

*Metropolitan Council  
Recycling Treated Municipal  
Wastewater for Industrial Water Use*

LCMR05-07d

MCES Project Number 070186

*TECHNICAL MEMORANDUM 2*

*Sampling Plan and Results*

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**Craddock Consulting Engineers**  
In Association with  
**CDM and James Crook**

# Technical Memorandum 2

## Sampling Plan and Results

### 1.0 Introduction

This technical memorandum is the second in a series of memoranda developed under a Metropolitan Council (Council) project titled "Recycling Treated Municipal Wastewater for Industrial Water Use." Funding for this project was recommended by the Legislative Commission on Minnesota Resources (LCMR) from the Minnesota Environment and Natural Resources Trust Fund. The Council is providing additional funding for the project through in-kind contributions of staff time. Other state agencies are participating via stakeholder meetings and technical review and input.

The project proposal to LCMR included the provision for the sampling of Council WWTPs if early project tasks determined that additional information was needed. Following completion of Task 1 of the project in June 2006, it was decided that the project would benefit from a better characterization of water quality constituents of concern applicable to a range of industries. This memorandum documents the sampling plan and the results.

### 1.1 Objectives

The goal of the sampling program was to define the concentrations of constituents of concern for industrial water use practices that are the more dominant uses of water in the state of Minnesota and for which use of reclaimed water is more likely. The sampling program targeted constituents that are not typically monitored in WWTP effluent.

### 1.2 Constituents of Concern

The historic water quality record of WWTP effluent is extensive for constituents of concern to the receiving waters. These constituents include carbonaceous or total biochemical oxygen demand (CBOD, TBOD, or BOD), total suspended solids (TSS), ammonia (NH<sub>3</sub>), total phosphorus (TP), and fecal coliform. These parameters are also important in characterizing the effluent quality and applicability for industrial use. However, there are many other constituents of concern for industrial applications and the majority of these are not commonly characterized in municipal WWTP effluent. Additional sampling is needed to accurately define the concentrations of these constituents in the WWTP effluent.

The industrial demand analysis of Technical Memorandum 1 of this project, titled "Implementation Issues and Customer Inventory", identified the major uses of water by industries in Minnesota and in more detail for the Minneapolis/St. Paul metropolitan area (metro area). One significant use of water in Minnesota is for cooling at power generation facilities and for other industrial processes. Use of reclaimed water for cooling water is common in states with established wastewater

reuse practices. The use of the Mankato WWTP treated effluent for cooling water use at the new Mankato Energy Center facility demonstrates that this practice has strong potential in Minnesota.

In addition to constituents of concern for cooling water, other constituents will be analyzed for boiler feed water use, and other industrial categories, such as pulp & paper (indicative of requirements for paper and print production, a significant water use in the metro area), general chemical processing, and materials production (cement). Table 1 lists cooling water and industrial process water quality requirements for several industries.

### **1.3 Study Boundaries**

The work program contained in the Agreement between the LCMR and Met Council limited the sampling program to Council facilities. With eight facilities of varying sizes, ground and surface community water supplies, a range of industrial dischargers, and different treatment processes, the sampling results will provide a range of values that can generally be applied across the state.

The effluent quality of a municipal WWTP is affected by many factors, including: the source water used by the community; industrial, commercial and domestic discharges to the WWTP; and the wastewater treatment processes (and recycles) of the WWTP. The range of concentrations for the constituents listed in Table 1 is expected to vary significantly over the state or even for WWTPs of communities using the same water supply. It is critical that a specific WWTP effluent be analyzed for the constituents of concern for each industry considering use of that reclaimed water supply.

While the sampling results of one facility can not be assumed directly for another facility, a potential range of concentrations can be assumed. A better understanding of variability in WWTP effluent quality for different plants will assist in determining the applicability of reclaimed water for a specific industry at a specific plant. The results can also help to identify where more sampling is required and can streamline additional sampling efforts.

## **2.0 Sampling Plan**

### **2.1 Constituents of Concern**

The constituents selected for the sampling program include those identified as a concern for general water uses or industry categories, as listed in Table 1, plus constituents that are anticipated to be regulated through a permit. The state of Minnesota uses the California Water Recycling Criteria for its regulatory review of water reuse practices, which includes limits for pathogens, organics, and solids. Total coliforms are the only regulated constituent for industrial water uses in the California Water Recycling Criteria. Table 2 lists all the constituents included for this sampling program.

**Table 1. Generalized Water Quality Criteria for Select Industrial Uses**

Constituent (in mg/L)	Cooling Water	Boiler Feed Water			Pulp & Paper			Chemical	Petrochem & Coal	Textiles		Cement
	(Makeup for Recirculating Systems)*	Low Pressure (<150 psig)	Medium Pressure (150-700 psig)	High Pressure (>700 psig)	Mechanical Piping	Chemical, Unbleached	Pulp & Paper, Bleached			Sizing Suspension	Scouring, Bleach & Dye	
Alkalinity (as CaCO <sub>3</sub> )	20-350	350	100	40	--	--	--	125	--	--	--	400
Aluminum (Al)	0.1	5	0.1	0.01	--	--	--	--	--	--	--	--
Calcium (Ca)	50	--	0.4	0.01	--	20	20	70	75	--	--	--
Chemical Oxygen Demand (COD)	45	5	5	1	--	--	--	--	--	--	--	--
Chloride (Cl)	100-500	--	--	--	1,000	200	200	500	300	--	--	250
Color (units)	--	--	--	--	30	30	10	20	25	5	5	--
Copper (Cu)	--	0.5	0.05	0.05	--	--	--	--	0.05	0.01	--	--
Dissolved Oxygen (DO)	--	2.5	0.007	0.007	--	--	--	--	--	--	--	--
Iron (Fe)	0.5	1	0.3	0.05	0.3	1	0.1	0.1	1	0.3	0.1	2.5
Hardness (as CaCO <sub>3</sub> )	130-650	350	1	0.07	--	100	100	250	350	25	25	--
Bicarbonate (HCO <sub>3</sub> )	25-200	170	120	48	--	--	--	130	450	--	--	--
Magnesium (Mg)	--	--	0.25	0.01	--	12	12	20	30	--	--	--
Manganese (Mn)	0.5	0.3	0.1	0.01	0.1	0.5	0.05	0.1	--	0.05	0.01	0.5
Ammonia (NH <sub>3</sub> )	24	0.1	0.1	0.1	--	--	--	--	40	--	--	--
Nitrate (NO <sub>3</sub> )	--	--	--	--	--	--	--	5	10	--	--	--
Phosphorus (total: TP)	1	--	--	--	--	--	--	--	--	--	--	--
pH (units)	--	--	--	--	6 – 10	6 – 10	6 – 10	5.5-9.0	6 – 9	--	--	6.5 – 8.5
Silicondioxide (SiO <sub>2</sub> )	50	30	10	0.7	--	50	50	50	60	--	--	35
Sulfate (SO <sub>4</sub> )	200	--	--	--	--	--	--	100	600	--	--	250
Total Dissolved Solids (TDS)	500	700	500	200	--	--	--	1,000	1,000	100	100	600
Total Suspended Solids (TSS)	100	10	5	0.5	--	10	10	5	10	5	5	500
Zinc (Zn)	--	--	0.01	0.01	--	--	--	--	--	--	--	--

\*Maximum of value range refers to concentration in final cooling stream discharge.

Source: Adapted from Water Pollution Control Federation, 1989; Goldstein et al, 1970; Metcalf & Eddy, 2007.

As shown in Table 2, there are several constituents that are routinely analyzed by Council, typically as part of their NPDES Permit requirements. The sampling program funded under this project included only those constituents not routinely sampled at each WWTP, listed in Table 3.

**Table 2. Constituents to Characterize in Sampling Program**

Constituent	Unit	Routinely Sampled (x=yes)
Alkalinity (as CaCO <sub>3</sub> )	mg/L	
Aluminum (Al)	mg/L	
Calcium (Ca)	mg/L	
Carbonaceous Biochemical Oxygen Demand (CBOD)	mg/L	X
Chemical Oxygen Demand (COD)	mg/L	X
Chloride (Cl)	mg/L	
Color	units	
Dissolved Oxygen (DO)	mg/L	X
E. Coli	-	
Fecal Coliform	No./100 ml	X
Iron (Fe)	mg/L	
Hardness (as CaCO <sub>3</sub> )	mg/L	
Bicarbonate (HCO <sub>3</sub> )	mg/L	
Magnesium (Mg)	mg/L	
Manganese (Mn)	mg/L	
Ammonia (NH <sub>3</sub> )	mg/L	X
Nitrate (NO <sub>3</sub> )	mg/L	X
Orthophosphate (PO <sub>4</sub> )	mg/L	X
Phosphorus (total: TP)	mg/L	X
pH	units	X
Silicon Dioxide (SiO <sub>2</sub> )	mg/L	
Sulfate (SO <sub>4</sub> )	mg/L	
Total Coliform	No./100 ml	
Total Dissolved Solids (TDS)	mg/L	
Total Organic Carbon (TOC)	mg/L	
Total Suspended Solids (TSS)	mg/L	X
Turbidity	NTU	

**Table 3. Sampling Program Constituents**

Alkalinity (as CaCO<sub>3</sub>)  
Aluminum (Al)  
Bicarbonate (HCO<sub>3</sub>)  
Calcium (Ca)  
Chloride (Cl)  
Color  
E. Coli  
Iron (Fe)  
Hardness (as CaCO<sub>3</sub>)  
Magnesium (Mg)  
Manganese (Mn)  
Silicondioxide (SiO<sub>2</sub>)  
Sulfate (SO<sub>4</sub>)  
Total Coliform  
Total Dissolved Solids (TDS)  
Total Organic Carbon (TOC)  
Turbidity

## 2.2 Sample Type, Collection, and Location

The Council handled all sampling and laboratory analyses. Samples were collected at the same location used to characterize the final effluent for permit monitoring. The routinely collected daily sample at the Metro Plant was used for this project's sampling program. An additional sampler was required at the other three plants because there is an insufficient sample volume routinely collected at those facilities for the additional analyses required by this sampling program. The samplers collected flow-weighted 24-hour composite samples, except at the Empire WWTP, which provided a time-weighted composite sample. The Council's Industrial Waste department staff setup and managed the sampler operation. Operators at each plant collected this program's samples at the same time as they collected the routine effluent samples.

The first sampling period included 8-15 samples collected over a three week period in late October to early November. Samples were collected on weekdays and weekends whenever routine samples were collected. After review of the Fall 2006 results it was determined that additional sampling would strengthen confidence in understanding constituent variability. A spring sampling schedule was performed: during the first three weeks of April, 8-12 samples were analyzed for the constituents listed in Table 3. All available data for the routine monitoring program were obtained for the similar time periods. The sample count varied with each plant based on the NPDES permit requirements.

Samples were collected at four Council WWTPs:

- Blue Lake
- Empire
- Metropolitan
- Seneca

## 3.0 Sampling Results

The sampling program developed for this project provided an initial base of information that was used for various tasks in the project, including:

- general characterizations of effluent water quality for Minnesota WWTPs
- plant-specific information to compare the effluent quality of the Council's four largest WWTPs

This technical memorandum serves to document the data and provide summary information on the effluent quality of the four Council WWTPs evaluated.

### 3.1 General Summary

The constituents analyzed in this project's sampling program, indicate that hardness and salt concentrations occur at concentration thresholds of concern for a range of industrial water uses. Similar to the results of Technical Memorandum 5, *Wastewater Treatment Plant Effluent Quality*, which reviewed general water quality parameters for all of Minnesota's WWTPs, the NPDES permitted constituents for the four WWTPs were well below required limits and had low variability in the samples measured.

Table 4 provides the mean and standard deviation of the samples collected for the Fall 2006 and Spring 2007 sampling periods. The recommended limits for each constituent as it relates to cooling water uses, is provided in the third column. Exhibit A provides additional statistics for this table, such as minimum and maximum values, and the number of samples the statistics are based upon. It also contains recommended limits for various industrial water uses in a format similar to Table 4. Exhibits B-D provide data for each WWTP.

The Fall 2006 sampling data were evaluated with time series plots to look for any outliers and see if any trends existed. Given that this is a small data set (8-28 samples), this effort was used more to screen and identify any gross trends. Additional data will need to be reviewed over a longer period of time to define any trends.

**Table 4. Wastewater Recycling Sampling Program Summary Results<sup>1</sup>**

Constituent	Unit	Limit <sup>2</sup>	Blue Lake		Empire		Metro		Seneca	
			Mean	St Dev <sup>3</sup>	Mean	St Dev	Mean	St Dev	Mean	St Dev
Alkalinity (as CaCO <sub>3</sub> )	mg/L	20-350	293	10	246	20	157	15	184	14
Aluminum (Al)	mg/L	0.1	0.022	0.008	0.023	0.006	0.030	0.004	0.024	0.002
Ammonia (NH <sub>3</sub> )	mg/L	24	0.182	0.068	0.2	0.3	0.216	0.34	0.117	0.110
Bicarbonate (HCO <sub>3</sub> )	mg/L as CaCO <sub>3</sub>	25-200	300	8	256	31	157	20	182	6
Calcium (Ca)	mg/L	50	93.2	3.8	82.2	4.5	72.2	4.4	62.9	5.3
Carbonaceous Biochemical Oxygen Demand (CBOD)	mg/L	<20	3.0	0.0	3.2	0.9	3.2	0.5	3.3	1.4
Chemical Oxygen Demand (COD)	mg/L	*	34.1	5.1	37.4	5.0	32.2	3.4	34.1	4.4
Chloride (Cl)	mg/L	50-500	387	34	387	28	239	11	285	27
Color	units	*	51	7	58	7	45	8	61	13
Copper (Cu)	mg/L	*	-	-	-	-	5.06	0.45	-	-
Dissolved Oxygen (DO)	mg/L	*	8.63	0.43	8.6	0.5	5.8	0.9	8.88	0.55
E. Coli	No./100ml	*	731	572	7	5	283	349	57	120
Fecal Coliform	No./100ml	*	75	66	15	17	68	80	33	55
Hardness (as CaCO <sub>3</sub> )	mg/L as CaCO <sub>3</sub>	130-650	351	17	293	16	258	15	243	14
Iron (Fe)	mg/L	0.5	0.076	0.015	0.105	0.023	0.068	0.018	0.133	0.043
Magnesium (Mg)	mg/L	*	35.9	1.8	27.6	1.3	24.0	0.6	25.4	1.2
Manganese (Mn)	mg/L	0.5	0.015	0.004	0.038	0.023	0.016	0.003	0.035	0.024
Nitrate (NO <sub>3</sub> )	mg/L	*	10.97	0.83	15.8	2.5	16.4	1.8	15.9	1.4
Orthophosphate (PO <sub>4</sub> )	mg/L	*	0.406	0.289	0.057	0.125	0.259	0.197	0.968	0.801
Phosphorus (total: TP)	mg/L	1	0.485	0.164	0.340	0.109	0.457	0.246	1.500	0.855
pH		*	7.3	0.2	7.0	0.1	7.0	0.1	7.1	0.1
Silicondioxide (SiO <sub>2</sub> ) or Silica	mg/L	50	22	2	19	1	17	0	18	2
Sulfate (SO <sub>4</sub> )	mg/L	200	51.12	9.17	39.81	4.51	74.73	6.67	374.30	200.30
Total Collform	No./100 ml	<23	3,496	1,150	499	721	3,798	2,655	2,491	2,175
Total Dissolved Solids (TDS)	mg/L	500	1,097	80	1,130	166	805	37	1,326	299
Total Organic Carbon (TOC)	mg/L	*	8.1	0.7	9.4	1.0	8.0	0.6	8.4	0.7
Total Suspended Solids (TSS)	mg/L	20-100	1.7	1.0	3	2	2.4	0.8	3.1	1.2
Turbidity	NTU	*	2	0	4	1	2	0	3	1

<sup>1</sup>Based on Fall 2006 and Spring 2007 sampling periods; see Exhibits for daily data and additional statistics<sup>2</sup>Cooling Water (USEPA, 2004); variable range related to amount of recycling and materials of construction; high range is typically maximum in blowdown/final water<sup>3</sup>St Dev = one standard deviation

## 3.2 Specific Constituents of Concern

Constituents exceeding the recommended limits for cooling water use or higher water quality uses were evaluated in more detail. The mean and standard deviation for the following constituents are summarized in Figures 1-8 at the end of the memorandum:

- Alkalinity
- Bicarbonate
- Calcium
- Chloride
- Hardness
- Silica
- Sulfate
- TDS

Lower hardness, alkalinity, calcium and bicarbonate concentrations would be expected for softer source water areas. A large percentage of the Metropolitan WWTP's service area is provided lime softened water by Minneapolis and St. Paul. The City of Bloomington has a lime softened water supply and contributes to a significant portion of the Seneca WWTP's influent. The Seneca WWTP also had lower average values for constituents characterizing hardness, as shown in Figures 1-4.

High WWTP effluent chloride concentrations often occur in areas with hard source water because of the increased loadings to the WWTP from the brine discharges of domestic water softeners or the concentrate streams from commercial or industrial softening systems. Figure 5 indicates this inference applies to the Council facilities evaluated. The Metro WWTP chloride concentration averaged 240 mg/L and never exceeded 265 mg/L. The Seneca WWTP had chloride concentrations averaging around 300 mg/L. The Empire and Blue Lake WWTP chloride concentrations averaged nearly 400 mg/L and had a wider range of variability.

All four WWTPs exceed chloride concentrations required for cooling water with systems recycling water more than 2 times. At concentrations greater than 500 mg/L there is concern with corrosion. This threshold will vary with materials of construction, and is referenced for 316 stainless steel condenser tubes (personal communication with D. Taylor, Great River Energy).

Chloride concentration in WWTP effluent has also been linked to the influence of infiltration and inflow (I&I) and chlorides imparted from road salt. The City of Oconomowoc, Wisconsin has monitored chlorides for ten years and found evidence of significant chloride contributions from chloride in soil below roadbeds that accumulated from road salting (personal communications with Tom Steinbach, City of Oconomowoc). The longer-term monitoring indicated that the highly variable loadings of chlorides can be inaccurately characterized with limited sampling (e.g. one sample each quarter).

Total dissolved solids (TDS) concentrations, which often follow chloride concentrations, did not have as extreme a difference between the WWTPs, as shown in Figure 6. The Metro WWTP was the lowest and had fairly low variability, averaging 800 mg/L of TDS. The Seneca WWTP had the highest average concentration with a high variability (no outliers were removed), averaging over 1,300 mg/L. The Blue Lake and Empire WWTPs averaged around 1,100 mg/L and the Metro WWTP was the lowest at 800 mg/L. All the facilities exceed recommended limits for a variety of industrial water uses. TDS concentrations over 1,000 mg/L are also not recommended for some irrigation practices, which includes landscape irrigation by an industry. If multiple-use options are considered and urban or agricultural irrigation is integrated with an industrial reuse system, a more detailed analysis of the dissolved solids would be required.

Silica concentrations averaged about 20 mg/L for all the facilities. These were acceptable levels for cooling water uses, but other uses, as for boiler feed water, would require silica removal to meet levels below 1 mg/L. Sulfate was not a concern at any of the plants except Seneca. The sulfate concentrations were highly variable, averaging 375 mg/L with a standard deviation of 200 mg/L. The implications of high sulfates would depend on the application for cooling water and could affect the treatment process selection. It is also a constituent that could be controlled at the WWTP or through source control if there is a known industrial contributor.

### **3.3 Results Summary and Next Steps**

The sampling program initiated by this study provides a basis for the Council to consider a more routine sampling program for constituents that are poorly characterized in their WWTP effluent. It also provides information to other facilities that are considering wastewater recycling applications, particularly the parameters they should target.

The sampling results demonstrated how the Metropolitan WWTP's larger size dampens the variability. The standard deviations for most constituents were the lowest at the Metropolitan Plant. The concentrations of the constituents documented in Section 3.2 were also the lowest at the Metropolitan WWTP. This was likely a function of the source water (softened) and also the ability to dampen any industry or other specific discharges with more consistent quality sources.

It is recommended that additional data review and coordination with specific industries be conducted to establish a shorter list of parameters and identify those needing more samples to characterize variability. Incorporation of constituents of concern for potential treatment technologies should also be included in future sampling programs. For example, membrane modeling and pilot studies rely on specific ions as limiting factors to measure membrane performance. These dissolved ions may not be considered a concern for the industry, but are important in assessing treatment options.

The variability in the approximately 25 samples analyzed for each plant in this study indicates that additional sampling is warranted. At a minimum, chloride and TDS should be monitored, with a frequency of twice a week or more. These constituents have a higher variability at each plant than most constituents and are important parameters in assessing the application for a variety of water uses, as well as membrane system sizing. The WWTP effluent sampling program can add other parameters once more defined goals are in place on the potential uses of reclaimed water and the treatment technologies under consideration.

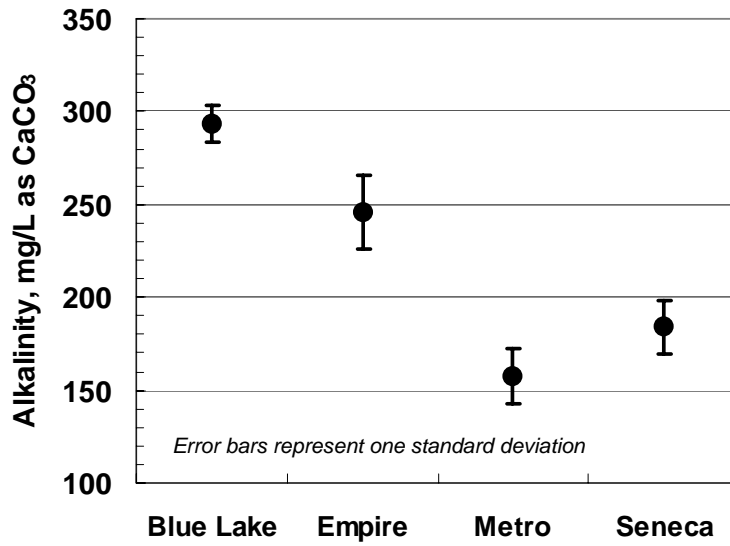


Figure 1. Average Alkalinity Concentration

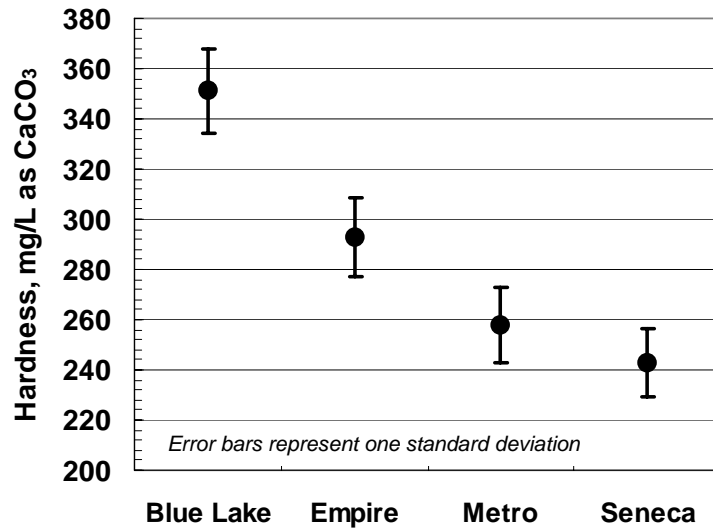


Figure 2. Average Hardness Concentration

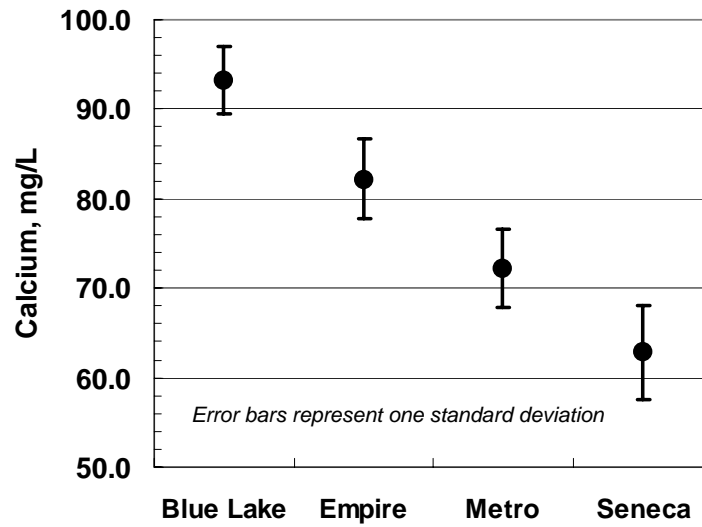


Figure 3. Average Calcium Concentration

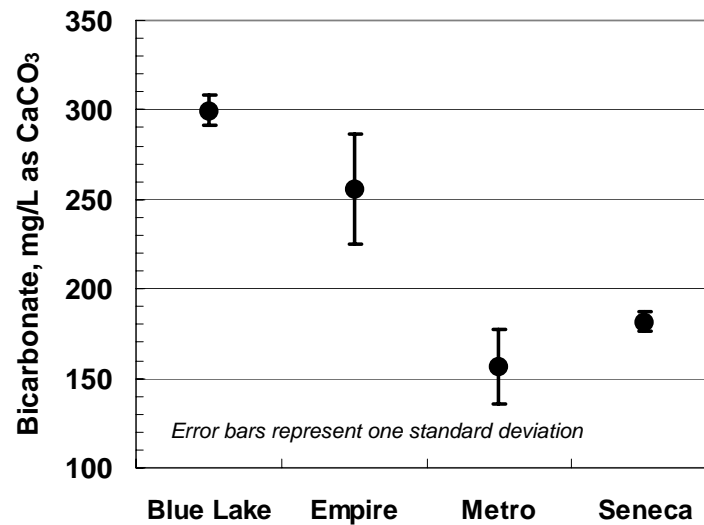


Figure 4. Average Bicarbonate Concentration

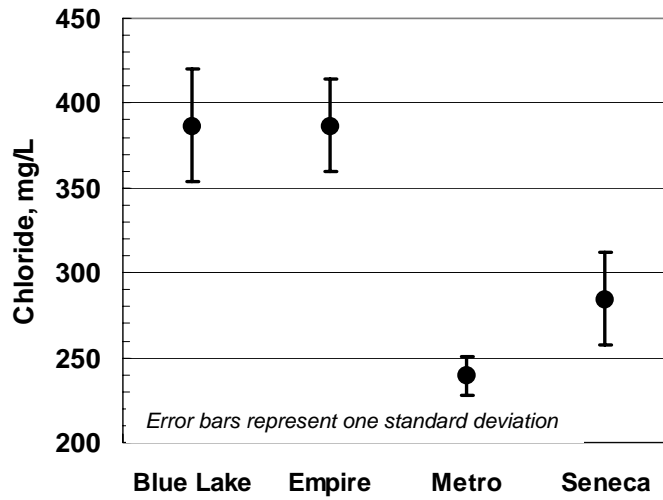


Figure 5. Average Chloride Concentration

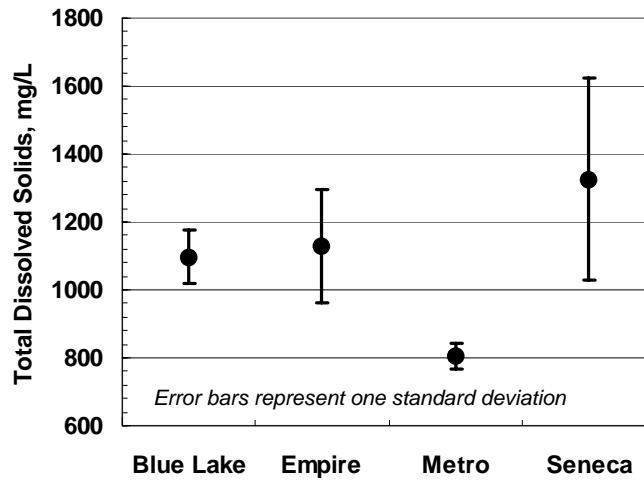
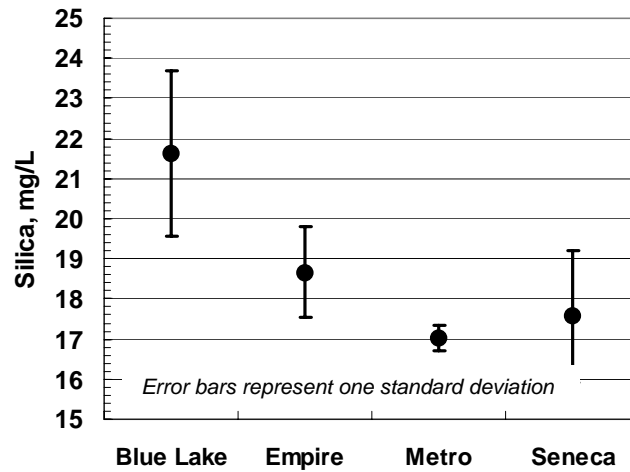
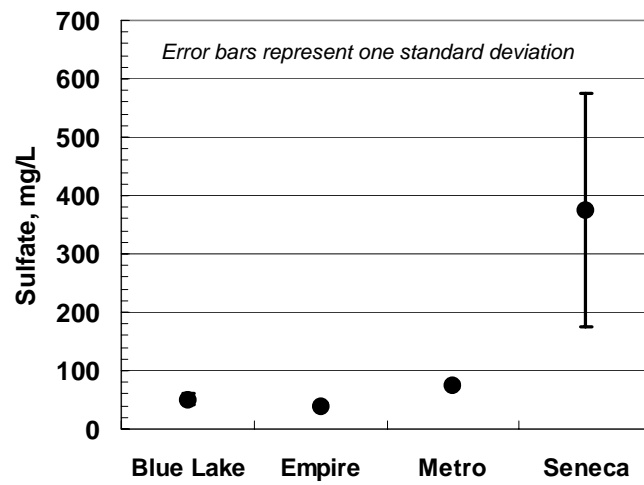


Figure 6. Average Total Dissolved Solids Concentration



**Figure 7. Average Silica Concentration**



**Figure 8. Average Sulfate Concentration**

# **Exhibit A**

## **Summary Results**

**Recommended Limits for Various Industrial Water Uses**

Constituent	Unit	Limit <sup>1</sup>	Limit <sup>2</sup>	Limit <sup>3</sup>	Limit <sup>4</sup>	Limit <sup>5</sup>	Limit <sup>6</sup>	Limit <sup>7</sup>	Limit <sup>8</sup>	Limit <sup>9</sup>	Limit <sup>10</sup>	Limit <sup>11</sup>	Limit <sup>12</sup>	Limit <sup>13</sup>
Alkalinity (as CaCO <sub>3</sub> )	mg/L	20-350	350	100	40	*	*	*	125	*	*	*	400	20
Aluminum (Al)	mg/L	0.1	5	0.1	0.01	*	*	*	*	*	*	*	*	0.5
Ammonia (NH <sub>3</sub> )	mg/L	24	0.1	0.1	0.1	*	*	*	*	*	*	*	*	*
Bicarbonate (HCO <sub>3</sub> )	mg/L	25-200	170	120	48	*	*	*	128	*	*	*	*	*
Calcium (Ca)	mg/L	50	*	0.4	0.01	*	20	20	68	75	*	*	*	*
Carbonaceous Biochemical Oxygen Demand (CBOD)	mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Chemical Oxygen Demand (COD)	mg/L	*	5	5	1	*	*	*	*	*	*	*	*	*
Chloride (Cl)	mg/L	500	*	*	*	1000	200	200	500	300	*	*	250	2
Color		*	*	*	*	30	30	10	20	*	5	5	*	*
Copper (Cu)	mg/L	*	*	*	*	*	*	*	*	0.05	0.01	*	*	*
Dissolved Oxygen (DO)	mg/L	*	2.5	0.007	0.007	*	*	*	*	*	*	*	*	*
E. Coli		*	*	*	*	*	*	*	*	*	*	*	*	*
Fecal Coliform		*	*	*	*	*	*	*	*	*	*	*	*	*
Hardness (as CaCO <sub>3</sub> )	mg/L	130-650	350	1	0.07	*	100	100	250	350	25	25	*	20
Iron (Fe)	mg/L	0.5	1	0.3	0.05	0.3	1	0.1	0.1	1	0.3	0.1	2.5	0.05
Magnesium (Mg)	mg/L	*	*	0.25	0.01	*	12	12	19	30	*	*	*	*
Manganese (Mn)	mg/L	0.5	0.3	0.1	0.01	0.1	0.5	0.05	0.1	*	0.05	0.01	0.5	0.01
Nitrate (NO <sub>3</sub> )	mg/L	*	*	*	*	*	*	*	5	*	*	*	*	*
Orthophosphate (PO <sub>4</sub> )	mg/L	*	*	*	*	*	*	*	*	*	*	*	*	*
Phosphorus (total: TP)	mg/L	1	*	*	*	*	*	*	*	*	*	*	*	1
pH		*	*	*	*	6-10	6-10	6-10	6.2-8.3	6-9	*	*	6.5-8.5	6.5-8.5
Silicondioxide (SiO <sub>2</sub> ) or Silica	mg/L	50	30	10	0.7	*	50	50	50	*	*	*	35	*
Sulfate (SO <sub>4</sub> )	mg/L	200	*	*	*	*	*	*	100	*	*	*	250	3
Total Coliform		*	*	*	*	*	*	*	*	*	*	*	*	*
Total Dissolved Solids (TDS)	mg/L	500	700	500	200	*	*	*	1000	1000	100	100	600	*
Total Organic Carbon (TOC)	mg/L	*	*	*	*	*	*	*	*	*	*	*	*	6
Total Suspended Solids (TSS)	mg/L	100	10	5	0.5	*	10	10	5	10	5	5	500	0.5
Turbidity		*	*	*	*	*	*	*	*	*	*	*	*	*
Zinc (Zn)	mg/L	*	*	0.01	0.01	*	*	*	*	*	*	*	*	*

<sup>1</sup> Cooling Water (USEPA, 2004): variable range related to amount of recycling and materials of construction; high range is typically maximum in blowdown/final water

<sup>2</sup> Industrial Boiler Feed Water (low pressure) (Table 2-8, Technical Memorandum "Recycling Treated Wastewater for Industrial Water Use in Minnesota: Implementation Issues and Customer Inventory)

<sup>3</sup> Industrial Boiler Feed Water (medium pressure) (Table 2-8, Technical Memorandum "Recycling Treated Wastewater for Industrial Water Use in Minnesota: Implementation Issues and Customer Inventory)

<sup>4</sup> Industrial Boiler Feed Water (high pressure) (Table 2-8, Technical Memorandum "Recycling Treated Wastewater for Industrial Water Use in Minnesota: Implementation Issues and Customer Inventory)

<sup>5</sup> Pulp & Paper (Mechanical Pulping) (USEPA, 2004)

<sup>6</sup> Pulp & Paper (Chemical, Unbleached)(USEPA, 2004)

<sup>7</sup> Pulp & Paper (bleached) (USEPA, 2004)

<sup>8</sup> Chemical Processing (USEPA, 2004)

<sup>9</sup> Petrochem & Coal (USEPA, 2004)

<sup>10</sup> Textile (Sizing Suspension) (USEPA, 2004)

<sup>11</sup> Textile (Scouring, Bleach & Dye) (USEPA, 2004)

<sup>12</sup> Cement (USEPA, 2004)

<sup>13</sup> Ethanol process water (personal communications with undisclosed ethanol plant developers)

**Wastewater Recycling Sampling Program Summary Results<sup>1</sup>**

Constituent	Unit	Limit <sup>2</sup>	Limit <sup>3</sup>	Blue Lake					Empire					Metro					Seneca				
				Mean	St Dev <sup>4</sup>	Min	Max	Number	Mean	St Dev	Min	Max	Number	Mean	St Dev	Min	Max	Number	Mean	St Dev	Min	Max	Number
Alkalinity (as CaCO <sub>3</sub> )	mg/L	20-350	40	293	10	274	311	24	246	20	179	274	27	157	15	141	202	29	184	14	169	242	25
Aluminum (Al)	mg/L	0.1	0.01	0.022	0.008	0.012	0.051	24	0.023	0.006	0.013	0.034	27	0.030	0.004	0.020	0.037	29	0.024	0.002	0.018	0.028	25
Ammonia (NH <sub>3</sub> )	mg/L	24	0.1	0.182	0.068	0.060	0.330	37	0.2	0.3	0.1	2.0	43	0.216	0.338	0.020	2.320	61	0.117	0.110	0.030	0.620	40
Bicarbonate (HCO <sub>3</sub> )	mg/L as CaCO <sub>3</sub>	25-200	48	300	8	272	309	19	256	31	214	367	19	157	20	84	185	19	182	6	174	193	19
Calcium (Ca)	mg/L	50	0.01	93.2	3.8	87.3	101.0	24	82.2	4.5	65.4	88.0	27	72.2	4.4	67.2	80.2	29	62.9	5.3	58.5	86.6	25
Carbonaceous Biochemical Oxygen Demand (CBOD)	mg/L	*	*	3.0	0.0	3.0	3.0	30	3.2	0.9	3.0	8.0	35	3.2	0.5	3.0	5.0	61	3.3	1.4	3.0	11.0	33
Chemical Oxygen Demand (COD)	mg/L	*	1	34.1	5.1	21.0	48.0	37	37.4	5.0	24.0	52.0	39	32.2	3.4	22.0	39.0	61	34.1	4.4	28.0	48.0	40
Chloride (Cl)	mg/L	500	*	387	34	280	426	24	387	28	295	419	24	239	11	208	262	29	285	27	261	402	24
Color		*	*	51	7	36	61	12	58	7	47	77	12	45	8	33	62	12	61	13	41	78	12
Copper (Cu)	mg/L	*	*	-	-	-	-	-	-	-	-	-	-	5.06	0.45	4.5	5.7	5	-	-	-	-	-
Dissolved Oxygen (DO)	mg/L	*	0.007	8.63	0.43	7.50	10.40	50	8.6	0.5	7.5	10.1	54	5.8	0.9	3.0	8.5	61	8.88	0.55	8.01	10.02	54
E. Coli	No./100ml	*	*	731	572	96	2092	26	7	5	3	22	14	283	349	1	3973	22	57	120	4	548	22
Fecal Coliform	No./100ml	*	*	75	66	7	260	36	15	17	2	54	29	68	80	2	500	54	33	55	2	290	38
Hardness (as CaCO <sub>3</sub> )	mg/L as CaCO <sub>3</sub>	130-650	0.07	351	17	324	384	24	293	16	240	312	27	258	15	242	290	29	243	14	228	302	25
Iron (Fe)	mg/L	0.5	0.05	0.076	0.015	0.048	0.100	24	0.105	0.023	0.074	0.192	27	0.068	0.018	0.049	0.150	29	0.133	0.043	0.084	0.256	25
Magnesium (Mg)	mg/L	*	0.01	35.9	1.8	30.1	39.3	24	27.6	1.3	24.8	29.4	27	24.0	0.6	22.7	25.0	29	25.4	1.2	23.5	29.8	25
Manganese (Mn)	mg/L	0.5	0.01	0.015	0.004	0.009	0.027	24	0.038	0.023	0.008	0.097	27	0.016	0.003	0.010	0.023	29	0.035	0.024	0.011	0.094	25
Nitrate (NO <sub>3</sub> )	mg/L	*	*	10.97	0.83	8.99	12.6	37	15.8	2.5	11.5	20.3	24	16.4	1.8	11.9	19.0	45	15.9	1.4	14.1	19.2	40
Orthophosphate (PO <sub>4</sub> )	mg/L	*	*	0.406	0.289	0.167	1.370	24	0.057	0.125	0.006	0.614	27	0.259	0.197	0.093	0.810	29	0.968	0.801	0.019	3.050	25
Phosphorus (total: TP)	mg/L	1	*	0.485	0.164	0.290	0.860	37	0.340	0.109	0.190	0.710	28	0.457	0.246	0.200	1.500	61	1.500	0.855	0.560	3.700	40
pH		*	*	7.3	0.2	7.0	7.8	50	7.0	0.1	6.6	7.4	54	7.0	0.1	6.7	7.3	59	7.1	0.1	6.5	7.3	54
Silicondioxide (SiO <sub>2</sub> ) or Silica	mg/L	50	0.7	22	2	13	23	24	19	1	16	20	27	17	0	16	18	29	18	2	16	22	25
Sulfate (SO <sub>4</sub> )	mg/L	200	*	51.1	9.2	39.7	83.1	24	39.8	4.5	23.8	47.1	26	74.7	6.7	63.4	93.8	29	374.3	200.3	39.7	724.2	25
Total Coliform		*	*	3,496	1,150	2,450	4,920	22	499	721	104	2,450	10	3,798	2,655	1,300	10,000	17	2,491	2,175	106	8,812	18
Total Dissolved Solids (TDS)	mg/L	500	200	1,097	80	875	1,260	24	1,130	166	961	1,920	27	805	37	716	907	29	1,326	299	900	1,960	25
Total Organic Carbon (TOC)	mg/L	*	*	8.1	0.7	7.0	10.0	23	9.4	1.0	7.6	11.8	27	8.0	0.6	7.0	9.2	29	8.4	0.7	7.3	9.6	25
Total Suspended Solids (TSS)	mg/L	100	0.5	1.7	1.0	1.0	6.0	37	3	2	1	15	43	2.4	0.8	1.0	4.0	61	3.1	1.2	1.0	7.0	40
Turbidity		*	*	2	0	1	3	24	4	1	1	5	27	2	0	1	3	29	3	1	2	5	25

<sup>1</sup>Based on Fall 2006 and Spring 2007 sampling periods; see other Exhibits for daily data

<sup>2</sup>Cooling Water (USEPA, 2004); variable range related to amount of recycling and materials of construction; high range is typically maximum in blowdown/final water

<sup>3</sup>Industrial Boiler Feed Water (high pressure) (Table 2-8, Technical Memorandum "Recycling Treated Wastewater for Industrial Water Use in Minnesota: Implementation Issues and Customer Inventory)

<sup>4</sup>St Dev = one standard deviation

**Exhibit B**  
**Blue Lake WWTP Sampling Results**



**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO3	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO3	Calcium mg/L	CBOD mg/L
10/8/06	Sunday	25.92	288	0.019	0.26	306	92.9	3
10/9/06	Monday	26.78	286	0.018	0.26	303	90.6	<3
10/10/06	Tuesday	26.41	284	0.018	0.22	295	89.4	<3
10/11/06	Wednesday	26.82	288	0.051	0.24	297	90.9	<3
10/12/06	Thursday	26.22	302	0.019	0.19	306	92.5	
10/13/06	Friday	26.31						
10/14/06	Saturday	26						
10/15/06	Sunday	25.84	301	0.018	0.17	309	91.6	<3
10/16/06	Monday	26.93	289	0.018	0.18	299	89.3	<3
10/17/06	Tuesday	26.14	281	0.012	0.19	294	88.8	<3
10/18/06	Wednesday	26.1	281	0.033	0.18	291	89.4	3
10/19/06	Thursday	25.98	297	0.027	0.18	304	92.2	
10/20/06	Friday	25.25						
10/21/06	Saturday	25.16						
10/22/06	Sunday	25.75	301	0.027	0.16	305	93.1	3
10/23/06	Monday	26.58	293	0.024	0.13	303	92.1	<3
10/24/06	Tuesday	25.99	286	0.017	0.15	299	89.7	<3
10/25/06	Wednesday	25.95	278	0.016	0.14	301	91.3	<3
10/26/06	Thursday	25.94	289	0.018	0.16	307	93.4	
10/27/06	Friday	26.19						
4/1/07	Sunday	40.54			0.14			<3
4/2/07	Monday	34.3	274	0.025	0.06	272	87.3	<3
4/3/07	Tuesday	32.15			0.09			<3
4/4/07	Wednesday	31.26	308	0.016	0.23		97.6	<3
4/5/07	Thursday	30.54	311	0.017	0.08	304	99.1	
4/6/07	Friday	30.12						
4/7/07	Saturday	29.98						
4/8/07	Sunday	29.22	305	0.015	0.09		96.2	<3
4/9/07	Monday	29.83	291	0.017	0.09	302	96.4	<3
4/10/07	Tuesday	29			0.13			<3
4/11/07	Wednesday	30.03	301	0.027	0.16	295	98.1	<3
4/12/07	Thursday	29.85			0.18			
4/13/07	Friday	30.15						
4/14/07	Saturday	30.03						
4/15/07	Sunday	29.52	303	0.021	0.33		98.2	<3
4/16/07	Monday	29.8	298	0.022	0.29		96.7	3
4/17/07	Tuesday	28.55			0.26			3
4/18/07	Wednesday	28.59			0.32			3
4/19/07	Thursday	28.67	297	0.024	0.29		101	
4/20/07	Friday	28.22						
4/21/07	Saturday	27.79						
4/22/07	Sunday	28.53			0.19			<3
4/23/07	Monday	32.17			0.15			<3
4/24/07	Tuesday	29.76			0.22			3
4/25/07	Wednesday	29.22			0.23			3
4/26/07	Thursday	28.82			0.16			
4/27/07	Friday	28.58						

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO3	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO3	Calcium mg/L	CBOD mg/L
4/28/07	Saturday	28.22						
4/29/07	Sunday	27.98			0.12			3
4/30/07	Monday	28.63			0.12			<3
Mean		28.45	293.00	0.02	0.18	299.58	93.24	3.00
Standard Deviation		2.70	9.92	0.01	0.07	8.30	3.77	0.00
Min		25.16	274	0.012	0.06	272	87.3	3
Max		40.54	311	0.051	0.33	309	101	3
No. of Samples		50	24	24	37	19	24	30
* Not included in statistics								

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	COD mg/L	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli mpn/100ml	Hardness mg/L CaCO3
10/8/06	Sunday	34	415			8.2			360
10/9/06	Monday	29	410			8.6		38	344
10/10/06	Tuesday	32	407			8.7		38	334
10/11/06	Wednesday	31	419			8.33		66	356
10/12/06	Thursday	38	426			8.4	1373	92	346
10/13/06	Friday					8.8	2092	150	
10/14/06	Saturday					9			
10/15/06	Sunday	25	411	54		7.5			342
10/16/06	Monday	31	400	50		8.05	411	48	334
10/17/06	Tuesday	33	397	50		7.96	96	64	332
10/18/06	Wednesday	36	407	61		8.17		35	338
10/19/06	Thursday	33	405	57		8.3	822	57	346
10/20/06	Friday					8.2	250	30	
10/21/06	Saturday					8.2			
10/22/06	Sunday	34	401	56		8.6			342
10/23/06	Monday	40	393	53		8.5	122	24	338
10/24/06	Tuesday	26	387			8.7	144	39	324
10/25/06	Wednesday	21	410			8.48	106	33	340
10/26/06	Thursday	26	409	49		8.5	120	32	346
10/27/06	Friday					8.5	311	35	
4/1/07	Sunday	33				8			
4/2/07	Monday	32	280	36		8.67		230	336
4/3/07	Tuesday	32				8.53	361	50	
4/4/07	Wednesday	34	332			9.03	816	130	368
4/5/07	Thursday	35	350	52		9.1	185	46	384
4/6/07	Friday					9.1	921	160	
4/7/07	Saturday					8.7			
4/8/07	Sunday	32	353			8.6			378
4/9/07	Monday	48	351	37		8.97	461	77	366
4/10/07	Tuesday	37				9.2	613	150	
4/11/07	Wednesday	36	381	52		9.37	1986	240	366
4/12/07	Thursday	40				10.4	1553	260	
4/13/07	Friday					9.2	921	150	
4/14/07	Saturday					9			
4/15/07	Sunday	38	375			8.8			372
4/16/07	Monday	34	369			8.71	903	48	358
4/17/07	Tuesday	33				8.73	816	69	
4/18/07	Wednesday	36				8.74	727	47	
4/19/07	Thursday	33	400			8.83	770	43	377
4/20/07	Friday					8.6	1516	42	
4/21/07	Saturday					8.66			
4/22/07	Sunday	36				8.43			
4/23/07	Monday	30				8.42	613	57	
4/24/07	Tuesday	44				8.69		22	
4/25/07	Wednesday	37				8.7		29	
4/26/07	Thursday	36				8.58		37	
4/27/07	Friday					8.61		8	

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	COD mg/L	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli mpn/100ml	Hardness mg/L CaCO <sub>3</sub>
4/28/07	Saturday					8.55			
4/29/07	Sunday	40				8.43			
4/30/07	Monday	36				8.54		7	
Mean		34.08	387.00	50.58		8.63	731	75	351.13
Standard Deviation		5.10	33.65	7.39		0.43	572	66	16.77
Min		21	280	36		7.5	96	7	324
Max		48	426	61		10.4	2092	260	384
No. of Samples		37	24	12		50	26	36	24
* Not included in statistics									

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Iron mg/L	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L
10/8/06	Sunday	0.096	37.3	0.018	12.6		0.64	0.83	7.4	23
10/9/06	Monday	0.08	36.7	0.016	12		1.12	0.86	7.3	18
10/10/06	Tuesday	0.078	36	0.014	11.9		0.59	0.8	7.2	22
10/11/06	Wednesday	0.079	36.5	0.015	11.2		0.49	0.62	7.5	23
10/12/06	Thursday	0.08	36.5	0.016	11.4		0.365	0.56	7.5	23
10/13/06	Friday								7.5	
10/14/06	Saturday								7.4	
10/15/06	Sunday	0.08	36.6	0.014	11		0.27	0.43	7.4	22
10/16/06	Monday	0.076	35.2	0.014	11.6		0.322	0.45	7.3	22
10/17/06	Tuesday	0.078	35.2	0.014	12		0.347	0.52	7.3	22
10/18/06	Wednesday	0.1	34.8	0.02	11		1.37	0.43	7.4	22
10/19/06	Thursday	0.093	36.1	0.023	10.8		0.275	0.42	7.4	22
10/20/06	Friday								7.4	
10/21/06	Saturday								7.4	
10/22/06	Sunday	0.083	36.9	0.013	10.4		0.294	0.35	7.4	13
10/23/06	Monday	0.093	34.7	0.027	11.2		0.25	0.42	7.7	22
10/24/06	Tuesday	0.076	33.8	0.014	12		0.271	0.4	7.8	22
10/25/06	Wednesday	0.071	34.2	0.011	11.4		0.3	0.38	7.3	22
10/26/06	Thursday	0.085	35	0.012	11.1		0.255	0.37	7.4	22
10/27/06	Friday								7.4	
4/1/07	Sunday				8.99	0.07		0.29	7.3	
4/2/07	Monday	0.051	30.1	0.0085	9.25	<0.03	0.183	0.38	7.2	22
4/3/07	Tuesday				9.14	<0.03		0.8	7.1	
4/4/07	Wednesday	0.048	34.8	0.012	9.56	<0.03	0.456	0.62	7.1	22
4/5/07	Thursday	0.05	36.7	0.013	9.59	<0.03	0.229	0.45	7.2	23
4/6/07	Friday								7.2	
4/7/07	Saturday								7.2	
4/8/07	Sunday	0.054	36.8	0.01	10.6	0.05	0.167	0.33	7.1	22
4/9/07	Monday	0.054	37.2	0.009	10.9	0.05	0.271	0.45	7.2	22
4/10/07	Tuesday				11.6	0.11		0.84	7	
4/11/07	Wednesday	0.068	38.3	0.014	11.2	0.16	0.54	0.74	7	22
4/12/07	Thursday				10.8	0.18		0.48	7.5	
4/13/07	Friday								7.2	
4/14/07	Saturday								7.2	
4/15/07	Sunday	0.09	37.2	0.016	10.3	0.23	0.227	0.41	7.1	22
4/16/07	Monday	0.079	36.6	0.013	11.1	0.22	0.225	0.39	7.1	22
4/17/07	Tuesday				11.3	0.2		0.43	7.1	
4/18/07	Wednesday				10.6	0.23		0.45	7.1	
4/19/07	Thursday	0.088	39.3	0.018	10.2	0.22	0.29	0.54	7	22
4/20/07	Friday								7.2	
4/21/07	Saturday								7.2	
4/22/07	Sunday				11.5	0.12		0.43	7.1	
4/23/07	Monday				11.4	0.11		0.31	7.2	
4/24/07	Tuesday				11	0.14		0.33	7.1	
4/25/07	Wednesday				11	0.13		0.36	7	
4/26/07	Thursday				11.4	0.09		0.36	7.1	
4/27/07	Friday								7.2	

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Iron mg/L	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L
4/28/07	Saturday								7.1	
4/29/07	Sunday				11.4	0.05		0.37	7.1	
4/30/07	Monday				11.4	0.05		0.36	7	
Mean		0.08	35.94	0.01	10.97	0.12	0.41	0.49	7.25	21.63
Standard Deviation		0.02	1.79	0.00	0.83	0.07	0.29	0.16	0.18	2.06
Min		0.048	30.1	0.0085	8.99	0.03	0.167	0.29	7	13
Max		0.1	39.3	0.027	12.6	0.23	1.37	0.86	7.8	23
No. of Samples		24	24	24	37	22	24	37	50	24
* Not included in statistics										

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Sulfate mg/L	Temp (Inf) Deg C	Total Coliform mpn/100ml	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
10/8/06	Sunday	47.11				1190	8.5	~2	2
10/9/06	Monday	43.98				1260	7.7	~2	2
10/10/06	Tuesday	53.76				1140	7.6	~2	2
10/11/06	Wednesday	58.93				1150	7.9	~1	2
10/12/06	Thursday	55.86		>4840		1160	8.4	~1	2
10/13/06	Friday			>4838					
10/14/06	Saturday								
10/15/06	Sunday	45.67				1130	8.6	~1	1
10/16/06	Monday	39.65		>4839		1110	7.1	<1	1
10/17/06	Tuesday	51.14		>4839		1090	7.5	<1	2
10/18/06	Wednesday	43				1120	8	~1	1
10/19/06	Thursday	43.48		3431		1100	8.8	~2	2
10/20/06	Friday			>4839					
10/21/06	Saturday								
10/22/06	Sunday	52.9				1130	8.5	~1	2
10/23/06	Monday	55.26		3466		1110	7.7	6	2
10/24/06	Tuesday	42.47		4920		1090	7.4	~1	2
10/25/06	Wednesday	57.49		4839		1150	7.8	<1	3
10/26/06	Thursday	48.6		3973		1170	8.7	~1	2
10/27/06	Friday			4839					
4/1/07	Sunday		9		3.8			~2	
4/2/07	Monday	43.9	10.5		3	875	7.3	~1	2
4/3/07	Tuesday		10.5		3.6			~2	
4/4/07	Wednesday	49	10.5		3.5	993	7.8	~2	2
4/5/07	Thursday	53.5	10		3.9	1030	8.5	~1	1
4/6/07	Friday		10	>2420					
4/7/07	Saturday		9						
4/8/07	Sunday	50.7	9		4.1	1050	8.7	~2	1
4/9/07	Monday	64.8	10.5	>2420	4.3	1030	7	~2	2
4/10/07	Tuesday		10.5	>2420	4.9			~2	
4/11/07	Wednesday	83.1	11	>2420	4.9	1080	8.4	~2	2
4/12/07	Thursday		10	>2420	4.6			~2	
4/13/07	Friday		10	>2420					
4/14/07	Saturday		10						
4/15/07	Sunday	47.9	10		4.4	968	10	~1	2
4/16/07	Monday	43	11	>2420	3.6	1060	9	~1	2
4/17/07	Tuesday		11.5	>2420	4.1			~2	
4/18/07	Wednesday		11	>2420	4			~1	
4/19/07	Thursday	51.7	11	>2420	5.4	1140		~2	2
4/20/07	Friday		11.5						
4/21/07	Saturday		11.5						
4/22/07	Sunday		11		4.5			~1	
4/23/07	Monday		11.5	>2420	3.6			~2	
4/24/07	Tuesday		11.5		4.1			~2	
4/25/07	Wednesday		11.5		4			~2	
4/26/07	Thursday		11.5		4.3			~1	
4/27/07	Friday		12						

**MCES Blue Lake Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Sulfate mg/L	Temp (Inf) Deg C	Total Coliform mpn/100ml	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
4/28/07	Saturday		12						
4/29/07	Sunday		11.5		4.7			4	
4/30/07	Monday		11.5		4.5			~2	
Mean		51.12	10.73	3496	4.17	1096.92	8.13	1.70	1.83
Standard Deviation		9.17	0.86	1150	0.55	79.83	0.71	0.97	0.48
Min		39.65	9	2450	3	875	7	1	1
Max		83.1	12	4920	5.4	1260	10	6	3
No. of Samples		24	30	22	22	24	23	37	24
* Not included in statistics									

**Exhibit C**  
**Empire WWTP Sampling Results**



**MCES Empire Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO3	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO3	Calcium mg/L	CBOD mg/L	COD mg/L
10/24/06	Tuesday	8.01	230	0.027	0.31	244	84.5	3	36
10/25/06	Wednesday	7.96			0.53			4	31
10/26/06	Thursday	7.87	264	0.025	0.08	276	81.4		24
10/27/06	Friday	7.86							
10/28/06	Saturday	8.48							
10/29/06	Sunday	8.94	246	0.027	0.42	367	79.2	4	34
10/30/06	Monday	8.13	237	0.034	0.54	245	80	4	42
10/31/06	Tuesday	7.78	243	0.027	0.7	243	86	3	40
11/1/06	Wednesday	8.3	274	0.028	0.06	275	86.6	<3	32
11/2/06	Thursday	8.3	268	0.027	0.25	269	84.3		34
11/3/06	Friday	8.13							
11/4/06	Saturday	8.76							
11/5/06	Sunday	9.13	238	0.024	0.22	250	78.3	<3	33
11/6/06	Monday	8.57	232	0.023	0.25	237	76.8	<3	38
11/7/06	Tuesday	8.26	243	0.022	~0.06	242	81.3	<3	33
11/8/06	Wednesday	8.21			0.28			<3	34
11/9/06	Thursday	8.27	253	0.023	0.11	253	85.6	<3	
11/10/06	Friday	8.36			0.07			<3	
11/11/06	Saturday	8.94	255	0.029		254	80.6		
11/12/06	Sunday	9.21			0.93			3	35
11/13/06	Monday	8.47	227	0.023	1.96	231	80.1	<3	35
11/14/06	Tuesday	8.16			0.06			3	38
11/15/06	Wednesday	8.25	261	0.026	0.08	261	88	<3	32
11/16/06	Thursday	8.27	252	0.026	~0.05	257	85.9		32
4/1/07	Sunday	10.99			0.08			<3	40
4/2/07	Monday	9.29	213	0.019	~0.05	214	76.8	<3	36
4/3/07	Tuesday	8.96			0.08			<3	36
4/4/07	Wednesday	8.8	257	0.016	0.08		85	<3	36
4/5/07	Thursday	8.96	270	0.013	0.08	260	84.1		38
4/6/07	Friday	9.18							
4/7/07	Saturday	9.56							
4/8/07	Sunday	9.47	271	0.016	0.07		82.7	<3	36
4/9/07	Monday	9.11	239	0.018	0.1	238	82.9	<3	37
4/10/07	Tuesday	8.9			0.1			<3	40
4/11/07	Wednesday	8.89	255	0.022	0.09	252	84.2	<3	34
4/12/07	Thursday	8.94			0.09				35
4/13/07	Friday	9.02			0.12			<3	
4/14/07	Saturday	9.56			0.1				
4/15/07	Sunday	9.73	251	0.02	0.11		85.8	3	44
4/16/07	Monday	9.06	243	0.02	0.15		83	3	46
4/17/07	Tuesday	8.69			0.15			3	38
4/18/07	Wednesday	8.72			0.14			8	52
4/19/07	Thursday	8.7	179	0.033	0.11		65.4		42
4/20/07	Friday	8.68	249	0.014			84		
4/21/07	Saturday	9.02	249	0.014			84		
4/22/07	Sunday	9.5	236	0.015	0.49		83.7	<3	40
4/23/07	Monday	8.8			0.14			<3	37
4/24/07	Tuesday	8.52			0.13			3	45
4/25/07	Wednesday	8.53			0.1			<3	41

**MCES Empire Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO <sub>3</sub>	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO <sub>3</sub>	Calcium mg/L	CBOD mg/L	COD mg/L
4/26/07	Thursday	8.4			0.09				40
4/27/07	Friday	8.64							
4/28/07	Saturday	9.13							
4/29/07	Sunday	9.41			0.09			<3	44
4/30/07	Monday	8.9			0.1			<3	40
Mean		8.75	245.74	0.02	0.23	256.21	82.23	3.23	37.44
Standard Deviation		0.57	19.75	0.01	0.33	30.79	4.47	0.88	5.00
Min		7.78	179	0.013	0.05	214	65.4	3	24
Max		10.99	274	0.034	1.96	367	88	8	52
No. of Samples		54	27	27	43	19	27	35	39
* Not included in statistics									

**MCES Empire Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli. mpn/100 mL	Hardness mg/L CaCO3	Iron mg/L
10/24/06	Tuesday	406	77		9.2		42	302	0.094
10/25/06	Wednesday				7.5		48		
10/26/06	Thursday	348	64		8.2		54	278	0.099
10/27/06	Friday				8.3		45		
10/28/06	Saturday				8.1				
10/29/06	Sunday	371			8.1			282	0.122
10/30/06	Monday	383			8.3		50	288	0.128
10/31/06	Tuesday	418			8		36	304	0.106
11/1/06	Wednesday	402			8.1			304	0.096
11/2/06	Thursday	392			8			306	0.101
11/3/06	Friday				8.2				
11/4/06	Saturday				8.3				
11/5/06	Sunday	400			8.3			292	0.104
11/6/06	Monday	386			8			276	0.102
11/7/06	Tuesday	419	52		8			290	0.094
11/8/06	Wednesday				8				
11/9/06	Thursday	410	54		8.1	59*		298	0.115
11/10/06	Friday				8.2				
11/11/06	Saturday	399	60		8.5			274	0.127
11/12/06	Sunday				9.1				
11/13/06	Monday	406	56		8.6			270	0.096
11/14/06	Tuesday				8.2				
11/15/06	Wednesday	404	59		8			292	0.11
11/16/06	Thursday	406	59		8			294	0.13
4/1/07	Sunday				8.8				
4/2/07	Monday	339	56		8.5		6	282	0.116
4/3/07	Tuesday				8.9	9	4		
4/4/07	Wednesday	374			8.8	11	6	312	0.084
4/5/07	Thursday	379	47		10.09	7	8	310	0.076
4/6/07	Friday				9.1	4	3		
4/7/07	Saturday				9.1				
4/8/07	Sunday	379			9			304	0.087
4/9/07	Monday	384	54		9.4		5	298	0.074
4/10/07	Tuesday				9.8	3	4		
4/11/07	Wednesday	393	55		8.85		5	302	0.082
4/12/07	Thursday				9	4	7		
4/13/07	Friday				9.1	5	6		
4/14/07	Saturday				9.1		4		
4/15/07	Sunday	394			8.9		37	298	0.105
4/16/07	Monday	398			8.1	22	10	294	0.089
4/17/07	Tuesday				8.3	9	4		
4/18/07	Wednesday				8.5	9	8		
4/19/07	Thursday	295			8.6	5	5	240	0.192
4/20/07	Friday				9.2	5	3	306	0.106
4/21/07	Saturday				8.8			300	0.093
4/22/07	Sunday				9.1			308	0.106
4/23/07	Monday				8.79	3	7		
4/24/07	Tuesday				8.69		4		
4/25/07	Wednesday				8.78	3	5		

**MCES Empire Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli. mpn/100 mL	Hardness mg/L CaCO3	Iron mg/L
4/26/07	Thursday				9		7		
4/27/07	Friday				8.9		2		
4/28/07	Saturday				8.8				
4/29/07	Sunday				8.3				
4/30/07	Monday				8.74		3		
Mean		386.88	57.75		8.60	7	15	292.74	0.10
Standard Deviation		27.60	7.44		0.51	5	17	15.63	0.02
Min		295	47		7.5	3	2	240	0.074
Max		419	77		10.09	22	54	312	0.192
No. of Samples		24	12		54	14	29	27	27
* Not included in statistics									

**MCES Empire Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L	Sulfate mg/L
10/24/06	Tuesday	25.9	0.025	18		0.295	0.71	7	19	41.07
10/25/06	Wednesday							7		
10/26/06	Thursday	24.8	0.035	11.8		0.016	0.39	7	19	45.86
10/27/06	Friday							6.8		
10/28/06	Saturday							6.9		
10/29/06	Sunday	26.9	0.044	11.8		0.056	0.32	7	20	40.02
10/30/06	Monday	27.2	0.03			0.017		6.8	19	42.77
10/31/06	Tuesday	28.2	0.041	18.7		0.015	0.32	7	20	45.93
11/1/06	Wednesday	28	0.041			0.017		7	20	43.54
11/2/06	Thursday	28.2	0.05	11.5		0.014	0.54	7.2	19	41.64
11/3/06	Friday							6.9		
11/4/06	Saturday							6.9		
11/5/06	Sunday	27.1	0.014	16.2		0.015	0.29	6.9	20	39.31
11/6/06	Monday	27.1	0.008			0.018		7.1	19	37.54
11/7/06	Tuesday	28	0.01	19.1		0.019	0.35	7.3	19	36.62
11/8/06	Wednesday			18.2			0.32	7		
11/9/06	Thursday	28	0.097			0.021	0.33	7.1	20	37.61
11/10/06	Friday						0.3	7		
11/11/06	Saturday	26.3	0.047			0.027		7	20	34.55
11/12/06	Sunday			17.7			0.38	6.9		
11/13/06	Monday	24.9	0.015			0.011		7	20	37.43
11/14/06	Tuesday			17			0.36	7		
11/15/06	Wednesday	28.3	0.058			0.019		7.1	19	40.59
11/16/06	Thursday	28.3	0.082	17.1		0.038	0.53	7.1	20	38.88
4/1/07	Sunday			17.1	0.07		0.32	6.9		
4/2/07	Monday	24.9	0.068			0.017		6.6	17	43.1
4/3/07	Tuesday			15.2	0.03		0.27	7.1		
4/4/07	Wednesday	28	0.052			0.011		6.9	18	43.8
4/5/07	Thursday	27.5	0.054	12.1	<0.03	~0.006	0.4	7	18	47.1
4/6/07	Friday							7.1		
4/7/07	Saturday							7.1		
4/8/07	Sunday	28	0.039	13.5	0.03	0.012	0.21	7	18	39.8
4/9/07	Monday	28.6	0.032			0.023		7.1	18	23.8
4/10/07	Tuesday			17.1	0.03		0.19	7		
4/11/07	Wednesday	28.9	0.036			0.015		7	18	41.5
4/12/07	Thursday			15	<0.03		0.28	7.2		
4/13/07	Friday						0.36	7.1		
4/14/07	Saturday						0.41	7		
4/15/07	Sunday	28.8	0.021	15.4	0.04	0.039	0.27	7.1	18	39.1
4/16/07	Monday	28.8	0.018			0.014		7	18	38.7
4/17/07	Tuesday			20.3	0.07		~0.24	7.1		
4/18/07	Wednesday							7		
4/19/07	Thursday	26.1	0.061	14.7	0.04	0.614	0.31	7.1	16	860
4/20/07	Friday	29.1	0.021			~0.007		7	17	38.7
4/21/07	Saturday	29.2	0.01			0.097		7.1	17	39
4/22/07	Sunday	29.4	0.009	14.9	0.04	0.097	0.33	7.1	18	37
4/23/07	Monday							6.9		
4/24/07	Tuesday			17.6	0.05		0.3	6.8		
4/25/07	Wednesday							6.8		

**MCES Empire Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L	Sulfate mg/L
4/26/07	Thursday			12.6	<0.03		0.28	7		
4/27/07	Friday							7.1		
4/28/07	Saturday							7.1		
4/29/07	Sunday			15.6	0.03		0.2	6.8		
4/30/07	Monday							7.4		
Mean		27.57	0.04	15.76	0.04	0.06	0.34	7.01	18.67	39.81
Standard Deviation		1.34	0.02	2.52	0.01	0.12	0.11	0.13	1.14	4.51
Min		24.8	0.008	11.5	0.03	0.006	0.19	6.6	16	23.8
Max		29.4	0.097	20.3	0.07	0.614	0.71	7.4	20	47.1
No. of Samples		27	27	24	13	27	28	54	27	26
* Not included in statistics										

**MCES Empire Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Temp (Inf) Deg C	Total coliform mpn/100ml	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
10/24/06	Tuesday				1120	8.7	5	5
10/25/06	Wednesday						6	
10/26/06	Thursday				1040	10.2	3	4
10/27/06	Friday							
10/28/06	Saturday							
10/29/06	Sunday				1060	10.2	3	5
10/30/06	Monday				1070	9.2	7	5
10/31/06	Tuesday				1150	9.8	4	5
11/1/06	Wednesday				1140	9.4	3	4
11/2/06	Thursday				1110	8.9	3	4
11/3/06	Friday							
11/4/06	Saturday							
11/5/06	Sunday				1120	10.6	~1	4
11/6/06	Monday				1090	9.7	~2	4
11/7/06	Tuesday				1140	10.4	~2	4
11/8/06	Wednesday						~2	
11/9/06	Thursday		>9678*		1150	10.4	8	4
11/10/06	Friday						~2	
11/11/06	Saturday				1110	11.8		4
11/12/06	Sunday						3	
11/13/06	Monday				1130	11.1	~2	4
11/14/06	Tuesday						3	
11/15/06	Wednesday				1120	9.8	3	4
11/16/06	Thursday				1160	9.4	3	4
4/1/07	Sunday	13.5		3.8			4	
4/2/07	Monday	13.5			961	8.9	~1	5
4/3/07	Tuesday	13.5		4.7			3	
4/4/07	Wednesday	12.5			1050	7.6	3	3
4/5/07	Thursday	12.5		3.2	1050	7.7	7	1
4/6/07	Friday	12.5						
4/7/07	Saturday	12						
4/8/07	Sunday	12		4	1050	8.1	~2	2
4/9/07	Monday	13.5			1070	8.2	~2	2
4/10/07	Tuesday	12.5	179	4.4			~2	
4/11/07	Wednesday	13.5	172		1080	8.6	~2	3
4/12/07	Thursday	13.5	104	3.7			3	
4/13/07	Friday	13.5	772	4.1			3	
4/14/07	Saturday	13.5		4.4			~2	
4/15/07	Sunday	13.5		3.6	1220	9.9	~2	3
4/16/07	Monday	13.2	150		1090	9.3	~2	3
4/17/07	Tuesday	13	173	4.3			4	
4/18/07	Wednesday	13.5	>2420				15	
4/19/07	Thursday	13	613	4.6	1920	9.4	~2	4
4/20/07	Friday	13.5			1080	8.3		2
4/21/07	Saturday	13.5			1110	8.7		3
4/22/07	Sunday	12.5		6.1	1110	8.2	~2	2
4/23/07	Monday	14.5	196				3	
4/24/07	Tuesday	13.7		4.4			4	
4/25/07	Wednesday	13.4	179				~2	

**MCES Empire Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Temp (Inf)	Total coliform	TKN	TDS	TOC	TSS	Turbidity
		Deg C	mpn/100ml	mg/L	mg/L	mg/L	mg/L	NTU
4/26/07	Thursday	13.5		4.3			~2	
4/27/07	Friday	13.5						
4/28/07	Saturday	13.5						
4/29/07	Sunday	13.5		4.5			~2	
4/30/07	Monday	14.5					~2	
Mean		13.26	499	4.27	1129.67	9.35	3.28	3.59
Standard Deviation		0.60	721	0.65	165.50	1.04	2.39	1.08
Min		12	104	3.2	961	7.6	1	1
Max		14.5	2450	6.1	1920	11.8	15	5
No. of Samples		30	10	15	27	27	43	27
* Not included in statistics								

**Exhibit D**  
**Metropolitan (Metro) WWTP**  
**Sampling Results**

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO3	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO3	Calcium mg/L	CBOD mg/L
10/8/06	Sunday	174.01	152	0.036	0.09	163	70.3	4
10/9/06	Monday	183.52			0.1			3
10/10/06	Tuesday	179.59			0.08			<3
10/11/06	Wednesday	182.8			0.09			3
10/12/06	Thursday	179.64			0.06			3
10/13/06	Friday	178.68			0.07			4
10/14/06	Saturday	173.21			0.07			4
10/15/06	Sunday	172.27			0.07			3
10/16/06	Monday	184.17	152	0.03	0.07	158	68.5	3
10/17/06	Tuesday	178.89	149	0.032	0.18	157	71.5	<3
10/18/06	Wednesday	178.61	144	0.034	0.07	153	70	<3
10/19/06	Thursday	175.89	141	0.035	0.09	150	69.4	<3
10/20/06	Friday	176.28			0.07			3
10/21/06	Saturday	169.28			0.08			4
10/22/06	Sunday	169.52	143	0.028	0.08	155	70.3	3
10/23/06	Monday	178.66	149	0.028	0.07	160	68.8	<3
10/24/06	Tuesday	175.13	143	0.03	0.07	159	70.6	<3
10/25/06	Wednesday	175.09	148	0.03	0.06	155	71.4	3
10/26/06	Thursday	176.14	152	0.034	0.05	154	70.3	<3
10/27/06	Friday	176.06	150	0.028	0.06	153	67.6	3
10/28/06	Saturday	171.4	152	0.032	0.06	153	69.7	4
10/29/06	Sunday	171.1	153	0.029	0.05	155	69.3	3
10/30/06	Monday	178.78	155	0.028	0.02	159	68.8	<3
10/31/06	Tuesday	172.52	154	0.031	0.14	157	69.5	<3
11/1/06	Wednesday	171.93	152	0.032	0.54		69.4	<3
11/2/06	Thursday	174.81			0.17			<3
11/3/06	Friday	174.45	148	0.031	0.1		69.4	<3
11/4/06	Saturday	168.99			0.07			<3
11/5/06	Sunday	169.06	151	0.034	0.05		67.7	<3
11/6/06	Monday	174.46	154	0.035	0.05		67.2	<3
11/7/06	Tuesday	172.74	149	0.037	0.2		68.9	<3
4/1/07	Sunday	227.99			0.19			<3
4/2/07	Monday	210.21	178	0.024	0.1	180	78.4	3
4/3/07	Tuesday	202.83			0.21			4
4/4/07	Wednesday	197.78	180	0.021	0.23		77.3	4
4/5/07	Thursday	193.53	184	0.024	0.33	185	80.2	3
4/6/07	Friday	195.56			0.28			3
4/7/07	Saturday	187.99			0.24			<3
4/8/07	Sunday	185.25	202	0.02	0.11		78.9	3
4/9/07	Monday	190.71	178	0.024	0.44	184	77.6	3
4/10/07	Tuesday	187.27			0.56			3
4/11/07	Wednesday	197.24	169	0.028	0.42	84	79.2	<3
4/12/07	Thursday	191.91			1.35			3
4/13/07	Friday	187.45			0.28			4
4/14/07	Saturday	188.48			0.1			<3
4/15/07	Sunday	190.93	168	0.032	0.06		78.8	3
4/16/07	Monday	203.71	163	0.03	0.15		78.5	3
4/17/07	Tuesday	201.44			0.27			3
4/18/07	Wednesday	200.32			0.39			3

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO <sub>3</sub>	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO <sub>3</sub>	Calcium mg/L	CBOD mg/L
4/19/07	Thursday	200.19	152	0.029	0.26		77.1	3
4/20/07	Friday	202.49			0.26			3
4/21/07	Saturday	197.82			0.11			4
4/22/07	Sunday	206.28			0.14			3
4/23/07	Monday	215.74			0.32			<3
4/24/07	Tuesday	206.33			0.17			3
4/25/07	Wednesday	206.01			0.09			4
4/26/2007	Thursday	206.43			0.07			3
4/27/2007	Friday	207.93			0.38			5
4/28/2007	Saturday	201.53			0.25			3
4/29/2007	Sunday	200.11			0.07			3
4/30/2007	Monday	211.26			2.32			4
Mean		187.55	157.41	0.03	0.22	156.53	72.23	3.21
Stan Dev		14.41	14.52	0.00	0.34	20.47	4.38	0.45
Min		168.99	141	0.02	0.02	84	67.2	3
Max		227.99	202	0.037	2.32	185	80.2	5
No. Samples		61	29	29	61	19	29	61
* Not included in statistics								

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	COD mg/L	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli. mpn/100ml	Hardness mg/L CaCO3
10/8/06	Sunday	27	238			5.81		86	258
10/9/06	Monday	29				6.12		54	
10/10/06	Tuesday	35				6.07		90	
10/11/06	Wednesday	30				6.11		72	
10/12/06	Thursday	32				8.17		130	
10/13/06	Friday	29				8.49		120	
10/14/06	Saturday	32				6.12		35	
10/15/06	Sunday	26				6.04		110	
10/16/06	Monday	33	236	49		5.98		41	244
10/17/06	Tuesday	33	246	52		5.73		68	254
10/18/06	Wednesday	34	248	56		6.22		61	252
10/19/06	Thursday	32	243	46		5.85		35	244
10/20/06	Friday	32				5.83		36	
10/21/06	Saturday	34				5.93		44	
10/22/06	Sunday	27	240	43		6.08		44	252
10/23/06	Monday	31	223	62		6.12	170	48	242
10/24/06	Tuesday	27	244			6.32		160	248
10/25/06	Wednesday	22	249	42		5.93	551	68	246
10/26/06	Thursday	30	247	45		6.12	798	100	248
10/27/06	Friday	29	242			6.32	413	93	246
10/28/06	Saturday	29	245			6.08		95	248
10/29/06	Sunday	30	233			6.15		100	250
10/30/06	Monday	32	231			6.04	952	110	242
10/31/06	Tuesday	34	239			6.32	3973*	400*	256
11/1/06	Wednesday	33	254			5.96			254
11/2/06	Thursday	33				6.05			
11/3/06	Friday	33	247			5.71			248
11/4/06	Saturday	34				6.37			
11/5/06	Sunday	33	233			6.29			246
11/6/06	Monday	32	224			6.49			242
11/7/06	Tuesday	29	242			6.29			252
4/1/07	Sunday	29			4.5	4.63		28	
4/2/07	Monday	28	208	33		5.76	57	22	282
4/3/07	Tuesday	36				5.53	411	50	
4/4/07	Wednesday	31	239			4.77	28	9	290
4/5/07	Thursday	37	244	38		4.98	1	2	288
4/6/07	Friday	31				4.78	98	10	
4/7/07	Saturday	37				5.06		10	
4/8/07	Sunday	30	235		4.8	4.34		27	278
4/9/07	Monday	32	223	38		5.64	150	34	274
4/10/07	Tuesday	38				2.99	6	4	
4/11/07	Wednesday	34	262	41		3.84	11	7	276
4/12/07	Thursday	30				3.9	93	27	
4/13/07	Friday	31				3.67		10	
4/14/07	Saturday	30				4.41		24	
4/15/07	Sunday	31	236		5.1	6		320	276
4/16/07	Monday	28	231			5.81	118	56	272
4/17/07	Tuesday	33				6.09	93	20	
4/18/07	Wednesday	34				5.81	291	68	

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	COD mg/L	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli. mpn/100ml	Hardness mg/L CaCO3
4/19/07	Thursday	34	255			6.52	86	20	272
4/20/07	Friday	36				5.84	130	40	
4/21/07	Saturday	37				5.96		32	
4/22/07	Sunday	31			5.7	6.8		61	
4/23/07	Monday	33				6.06	1300	500	
4/24/07	Tuesday	34				5.45		20	
4/25/07	Wednesday	38				5.37	196	38	
4/26/2007	Thursday	37				5.66		120	
4/27/2007	Friday	38				4.54		94	
4/28/2007	Saturday	38				5.76		52	
4/29/2007	Sunday	36			5.2	6.31		66	
4/30/2007	Monday	39				5.81		42	
Mean		32.25	239.21	45.42	5.06	5.76	283	68	257.93
Stan Dev		3.45	11.05	8.23	0.45	0.90	349	80	15.11
Min		22	208	33	4.5	2.99	1	2	242
Max		39	262	62	5.7	8.49	1300	500	290
No. Samples		61	29	12	5	61	21	53	29
* Not included in statistics									

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Iron mg/L	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L
10/8/06	Sunday	0.15	24.1	0.019	17.68		0.224	0.4	7	17
10/9/06	Monday				17.37			0.4	6.9	
10/10/06	Tuesday				18.24			0.5	7.2	
10/11/06	Wednesday				18.57			0.4	7.1	
10/12/06	Thursday				18.73			0.4	7.1	
10/13/06	Friday							0.4	7.2	
10/14/06	Saturday							0.4	7.1	
10/15/06	Sunday				17.29			0.4	7.1	
10/16/06	Monday	0.063	23.5	0.016	16.99		0.223	0.4	6.9	17
10/17/06	Tuesday	0.066	24.4	0.019	18.99		0.273	0.5	7	17
10/18/06	Wednesday	0.066	24.6	0.021	18.88		0.227	0.4	7	17
10/19/06	Thursday	0.07	23.6	0.022	18.17		0.333	0.6	6.9	17
10/20/06	Friday							0.7	7	
10/21/06	Saturday							1	7	
10/22/06	Sunday	0.055	24.4	0.018	17.52		0.765	1	7.1	18
10/23/06	Monday	0.056	23.9	0.017	17.17		0.81	1.3	7	18
10/24/06	Tuesday	0.063	22.9	0.018	18.55		0.59	1.5	7	17
10/25/06	Wednesday	0.064	23.3	0.014	18.08		0.56	0.7	6.9	17
10/26/06	Thursday	0.07	22.7	0.016	17.33		0.43	0.7	7	17
10/27/06	Friday	0.07	23.2	0.014			0.402	0.6	7	17
10/28/06	Saturday	0.072	24.1	0.016			0.33	0.5	7	17
10/29/06	Sunday	0.062	24.1	0.013	16.79		0.202	0.4	7	17
10/30/06	Monday	0.059	23.9	0.01	16.4		0.162	0.4	7	17
10/31/06	Tuesday	0.072	24.1	0.013	17.45		0.159	0.3	7	17
11/1/06	Wednesday	0.073	23.4	0.015	17.75		0.153	0.3	6.94	17
11/2/06	Thursday				18.06			0.5	6.9	
11/3/06	Friday	0.071	23.6	0.012			0.141	0.5	6.8	17
11/4/06	Saturday							0.4	7	
11/5/06	Sunday	0.068	24.3	0.013	16.23		0.184	0.4	7	17
11/6/06	Monday	0.07	24	0.012	15.9		0.178	0.4	7	17
11/7/06	Tuesday	0.09	24.7	0.014	17.69		0.193	0.4	7	17
4/1/07	Sunday				11.86	0.07		0.3		
4/2/07	Monday	0.056	23.2	0.013	13.22	0.06	0.102	0.2	7.1	17
4/3/07	Tuesday				13.82	0.17		0.3	6.9	
4/4/07	Wednesday	0.049	23.8	0.017	14.89	0.26	0.093	0.3	6.9	17
4/5/07	Thursday	0.057	24.8	0.023	13.45	0.73	0.114	0.3	7	17
4/6/07	Friday							0.3	6.7	
4/7/07	Saturday							0.3		
4/8/07	Sunday	0.058	24.9	0.014	13.29	0.13	0.133	0.4	7.3	17
4/9/07	Monday	0.059	24.3	0.019	13.92	0.43	0.12	0.5	6.8	17
4/10/07	Tuesday				15.59	0.3		0.9	7.2	
4/11/07	Wednesday	0.064	24.9	0.02	15.62	0.35	0.113	0.4	7.1	17
4/12/07	Thursday				17.59	0.5		0.3	7.2	
4/13/07	Friday							0.3	7.1	
4/14/07	Saturday							0.3	7.2	
4/15/07	Sunday	0.078	25	0.015	14.65	<0.03	0.105	0.3	7	17
4/16/07	Monday	0.07	24.9	0.016	15.03	0.14	0.098	0.4	7	17
4/17/07	Tuesday				16.79	0.17		0.7	7	
4/18/07	Wednesday				17.14	0.27		0.3	7.1	

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Iron mg/L	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L
4/19/07	Thursday	0.06	24.8	0.018	17.61	0.21	0.107	0.3	7	16
4/20/07	Friday							0.3	7.3	
4/21/07	Saturday							0.3	7	
4/22/07	Sunday				15.21	0.07		0.2	7	
4/23/07	Monday				14.5	0.16		0.3	7	
4/24/07	Tuesday				16.72	0.13		0.3	7.2	
4/25/07	Wednesday				16.81	0.06		0.4	6.9	
4/26/2007	Thursday				16.36	0.13		0.3	7	
4/27/2007	Friday							0.3	6.9	
4/28/2007	Saturday							0.3	7.2	
4/29/2007	Sunday				15.2	<0.03		0.3	7	
4/30/2007	Monday				13.74	0.57		0.6	7.1	
Mean		0.07	24.05	0.02	16.42	0.23	0.26	0.46	7.02	17.03
Stan Dev		0.02	0.65	0.00	1.78	0.19	0.20	0.25	0.12	0.33
Min		0.049	22.7	0.01	11.86	0.03	0.093	0.2	6.7	16
Max		0.15	25	0.023	18.99	0.73	0.81	1.5	7.3	18
No. Samples		29	29	29	45	22	29	61	59	29
* Not included in statistics										

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Sulfate mg/L	Temp (Inf) Deg C	Total Coliform mpn/100m	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
10/8/06	Sunday	66.24				800	7.4	2	2
10/9/06	Monday							2	
10/10/06	Tuesday							1	
10/11/06	Wednesday							3	
10/12/06	Thursday							3	
10/13/06	Friday							1	
10/14/06	Saturday							4	
10/15/06	Sunday							2	
10/16/06	Monday	72.44				760	8.2	3	2
10/17/06	Tuesday	81.22				821	8.7	2	2
10/18/06	Wednesday	82.81				833	8.1	2	2
10/19/06	Thursday	83.12				831	7.7	3	2
10/20/06	Friday							2	
10/21/06	Saturday							2	
10/22/06	Sunday	76.69				797	7.3	3	2
10/23/06	Monday	73.83		>4839		768	7.8	2	2
10/24/06	Tuesday	72.24				821	8	3	3
10/25/06	Wednesday	74.74		>4839		826	7.9	2	2
10/26/06	Thursday	74.73		>9678		838	8.1	2	2
10/27/06	Friday	76.9		>4839		791	8.1	1	2
10/28/06	Saturday	77.68				808	7.9	2	2
10/29/06	Sunday	72.24				780	7.5	2	2
10/30/06	Monday	64.28		>9678		753	7.5	3	2
10/31/06	Tuesday	74.04		>9678*		797	8.2	2	2
11/1/06	Wednesday	80.68				840	8.3	2	3
11/2/06	Thursday							3	
11/3/06	Friday	78.72				824	8.7	2	2
11/4/06	Saturday							3	
11/5/06	Sunday	71.58				790	7.9	3	2
11/6/06	Monday	65.96				774	8.3	4	2
11/7/06	Tuesday	76.98				824	8.6	3	2
4/1/07	Sunday		13		3.1			2	
4/2/07	Monday	63.4	13		3.1	716	7	3	2
4/3/07	Tuesday		13		3.4			2	
4/4/07	Wednesday	78.4	13		3.3	812	7.5	2	2
4/5/07	Thursday	76.9	13		3.7	820	7.4	2	2
4/6/07	Friday		13	>2420	4.2			2	
4/7/07	Saturday		13		4			3	
4/8/07	Sunday	70.2			3.8	783	7	2	1
4/9/07	Monday	67.4	13	>2420	4.1	764	7.3	2	2
4/10/07	Tuesday		13	1300	4			2	
4/11/07	Wednesday	93.8	13	2420	4.3	856	8	3	3
4/12/07	Thursday		13	>2420	5.4			2	
4/13/07	Friday		14		3.8			2	
4/14/07	Saturday		13		3.6			2	
4/15/07	Sunday	70.4	14		3.4	907	9.2	4	2
4/16/07	Monday	67.6	14	>2420	3	780	8.9	2	2
4/17/07	Tuesday		14	>2420	3.9			3	
4/18/07	Wednesday		14	>2420	3.6			3	

**MCES Metropolitan Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Sulfate mg/L	Temp (Inf) Deg C	Total Coliform mpn/100m	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
4/19/07	Thursday	82	14	>2420	4	824	8.6	2	2
4/20/07	Friday		15		3.7			3	
4/21/07	Saturday		14		4.1			3	
4/22/07	Sunday				4			1	
4/23/07	Monday		14	>2420	3.5			4	
4/24/07	Tuesday		15		3.5			2	
4/25/07	Wednesday		15	>2420	3.3			4	
4/26/2007	Thursday		15		3.9			2	
4/27/2007	Friday		15		3.8			2	
4/28/2007	Saturday		15		3.7			2	
4/29/2007	Sunday		15		4.2			1	
4/30/2007	Monday		15		6.3			3	
Mean		74.73	13.86	3798	3.86	804.76	7.97	2.39	2.07
Stan Dev		6.67	0.85	2655	0.65	36.87	0.56	0.76	0.37
Min		63.4	13	1300	3	716	7	1	1
Max		93.8	15	10000	6.3	907	9.2	4	3
No. Samples		29	28	17	30	29	29	61	29
* Not included in statistics									

**Exhibit E**  
**Seneca WWTP Sampling Results**

**MCES Seneca Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO3	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO3	Calcium mg/L	CBOD mg/L	COD mg/L
10/8/06	Sunday	23.03	173	0.023	0.09	177	60.5	<3	28
10/9/06	Monday	23.48	180	0.023	0.1	181	58.5	<3	30
10/10/06	Tuesday	23.16	178	0.025	0.07	185	61.2	<3	32
10/11/06	Wednesday	22.7	173	0.027	0.1	181	61.5	<3	32
10/12/06	Thursday	22.73	180	0.025	0.07	178	58.8		33
10/13/06	Friday	22.72							
10/14/06	Saturday	22.88							
10/15/06	Sunday	22.88	184	0.024	0.08	182	60.6	<3	29
10/16/06	Monday	22.77	181	0.024	0.08	185	60.1	<3	34
10/17/06	Tuesday	22.4	183	0.018	0.09	191	62.1	<3	36
10/18/06	Wednesday	22.56	183	0.026	0.07	176	62	<3	36
10/19/06	Thursday	22.5	186	0.024	0.12	179	62.5		36
10/20/06	Friday	22.48							
10/21/06	Saturday	22.95							
10/22/06	Sunday	23.47	191	0.023	0.49	183	61.3	<3	36
10/23/06	Monday	23.81	186	0.022	0.18	185	62.2	<3	38
10/24/06	Tuesday	22.86	188	0.024	~0.03	193	64.3	<3	31
10/25/06	Wednesday	23.14	196	0.023	~0.06	190	64.4	<3	29
10/26/06	Thursday	22.91	194	0.024	0.08	188	63.8		28
10/27/06	Friday	22.84							
10/28/06	Saturday	23.03							
10/29/06	Sunday	23.17			0.08			3	28
10/30/06	Monday	23.27			~0.05			5	35
10/31/06	Tuesday	22.28			~0.03			3	36
4/1/07	Sunday	24.81			0.12			<3	34
4/2/07	Monday	23.44	170	0.022	~0.05	175	60.4	<3	31
4/3/07	Tuesday	22.95			0.09			<3	32
4/4/07	Wednesday	22.99	192	0.023	0.25		63.5	3	33
4/5/07	Thursday	23.07	183	0.023	0.08	178	63.8		36
4/6/07	Friday	23.54							
4/7/07	Saturday	23.67							
4/8/07	Sunday	22.57	192	0.019	0.07		62.1	11	30
4/9/07	Monday	23.26	170	0.021	0.08	174	59	3	29
4/10/07	Tuesday	23.06			0.09			<3	48
4/11/07	Wednesday	23.55	178	0.026	0.08	174	61.3	3	34
4/12/07	Thursday	23.5			0.13				38
4/13/07	Friday	23.56							
4/14/07	Saturday	23.94							
4/15/07	Sunday	23.73	174	0.028	0.12		64.1	<3	30
4/16/07	Monday	23.19	176	0.028	0.08		62.3	<3	33
4/17/07	Tuesday	22.61			0.08			<3	32
4/18/07	Wednesday	22.98			0.11			<3	34
4/19/07	Thursday	23.13	242	0.024	0.13		86.6		38
4/20/07	Friday	22.95							
4/21/07	Saturday	23.1							
4/22/07	Sunday	23.5			0.17			<3	40
4/23/07	Monday	23.43	169	0.025	0.09		64.7	<3	30
4/24/07	Tuesday	22.85			0.08			3	36

**MCES Seneca Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Flow mgd	Alkalinity mg/L CaCO <sub>3</sub>	Aluminum mg/L	Ammonia mg/L	Bicarbonate mg/L CaCO <sub>3</sub>	Calcium mg/L	CBOD mg/L	COD mg/L
4/25/07	Wednesday	23.46			0.11			3	38
4/26/07	Thursday	22.72			0.62				44
4/27/07	Friday	22.88							
4/28/07	Saturday	23.2							
4/29/07	Sunday	22.86			0.11			<3	40
4/30/07	Monday	23.04			0.07			<3	38
Mean		23.10	184.08	0.02	0.12	181.84	62.86	3.30	34.13
Standard Deviation		0.44	14.36	0.00	0.11	5.82	5.25	1.42	4.42
Min		22.28	169	0.018	0.03	174	58.5	3	28
Max		24.81	242	0.028	0.62	193	86.6	11	48
No. of Samples		54	25	25	40	19	25	33	40
* Not included in statistics									

**MCES Seneca Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli mpn/100 mL	Hardness mg/L CaCO3	Iron mg/L
10/8/06	Sunday	294			8.32			236	0.123
10/9/06	Monday	280			8.6		10	234	0.096
10/10/06	Tuesday	297			8.66		20	242	0.095
10/11/06	Wednesday	278			8.41		20	246	0.118
10/12/06	Thursday	269			8.44	26	20	232	0.111
10/13/06	Friday				8.3	38	22		
10/14/06	Saturday				8.45				
10/15/06	Sunday	268	61		8.42			240	0.116
10/16/06	Monday	273	59		8.17	32	31	236	0.087
10/17/06	Tuesday	279	75		8.06	14	20	238	0.103
10/18/06	Wednesday	279	78		8.28		40	242	0.129
10/19/06	Thursday	283	70		8.25		30	248	0.119
10/20/06	Friday				8.2		33		
10/21/06	Saturday				8.42				
10/22/06	Sunday	286	76		8.24			228	0.127
10/23/06	Monday	274	67		8.5		20	236	0.084
10/24/06	Tuesday	289			8.78		20	248	0.121
10/25/06	Wednesday	299			8.01	52	27	252	0.14
10/26/06	Thursday	297	61		8.81		44	246	0.13
10/27/06	Friday				8.2	29	21		
10/28/06	Saturday				8.33				
10/29/06	Sunday				8.3				
10/30/06	Monday				8.28		8		
10/31/06	Tuesday				8.36	14	7		
4/1/07	Sunday				9.19				
4/2/07	Monday	261	44		10.02		2	242	0.105
4/3/07	Tuesday				9.83	13	10		
4/4/07	Wednesday	275			9.51	33	20	246	0.133
4/5/07	Thursday	272	54		10	18	10	248	0.182
4/6/07	Friday				9.82	548	290		
4/7/07	Saturday				9.74				
4/8/07	Sunday	266			9.52			240	0.189
4/9/07	Monday	268	41		9.62	4	4	238	0.123
4/10/07	Tuesday				9.32	47	28		
4/11/07	Wednesday	282	48		9.01	15	10	238	0.143
4/12/07	Thursday				9.2	238	160		
4/13/07	Friday				9.27	18	20		
4/14/07	Saturday				9.04				
4/15/07	Sunday	285			9.04			238	0.226
4/16/07	Monday	274			9.11	6	20	232	0.183
4/17/07	Tuesday				9.26	5	9		
4/18/07	Wednesday				9.44	6	10		
4/19/07	Thursday	402			9.49	71	47	302	0.095
4/20/07	Friday				9.17	23	20		
4/21/07	Saturday				8.98				
4/22/07	Sunday				8.99				
4/23/07	Monday				8.98		170	246	0.256
4/24/07	Tuesday				9.1		10		

**MCES Seneca Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Chloride ion mg/L	Color units	Copper mg/L	DO mg/L	E. coli mpn/100ml	Fecal Coli mpn/100 mL	Hardness mg/L CaCO3	Iron mg/L
4/25/07	Wednesday				9.13	5	5		
4/26/07	Thursday				9.49		3		
4/27/07	Friday				8.68		10		
4/28/07	Saturday				8.59				
4/29/07	Sunday				9.32				
4/30/07	Monday				8.76		2		
Mean		284.58	61.17		8.88	57	33	242.96	0.13
Standard Deviation		27.07	12.57		0.55	120	55	13.68	0.04
Min		261	41		8.01	4	2	228	0.084
Max		402	78		10.02	548	290	302	0.256
No. of Samples		24	12		54	22	38	25	25
* Not included in statistics									

**MCES Seneca Plant Final Effluent Sampling Results  
Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L	Sulfate mg/L
10/8/06	Sunday	25.5	0.018	18.3		1.6	2.4	7.1	18	447.82
10/9/06	Monday	25.5	0.012	16.9		0.55	1.5	7.2	22	286.15
10/10/06	Tuesday	26.1	0.012	17.2		0.44	0.78	7.2	18	380.42
10/11/06	Wednesday	25.9	0.011	18.7		0.32	0.59	7.1	18	417.92
10/12/06	Thursday	24.9	0.013	19.2		0.195	0.56	7.1	18	195.87
10/13/06	Friday							7.1		
10/14/06	Saturday							7		
10/15/06	Sunday	26.1	0.039	17.8		0.328	0.58	7.1	18	103.04
10/16/06	Monday	26.2	0.012	16.6		0.461	0.8	7.1	18	85.9
10/17/06	Tuesday	26.9	0.014	17.7		0.388	0.76	7.2	18	94.23
10/18/06	Wednesday	25.8	0.017	18.1		0.371	1.8	7.1	18	287.04
10/19/06	Thursday	25.7	0.025	17.7		1.9	2.6	7.1	18	518.02
10/20/06	Friday							7.2		
10/21/06	Saturday							7.1		
10/22/06	Sunday	25.3	0.036	16		1.99	2.8	6.9	22	387.76
10/23/06	Monday	25.2	0.016	15.4		2.02	2.5	7.1	17	238.86
10/24/06	Tuesday	25.5	0.016	15.5		2.05	2.7	7.1	18	531.07
10/25/06	Wednesday	25.3	0.018	16.2		2.31	3	7.2	18	663.65
10/26/06	Thursday	25	0.022	16.4		3.05	3.7	7.2	19	724.17
10/27/06	Friday							7.1		
10/28/06	Saturday							7.2		
10/29/06	Sunday			17.3			3	7.1		
10/30/06	Monday			15.9			2.2	7.2		
10/31/06	Tuesday			16.8			3.3	7.3		
4/1/07	Sunday			14.3	0.11		1.4	7		
4/2/07	Monday	23.5	0.063	14.4	<0.03	0.72	1.1	7	16	279
4/3/07	Tuesday			14.2	<0.03		1.1	6.5		
4/4/07	Wednesday	24.2	0.066	15.4	<0.03	0.89	1.3	7	16	678
4/5/07	Thursday	24.6	0.094	15	0.06	0.81	1.1	7.1	16	679
4/6/07	Friday							7.1		
4/7/07	Saturday							7		
4/8/07	Sunday	24.5	0.066	14.1	<0.03	0.65	1	6.9	16	282
4/9/07	Monday	24	0.051	14.4	<0.03	1.01	1.4	7.1	16	206
4/10/07	Tuesday			14.4	<0.03		1.4	7		
4/11/07	Wednesday	24.6	0.059	15.5	0.05	0.54	0.93	7.2	16	558
4/12/07	Thursday			15.1	0.08		1.1	7.1		
4/13/07	Friday							7		
4/14/07	Saturday							7.1		
4/15/07	Sunday	24.6	0.063	15.2	0.07	0.49	1	7	16	442
4/16/07	Monday	25	0.053	14.4	<0.03	0.55	0.86	7	16	320
4/17/07	Tuesday			15	<0.03		0.88	7.1		
4/18/07	Wednesday			15.4	0.03		1.1	7.2		
4/19/07	Thursday	29.8	0.028	15.4	0.04	0.019	1.1	7.2	17	39.7
4/20/07	Friday							7.1		
4/21/07	Saturday							7.2		
4/22/07	Sunday			14.8	0.04		0.89	7.1		
4/23/07	Monday	25.4	0.053	14.9	0.04	0.56	0.82	7.1	16	512
4/24/07	Tuesday			15.3	<0.03		0.67	7.1		

**MCES Seneca Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Magnesium mg/L	Manganese mg/L	Nitrate mg/L	Nitrite mg/L	Ortho P mg/L	TP mg/L	pH	Silica mg/L	Sulfate mg/L
4/25/07	Wednesday			16.1	0.03		0.85	7.1		
4/26/07	Thursday			14.2	0.08		0.91	7.1		
4/27/07	Friday							7.2		
4/28/07	Saturday							7.1		
4/29/07	Sunday			15.3	<0.03		1.9	7.1		
4/30/07	Monday			15	<0.03		1.6	7		
Mean		25.40	0.04	15.89	0.04	0.97	1.50	7.09	17.56	374.30
Standard Deviation		1.19	0.02	1.38	0.02	0.80	0.86	0.12	1.66	200.30
Min		23.5	0.011	14.1	0.03	0.019	0.56	6.5	16	39.7
Max		29.8	0.094	19.2	0.11	3.05	3.7	7.3	22	724.17
No. of Samples		25	25	40	22	25	40	54	25	25
* Not included in statistics										

**MCES Seneca Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Temp (Inf) Deg C	Total coliform mpn/100ml	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
10/8/06	Sunday				1460	8.6	~2	3
10/9/06	Monday				1150	7.5	~2	2
10/10/06	Tuesday				1400	8.2	~2	3
10/11/06	Wednesday				1310	8	~1	3
10/12/06	Thursday		3973		1070	7.4	~2	3
10/13/06	Friday		1670					
10/14/06	Saturday							
10/15/06	Sunday				917	8.5	3	3
10/16/06	Monday		3466		900	8.5	3	2
10/17/06	Tuesday		3973		910	9	~2	3
10/18/06	Wednesday				1070	8.6	~2	3
10/19/06	Thursday				1560	9.2	3	3
10/20/06	Friday							
10/21/06	Saturday							
10/22/06	Sunday				1400	9.3	4	3
10/23/06	Monday				1120	7.9	3	3
10/24/06	Tuesday				1570	9.2	~2	3
10/25/06	Wednesday		>4839		1840	8.9	~3	3
10/26/06	Thursday				1960	9.4	~2	2
10/27/06	Friday		3719					
10/28/06	Saturday							
10/29/06	Sunday						3	
10/30/06	Monday						6	
10/31/06	Tuesday		8812				~2	
4/1/07	Sunday	16		3.6			5	
4/2/07	Monday	18		3.4	1130	7.3	~3	2
4/3/07	Tuesday	17		4			3	
4/4/07	Wednesday	16		4.1	1720	7.8	3	2
4/5/07	Thursday	16		3.5	1740	7.7	4	2
4/6/07	Friday	15.5	>2420					
4/7/07	Saturday	15.5						
4/8/07	Sunday	15.7		3.9	1140	7.6	4	2
4/9/07	Monday	16	106	3.7	1090	7.4	3	2
4/10/07	Tuesday	15.8	1986	4.1			~2	
4/11/07	Wednesday	18	649	4.8	1580	8.2	~3	3
4/12/07	Thursday	16	>2420	3.8			4	
4/13/07	Friday	16.5	2420					
4/14/07	Saturday	16.8						
4/15/07	Sunday	16.9		3.9	1270	9.3	3	2
4/16/07	Monday	17	313	4.2	1250	9	~2	3
4/17/07	Tuesday	17.4	261	4.2			~2	
4/18/07	Wednesday	17.2	866	4.3			3	
4/19/07	Thursday	17.4	>2420	4.5	1090	9.6	3	3
4/20/07	Friday	17						
4/21/07	Saturday	17						
4/22/07	Sunday	16.9		4.4			5	
4/23/07	Monday	17		4.4	1500	7.8	4	5
4/24/07	Tuesday	17		4.2			3	

**MCES Seneca Plant Final Effluent Sampling Results**  
**Recycling Treated Municipal Wastewater for Industrial Water Use**

Date	Day of Wk	Temp (Inf) Deg C	Total coliform mpn/100ml	TKN mg/L	TDS mg/L	TOC mg/L	TSS mg/L	Turbidity NTU
4/25/07	Wednesday	17	272	4.5			3	
4/26/07	Thursday	17		6			3	
4/27/07	Friday	16.8						
4/28/07	Saturday	16.5						
4/29/07	Sunday	17		4.9			5	
4/30/07	Monday	18		3.8			7	
Mean		16.73	2491	4.19	1325.88	8.40	3.10	2.72
Standard Deviation		0.70	2175	0.56	299.35	0.73	1.22	0.68
Min		15.5	106	3.4	900	7.3	1	2
Max		18	8812	6	1960	9.6	7	5
No. of Samples		30	18	22	25	25	40	25
* Not included in statistics								