error on pH meter	
Heather,	
Maciej, 10/4/200512:43pml II -1 II 1-1 EC Rugp Grab Flow Stage Temp pH DO mostly suppy	
Heather,	
10/4/200512:43pmUL-1 U1-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, mostly sunny	
Maciej,	
10/4/2005 12:43pm UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, mostly sunny	
Maciei.	
10/4/2005 11:41am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp. pH, DO, Partly cloudy	
Heather, Maciai	
10/4/2005 11:41am UL-2 U2-2 FC Ryon Grab Flow, Stage, Temp. pH, DO, Partly cloudy	
Heather,	
Maciej, 10/4/2005111:41amUII -2 U2-3 EC Ryon Grab Flow Stage Temp pH DO Partly cloudy	
Heather,	
Maciej, Maciej, Duran Julio Alla da EGA Duran Crana Tarra al Li DO Chara suraru and al	
Heather	1
Maciej,	
10/11/2005 12:40pm UL-1 U1-2 FC Ryon Grab Flow, Stage, Temp. pH, DO, Clear, sunny , and cold	1
Maciei.	
10/11/2005 12:40pm UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp. pH, DO, Clear, sunny , and cold	1
Heather, Magiai	
10/11/2005 11:40am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp. pH, DO, Clear, sunny, and cold	1
Heather,	
Maciej, 10/11/2005111:40amUI -2 U2-2 FC Ryon Grab Flow Stage Temp pH DO Clear suppy, and cold	1
Heather,	
Maciej, Maciej, Dura Tarra al Do Class surger and al	
Heather.	1
Maciej,	
10/18/2005 12:51pm UL-1 U1-1 FC Ryon Grab Flow, Stage, Temp. pH. DO, Cloudy	
Maciei,	
10/18/2005 12:51pm UL-1 U1-2 FC Ryon Grab Flow, Stage, Temp. pH. DO, Cloudy	
Heather, Maciei	
10/18/2005 12:51pm UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp. pH. DO, Cloudy	
Heather,	
10/18/2005 11:48am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp. pH. DO, Cloudy	
10/18/2005 11:48am UL-2 U2-2 FC Heather, Grab Flow, Stage, Temp. pH. DO, Cloudy	

					Maciej,		
					Ryon Heathar		
					Maciej,		
10/18/2005	11:48am	UL-2	U2-3	FC	Ryon	Grab	Flow, Stage, Temp. pH. DO, Cloudy
					Heather, Maciei		
10/18/2005	12:20pm	UL-S	US-1	FC	Ryon	Grab	Temp. Ph. DO, cloudy, no flow
					Heather,		
10/18/2005	12·20nm	UI -S	115-2	FC	Maciej, Rvon	Grah	Temp Ph. DO, cloudy no flow
10/10/2000	12.200111		002	10	Heather,	Ciub	
					Maciej,		
10/18/2005	12:20pm	UL-S	US-3	FC	Ryon Heather	Grab	I emp. Ph. DO, cloudy, no flow
					Maciej,		Flow, Stage, Temp. pH. DO, Clear Sky, noticeable sediment
10/25/2005	12:30pm	UL-1	U1-1	FC	Ryon	Grab	in water
					Heather, Maciei		Flow Stage Temp pH DO Clear Sky noticeable sediment
10/25/2005	12:30pm	UL-1	U1-2	FC	Ryon	Grab	in water
					Heather,		
10/25/2005	12:30pm	UI -1	U1-3	FC	Maciej, Rvon	Grab	in water
					Heather,		
10/25/2005	11.2600		110.4	50	Maciej,	Croh	Flow Store Temp of DO Clear alw
10/25/2005	11:30am	UL-2	02-1	FC	Heather	Grab	
					Maciej,		
10/25/2005	11:36am	UL-2	U2-2	FC	Ryon	Grab	Flow, Stage, Temp. pH, DO, Clear sky
					Heather, Maciei.		
10/25/2005	11:36am	UL-2	U2-3	FC	Ryon	Grab	Flow, Stage, Temp. pH, DO, Clear sky
					Heather,		
10/25/2005	12:15pm	UL-S	US-1	FC	Rvon	Grab	Temp, pH, DO, clear, no flow, ice forming
					Heather,		
10/25/2005	12:15nm	111 0	119.2	FC	Maciej,	Grah	Tomp pH DO clear no flow ico forming
10/23/2003	12.15pm	01-3	03-2	FC	Heather.	Giab	
					Maciej,		
10/25/2005	12:15pm	UL-S	US-3	FC	Ryon	Grab	I emp. pH. DO, clear, no flow, ice forming
11/1/2005	1:15pm	UL-1	U1-1	FC	Maciej	Grab	operating
					Ryon,		Stage, Temp, pH, DO. Cold, light fog, Flow meter stopped
11/1/2005	1:15pm	UL-1	U1-2	FC	Maciej	Grab	operating Stage Temp, pH, DO, Cold, light fog, Flow mater stopped
11/1/2005	1:15pm	UL-1	U1-3	FC	Maciej	Grab	operating
					Ryon,		
11/1/2005	12:30pm	UL-2	U2-1	FC	Maciej	Grab	Flow, Stage, Temp, pH, DO, cold, light fog
11/1/2005	12:30pm	UL-2	U2-2	FC	Maciej	Grab	Flow, Stage, Temp, pH, DO, cold, light fog
					Ryon,		
11/1/2005	12:30pm	UL-2	U2-3	FC	Maciej	Grab	Flow, Stage, Temp, pH, DO, cold, light fog
11/8/2005	1:34pm	UL-1	U1-1	FC	Ryon, Maciei	Grab	Flow, Stage, Temp, pH, DO, cold 10F, partly sunny
		-	-	_	Ryon,		
11/8/2005	1:34pm	UL-1	U1-2	FC	Maciej	Grab	Flow, Stage, Temp, pH, DO, cold 10F, partly sunny
11/8/2005	1:34pm	UL-1	U1-3	FC	куоп, Maciei	Grab	Flow, Stage, Temp, pH, DO, cold 10F, partly sunny
		1	-	1	Ryon,		
11/8/2005	12:45pm	UL-2	U2-1	FC	Maciej	Grab	Flow, Stage, Temp, pH, DO, cold 10F, partly sunny
11/8/2005	12:45pm	UL-2	U2-2	FC	куоп, Maciei	Grab	Flow, Stage, Temp, pH, DO, cold 10F, partly sunny
					Ryon,		
11/8/2005	12:45pm	UL-2	U2-3	FC	Maciej	Grab	Flow, Stage, Temp, pH, DO, cold 10F, partly sunny
11/8/2005		UL-S	US-1	FC	Ryon,	Grab	No sample taken

11/8/2005 UL-S US-S FC Maxing Gray no. No sample taken 11/8/2005 UL-S US-S FC Maxing Grab No sample taken 11/8/2005 UL-S US-S FC Maxing Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UT-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UT-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 UZ-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 UZ-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/						Maciej		
11/8/2005 UL-S UL-S UL-S Vacable Field No sample taken 11/8/2005 UL-S UL-S FC Ryon Maclej, Heather, Maclej, I1/15/2005 Field No sample taken 11/8/2005 12.50pmUL-1 UL-S FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/8/2005 12.50pmUL-1 UL-S FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/8/2005 12.50pmUL-1 UL-S FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/8/2005 11.59amUL-2 U2-F FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s freemerber to convert to m/s in calc. Cloudy. 11/15/2005 11.59amUL-2 U2-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s freemerber to convert to m/s in calc. Cloudy. 11/15/2005 11.59amUL-2 U2-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12.30pmUL-3 U2-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12.30pmUL-3 U2-3 FC Ryon Grab<	44/0/0005					Ryon,	<u> </u>	
11/8/2005 UL-S UL-S UL-S Vacing Heather, Nacie, Wacie, Pice Grab No sample taken 11/15/2005 12:50pm UL-1 IFC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UL-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UL-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm UL-3 FC Ryon Grab remember to convert to m/s in calc. Cloudy.	11/8/2005		UL-S	US-2	FC	Maciej	Grab	No sample taken
Heather, 11/15/2005 Heather, Heather, Maciej, 11/15/2005 Heather, Heather, Maciej, 11/15/2005 Heather, Heather, Maciej, 11/15/2005 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm/UL-1 U1-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm/UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am/UL-2 U2-1 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm/UL-S US-1 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm/UL-S US-1 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm/UL-S US-2 FC	11/8/2005		UL-S	US-3	FC	Maciej	Grab	No sample taken
11/15/2005 12:50pm UL-1 UL-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UL-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UL-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 UL-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 UL-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-3 UL-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-3 UL-3 FC Ryon Grab						Heather,		
Heather, 11/15/2005 Heather, Ryon Fow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 U1-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab remember to convert to m/s in cale. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab remember to convert to m/s in cale. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab remember to convert to m/s in cale. Cloudy. 11/15/2005 12:30pm UL-S US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-1 U1-1 FC Ryon Grab Temp, pH, DO 11/15/2005 12:20pm UL-1 U1-2 FC Ryon Grab<	11/15/2005	12:50pm	UL-1	U1-1	FC	Naciej, Ryon	Grab	Flow, Stage, Temp, pH, DO, cloudy and snowing.
Maciej, 11/15/2005 Maciej, 12:50pm UL-1 Maciej, UL-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm UL-1 UL-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 UL-2 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 UL-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 UL-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-5 US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-3 US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-1 UL-1 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-1 UL-2 FC						Heather,		
11/12/2005 12:30,m/UL-1 U1-2 C Fyori Grab Fow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 12:50pm/UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am/UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm/UL-S US-1 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm/UL-S US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm/UL-S US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm/UL-1 U1-1 FC Ryon Grab Temp, pH, DO 11/22/2005 1:26pm/UL-1 U1-1 FC <td>11/15/2005</td> <td>12.50nm</td> <td>111 1</td> <td>111.2</td> <td>FC</td> <td>Maciej, Rvon</td> <td>Grah</td> <td>Flow Stage Tomp pH DO cloudy and showing</td>	11/15/2005	12.50nm	111 1	111.2	FC	Maciej, Rvon	Grah	Flow Stage Tomp pH DO cloudy and showing
11/15/2005 12:50pm UL-1 U1-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab Femember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab Femember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm UL-S US-1 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Temp, pH, D	11/13/2003	12.50pm		01-2	10	Heather.	Grab	Tiow, Stage, Temp, pri, DO, cloudy and showing.
11/15/2005 12:50pm/UL-1 UI-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, cloudy and snowing. 11/15/2005 11:59am/UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, flow meter was set on ft/s 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am/UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am/UL-2 U2-3 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm/UL-S US-1 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm/UL-S US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm/UL-S US-3 FC Ryon Grab Temp, pH, DO 11/22/2005 12:6pm/UL-1 U1-2 FC Ryon Grab Temp, pH, DO, Cloudy, Water very clear, Flow						Maciej,		
11/15/2005 11:59am UL-2 U2-1 FC Ryon Grab Flow, Stage, Temp, PH, DO, flow meter was set on ft/s 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm UL-S US-1 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-2 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Temp, pH, DO 11/12/2/2005 12:30pm UL-1 U1-1 FC Ryon Grab Temp, pH, DO 11/22/2005 12:26pm UL-1 U1-2	11/15/2005	12:50pm	UL-1	U1-3	FC	Ryon Hoothor	Grab	Flow, Stage, Temp, pH, DO, cloudy and snowing.
11/15/2005 11:59am UL-2 U2-1 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab remember to convert to m/s in calc. Cloudy. 11/15/2005 12:30pm UL-S US-1 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Temp, pH, DO 11/15/2005 12:30pm UL-1 U1-1 FC Ryon Grab Temp, pH, DO 11/22/2005 12:6pm UL-1 U1-1 FC Ryon Grab meter stopped operating midstream. 11/22/2005 12:6pm UL-1 U1-1 FC Ryon Grab meter stopped operating midstream. 11/22/2005 12						Maciej,		Flow, Stage, Temp, pH, DO, flow meter was set on ft/s
Heather, 11/15/2005 11:59am UL-2 U2-2 FC Ryon Grab Heather, 11/15/2005 11:59am UL-2 U2-3 FC Ryon Grab Heather, 11/15/2005 12:30pm UL-S US-1 FC Ryon Grab Heather, 11/15/2005 12:30pm UL-S US-1 FC Ryon Grab Heather, 11/15/2005 12:30pm UL-S US-2 FC Ryon Grab Heather, 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Heather, 11/15/2005 12:30pm UL-S US-3 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-2 VS-3 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-2 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-1 U1-2 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-2 V2-1 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-2 V2-2 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-2 V2-2 FC Ryon Grab Heather, 11/22/2005 12:30pm UL-2 V2-3 FC Ryon Grab Heather, 11/22/2005 10:01pm UL-S V3-3 FC Ryon Grab Heather, 11/22/2005 10:01pm UL-	11/15/2005	11:59am	UL-2	U2-1	FC	Ryon	Grab	remember to convert to m/s in calc. Cloudy.
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11/22/2005 12:23pm UL-2 U2-2 FC Ryon Grab cloudy, 11/22/2005 12:23pm UL-2 U2-3 FC Ryon Grab cloudy, 11/22/2005 12:23pm UL-2 U2-3 FC Ryon Grab cloudy, 11/22/2005 12:23pm UL-2 U2-3 FC Ryon Grab Flow, Stage, Temp. pH. DO, mostly cloudy, water is very 11/22/2005 1:01pm UL-S US-1 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty 11/22/2005 1:01pm UL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty 11/22/2005 1:01pm UL-S US-2 FC Ryon Grab Water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Water flowed over top of ice. 11/22/2005 1:08pm UL-1 U1-1 FC						Heather, Maciei		Flow Stage Temp of DO mostly cloudy water is very
11/22/200512:23pmUL-2U2-3FCHeather, Maciej, RyonFlow, Stage, Temp. pH. DO, mostly cloudy, water is very cloudy,11/22/200512:23pmUL-2U2-3FCRyonGrabFlow, Stage, Temp. pH. DO, mostly cloudy, water is very cloudy,11/22/200511:01pmUL-SUS-1FCRyonGrabTemp, pH, DO, ice sheet, recent flow activity, appears dirty water flowed over top of ice.11/22/200511:01pmUL-SUS-2FCRyonGrabTemp, pH, DO, ice sheet, recent flow activity, appears dirty water flowed over top of ice.11/22/200511:01pmUL-SUS-2FCRyonGrabTemp, pH, DO, ice sheet, recent flow activity, appears dirty water flowed over top of ice.11/22/200511:01pmUL-SUS-3FCRyonGrabTemp, pH, DO, ice sheet, recent flow activity, appears dirty water flowed over top of ice.11/22/200511:01pmUL-SUS-3FCRyonGrabTemp, pH, DO, ice sheet, recent flow activity, appears dirty water flowed over top of ice.11/22/200511:01pmUL-SUS-3FCRyonGrabFlow, Stage, Temp, pH, DO, Flow meter stopped workign mid stream, mostly cloudy.	11/22/2005	12:23pm	UL-2	U2-2	FC	Ryon	Grab	cloudy,
11/22/2005 12:23pm UL-2 U2-3 FC Ryon Grab cloudy, 11/22/2005 12:23pm UL-2 U2-3 FC Ryon Grab cloudy, 11/22/2005 12:23pm UL-2 U2-3 FC Ryon Grab cloudy, 11/22/2005 11:01pm UL-S US-1 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity, appears dirty 11/22/2005 11:01pm UL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity, appears dirty 11/22/2005 11:01pm UL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity, appears dirty 11/22/2005 11:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity, appears dirty 11/22/2005 11:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity, appears dirty 11/22/2005 11:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity, appears dirty 11/22/2005 11:01pm UL-S US-3 FC Ryon Grab <td< td=""><td></td><td></td><td></td><td></td><td></td><td>Heather,</td><td></td><td>Flow Stone Tome all DO month cloudy water is your</td></td<>						Heather,		Flow Stone Tome all DO month cloudy water is your
11/22/2005 1:01pmUL-S US-1 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pmUL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pmUL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pmUL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pmUL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pmUL-S US-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid 11/29/2005 1:08pmUL-1 U1-1 FC Ryon Grab stream, mostly cloudy.	11/22/2005	12:23pm	UL-2	U2-3	FC	iviaciej, Rvon	Grab	cloudy, stage, Temp. pH. DO, mostly cloudy, water is very cloudy.
11/22/2005 1:01pm UL-S US-1 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid 11/29/2005 1:08pm UL-1 U1-1 FC Ryon Grab stream, mostly cloudy.					-	Heather,		
11/22/2005 1:01pm UL-S US-1 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-2 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:08pm UL-1 U1-1 FC Ryon Grab stream, mostly cloudy.	11/22/2005	1.01nm			FC	Maciej,	Croh	Temp, pH, DO, ice sheet, recent flow activity , appears dirty
11/22/2005 1:01pm UL-S US-2 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid stream, mostly cloudy.	11/22/2005	1.0 ipin	UL-3	03-1	гu	Heather.	Grab	
11/22/2005 1:01pm UL-S US-2 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab Temp, pH, DO, ice sheet, recent flow activity , appears dirty 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/29/2005 1:08pm UL-1 U1-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid 11/29/2005 1:08pm UL-1 U1-1 FC Ryon Grab stream, mostly cloudy.						Maciej,		Temp, pH, DO, ice sheet, recent flow activity , appears dirty
11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/29/2005 1:08pm UL-1 U1-1 FC Ryon Grab stream, mostly cloudy.	11/22/2005	1:01pm	UL-S	US-2	FC	Ryon	Grab	water flowed over top of ice.
11/22/2005 1:01pm UL-S US-3 FC Ryon Grab water flowed over top of ice. 11/29/2005 1:08pm UL-1 U1-1 FC Ryon Grab Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid 11/29/2005 1:08pm UL-1 U1-1 FC Ryon Grab stream, mostly cloudy.						Maciej,		Temp, pH, DO, ice sheet, recent flow activity, appears dirty
Heather, Maciej, Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid 11/29/2005 1:08pmUL-1 U1-1 FC Ryon Grab stream, mostly cloudy.	11/22/2005	1:01pm	UL-S	US-3	FC	Ryon	Grab	water flowed over top of ice.
11/29/2005 1:08pmUL-1 U1-1 FC Ryon Grab stream, mostly cloudy.						Heather, Maciei		Flow Stage Temp pH DO Flow meter stopped workign mid
	11/29/2005	1:08pm	UL-1	U1-1	FC	Ryon	Grab	stream, mostly cloudy.
Heather,						Heather,		
11/29/2005 1:08pmUL-1 U1-2 FC Rvon Grab stream. mostly cloudy.	11/29/2005	1:08pm	UL-1	U1-2	FC	iviaciej, Rvon	Grab	Flow, Stage, Lemp, pH, DO, Flow meter stopped workign mid stream, mostly cloudy.
11/29/2005 1:08pmUL-1 U1-3 FC Heather, Grab Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid	11/29/2005	1:08pm	UL-1	U1-3	FC	Heather	Grab	Flow, Stage, Temp, pH, DO, Flow meter stopped workign mid

					Maciej,		stream, mostly cloudy.
					Ryon		
					Heather, Maciei		
11/29/2005	12:12pm	UL-2	U2-1	FC	Ryon	Grab	Flow, Stage, Temp, pH, DO, mostly cloudy
					Heather,		
11/29/2005	12·12nm	111-2	112-2	FC	Maciej, Rvon	Grab	Flow Stage Temp pH DO mostly cloudy
11/20/2000	12.12pm		02 2		Heather,	Ciub	
					Maciej,		
11/29/2005	12:12pm	UL-2	U2-3	FC	Ryon	Grab	Flow, Stage, Temp, pH, DO, mostly cloudy
					Heather, Maciei.		
11/29/2005	12:51pm	UL-S	US-1	FC	Ryon	Grab	Temp, pH, DO
					Heather,		
11/29/2005	12:51pm	ui-s	US-2	FC	iviaciej, Rvon	Grab	Temp. pH, DO
11/20/2000	12.0 19.11	02.0	002		Heather,	Ciub	
					Maciej,		
11/29/2005	12:51pm	UL-S	US-3	FC	Ryon Heather	Grab	Temp, pH, DO
					Maciei.		Flow, Stage, Temp. pH. DO, , Flow meter stopped operating
12/6/2005	2:20pm	UL-1	U1-1	FC	Ryon	Grab	midstream, Sleet.
					Heather,		
12/6/2005	2:20pm	UI -1	U1-2	FC	iviaciej, Rvon	Grab	midstream. Sleet.
					Heather,		
					Maciej,		Flow, Stage, Temp. pH. DO, , Flow meter stopped operating
12/6/2005	2:20pm	UL-1	U1-3	FC	Ryon Hoothor	Grab	midstream, Sleet.
					Maciej,		Flow, Stage, Temp. pH. DO, Evidence of sediment being
12/6/2005	1:20pm	UL-2	U2-1	FC	Ryon	Grab	dumped into stream from road by grater, snowing.
					Heather,		Elow Store Tomp pH DO Evidence of addiment being
12/6/2005	1:20pm	UL-2	U2-2	FC	Ryon	Grab	dumped into stream from road by grater, snowing.
					Heather,		
12/6/2005	1.20000			FO	Maciej,	Croh	Flow, Stage, Temp. pH. DO, Evidence of sediment being
12/0/2003	1.20pm	UL-2	02-3	FC	Heather	Grab	dumped into stream nom road by grater, snowing.
					Maciej,		
12/6/2005	1:50pm	UL-S	US-1	FC	Ryon	Grab	Temp, pH. DO
					Heather, Maciei		
12/6/2005	1:50pm	UL-S	US-2	FC	Ryon	Grab	Temp, pH. DO
					Heather,		
12/6/2005	1.20pm	UI -S	115-3	FC	Maciej, Rvon	Grah	Temp pH DO
12/0/2000	1.00pm		000		Ryon	Ciub	Stage, Temp, pH. DO, water has high sediment load, very
12/8/2005	11:40am	UL-1	U1-1	FC	Ryon	Grab	cloudy.
12/9/2005	11:40om	111 4	114.2	FC	Buon	Croh	Stage, Temp, pH. DO, water has high sediment load , very
12/0/2003	11.40am		01-2	FC	куоп	Giab	Stage Temp pH DO water has high sediment load very
12/8/2005	11:40am	UL-1	U1-3	FC	Ryon	Grab	cloudy.
12/8/2005	11:00am	UL-2	U2-1	FC	Ryon	Grab	Stage, Temp, pH. DO.
12/8/2005	11:00am	UL-2	U2-2	FC	Rvon	Grab	Stage, Temp, pH, DO.
12/8/2005	11:00am	111-2	112-3	FC	Ryon	Grah	Stage Temp pH DO
12/0/2000	71.00am	56.2	52-5			5.00	Temp. pH. DO. Evidence of recent water flow from drain.
12/8/2005	11:25am	UL-S	US-1	FC	Ryon	Grab	had created an ice free area.
10/0/0005	11.05000		110.0	FC	Buran	Croh	Temp. pH. DO. Evidence of recent water flow from drain,
12/0/2005	11:25am	01-2	03-2	r0	Ryon	GIAD	Temp pH_DO_Evidence of recent water flow from drain
12/8/2005	11:25am	UL-S	US-3	FC	Ryon	Grab	had created an ice free area.
10/10/5	4.55				Ryon,	<u> </u>	Flow, Stage, Temp, pH. DO, Flow meter stopped operating
12/13/2005	1:30pm	UL-1	U1-1	FC	Maciej	Grab	miastream. Overcast.
12/13/2005	1:30pm	UL-1	U1-2	FC	Ryon,	Grab	Flow, Stage, Temp, pH. DO, Flow meter stopped operating

					Maciej		midstream. Overcast.
12/13/2005	1:30pm	UL-1	U1-3	FC	Ryon, Maciej	Grab	Flow, Stage, Temp, pH. DO, Flow meter stopped operating midstream. Overcast.
12/13/2005		UL-2	U2-1	FC	Ryon, Maciej	Grab	Stage, Temp, pH, DO. Water appears very sediment laden, weather is over cast.
12/13/2005		UL-2	U2-2	FC	Ryon, Maciej	Grab	Stage, Temp, pH, DO. Water appears very sediment laden, weather is over cast.
12/13/2005		UL-2	U2-3	FC	Ryon, Maciej	Grab	Stage, Temp, pH, DO. Water appears very sediment laden, weather is over cast.
12/13/2005		UL-S	US-1	FC	Ryon, Maciej	Grab	Temp, pH, DO.
12/13/2005		UL-S	US-2	FC	Ryon, Maciej	Grab	Temp, pH, DO.
12/13/2005		UL-S	US-3	FC	Ryon, Maciej	Grab	Temp, pH, DO.
12/20/2005	1:10pm	UL-1	U1-1	FC	Heather, Maciej, Ryon	Grab	Flow, Stage, pH, DO, Clear sky
12/20/2005	1:10pm	UL-1	U1-2	FC	Heather, Maciej, Ryon	Grab	Flow, Stage, pH, DO, Clear sky
					Heather, Maciej,		
12/20/2005	1:10pm	UL-1	U1-3	FC	Ryon Heather	Grab	Flow, Stage, pH, DO, Clear sky
12/20/2005	2:00pm	UL-2	U2-1	FC	Maciej, Ryon	Grab	Stage, Temp. pH, DO , flow meter stopped functioning due to cold.
12/20/2005	2:00pm	UL-2	U2-2	FC	Heather, Maciej, Rvon	Grab	Stage, Temp. pH, DO , flow meter stopped functioning due to cold.
12/20/2005	2:00pm	UL-2	U2-3	FC	Heather, Maciej, Ryon	Grab	Stage, Temp. pH, DO , flow meter stopped functioning due to cold.
12/20/2005	1:45pm	UL-S	US-1	FC	Heather, Maciej, Ryon	Grab	Temp. pH, DO, weather clear and cold.
12/20/2005	1:45pm	UL-S	US-2	FC	Heather, Maciej, Ryon	Grab	Temp. pH, DO, weather clear and cold.
12/20/2005	1:45pm	UL-s	US-3	FC	Heather, Maciej, Ryon	Grab	Temp. pH, DO, weather clear and cold.
1/17/2006	12:45pm	UL-1	U1-1	FC	Ryon	Grab	Stage, Temp. pH, DO meter read Error 4 indication. Weather is mostly sunny and cold. Water appears to be very clear.
1/17/2006	12:45pm	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp. pH, DO meter read Error 4 indication. Weather is mostly sunny and cold. Water appears to be very clear.
1/17/2006	12:45pm	UL-1	U1-3	FC	Ryon	Grab	Stage, Temp. pH, DO meter read Error 4 indication. Weather is mostly sunny and cold. Water appears to be very clear.
1/17/2006	12:00pm	UL-2	U2-1	FC	Ryon	Grab	Stage, Temp, pH, DO, water is very clear, sunny very cold around 10F.
1/17/2006	12:00pm	UL-2	U2-2	FC	Ryon	Grab	Stage, Temp, pH, DO, water is very clear, sunny very cold around 10F.
1/17/2006	12:00pm	UL-2	U2-3	FC	Ryon	Grab	Stage, Temp, pH, DO, water is very clear, sunny very cold around 10F.
1/17/2006	1:25pm	UL_S	US-1	FC	Ryon	Grab	Ice depth exceeds 2 feet unable to sample. Weather is sunny and clear
1/17/2006	1:25pm	UL-S	US-2	FC	Ryon	Grab	Ice depth exceeds 2 feet unable to sample. Weather is sunny and clear
1/17/2006	1:25pm	UL-S	US-3	FC	Ryon	Grab	Ice depth exceeds 2 feet unable to sample. Weather is sunny and clear
1/31/2006	12:45pm	UL-1	U1-1	FC	Ryon, Bill	Grab	Temp, pH, DO, Flow meter stopped functioning due to low temperature, weather was partly cloudy, around 5 F
1/31/2006	12:45pm	UL-1	U1-2	FC	Ryon, Bill	Grab	Temp, pH, DO, Flow meter stopped functioning due to low temperature, weather was partly cloudy, around 5 F
1/31/2006	12:45pm	UL-1	U1-3	FC	Ryon, Bill	Grab	Temp, pH, DO, Flow meter stopped functioning due to low temperature, weather was partly cloudy, around 5 F

					Ryon,	<u> </u>	Flow, Stage, pH, DO, weather was partly cloudy, temper
1/31/2006	11:30am	UL-2	U2-1	FC	Bill Rvon.	Grab	about 5F Flow Stage pH DO weather was partly cloudy, temper
1/31/2006	11:30am	UL-2	U2-2	FC	Bill	Grab	about 5F
1/31/2006	11·30am	111-2	112-3	FC.	Ryon, Bill	Grah	Flow, Stage, pH, DO, weather was partly cloudy, temper
1/01/2000	11.50am		02 3		Ryon,	Grab	
1/31/2006		UL-S	US-1	FC	Bill	Grab	Ice Depth exceeds 2 feet unable to sample.
2/7/2006	1:00pm	UL-1	U1-1	FC	Ryon	Grab	Stage, Temp. pH, DO, water is somewhat cloudy,
2/7/2006	1:00pm	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp. pH, DO, water is somewhat cloudy,
2/7/2006	1:00pm	UL-1	U1-3	FC	Ryon	Grab	Stage, Temp. pH, DO, water is somewhat cloudy,
2/7/2006	12:10pm	UL-2	U2-1	FC	Ryon	Grab	Stage, Temp, pH, DO, water is clear, surface ice has melted, cloudy about 31F
2/7/2006	12:10pm	UL-2	U2-2	FC	Ryon	Grab	Stage, Temp, pH, DO, water is clear, surface ice has melted, cloudy about 31F
2/7/2006	12:10pm	UL-2	U2-3	FC	Ryon	Grab	Stage, Temp, pH, DO, water is clear, surface ice has melted, cloudy about 31F
2/7/2006	12:30nm	UL-S	US-1	FC	Rvon	Grab	Temp. pH, DO, evidence of flow from drain, water appeared to run over top of ice
2/1/2000	12.000111	02.0	001		Ryon	Ciub	Temp. pH, DO, evidence of flow from drain, water appeared
2/7/2006	12:30pm	UL-S	US-2	FC	Ryon	Grab	to run over top of ice.
2/7/2006	12:30pm	UL-S	US-3	FC	Ryon	Grab	to run over top of ice.
2/14/2006	12:00pm	UL-1	U1-1	FC	Ryon	Grab	Temp, pH, DO, weather was partly cloudy, cold around 25F
2/14/2006	12:00pm	UL-1	U1-2	FC	Ryon	Grab	Temp, pH, DO, weather was partly cloudy, cold around 25F
2/14/2006	12:00pm	UL-1	U1-3	FC	Ryon	Grab	Temp, pH, DO, weather was partly cloudy, cold around 25F
2/14/2006	10:43am	UL-2	U2-1	FC	Ryon	Grab	Temp, pH, DO, water is clear, weather partly cloudy.
2/14/2006	10:43am	UL-2	U2-2	FC	Ryon	Grab	Temp, pH, DO, water is clear, weather partly cloudy.
2/14/2006	10:43am	UL-2	U2-3	FC	Ryon	Grab	Temp, pH, DO, water is clear, weather partly cloudy.
2/14/2006	11:10am	UL-S	US-1	FC	Ryon	Grab	Temper, pH, DO, evidence of recent flow from drain.
2/14/2006	11:10am	UL-S	US-2	FC	Ryon	Grab	Temper, pH, DO, evidence of recent flow from drain.
2/14/2006	11:10am	UL-S	US-3	FC	Ryon	Grab	Temper, pH, DO, evidence of recent flow from drain.
3/15/2006	11:55am	UL-1	U1-1	FC	Ryon	Grab	Stage, Temp. pH, DO,
3/15/2006	11:55am	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp. pH, DO,
3/15/2006	11:55am	UL-1	U1-3	FC	Ryon	Grab	Stage, Temp. pH, DO,
3/15/2006	11:10am	UL-2	U2-1	FC	Ryon	Grab	Stage, Temp, pH, DO, partly cloudy
3/15/2006	11:10am	UL-2	U2-2	FC	Ryon	Grab	Stage, Temp, pH, DO, partly cloudy
3/15/2006	11:10am	UL-2	U2-3	FC	Ryon	Grab	Stage, Temp, pH, DO, partly cloudy
3/15/2006		UL-S		FC	Ryon	Grab	Ice to thick to sample
3/29/2006	12:30pm	UL-1	U1-1	FC	Ryon	Grab	Stage, Temp. pH, DO, water is cloudy, weather sunny about 41 F
3/29/2006	12:30pm	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp. pH, DO, water is cloudy, weather sunny about 41 F
3/29/2006	12:30pm	UL-1	U1-3	FC	Ryon	Grab	Stage, Temp. pH, DO, water is cloudy, weather sunny about 41 F
3/29/2006	11:45am	111-2	U2-1	FC	Rvon	Grab	Stage, Temp, pH, DO, water is somewhat clear, weather is
0,20,2000							Stage, Temp, pH, DO, water is somewhat clear, weather is
3/29/2006	11:45am	UL-2	U2-2	FC	Ryon	Grab	sunny, Stage, Temp, pH, DO, water is somewhat clear, weather is
3/29/2006	11:45am	UL-2	U2-3	FC	Ryon	Grab	sunny, Temp, pH, DO, very little flow from drain, no evidence of
3/29/2006	12:00pm	UL-S	US-1	FC	Ryon	Grab	large flow, still iced over, Temp pH DO very little flow from drain, no evidence of
3/29/2006	12:00pm	UL-S	US-2	FC	Ryon	Grab	large flow, still iced over,
3/29/2006	12:00pm	UL-S	US-3	FC	Ryon	Grab	large flow, still iced over,

F /0/0000	40.00			50	D	0	
5/2/2006	12:00pm	UL-1	01-1	FC	Ryon	Grab	Stage, Temp, pH, DO, water is clear sunny, about 45F
5/2/2006	12:00pm	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp, pH, DO, water is clear sunny, about 45F
5/2/2006	12:00pm	UL-1	U1-3	FC	Ryon	Grab	Stage, Temp, pH, DO, water is clear sunny, about 45F
5/2/2006	11:00am	UL-2	U2-1	FC	Ryon	Grab	Stage, Temp, pH, DO, water is very clear, snow still on banks, Mostly sunny about 45F
5/2/2006	11.00am	111-2	112-2	FC	Ryon	Grah	Stage, Temp, pH, DO, water is very clear, snow still on
5/2/2000	11.00411		02-2		TYON	Giab	Stage, Temp, pH, DO, water is very clear, snow still on
5/2/2006	11:00am	UL-2	U2-3	FC	Ryon	Grab	banks, Mostly sunny about 45F
5/2/2006	11:25am	UL-S	US-1	FC	Ryon	Grab	Temp, pH, DO, ice sheet still covering area, some evidence of recent water flow, but no flow at sample time.
5/2/2006	11:25am	UI-S	US-2	FC	Rvon	Grab	Temp, pH, DO, ice sheet still covering area, some evidence of recent water flow, but no flow at sample time.
5/2/2006	11:25am	UL-S	US-3	FC	Ryon	Grab	Temp, pH, DO, ice sheet still covering area, some evidence of recent water flow, but no flow at sample time.
= (4.4/00000	4.00			-0		<u> </u>	Stage, Temp, pH, DO, water somewhat cloudy can still see
5/11/2006	1:30pm	UL-1	U1-1	FC	Ryon	Grab	creek bttm, weather cloudy, about 54F
5/11/2006	1:30pm	UL-1	U1-2	FC	Ryon	Grab	creek bttm, weather cloudy, about 54F
					,		Stage, Temp, pH, DO, water somewhat cloudy can still see
5/11/2006	1:30pm	UL-1	U1-3	FC	Ryon	Grab	creek bttm, weather cloudy, about 54F
5/11/2006	12·45pm	UI -2	112-1	FC	Rvon	Grab	Stage, Temp, pH, DO, water alitte cloudy, large amount of algal growth, weather is cloudy
0/11/2000	12.400111		02 1		Ryon	Ciub	Stage, Temp, pH, DO, water alitte cloudy, large amount of
5/11/2006	12:45pm	UL-2	U2-2	FC	Ryon	Grab	algal growth, weather is cloudy,
5/11/2006	12:45pm	UL-2	U2-3	FC	Rvon	Grab	Stage, Temp, pH, DO, water alitte cloudy , large amount of algal growth, weather is cloudy.
							Temp, pH, DO, lake and site is ice Free, no flow from drain,
5/11/2006	1:00pm	UL-S	US-1	FC	Ryon	Grab	but noticable bubbles at underwater pipe.
5/11/2006	1.00pm	2-111	115-2	FC	Ryon	Grah	Temp, pH, DO, lake and site is ice Free, no flow from drain, but poticable bubbles at underwater pipe
3/11/2000	1.00pm	01-0	00-2		TYON	Giab	Temp, pH, DO, lake and site is ice Free, no flow from drain.
5/11/2006	1:00pm	UL-S	US-3	FC	Ryon	Grab	but noticable bubbles at underwater pipe.
5/22/2006	1:45pm	UL-1	U1-1	FC	Ryon	Grab	Stage, Temp, pH , DO, weather is sunny about 59F ,
5/22/2006	1:45pm	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp, pH , DO, weather is sunny about 59F ,
5/22/2006	1:45pm	UL-1	U1-3	FC	Rvon	Grab	Stage, Temp, pH, DO, weather is sunny about 59F.
5/22/2006	1:25pm	UL-2	U2-1	FC	Ryon	Grab	Stage, Temp, pH, DO , noticeable algal growth on creek bttm, weather is sunny about 59F
5/22/2006	1:25pm	UL-2	U2-2	FC	Ryon	Grab	Stage, Temp, pH, DO , noticeable algal growth on creek bttm, weather is sunny about 59F
5/22/2006	1:25pm	UL-2	U2-3	FC	Ryon	Grab	Stage, Temp, pH, DO , noticeable algal growth on creek bttm, weather is sunny about 59F
6/12/2006	12:09pm	UL-1	U1-1	FC	Ryon	Grab	Stage, Temp, pH, DO, weather is partly cloudy around 58F
6/12/2006	12:09pm	UL-1	U1-2	FC	Ryon	Grab	Stage, Temp, pH, DO, weather is partly cloudy around 58F
6/12/2006	12:09pm	UL-1	U1-3	FC	Ryon	Grab	Stage, Temp, pH, DO, weather is partly cloudy around 58F
6/12/2006	11:04am	11-2	112-1	FC	Rvon	Grab	Stage Temp pH DQ weather is parity cloudy
6/12/2000	11.0400		112.2	FC	Ryon	Grah	Stage Temp pH DO weather is parity cloudy.
6/12/2000	11.04am		112.2		Duer		Charge, Temp, pH, DO, weather is partly cloudy,
0/12/2006	11:04am	UL-2	02-3		rcyon	GIAD	Stage, Temp, pn, DO, weather is parity cloudy,
6/12/2006	11:45am	UL-S	US-1	FC	Ryon	Grab	I emp, pH, DO, no flow from drain, weather is partly cloudy.
6/12/2006	11:45am	UL-S	US-2	FC	Ryon	Grab	Temp, pH, DO, no flow from drain, weather is partly cloudy .
6/12/2006	11:45am	UL-S	US-3	FC	Ryon	Grab	Temp, pH, DO, no flow from drain, weather is partly cloudy.