



2004



# Oklahoma Water Resources Board

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## Lake Thunderbird Pilot Plant Study 2003

for the

Central Oklahoma Master Conservancy District

May 2004

Final Report

Oklahoma Water Resources Board  
3800 North Classen Boulevard  
Oklahoma City, OK 73118

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## Executive Summary

The Central Oklahoma Master Conservancy District (COMCD), in cooperation with the City of Midwest City (MWC), manufactured and ran drinking water pilot plants to screen the methods of hydrogen peroxide and EarthTec® pretreatment to Lake Thunderbird raw water. The purpose of the project was to determine the effectiveness of the two pretreatment options ability to improve raw water quality, enhancing municipalities' ability to better serve their customers. Two separate pilot plants were constructed: one tested EarthTec® as an in-lake treatment option and the other tested concentrated hydrogen peroxide as a pretreatment in the raw water transmission line. Tests were run from June 19, 2003 through November 4, 2003. Screening criteria were as follows: reductions of target parameters would pass pilot plant screening while methods shown to be ineffective in reducing target parameters would not pass screening. Primary test parameters were total organic carbon (TOC) and taste and odor number (TON). Secondary parameters important to the process included trihalomethane formation potential (THMFP), haloacetic acids (HAA) and UV254.

Statistical tests were run comparing raw water against both pilot plants to minimize environmental and temporal influence. Test results showed that EarthTec® was not effective at reducing primary test parameters, secondary test parameters or chlorophyll-a. However, the peroxide pilot plant did show significant reduction of TOC, THMFP and UV254. When compared against the Midwest City water treatment plant process (through clarification and filtration), hydrogen peroxide treatment showed enhanced removal of TON, TOC, HAA and UV254 ([Table 1](#)).

Test Parameter (unit)	EarthTec®	Hydrogen Peroxide
	sample site 1 vs sample site 3	sample site 2 vs sample site 4
	↑ or ↓	↑ or ↓
TON (number)	↑	↓
TOC (mg/L)	NA	↓
HAA (mg/L)	NA	↓
THMFP (mg/L)	↑	NA
UV254 (cm-1)	↑	↓

**Table 1:** Screening results for the EarthTec® and hydrogen peroxide pilot plants. The arrow represents the direction of change due to pilot plant treatment. NA – no significant change

## Recommendations

- EarthTec® may not be an effective pretreatment option for Lake Thunderbird raw water and does not warrant further investigation.
- Significant reduction of TOC, THMFP and UV254 were observed with application of hydrogen peroxide and warrants further investigation.
- Hydrogen peroxide pretreatment enhanced the Midwest City water treatment process train's ability to reduce TON, TOC, HAA and UV254 and warrants further investigation.

## Introduction

The Oklahoma Water Resources Board (OWRB) had been requested to support pilot plant testing directed by the Central Oklahoma Master Conservancy District (COMCD). The purpose of the project was to evaluate pre-treatment options to improve raw water quality and enhance the ability of municipalities to serve their customers. Study results will be used to aid COMCD decision making for further investigation. The staff of the City of Midwest City (MWC) water treatment plant (WTP) manufactured and ran pilot plants to show the effects of applying concentrations of hydrogen peroxide and EarthTec<sup>®</sup> to diverted Lake Thunderbird raw water as a pretreatment measure. Tests were run from June 19, 2003 through November 4, 2003. The OWRB ensured laboratory analysis of the pilot plant samples, provided concurrence between parties for proposed actions, compiled laboratory data and drafted a technical evaluation of the pilot plant studies. For this study, the COMCD suspended the application of free chlorine to the raw water supply during the testing period.

A description of the raw water delivery system and pilot plant designs are given. Following details of the pilot plant design are discussions of the test parameters, statistical procedures used to evaluate pilot plant results, pilot plant results, summary and finally recommendations.

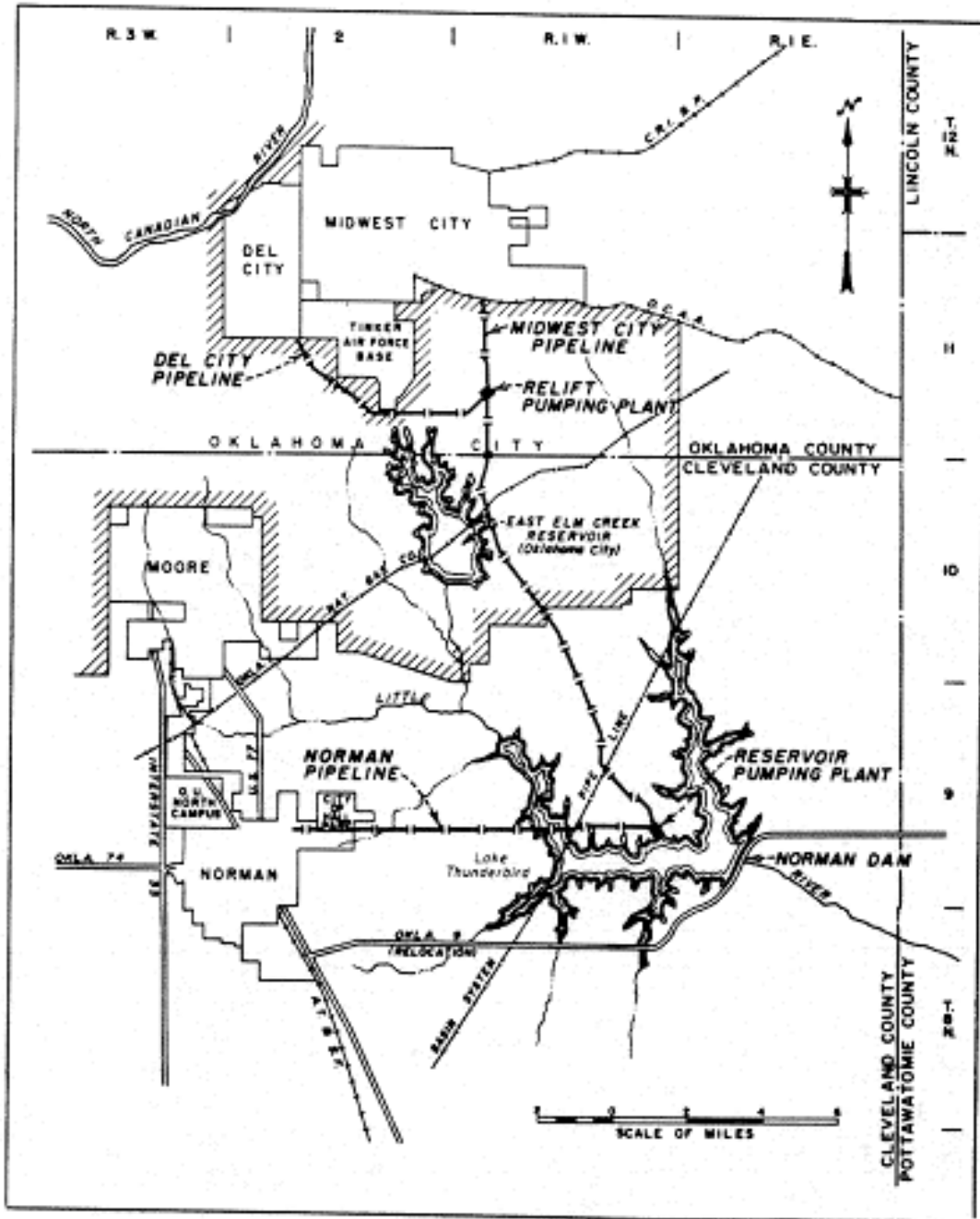
## Raw Water Delivery System

The COMCD furnishes Lake Thunderbird water to the City of Norman, Del City and Midwest City to be processed into potable water through a series of pipes and pump stations originating from Lake Thunderbird. The COMCD's raw water pumping plant is located on the north shore of Lake Thunderbird adjacent to their water quality sample site 4. Raw water is routed directly to Norman from the pumping plant while a separate line delivers raw water to a relift station prior to routing to Midwest City and Del City.

Del City and Midwest City share a raw water conveyance line to a one million gallon open top holding tank at a relift station located 12.5 miles north of the lake ([Figure 1](#)). From the relift station, raw water is routed 3.6 miles to the Midwest City water treatment plant. Located on the plant grounds are two regulating tanks capable of holding 2.383 million gallons of raw water. From the regulating tanks, the water flows into "Tucker's Vault" and then proceeds into the plant train for processing. [Table 2](#) summarizes detention times at several flow rates in the MWC WTP. A seven million gallon (7 MG) flow rate and fifteen-hour (15 hr) total detention time were used for the pilot plant design because they most closely approximate the raw water conveyance summer operating conditions.

	<b>4 MG Flow</b>	<b>7 MG Flow</b>	<b>13 MG Flow</b>
<b>Lake to Relift</b>	20.16	11.52	6.2
<b>Relift</b>	2.8	1.6	0.87
<b>Relift to Plant</b>	4.2	2.4	1.3
<b>Total Detention</b>	27.16	15.52	8.37

**Table 2:** Detention times (hours) from Lake Thunderbird to MWC WTP



**Figure 1:** Diagram showing COMCD Lake Thunderbird pumping plant and network of transmission lines to municipal treatment plants.

# Pilot Plant Design

## Hydrogen Peroxide

The hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) pretreatment was tested on a small-scale pilot plant based on the MWC WTP train #2. The pilot plant consisted of the following structures:

1. A ten-inch by ten-foot (10" x 10') section of PVC pipe was used to simulate the COMCD transmission line. The PVC pipe was capped on each end and retrofitted on one end with injection points for hydrogen peroxide and ferric sulfate. Detention time in the pipe was 5.4 hours.
2. A regulating tank.
3. Pre-treatment basin
4. A flash mixer with a variable speed mixer.
5. A contact basin with a variable speed mixer.
6. Four filters.
  - a. Filter 1: 50% lignite and 50% anthracite
  - b. Filter 2: 50% bituminous and 50% anthracite
  - c. Filter 3: 100% anthracite
  - d. Filter 4: 25% lignite and 75% anthracite

To ensure accuracy of testing, the required detention times in each structure of the pilot plant were calculated to match detention times in the main plant. Equation 1 was used to calculate the required detention time of each pilot plant component. Volumes and detention times for each structure in the pilot plant are contained in [Table 3](#).

$$\text{Equation 1: Detention time (minutes)} = \frac{\text{container capacity (gallons)} \times 3785 \text{ mL/gallons}}{\text{Flow}}$$

	<b>Regulating Tank</b>	<b>Pre-treatment Basin</b>	<b>Flash Mixer</b>	<b>Contact Basin</b>	<b>Filters</b>
<b>Tank size (inches)</b>	30" x 20.5"	15.75"	Insignificant	18.75" x 22"	N/A
<b>Tank volume (gallons)</b>	51.74	9.8	Insignificant	30.85	N/A
<b>Detention Time</b>	6.9 hours	1.3 hours	4.94 minutes	4.1 hours	0.133 hours

**Table 3:** H<sub>2</sub>O<sub>2</sub> plant detention times at 473 mL/min flow

## Earthtec®

EarthTec® was applied to a 1,500 gallon tank which was used to mimic the lake. EarthTec® treated water was routed to a 10' long 10" diameter PVC pipe capped at the end and fitted with a valve for withdrawal of samples. The EarthTec® pilot plant was operated with a detention time of 5.4 hours and flow of 473 ml/min.

## Chemicals and Application Points

To determine the effect of the pre-treatment options, only the pre-treatment chemicals were varied (hydrogen peroxide, ferric sulfate, and Earthtec<sup>®</sup>). Ferric sulfate was used because it is a good coagulant and a good catalyst (e.g. Fenton's Reagent) when using hydrogen peroxide. Other chemicals used on a daily basis included: chlorine dioxide, chlorine, and two types of polymers.

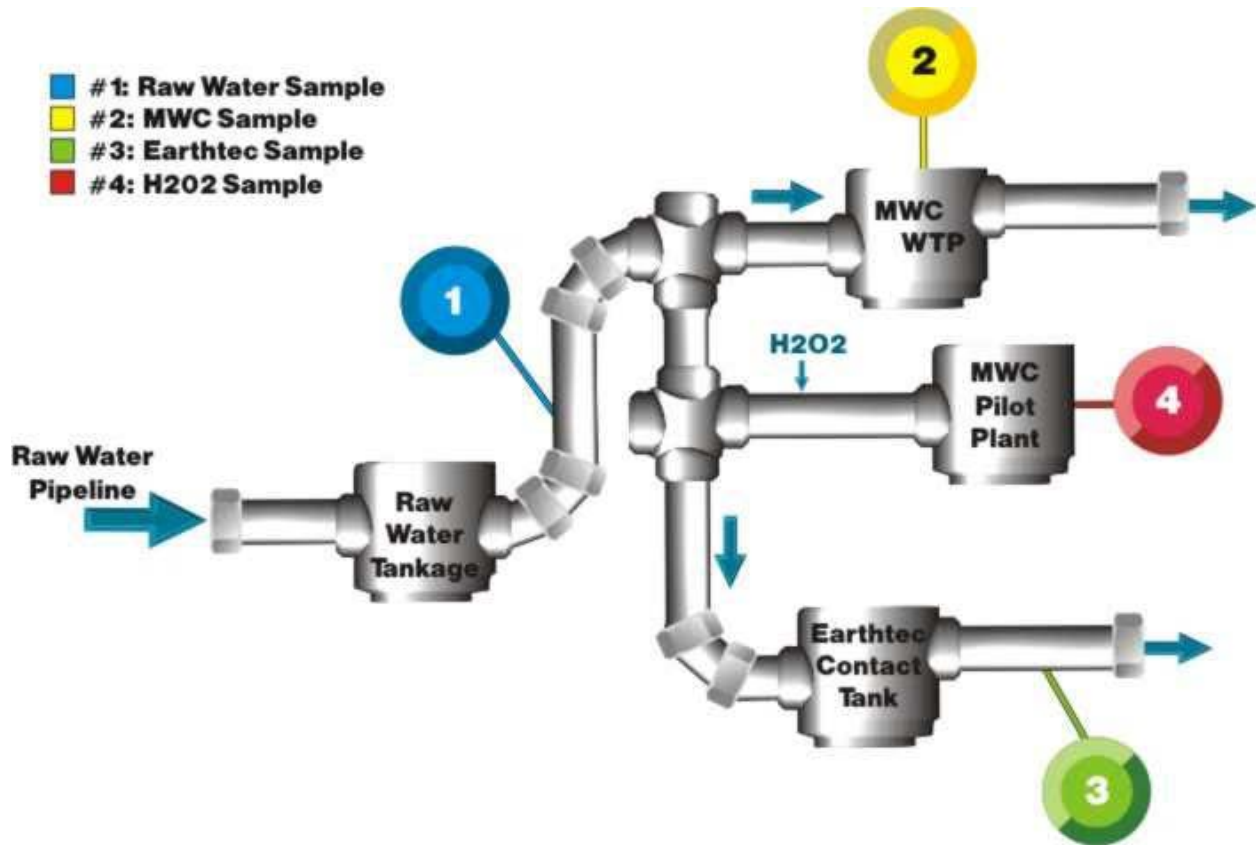
In the hydrogen peroxide pilot plant, ferric sulfate and hydrogen peroxide were applied to the raw water in the ten-inch pipe. The water flowed through the regulating tank to the flashmixer where polymer and chlorine dioxide were applied. The water then entered the contact basin and chlorine was applied. After leaving the contact basin, the water flowed to the four filters.

## Sample Sites

[Figure 2](#) shows the location of the four sample sites.

1. Sample #1: Raw water with no treatment. This sample was collected from a laboratory faucet in direct connection to Tucker's vault.
2. Sample #2: MWC filtered (full scale plant). This sample was collected from a faucet inside the water treatment plant that is connected to the post conventional treatment waterline.
3. Sample #3: Raw water with Earthtec<sup>®</sup>. This sample represents lake pretreatment.
4. Sample #4: MWC filtered with hydrogen peroxide pre treatment (pilot plant). This sample represents pretreatment of raw water with peroxide followed by conventional water treatment.





**Figure 2:** Pilot plant schematic with sample sites. **Note:** This study did not involve finished water in anyway.

### Test Parameter Discussion

Pilot plant water quality parameters were selected using input from COMCD board members and staff from the Cities of Norman, Del City and Midwest City. As directed by the COMCD, the OWRB contracted all pilot plant analysis to one laboratory, Accurate Labs of Stillwater, OK. Sample procedures followed were those prescribed by Accurate Labs designed to follow standard sampling methods. [Table 4](#) details sampling requirements and analytical methodology. A brief discussion of each pilot plant test parameter is given to familiarize the reader and help with interpretation of test results.

Analysis	Container	Hold Time
Total organic carbon by SM 5310C	1-40ml vial (H3PO4)	28 days
Trihalomethane formation potential by EPA 524	3-40ml vial (no headspace)	14 days
Algae counts by SM10200i	1-1Liter amber glass	none noted
Total copper by EPA 200.7	1-500ml plastic (HNO3)	6 months
Threshold odor number by SM 2150B	1-1Liter glass	ASAP
Geosmin/ MIB by EPA 6040	2-60ml amber vials (HgCl2) (no headspace)	14 days
Haloacetic acid by EPA 522	3-60ml amber vials (NH4Cl) (no headspace)	14 days
UV 254 by SM5910b	1-40ml amber vial	48 hours

**Table 4:** Summary of laboratory analytical methods and sampling requirements for pilot plant samples.

**Chlorophyll-a** is a direct measure of living algae. Chlorophyll-a has a very short life outside of living cells and is rapidly converted to pheophytin-a upon cell death. Chlorophyll-a is a measure of raw water quality and viewed as an indicator of raw water quality and organic content.

**Taste and Odor Number (TON)** is a value derived from human ability to detect objectionable smells. Values are reported as integer numbers and generally applied to finished drinking water. A value of 3 or more is considered objectionable.

**Total Organic Carbon (TOC)** serves as a direct measure of organic content. TOC, a required monitoring parameter for water treatment plants, does not differentiate between dissolved and particulate fractions.

**Haloacetic Acid (HAA)** analysis is a required monitoring parameter in the finished water distribution system. Haloacetic acids represent a class of halogenated two-carbon organic compounds representing a potential threat to human health. Chlorine, bromine and iodine are the more common halogens.

**Trihalomethane Formation Potential (THMFP)** analysis serves as an indicator of the potential for trihalomethane (THM) to form in a chlorinated finished water distribution system. Although not a required monitoring parameter for water distribution systems this parameter is a useful predictor.

**Ultraviolet absorption at 254 nm (UV254)** indicates the total concentration of UV-absorbing organic compounds in drinking water. This parameter is unitless as it reports the absorption of ultraviolet light at 254-nanometer wavelength of the filtered sample. It can be utilized to correlate the dissolved organic carbon content of the sample.

**Geosmin**, detectable to the human palate above 4 ng/L, is a known taste and odor causing chemical sometimes found in drinking water. Certain species of algae are known to produce this chemical. Cell death is usually responsible for the release of this compound from the algae into the water column and subsequent objectionable taste and odor.

**2-Methylisoborneol (MIB)** is another taste and odor chemical detectable to the human palate at low concentrations. Certain species of algae are known to produce this chemical. Cell death is usually responsible for the release of this compound from the algae into the water column and subsequent objectionable taste and odor.

**Copper** is a metal and known toxicant to plant and invertebrate life. Copper is the stated active ingredient in the aquatic herbicide, EarthTec<sup>®</sup>. Copper above 1 mg/L in drinking water can cause undesirable taste and color issues.

## Statistical Procedures

A battery of statistical tests was applied to the pilot plant water quality data. The first round of tests established the statistical distribution for each parameter by sample site. Results showed the majority of parameters results were (statistically) non-normal. Several reasons can explain a non-normal distribution including small sample size, narrow range of data reports and many reports below detection limits. These facts do not degrade the value of the data but serve to lead the investigator towards appropriate test methods. Because most of the data were non-normal, non-parametric test procedures were used to ensure the validity of pilot plant results.

The Kruskal-Wallis test packaged in Minitab<sup>®</sup> software was chosen for the bulk of analysis. In short, the Kruskal-Wallis test looks for differences between medians. Median is a non-normal measure of central tendency just as average is a normal measure of central tendency but average assumes a normal distribution. When data is normally distributed the average and median are the same value. When distributions are not normally distributed the average value will be biased by extreme values. Median on the other hand is the middle observation in a data

set and represents the place in the distribution where half the values in the set are greater than and half the values less than the median value. An additional advantage of the Kruskal-Wallis (against median) test statistic is the ability to conclude major effects possibly obscured by the wide range of pilot plant settings used over the entire data set. The Kruskal-Wallis hypotheses are:

H0: the population medians are all equal versus

H1: the medians are not all equal

Finally the packaged Minitab software reports all results to the user as a p-value or probability of a false conclusion. In the case of pilot plant results, p-values less than 0.10 allow for the test hypothesis to be rejected and conclude significant differences for that parameter. For this report, differences concluding that the pilot plant treatment significantly affected the laboratory parameter have been bolded for ease of interpretation followed by a percent change between median values. A positive % change represents a pilot plant increase while a negative value represents a pilot plant decrease. The last value given from this statistical testing is the median value for the particular pilot plant treatment. An assumption for this test is that the samples from the different populations are independent random samples from continuous distributions, with the distributions having the same shape. Based on these basic statistical test results, general conclusions for each pilot plant parameter are drawn to point towards a recommendation regarding each tested pilot methodology.

Additional presentation of test pilot plant results and statistical evaluation are given for pilot plant methods recommended for additional investigation. Optimal plant settings (as bracketed by the input range) are given. Additional statistical evaluation was also performed on the results of the recommended pilot plant method. These tests were to determine primary factors affecting response parameters such as TOC, UV 254 and TON.

## Results

Presentation of test results has been segregated to characterize the following processes:

- EarthTec® pretreatment of Lake Thunderbird water with accompanying conveyance system retention
- Enhanced hydrogen peroxide pretreatment of diverted raw water from Lake Thunderbird within the conveyance system

All laboratory test results have been compiled and are presented in [Appendix A](#). [Appendix A](#) also includes quality assurance and quality control reports and a statement of detection limits for all parameters.

### EarthTec® Pretreatment

Sample site 1 was compared against sample site 3 to screen the effectiveness of the Earthtec® pilot plant ([Figure 2](#)). A statistical reduction of MIB was noted while no statistical change was noted for TOC, HAA, and geosmin ([Table 5](#)). Chlorophyll-a, TON, THMFP, UV254 and copper showed a statistically significant increase. The increase of dissolved organic carbon as reflected through UV254, THMFP and TON could be expected through release of algae cell contents. The increase of copper, the active ingredient of the algaecide EarthTec®, was a predictable conclusion. EarthTec® pretreatment was not effective at reducing primary or secondary test parameters.

Test Parameter (unit)	EarthTec®				
	Median Value	p-value	Median Change	Range	↑↓
Chl-a (µg/L)	<b>1750</b>	<b>0.043</b>	<b>386%</b>	<b>-54% to 12,458%</b>	↑
TON (number)	<b>0.5</b>	<b>0.032</b>	<b>0%</b>	<b>0% to 100%</b>	↑
TOC (mg/L)	5.80	0.271	7%	0% to 32%	—
HAA (mg/L)	2	0.547	0%	0% to 278%	—
THMFP (mg/L)	<b>626</b>	<b>0.083</b>	<b>12%</b>	<b>-8% to 69%</b>	↑
UV254 (cm-1)	<b>0.0860</b>	<b>0.022</b>	<b>12%</b>	<b>1% to 29%</b>	↑
Geosmin (ng/L)	1.50	0.745	0%	-46% to 247%	—
MIB (ng/L)	<b>1.50</b>	<b>0.054</b>	<b>-59%</b>	<b>-95% to 0%</b>	↓
Cu (mg/L)	<b>0.090</b>	<b>0.000</b>	<b>1019%</b>	<b>167% to 7,500%</b>	↑

**Table 5:** Statistical comparison of EarthTec® pilot plant treated water against raw water. Bolded numbers represent statistical significance between treatments as indicated by the p-value while the arrow represents the direction of change due to pilot plant treatment. Median change represents the percent reduction between treatment medians.

## Peroxide Treatment

For the first statistical comparison, raw water was compared against the peroxide pretreated pilot plant water; in effect comparing the results from sample site 4 to sample site 1 ([Figure 2](#)). Peroxide treatment resulted in significant reductions of chlorophyll-a, TOC, THMFP and UV254. Conversely, significant increases of TON and HAA were noted ([Table 6](#)). These increases are likely attributed to the application of chlorine dioxide and free chlorine in the pilot plant train. No significant changes were noted for the taste and odor chemicals geosmin and MIB. The removal of chlorophyll-a shows elimination of algae cells by the pilot plant. However the TON and HAA enhancement suggests that although the cells are eliminated the contents are not. The reduction of UV 254 shows removal of dissolved organic compounds while TOC shows a moderate reduction of total organic compounds.

For the second statistical comparison, raw water was compared against Midwest City's full-scale treatment system, in effect comparing the results from sample site 2 to sample site 1 ([Figure 2](#)). This allowed for a brief assessment of conventional treatment without the peroxide enhancement. Significant reductions were noticed for chlorophyll-a and UV254. Conversely, significant enhancements were noted for TON and HAA. No significant changes were noted with TOC, THMFP, geosmin, or MIB concentration. The removal of chlorophyll-a shows removal of algae cells from the raw water. However, the TON and HAA enhancement combined with the lack of significant reduction of TOC suggests that although the cells are eliminated the contents are not. The reduction of UV 254 shows some removal of dissolved organic compounds.

The third and final comparison was to estimate the effect of peroxide enhancement by subtracting MWC median reports from peroxide median reports using data from [Table 6](#). Hydrogen peroxide pretreatment provided enhanced removal of TON, TOC, HAA, MIB and UV254 compared against MWC ([Table 7](#)).

Test Parameter	Raw Water vs. Peroxide				Raw Water vs. MWC			
	Median Value	p-value	Median Change	Range	Median Value	p-value	Median Change	Range
Chl-a (µg/L)	<b>0.5</b>	<b>0.000</b>	<b>-100%</b>	-100% to – 81%	<b>0.5</b>	<b>0.000</b>	<b>-100%</b>	<b>-100</b>
TON (number)	<b>1.2</b>	<b>0.000</b>	<b>240%</b>	<b>-100% to 700%</b>	<b>4.0</b>	<b>0.000</b>	<b>700%</b>	<b>300% to 1,600%</b>
TOC (mg/L)	<b>4.5</b>	<b>0.014</b>	<b>-17%</b>	<b>-53% to 5%</b>	5.3	0.643	-4%	-12% to 2%
HAA (mg/L)	<b>49.5</b>	<b>0.000</b>	<b>2478%</b>	<b>940% to 12,600%</b>	<b>94</b>	<b>0.000</b>	<b>4,598%</b>	<b>3,175% to 7,800%</b>
THMFP (mg/L)	<b>423</b>	<b>0.009</b>	<b>-6%</b>	<b>-71% to 14%</b>	523	0.862	-6%	-20% to 6%
UV254 (cm-1)	<b>0.0465</b>	<b>0.000</b>	<b>-40%</b>	-67% to – 26%	<b>0.0495</b>	<b>0.000</b>	<b>-35%</b>	<b>-52% to 33%</b>
Geosmin (ng/L)	1.5	0.547	0%	-84% to 25%	1.5	0.324	0%	-13% to 1,300%
MIB (ng/L)	1.5	0.439	59%	-85% to 86%	6.5	0.585	76%	-77% to 393%

**Table 6:** Statistical comparison of raw water against the peroxide pilot plant (prior to disinfection) water (Raw Water vs. Peroxide) and raw water against MWC treated water prior to disinfection (Raw Water vs. MWC). Bolded numbers represent statistical significance between treatments as indicated by the p-value. Median change represents the percent reduction between treatment medians.

Test Parameter (unit)	Difference between Medians	Difference between Median % Reduction	Direction of Change
Chl-a (µg/L)	0	0%	—
TON (number)	2.8	60%	↓
TOC (mg/L)	0.8	13%	↓
HAA (mg/L)	44.5	2,120%	↓
THMFP (mg/L)	100	0%	—
UV254 (cm-1)	0.0030	5%	↓
Geosmin (ng/L)	0.0	0%	—
MIB (ng/L)	5.0	17%	↓

**Table 7:** Net removal by peroxide pilot plant as compared against MWC plant performance.

## Peroxide Plant Settings

The ability of the peroxide pilot plant to enhance performance warranted additional evaluation as to what settings produced the best water. Midwest City Water Treatment Plant staff varied settings as testing progressed in order to approach best performance. Using measures of organic carbon (TOC) as the most important parameter, the settings on 09/30/03 showed a 51 % reduction of TOC, the highest to date ([Table 8](#)).

Peroxide Pilot Plant Treatment											
Date	Feed Rate Settings (ppm)						Parameter Test Results (Removal Rates)				
	Ferric	POLYMER		H <sub>2</sub> O <sub>2</sub>	Cl <sub>2</sub>	ClO <sub>2</sub>	TOC (mg/L)	UV254 (cm-1)	HAA (mg/L)	THMFP (mg/L)	TON (#)
		9311/2202	8809/4202								
07/01/03	25.0	10.0		0.5	5.0	0.0	27%	45%	-3085%	47%	0%
07/22/03	25.0	10.0		0.5	5.0	1.5	-4%	47%	-3065%	38%	-180%
08/05/03	25.0		10.0	0.5	5.0	1.5	24%	37%	-940%	13%	-180%
08/12/03	25.0		10.0	3.0	5.0	1.5	6%	26%	-1485%	11%	-500%
08/19/03	25.0	10.0		10.0	5.0	1.5	28%	48%	-1605%	29%	0%
08/26/03	25.0	10.0		20.0	7.0	1.5	20%	40%	-1040%	21%	0%
09/02/03	0	10.0		20.0	7.0	0.0	-5%	32%	-12600%	11%	-100%
09/09/03	0	10.0		1.0	7.0	1.5	15%	36%	-2510%	27%	-300%
09/16/03	20.0	8.0		30.0	7.0	1.5	18%	38%	-2285%	10%	-300%
09/23/03	30.0	8.0		30.0	7.0	1.5	53%	67%	-1055%	71%	-100%
09/30/03	40.0	8.0		30.0	7.0	1.5	9%	40%	-2465%	23%	-700%

**Table 8:** Experimental Design of Peroxide Pilot Plant with laboratory test results presented as percent reduction from raw water.

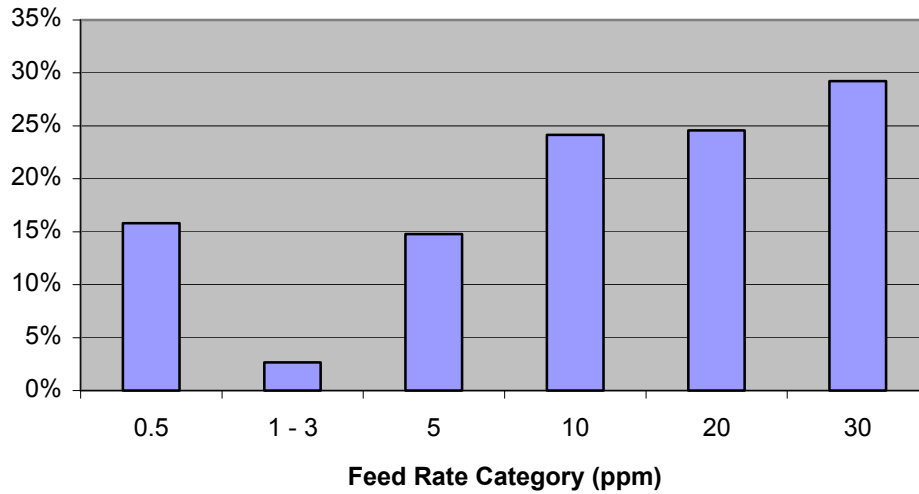
## Peroxide Feed Rate

Plots of peroxide feed rate verses averaged test parameters were prepared to seek potential relationships between peroxide feed rate and removal of organic constituents. Simple plotting of all applicable parameters was performed encompassing six peroxide feed rates ranging from 0.5 ppm to 30 ppm. It is important to note that while peroxide feed rate was varied, other pilot plant settings were also varied. [Table 8](#) summarizes the experimental design for the first set of pilot plant tests. Three additional tests were performed after September 30, 2003 varying only peroxide feed rate. Combined with the pre-September 30, 2003 tests, a total of 4 tests with two different feed rates were performed under controlled conditions. Preliminary plots of these four tests and two feed rates were not instructive.

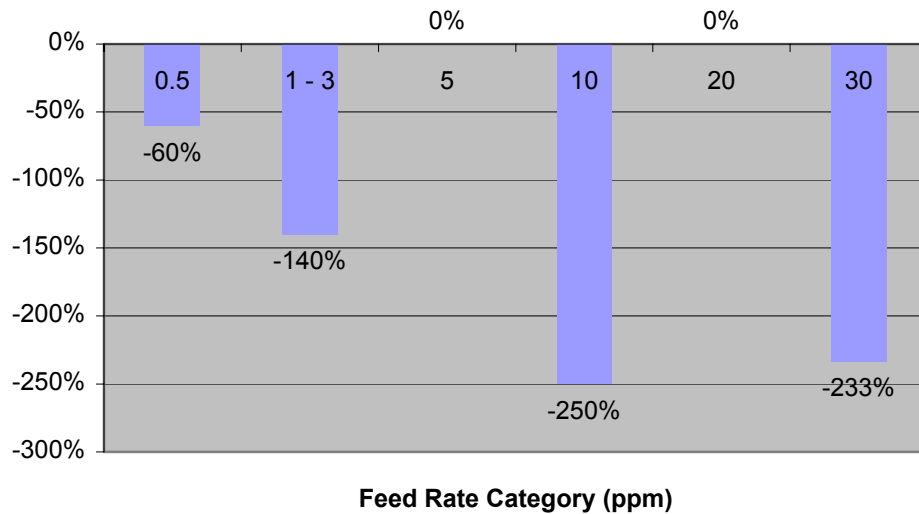
To provide an overview of parameter response to peroxide feed rate the entire data of 14 test dates were used. Data was transformed to reduce the influence of seasonal variation and grouped averages used to minimize but not eliminate bias. As in previous analysis the first transformation was to calculate the difference between raw water content and peroxide enhanced conventional treatment. These results were then grouped by feed rate to yield groups with sample sizes of 2 to 3 and plots constructed of average percent removal level (raw water against peroxide treatment) for various feed rate settings. These plots should not be considered diagnostic but indicative.

Generally increasing feed rate increased the percent removal of TOC ([Figure 3](#)). The lowest setting of 0.5 ppm showed an average of 16% removal while the 1-3 ppm setting had the lowest average removal rate of 3%. From here average removal percentages increased up to an average removal of 29% at 30-ppm feed rate. While TOC showed increasing removal with increasing feed rate, TON did not provide a consistent picture of dose response ([Figure 4](#)). Both the 5-ppm and 20-ppm showed 0% reduction of TON, all other feed settings indicated an enhancement of TON. Generally increasing feed rate increased the percent removal of THMFP ([Figure 5](#)). The lowest setting of 0.5 ppm showed an average of 36% removal while the 1-3 ppm setting had the lowest average removal rate of 7%. From here average removal percentages

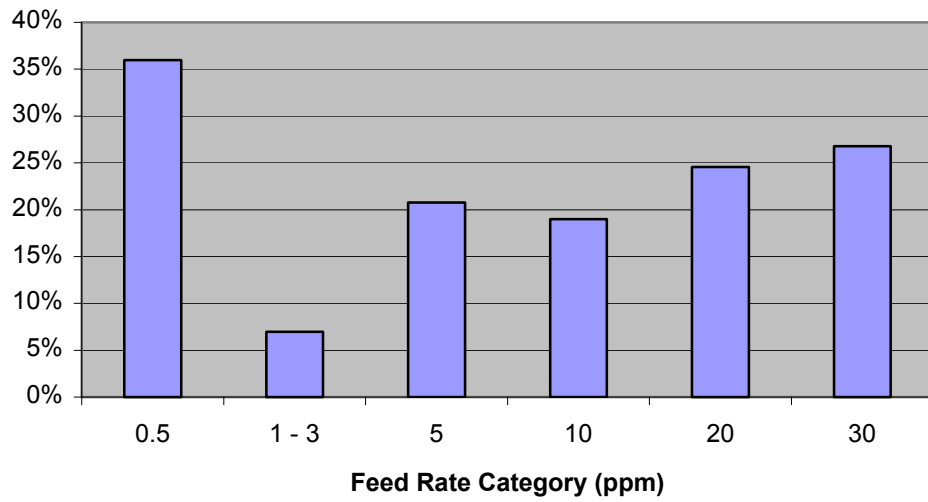
generally increased up to an average removal of 27% at 30 ppm feed rate. In general HAA was elevated by treatment ([Figure 6](#)). The highest magnitude was noted at the two lowest feed rates with the smallest increase of HAA occurring at the 5 ppm feed rate. The last parameter examined was UV254. With the exception of the 5ppm feed rate category, the average percent removal of UV254 increased with increasing feed rate ([Figure 7](#)).



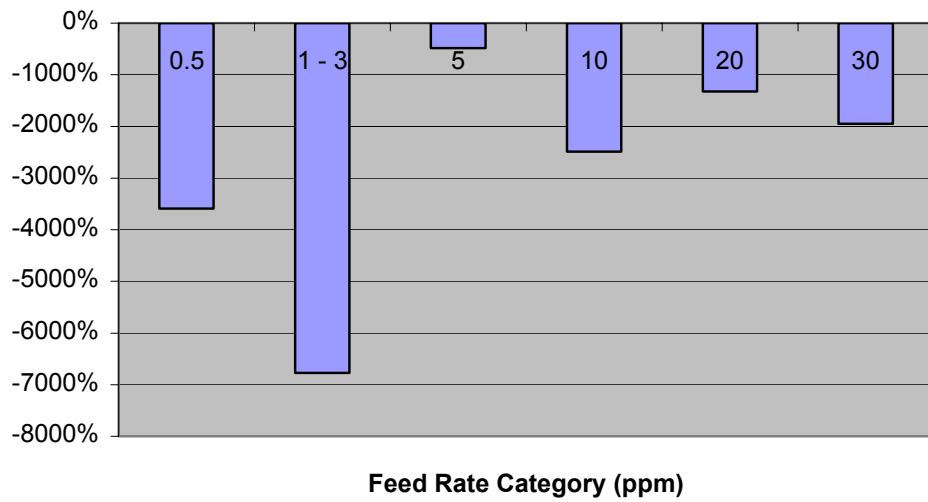
**Figure 3:** Hydrogen Peroxide feed rate on average TOC % reduction



**Figure 4:** Hydrogen Peroxide feed rate on average TON % reduction

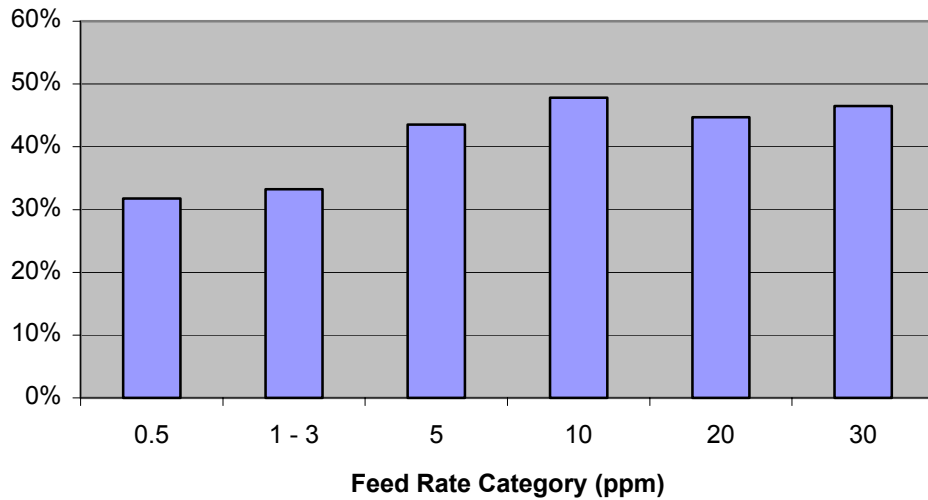


**Figure 5:** Hydrogen Peroxide feed rate on average THMFP % reduction



**Figure 6:** Hydrogen Peroxide feed rate on average HAA % reduction

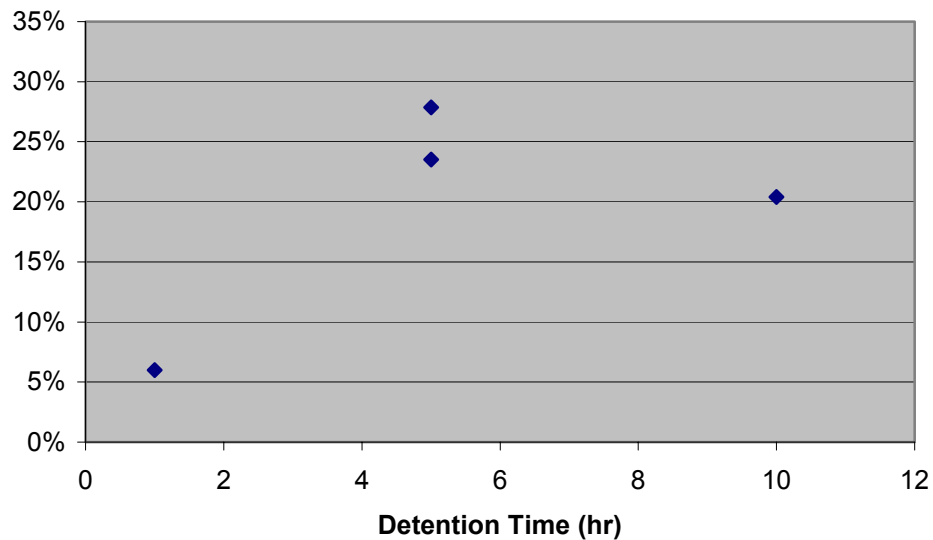




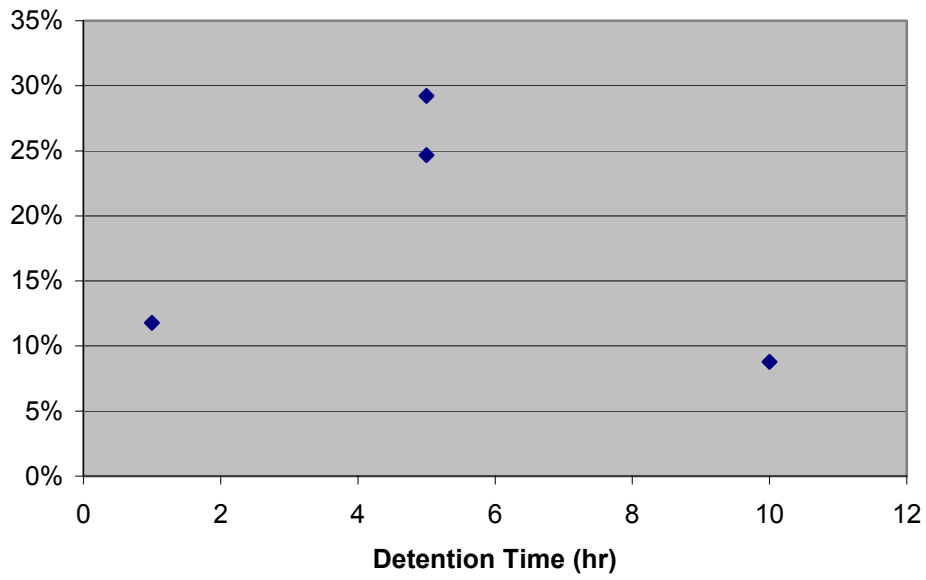
**Figure 7:** Hydrogen Peroxide feed rate on average UV254 %reduction

### Detention Time

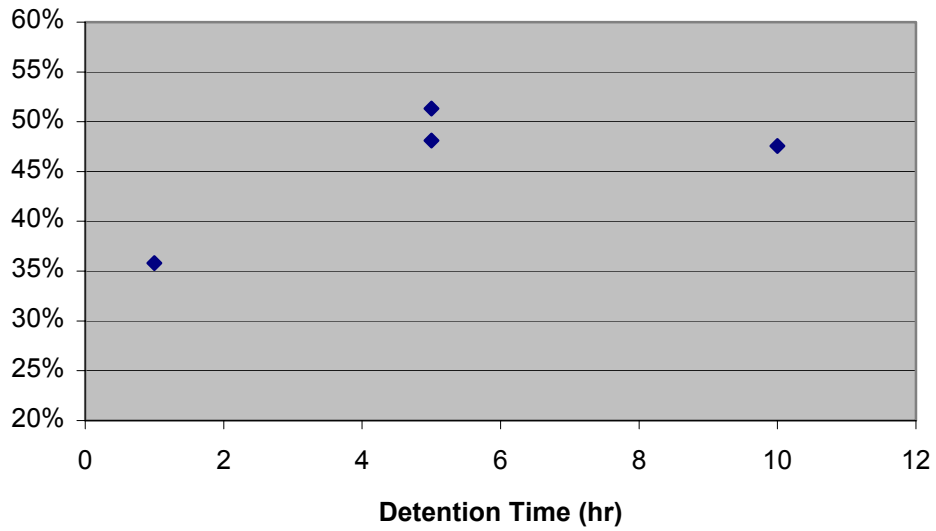
The effect of detention time on the hydrogen peroxide pilot plant was also examined. Four tested were available; 8/19/03, 10/09/03, 10/23/03 and 11/04/03. Percent reductions were calculated by subtracting the raw water value from the peroxide enhanced treatment value and plotting the results against detention time for the parameters of TOC, THMFP, HAA and UV254. TOC, THMFP and UV 254 showed the greatest reduction with a 5-hour detention time ([Figures 8, 9, and 10](#)). UV254 seemed to maintain about a 50% reduction independent of detention time.



**Figure 8:** Percent reduction of TOC with variable detention time



**Figure 9:** Percent reduction of THMFP with variable detention time



**Figure 10:** Percent reduction of UV254 with variable detention time

## Summary

Two pilot plants were constructed and run for the purpose of screening raw water pretreatment options. Tests were run from June 19, 2003 through November 4, 2003. Samples were analyzed by a contract laboratory, reported to the OWRB, compiled and used for screening. Test data was examined for reduction of primary and secondary parameters by each pilot plant.

EarthTec<sup>®</sup> was not effective at reducing primary measures of organic content such as TOC and TON, or chlorophyll-a concentrations. However, the algaecide seemed effective at reducing MIB. Significant reduction of the target parameters: TOC, THMFP and UV254 were noted for the peroxide pilot plant.

Hydrogen peroxide treatment provided enhanced removal of TON, TOC, HAA and UV254 compared against the MWC water treatment plant process (through clarification and filtration). Examination of variable feed rate indicated increasing TOC removal with increasing feed rate. Detention time data indicated peak TOC removal percentage at the 5-hour detention time. Feed rate and detention time data however, were not as conclusive for TON. For the most part TON was elevated by peroxide treatment. Assessing the effect of detention time on TON was not possible because the numerous below detection limit reports precluded any calculations.

## Recommendations

- EarthTec<sup>®</sup> may not be an effective pretreatment option for Lake Thunderbird raw water and does not warrant further investigation.
- Significant reduction of TOC, THMFP and UV254 were observed with application of hydrogen peroxide and warrants further investigation.
- Hydrogen peroxide pretreatment enhanced the Midwest City water treatment process train's ability to reduce TON, TOC, HAA and UV254 and warrants further investigation.

# Appendix A:

## Accurate Labs Raw Data

Date	Sample Site	Test & Method #	Parameter	Results	Units
06/19/03	1	SM 10200H Algae	Chlorophyll A	140	mg/m3
06/19/03	1	SM 2150B Odor	Odor	BPQL	TON
06/19/03	1	SM 5310C TOC	Total Organic Carbon	4.2	mg/L
06/19/03	1	HACH 10054 UV-254	UV254	0.104	cm-1
06/19/03	1	EPA 200.7 Cu	Copper	0.0068	mg/L
06/19/03	1	EPA 524 - Potential THMs	Chloroform	283	ug/L
06/19/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
06/19/03	1	EPA 524 - Potential THMs	Dibromochloromethane	26	ug/L
06/19/03	1	EPA 524 - Potential THMs	Bromodichloromethane	78	ug/L
06/19/03	1	EPA 524 - Potential THMs	Potential THM's	387	ug/L
06/19/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
06/19/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
06/19/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
06/19/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
06/19/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
06/19/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
06/19/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
06/19/03	1	SM 6040D - Geosmin & MIB	MIB	6.6	ng/L
06/19/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
06/19/03	2	SM 2150B Odor	Odor	2	TON
06/19/03	2	SM 5310C TOC	Total Organic Carbon	3.7	mg/L
06/19/03	2	HACH 10054 UV-254	UV254	0.05	cm-1
06/19/03	2	EPA 200.7 Cu	Copper	0.0094	mg/L
06/19/03	2	EPA 524 - Potential THMs	Chloroform	280	ug/L
06/19/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
06/19/03	2	EPA 524 - Potential THMs	Dibromochloromethane	31.1	ug/L
06/19/03	2	EPA 524 - Potential THMs	Bromodichloromethane	70.1	ug/L
06/19/03	2	EPA 524 - Potential THMs	Potential THM's	382	ug/L
06/19/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
06/19/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
06/19/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	38.6	ug/L
06/19/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	30.8	ug/L
06/19/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	6.31	ug/L
06/19/03	2	EPA 552 - Haloacetic Acids	Total HAA's	75.7	ug/L
06/19/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
06/19/03	2	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
06/19/03	3	SM 10200H Algae	Chlorophyll A	64	mg/m3
06/19/03	3	SM 2150B Odor	Odor	BPQL	TON
06/19/03	3	SM 5310C TOC	Total Organic Carbon	4.3	mg/L
06/19/03	3	HACH 10054 UV-254	UV254	0.104	cm-1
06/19/03	3	EPA 200.7 Cu	Copper	0.067	mg/L
06/19/03	3	EPA 524 - Potential THMs	Chloroform	334	ug/L
06/19/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
06/19/03	3	EPA 524 - Potential THMs	Dibromochloromethane	27	ug/L
06/19/03	3	EPA 524 - Potential THMs	Bromodichloromethane	88.2	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
06/19/03	3	EPA 524 - Potential THMs	Potential THM's	449	ug/L
06/19/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
06/19/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
06/19/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
06/19/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
06/19/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
06/19/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
06/19/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
06/19/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
06/19/03	4	SM 10200H Algae	Chlorophyll A	21	mg/m3
06/19/03	4	SM 2150B Odor	Odor	BPQL	TON
06/19/03	4	SM 5310C TOC	Total Organic Carbon	3.8	mg/L
06/19/03	4	HACH 10054 UV-254	UV254	0.072	cm-1
06/19/03	4	EPA 200.7 Cu	Copper	0.018	mg/L
06/19/03	4	EPA 524 - Potential THMs	Chloroform	364	ug/L
06/19/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
06/19/03	4	EPA 524 - Potential THMs	Dibromochloromethane	20.2	ug/L
06/19/03	4	EPA 524 - Potential THMs	Bromodichloromethane	55.8	ug/L
06/19/03	4	EPA 524 - Potential THMs	Potential THM's	440	ug/L
06/19/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
06/19/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
06/19/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	52.5	ug/L
06/19/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	36.2	ug/L
06/19/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	5.61	ug/L
06/19/03	4	EPA 552 - Haloacetic Acids	Total HAA's	94.4	ug/L
06/19/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
06/19/03	4	SM 6040D - Geosmin & MIB	MIB	8.1	ng/L
07/01/03	1	SM 10200H Algae	Chlorophyll A	86	mg/m3
07/01/03	1	SM 2150B Odor	Odor	BPQL	TON
07/01/03	1	SM 5310C TOC	Total Organic Carbon	4.1	mg/L
07/01/03	1	HACH 10054 UV-254	UV254	0.077	cm-1
07/01/03	1	EPA 200.7 Cu	Copper	BPQL	mg/L
07/01/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/01/03	1	SM 6040D - Geosmin & MIB	MIB	9.9	ng/L
07/01/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
07/01/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
07/01/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
07/01/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
07/01/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
07/01/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
07/01/03	1	EPA 524 - Potential THMs	Chloroform	342	ug/L
07/01/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/01/03	1	EPA 524 - Potential THMs	Dibromochloromethane	29.7	ug/L
07/01/03	1	EPA 524 - Potential THMs	Bromodichloromethane	92.3	ug/L
07/01/03	1	EPA 524 - Potential THMs	Potential THM's	464	ug/L
07/01/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
07/01/03	2	SM 2150B Odor	Odor	6	TON
07/01/03	2	SM 5310C TOC	Total Organic Carbon	4	mg/L
07/01/03	2	HACH 10054 UV-254	UV254	0.05	cm-1

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
07/01/03	2	EPA 200.7 Cu	Copper	BPQL	mg/L
07/01/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/01/03	2	SM 6040D - Geosmin & MIB	MIB	5.6	ng/L
07/01/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	24	ug/L
07/01/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	3.78	ug/L
07/01/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	34.1	ug/L
07/01/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	28.2	ug/L
07/01/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	3.62	ug/L
07/01/03	2	EPA 552 - Haloacetic Acids	Total HAA's	93.6	ug/L
07/01/03	2	EPA 524 - Potential THMs	Chloroform	322	ug/L
07/01/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/01/03	2	EPA 524 - Potential THMs	Dibromochloromethane	26.5	ug/L
07/01/03	2	EPA 524 - Potential THMs	Bromodichloromethane	67.5	ug/L
07/01/03	2	EPA 524 - Potential THMs	Potential THM's	416	ug/L
07/01/03	3	SM 10200H Algae	Chlorophyll A	22	mg/m3
07/01/03	3	SM 2150B Odor	Odor	BPQL	TON
07/01/03	3	SM 5310C TOC	Total Organic Carbon	4.7	mg/L
07/01/03	3	HACH 10054 UV-254	UV254	0.087	cm-1
07/01/03	3	EPA 200.7 Cu	Copper	0.076	mg/L
07/01/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/01/03	3	SM 6040D - Geosmin & MIB	MIB	7	ng/L
07/01/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
07/01/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
07/01/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
07/01/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
07/01/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
07/01/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
07/01/03	3	EPA 524 - Potential THMs	Chloroform	330	ug/L
07/01/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/01/03	3	EPA 524 - Potential THMs	Dibromochloromethane	20.7	ug/L
07/01/03	3	EPA 524 - Potential THMs	Bromodichloromethane	74	ug/L
07/01/03	3	EPA 524 - Potential THMs	Potential THM's	425	ug/L
07/01/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
07/01/03	4	SM 2150B Odor	Odor	BPQL	TON
07/01/03	4	SM 5310C TOC	Total Organic Carbon	3	mg/L
07/01/03	4	HACH 10054 UV-254	UV254	0.042	cm-1
07/01/03	4	EPA 200.7 Cu	Copper	0.031	mg/L
07/01/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/01/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
07/01/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	29.3	ug/L
07/01/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
07/01/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	18.3	ug/L
07/01/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	12.7	ug/L
07/01/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	3.45	ug/L
07/01/03	4	EPA 552 - Haloacetic Acids	Total HAA's	63.7	ug/L
07/01/03	4	EPA 524 - Potential THMs	Chloroform	198	ug/L
07/01/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/01/03	4	EPA 524 - Potential THMs	Dibromochloromethane	12.6	ug/L
07/01/03	4	EPA 524 - Potential THMs	Bromodichloromethane	36.4	ug/L
07/01/03	4	EPA 524 - Potential THMs	Potential THM's	247	ug/L

Date	Sample Site	Test & Method #	Parameter	Results	Units
07/22/03	1	SM 10200H Algae	Algae	220	mg/m3
07/22/03	1	SM 2150B Odor	Odor	BPQL	TON
07/22/03	1	SM 5310C TOC	Total Organic Carbon	4.7	mg/L
07/22/03	1	HACH 10054 UV-254	UV254	0.087	cm-1
07/22/03	1	EPA 200.7 Cu	Copper	0.01	mg/L
07/22/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/22/03	1	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
07/22/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
07/22/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
07/22/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
07/22/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
07/22/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
07/22/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
07/22/03	1	EPA 524 - Potential THMs	Chloroform	372	ug/L
07/22/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/22/03	1	EPA 524 - Potential THMs	Dibromochloromethane	28.5	ug/L
07/22/03	1	EPA 524 - Potential THMs	Bromodichloromethane	91.3	ug/L
07/22/03	1	EPA 524 - Potential THMs	Potential THM's	492	ug/L
07/22/03	2	SM 10200H Algae	Algae	BPQL	mg/m3
07/22/03	2	SM 2150B Odor	Odor	2	TON
07/22/03	2	SM 5310C TOC	Total Organic Carbon	4.7	mg/L
07/22/03	2	HACH 10054 UV-254	UV254	0.054	cm-1
07/22/03	2	EPA 200.7 Cu	Copper	0.009	mg/L
07/22/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/22/03	2	SM 6040D - Geosmin & MIB	MIB	7.4	ng/L
07/22/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
07/22/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	2.65	ug/L
07/22/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	35.1	ug/L
07/22/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	23.9	ug/L
07/22/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	3.88	ug/L
07/22/03	2	EPA 552 - Haloacetic Acids	Total HAA's	65.5	ug/L
07/22/03	2	EPA 524 - Potential THMs	Chloroform	374	ug/L
07/22/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/22/03	2	EPA 524 - Potential THMs	Dibromochloromethane	26.9	ug/L
07/22/03	2	EPA 524 - Potential THMs	Bromodichloromethane	72.3	ug/L
07/22/03	2	EPA 524 - Potential THMs	Potential THM's	473	ug/L
07/22/03	3	SM 10200H Algae	Algae	360	mg/m3
07/22/03	3	SM 2150B Odor	Odor	BPQL	TON
07/22/03	3	SM 5310C TOC	Total Organic Carbon	4.8	mg/L
07/22/03	3	HACH 10054 UV-254	UV254	0.077	cm-1
07/22/03	3	EPA 200.7 Cu	Copper	0.12	mg/L
07/22/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/22/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
07/22/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
07/22/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
07/22/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
07/22/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
07/22/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
07/22/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
07/22/03	3	EPA 524 - Potential THMs	Chloroform	398	ug/L
07/22/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/22/03	3	EPA 524 - Potential THMs	Dibromochloromethane	21	ug/L
07/22/03	3	EPA 524 - Potential THMs	Bromodichloromethane	78.9	ug/L
07/22/03	3	EPA 524 - Potential THMs	Potential THM's	498	ug/L
07/22/03	4	SM 10200H Algae	Algae	BPQL	mg/m3
07/22/03	4	SM 2150B Odor	Odor	1.4	TON
07/22/03	4	SM 5310C TOC	Total Organic Carbon	4.9	mg/L
07/22/03	4	HACH 10054 UV-254	UV254	0.046	cm-1
07/22/03	4	EPA 200.7 Cu	Copper	0.032	mg/L
07/22/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
07/22/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
07/22/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
07/22/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	2.39	ug/L
07/22/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	36.6	ug/L
07/22/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	20.9	ug/L
07/22/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	3.34	ug/L
07/22/03	4	EPA 552 - Haloacetic Acids	Total HAA's	63.3	ug/L
07/22/03	4	EPA 524 - Potential THMs	Chloroform	261	ug/L
07/22/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
07/22/03	4	EPA 524 - Potential THMs	Dibromochloromethane	11.1	ug/L
07/22/03	4	EPA 524 - Potential THMs	Bromodichloromethane	31.8	ug/L
07/22/03	4	EPA 524 - Potential THMs	Potential THM's	304	ug/L
08/05/03	1	SM 10200H Algae	Algae	390	mg/m3
08/05/03	1	SM 2150B Odor	Odor	BPQL	TON
08/05/03	1	SM 5310C TOC	Total Organic Carbon	5.1	mg/L
08/05/03	1	HACH 10054 UV-254	UV254	0.073	cm-1
08/05/03	1	EPA 200.7 Cu	Copper	0.012	mg/L
08/05/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/05/03	1	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/05/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/05/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/05/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/05/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/05/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/05/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/05/03	1	EPA 524 - Potential THMs	Chloroform	504	ug/L
08/05/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/05/03	1	EPA 524 - Potential THMs	Dibromochloromethane	32	ug/L
08/05/03	1	EPA 524 - Potential THMs	Bromodichloromethane	110	ug/L
08/05/03	1	EPA 524 - Potential THMs	Potential THM's	646	ug/L
08/05/03	2	SM 10200H Algae	Algae	BPQL	mg/m3
08/05/03	2	SM 2150B Odor	Odor	3	TON
08/05/03	2	SM 5310C TOC	Total Organic Carbon	4.8	mg/L
08/05/03	2	HACH 10054 UV-254	UV254	0.04	cm-1
08/05/03	2	EPA 200.7 Cu	Copper	0.012	mg/L
08/05/03	2	SM 6040D - Geosmin & MIB	Geosmin	21	ng/L
08/05/03	2	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/05/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L



<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
08/05/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/05/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	40.6	ug/L
08/05/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	33.2	ug/L
08/05/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.86	ug/L
08/05/03	2	EPA 552 - Haloacetic Acids	Total HAA's	78.6	ug/L
08/05/03	2	EPA 524 - Potential THMs	Chloroform	501	ug/L
08/05/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/05/03	2	EPA 524 - Potential THMs	Dibromochloromethane	31.3	ug/L
08/05/03	2	EPA 524 - Potential THMs	Bromodichloromethane	90.5	ug/L
08/05/03	2	EPA 524 - Potential THMs	Potential THM's	623	ug/L
08/05/03	3	SM 10200H Algae	Algae	250	mg/m3
08/05/03	3	SM 2150B Odor	Odor	BPQL	TON
08/05/03	3	SM 5310C TOC	Total Organic Carbon	4.6	mg/L
08/05/03	3	HACH 10054 UV-254	UV254	0.074	cm-1
08/05/03	3	EPA 200.7 Cu	Copper	0.032	mg/L
08/05/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/05/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/05/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/05/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/05/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/05/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/05/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/05/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/05/03	3	EPA 524 - Potential THMs	Chloroform	501	ug/L
08/05/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/05/03	3	EPA 524 - Potential THMs	Dibromochloromethane	29.6	ug/L
08/05/03	3	EPA 524 - Potential THMs	Bromodichloromethane	108	ug/L
08/05/03	3	EPA 524 - Potential THMs	Potential THM's	639	ug/L
08/05/03	4	SM 10200H Algae	Algae	BPQL	mg/m3
08/05/03	4	SM 2150B Odor	Odor	1.4	TON
08/05/03	4	SM 5310C TOC	Total Organic Carbon	3.9	mg/L
08/05/03	4	HACH 10054 UV-254	UV254	0.046	cm-1
08/05/03	4	EPA 200.7 Cu	Copper	0.024	mg/L
08/05/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/05/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/05/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/05/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/05/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	10.8	ug/L
08/05/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	5.25	ug/L
08/05/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.78	ug/L
08/05/03	4	EPA 552 - Haloacetic Acids	Total HAA's	20.8	ug/L
08/05/03	4	EPA 524 - Potential THMs	Chloroform	446	ug/L
08/05/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/05/03	4	EPA 524 - Potential THMs	Dibromochloromethane	32.3	ug/L
08/05/03	4	EPA 524 - Potential THMs	Bromodichloromethane	83.5	ug/L
08/05/03	4	EPA 524 - Potential THMs	Potential THM's	562	ug/L
08/12/03	1	SM 10200H Algae	Chlorophyll A	360	mg/m3
08/12/03	1	SM 2150B Odor	Odor	BPQL	TON
08/12/03	1	SM 5310C TOC	Total Organic Carbon	5.1	mg/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
08/12/03	1	HACH 10054 UV-254	UV254	0.073	cm-1
08/12/03	1	EPA 200.7 Cu	Copper	0.007	mg/L
08/12/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/12/03	1	SM 6040D - Geosmin & MIB	MIB	5.9	ng/L
08/12/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/12/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/12/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/12/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/12/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/12/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/12/03	1	EPA 524 - Potential THMs	Chloroform	417	ug/L
08/12/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/12/03	1	EPA 524 - Potential THMs	Dibromochloromethane	30.7	ug/L
08/12/03	1	EPA 524 - Potential THMs	Bromodichloromethane	99.2	ug/L
08/12/03	1	EPA 524 - Potential THMs	Potential THM's	547	ug/L
08/12/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
08/12/03	2	SM 2150B Odor	Odor	3	TON
08/12/03	2	SM 5310C TOC	Total Organic Carbon	5.1	mg/L
08/12/03	2	HACH 10054 UV-254	UV254	0.049	cm-1
08/12/03	2	EPA 200.7 Cu	Copper	0.012	mg/L
08/12/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/12/03	2	SM 6040D - Geosmin & MIB	MIB	13	ng/L
08/12/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/12/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	4.1	ug/L
08/12/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	43	ug/L
08/12/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	40	ug/L
08/12/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.6	ug/L
08/12/03	2	EPA 552 - Haloacetic Acids	Total HAA's	92	ug/L
08/12/03	2	EPA 524 - Potential THMs	Chloroform	442	ug/L
08/12/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/12/03	2	EPA 524 - Potential THMs	Dibromochloromethane	30.9	ug/L
08/12/03	2	EPA 524 - Potential THMs	Bromodichloromethane	86.8	ug/L
08/12/03	2	EPA 524 - Potential THMs	Potential THM's	560	ug/L
08/12/03	3	SM 10200H Algae	Chlorophyll A	1200	mg/m3
08/12/03	3	SM 2150B Odor	Odor	BPQL	TON
08/12/03	3	SM 5310C TOC	Total Organic Carbon	5.3	mg/L
08/12/03	3	HACH 10054 UV-254	UV254	0.084	cm-1
08/12/03	3	EPA 200.7 Cu	Copper	0.094	mg/L
08/12/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/12/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/12/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/12/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/12/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/12/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/12/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/12/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/12/03	3	EPA 524 - Potential THMs	Chloroform	466	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
08/12/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/12/03	3	EPA 524 - Potential THMs	Dibromochloromethane	28.4	ug/L
08/12/03	3	EPA 524 - Potential THMs	Bromodichloromethane	96.6	ug/L
08/12/03	3	EPA 524 - Potential THMs	Potential THM's	591	ug/L
08/12/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
08/12/03	4	SM 2150B Odor	Odor	3	TON
08/12/03	4	SM 5310C TOC	Total Organic Carbon	4.8	mg/L
08/12/03	4	HACH 10054 UV-254	UV254	0.054	cm-1
08/12/03	4	EPA 200.7 Cu	Copper	0.027	mg/L
08/12/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/12/03	4	SM 6040D - Geosmin & MIB	MIB	11	ng/L
08/12/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/12/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/12/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	16.3	ug/L
08/12/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	10.9	ug/L
08/12/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.5	ug/L
08/12/03	4	EPA 552 - Haloacetic Acids	Total HAA's	31.7	ug/L
08/12/03	4	EPA 524 - Potential THMs	Chloroform	382	ug/L
08/12/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/12/03	4	EPA 524 - Potential THMs	Dibromochloromethane	29.7	ug/L
08/12/03	4	EPA 524 - Potential THMs	Bromodichloromethane	75.4	ug/L
08/12/03	4	EPA 524 - Potential THMs	Potential THM's	487	ug/L
08/19/03	1	SM 10200H Algae	Chlorophyll A	1200	mg/m3
08/19/03	1	SM 2150B Odor	Odor	BPQL	TON
08/19/03	1	SM 5310C TOC	Total Organic Carbon	6.1	mg/L
08/19/03	1	HACH 10054 UV-254	UV254	0.079	cm-1
08/19/03	1	EPA 200.7 Cu	Copper	0.0058	mg/L
08/19/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/19/03	1	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/19/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/19/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/19/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/19/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/19/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/19/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/19/03	1	EPA 524 - Potential THMs	Chloroform	445	ug/L
08/19/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/19/03	1	EPA 524 - Potential THMs	Dibromochloromethane	29.9	ug/L
08/19/03	1	EPA 524 - Potential THMs	Bromodichloromethane	99.8	ug/L
08/19/03	1	EPA 524 - Potential THMs	Potential THM's	575	ug/L
08/19/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
08/19/03	2	SM 2150B Odor	Odor	4	TON
08/19/03	2	SM 5310C TOC	Total Organic Carbon	6.1	mg/L
08/19/03	2	HACH 10054 UV-254	UV254	0.052	cm-1
08/19/03	2	EPA 200.7 Cu	Copper	0.01	mg/L
08/19/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
08/19/03	2	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/19/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/19/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/19/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	52.3	ug/L
08/19/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	36.8	ug/L
08/19/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	5.2	ug/L
08/19/03	2	EPA 552 - Haloacetic Acids	Total HAA's	94.3	ug/L
08/19/03	2	EPA 524 - Potential THMs	Chloroform	464	ug/L
08/19/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/19/03	2	EPA 524 - Potential THMs	Dibromochloromethane	30.8	ug/L
08/19/03	2	EPA 524 - Potential THMs	Bromodichloromethane	90.9	ug/L
08/19/03	2	EPA 524 - Potential THMs	Potential THM's	586	ug/L
08/19/03	3	SM 10200H Algae	Chlorophyll A	2000	mg/m3
08/19/03	3	SM 2150B Odor	Odor	1	TON
08/19/03	3	SM 5310C TOC	Total Organic Carbon	7.4	mg/L
08/19/03	3	HACH 10054 UV-254	UV254	0.085	cm-1
08/19/03	3	EPA 200.7 Cu	Copper	0.03	mg/L
08/19/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/19/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/19/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/19/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/19/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/19/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/19/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/19/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/19/03	3	EPA 524 - Potential THMs	Chloroform	523	ug/L
08/19/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/19/03	3	EPA 524 - Potential THMs	Dibromochloromethane	29.2	ug/L
08/19/03	3	EPA 524 - Potential THMs	Bromodichloromethane	103	ug/L
08/19/03	3	EPA 524 - Potential THMs	Potential THM's	655	ug/L
08/19/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
08/19/03	4	SM 2150B Odor	Odor	BPQL	TON
08/19/03	4	SM 5310C TOC	Total Organic Carbon	4.4	mg/L
08/19/03	4	HACH 10054 UV-254	UV254	0.041	cm-1
08/19/03	4	EPA 200.7 Cu	Copper	0.021	mg/L
08/19/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/19/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/19/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/19/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/19/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	17.7	ug/L
08/19/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	11.8	ug/L
08/19/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.62	ug/L
08/19/03	4	EPA 552 - Haloacetic Acids	Total HAA's	34.1	ug/L
08/19/03	4	EPA 524 - Potential THMs	Chloroform	331	ug/L
08/19/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/19/03	4	EPA 524 - Potential THMs	Dibromochloromethane	20.6	ug/L
08/19/03	4	EPA 524 - Potential THMs	Bromodichloromethane	55.7	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
08/19/03	4	EPA 524 - Potential THMs	Potential THM's	407	ug/L
08/26/03	1	EPA 200.7 Cu	Copper	0.007	mg/L
08/26/03	1	SM 6040D - Geosmin & MIB	Geosmin	9.6	ng/L
08/26/03	1	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/26/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/26/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/26/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
08/26/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
08/26/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/26/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
08/26/03	1	EPA 524 - Potential THMs	Chloroform	447	ug/L
08/26/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/26/03	1	EPA 524 - Potential THMs	Dibromochloromethane	27.4	ug/L
08/26/03	1	EPA 524 - Potential THMs	Bromodichloromethane	95	ug/L
08/26/03	1	EPA 524 - Potential THMs	Potential THM's	569	ug/L
08/26/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
08/26/03	2	SM 2150B Odor	Odor	12	TON
08/26/03	2	SM 5310C TOC	Total Organic Carbon	5.4	mg/L
08/26/03	2	HACH 10054 UV-254	UV254	0.049	cm-1
08/26/03	2	EPA 200.7 Cu	Copper	0.016	mg/L
08/26/03	2	SM 6040D - Geosmin & MIB	Geosmin	8.4	ng/L
08/26/03	2	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/26/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/26/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	8.32	ug/L
08/26/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	64.2	ug/L
08/26/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	65.2	ug/L
08/26/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	8.18	ug/L
08/26/03	2	EPA 552 - Haloacetic Acids	Total HAA's	146	ug/L
08/26/03	2	EPA 524 - Potential THMs	Chloroform	485	ug/L
08/26/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/26/03	2	EPA 524 - Potential THMs	Dibromochloromethane	28.1	ug/L
08/26/03	2	EPA 524 - Potential THMs	Bromodichloromethane	89.9	ug/L
08/26/03	2	EPA 524 - Potential THMs	Potential THM's	603	ug/L
08/26/03	3	SM 10200H Algae	Chlorophyll A	4000	mg/m3
08/26/03	3	SM 2150B Odor	Odor	BPQL	TON
08/26/03	3	SM 5310C TOC	Total Organic Carbon	6.4	mg/L
08/26/03	3	HACH 10054 UV-254	UV254	0.088	cm-1
08/26/03	3	EPA 200.7 Cu	Copper	0.24	mg/L
08/26/03	3	SM 6040D - Geosmin & MIB	Geosmin	5.2	ng/L
08/26/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/26/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/26/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/26/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	3.5	ug/L
08/26/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	4.07	ug/L
08/26/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
08/26/03	3	EPA 552 - Haloacetic Acids	Total HAA's	7.57	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
08/26/03	3	EPA 524 - Potential THMs	Chloroform	821	ug/L
08/26/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/26/03	3	EPA 524 - Potential THMs	Dibromochloromethane	26.6	ug/L
08/26/03	3	EPA 524 - Potential THMs	Bromodichloromethane	112	ug/L
08/26/03	3	EPA 524 - Potential THMs	Potential THM's	961	ug/L
08/26/03	4	SM 10200H Algae	Chlorophyll A	180	mg/m3
08/26/03	4	SM 2150B Odor	Odor	BPQL	TON
08/26/03	4	SM 5310C TOC	Total Organic Carbon	4.3	mg/L
08/26/03	4	HACH 10054 UV-254	UV254	0.047	cm-1
08/26/03	4	EPA 200.7 Cu	Copper	0.016	mg/L
08/26/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
08/26/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
08/26/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
08/26/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
08/26/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	11.9	ug/L
08/26/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	7.44	ug/L
08/26/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	3.45	ug/L
08/26/03	4	EPA 552 - Haloacetic Acids	Total HAA's	22.8	ug/L
08/26/03	4	EPA 524 - Potential THMs	Chloroform	359	ug/L
08/26/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
08/26/03	4	EPA 524 - Potential THMs	Dibromochloromethane	22.7	ug/L
08/26/03	4	EPA 524 - Potential THMs	Bromodichloromethane	68.8	ug/L
08/26/03	4	EPA 524 - Potential THMs	Potential THM's	450	ug/L
09/02/03	1	SM 10200H Algae	Chlorophyll A	680	mg/m3
09/02/03	1	SM 2150B Odor	Odor	BPQL	TON
09/02/03	1	SM 5310C TOC	Total Organic Carbon	6.2	mg/L
09/02/03	1	HACH 10054 UV-254	UV254	0.081	cm-1
09/02/03	1	EPA 200.7 Cu	Copper	0.01	mg/L
09/02/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/02/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/02/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/02/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/02/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/02/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/02/03	1	EPA 524 - Potential THMs	Chloroform	434	ug/L
09/02/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/02/03	1	EPA 524 - Potential THMs	Dibromochloromethane	31.2	ug/L
09/02/03	1	EPA 524 - Potential THMs	Bromodichloromethane	102	ug/L
09/02/03	1	EPA 524 - Potential THMs	Potential THM's	567	ug/L
09/02/03	1	SM 6040D - Geosmin & MIB	Geosmin	5.6	ng/L
09/02/03	1	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/02/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/02/03	2	SM 2150B Odor	Odor	3	TON
09/02/03	2	SM 5310C TOC	Total Organic Carbon	6.1	mg/L
09/02/03	2	HACH 10054 UV-254	UV254	0.043	cm-1
09/02/03	2	EPA 200.7 Cu	Copper	0.015	mg/L

Date	Sample Site	Test & Method #	Parameter	Results	Units
09/02/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/02/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/02/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	84.1	ug/L
09/02/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	63.4	ug/L
09/02/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	5.15	ug/L
09/02/03	2	EPA 552 - Haloacetic Acids	Total HAA's	153	ug/L
09/02/03	2	EPA 524 - Potential THMs	Chloroform	468	ug/L
09/02/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/02/03	2	EPA 524 - Potential THMs	Dibromochloromethane	28	ug/L
09/02/03	2	EPA 524 - Potential THMs	Bromodichloromethane	90	ug/L
09/02/03	2	EPA 524 - Potential THMs	Potential THM's	586	ug/L
09/02/03	2	SM 6040D - Geosmin & MIB	Geosmin	6.9	ng/L
09/02/03	2	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/02/03	3	SM 10200H Algae	Chlorophyll A	1500	mg/m3
09/02/03	3	SM 2150B Odor	Odor	BPQL	TON
09/02/03	3	SM 5310C TOC	Total Organic Carbon	6.2	mg/L
09/02/03	3	HACH 10054 UV-254	UV254	0.087	cm-1
09/02/03	3	EPA 200.7 Cu	Copper	0.13	mg/L
09/02/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/02/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/02/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/02/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	1.41	ug/L
09/02/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/02/03	3	EPA 552 - Haloacetic Acids	Total HAA's	1.41	ug/L
09/02/03	3	EPA 524 - Potential THMs	Chloroform	602	ug/L
09/02/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/02/03	3	EPA 524 - Potential THMs	Dibromochloromethane	29.5	ug/L
09/02/03	3	EPA 524 - Potential THMs	Bromodichloromethane	112	ug/L
09/02/03	3	EPA 524 - Potential THMs	Potential THM's	744	ug/L
09/02/03	3	SM 6040D - Geosmin & MIB	Geosmin	6	ng/L
09/02/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/02/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/02/03	4	SM 2150B Odor	Odor	1	TON
09/02/03	4	SM 5310C TOC	Total Organic Carbon	6.5	mg/L
09/02/03	4	HACH 10054 UV-254	UV254	0.055	cm-1
09/02/03	4	EPA 200.7 Cu	Copper	0.02	mg/L
09/02/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/02/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/02/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	144	ug/L
09/02/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	110	ug/L
09/02/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/02/03	4	EPA 552 - Haloacetic Acids	Total HAA's	254	ug/L
09/02/03	4	EPA 524 - Potential THMs	Chloroform	415	ug/L
09/02/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/02/03	4	EPA 524 - Potential THMs	Dibromochloromethane	20.4	ug/L
09/02/03	4	EPA 524 - Potential THMs	Bromodichloromethane	68.2	ug/L
09/02/03	4	EPA 524 - Potential THMs	Potential THM's	504	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
09/02/03	4	SM 6040D - Geosmin & MIB	Geosmin	7	ng/L
09/02/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/09/03	1	SM 10200H Algae	Chlorophyll A	1200	mg/m3
09/09/03	1	SM 2150B Odor	Odor	1	TON
09/09/03	1	SM 5310C TOC	Total Organic Carbon	5.5	mg/L
09/09/03	1	HACH 10054 UV-254	UV254	0.078	cm-1
09/09/03	1	EPA 200.7 Cu	Copper	0.0067	mg/L
09/09/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/09/03	1	SM 6040D - Geosmin & MIB	MIB	20	ng/L
09/09/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/09/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/09/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/09/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/09/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/09/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/09/03	1	EPA 524 - Potential THMs	Chloroform	490	ug/L
09/09/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/09/03	1	EPA 524 - Potential THMs	Dibromochloromethane	23	ug/L
09/09/03	1	EPA 524 - Potential THMs	Bromodichloromethane	92	ug/L
09/09/03	1	EPA 524 - Potential THMs	Potential THM's	605	ug/L
09/09/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/09/03	2	SM 2150B Odor	Odor	12	TON
09/09/03	2	SM 5310C TOC	Total Organic Carbon	5.6	mg/L
09/09/03	2	HACH 10054 UV-254	UV254	0.051	cm-1
09/09/03	2	EPA 200.7 Cu	Copper	0.013	mg/L
09/09/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/09/03	2	SM 6040D - Geosmin & MIB	MIB	34	ng/L
09/09/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/09/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	7.51	ug/L
09/09/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	76.4	ug/L
09/09/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	65.6	ug/L
09/09/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	8.19	ug/L
09/09/03	2	EPA 552 - Haloacetic Acids	Total HAA's	158	ug/L
09/09/03	2	EPA 524 - Potential THMs	Chloroform	494	ug/L
09/09/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/09/03	2	EPA 524 - Potential THMs	Dibromochloromethane	24.6	ug/L
09/09/03	2	EPA 524 - Potential THMs	Bromodichloromethane	79.2	ug/L
09/09/03	2	EPA 524 - Potential THMs	Potential THM's	598	ug/L
09/09/03	3	SM 10200H Algae	Chlorophyll A	3100	mg/m3
09/09/03	3	SM 2150B Odor	Odor	1	TON
09/09/03	3	SM 5310C TOC	Total Organic Carbon	5.5	mg/L
09/09/03	3	HACH 10054 UV-254	UV254	0.084	cm-1
09/09/03	3	EPA 200.7 Cu	Copper	0.082	mg/L
09/09/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/09/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/09/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/09/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/09/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/09/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	1.04	ug/L



<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
09/09/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/09/03	3	EPA 552 - Haloacetic Acids	Total HAA's	1.04	ug/L
09/09/03	3	EPA 524 - Potential THMs	Chloroform	530	ug/L
09/09/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/09/03	3	EPA 524 - Potential THMs	Dibromochloromethane	22.7	ug/L
09/09/03	3	EPA 524 - Potential THMs	Bromodichloromethane	98.8	ug/L
09/09/03	3	EPA 524 - Potential THMs	Potential THM's	652	ug/L
09/09/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/09/03	4	SM 2150B Odor	Odor	2	TON
09/09/03	4	SM 5310C TOC	Total Organic Carbon	4.7	mg/L
09/09/03	4	HACH 10054 UV-254	UV254	0.05	cm-1
09/09/03	4	EPA 200.7 Cu	Copper	0.024	mg/L
09/09/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/09/03	4	SM 6040D - Geosmin & MIB	MIB	7.2	ng/L
09/09/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	16.9	ug/L
09/09/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/09/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	17.3	ug/L
09/09/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	12.8	ug/L
09/09/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	5.19	ug/L
09/09/03	4	EPA 552 - Haloacetic Acids	Total HAA's	52.2	ug/L
09/09/03	4	EPA 524 - Potential THMs	Chloroform	341	ug/L
09/09/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/09/03	4	EPA 524 - Potential THMs	Dibromochloromethane	26.6	ug/L
09/09/03	4	EPA 524 - Potential THMs	Bromodichloromethane	72.8	ug/L
09/09/03	4	EPA 524 - Potential THMs	Potential THM's	441	ug/L
09/16/03	1	SM 10200H Algae	Algae	43	mg/m3
09/16/03	1	SM 2150B Odor	Odor	1	TON
09/16/03	1	SM 5310C TOC	Total Organic Carbon	5.6	mg/L
09/16/03	1	HACH 10054 UV-254	UV254	0.077	cm-1
09/16/03	1	EPA 200.7 Cu	Copper	0.009	mg/L
09/16/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/16/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/16/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/16/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/16/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/16/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/16/03	1	EPA 524 - Potential THMs	Chloroform	334	ug/L
09/16/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/16/03	1	EPA 524 - Potential THMs	Dibromochloromethane	30.2	ug/L
09/16/03	1	EPA 524 - Potential THMs	Bromodichloromethane	77	ug/L
09/16/03	1	EPA 524 - Potential THMs	Potential THM's	441	ug/L
09/16/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/16/03	1	SM 6040D - Geosmin & MIB	MIB	31	ng/L
09/16/03	2	SM 10200H Algae	Algae	BPQL	mg/m3
09/16/03	2	SM 2150B Odor	Odor	17	TON
09/16/03	2	SM 5310C TOC	Total Organic Carbon	5.2	mg/L
09/16/03	2	HACH 10054 UV-254	UV254	0.045	cm-1
09/16/03	2	EPA 200.7 Cu	Copper	0.0098	mg/L
09/16/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L

Date	Sample Site	Test & Method #	Parameter	Results	Units
09/16/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	4.67	ug/L
09/16/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	56.3	ug/L
09/16/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	47.8	ug/L
09/16/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	6.05	ug/L
09/16/03	2	EPA 552 - Haloacetic Acids	Total HAA's	115	ug/L
09/16/03	2	EPA 524 - Potential THMs	Chloroform	371	ug/L
09/16/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/16/03	2	EPA 524 - Potential THMs	Dibromochloromethane	29.3	ug/L
09/16/03	2	EPA 524 - Potential THMs	Bromodichloromethane	71	ug/L
09/16/03	2	EPA 524 - Potential THMs	Potential THM's	471	ug/L
09/16/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/16/03	2	SM 6040D - Geosmin & MIB	MIB	44	ng/L
09/16/03	3	SM 10200H Algae	Algae	5400	mg/m3
09/16/03	3	SM 2150B Odor	Odor	1	TON
09/16/03	3	SM 5310C TOC	Total Organic Carbon	7.4	mg/L
09/16/03	3	HACH 10054 UV-254	UV254	0.099	cm-1
09/16/03	3	EPA 200.7 Cu	Copper	0.085	mg/L
09/16/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/16/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/16/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/16/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/16/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/16/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/16/03	3	EPA 524 - Potential THMs	Chloroform	495	ug/L
09/16/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/16/03	3	EPA 524 - Potential THMs	Dibromochloromethane	29.3	ug/L
09/16/03	3	EPA 524 - Potential THMs	Bromodichloromethane	88.4	ug/L
09/16/03	3	EPA 524 - Potential THMs	Potential THM's	613	ug/L
09/16/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/16/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/16/03	4	SM 10200H Algae	Algae	BPQL	mg/m3
09/16/03	4	SM 2150B Odor	Odor	2	TON
09/16/03	4	SM 5310C TOC	Total Organic Carbon	4.6	mg/L
09/16/03	4	HACH 10054 UV-254	UV254	0.048	cm-1
09/16/03	4	EPA 200.7 Cu	Copper	0.023	mg/L
09/16/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	18	ug/L
09/16/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/16/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	15.5	ug/L
09/16/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	10	ug/L
09/16/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.22	ug/L
09/16/03	4	EPA 552 - Haloacetic Acids	Total HAA's	47.7	ug/L
09/16/03	4	EPA 524 - Potential THMs	Chloroform	299	ug/L
09/16/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/16/03	4	EPA 524 - Potential THMs	Dibromochloromethane	26.7	ug/L
09/16/03	4	EPA 524 - Potential THMs	Bromodichloromethane	68.9	ug/L
09/16/03	4	EPA 524 - Potential THMs	Potential THM's	395	ug/L
09/16/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/16/03	4	SM 6040D - Geosmin & MIB	MIB	25	ng/L
09/23/03	1	SM 10200H Algae	Chlorophyll A	140	mg/m3

Date	Sample Site	Test & Method #	Parameter	Results	Units
09/23/03	1	SM 2150B Odor	Odor	BPQL	TON
09/23/03	1	SM 5310C TOC	Total Organic Carbon	5.8	mg/L
09/23/03	1	HACH 10054 UV-254	UV254	0.076	cm-1
09/23/03	1	EPA 200.7 Cu	Copper	0.015	mg/L
09/23/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/23/03	1	SM 6040D - Geosmin & MIB	MIB	16	ng/L
09/23/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/23/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/23/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/23/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/23/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/23/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/23/03	1	EPA 524 - Potential THMs	Chloroform	499	ug/L
09/23/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/23/03	1	EPA 524 - Potential THMs	Dibromochloromethane	25.9	ug/L
09/23/03	1	EPA 524 - Potential THMs	Bromodichloromethane	86.5	ug/L
09/23/03	1	EPA 524 - Potential THMs	Potential THM's	611	ug/L
09/23/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/23/03	2	SM 2150B Odor	Odor	8	TON
09/23/03	2	SM 5310C TOC	Total Organic Carbon	5.8	mg/L
09/23/03	2	HACH 10054 UV-254	UV254	0.045	cm-1
09/23/03	2	EPA 200.7 Cu	Copper	0.017	mg/L
09/23/03	2	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/23/03	2	SM 6040D - Geosmin & MIB	MIB	23	ng/L
09/23/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/23/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	5.37	ug/L
09/23/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	57.3	ug/L
09/23/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	47.8	ug/L
09/23/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	5.42	ug/L
09/23/03	2	EPA 552 - Haloacetic Acids	Total HAA's	116	ug/L
09/23/03	2	EPA 524 - Potential THMs	Chloroform	388	ug/L
09/23/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/23/03	2	EPA 524 - Potential THMs	Dibromochloromethane	27.2	ug/L
09/23/03	2	EPA 524 - Potential THMs	Bromodichloromethane	71	ug/L
09/23/03	2	EPA 524 - Potential THMs	Potential THM's	486	ug/L
09/23/03	3	SM 10200H Algae	Chlorophyll A	3600	mg/m3
09/23/03	3	SM 2150B Odor	Odor	1	TON
09/23/03	3	SM 5310C TOC	Total Organic Carbon	6.2	mg/L
09/23/03	3	HACH 10054 UV-254	UV254	0.096	cm-1
09/23/03	3	EPA 200.7 Cu	Copper	0.19	mg/L
09/23/03	3	SM 6040D - Geosmin & MIB	Geosmin	5.2	ng/L
09/23/03	3	SM 6040D - Geosmin & MIB	MIB	5.5	ng/L
09/23/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/23/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/23/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/23/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/23/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/23/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/23/03	3	EPA 524 - Potential THMs	Chloroform	590	ug/L
09/23/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L

<b>Date</b>	<b>Sample Site</b>	<b>Test &amp; Method #</b>	<b>Parameter</b>	<b>Results</b>	<b>Units</b>
09/23/03	3	EPA 524 - Potential THMs	Dibromochloromethane	24.1	ug/L
09/23/03	3	EPA 524 - Potential THMs	Bromodichloromethane	84.7	ug/L
09/23/03	3	EPA 524 - Potential THMs	Potential THM's	699	ug/L
09/23/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/23/03	4	SM 2150B Odor	Odor	1	TON
09/23/03	4	SM 5310C TOC	Total Organic Carbon	2.7	mg/L
09/23/03	4	HACH 10054 UV-254	UV254	0.025	cm-1
09/23/03	4	EPA 200.7 Cu	Copper	0.016	mg/L
09/23/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/23/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/23/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	9.83	ug/L
09/23/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/23/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	7.9	ug/L
09/23/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	5.42	ug/L
09/23/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/23/03	4	EPA 552 - Haloacetic Acids	Total HAA's	23.1	ug/L
09/23/03	4	EPA 524 - Potential THMs	Chloroform	128	ug/L
09/23/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/23/03	4	EPA 524 - Potential THMs	Dibromochloromethane	13.8	ug/L
09/23/03	4	EPA 524 - Potential THMs	Bromodichloromethane	35.1	ug/L
09/23/03	4	EPA 524 - Potential THMs	Potential THM's	177	ug/L
09/30/03	1	SM 10200H Algae	Chlorophyll A	360	mg/m3
09/30/03	1	SM 2150B Odor	Odor	BPQL	TON
09/30/03	1	SM 5310C TOC	Total Organic Carbon	5.5	mg/L
09/30/03	1	HACH 10054 UV-254	UV254	0.077	cm-1
09/30/03	1	EPA 200.7 Cu	Copper	0.012	mg/L
09/30/03	1	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/30/03	1	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/30/03	1	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/30/03	1	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/30/03	1	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/30/03	1	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/30/03	1	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/30/03	1	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/30/03	1	EPA 524 - Potential THMs	Chloroform	254	ug/L
09/30/03	1	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/30/03	1	EPA 524 - Potential THMs	Dibromochloromethane	19.8	ug/L
09/30/03	1	EPA 524 - Potential THMs	Bromodichloromethane	47.7	ug/L
09/30/03	1	EPA 524 - Potential THMs	Potential THM's	322	ug/L
09/30/03	2	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/30/03	2	SM 2150B Odor	Odor	4	TON
09/30/03	2	SM 5310C TOC	Total Organic Carbon	5.3	mg/L
09/30/03	2	HACH 10054 UV-254	UV254	0.045	cm-1
09/30/03	2	EPA 200.7 Cu	Copper	0.012	mg/L
09/30/03	2	SM 6040D - Geosmin & MIB	Geosmin	7.4	ng/L
09/30/03	2	SM 6040D - Geosmin & MIB	MIB	8.9	ng/L
09/30/03	2	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/30/03	2	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/30/03	2	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L

Date	Sample Site	Test & Method #	Parameter	Results	Units
09/30/03	2	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/30/03	2	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/30/03	2	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/30/03	2	EPA 524 - Potential THMs	Chloroform	273	ug/L
09/30/03	2	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/30/03	2	EPA 524 - Potential THMs	Dibromochloromethane	19.9	ug/L
09/30/03	2	EPA 524 - Potential THMs	Bromodichloromethane	41.4	ug/L
09/30/03	2	EPA 524 - Potential THMs	Potential THM's	334	ug/L
09/30/03	3	SM 10200H Algae	Chlorophyll A	3500	mg/m3
09/30/03	3	SM 2150B Odor	Odor	BPQL	TON
09/30/03	3	SM 5310C TOC	Total Organic Carbon	6.1	mg/L
09/30/03	3	HACH 10054 UV-254	UV254	0.081	cm-1
09/30/03	3	EPA 200.7 Cu	Copper	0.1	mg/L
09/30/03	3	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/30/03	3	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/30/03	3	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/30/03	3	EPA 552 - Haloacetic Acids	Monobromoacetic acid	BPQL	ug/L
09/30/03	3	EPA 552 - Haloacetic Acids	Dichloroacetic acid	BPQL	ug/L
09/30/03	3	EPA 552 - Haloacetic Acids	Trichloroacetic acid	BPQL	ug/L
09/30/03	3	EPA 552 - Haloacetic Acids	Dibromoacetic acid	BPQL	ug/L
09/30/03	3	EPA 552 - Haloacetic Acids	Total HAA's	BPQL	ug/L
09/30/03	3	EPA 524 - Potential THMs	Chloroform	310	ug/L
09/30/03	3	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/30/03	3	EPA 524 - Potential THMs	Dibromochloromethane	18.2	ug/L
09/30/03	3	EPA 524 - Potential THMs	Bromodichloromethane	48.7	ug/L
09/30/03	3	EPA 524 - Potential THMs	Potential THM's	377	ug/L
09/30/03	4	SM 10200H Algae	Chlorophyll A	BPQL	mg/m3
09/30/03	4	SM 2150B Odor	Odor	4	TON
09/30/03	4	SM 5310C TOC	Total Organic Carbon	5	mg/L
09/30/03	4	HACH 10054 UV-254	UV254	0.046	cm-1
09/30/03	4	EPA 200.7 Cu	Copper	0.016	mg/L
09/30/03	4	SM 6040D - Geosmin & MIB	Geosmin	BPQL	ng/L
09/30/03	4	SM 6040D - Geosmin & MIB	MIB	BPQL	ng/L
09/30/03	4	EPA 552 - Haloacetic Acids	Monochloroacetic acid	BPQL	ug/L
09/30/03	4	EPA 552 - Haloacetic Acids	Monobromoacetic acid	23.6	ug/L
09/30/03	4	EPA 552 - Haloacetic Acids	Dichloroacetic acid	10.9	ug/L
09/30/03	4	EPA 552 - Haloacetic Acids	Trichloroacetic acid	12	ug/L
09/30/03	4	EPA 552 - Haloacetic Acids	Dibromoacetic acid	4.8	ug/L
09/30/03	4	EPA 552 - Haloacetic Acids	Total HAA's	51.3	ug/L
09/30/03	4	EPA 524 - Potential THMs	Chloroform	197	ug/L
09/30/03	4	EPA 524 - Potential THMs	Bromoform	BPQL	ug/L
09/30/03	4	EPA 524 - Potential THMs	Dibromochloromethane	17.6	ug/L
09/30/03	4	EPA 524 - Potential THMs	Bromodichloromethane	32.5	ug/L
09/30/03	4	EPA 524 - Potential THMs	Potential THM's	247	ug/L

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
06/19/2003	LCS	C	HAA552w-LCS	97	73	142	Dichloroacetic acid
06/19/2003	LCS	C	GEOLCS	95	70	130	MIB

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
06/19/2003	LCS	C	GEOLCS	95	70	130	MIB
06/19/2003	LCS	C	THM524w-LCS	127	70	130	Dichlorobromomethane
06/19/2003	LCS	C	THM524w-LCS	126	70	130	Bromoform
06/19/2003	LCS	C	THM524w-LCS	124	70	130	Chloroform
06/19/2003	LCS	C	THM524w-LCS	126	70	130	Chlorodibromomethane
06/19/2003	LFB	C	ICP-27-LFB	104	87	116	Copper
06/19/2003	LCS	C	HAA552w-LCS	94	72	140	Dibromoacetic acid
06/19/2003	LCS	C	GEOLCS	92	70	130	Geosmin
06/19/2003	LCS	C	HAA552w-LCS	97	73	142	Dichloroacetic acid
06/19/2003	LCS	C	HAA552w-LCS	95	71	147	Monobromoacetic acid
06/19/2003	LCS	C	HAA552w-LCS	103	70	156	Monochloroacetic acid
06/19/2003	LCS	C	HAA552w-LCS	96	72	141	Trichloroacetic acid
06/19/2003	LCS	C	HAA552w-LCS	96	72	141	Trichloroacetic acid
06/19/2003	LCS	C	TOC-LCS	93	80	120	Total Organic Carbon
06/19/2003	LCS	C	HAA552w-LCS	94	72	140	Dibromoacetic acid
06/19/2003	A2395-001D	D	Chloroph-DUP	15	0	20	Chlorophyll A
06/19/2003	A2425-002D	D	TOC-Dup	3	0	20	Total Organic Carbon
06/19/2003	A2414-001D	D	UV254-Dup	6	0	20	UV254
06/19/2003	A2395-001D	D	Chloroph-DUP	15	0	20	Chlorophyll A
07/01/2003	LCS	C	HAA552w-LCS	92	72	141	Trichloroacetic acid
07/01/2003	LCS	C	GEOLCS	95	70	130	MIB
07/01/2003	LCS	C	GEOLCS	95	70	130	MIB
07/01/2003	LCS	C	HAA552w-LCS	84	72	140	Dibromoacetic acid
07/01/2003	LCS	C	HAA552w-LCS	84	72	140	Dibromoacetic acid
07/01/2003	LCS	C	HAA552w-LCS	87	73	142	Dichloroacetic acid
07/01/2003	LCS	C	HAA552w-LCS	87	73	142	Dichloroacetic acid
07/01/2003	LCS	C	HAA552w-LCS	91	71	147	Monobromoacetic acid
07/01/2003	LCS	C	HAA552w-LCS	91	71	147	Monobromoacetic acid
07/01/2003	LCS	C	GEOLCS	77	70	130	Geosmin
07/01/2003	LCS	C	HAA552w-LCS	92	70	156	Monochloroacetic acid
07/01/2003	LCS	C	HAA552w-LCS	92	72	141	Trichloroacetic acid
07/01/2003	LFB	C	ICP-27-LFB	94	87	116	Copper
07/01/2003	LFB	C	ICP-27-LFB	94	87	116	Copper
07/01/2003	LCS	C	THM524w-LCS	95	77	123	Dichlorobromomethane
07/01/2003	LCS	C	THM524w-LCS	98	71	132	Bromoform
07/01/2003	LCS	C	THM524w-LCS	90	73	120	Chloroform
07/01/2003	LCS	C	THM524w-LCS	95	74	128	Chlorodibromomethane
07/01/2003	LCS	C	TOC-LCS	86	80	120	Total Organic Carbon
07/01/2003	LCS	C	HAA552w-LCS	92	70	156	Monochloroacetic acid
07/01/2003	A2622-004D	D	Chloroph-DUP	0	0	20	Chlorophyll A
07/01/2003	A2622-001D	D	UV254-Dup	1	0	20	UV254
07/01/2003	A2622-002D	D	TOC-Dup	0	0	20	Total Organic Carbon
07/01/2003	A2622-004D	D	Chloroph-DUP	0	0	20	Chlorophyll A

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
07/22/2003	LCS	C	HAA552w-LCS	101	72	141	Trichloroacetic acid
07/22/2003	LCS	C	GEOLCS	101	70	130	MIB
07/22/2003	LCS	C	GEOLCS	101	70	130	MIB
07/22/2003	LCS	C	HAA552w-LCS	104	72	140	Dibromoacetic acid
07/22/2003	LCS	C	HAA552w-LCS	99	73	142	Dichloroacetic acid
07/22/2003	LCS	C	HAA552w-LCS	99	73	142	Dichloroacetic acid
07/22/2003	LCS	C	HAA552w-LCS	105	71	147	Monobromoacetic acid
07/22/2003	LCS	C	HAA552w-LCS	105	71	147	Monobromoacetic acid
07/22/2003	LCS	C	GEOLCS	88	70	130	Geosmin
07/22/2003	LCS	C	HAA552w-LCS	103	70	156	Monochloroacetic acid
07/22/2003	LCS	C	HAA552w-LCS	104	72	140	Trichloroacetic acid
07/22/2003	LFB	C	ICP-27-LFB	100	87	116	Copper
07/22/2003	LCS	C	THM524w-LCS	96	77	123	Dichlorobromomethane
07/22/2003	LCS	C	THM524w-LCS	88	71	132	Bromoform
07/22/2003	LCS	C	THM524w-LCS	93	73	120	Chloroform
07/22/2003	LCS	C	THM524w-LCS	90	74	128	Chlorodibromomethane
07/22/2003	LCS	C	TOC-LCS	93	80	120	Total Organic Carbon
07/22/2003	LCS	C	HAA552w-LCS	103	70	156	Monochloroacetic acid
07/22/2003	A3127-002D-004D	D	Chloroph-DUP	0	0	20	Chlorophyll A
07/22/2003	A3127-003D-004D	D	UV254-Dup	4	0	20	UV254
07/22/2003	A3127-003D-004D	D	TOC-Dup	2	0	20	Total Organic Carbon
07/22/2003	A3127-002D-004D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/05/2003	LCS	C	HAA552w-LCS	103	73	142	Dichloroacetic acid
08/05/2003	LCS	C	GEOLCS	102	70	130	Geosmin
08/05/2003	LCS	C	GEOLCS	102	70	130	Geosmin
08/05/2003	LCS	C	GEOLCS	96	70	130	MIB
08/05/2003	LCS	C	TOC-LCS	99	80	120	Total Organic Carbon
08/05/2003	LFB	C	ICP-27-LFB	97	87	116	Copper
08/05/2003	LCS	C	HAA552w-LCS	107	72	140	Dibromoacetic acid
08/05/2003	LCS	C	THM524w-LCS	87	74	128	Chlorodibromomethane
08/05/2003	LCS	C	HAA552w-LCS	103	73	142	Dichloroacetic acid
08/05/2003	LCS	C	HAA552w-LCS	107	71	147	Monobromoacetic acid
08/05/2003	LCS	C	HAA552w-LCS	115	70	156	Monochloroacetic acid
08/05/2003	LCS	C	HAA552w-LCS	104	72	141	Trichloroacetic acid
08/05/2003	LCS	C	HAA552w-LCS	104	72	141	Trichloroacetic acid
08/05/2003	LCS	C	THM524w-LCS	81	77	123	Dichlorobromomethane
08/05/2003	LCS	C	THM524w-LCS	73	71	132	Bromoform
08/05/2003	LCS	C	THM524w-LCS	82	73	120	Chloroform
08/05/2003	LCS	C	HAA552w-LCS	107	72	140	Dibromoacetic acid
08/05/2003	A3457-004D	D	UV254-Dup	2	0	20	UV254
08/05/2003	A3454-002D	D	TOC-Dup	8	0	20	Total Organic Carbon
08/05/2003	A3457-002D	D	Algae	0	0	20	Algae
08/05/2003	A3457-002D	D	Algae	0	0	20	Algae

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
08/12/2003	LCS	C	HAA552w-LCS	109	70	156	Monochloroacetic acid
08/12/2003	LCS	C	GEOLCS	88	70	130	MIB
08/12/2003	LCS	C	GEOLCS	88	70	130	MIB
08/12/2003	LFB	C	ICP-27-LFB	95	87	116	Copper
08/12/2003	LCS	C	HAA552w-LCS	87	72	140	Dibromoacetic acid
08/12/2003	LCS	C	HAA552w-LCS	87	72	140	Dibromoacetic acid
08/12/2003	LCS	C	HAA552w-LCS	98	73	142	Dichloroacetic acid
08/12/2003	LCS	C	HAA552w-LCS	98	73	142	Dichloroacetic acid
08/12/2003	LCS	C	GEOLCS	100	70	130	Geosmin
08/12/2003	LCS	C	HAA552w-LCS	95	71	147	Monobromoacetic acid
08/12/2003	LCS	C	HAA552w-LCS	99	72	141	Trichloroacetic acid
08/12/2003	LCS	C	HAA552w-LCS	99	72	141	Trichloroacetic acid
08/12/2003	LCS	C	TOC-LCS	100	80	120	Total Organic Carbon
08/12/2003	LCS	C	THM524w-LCS	106	77	123	Dichlorobromomethane
08/12/2003	LCS	C	THM524w-LCS	100	71	132	Bromoform
08/12/2003	LCS	C	THM524w-LCS	102	73	120	Chloroform
08/12/2003	LCS	C	THM524w-LCS	104	74	128	Chlorodibromomethane
08/12/2003	LCS	C	HAA552w-LCS	95	71	147	Monobromoacetic acid
08/12/2003	A3804-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/12/2003	A3613-002D	D	TOC-Dup	2	0	20	Total Organic Carbon
08/12/2003	A3613-001D	D	UV254-Dup	3	0	20	UV254
08/12/2003	A3804-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/19/2003	LCS	C	HAA552w-LCS	105	70	156	Monochloroacetic acid
08/19/2003	LCS	C	GEOLCS	95	70	130	MIB
08/19/2003	LFB	C	ICP-27-LFB	97	87	116	Copper
08/19/2003	LCS	C	TOC-LCS	97	80	120	Total Organic Carbon
08/19/2003	LCS	C	HAA552w-LCS	93	72	140	Dibromoacetic acid
08/19/2003	LCS	C	HAA552w-LCS	93	72	140	Dibromoacetic acid
08/19/2003	LCS	C	HAA552w-LCS	96	73	142	Dichloroacetic acid
08/19/2003	LCS	C	GEOLCS	98	70	130	Geosmin
08/19/2003	LCS	C	HAA552w-LCS	99	71	147	Monobromoacetic acid
08/19/2003	LCS	C	THM524w-LCS	104	74	128	Chlorodibromomethane
08/19/2003	LCS	C	HAA552w-LCS	88	72	141	Trichloroacetic acid
08/19/2003	LCS	C	HAA552w-LCS	88	72	141	Trichloroacetic acid
08/19/2003	LCS	C	THM524w-LCS	108	77	123	Dichlorobromomethane
08/19/2003	LCS	C	THM524w-LCS	102	71	132	Bromoform
08/19/2003	LCS	C	THM524w-LCS	103	73	120	Chloroform
08/19/2003	LCS	C	HAA552w-LCS	96	73	142	Dichloroacetic acid
08/19/2003	A3804-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/19/2003	A3804-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/19/2003	A3804-001D	D	UV254-Dup	4	0	20	UV254



## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
08/19/2003	A3778-003D	D	TOC-Dup	5	0	20	Total Organic Carbon
08/26/2003	LCS	C	THM524w-LCS	95	73	120	Chloroform
08/26/2003	LCS	C	GEOLCS	100	70	130	Geosmin
08/26/2003	LCS	C	GEOLCS	92	70	130	MIB
08/26/2003	LCS	C	TOC-LCS	104	80	120	Total Organic Carbon
08/26/2003	LFB	C	ICP-27-LFB	103	87	116	Copper
08/26/2003	LCS	C	GEOLCS	100	70	130	Geosmin
08/26/2003	LCS	C	THM524w-LCS	93	71	132	Bromoform
08/26/2003	LCS	C	HAA552w-LCS	117	72	141	Trichloroacetic acid
08/26/2003	LCS	C	THM524w-LCS	94	74	128	Chlorodibromomethane
08/26/2003	LCS	C	HAA552w-LCS	123	72	140	Dibromoacetic acid
08/26/2003	LCS	C	HAA552w-LCS	123	72	140	Dibromoacetic acid
08/26/2003	LCS	C	HAA552w-LCS	113	73	142	Dichloroacetic acid
08/26/2003	LCS	C	HAA552w-LCS	113	73	142	Dichloroacetic acid
08/26/2003	LCS	C	HAA552w-LCS	109	71	147	Monobromoacetic acid
08/26/2003	LCS	C	HAA552w-LCS	109	71	147	Monobromoacetic acid
08/26/2003	LCS	C	HAA552w-LCS	113	70	156	Monochloroacetic acid
08/26/2003	LCS	C	HAA552w-LCS	117	72	141	Trichloroacetic acid
08/26/2003	LCS	C	THM524w-LCS	97	77	123	Dichlorobromomethane
08/26/2003	A3976-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/26/2003	A3976-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
08/26/2003	A4011-002D	D	TOC-Dup	10	0	20	Total Organic Carbon
08/26/2003	A3976-001D	D	UV254-Dup	4	0	20	UV254
09/02/2003	LCS	C	HAA552w-LCS	108	70	156	Monochloroacetic acid
09/02/2003	LCS	C	GEOLCS	91	70	130	MIB
09/02/2003	LFB	C	ICP-27-LFB	103	87	116	Copper
09/02/2003	LCS	C	HAA552w-LCS	98	72	140	Dibromoacetic acid
09/02/2003	LCS	C	HAA552w-LCS	98	72	140	Dibromoacetic acid
09/02/2003	LCS	C	HAA552w-LCS	103	73	142	Dichloroacetic acid
09/02/2003	LCS	C	GEOLCS	87	70	130	Geosmin
09/02/2003	LCS	C	HAA552w-LCS	90	71	147	Monobromoacetic acid
09/02/2003	LCS	C	THM524w-LCS	91	74	128	Chlorodibromomethane
09/02/2003	LCS	C	HAA552w-LCS	99	72	141	Trichloroacetic acid
09/02/2003	LCS	C	HAA552w-LCS	99	72	141	Trichloroacetic acid
09/02/2003	LCS	C	TOC-LCS	110	80	120	Total Organic Carbon
09/02/2003	LCS	C	THM524w-LCS	95	77	123	Dichlorobromomethane
09/02/2003	LCS	C	THM524w-LCS	87	71	132	Bromoform
09/02/2003	LCS	C	THM524w-LCS	94	73	120	Chloroform
09/02/2003	LCS	C	HAA552w-LCS	103	73	142	Dichloroacetic acid
09/02/2003	A4187-002D	D	TOC-Dup	3	0	20	Total Organic Carbon
09/02/2003	A4122-001D	D	UV254-Dup	2	0	20	UV254
09/09/2003	LCS	C	HAA552w-LCS	91	72	141	Trichloroacetic acid

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
09/09/2003	LCS	C	HAA552w-LCS	89	72	140	Dibromoacetic acid
09/09/2003	LCS	C	HAA552w-LCS	89	72	140	Dibromoacetic acid
09/09/2003	LCS	C	HAA552w-LCS	93	73	142	Dichloroacetic acid
09/09/2003	LCS	C	HAA552w-LCS	93	73	142	Dichloroacetic acid
09/09/2003	LCS	C	HAA552w-LCS	94	71	147	Monobromoacetic acid
09/09/2003	LCS	C	HAA552w-LCS	94	71	147	Monobromoacetic acid
09/09/2003	LCS	C	HAA552w-LCS	93	70	156	Monochloroacetic acid
09/09/2003	LCS	C	HAA552w-LCS	91	72	141	Trichloroacetic acid
09/09/2003	LCS	C	THM524w-LCS	95	74	128	Chlorodibromomethane
09/09/2003	LCS	C	GEOLCS	98	70	130	Geosmin
09/09/2003	LCS	C	GEOLCS	82	70	130	MIB
09/09/2003	LCS	C	GEOLCS	82	70	130	MIB
09/09/2003	LFB	C	ICP-27-LFB	103	87	116	Copper
09/09/2003	LCS	C	TOC-LCS	110	80	120	Total Organic Carbon
09/09/2003	LCS	C	THM524w-LCS	95	77	123	Dichlorobromomethane
09/09/2003	LCS	C	THM524w-LCS	95	71	132	Bromoform
09/09/2003	LCS	C	THM524w-LCS	90	73	120	Chloroform
09/09/2003	LCS	C	HAA552w-LCS	93	70	156	Monochloroacetic acid
09/09/2003	A4313-001D	D	UV254-Dup	4	0	20	UV254
09/16/2003	LCS	C	HAA552w-LCS	92	70	156	Monochloroacetic acid
09/16/2003	LCS	C	GEOLCS	92	70	130	MIB
09/16/2003	LCS	C	GEOLCS	92	70	130	MIB
09/16/2003	LFB	C	ICP-27-LFB	96	87	116	Copper
09/16/2003	LCS	C	HAA552w-LCS	106	72	140	Dibromoacetic acid
09/16/2003	LCS	C	HAA552w-LCS	106	72	140	Dibromoacetic acid
09/16/2003	LCS	C	HAA552w-LCS	97	73	142	Dichloroacetic acid
09/16/2003	LCS	C	HAA552w-LCS	97	73	142	Dichloroacetic acid
09/16/2003	LCS	C	HAA552w-LCS	93	71	147	Monobromoacetic acid
09/16/2003	LCS	C	GEOLCS	104	70	130	Geosmin
09/16/2003	LCS	C	HAA552w-LCS	92	70	156	Monochloroacetic acid
09/16/2003	LCS	C	THM524w-LCS	88	74	128	Chlorodibromomethane
09/16/2003	LCS	C	HAA552w-LCS	92	72	141	Trichloroacetic acid
09/16/2003	LCS	C	HAA552w-LCS	92	72	141	Trichloroacetic acid
09/16/2003	LCS	C	TOC-LCS	110	80	120	Total Organic Carbon
09/16/2003	LCS	C	THM524w-LCS	82	77	123	Dichlorobromomethane
09/16/2003	LCS	C	THM524w-LCS	78	71	132	Bromoform
09/16/2003	LCS	C	THM524w-LCS	81	73	120	Chloroform
09/16/2003	LCS	C	HAA552w-LCS	93	71	147	Monobromoacetic acid
09/16/2003	A4508-003D	D	Algae	0	0	20	Algae
09/16/2003	A4508-003D	D	Algae	0	0	20	Algae
09/16/2003	A4508-004D	D	TOC-Dup	2	0	20	Total Organic Carbon
09/16/2003	A4508-001D	D	UV254-Dup	0	0	20	UV254
09/23/2003	LCS	C	HAA552w-LCS	101	70	156	Monochloroacetic acid

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
09/23/2003	LCS	C	GEOLCS	99	70	130	Geosmin
09/23/2003	LCS	C	GEOLCS	88	70	130	MIB
09/23/2003	LCS	C	GEOLCS	88	70	130	MIB
09/23/2003	LFB	C	ICP-27-LFB	98	87	116	Copper
09/23/2003	LCS	C	HAA552w-LCS	101	72	140	Dibromoacetic acid
09/23/2003	LCS	C	HAA552w-LCS	101	72	140	Dibromoacetic acid
09/23/2003	LCS	C	HAA552w-LCS	93	73	142	Dichloroacetic acid
09/23/2003	LCS	C	HAA552w-LCS	93	73	142	Dichloroacetic acid
09/23/2003	LCS	C	HAA552w-LCS	92	71	147	Monobromoacetic acid
09/23/2003	LCS	C	GEOLCS	99	70	130	Geosmin
09/23/2003	LCS	C	HAA552w-LCS	101	70	156	Monochloroacetic acid
09/23/2003	LCS	C	THM524w-LCS	93	74	128	Chlorodibromomethane
09/23/2003	LCS	C	HAA552w-LCS	92	72	141	Trichloroacetic acid
09/23/2003	LCS	C	HAA552w-LCS	92	72	141	Trichloroacetic acid
09/23/2003	LCS	C	TOC-LCS	120	80	120	Total Organic Carbon
09/23/2003	LCS	C	THM524w-LCS	96	77	123	Dichlorobromomethane
09/23/2003	LCS	C	THM524w-LCS	87	71	132	Bromoform
09/23/2003	LCS	C	THM524w-LCS	90	73	120	Chloroform
09/23/2003	LCS	C	HAA552w-LCS	92	71	147	Monobromoacetic acid
09/23/2003	A4712-004D	D	TOC-Dup	0	0	20	Total Organic Carbon
09/23/2003	A4712-001D	D	UV254-Dup	3	0	20	UV254
09/23/2003	A4712-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
09/23/2003	A4712-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
09/30/2003	LCD	C	HAA552w-LCD	104	70	156	Monochloroacetic acid
09/30/2003	LCS	C	HAA552w-LCS	85	72	140	Dibromoacetic acid
09/30/2003	LCS	C	HAA552w-LCS	85	72	140	Dibromoacetic acid
09/30/2003	LCS	C	HAA552w-LCS	93	73	142	Dichloroacetic acid
09/30/2003	LCS	C	HAA552w-LCS	93	73	142	Dichloroacetic acid
09/30/2003	LCS	C	HAA552w-LCS	94	71	147	Monobromoacetic acid
09/30/2003	LCS	C	HAA552w-LCS	94	71	147	Monobromoacetic acid
09/30/2003	LCS	C	HAA552w-LCS	98	70	156	Monochloroacetic acid
09/30/2003	LCS	C	HAA552w-LCS	86	72	141	Trichloroacetic acid
09/30/2003	LCS	C	HAA552w-LCS	86	72	141	Trichloroacetic acid
09/30/2003	LCD	C	HAA552w-LCD	90	72	140	Dibromoacetic acid
09/30/2003	LCD	C	HAA552w-LCD	90	72	140	Dibromoacetic acid
09/30/2003	LCD	C	HAA552w-LCD	98	73	142	Dichloroacetic acid
09/30/2003	LCD	C	HAA552w-LCD	98	73	142	Dichloroacetic acid
09/30/2003	LCD	C	HAA552w-LCD	101	71	147	Monobromoacetic acid
09/30/2003	LCS	C	GEOLCS	104	70	130	MIB
09/30/2003	LCS	C	THM524w-LCS	101	73	120	Chloroform
09/30/2003	LCS	C	THM524w-LCS	94	71	132	Bromoform
09/30/2003	LCS	C	THM524w-LCS	101	77	123	Dichlorobromomethane
09/30/2003	LFB	C	ICP-27-LFB	94	87	116	Copper
09/30/2003	LCD	C	HAA552w-LCD	101	71	147	Monobromoacetic acid

## Quality Control Results

Date	Lab#	Code*	Test Group ID	Calc	Lower Limit	Upper Limit	Test Name
09/30/2003	LCS	C	TOC-LCS	110	80	120	Total Organic Carbon
09/30/2003	LCS	C	THM524w-LCS	96	74	128	Chlorodibromomethane
09/30/2003	LCS	C	GEOLCS	104	70	130	MIB
09/30/2003	LCS	C	GEOLCS	109	70	130	Geosmin
09/30/2003	LCS	C	GEOLCS	109	70	130	Geosmin
09/30/2003	LCD	C	HAA552w-LCD	93	72	141	Trichloroacetic acid
09/30/2003	LCD	C	HAA552w-LCD	93	72	141	Trichloroacetic acid
09/30/2003	A4860-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
09/30/2003	A4860-002D	D	Chloroph-DUP	0	0	20	Chlorophyll A
09/30/2003	A4860-001D	D	UV254-Dup	3	0	20	UV254
09/30/2003	A4831-002D	D	TOC-Dup	0	0	20	Total Organic Carbon

\* QC Codes: C - control, D - Duplicate

### Detection Limits

Parameter	PQL*
MIB	3 ng/L
Dichlorobromomethane	1.7 ug/L
Bromoform	2.0 ug/L
Chloroform	2.1 ug/L
Chlorodibromomethane	2.3 ug/L
Copper	0.002 mg/L
Dibromoacetic acid	0.4 ug/L
Geosmin	3 ng/L
Dichloroacetic acid	1.0 ug/L
Monobromoacetic acid	0.6 ug/L
Monochloroacetic acid	1.1 ug/L
Trichloroacetic acid	0.3 ug/L
Total Organic Carbon	0.2 ug/L
UV254	0.009 cm-1
Chlorophyll A	N/A

\*: practical quantitation limit - the method detection limit (MDL) adjusted for any dilutions or others changes made to the sample to deal with interferences/ matrix effects. BPQL: Below Practical Quantitative Limits (if applicable)

