ASSESSING THE SPATIAL AND TEMPORAL DISTRIBUTION OF MTBE AND BTEX COMPOUNDS IN LAKE LEWISVILLE, TEXAS FEBRUARY 1999 – FEBRUARY 2000

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The spatial and temporal distribution of Methyl Tertiary-Butyl Ether (MTBE) and BTEX (Benzene, Toluene, Ethylbenzene, Xylenes) compounds were assessed in a multipurpose reservoir, Lake Lewisville, Texas between February 1999 and February 2000. Concentrations of MTBE ranged from 0.0 – 16.7 μg/L. Levels of MTBE in the lake were related to watercraft. BTEX concentrations were never detected above 2.0 μg/L during the sampling period. Finished drinking water from Denton and the Upper Trinity Regional Water District (UTRWD) Treatment Plants were also tested for MTBE and BTEX. MTBE and BTEX were not detected in UTRWD water samples. Denton's finished water samples never exceeded 2.2 μg/L for MTBE and BTEX was not detected except for one replicate of 1.1 μg/L toluene.

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CHAPTER I

INTRODUCTION

This research project concerns quantifying the spatial and temporal distribution of MTBE and BTEX compounds in Lake Lewisville, Texas. Growing concern over the occurrence of Methyl Tertiary-Butyl Ether (MTBE) and BTEX (Benzene, Toluene, Ethlybenzene and Xylenes) compounds in surface and ground waters across the United States has prompted the need for more information on the distribution and impacts of these compounds. Lake Lewisville is one of the most heavily used recreational reservoirs in Texas (Geomarine, 1998). The potential impacts of watercraft as sources of MTBE and BTEX on Lake Lewisville had not been studied. Due to its importance not only as a recreational resource, but also a source of drinking water, knowledge of MTBE and BTEX in the reservoir is of interest.

MTBE is a volatile organic compound (VOC) made by adding methanol to isobutylene. Gasoline containing this additive is referred to as reformulated gasoline (RFG). In 1990, U.S. Congress mandated RFG as part of the Clean Air Act Amendment to help reduce smog in large cities where the National Ambient Air Quality Standards for carbon monoxide and ozone were exceeded (EPA Draft Document, 1997). As a fuel additive, MTBE is used in parts of the United States to help reduce automobile emissions, such as benzene, 1,3-butadiene and carbon monoxide, by increasing burning efficiency. The Clean Air Act requires that RFG contain 2% oxygen by weight. Over 85% of RFG contain MTBE (EPA Blue Ribbon Panel, July 1999). MTBE is the most commonly used oxygenate.

In 1992, 9.1 billion pounds (4.1 billion kilograms) of MTBE were produced in the United States (EPA, 1994). In 1993, MTBE production ranked second among all organic compounds manufactured in the U.S. Twenty-seven companies currently produce MTBE in the United States, 18 are located in Texas. Annual use of RFG containing 2.0% oxygen by weight began in 1995 (EPA, 1997). Consequently, MTBE consumption increased to 46 billion pounds (21 billion kg) in 1995 (U.S. Department of Energy, 1995a, b).

Concentrations of MTBE have been detected in shallow groundwater samples ranging from 0.2 μg/L to 20,000 μg/L (Squillace et. al, 1996). Between 5% and 10% of drinking water supplies in areas where RFG (2% oxygen by weight) or Oxyfuel (2.7% oxygen by weight) are used have detectable amounts of MTBE in drinking water. Detection of MTBE in drinking water is increasing (EPA Blue Ribbon Panel, July 1999). Most contaminated drinking water have MTBE below 20-40 μg/L. This level is recommended by the EPA to avoid taste and odor problems and potential human health concerns (EPA Blue Ribbon Panel, July, 1999).

Concerns have been raised however, about taste and odor problems caused by low levels of MTBE in drinking water. The EPA Blue Ribbon Panel (July 1999) "…believes that the occurrence of MTBE in drinking water should be substantially reduced." The Panel also stated, however, that MTBE is an essential component of the United States gasoline supply. Changes in its use must be implemented over sufficient time to maintain stability of the supply system. On March 21, 2000, the Clinton administration urged the phase-out of MTBE over the next few years. Concern over MTBE contamination of groundwater supplies in areas throughout the United States prompted this decision. EPA administrator, Carol Browner, said she wants Congress to amend the 1990 Clean Air Act's requirement of MTBE in RFG.

BTEX (benzene, toluene, ethylbenzene, xylenes) chemicals are volatile monoaromatic hydrocarbons found in crude oil, gasoline and other petroleum products. BTEX chemicals are also used as industrial solvents and are starting materials for many pesticides, plastics and synthetic fibers. BTEX compounds represent 6.43% to 36.47% of gasoline by weight (Irwin, 1997).

Physical and Chemical Characteristics

MTBE is water soluble (51.26g/l at 25°C) and therefore mobile in aquatic environments (EPA, 1993). Table 1 lists the physical and chemical properties of MTBE. Volatilization half-lives of MTBE from lakes is estimated to be 80-120 days (Reuter, 1998). Turbulence from boating and wave action in lakes would be expected to increase the rate of volatilization. In the atmosphere, it degrades to formaldehyde and tertiary butyl formate (TBF), both known carcinogens. Though MTBE does reduce emissions of benzene and carbon monoxide from internal combustion engines, formaldehyde emissions may increase with its use (EPA, 1993c).

Ecological effects of MTBE in aquatic environments are not well known. MTBE is tentatively classified by the EPA as a possible human carcinogen. The EPA MTBE drinking water advisory for taste and odor ranges from 20-40 μg/L. Taste and odor problems are characteristic of the compound. In 1999 California decided to phase out MTBE and has a primary drinking water standard of 15 μg/L and a secondary standard of 3 μg/L for taste and odor (USGS, 1997).

Table 1. Chemical Properties of MTBE

EPA Fact Sheet September 1997

Chemical Name	Methyl Tert-Butyl Ether
CAS Registry No.	1634-04-4
Synonyms	MTBE: 2-methyl, 2-methoxy propane; tert-butyl methyl ether; methyl tertiary butyl ether; methyl-tert-butyl ether
Molecular weight (g/mol)	88.15
Molecular formula	C H O
Structural formula	CH OC(CH)
Boiling point	55.2^{0} C
Vapor pressure (mmHg)	240
Vapor density	3.1
Density (g/ml @ 20^{0}C)	0.74
Solubility (g/ 100g water)	4.8
Henry's Law Constant (Atm-m^3)/ (g-mole) Dimensionless	5.28E-4 to 3E-3 2.2E-2 to 1.2E-1
Log K_{oc}	0.55 to 0.91

BTEX chemicals are released into the environment as a by-product of combustion (see table 2). Automobiles are a major source of benzene emissions. Ninety percent of ambient air concentration of benzene is due to heavy automobile traffic (California Air Resources Board, 1998). Benzene is a non-threshold toxicant, meaning that any level of exposure may be harmful to organisms. Benzene is a known human carcinogen. Its effects on humans include aplastic anemia and pancytopenia and acute myelogenous leukemia (Medinsky *et al*, 1995).

Releases of MTBE and BTEX compounds to the environment may occur during industrial production, fuel spills, gasoline storage tank leaks, spills from automobile service stations, use of motorized watercraft (specifically 2-cycle engines) and from vapor emissions. The Toxic Release Inventory estimates that MTBE releases to surface water were about 3% of all MTBE releases in 1994. In a 1994 industrial survey, the American Petroleum Institute reported that oxygenates had negative effects on certain elastomers. Elastomers are synthetic rubber or neoprene pieces used in the mechanical connections between hoses and tanks containing reformulated gasoline and oxygenates. Undiluted oxygenates deteriorate elastomeric and polymeric materials which are often used to transport such materials. Research is necessary to develop elastomers that are resistant to degradation by oxygenates. The objectives of this study were to:

- determine the levels of MTBE and BTEX in Lake Lewisville
- assess the seasonal and temporal distribution of MTBE and BTEX in the reservoir
- determine if certain areas of the reservoir have higher concentrations of MTBE and BTEX than other parts of the lake

- determine if and how recreational boating impacts the levels of MTBE and BTEX in the lake
- determine if MTBE and/or BTEX is detected in the city of Denton's and the UTRWD's finished drinking water

Table 2. BTEX Properties.

	Formula	**Water Solubility**	**Percent (by weight) in gasoline**	**Molecular weight(g/mol)**	**Density** (g/ml @ 20^0 C)
Benzene	$C_6 H_6$	1780 mg/L	0.12-3.50	78.12	0.87865
Toluene	$C_{11}H_{16}O$	535 mg/L	2.73-21.80	92.15	0.8669
Ethylbenzene	$C_8 H_{10}$	152 mg/L	0.36-2.86	106.17	0.8670
o-Xylene	$C_8 H_{10}$	175 mg/L	0.68-2.86	106.17	0.8802
m-Xylene	$C_8 H_{10}$	175 mg/L	1.77-3.87	106.17	0.8642
p-Xylene	$C_8 H_{10}$	175 mg/L	0.77-1.58	106.17	0.8611

CHAPTER II

LITERATURE REVIEW:

MTBE and BTEX in Surface Water

BTEX compounds are not commonly detected (<10%) in surface waters in most areas of the United States and Canada (ATSDR 1993, USGS 1995). Areas with high water recreation or those close to industry tend to have higher concentrations of hydrocarbons, including BTEX. A USGS study (1998) of Lake Tahoe showed that the highest concentrations of BTEX were found near Tahoe City, California during a period of heavy water recreation. Volatilization and degradation of BTEX compounds, discussed later in this chapter, may account for the low levels detected in aquatic environments.

MTBE was detected in surface water near Long Island, New York in 29% of the samples collected, with a maximum concentration of 20 μg/L (USGS, 1995). Research on MTBE in aquatic environments is ongoing at the University of California, Davis (UC) in conjunction with the Tahoe Research Group (TRG). UC and TRG scientists are trying to determine MTBE sources, toxicity to aquatic organisms, climate effects, ecological effects, fate and transport and potential methods of controlling MTBE in the environment. Hydrodynamic simulation models have been designed to include how heat transfer, evaporation, solar insulation, inflow, outflow, diffusion and wind mixing influence the transport of MTBE throughout a lake system (McCord and Schladow, 1998). Much of this research has focused on Donner Lake in the Sierra Nevada Mountains. The Metropolitan Water District of Southern California monitored MTBE concentrations in Lake Perris, California while the U.S. Geological Survey conducted a study of MTBE and other VOC's in Lake Tahoe, California. All of these reservoirs are sources of drinking water for California.

The Lake Tahoe Interagency Monitoring Program, directed by John Reuter, a UC Davis professor, studied MTBE in Donner Lake, California. Analyses of three reservoirs (Perris, Silverwood and Castaic) used for drinking water by the Metropolitan Water District in Southern California, suggest a link between MTBE concentrations and recreational watercraft (McClurg, 1998). Research in California supports the hypotheses that MTBE plumes are highly mobile and resistant to biodegradation (Reuter, 1998).

Due to this recalcitrance and mobility, MTBE contamination may be an increasing problem in drinking water supplies. Water resource management at the local level may help prevent these potential hazards. Hydrologic variability, such as the occurrence of precipitation, resulted in brief increases in MTBE concentrations. However, further research is necessary to better document MTBE's behavior in watersheds. To date, many states only have preliminary information on MTBE due to limited water supply testing.

From March 1997 to January 1998, researchers studied the concentrations of MTBE in Donner Lake. Donner Lake has an elevation of 1809 meters above sea level and a surface area of 3.9km^2. Its volume is approximately 102,000 acre feet with a maximum depth of 70 meters and average depth of 33 meters. Data from the Donner Lake project show MTBE concentrations increased during the summer boating season from 0.1 μg/L in May to 2 μg/L just before the 4th of July weekend. On July 7th MTBE was 12 μg/L. The increase is most likely due to increased boat and 2-cycle engine traffic combined with seasonally low streamflow into the lake. Statistical analysis shows that 86% of the change in MTBE in Donner Lake was attributed to variation in watercraft recreation (Reuter *et al*, 1998).

The Metropolitan Water District of Southern California reported that concentrations of MTBE were much higher in and around marinas and popular boating areas on Lake Perris. Epilimnetic concentrations of MTBE in Lake Perris were as high as 25 μg/L (Reuter *et al*, 1998). Between July and September 1997, the U.S. Geological Survey found concentrations of MTBE in Lake Tahoe ranging from 0.18 to 4.2 μg/L. Higher concentrations of MTBE on Lake Tahoe were found in areas near sites with heavy recreational activity (Reuter *et al*, 1998). Concentrations of 5μg/L were reported in California water bodies used for motorized recreation (USGS, 1999).

Little data exist concerning MTBE and BTEX concentrations in Lake Lewisville or reservoirs in the Dallas/ Ft. Worth Metroplex. Texas Natural Resource Conservation Commission (TNRCC) and Texas Parks and Wildlife sampled some local lakes for MTBE in 1999. On September 1, 1999 the TNRCC added MTBE to its routine reservoir sampling as part of the Surface Water Quality Monitoring program. TNRCC sampled Lake Lewisville and found an MTBE concentration of 1.14μg/L however, this was based on one sample collected from the middle of the lake, which does not adequately characterize MTBE concentrations in the lake. Texas Parks and Wildlife sampled Lake Lewisville on August 21, 1999 for MTBE and BTEX and found concentrations ranging from 6.6-11.3μg/L, while BTEX concentrations ranged from 0- 2.5μg/L. Texas Parks and Wildlife sampled from areas in the reservoir that are popular for water recreation thus their assessment is a better representation of MTBE concentrations, though it was a single sampling trip.

Grapevine Lake, located near the Dallas/Ft. Worth Metroplex, was also tested by Texas Parks and Wildlife who found concentrations, on August 28, 1999, ranging from 3.5-4.7μg/L. BTEX concentrations in Grapevine Lake ranged from 0- 0.8μg/L. TNRCC and Texas Parks and Wildlife are currently planning more extensive assessment of MTBE and BTEX in Texas lakes.

Sources of MTBE and BTEX in Lakes

In 1997, it was estimated that over 78 million people in the United States participated in recreational boating (NMMA, 1998). A study of sources of MTBE in Lake Tahoe was conducted by the UC Davis and TRG, the U.S. Geological Survey (USGS) and the University of Nevada, Reno (UNR) for the Lahontan Regional Water Quality Control Board in 1997. The project was designed to determine the amount of MTBE and BTEX contributed to the lake by the use of different types of watercraft. MTBE in the lake was expected to result from direct input from the wet exhaust system of most marine engines. Of the 16 million boats in use during 1997, about half were powered by outboard motors, the majority of which were 2-cycle engines (ENSR, 1998). Two-cycle engines release ten times the amount of gasoline constituents, namely MTBE, than do 4-cycle engines for each gallon of gasoline (TRPA, 1997). Thus, this study focus on the input of MTBE from these types of engines.

Studies demonstrated that MTBE and BTEX concentrations were highest around marinas and areas with heavy recreation. Two sites were tested for MTBE and BTEX including Ski Run Marina and Tahoe Meadows (an area with minimal recreational watercraft and no rental or fueling facilities). At Ski Run Marina, MTBE and benzene concentrations ranged from 1-31.0 µg /L and 0-11.0 µg/L respectively (Fiore *et al*, November 1998). These levels violated state and federal antidegradation policies adopted to protect Lake Tahoe as an Outstanding National Resource Water (ONRW).

As an ONRW, Lake Tahoe may only have temporary or short-term changes in water quality as long as these changes do not impact the designated use (EPA, 1994). Due to the significance of Lake Tahoe as a domestic and municipal water supply, drinking water quality standards established in state policy must be achieved at all times (CSWRCB, 1994). At the Tahoe Meadows site, MTBE concentrations ranged from 0-2.6 µg/L and BTEX concentrations ranged from 0-1.9 µg/L (Fiore *et al,* November 1998).

Decreases in MTBE and BTEX concentrations in Lake Tahoe are due to the volatilization rate, established from this study, and reduced motorized watercraft activity after the summer boating season. Volatilization half-life for MTBE was calculated as 2.6 $t_{1/2}$ (days), while benzene, toluene, ethylbenzene and xylenes were 2.1, 2.2, 2.3 and 2.5 $t_{1/2}$ (days) respectively (Fiore *et al*. 1998). These rates are approximately the same rate, thus any differences among the ratios of the compounds in the water are not due to volatilization half-life.

Six different engine types, representative of the boating population, were studied including a 15 hp 2-cycle carbureted outboard, a 150 hp carbureted 2-cycle outboard, a 80 hp 2-cycle carbureted personal watercraft, a 110 hp 2-cycle electronic fuel injected personal watercraft, a 150 hp 2-cycle direct fuel injected (Ficht type) outboard, and a 150 hp (and a 170 hp) 4-cycle inboard/outboard (Fiore *et al*, November 1998). In an attempt to reduce emissions, marine manufacturers developed the direct fuel-injected 2-cycle engines. Although these motors do emit fewer hydrocarbons than older models, their reliability has been questioned (Long, 1996).

A Lake Enclosure Test was used to assess the amount of MTBE and BTEX concentrations release to the lake from an 80 hp carbureted 2-cycle personal watercraft, a 150 hp 2-cycle direct fuel injected (Ficht type) outboard, and 170 hp 4-cycle carbureted inboard/outboard motor boat. The enclosure was 100 feet x 200 feet and had an average depth of 3 meters. Three sides of the area were bordered by land while the third barrier was sediment that maintained water volume. California certified gasoline obtained from the California Air Resources Board (CARB) was used for this test. The personal watercraft was able to operate at typical speeds used by recreationers while the two boats, due to their larger size, were only able to run at trolling speeds. Trolling speed for outboard engines was assumed to be more wasteful than cruising, although speed of engine operation was not held constant for all watercraft (Jackivicz and Kuzminski, 1973).

A 5-meter cross-sectional grid was used to assess the horizontal and vertical distribution of MTBE and BTEX in the lake following a single pass of a watercraft. Prior to passage of watercraft, four samples were taken as controls. Background concentrations of MTBE and BTEX were present in these samples and subtracted from the samples taken after watercraft had passed.

In the enclosure test, the personal watercraft released the greatest amount of MTBE and BTEX, with concentrations ranging from 3-24 μg/L (Fiore *et al*, November 1998). Depth samples indicated that water in the enclosure became well mixed from the operation of the personal watercraft. By assuming that 25% of the gasoline consumed by the personal watercraft was released to the water (SAI, 1994), it was estimated that 40% of the MTBE coming out of the exhaust system remained in the water and 60% was purged to the atmosphere. Concentrations of MTBE released to the water from the 150 hp 2-cycle direct fuel injected outboard engine ranged from 0-2 μg/L. The 170 hp 4-cycle inboard/outboard motor released MTBE concentrations ranging from 0-1μg/L (Fiore *et al*, November 1998).

Levels of MTBE and BTEX resulting from the 2-cycle personal watercraft exceeded California's Department of Health Services drinking water action level of 20 μg/L. According to the State Water Resources Control Board, as stated in Resolution No. 68-16, all waters encompassed by Lake Tahoe, including marinas and high-use areas, high water quality standards must be maintained to protect municipal and domestic water supplies (CSWRCB 1994). 'Resolution No. 68-16 states that discharges to existing high quality waters will be controlled as needed to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained' (Fiore *et al*, November 1998). The Regional Water Quality Control Boards require that levels of certain gasoline constituents in water meet specific concentrations based on the Department of Health Services primary and secondary Maximum Contaminate Levels for drinking water (CSWRCB, 1994). As stated earlier, Lake Tahoe, as an ONRW, is protected by strict state and federal policies, which do not permit temporary and short-term changes in water quality if existing uses are, impacted (CSWRCB and EPA, 1994).

Using the same calculation used for personal watercraft, it was estimated that about 0.7% of the MTBE added to gasoline in the 2-cycle Ficht outboard engine remained in the water. Approximately 0.2% of MTBE added to gasoline in the 4-cycle inboard/outboard motor was retained in the water during the enclosure test (Fiore *et al,* November 1998). Some uncertainty does remain with these values because they are extrapolations.

In a second experiment, gasoline used in each engine was not uniform thus there is some uncertainty with the results of MTBE concentrations released to the lake. Results indicated that the 2-cycle engines released the greatest amount of unburned gasoline. The 2-cycle carbureted 15 hp outboard released the most gasoline (34.0 µg/L MTBE) followed by the 80 hp 2-cycle personal watercraft (30.0 µg/L MTBE) and the 2-cycle electronic fuel injection 110 hp personal watercraft (8.0 µg/L MTBE). The 4-cycle carbureted inboard/outboard was observed to release the lowest amount of gasoline (1.0 µg/L MTBE) (Fiore *et al*, November 1998).

Conclusions from the Lake Tahoe study indicate that gasoline concentrations (including MTBE) rose during the summer boating season and decreased to near detection limits by November. All watercraft released some measurable amount of gasoline into the lake. Levels of MTBE released to the lake were influenced by the type of watercraft engine with the 2-cycle carbureted engines releasing 10-15 times more gasoline than the 4-cycle engines (Fiore *et al*, November 1998). New technology of the 2-cycle engines such as the 150 hp direct fuel injected Ficht technology released substantially less amounts of gasoline than carbureted 2-cycle motors. Finally, the enclosure test demonstrated that operation of the 2-cycle carbureted personal watercraft violated drinking water standards according to the California Department of Health Services (Fiore *et al*, November 1998).

MTBE and BTEX in Groundwater

Research of MTBE concentrations in California groundwater is also extensive. A minimum estimate of MTBE-impacted sites in California exceeds 10,000. As of March 1998, MTBE monitoring of 32% of the 6,593 active drinking water wells within large public water supplies and 7% of wells in smaller systems have been reported to the California Department of Health Services. MTBE impacted 0.35%, and benzene 0.42%, of the 2,297 wells monitored. These compounds have action levels of 20μg/L (MTBE) and 1μg/L (benzene). Even infrequent releases of MTBE may significantly impact water supply (University of California, 1997).

Data from 1992 through 1996 from 29 sites located in San Diego County were analyzed to determine MTBE and BTEX groundwater plumes over time. Concentrations of MTBE and BTEX were analyzed from 2,320 samples. Over three years, the co-occurrence of MTBE and BTEX decreased from 80% to 60% though the frequency of detection did not decrease. In downgradient wells, MTBE concentrations were equivalent to or significantly higher than BTEX implying that MTBE was dispersing from monitored networks at significantly higher concentrations than BTEX. Action levels of 20μg/L (MTBE) and 1μg/L (BTEX) were exceeded in 30% of the wells. This assessment suggests that the attenuation of BTEX plumes to action levels will likely occur in a shorter distance than MTBE plumes. MTBE attenuation appeared more limited due to the recalcitrance of the compound in groundwater (University of California, 1997). This study suggests that the primary mechanism for MTBE attenuation is dispersion.

The Vadose and Saturated Zone Exposure model has been used by the American Petroleum Institute (API) to determine the groundwater fate and transport of BTEX leaching from associated wastes in the environment. API monitored a North Carolina gasoline release field site for three years to study biodegradation of MTBE and BTEX in groundwater. Results showed that degradation of BTEX was likely enhanced by the presence of nitrate, which decreased the level of oxygen demand on the aquifer thus increasing net amounts of oxygen available for aerobic biodegradation of benzene. Results also showed biodegradation of MTBE within 90 meters of the contamination source. The BIOPLUME II and 3-d analytical model provided predictions of MTBE concentrations in the middle of the plume (API, May 1998). A study of MTBE and BTEX biodegradation in the Borden aquifer at a Canadian Force Base suggests that BTEX chemicals degrade more readily than MTBE in aquifers that are aerobic (API, December 1998).

A rural underground storage tank in the Coastal Plain of North Carolina was monitored for MTBE and BTEX for more than three years to attempt to calculate *in situ* biodegradation rates. Toluene, ethylbenzene and xylene (TEX) biodegradation appeared to use oxygen and nitrate as terminal electron acceptors. Dissolved oxygen concentrations within the plume were lower than background levels. Anaerobic biodegradation of TEX was likely enhanced by nitrate. Mass loss of TEX compounds reduces overall oxygen demand on the aquifer and increases the net amount of oxygen available for aerobic benzene biodegradation.

Rates of mass decay for all compounds decreased as the dissolved plume moved further away from the source of contamination. This indicates a substantially greater amount of biodegradation close to the source. Data showed evidence of MTBE biodegradation within 90 meters of the contaminant source however, no evidence of biodegradation further downgradient (API, 1998).

As part of the National Water-Quality Assessment Program, the U.S. Geological Survey collected water samples from 211 urban wells or springs and 562 agricultural wells in 1993 and 1994 (USGS, October 1995). Land-use was recorded in areas surrounding wells to assess effects of different uses on ground-water quality. Of these wells sampled, 27% were contaminated with MTBE at or above the reporting limit of 0.2μg/L. Three percent of wells exceeded 20μg/L. MTBE is the second most commonly detected chemical in shallow groundwater in urban areas.

Biodegradation of MTBE and BTEX

Biodegradation is controlled primarily by water temperature, dissolved oxygen levels, amount of hydrocarbon present, nutrient availability and acclimation of microorganisms. During the summer, hydrocarbons can be degraded quickly when water temperature and productivity is high. Low molecular weight, decreased temperature, decreasing salinity and increased concentrations of dissolved organic matter increase the ability of hydrocarbons to dissolve in water (ENSR, 1998). Therefore, during periods with colder temperature and less productivity, degradation is slower. Compounds with high molecular weight are more resistant to biodegradation and microbial populations must be established before biodegradation can occur at any significant rate.

Knowledge of MTBE biodegradation is limited. Biodegradation, (Fujiwara *et al*, 1984, Alexander 1973) photooxidation and hydrolysis of MTBE is not expected to occur at any significant rate in the aquatic environment. Sulfita and Mormile (1993) indicate that no MTBE biodegradation occurred in laboratory microcosms using sediments from a petroleum-contaminated site. However, Salanitro (1994) reported MTBE degradation by an isolated bacterial strain. The Petroleum Research Forum, 1993, reported that MTBE was degraded by bacteria but not activated sludge. Thus, a comprehensive understanding of MTBE biodegradation is lacking. Geochemical conditions may affect such processes. Further research is necessary to better understand MTBE distribution and fate in the environment.

Toluene and ethylbenzene do not photooxidize (HSDB, 1998) but may form complexes with naturally occurring humic materials in water which are subject to photooxidation. While biodegradation rates are faster than photodegradation, increasing solar intensity increases the rate of photooxidation (ENSR, 1998). Thus when colder temperature and decreased production limits biodegradation, photooxidation may play a more significant role in environmental fate of some compounds.

Some bacteria can degrade BTEX chemicals. Of ten bacterial isolates tested under anaerobic conditions, eight degraded toluene, five degraded ethylbenzene, three degraded benzene and one degraded meta-Xylene (Fries *et al*, 1994). BTEX chemicals are found in conditions where oxygen demand quickly exceeds supply, such as in sediments of natural water bodies, thus anaerobic biodegradation is important (Heider *et al*, 1997). All BTEX chemicals can be degraded to catechol (Stephens, 1998).

Removing MTBE From Contaminated Water

Removal of petroleum contaminants from soil and water is important. A common process for removing organic compounds is granular activated carbon and air stripping. Speth and Miltner (1990) demonstrated that neither process was effective in removing MTBE, due to limited adsorption capacity of activated carbon for MTBE. On the other hand, field studies have shown limited removal by carbon adsorption though MTBE concentrations must be low to be adsorbed. For instance, an influent concentration of 30μg/L required frequent regeneration of carbon beds. Henry's constant for MTBE is low thus allowing air stripping to be effective at removing 93% of MTBE at high air-to-water ratio (200:1) (McKinnon and Dyksen, 1984). Combined treatments were highly successful in removing MTBE (Truong and Parmele, 1992).

Oxygenate destruction was effective by means of ozone, ozone/UV and ozone/peroxide treatments. A two-stage process, abiotic oxidation followed by aerobic biodegradation, has the potential for effectively removing MTBE from water. Due to their ability to enhance biodegradability of organic residues in water, these treatments show that oxidation followed by biofiltration has a potential to be successful in optimizing biodegradation of these compounds (EPA Draft Document, 1997).

Human Health Risks

Ingestion of oxygenates by humans has not been studied, making it difficult to determine proper exposure limits and oral Reference Doses for MTBE. UC researchers have developed some human exposure rates to MTBE. A risk characterization of MTBE by Stern and Tardiff in 1996 identified six considerations for MTBE exposure to humans. These considerations include 1) the nature and extent of the MTBE release 2) the environmental pathways from points of release to humans 3) MTBE's fate in the environment 4) routes to human contact and intake 5) the magnitude, frequency and duration of doses and 6) estimation of the size and distribution of the exposed human population (Stern and Tardiff, 1997).

In examining the first consideration, extent of MTBE releases, it is necessary to further discuss how MTBE is released into the environment. Leaking underground storage tanks, gasoline spills during transport of RFG containing MTBE, fuel spills during refueling of automobiles, release into surface waters by watercraft and atmospheric deposition. Total annual industrial emissions of MTBE in 1992 in the U.S., reported by the Toxic Release Inventory, 2.8 million pounds (6.17 million kilograms) to the air, 100,000 pounds (220,500 kilograms) to surface water, 68,000 pounds (149,940 kilograms) to underground injection sites and 288 pounds (635.04 kilograms) to land (TRI, 1994). As Stern and Tardiff suggest, a major spill of either pure MTBE or RFG containing RFG would trigger an emergency response thereby abating the severity of the spill which would also decrease the chance of human exposure.

The second consideration, environmental pathways of MTBE to humans, include inhalation during refueling of automobiles, contamination of drinking water resulting from leaking underground storage tanks releasing to underground aquifers, wet deposition to aquifers and contamination of drinking water collected from surface waters polluted by recreational watercraft, urban runoff or wet deposition.

Data from Davidson *et al*. states however, that wet deposition of MTBE to groundwater would likely only result in an average concentration of less than 0.25 μg/L in tap water. The chance of MTBE being released by underground storage tanks may be 2-5 orders of magnitude higher than wet deposition (Stern and Tardiff, 1997). Concentrations of MTBE may also be higher, ranging from 100- 100,000 μg/L. A U.S. Geological Survey of non-potable, shallow wells found that 27% of wells in urban areas and 1.3% of wells in agricultural areas (where MTBE is less likely to be a component of the gasoline) were contaminated with MTBE (Stern and Tardiff, 1997). Only 3% of wells in urban areas, however, had MTBE concentrations greater than 20 μg/L. Underground storage tank leaks may also result in releases of BTEX compounds. MTBE, due to its high water solubility, may act as a solvent for BTEX compounds thereby carrying BTEX further through groundwater than it would travel itself.

MTBE's fate in the environment is still being researched. MTBE is expected to volatilize rapidly from soil surfaces. MTBE in subsoils, however, may persist as there is little evidence that MTBE biodegrades aerobically or anaerobically (EPA, 1993a). It is also likely, however, that MTBE does not adsorb to soils or sediments (HSDB, 1994). MTBE volatilization half-life in streams, rivers and lakes has been calculated to be 2.5 hours, 9.5 hours and 137 days respectively (EPA, 1993a). Reuter (1998) calculated the volatilization half-life of MTBE in lakes to be 80-120 days.

Humans may be exposed to MTBE by ingestion of MTBE in drinking water and food, inhalation of MTBE volatilizing from tap water during showering and bathing or automobile refueling and dermal adsorption during showering or bathing or other water related activities such as swimming (Stern and Tardiff, 1997).

Stern and Tardiff estimate human MTBE exposure through tap water in the following ways. The average daily dose (ADD) is a method of determining potential long-term exposure by estimating from the following parameters: body weight, contact rate, rates of adsorption into the gastrointestinal tract, lungs and skin for ingestion, inhalation and dermal exposure and duration and frequency of contact activities (Stern and Tardiff, 1997).

An estimated ADD for combined exposures of MTBE in tap water resulting from the maximum theoretical atmospheric deposition is 6×10^{-5} mg/kg/day (Brown, 1997). Brown also estimated the geometric mean ADD for humans exposed to MTBE in tap water as a result of point-source leaks to be 0.36 μg/L and an arithmetic mean of 96 μg/L. Calculations for ingestion of MTBE in tap water yielded an estimated geometric mean ADD of 7.7×10^{-6} mg/kg/day (Brown, 1997). A geometric mean ADD calculated for dermal absorption from bathing activities was 2.6×10^{-8} mg/kg/day. Finally, exposure resulting from combined routes yielded a geometric mean of 1×10^{-5} mg/kg/day (Brown, 1997).

In estimating the magnitude, duration, frequency and extent of human population potentially exposed to MTBE in tap water, Brown (1997) reviewed data from public and private water systems from 1989-1995. In 1997, it was calculated that approximately 30%, or 73 million people, live in areas where MTBE is used. More than half of this population gets their drinking water from surface water where, according to Stern and Tardiff, MTBE concentrations are negligible due to high volatility (Stern and Tardiff, 1997).

Development of NOAEL, No Observable Adverse Effects Limit, for humans is estimated to evaluate the potential deleterious effects of MTBE exposure during a lifetime (Barnes and Dorsoun, 1988). To account for variability in extrapolating from animal species to humans, uncertainty factors are incorporated into the calculation of a NOAEL for MTBE. These factors include variability in sensitivity or susceptibility of individuals in human populations and database deficiencies. NOAEL ratios greater than one provide an adequate margin of safety because uncertainty is included in calculation (Stern and Tardiff, 1997).

Long-term human exposure to MTBE has an NOAEL of 0.1 to 2 mg/kg/day (calculated from the 2-year inhalation study). Using 2 mg/kg/day, the maximum concentration in tap water, at or below which no adverse human health effects may occur, is 14 mg/L, or 14,000μg/L (2 mg/kg/day x 70 kg ÷ 2 L/day, adjusted for relative source contribution of 20%). Using 0.1 mg/kg/day, the maximum concentration in tap water is 0.7 mg/L or 700 μg/L. Therefore, the estimates for the maximum concentration of MTBE in tap water at or below which adverse health effects are not expected to occur range from 700 to 14,000 μg/L for chronic exposure (Stern and Tardiff, 1997).

Little information exists concerning human carcinogenicity, teratogenicity, genotoxicity or neurotoxicity for MTBE in water. Thresholds for taste and odor range from 39 to 135μg/L (taste) and 15 to 180 μg/L (odor) (Young *et al*, 1996; Prah *et al*, 1994; Vetrano, 1993a,b). Differences in an individual's ability to detect the compound with either their sense of smell or taste account for this wide range. Perception and attitudes of fuel oxygenates or toxic chemicals in general may have an effect on such thresholds and may shape social acceptance or tolerance of MTBE.

Human inhalation exposure limits of benzene are 2.5 parts per million (ppm) for 15-min. and 0.5 ppm for eight-h exposures. The odor threshold for BTEX was determined as 3 mg/L (EPA, 1974). Introduction of cleaner burning gasoline, such as RFGs, has reduced benzene emissions by as much as 50% (McClurg, 1998). MTBE, used in reformulated gasoline, is often found with BTEX in the environment. Although both are soluble in water, BTEX is less soluble than MTBE. The following table summarizes certain human health exposure concentrations of BTEX and catechol, their breakdown product.

Table 3. 1994-95 American Conference of Governmental Industrial Hygienists (ACGIH) chemical substances threshold limit values (TLVs) and 1989 OSHA permissible exposure levels (PELs). 1994 National Primary Drinking Water Standards and Health Advisories of the Office of Water of the U.S. EPA time-weighted average (TWA) for normal 8-hour workdays and short-term exposure limits (STEL) or ceiling recommendations. A2- suspected human carcinogen. MCL is the maximum contaminant level. MCLG, maximum contaminant levels goal (mg/L). RfD, Reference Dose (mg/kg/day). Klaussen, 1996).

	ACGIH TLV		**OSHA PEL**		**MCLG**	**MCL**	**RfD**
	TWA	STEL	TWA	STEL			
Benzene	10ppm	--	1ppm	5ppm	--	0.005mg/l	
Toluene	50ppm(skin)	--	100ppm	150ppm	1mg/l	1mg/l	0.1mg/kg/day
Ethylbenzene	100ppm	125ppm	100ppm	125ppm	0.7mg/l	0.7mg/l	0.2mg/kg/day
Xylene	100ppm	150ppm	100ppm	150ppm	10mg/l	10mg/l	2mg/kg/day
Catechol	5ppm(skin)	--	5ppm(skin)	--	--	--	--

Benzene is fat-soluble and when ingested by humans becomes water-soluble through oxidation by liver enzymes. Benzene oxidation in liver produces “phenolic” molecules including catechol, which is more toxic than benzene. Catechol is then absorbed in the bone marrow where blood cells are formed. Phenolic molecules create mutations in bone marrow stem cells. This effect on stem cells can cause them to differentiate out of control, which marks the beginning of leukemia.

Exposure of workers to BTEX solvents in a poorly ventilated environment who did not have proper breathing equipment have resulted in death. If BTEX is inhaled, it can affect the Central Nervous System (CNS) causing disorientation, giddiness, euphoria and confusion progressing to unconsciousness, paralysis, convulsion and death from respiratory or cardiovascular arrest.

Ecological Risks

MTBE does not sorb to sediment thus MTBE would be dissolved in the interstitial water in sediment and therefore bioavailable to benthic organisms (Johnson, 1998). Information needed to characterize ecological risk of MTBE to benthic organisms includes 1) concentration of MTBE in the interstitial water in sediment and 2) toxicity to benthic organisms. No information was found on the amount of MTBE in interstitial water in sediment or toxicity of MTBE to benthic organisms.

EPA does not have water quality criteria for oxygenates in aquatic environments. Reproductive effects of MTBE on *Ceriodaphnia dubia* occurred at 204 mg/L (IC_{25}) (ENSR, 1997a,b). Research indicates a low potential for MTBE to bioconcentrate. Bioconcentration factors (BCF) of 1.5 and 1.4 were reported for *Cyprinis carpio* exposed to 10 and 80 mg/L MTBE (EPA, 1993a). Based on its log K_{ow} of 1.2, MTBE is not expected to substantially bioaccumulate in biota. Modeling and experimental data indicate that MTBE in fish is rapidly excreted across the gills and through urine. Few studies exist on chronic toxicity of MTBE to laboratory animals (Belpoggi *et al*, 1995). MTBE LC_{50} and NOAEL values have been determined for these species exposed to MTBE, *Ceriodaphnia dubia, Selenastrum* *capricornutum, Pimephelas promelas* and *Onchorynchus mykiss.* The LC_{50} and chronic NOAEL for *Ceriodaphnia dubia* are 340-680 μg/L and 200 μg/L respectively. The LC_{50} for *Selenastrum capricornutum,* which has the lowest tolerance for MTBE, is 184 μg/L. *Pimephelas promelas* have a NOAEL of 288 μg/L and a proposed MATC of 66 μg/L while *Onchorynchus mykiss* have an LC_{50} of 880-240 μg/L (Mancini and Stubblefield, 1997).

The Toxicity Reference Value (TRV) is the lowest concentration of a contaminate at which chronic toxicity might occur. Ratio of exposure of an organism to the TRV can be used to calculate risk. By dividing the *Onchorynchus mykiss* LC_{50} of 880 μg/L by 125, in order to adjust for an NOAEL value, the TRV is calculated as 7 μg/L. A second TRV of 33 μg/L was calculated using the *Pimephelas promelas* MATC value of 66 μg/L, the lowest chronic value. Expected exposure of MTBE to organisms is much lower than the TRV values. Thus, adverse ecological impacts on *Onchorynchus mykiss* are not expected to occur until MTBE concentrations range from 46-47 μg/L (Johnson, 1998).

National ambient water quality criteria have not been established for BTEX compounds due to lack of data. A 27-day chronic study was executed for toluene toxicity to *Onchorynchus mykiss* embryo-larvae, which yielded an LC_{50} of 0.02 mg/L (Environment Canada, 1993b). The following table shows average values for BTEX acute toxicity to *Daphnia magna.*

Table 4. Acute BTEX toxicity to *Daphnia magna*

	48-HOUR EC50 (% of WSF)	**48-HOUR EC50 (Measured by fluorescence in mg/L)**
HYDROCARBON		
BENZENE	0.81	12.9
TOLUENE	1.2	6.6
EHTYLBENZENE	2.1	2.9
p-XYLENE	2.5	4.7
o-XYLENE	1.1	1.5
m-XYLENE	2.7	4.1
	48-HOUR LC50 (% of WSF)	**48-HOUR LC50 (Measured by Fluorescence in mg/L)**
BENZENE	5.9	88.9
TOLUENE	16.6	90.7
ETHYLBENZENE	11.5	15.8
p-XYLENE	18.0	33.7
o-XYLENE	12.1	16.8
m-XYLENE	17.4	26.5

Note: % of WSF is the amount a saturated solution can be diluted to and still produce the toxic effect. Thus it is a way of communicating the potency of a compound to an organism.

As demonstrated by the table, ethylbenzene and o-xylene are the most toxic to *Daphnia magna* based on concentration in mg/L , while benzene is the most potent according to %WSF(Irwin, 1997).

Analytical Methods for MTBE and BTEX

The EPA method 8020A/21B is the most common method used for detecting MTBE in ground water; however, it has limitations. In the presence of high concentrations of non-oxygenated gasoline (50,000 μg/L), the method yielded false positives for oxygenated compounds, including MTBE. EPA method 8260A and a modified version of ASTM Method D4815 were accurate, regardless of the amount of gasoline present in the sample. The latter method is recommended when low concentrations of MTBE are present. Median Detection Limit (MDL) for MTBE is 0.06μg/L (USGS Draft Document, 1997).

Immuno assay analysis is another method currently used by researchers to test water samples for BTEX. This method is relatively quick and since it does not require a GC/MS, is cost effective. GC/MS may be more accurate in analyzing water samples for BTEX. Researchers are beginning however, to utilize Immuno assay analysis to assess chemicals and compounds such as BTEX in water samples.

CHAPTER III

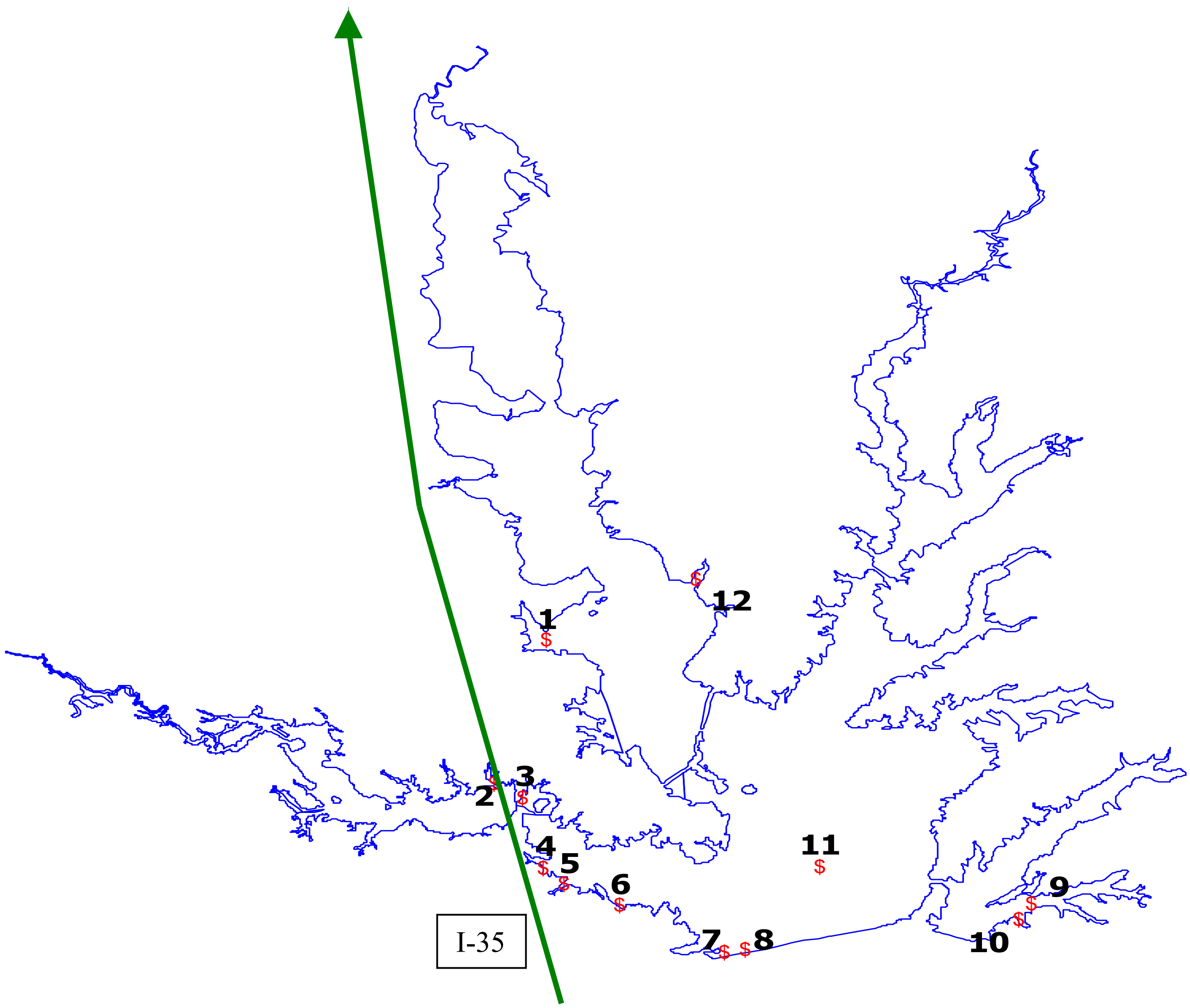
MATERIALS AND METHODS:

Lake Lewisville, Texas

Lake Lewisville is a 29,980 acre reservoir, at conservation pool, located 40 kilometers north of Dallas and 8 kilometers south of Denton. Figure 1 shows the location of Lake Lewisville and the MTBE/BTEX sampling sites on the lake. Lake Lewisville has designated water uses including Flood Control, Contact Recreation, High Quality Aquatic Habitat and Public Water Supply. Constructed in 1952 by the Corps of Engineers, the reservoir is the source from which the cities of Dallas, Denton, Lewisville and the Upper Trinity Regional Water District (UTRWD) produce drinking water. Lake Lewisville is one of the most heavily used recreational reservoirs in Texas (Geomarine, 1998). Four marinas, 10 recreational parks and 29 boat ramps allow easy accessibility for thousands of people. Boats and watercraft, especially those with 2-cycle engines, appear be depositing MTBE and minute amounts of BTEX into this reservoir. TNRCC has established surface water quality standards for Lake Lewisville but these standards do not include either BTEX or MTBE compounds.

Due to rapid volatilization of MTBE and BTEX from surface waters, concentrations of the compounds are expected to result mainly from direct recreational inputs. Storm water runoff from the Lake Lewisville watershed may contribute some concentrations of MTBE to the lake, though my research project did not address this issue. Nonpoint sources of pollution, such as runoff from automobile service stations located in the watershed, may contribute small amounts of MTBE to the lake, however, this also was not addressed in this project.

Figure 1
MTBE/BTEX Sampling Sites on Lake Lewisville, Texas



SITES

1- Lakeview Marina
2- Denton Intake (Party Cove)
3- Arrowhead Boat Ramp
4- Tower Bay Boat Ramp
5- Eagle Point Marina
6- Lake Lewisville St. Park Boat Ramp
7- Lewisville Intake
8- UTRWD Intake
9- Pier 121 Marina
10- Easthill Boat Ramp
11- Midlake

Sampling Design

Sampling of Lake Lewisville began in February 1999 and continued through February 2000. Samples were collected monthly from October through April and weekly from May through September to assess the temporal and spatial variation of MTBE and BTEX in the lake. Intensive sampling of lake surface waters during the summer months was implemented to monitor possible influences of recreational boating on MTBE and BTEX in the lake.

Selection of Sites

MTBE and BTEX were measured at twelve sampling sites on Lake Lewisville (see figure 1). Sites were chosen to sample areas of both high and low motorized boat usage. Sites 5 (Eagle Point Marina) and 9 (Pier 121 Marina) represent heavily used marinas with over 1,700 boat slips combined. Site 1 (Lakeview Marina) is a smaller marina and was chosen as a comparison for the other two marinas. Similarly, site 12 (Dallas Yacht Club) was chosen to compare the influence of sailboats on MTBE levels compared to motorized watercraft. Site 2 (Denton intake/ Party Cove) represents an area on the lake where watercraft regularly congregate for extended periods of time. Sites 3, 4 and 10 are boat ramps representing the influence of vessels visiting the reservoir while sites 7 and 8 are drinking water intakes. Site 11 is located in the middle of the main body of the lake and serves as a reference site.

Research indicates that MTBE concentrates in the epilimnion of lakes due to the source being watercraft (Johnson, 1998). Therefore, only surface water samples (0.25 meters) were collected at eleven of the twelve sites. Site 2, the Denton drinking water intake, is located in a cove that is heavily used by watercraft. This cove is called the ‘Party Cove’ by local residents. Beginning in July, Site 2, due to its significance as a source of drinking water for the city of Denton, was sampled at the surface (0.25 meters) and at two, four and six meters depth. On some days, samples were collected at five meters depth due to low lake levels preventing collection from six meters.

Water Quality

Water quality parameters including temperature, pH, conductivity and dissolved oxygen (D.O.) were monitored using a Hydrolab datasonde (see Appendix A). The Hydrolab datasonde was calibrated less than 24 hours prior to each sampling trip using the methods described in the Hydrolab Datasonde 4 manual (HL#003078, Revision D 1997). Secchi depth was also recorded at each sampling site. An estimate of the number recreational watercraft on the lake within approximately 200 meters of the sampling vessel were recorded during each sampling date.

Drinking Water

Water samples were collected at the three drinking water intake structures located on the lake. In addition to the City of Denton intake, as previously mentioned, water samples were collected near the intakes for the Upper Trinity Regional Water District (UTRWD) and City of Lewisville, which are located along the western part of the dam. Denton draws water from two elevations depending on lake depth. One intake is at 147.8 meters above mean sea level (MSL) while the second is at 153.9 meters MSL. Lewisville’s intake draws vertically into the water column from a large platform. UTRWD also has two intake depths at approximately 152.4 and 155.4 meters MSL. Dallas draws water from the outflow of the lake, which flows into the Trinity River. This intake was not sampled.

Finished water samples were also collected from the Denton and UTRWD Municipal Water Treatment Plants. Collection of Denton's finished water began on July 6, 1999 while collection of the UTRWD's finished water began September 27, 1999. Denton's water is treated using conventional water treatment (i.e. coagulation, flocculation, sedimentation, filtration and disinfection). UTRWD uses a similar method with activated carbon in the treatment process.

Sample Collection and Analyzation

Three replicate water samples were collected at each station and analyzed for MTBE and BTEX. Water samples were collected in 40ml VOA (volatile organic aromatic) bottles provided by the EPA. Preservation of water samples to a pH of 2 with hydrochloric acid was not done because samples were analyzed within four weeks of collection. Brief shelflife of MTBE and BTEX samples prevents possible degradation that may occur before analyzation. Dr. Guy Sewell of the U.S. EPA National Risk Management Research Laboratory Subsurface Protection and Remediation Division in Ada, Oklahoma advised this action.

After collection, water samples were kept at 4°C until they were shipped to the EPA Laboratory in Ada, Oklahoma. Water samples were shipped overnight in coolers containing ice to the EPA Laboratory where they were immediately refrigerated.

The U.S. EPA Laboratory analyzed all water samples for MTBE and BTEX by method RSKSOP-122 "Analysis of Volatile Aromatic Hydrocarbons with Separation of

Xylene Isomers by Purge & Trap Gas Chromatography" (See Appendix G). Auto-sampling was performed using a Dynatech Precision autosampler system in line with a Tekmar LSC 2000 concentrator. All samples were acquired using the Millenium data system. A 5 point (1-1000 μg/L) external calibration curve was used to determine the concentration for all compounds (ManTech, 1999).

Statistical Analyses

Data were analyzed via the Statistical Analysis System (SAS) program. Results were analyzed with a parametric Shapiro Wilk normality test and a nonparametric Kruskal Wallis analysis. Standard Anova followed by a Multiple Range test with Student Newman Keuls (SNK) analyses on ranked data were used to indicate relationships of MTBE and BTEX concentrations among sampling sites and location. A nonparametric Mann Whitney U two sample analysis showed difference of MTBE and BTEX concentrations between summer and winter months. May through September was considered summer while October through April was considered winter in this study.

CHAPTER IV

RESULTS:

Temporal Distribution of MTBE and BTEX

Ambient concentrations of MTBE ranged from 0.0- 16.7 μg/L over the entire sampling period. The Shapiro Wilk test for normality determined that the MTBE data were not normally distributed ($p<0.0001$). The nonparametric Kruskal Wallis analysis of variance showed that MTBE data throughout the sampling year were significantly different ($p<0.0001$). At most sites, the concentrations of MTBE increased in the summer recreational season between May and September and then decreased beginning in November. For example, at site 2, MTBE concentrations during the summer months ranged from 2.0 – 14.8 μg/L. During winter months, however, concentrations of MTBE at site 2 only ranged from 0.0 – 2.0 μg/L.

By separating the summer and winter sampling months, a Mann Whitney U nonparametric two sample test determined that the seasons were highly significantly different ($p<0.0001$) (see Appendix F). MTBE data were separated according to site classification on the lake (see table 5). A nonparametric Multiple Range test with SNK analysis grouped summer MTBE data according to a site's classification on the lake and their MTBE concentration . Site classifications sharing the same line are not significantly different ($\alpha=0.05$) ($p<0.0001$) according to MTBE concentration.

Party Cove	Boat Ramp	>	Marina>	Finished water	Intakes	>	Open water	
Sailboat marina								

This analysis paired Party Cove and boat ramps together, marinas were a separate group, finished water and intakes were paired together while open water and the sailboat marina were grouped together.

Table 5. Sampling sites classified by function.

Sampling Site	**Classification**
1- Lakeview Marina	Marina
2- Party Cove/ Denton drinking water intake	Party Cove
3- Arrowhead Boat Ramp	Boat Ramp
4- Tower Bay Boat Ramp	Boat Ramp
5- Eagle Point Marina	Marina
6- Lake Lewisville State Park Boat Ramp	Boat Ramp
7- Lewisville drinking water intake	Intake
8- UTRWD drinking water intake	Intake
9- Pier 121 Marina	Marina
10- East Hill Boat Ramp	Boat Ramp
11- Midlake	Open Water
12- Dallas Yacht Club	Sailboat Marina
13- Denton finished drinking water	Finished Water
14- UTRWD finished drinking water	Finished Water

Winter MTBE data analyzed by a nonparametric Multiple Range test with SNK analysis, separated lake classifications into two significantly different groups ($p<0.0001$). Boat ramps and marinas were significantly different from Party Cove, open water, the sailboat marina, intakes and finished water. Classifications sharing the same line are not significantly different ($\alpha=0.05$) based on MTBE concentration.

Boat Ramp Marina > Party Cove Open water Sailboat Marina Intakes Finished water

quantitation (BLQ) (1.0 µg/L) throughout the entire sampling season. On April 23, a toluene concentration of 1.3 μg/L was detected in one replicate at site 2, Party Cove. Also, on July 29 1.1 μg/L of p-xylene was detected in one replicate of Denton's finished drinking water, site 13. Otherwise, benzene was BLQ on 15 occasions, while toluene was BLQ 9 times, ethyl-benzene 5, p-xylene 15, m-xylene 8 and o-xylene 7 occasions (see Appendix B).

Table 6 shows an estimate of the number of people visiting Lake Lewisville parks between February 1999 and February 2000. More people visited the reservoir during the summer months between May and September than during the winter, October through April. The month of July had the most visitors (460,000). More visitors means more watercraft on the lake. The increase in watercraft using the reservoir also increases the potential for MTBE deposition.

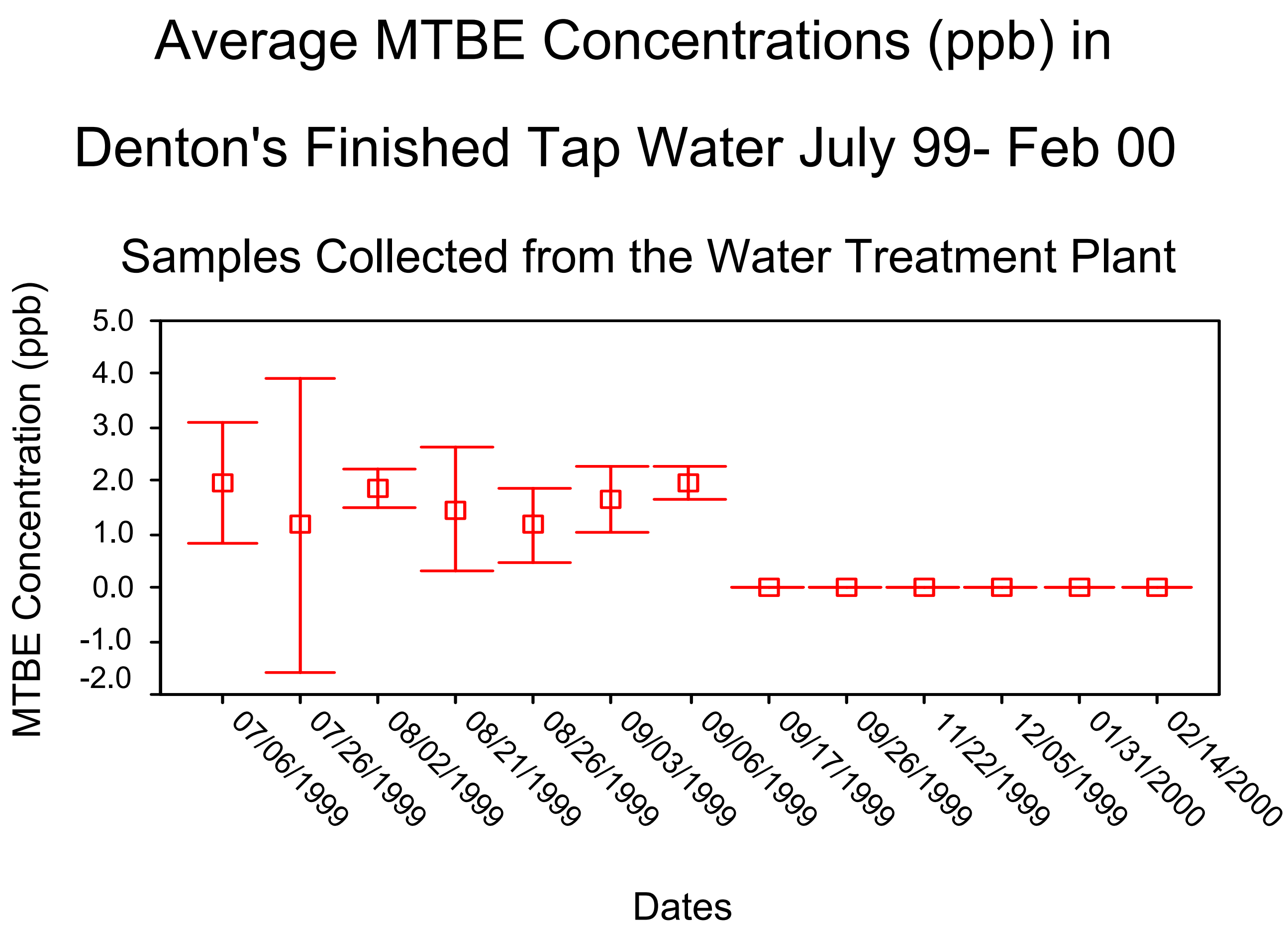
Denton's finished drinking water did not have MTBE concentrations above 2.2 μg/L in any samples collected except for one replicate on September 3, 1999 of 6.1μg/L. The other two replicates for MTBE on this date were 1.6 μg/L and 1.7 μg/L. The replicate of 6.1 μg/L was caused by an unexplainable high level. Concentrations of MTBE averaged 1.6 μg/L between July 6 and September 6, 1999. MTBE concentrations were not detectable in Denton's water between September 17, 1999 and February 14, 2000 (see figure 2). On July 6 benzene was BLQ in finished Denton water, otherwise BTEX was not detected on all other sampling dates. UTRWD did not have detectable levels of MTBE or BTEX in any finished water samples collected on five dates (see figure 3).

Table 6. Estimate of number of visitors to Lake Lewisville parks Feb. 1999-Feb. 2000

February 1999	119,000
March 1999	212,000
April 1999	346,000
May 1999	435,000
June 1999	362,000
July 1999	**460,000**
August 1999	285,000
September 1999	268,000
October 1999	150,000
November 1999	<100,000
December 1999	<100,000
January 2000	<100,000
February 2000	114,000

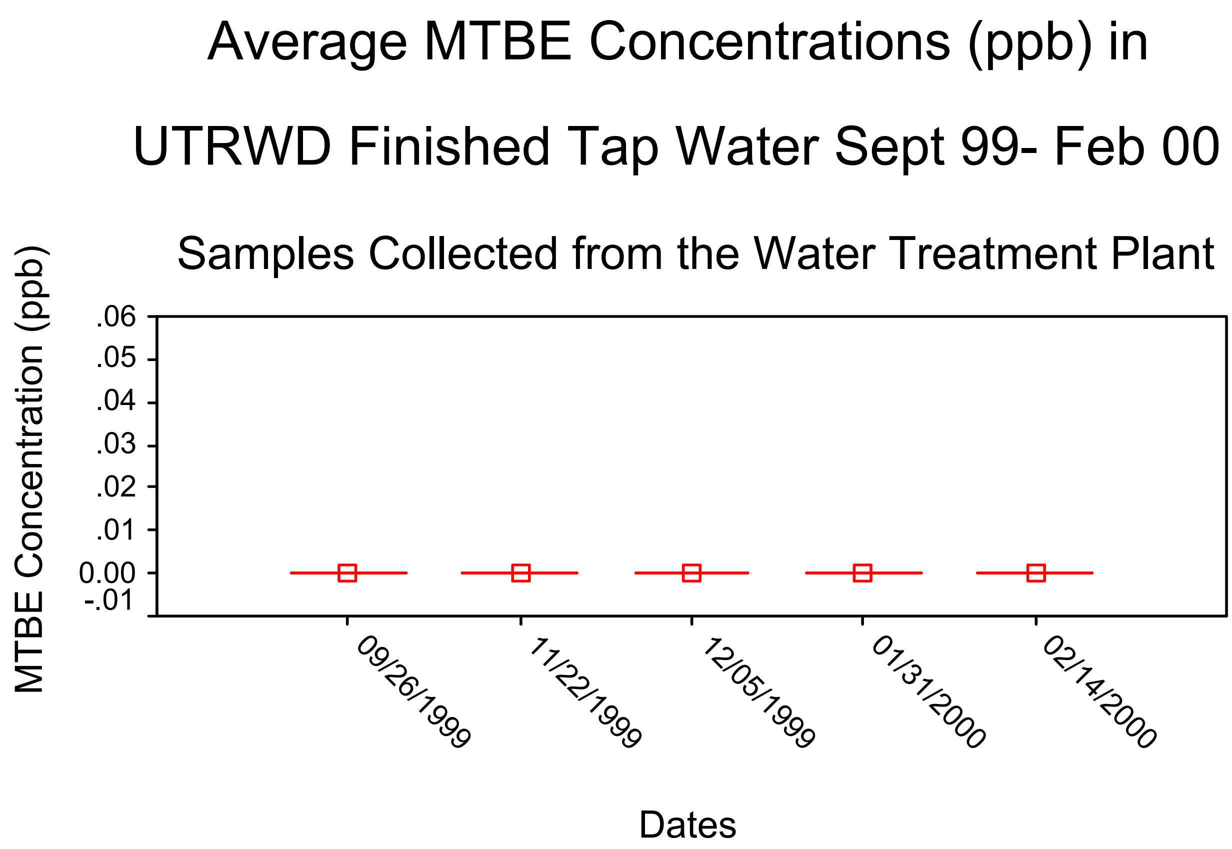
* U.S. Army Corps of Engineers, June 2000

Figure 2.



*95% Confidence Limit

Figure 3.



*95% Confidence Limit

UTRWD- Upper Trinity Regional Water District

Popular lake recreation holidays such as Fourth of July and Labor Day impacted the levels of MTBE in water samples. On June 30, MTBE concentrations at site 2 (Party Cove) averaged 4.8 μg/L while on July 6, just after the holiday weekend, concentrations averaged 12.9 μg/L. A similar pattern was noted throughout the reservoir (see figure 4). Labor Day impacted MTBE concentrations in the lake in a similar fashion. At site 2, MTBE concentrations averaged 3.9 μg/L on September 3, while on September 6, the average concentration had risen to 14.9 μg/L. Again, a comparable trend was noted throughout the lake (see figure 5). As discussed earlier, BTEX levels remained low throughout the sampling year, thus temporal distribution of BTEX is assumed not to vary according to site or lake classification.

Spatial Distribution of MTBE and BTEX Concentrations

Sites 2, 3, 4, 5 and 6 located near the Interstate 35 (I-35) bridge in the southwestern region of the lake showed higher levels of MTBE than those in the middle and northern areas. Similarly, sites 9 and 10 in the southeastern arm also showed higher levels of MTBE than the middle and northern areas of the lake (see Appendix E). Table 5 summarizes the classification of each site. A nonparametric Multiple Range test with SNK analysis of all samples, separating the sites by classification, show that boat ramps, Party Cove and marinas are significantly different ($p<0.0001$) from open water, the sailboat marina, intakes and finished drinking water.

Boat Ramp   Party Cove   Marina > Intakes   Finished water   Open water
Sailboat marina

A nonparametric Multiple Range test with SNK analysis grouped sampling sites according to MTBE concentration for each separate date (see Appendix C). Sites 2, 3, 4, 5 and 9 are often grouped together, meaning they were not significantly different (α=0.05). This group tended to overlap with the group including sites 1, 6 and 10. Sites 7, 8, 11 and 12 are usually a separate group. These groups did vary throughout the sampling year though this is the general pattern. Sites 13 and 14, Denton and UTRWD's finished drinking water, were frequently included in the group with sites 7, 8, 11 and 12.

Table 7 shows the rank for each site according to MTBE concentration for fourteen sampling dates. These fourteen dates represent times when data was collected from all twelve sites. The lower the rank the higher the concentration of MTBE for that site. Site 4 (Tower Bay Boat Ramp) has the lowest average rank (2.266) followed by site 2 (2.733) (Party Cove) and sites 5 (Eagle Point Marina) and 3 (Arrowhead Boat Ramp) with an average rank of 3.4. Thus, sites 4, 2, 3 and 5 had the highest MTBE concentration of these fourteen sampling trips.

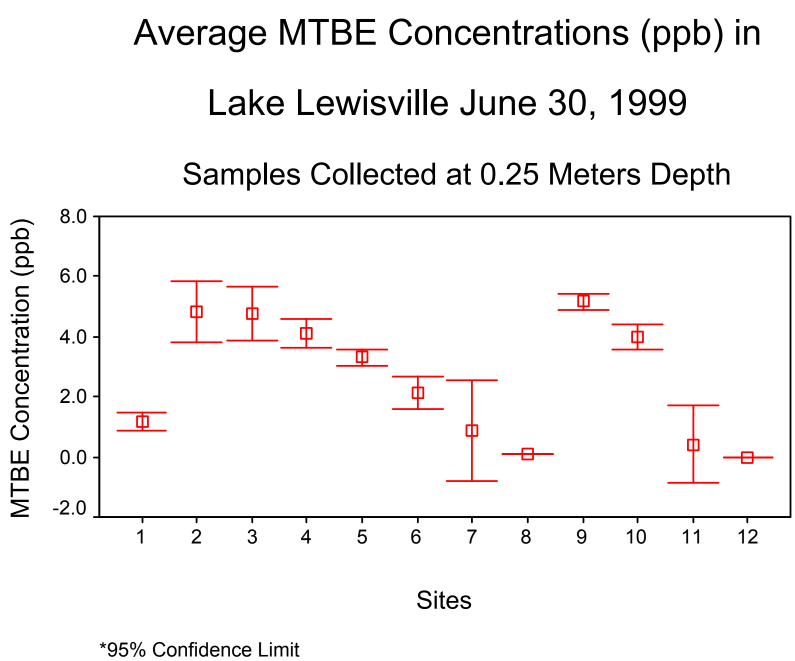
Sites 2, 3, 4, 5, 6, 9 and 10 tend to show higher concentrations of MTBE, as is demonstrated by the figures showing concentrations of MTBE at each site over time (Appendix D). These sites are either boat ramps, marinas or the Party Cove. Sites 1, 12, 11, 7 and 8 regularly have low levels of MTBE throughout the sampling year.

Table 7. Rank of MTBE data for each site for fourteen sampling dates.

Site	1	2	3	4	5	6	7	8	9	10	11	12
Date												
4/23/99	7	2	4	8	1	5	9	11	3	6	11	11
5/9/99	8	3	2	1	5	7	11.5	10	4	6	11.5	9
6/16/99	10	3	5	1	2	6	9	12	4	7	11	8
6/18/99	10.5	6	4	1	2	3	10.5	10.5	5	7	10.5	8
6/24/99	8	3	4	1	2	7	10.5	9	5.5	5.5	10.5	12
6/30/99	9	2	3	4	6	7	10	8	1	5	11	12
7/6/99	8	1	3	6	5	7	11	9	4	2	11	11
7/19/99	8	4	3	1	2	7	10	11.5	5	6	9	11.5
7/26/99	9	2	4	1	6	7	11	12	3	5	8	10
8/21/99	4	5	3	1	2	7	9	10	6	8	11.5	11.5
8/26/99	10.5	2	4	3	1	7	9	8	5	6	10.5	12
9/3/99	11	3	1	2	4	6	8	9	5	7	11	11
9/6/99	9	1	3	2	4	6	8	10	5	7	11.5	11.5
9/17/99	10	2	4	1	3	6	10	10	5	7	10	10
9/26/99	3	2	4	1	6	9.5	9.5	9.5	5	9.5	9.5	9.5
Avg. Rank	**8.333333**	**2.733333**	**3.4**	**2.266667**	**3.4**	**6.5**	**9.733333**	**9.966667**	**4.366667**	**6.266667**	**10.5**	**10.53333**

* Numbers represent rank according to MTBE concentration.

Figure 4. Comparison of MTBE Data before and after July 4, 1999.



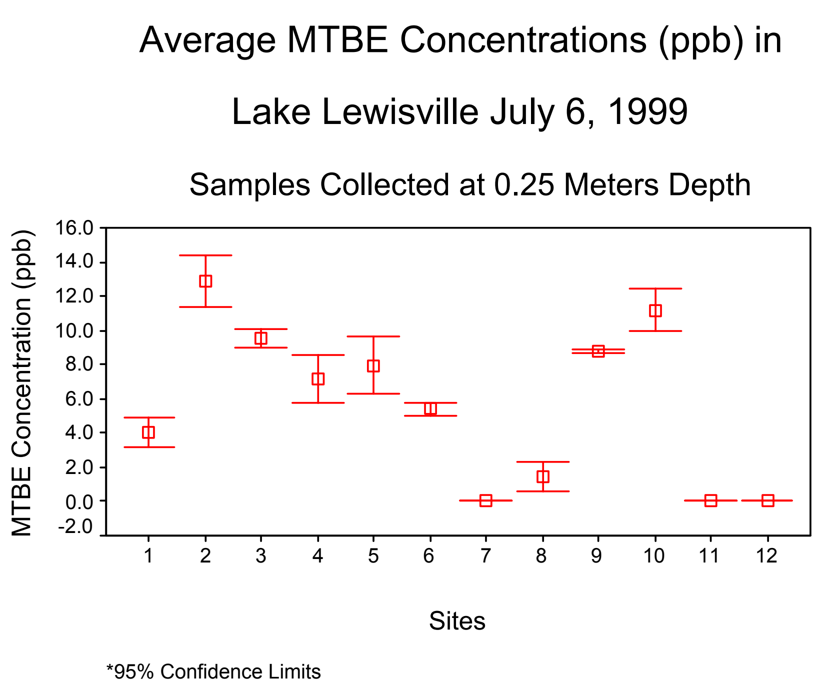
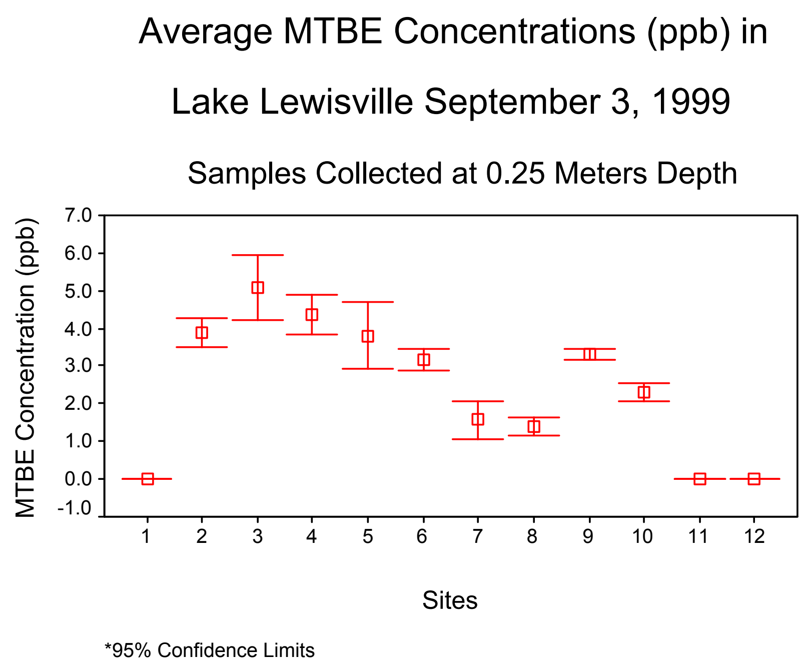
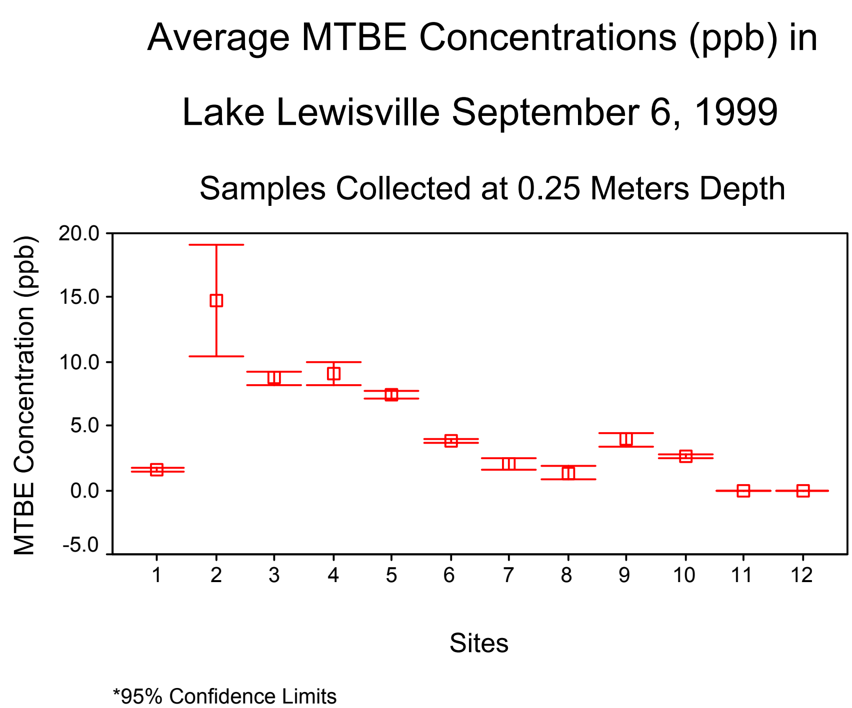


Figure 5. Comparison of MTBE data before and after Labor Day 1999.





Depth Distribution at Site 2

Results of MTBE measurements collected at site 2 began July 26, 1999 and continued throughout the rest of the sampling period. Data show that there was not a consistent pattern of MTBE depth distribution in Party Cove on the ten dates sampled. Only on August 2 and September 6, 2000 was the epilimnion (top 2.0 meters) different from the lower depths. Figure 6 demonstrates this pattern. Appendix F contains all depth profiles collected throughout the sampling period. On August 12, the concentration of MTBE was slightly higher at 4.0 meters (3.5 μg/L) than the surface (0.25 meters) (3.1μg/L) and 2.0 meters (3.2 μg/L) sample. These concentrations are not significantly different (α=0.05). For most depth profiles, the range of MTBE levels at site 2 was not significantly different. The largest difference between the top 2.0 meters and the 4.0 and 6.0 meters samples occurred on September 6, 1999, as shown in figure 6, just following Labor Day. MTBE concentrations were 6.1 μg/L at 6.0 meters but 14.3 μg/L at the surface.

MTBE Concentration Among Sites

A nonparametric Multiple Range test with SNK analysis of MTBE summer data separated by site demonstrates that sites 2, 3, 4, 5, 6, 9 and 10 are significantly different from sites 1, 7, 8, 11 and 12. Sites sharing the same bold line are not significantly different (α=0.05). Sites sharing the same thin line are also not significantly different.

Site 4 Site 3 Site 5 Site 2 Site 9 Site 10 Site 6 Site 1 Site 13 Site 8 Site 7 Site
11 Site 12 Site 14

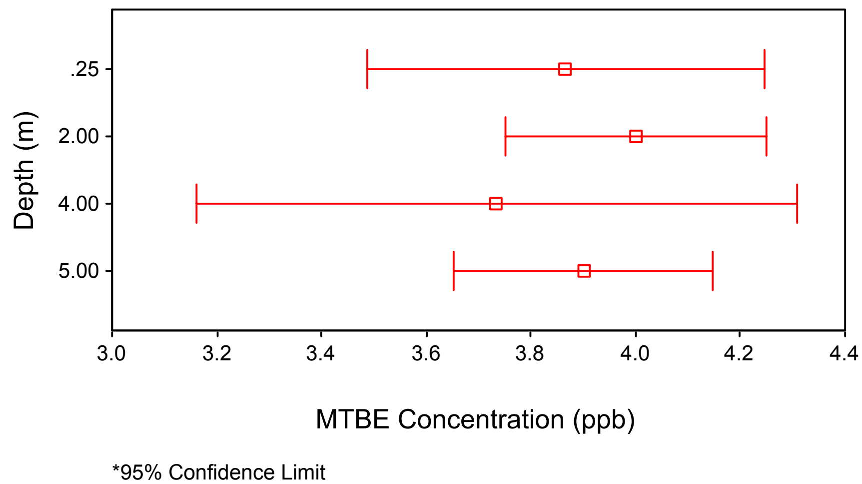
The separation of sites according to MTBE concentration is related to the number of watercraft using each of these areas (see table 8). As the table demonstrates, sites 2, 3, 4, 5, 6, 9 and 10 usually have more watercraft than sites 1,7, 8, 11 and 12.

Figure 6. Depth profile of MTBE at Site 2 before and after Labor Day, 1999.

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 September 3, 1999

Samples Collected at 0.25, 2, 4 & 5 Meters Depth



Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 September 6, 1999

Samples Collected at 0.25, 2, 4 & 6 Meters Depth

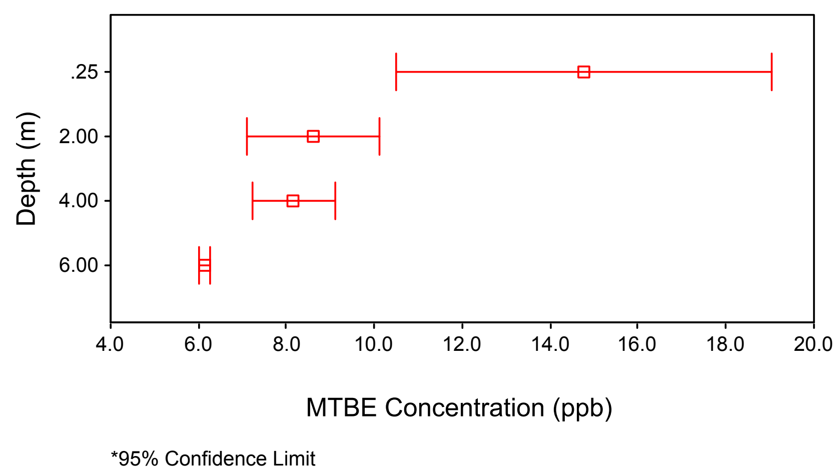


Table 8. Number of Watercraft Observed Within 200 Meters at Each Site on Each Sampling Date.

					Number of Watercraft Observed								
Date	**Day of Week**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 6**	**Site 7**	**Site 8**	**Site 9**	**Site 10**	**Site 11**	**Site 12**
4/23/99	Friday	3B	1WR	3B, 1WR	0	11B	3B, 1WR	0	2B, 1WR	0	1B, 3WR	0	0
5/9/99		1B	15B, 7WR	3B, 1WR	6WR	9B	3B, 3WR	1B	1B	3B	3B, 1WR	0	0
5/27/99	Thursday	NA	4B, 2WR	0	2B	2B	1B	0	0	3B	0	0	0
5/31/99	Monday	3B	36B, 10WR	4B, 4WR	3B, 4WR	8B, 2WR	15B, 8WR	0	4B	7B	4B, 10WR	NA	1B
6/16/99	Wednesday	1B	0	2WR	2B	1B	1B	0	0	1B	0	0	0
6/18/99	Friday	0	4B, 2WR	0	1B	2B, 5WR	0	0	0	2B	3B, 1WR	1B	1B
6/24/99													
6/30/99	Thursday	1B	0	1WR	0	0	2B	0	0	1B	0	0	0
7/6/99	Tuesday	1B	0	1B	1B, 1WR	2B, 3WR	0	0	0	2B, 1WR	0	0	0
7/19/99	Monday	0	1B	3WR	3WR	0	0	0	0	1WR	1WR	0	0
7/23/99	Friday	0	0	1B, 1WR	1B, 3WR	1B, 2WR	0	0	0	0	1B, 3WR	0	0
7/26/99	Wednesday	0	1B	1B, 3WR	1B, 1WR	0	0	1B	0	1B	2B	0	0
8/2/99	Monday	0	0	0	2B	0	2B	0	1B	0	0	0	0
8/12/99	Thursday	NA	1B	0	3B	0	0	0	0	3B, 1WR	0	0	0
8/21/99	Saturday	0	2B, 2WR	3B, 2WR	4B, 4WR	4B, 1WR	2B	2WR	2B, 1WR	2B	1B	0	1B

8/26/99	Thursday	1B	0	0	1B	0	1B	0	0	1B	3B	0	0
9/3/99	Friday	2B	0	1B	2B	1B	0	0	0	0	1WR	0	0
9/6/99	Monday	3B	20B, 3WR	3B, 4WR	3B	12B	3B	0	5B	8B, 2WR	5B, 2WR	0	0
9/17/99	Friday	0	1B	1B	1B	1B	0	0	2B, 1WR	0	0	0	0
9/26/99	Sunday	0	0	3B	1B, 3WR	0	2B	0	0	2B	0	0	0
11/21/99	Sunday	0	0	0	2B	0	0	0	0	1B	0	0	NA
12/5/99	Sunday	0	0	0	0	0	0	0	0	0	0	0	0
1/31/00	Monday	0	0	0	0	0	0	0	0	0	0	0	0
2/12/00	Saturday	0	0	0	3B	1B	2B	0	0	1B	1B	0	0

B-
BOAT
WR-
WAVERUNNER

CHAPTER V

DISCUSSION:

Temporal Distribution of MTBE and BTEX

Results of this study show that levels of MTBE and minimal amounts of BTEX were found in Lake Lewisville, Texas, between February 1999 and February 2000. Recreational boating does impact levels of MTBE in the lake. Concentrations of MTBE tend to increase with increasing water recreation. Therefore, as water recreation increases with warm weather in May, MTBE also increases. Table 6 supports this statement. More people visit Lake Lewisville during summer months than during the winter. Thus, more watercraft using the lake during the summer increases the amount of MTBE in the water. Combining information in tables 6 and 8 supports the hypothesis that distribution of motorized watercraft are related to distribution of MTBE concentrations in Lake Lewisville.

By September 26, 1999, MTBE concentrations began decreasing with decreasing number of watercraft on the lake. Sites 4 and 5, located on either side of the Eagle Point Marina, were the only sites with MTBE concentrations above 1.0 μg/L from the November and December 1999 and January and February 2000 sampling trips (see Appendix E).

Figure 5 shows MTBE levels in Denton's finished drinking water. After September 6, no MTBE was detected. Again, apparently due to the decreasing number of watercraft on Lake Lewisville, levels of MTBE decreased in the lake and in Denton's finished water. Although the maximum level of MTBE found in Denton's finished water was 2.2 μg/L, which is below EPA's recommended 20-40 μg/L for taste and odor, results suggest a potential for MTBE to increase if more watercraft are permitted to use Lake Lewisville. California's position to classify Lake Tahoe as an Outstanding Natural Resource and because it is used as a source of drinking water, officials are required to manage the reservoir according to drinking water quality standards (CSWRCB, 1994). The significance of Lake Lewisville as a source of drinking water for Denton, Dallas, Lewisville and UTRWD should influence the management of the lake.

UTRWD's finished drinking water did not have detectable levels of MTBE during any of the five samples collected. Raw water drawn from site 8, along the dam, only had MTBE above 2.0 µg/L on two occasions (see Appendix D). UTRWD also uses activated carbon during water treatment, which as the literature suggests, has been shown to decrease MTBE concentrations. The combination of low levels of MTBE in raw water at site 8 and activated carbon during treatment is assumed to account for not detectable concentrations of the compound in UTRWD finished water.

As figures 4 and 5 demonstrate, popular holiday weekends on Lake Lewisville increase levels of MTBE in the reservoir, especially in heavily used areas. The influx of more watercraft spike levels of MTBE, sometimes tripling the concentration. This spike in MTBE levels appears to be related to recreational vessels.

Spatial Distribution of MTBE and BTEX

As stated above, spatial distribution of watercraft on Lake Lewisville influences the distribution of MTBE concentrations. Similar to the Lake Tahoe study, areas of Lake Lewisville that are regularly used by recreational boaters show higher levels of MTBE than other parts of the lake. Heavily used lake areas include boat ramps, marinas and the region named Party Cove. Results from the Multiple Range test with SNK analyses separating lake sites according to classification and MTBE concentration supports this hypothesis.

Higher concentrations of MTBE in the lake are found in the southwestern region around the I-35 bridge and in the southeastern region near the Easthill Boat Ramp (site 10) and Pier 121 Marina (site 9) (see figure 1). Eagle Point Marina (site 5), Tower Bay Boat Ramp (site 4), Party Cove (site 2), Arrowhead Park Boat Ramp (site 3) and Lake Lewisville State Park Boat Ramp (site 6) are located around the I-35 bridge. For recreationists who do not keep watercraft at marinas on Lake Lewisville, the boat ramps at sites 3, 4 and 6 are often used due to the accessibility from I-35. Thus, more vessels are typically found in the I-35 region as compared to the middle and northern areas of the lake where sites 7, 8, 11, 1 and 12 are located. Eagle Point Marina is a large marina with 762 boat slips. Sneaky Pete's, a restaurant located in Eagle Point Marina, attracts many lake recreationists. The combination of having a large number of boat slips, a gas dock and Sneaky Pete's restaurant contributes to increased vessels at sites 4 and 5 thereby increasing MTBE concentrations.

Site 4, the Tower Bay boat ramp had the highest rank for the entire season and with the exception of four sampling dates, watercraft were always observed at site 4. The proximity of this boat ramp to I-35 and Eagle Point Marina explains why it often has the highest amount of MTBE.

Site 2, with the second highest rank according to MTBE data, also demonstrates the direct relationship of watercraft to levels of MTBE in lake samples. The popularity of this cove to recreationists affects water quality. Intermittent influxes of water vessels on weekends and during holidays such as July 4th and Labor Day create potential hazards for the water quality in the lake as well as Denton's drinking water. Although levels of MTBE in drinking water did not exceed 2.2 μg/L throughout sampling, increasing watercraft in Party Cove may likely increase levels of MTBE in Denton's drinking water.

Pier 121 Marina (site 9) and the Easthill boat ramp (site 10) are the most accessible entry points for recreationists coming to Lake Lewisville from the East. Highway 121 connects to this arm of the lake, which increases the number of lake users at these sites. Pier 121 Marina has 945 boat slips and a gas dock, which again contributes MTBE to this section of the reservoir.

Site 1, Lakeview Marina, is the smallest one for motorized watercraft with 456 boat slips. Throughout the sampling year, observation of Lakeview Marina found that it was not frequently utilized. As Table 9 demonstrates, not many vessels were observed during sampling. MTBE concentrations at site 1 were only above 3.0 μg/L on two occasions. Thus it is assumed that the infrequent use of this marina explains the minimal levels of MTBE detected.

The Dallas Yacht Club (site 12) houses sailboats, which are believed not to contribute significant levels of MTBE due to their mode of transport. It has a total of 162 boat slips. Data from site 12 supports this hypothesis as is demonstrated by the figure in Appendix D. MTBE levels were only above 0.5 μg/L three times at this location.

Sites 7, 8 and 11 are located in the main body of the lake, where watercraft do not tend to congregate or remain at low speeds for long periods of time. With the exception of two occasions when MTBE concentrations at site 8 were above 2.0 μg/L, these areas regularly show low levels (1.0 μg/L or less) of MTBE.

The nonparametric Multiple Range test with SNK analysis of MTBE summer data separated by site demonstrates that sites 2, 3, 4, 5, 6, 9 and 10 are significantly different from sites 1, 7, 8, 11 and 12 (see figure 8). Again, this difference is related to the number of watercraft using each of these areas (see table 8). While data in table 8 are qualitative, it is useful when evaluating MTBE concentrations at each site. As the table demonstrates, sites 2, 3, 4, 5, 6, 9 and 10 usually have more watercraft than sites 1,7, 8, 11 and 12. This again supports the hypothesis that watercraft appear to be related to MTBE concentrations in Lake Lewisville. Thus, results of the Lake Lewisville study support findings of previous research on reservoirs such as that on Donner Lake and Lake Tahoe in California. These studies, conducted by UC Davis, TRG, USGS and UNR in 1997, also found that MTBE concentrations were highest around marinas and areas of heavy recreation.

The presence of MTBE and small levels of BTEX may suggest other growing concerns about the use of multipurpose reservoirs across the United States. The use of recreational watercraft is of primary importance because of how directly vessels impact the water quality. A reported Toxicity Reference Value (TRV) for MTBE, or the lowest concentration at which chronic toxicity might occur, for *Onchorynchus mykiss* is 7.0 μg/L. A reported TRV for MTBE for *Pimephelas promelas* is 33.0 μg/L (Johnson, 1998). Data from Lake Lewisville show that levels have been as high as 16.7 μg/L MTBE. While high concentrations of MTBE may fluctuate throughout the boating season, there remains potential to impact sensitive species inhabiting the lake. In addition to gasoline constituents, the presence of other organic compounds such as Atrazine and other biocides have potential to impact water quality on Lake Lewisville (Waller, 1999). Little data exists on the additive or synerginistic effects of MTBE, BTEX or other organics like Atrazine in lakes. MTBE has the potential to act as a solvent for other more harmful compounds such as BTEX. As a solvent, MTBE may cause BTEX and other harmful compounds to travel farther and more rapidly than if MTBE were not present. The potential of these compounds to be harmful does exist in Lake Lewisville if proper monitoring and management strategies are not implemented. These concerns are not only ecological but relate to human health as well.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS:

The objectives of this project were to:

- Determine the levels of MTBE and BTEX in Lake Lewisville, Texas
- Assess the seasonal and temporal distribution of MTBE and BTEX in the reservoir
- Determine if certain areas of the lake are more susceptible to higher concentrations of MTBE and/or BTEX than other parts of the lake
- Determine if and how recreational watercraft impact the levels of MTBE and/or BTEX in the lake
- Determine if MTBE and/or BTEX are detected in the city of Denton's and the UTRWD's finished drinking water

The temporal and spatial distribution of watercraft on Lake Lewisville, Texas is related to MTBE concentrations. The results of the study conducted between February 1999 and February 2000 demonstrated that areas of the reservoir that were heavily used by recreational watercraft show higher amounts of MTBE than minimally used regions. Sites 2, 3, 4, 5 and 6 generally have the highest amounts of MTBE compared to other sites on the lake. These marinas, boat ramps and Party Cove are sheltered from strong winds, which may reduce the amount of MTBE that can volatilize to the atmosphere. Also, accessibility of these sites due to their proximity to I-35 exacerbates the impact of watercraft to MTBE concentrations.

Sites 9 and 10 also demonstrate higher concentrations of MTBE than the sites located in the middle and northern regions of the lake. Pier 121 Marina (site 9), is the largest marina with 945 boat slips, which contributes to increased MTBE concentration. Again, the proximity to Highway 121 increases the use of this marina and boat ramp.

Holiday weekends, such as July 4th and Labor Day spiked levels of MTBE in the reservoir, especially at sites 2, 3, 4, 5, 6, 9 and 10. During these holidays there was also an overall increase in MTBE concentrations throughout the lake. The relationship between watercraft and MTBE again explains this observation. These results agree with data from the 1997 Lake Tahoe and Donner Lake studies in California, which demonstrated how watercraft directly impact MTBE concentrations in lakes.

Although type of watercraft used on Lake Lewisville was not addressed in this study, previous research from Lake Tahoe, California has demonstrated that 2-cycle engines are the most polluting of all watercraft, contributing as much as 25 % of unburned fuel directly to the water. The use of 2-cycle watercraft is not restricted on Lake Lewisville and is assumed to add significant amounts of MTBE to the lake. The Donner Lake study demonstrated that 100% reduction of 2-cycle watercraft reduced MTBE concentrations from an average of 8.76 μg/L to 0.0 μg/L. While 100% reduction of 2-cycle watercraft is extreme, it demonstrates the effectiveness that this form of management has on water quality (Kalman and Lund, 1998).

The levels of MTBE in Lake Lewisville ranged from 0.0 –16.7 μg/L between February 1999 and February 2000. These levels are below the EPA recommended

20 –40 µg/L for taste and odor in drinking water. Although concentrations of MTBE decrease during winter months, the dramatic increase in the number of watercraft on the reservoir during summer months increases amounts of MTBE.

Levels of BTEX in Lake Lewisville did not appear to show any pattern consistent with that of MTBE. The levels of BTEX did not exceed 2.0 µg/L throughout the entire sampling year. Thus, BTEX levels in Lake Lewisville cannot be directly related to watercraft in the same manner as MTBE. Low levels of BTEX compounds may be attributed to the high volatilization rates of the compounds.

Recommendations

Findings of this study indicate that watercraft are related to concentrations of MTBE in Lake Lewisville. The heavy use of Lake Lewisville by water vessels, especially during summer months, creates a potential for impacts to water quality. The use of this reservoir as a source of drinking water for Denton, Dallas, Lewisville and the Upper Trinity Regional Water District should be of utmost importance when managing use of the resource. It would be in the interest of these cities to continue monitoring Lake Lewisville for MTBE and other gasoline constituents that may negatively impact lake and drinking water quality. The possibility for MTBE to act as a solvent for other more harmful compounds does exist in Lake Lewisville.

A 1999 Lake Lewisville Future Water-related Recreation Draft Development Policy discussed the watercraft carrying capacity of the reservoir. This issue should not only include boater safety, according to accident rates, but the ecological impacts of increasing the number of watercraft on the lake. The current median carrying capacity for watercraft for Lake Lewisville is estimated to be 1, 112 (USACE, 1999). This number was chosen for resource protection, safety, water quality and user satisfaction. Development of a lower carrying capacity may be necessary for periods of high MTBE concentration in order to protect ecological resources and drinking water quality.

The Party Cove, Denton's drinking water intake, consistently showed higher levels of MTBE than most other regions of the lake. This increased level of MTBE is attributed to the watercraft using the cove. Eliminating all watercraft access to this cove will reduce concentrations of MTBE dramatically. This measure will protect Denton's drinking water from MTBE contamination and other potentially harmful compounds caused by watercraft usage.

The Marina Demand Study conducted by the U.S. Army Corps of Engineers, EP 405-1-2, on April 1, 1994 indicated a desire for an increase in the number of marinas. This increase has potential to negatively impact the reservoir. There are currently 2,325 wet boat slips on Lake Lewisville. An additional 710 trailer parking spaces at access ramps may add more watercraft visiting the reservoir. Construction of a new marina on the lake may increase the number of wet slips by as much as 200 to 250 thereby increasing the total to 2,575 (USACE, 1999). Limiting the number of water vessels on the reservoir would help reduce levels of MTBE. This measure would benefit the ecology of Lake Lewisville.

As demonstrated by the Lake Tahoe study, the type of watercraft used in reservoirs affects the concentration of MTBE in the water. If the concentration of MTBE in Lake Lewisville continues to increase, it may be necessary to restrict or monitor the use of 2-cycle engines on the reservoir in order to prevent negative impacts to the lake and drinking water quality. In 1998, Lake Tahoe banned the use of 2-cycle engines on the reservoir to protect ecological and domestic water resources. A monitoring program on Lake Lewisville would indicate periods of high MTBE concentrations, which could then stimulate restrictions on the number of watercraft allowed to access the lake from boat ramps. Again, while this measure may seem extreme, it would effectively reduce potential impacts of MTBE.

Another possible management strategy is to restrict the use of reformulated gasoline in watercraft using Lake Lewisville. Marinas on the lake could be required to sell gasoline not containing MTBE. Information about MTBE in Lake Lewisville could be included in a boat registration and licensing package distributed to residents in the Dallas-Ft. Worth Metroplex who may use the lake. This information would encourage the use of gasoline not containing MTBE and provide an explanation of how watercraft impact water quality.

Educational information, developed by the EPA or TNRCC, distributed at marinas, watercraft dealers and watercraft rental facilities would inform citizens and lake users of the impact of watercraft on Lake Lewisville. This information would include the explanation of how 2-cycle engines impact water quality and again encourage recreational boaters to consider less polluting watercraft. Major points would be highlighted such as the significance of Lake Lewisville as a source of drinking water, ecological impacts of 2-cycle engines and how better fuel efficiency is achieved when using newer technologies. These newer technologies inlcude:

- Mercury Marine’s Optimax engine
- OMC-Johnson/Evenrude’s FICHT technology 2-cycle engine

- Suzuki’s 4-cycle DI/60/70 engine
- Tohatsu’s 50 horsepower TLDI (Tohatsu Low-emissions Direct Injection)
- Yamaha (replaced all 2-cycle engines with 4-cycle)

The significance of Lake Lewisville as a natural resource and a source of drinking water is important. Management strategies such as some suggested above would help protect these uses while maintaining the recreational value of the lake.

APPENDIX A
WATER QUALITY DATA FROM LAKE LEWISVILLE, TEXAS
FEBRUARY 1999 – FEBRUARY 2000

May 9, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	50999	122524	8.36	97.4	8.15	0.388	21.23	686
11	2.50	50999	122604	8.43	98.3	8.16	0.388	21.26	685.6
11	2.00	50999	122638	8.53	99.7	8.17	0.388	21.37	686
11	1.50	50999	122802	8.56	99.9	8.17	0.388	21.33	685.9
11	1.00	50999	122822	8.65	101.1	8.17	0.388	21.4	685.9
11	0.50	50999	122852	8.72	102	8.16	0.388	21.42	686
11	0.25	50999	122935	8.73	102.1	7.95	0.003	21.43	685.7
9	3.00	50999	125324	7.61	89.9	8.05	0.509	21.77	685.3
9	2.50	50999	125345	7.9	93.3	8.06	0.509	21.89	685.1
9	2.00	50999	125407	7.9	93.3	8.05	0.509	21.91	685.1
9	1.50	50999	125438	8.04	95.1	8.05	0.509	21.96	685.1
9	1.00	50999	125500	8.09	95.6	8.04	0.509	21.98	685.3
9	0.50	50999	125541	8.2	97	8.04	0.509	21.99	685.3
9	0.25	50999	125614	8.24	97.6	8.04	0.509	22.05	685.3
10	3.00	50999	130602	7.65	90.3	8.06	0.509	21.88	685
10	2.50	50999	130622	7.66	90.9	8.07	0.509	22.15	685
10	2.00	50999	130652	7.78	94.7	8.1	0.509	22.46	684.8
10	1.50	50999	130712	7.88	94.8	8.1	0.509	22.85	685
10	1.00	50999	130736	7.89	95.1	8.1	0.509	22.96	685
10	0.50	50999	130805	8.04	96.9	8.07	0.509	22.97	685
10	0.25	50999	130830	8.06	97.1	7.84	0.01	22.99	684.9
8	3.00	50999	132720	7.49	86.2	7.93	0.391	20.62	684.6
8	2.50	50999	132747	7.53	86.7	7.96	0.391	20.71	684.4
8	2.00	50999	132836	7.67	88.7	7.97	0.392	20.88	684.5
8	1.50	50999	132918	7.74	89.9	7.97	0.392	21.06	684.3
8	1.00	50999	132947	7.76	90.2	7.97	0.391	21.1	684.6
8	0.50	50999	133017	7.8	90.7	7.96	0.392	21.16	684.3
8	0.25	50999	133044	7.82	91	7.97	0.392	21.2	684.5
7		50999	133932	7.54	86.9	7.94	0.391	20.68	684.6
7	2.50	50999	133950	7.48	86.4	7.95	0.391	20.76	684.6
7	2.00	50999	134015	7.51	87.1	7.98	0.391	21.02	684.4
7	1.50	50999	134044	7.63	88.8	7.98	0.392	21.17	684.6
7	1.00	50999	134107	7.7	89.6	7.97	0.391	21.18	684.7
7	0.50	50999	134138	7.78	90.6	7.96	0.391	21.23	684.6
7	0.25	50999	134159	7.79	90.8	7.96	0.391	21.25	684.6
6	3.00	50999	135257	7.94	92	8.06	0.387	20.98	684.5
6	2.50	50999	135333	8.03	93.2	8.1	0.387	21.06	684.4
6	2.00	50999	135357	8.15	94.8	8.09	0.387	21.14	684.5
6	1.50	50999	135423	8.23	95.9	8.1	0.387	21.21	684.6
6	1.00	50999	135445	8.34	97.2	8.1	0.387	21.29	684.6
6	0.50	50999	135505	8.38	97.9	8.09	0.188	21.37	682.3

6	0.25	50999	135528	8.49	99.3	8.04	0.397	21.43	684.6
5	3.00	50999	140707	7.47	86.8	8.03	0.387	21.05	684.3
5	2.50	50999	140720	7.75	90.4	8.04	0.387	21.28	684.3
5	2.00	50999	140732	7.87	91.9	8.12	0.386	21.33	684.3
5	1.50	50999	140759	8.34	98.1	8.14	0.387	21.72	684.3
5	1.00	50999	140809	8.44	99.6	8.14	0.248	21.9	684.3
5	0.50	50999	140817	8.53	100.7	7.9	0.001	21.96	684.5
5	0.25	50999	142642	8.39	98.9	8.17	0.386	21.83	684.4
4	3.00	50999	142656	8.47	99.8	8.16	0.386	21.86	684.4
4	2.50	50999	142714	8.46	99.9	8.16	0.386	21.88	684.3
4	2.00	50999	142733	8.49	100.3	8.16	0.386	21.95	684.3
4	1.50	50999	142750	8.55	101.1	8.15	0.386	22	684.3
4	1.00	50999	142809	8.7	102.9	8.14	0.386	22.04	684.5
4	0.50	50999	142827	8.75	103.4	8.13	0.013	22.09	684.4
4	0.25	50999	144033	8.69	104.4	8.26	0.386	22.77	684.3
3	3.00	50999	144053	8.77	105.3	8.24	0.386	22.8	684.1
3	2.50	50999	144115	8.79	105.6	8.24	0.386	22.78	684.3
3	2.00	50999	144134	8.81	105.8	8.23	0.385	22.81	684.3
3	1.50	50999	144155	8.84	106.2	8.22	0.386	22.82	684.2
3	1.00	50999	144233	8.96	107.8	8.21	0.385	22.83	684.3
3	0.25	50999	144303	9.05	108.8	8.21	0.005	22.83	684.5
2	3.00	50999	145527	8.74	104.6	8.21	0.386	22.6	684.1
2	2.50	50999	145547	8.82	105.5	8.21	0.387	22.61	684.1
2	2.00	50999	145605	8.87	106.1	8.21	0.386	22.61	684.2
2	1.50	50999	145627	8.92	106.7	8.19	0.386	22.63	684.2
2	1.00	50999	145645	8.94	106.9	8.17	0.386	22.62	684
2	0.50	50999	145706	8.97	107.5	8.16	0.386	22.66	684.4
2	0.25	50999	145725	8.94	107.1	8.15	0.386	22.68	684.2
1	3.00	50999	153015	8.43	100.4	8.2	0.384	22.41	683.6
1	2.50	50999	153035	8.49	101.3	8.2	0.384	22.48	683.5
1	2.00	50999	153100	8.59	102.7	8.23	0.384	22.58	683.7
1	1.50	50999	153121	8.65	103.6	8.25	0.384	22.69	683.6
1	1.00	50999	153141	8.86	106.4	8.26	0.383	22.79	683.6
1	0.50	50999	153215	9.06	108.8	8.25	0.384	22.83	683.7
1	0.25	50999	153238	9.14	109.7	8.24	0.383	22.81	683.6
12	3.00	50999	154825	6.32	76.2	8.06	0.388	22.93	682.7
12	2.50	50999	154916	7.21	87.4	8.19	0.385	23.25	683.5
12	2.00	50999	154959	7.97	97.5	8.21	0.384	23.42	683.6
12	1.50	50999	155033	8.32	101.5	8.31	0.383	23.69	682.3
12	1.00	50999	155112	8.8	108.3	8.33	0.383	23.88	683.4
12	0.50	50999	155132	9.03	110.8	8.35	0.384	23.95	683.4
12	0.25	50999	155156	9.2	114.8	8.23	0.382	24.74	683.5

May 27, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	52799	131939	8.22	101.3	8.16	0.349	24.18	690.1
11	2.00	52799	132027	8.27	101.9	8.16	0.347	24.2	690.3
11	1.00	52799	132105	8.35	102.9	8.16	0.344	24.22	689
11	0.50	52799	132207	8.53	105.3	8.13	0.338	24.25	690
11	0.25	52799	132315	8.66	106.9	8.11	0.335	24.29	690
9	3.00	52799	134731	3.75	45.8	7.55	0.415	24.14	689.6
9	2.00	52799	134850	5.2	64.6	7.78	0.42	24.59	689.8
9	1.00	52799	134945	6.59	82.2	7.98	0.421	24.88	689.8
9	0.25	52799	135116	7.21	90.1	7.94	0.422	24.92	689.9
10	3.00	52799	140535	0.17	2.1	7.38	0.433	24.49	689.4
10	2.00	52799	140640	5.48	68	7.79	0.417	24.58	689.6
10	1.00	52799	140715	7.11	89.4	7.96	0.418	24.81	689.5
10	0.25	52799	140806	7.36	91.9	7.95	0.418	24.89	689.4
10	3.00	52799	141128	0.17	2.1	7.32	0.417	24.49	689.3
10	2.50	52799	141221	4.93	62	7.72	0.415	24.53	689.3
10	2.00	52799	141317	5.84	72.5	7.9	0.416	24.58	689.4
10	1.50	52799	141353	6.84	85.1	8	0.416	24.73	689.3
10	1.00	52799	141439	7.14	89.1	7.99	0.416	24.81	689.4
10	0.50	52799	141510	7.21	90	7.97	0.416	24.85	689.3
10	0.25	52799	141542	7.36	92.1	7.94	0.416	24.96	689.3
8	3.00	52799	143611	8.02	99.3	8.1	0.329	24.42	688.9
8	2.50	52799	143705	8.04	99.5	8.09	0.328	24.43	688.9
8	2.00	52799	143739	8.04	99.6	8.07	0.328	24.49	688.8
8	1.50	52799	143816	8.21	101.9	8.11	0.326	24.59	688.8
8	1.00	52799	143916	8.51	105.8	8.13	0.326	24.68	689.1
8	0.50	52799	143959	8.61	107.4	8.11	0.326	24.84	688.9
8	0.25	52799	144042	8.75	109.2	8.09	0.326	24.82	688.9
7	3.00	52799	145018	7.47	92.1	7.96	0.326	24.38	688.7
7	2.50	52799	145104	7.69	95.1	8.01	0.326	24.42	688.6
7	2.00	52799	145150	7.9	98	8.04	0.325	24.5	689
7	1.50	52799	145243	7.99	99.1	8	0.325	24.53	688.8
7	1.00	52799	145329	7.89	97.9	8	0.325	24.54	688.9
7	0.50	52799	145410	8.31	103.5	8.06	0.324	24.79	688.8
7	0.25	52799	145446	8.4	104.8	8.02	0.005	24.8	688.8
6	3.00	52799	151324	8.21	102.4	8.14	0.322	24.79	688.4
6	2.50	52799	151426	8.4	104.8	8.15	0.322	24.85	688.6
6	2.00	52799	151501	8.65	108	8.16	0.321	24.89	687.4
6	1.50	52799	151550	8.81	110.1	8.15	0.321	24.94	688.6
6	1.00	52799	151635	8.83	110.3	8.14	0.321	24.94	688.6
6	0.50	52799	151719	8.88	111.2	8.13	0.321	25.02	688.6
6	0.25	52799	151748	8.93	111.9	8.09	0.006	25.05	688.7
5	3.00	52799	152830	0.52	6.4	7.29	0.37	23.93	688.2

5	2.50	52799	152933	2.95	36.6	7.39	0.312	24.55	688.1
5	2.00	52799	153007	6.1	76.5	7.93	0.319	25.08	688.3
5	1.50	52799	153105	7.37	93	8.13	0.319	25.25	685.9
5	1.00	52799	153137	8.27	104.6	8.16	0.319	25.58	688.3
5	0.50	52799	153227	8.71	110.3	8.15	0.319	25.69	688.1
5	0.25	52799	153303	8.87	112.6	8.13	0.005	25.79	688.3
4	3.00	52799	154541	6.64	82.7	7.79	0.325	24.82	687.9
4	2.50	52799	154624	7.21	90.3	8.04	0.32	25	687.1
4	2.00	52799	154759	8	100.8	8.16	0.32	25.34	688
4	1.50	52799	154850	8.83	111.7	8.16	0.319	25.74	688.2
4	1.00	52799	154950	8.95	113.7	8.15	0.319	25.81	688.2
4	0.50	52799	155107	9.06	115.2	8.14	0.32	25.85	688.2
4	0.25	52799	155154	9.25	117.5	8.13	0.32	25.85	688
3	2.00	52799	160431	7.41	92.7	7.95	0.322	25.04	688
3	1.50	52799	160506	7.71	96.7	8.01	0.321	25.13	687.9
3	1.00	52799	160529	8.11	102.7	8.11	0.321	25.68	688.1
3	0.50	52799	160617	8.38	106.6	8.13	0.321	25.92	688.2
3	0.25	52799	160656	8.72	111.5	8.11	0.32	26.22	688.2
2	3.00	52799	161427	6.53	81.2	7.69	0.325	24.66	688.1
2	2.50	52799	161514	6.93	86.7	7.91	0.322	25.03	685.6
2	2.00	52799	161531	7.29	91.5	7.98	0.322	25.14	688.1
2	1.50	52799	161552	7.48	94	8.07	0.322	25.26	685.5
2	1.00	52799	161616	8	100.8	8.13	0.321	25.41	688
2	0.50	52799	161642	8.21	104.1	8.1	0.321	25.74	685.8
2	0.25	52799	161704	8.36	106.8	8.09	0.321	26.18	688.2
12	2.00	52799	164654 .		72.9	7.59	0.325	24.77	688.1
12	1.50	52799	164728 .		72.5	7.66	0.324	24.75	688.1
12	1.00	52799	164801 .		107.2	8.14	0.325	24.75	688.2
12	0.50	52799	164826 .		148.2	8.17	0.316	25.86	688.3
12	0.25	52799	164847 .		161.9	8.15	0.315	26.06	688.4

May 31, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
10	3.00	53099	144146	6.67	83.7	7.67	0.702	25.06	685.2
10	2.50	53099	144216	6.97	87.5	7.72	0.679	25.1	685.1
10	2.00	53099	144249	7.2	90.4	7.72	0.641	25.13	685.4
10	1.50	53099	144324	7.29	91.2	7.75	0.656	25.21	685.2
10	1.00	53099	144354	7.44	93.6	7.73	0.639	25.26	685.2
10	0.25	53099	144439	7.47	93.9	7.74	0.631	25.3	685.1
9	3.00	53099	150006	6.33	79.8	7.67	0.64	25.36	684
9	2.50	53099	150102	6.2	78.2	7.67	0.641	25.37	683.3
9	2.00	53099	150133	6.31	79.7	7.68	0.642	25.46	684.1
9	1.50	53099	150232	6.36	80.4	7.68	0.643	25.48	684
9	1.00	53099	150307	6.49	82	7.66	0.642	25.49	683.9
9	0.25	53099	150337	6.64	83.9	7.66	0.64	25.51	684
8	3.00	53099	152523	7.02	86.5	7.66	0.467	24.2	683.3
8	2.50	53099	152604	6.96	85.9	7.68	0.465	24.21	683.5
8	2.00	53099	152656	7.17	88.6	7.74	0.465	24.3	683.4
8	1.50	53099	152752	7.1	88.1	7.74	0.469	24.37	683.3
8	1.00	53099	152833	7.29	90.2	7.75	0.472	24.54	683.6
8	0.25	53099	152901	7.31	90.8	7.74	0.469	24.61	683.5
7	3.00	53099	153743	6.99	86.4	7.7	0.475	24.3	683.2
7	2.50	53099	153810	7.03	87	7.77	0.474	24.41	683.2
7	2.00	53099	153835	7.11	88	7.75	0.473	24.37	682.3
7	1.50	53099	153917	7.21	89.4	7.76	0.471	24.46	683.1
7	1.00	53099	153933	7.2	89.4	7.75	0.472	24.53	682.7
7	0.25	53099	153959	7.31	90.8	7.75	0.468	24.58	683.4
6	3.00	53099	155625	7.14	90.1	7.72	0.467	25.05	682.9
6	2.50	53099	155653	7.17	90.3	7.73	0.473	25.3	682.9
6	2.00	53099	155712	7.18	90.4	7.73	0.473	25.34	682.8
6	1.50	53099	155743	7.14	90.1	7.73	0.468	25.39	682.9
6	1.00	53099	155832	7.2	91	7.73	0.472	25.49	682.8
6	0.25	53099	155859	7.24	91.7	7.65	0.47	25.65	680.6
5	3.00	53099	161437	6.73	85.2	7.66	0.478	25.58	682.3
5	2.50	53099	161520	6.71	85.2	7.66	0.478	25.72	682.5
5	2.00	53099	161604	7.01	89.3	7.71	0.476	25.92	682.8
5	1.50	53099	161639	7.3	93.1	7.76	0.472	26.08	682.4
5	1.00	53099	161717	7.22	92.5	7.79	0.473	26.13	682.7
5	0.25	53099	161751	7.45	95.8	7.74	0.474	26.49	682.9
4	3.00	53099	163012	7.51	95.6	7.83	0.472	25.9	682.2
4	2.50	53099	163046	7.53	95.9	7.84	0.472	25.96	680
4	2.00	53099	163109	7.6	97	7.87	0.473	26.05	682.3
4	1.50	53099	163138	7.72	99	7.9	0.473	26.3	682.2
4	1.00	53099	163201	7.84	100.7	7.91	0.472	26.41	682.2
4	0.25	53099	163239	8.1	104.5	7.9	0.471	26.61	682.3
3	3.00	53099	164650	8.39	108.4	7.95	0.463	26.74	682.2
3	2.50	53099	164723	8.37	108.3	7.96	0.464	26.83	682.2

3	2.00	53099	164746	8.46	109.5	7.96	0.463	26.86	682.5
3	1.50	53099	164802	8.46	109.7	7.96	0.463	26.91	682.3
3	1.00	53099	164830	8.47	109.9	7.95	0.464	26.97	680
3	0.25	53099	164858	8.53	110.8	7.95	0.463	26.98	682.2
2	3.00	53099	170113	8.14	104.8	7.86	0.465	26.52	682.1
2	2.50	53099	170146	8.42	108.7	7.93	0.463	26.69	682
2	2.00	53099	170228	8.47	109.5	7.96	0.461	26.76	682.1
2	1.50	53099	170305	8.55	110.7	7.97	0.459	26.84	681.6
2	1.00	53099	170339	8.44	109.3	7.96	0.461	26.88	682.1
2	0.25	53099	170358	8.56	110.9	7.89	0.461	26.89	682.1
1	3.00	53099	173549	7.23	92.5	7.91	0.463	26.14	681.9
1	2.50	53099	173700	7.05	90.1	7.96	0.464	26.14	681.9
1	2.00	53099	173751	7.42	95.1	8.05	0.463	26.29	682
1	1.50	53099	173820	7.8	100.1	8.05	0.463	26.37	681.9
1	1.00	53099	173842	7.89	101.4	8.05	0.464	26.39	682
1	0.25	53099	173906	8.09	104.3	8.05	0.463	26.43	682
12	3.00	53099	175629	6.02	76.6	7.75	0.441	25.91	681.5
12	2.50	53099	175711	7.14	91.3	8.06	0.437	26.2	681.6
12	2.00	53099	175802	8.07	104	8.1	0.432	26.62	681.7
12	1.50	53099	175905	8.22	106	8.09	0.433	26.62	681.7
12	1.00	53099	175958	8.36	108	8.18	0.443	26.74	681.5
12	0.25	53099	180034	8.72	113.5	8.18	0.439	27.16	681.6

June 16, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	61699	120742	8.36	107.5	8.03	0.566	27.34	687.6
11	2.50	61699	120835	8.53	109.7	8.05	0.565	27.38	687.3
11	2.00	61699	120931	8.72	112.3	8.08	0.565	27.43	687.3
11	1.50	61699	121053	9.2	118.6	8.12	0.564	27.51	687.2
11	1.00	61699	121153	9.5	123	8.12	0.563	27.75	687
11	0.25	61699	121312	8.72	115.4	8.01	0.565	29	687
10	3.00	61699	123331	6.65	86.6	7.88	0.718	27.33	685.7
10	2.50	61699	123400	7.06	90.9	7.88	0.717	27.36	686.2
10	2.00	61699	123434	7	90	7.89	0.717	27.38	686.4
10	1.50	61699	123531	7.02	90.6	7.96	0.718	27.54	685.9
10	1.00	61699	123602	7.3	94.4	7.96	0.718	27.62	686.4
10	0.25	61699	123628	7.74	100.4	7.97	0.716	27.76	686.5
9	3.00	61699	124807	7.34	94.6	7.92	0.72	27.46	683.6
9	2.50	61699	124831	7.62	98.4	7.95	0.719	27.58	686
9	2.00	61699	124847	7.48	96.8	7.96	0.719	27.63	686.1
9	1.50	61699	124904	7.61	98.6	7.97	0.72	27.76	686.1
9	1.00	61699	124919	7.81	101.8	7.92	0.717	28.09	685.9
9	0.25	61699	124947	7.78	102.4	7.91	0.717	28.58	686.1
8	3.00	61699	131759	8.76	113.2	8.04	0.564	27.63	685.3
8	2.50	61699	131823	8.96	115.9	8.07	0.563	27.66	685.3
8	2.00	61699	131846	9.09	117.8	8.17	0.562	27.79	683
8	1.50	61699	131951	9.86	128.3	8.14	0.56	28.03	685.4
8	1.00	61699	132020	9.22	121.9	8.09	0.566	28.89	685.5
8	0.25	61699	132040	9.06	120.5	8.03	0.565	29.29	685.5
7	3.00	61699	132411	8.47	109.3	8.02	0.564	27.6	685.4
7	2.50	61699	132449	8.68	112.2	8.1	0.562	27.66	685.7
7	2.00	61699	132520	9.16	118.6	8.13	0.561	27.77	685.6
7	1.50	61699	132605	9.64	125.7	8.15	0.561	27.96	685.7
7	1.00	61699	132630	9.6	126.4	8.15	0.56	28.66	685.3
7	0.25	61699	132700	8.99	120	8.06	0.563	29.46	685.8
6	3.00	61699	134203	6.92	89.2	7.74	0.571	27.46	685.6
6	2.50	61699	134246	7.54	97.4	7.91	0.567	27.56	685.9
6	2.00	61699	134336	8.28	107	7.96	0.564	27.61	685.6
6	1.50	61699	134428	8.89	115	8.09	0.562	27.72	686
6	1.00	61699	134520	9.53	124.8	8.16	0.561	28.09	685.5
6	0.25	61699	134555	9.2	122	8.1	0.563	28.71	685.7
5	3.00	61699	134616	9.35	124.1	8.07	0.562	29.14	685.7
5	2.50	61699	135813	6.52	84.3	7.7	0.572	27.66	685.3
5	2.00	61699	135847	6.77	87.6	7.8	0.571	27.69	685.3
5	1.50	61699	135926	7.77	100.7	8.02	0.565	27.92	685.3
5	1.00	61699	140003	9.01	117.4	8.11	0.562	28.35	685.3
5	0.50	61699	140026	9.18	121.9	8.08	0.563	29.11	685.3
5	0.25	61699	140048	9.03	120.7	8.06	0.56	29.54	685.3

4	3.00	61699	141317	8.2	106.3	7.93	0.561	27.76	685.1
4	2.50	61699	141335	8.31	108.4	7.95	0.558	27.84	685.4
4	2.00	61699	141354	8.49	110.3	7.98	0.558	27.94	685.2
4	1.50	61699	141423	9.47	123.6	8.15	0.553	28.2	685.3
4	1.00	61699	141441	9.77	128.6	8.08	0.556	28.64	685.4
4	0.25	61699	141504	9.17	124.3	8.02	0.557	30.34	685.2
3	3.00	61699	143431	8.39	109	8.05	0.562	27.89	685.2
3	2.50	61699	143502	9.57	124.3	8.1	0.56	27.92	682.7
3	2.00	61699	143526	9.9	129.2	8.16	0.556	28.21	683
3	1.50	61699	143555	10.05	132.7	8.1	0.555	28.86	685.1
3	1.00	61699	143649	9.74	131.2	8.06	0.558	29.99	685.2
3	0.25	61699	143706	9.67	131	8.05	0.558	30.32	685.4
2	3.00	61699	144800	7.75	100.4	8.02	0.563	27.78	682.6
2	2.50	61699	144819	8.56	111	8.1	0.562	27.82	685.2
2	2.00	61699	144840	9.15	119.8	8.16	0.56	28	685.2
2	1.50	61699	144924	9.75	127.9	8.16	0.558	28.49	685.2
2	1.00	61699	144947	9.65	126.7	8.09	0.559	29.04	685.2
2	0.25	61699	145007	9.52	128	8.03	0.005	29.95	684.3
1	3.00	61699	152704	6.68	86.3	7.98	0.573	27.84	684.6
1	2.50	61699	152731	7.16	92.6	8.01	0.573	27.87	684.7
1	2.00	61699	152747	6.68	86.9	8.01	0.574	27.98	684.7
1	1.50	61699	152820	7.7	100.6	8.13	0.569	28.24	684.5
1	1.00	61699	152859	9.37	123.7	8.45	0.565	28.8	684.5

Site	Depth	Date	Time	DO	DO%	pH	SpCond	Temp	BPS
	Meters	MMDDYY	HHMMSS	mg/l	Sun	Units	mS/cm	C	mmHg
0.6256	1.62	61699	151013	8.91	117.5	8.093	0.506	28.767	684.33
0.4634	1.62	61699	151489	8.922	117.7	8.095	0.504	28.785	684.29
0.3012	1.61	61699	151965	8.934	117.9	8.097	0.501	28.803	684.26
0.1389	1.61	61699	152441	8.946	118.1	8.098	0.499	28.821	684.23
-0.0233	1.61	61699	152917	8.958	118.3	8.1	0.497	28.839	684.19

June 18, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	61899	115105	8.83	112.9	8.02	0.379	27.09	691.6
11	2.50	61899	115157	8.8	112.5	8.01	0.373	27.11	691.5
11	2.00	61899	115235	8.84	113.1	8	0.37	27.13	691.4
11	1.50	61899	115309	8.82	113	7.99	0.36	27.2	691.5
11	1.00	61899	115333	8.83	113.3	7.97	0.366	27.22	691.4
11	0.50	61899	115358	8.83	113.2	7.97	0.357	27.21	690.8
11	0.25	61899	115443	8.86	113.6	7.96	0.365	27.24	691.4
10	3.00	61899	121631	5.61	71.6	7.57	0.459	26.93	690.3
10	2.50	61899	121704	5.5	70.2	7.6	0.459	26.94	690.1
10	2.00	61899	121730	5.57	71.7	7.61	0.46	26.95	690.4
10	1.50	61899	121758	5.89	75.2	7.68	0.46	26.97	690.1
10	1.00	61899	121832	6.17	78.9	7.65	0.46	27.02	690.4
10	0.50	61899	121900	6.26	79.5	7.68	0.459	27.12	689.4
10	0.25	61899	121954	6.1	77.8	7.67	0.459	27.15	690.5
9	3.00	61899	122837	6.57	84.5	7.79	0.454	27	687.6
9	2.50	61899	122936	6.21	79.4	7.81	0.454	27.09	690
9	2.00	61899	123020	6.44	82.7	7.82	0.455	27.29	689.9
9	1.50	61899	123053	6.7	86	7.83	0.456	27.3	689.7
9	1.00	61899	123136	6.55	84.3	7.82	0.456	27.35	690.1
9	0.50	61899	123208	6.67	85.9	7.8	0.456	27.38	690.2
9	0.25	61899	123243	6.73	86.6	7.79	0.456	27.4	690.1
8	3.00	61899	125645	6.91	87.9	7.57	0.357	26.8	690.2
8	2.50	61899	125741	6.49	82.6	7.57	0.356	26.82	690.2
8	2.00	61899	125820	6.81	86.9	7.67	0.354	26.92	690.3
8	1.50	61899	125851	7.04	89.3	7.74	0.352	26.93	690.3
8	1.00	61899	125907	7.29	93.2	7.87	0.349	27.12	690.3
8	0.50	61899	125935	7.93	102.3	7.82	0.348	27.48	690.4
8	0.25	61899	130008	7.85	101.4	7.73	0.008	27.62	690.4
7	3.00	61899	130829	6.71	85.5	7.56	0.349	26.9	689.9
7	2.50	61899	130854	6.5	82.9	7.55	0.348	26.93	690.2
7	2.00	61899	130946	6.67	85.2	7.61	0.346	27	688.9
7	1.50	61899	131047	6.85	87.5	7.73	0.345	27.08	690
7	1.00	61899	131127	7.55	96.8	7.93	0.341	27.18	690
7	0.50	61899	131209	8.59	110.5	7.96	0.34	27.41	689.9
7	0.25	61899	131239	8.34	108	7.91	0.34	27.79	687.4
6	3.00	61899	132025	7.03	89.8	7.69	0.342	27.09	689.7
6	2.50	61899	132047	6.92	88.5	7.7	0.342	27.11	689.6
6	2.00	61899	132121	6.72	86	7.69	0.342	27.12	689.7
6	1.50	61899	132149	6.75	86.5	7.68	0.342	27.12	687.3
6	1.00	61899	132232	6.84	87.8	7.74	0.342	27.17	689.7
6	0.50	61899	132305	7.23	92.9	7.77	0.341	27.34	689.7
6	0.25	61899	132338	7.55	97	7.77	0.003	27.44	687.1
5	3.00	61899	133511	6.77	86.8	7.62	0.341	27.21	689.5
5	2.50	61899	133602	6.88	88.2	7.72	0.34	27.27	689.7

5	2.00	61899	133639	7.26	93.2	7.86	0.339	27.39	689.6
5	1.50	61899	133704	7.26	93.6	7.88	0.338	27.52	689.4
5	1.00	61899	133749	7.86	101.8	7.99	0.338	27.78	689.6
5	0.50	61899	133819	8.36	108.7	7.97	0.338	27.9	689.8
5	0.25	61899	133850	8.44	110.1	7.88	0.003	28.39	689.6
4	3.00	61899	135101	7.97	102.4	7.91	0.337	27.5	689.4
4	2.50	61899	135125	7.72	99.4	7.91	0.337	27.51	689.4
4	2.00	61899	135157	7.71	99.4	7.92	0.337	27.52	689.3
4	1.50	61899	135225	7.87	101.5	7.93	0.336	27.57	689.3
4	1.00	61899	135248	7.92	102.2	7.95	0.336	27.59	689.4
4	0.50	61899	135314	8.04	104.4	7.96	0.337	27.94	689.4
4	0.25	61899	135341	8.37	108.1	7.78	0.002	28.26	689.4
3	3.00	61899	140639	8.22	105.4	8.01	0.338	27.25	689.3
3	2.50	61899	140706	8.28	106.2	8.02	0.339	27.26	689.3
3	2.00	61899	140734	8.04	103.4	8.01	0.338	27.39	689.2
3	1.50	61899	140809	8.01	104.2	8.01	0.339	27.55	689.2
3	1.00	61899	140844	8.11	105.1	8	0.337	27.86	689.4
3	0.50	61899	140920	7.9	103.4	7.98	0.337	27.9	689.3
3	0.25	61899	140942	8.1	104.6	7.98	0.337	27.92	689.4
		61899							
2	3.00	61899	142433	6.38	81.6	7.74	0.34	27.11	689.2
2	2.50	61899	142516	6.54	83.8	7.76	0.338	27.24	689.2
2	2.00	61899	142543	6.61	84.8	7.79	0.338	27.3	689.1
2	1.50	61899	142613	6.83	87.9	7.84	0.337	27.42	689.3
2	1.00	61899	142633	7.06	91.1	7.86	0.337	27.55	689.1
2	0.50	61899	142654	7.24	93.5	7.86	0.337	27.68	689.3
2	0.25	61899	142719	7.22	93.8	7.84	0.337	27.81	689.1
1	3.00	61899	145745	7.26	93.9	8.11	0.336	27.69	688.4
1	2.50	61899	145823	7	90.5	8.12	0.337	27.76	689.3
1	2.00	61899	145901	7.84	101.9	8.23	0.336	27.97	689.3
1	1.50	61899	145928	8.45	110.2	8.3	0.335	28.15	687.1
1	1.00	61899	145953	8.72	114	8.32	0.335	28.31	689.4
1	0.50	61899	150021	8.82	115.4	8.32	0.335	28.39	689.2
1	0.25	61899	150051	9.01	118	8.17	0.008	28.42	689.5
12	2.50	61899	151732	5.88	74	7.77	0.345	26.23	689.4
12	2.00	61899	151800	6.15	77.7	7.91	0.344	26.4	689.5
12	1.50	61899	151828	6.87	87.3	8.02	0.343	26.71	689.5
12	1.00	61899	151912	7.78	100.3	8.14	0.343	27.48	689.4
12	0.50	61899	151942	8.1	105.4	8.2	0.342	28.01	689.5
12	0.25	61899	152054	8.71	114.7	8.19	0.342	28.62	689.5

June 24, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	62499	143133	8.19	105	8.01	0.545	27.18	683.6
11	2.50	62499	143241	8.03	102.8	8	0.544	27.14	684.5
11	2.00	62499	143350	8.12	104.1	8.02	0.543	27.22	684.4
11	1.50	62499	143453	8.15	104.5	7.99	0.543	27.19	684.5
11	1.00	62499	143740	8.04	103.1	7.99	0.543	27.2	684.3
11	0.25	62499	143851	8.13	104.3	8	0.543	27.24	684.3
10	3.00	62499	145957	7.02	90.2	7.87	0.68	27.28	684.1
10	2.50	62499	150226	7.15	91.8	7.87	0.679	27.27	684.1
10	2.00	62499	150348	7.18	92.4	7.88	0.68	27.32	684.1
10	1.50	62499	150407	7.13	91.7	7.87	0.679	27.31	683.7
10	1.00	62499	150435	7.33	94.3	7.88	0.679	27.37	684.1
10	0.25	62499	150507	7.48	96.2	7.86	0.679	27.38	684
9	3.00	62499	151312	7.47	96.3	7.91	0.683	27.46	683.6
9	2.50	62499	151434	7.05	90.9	7.92	0.683	27.47	683.6
9	2.00	62499	151635	7.31	94.2	7.92	0.682	27.5	683.6
9	1.50	62499	151814	7.45	96.3	7.92	0.682	27.57	682.7
9	1.00	62499	151845	7.68	99.2	7.92	0.682	27.59	683.5
9	0.25	62499	151911	7.7	99.5	7.91	0.682	27.58	683.5
8	3.00	62499	154345	6.71	85.3	7.78	0.555	26.76	682.5
8	2.50	62499	154427	6.86	87.4	7.83	0.555	26.9	680.9
8	2.00	62499	154503	6.98	89.2	7.84	0.555	27	683.4
8	1.50	62499	154547	7.04	89.9	7.84	0.555	26.97	683.1
8	1.00	62499	154714	6.88	87.9	7.79	0.556	26.97	683.7
8	0.25	62499	154752	6.91	88.3	7.77	0.024	27	683.6
7	3.00	62499	155244	6.64	84.1	7.72	0.556	26.69	683.2
7	2.50	62499	155338	6.39	81.2	7.71	0.557	26.73	683.4
7	2.00	62499	155426	6.33	80.5	7.68	0.557	26.81	683.4
7	1.50	62499	155512	6.35	80.9	7.68	0.557	26.83	683.5
7	1.00	62499	155603	6.51	82.9	7.67	0.557	26.81	683.6
7	0.25	62499	155707	6.53	83.2	7.66	0.557	26.81	683.4
6	3.00	62499	161313	6.37	81	7.81	0.544	26.78	683.6
6	2.50	62499	161344	6.62	84.3	7.83	0.543	26.85	683.5
6	2.00	62499	161448	7.05	90	7.88	0.542	26.96	683.6
6	1.50	62499	161552	7.01	89.5	7.89	0.541	26.99	682.6
6	1.00	62499	161626	7.09	90.6	7.89	0.541	27	683.5
6	0.25	62499	161655	7.27	92.9	7.88	0.541	27.02	683.2
5	3.00	62499	163053	5.12	65.4	7.59	0.538	26.95	683.5
5	2.50	62499	163143	5.32	68	7.67	0.537	27.02	683.5
5	2.00	62499	163243	5.62	71.9	7.66	0.536	27.05	683.6
5	1.50	62499	163328	5.99	76.7	7.79	0.536	27.19	683.5
5	1.00	62499	163416	6.33	81.4	7.83	0.535	27.38	683.5
5	0.50	62499	163535	7.3	94.5	7.95	0.535	27.71	683.6

5	0.25	62499	165016	6.26	80.2	7.82	0.532	27.15	683.7
4	3.00	62499	165131	6.25	80.1	7.88	0.532	27.21	683.7
4	2.50	62499	165211	6.88	88.2	8.01	0.53	27.18	683.6
4	2.00	62499	165247	7.37	94.9	8.04	0.53	27.46	682.5
4	1.50	62499	165317	7.8	100.6	8.05	0.528	27.55	683.6
4	1.00	62499	165405	8.28	106.8	8.15	0.525	27.82	683.6
4	0.25	62499	170936	8.5	111.8	8.21	0.523	28.6	683.6
3	3.00	62499	171022	8.43	110.9	8.23	0.524	28.65	683.7
3	2.50	62499	171126	8.23	108.4	8.22	0.524	28.67	683.7
3	2.00	62499	171242	8.77	115.4	8.2	0.524	28.67	681.2
3	1.50	62499	171333	8.52	111.4	8.19	0.524	28.68	683.6
3	1.00	62499	171402	8.95	117.9	8.2	0.524	28.68	683.6
3	0.25	62499	172354	8.25	108.2	8.19	0.527	28.51	683.6
2	3.00	62499	172431	8.32	109.3	8.19	0.527	28.52	683.6
2	2.50	62499	172543	8.22	108	8.18	0.527	28.54	683.3
2	2.00	62499	172713	8.2	107.9	8.19	0.527	28.63	683.3
2	1.50	62499	172744	8.35	109.9	8.19	0.527	28.7	683.6
2	1.00	62499	172812	8.84	116.5	8.2	0.526	28.79	683.5
2	0.25	62499	175220	5.71	73.4	7.88	0.544	27.32	683.4
1	3.00	62499	175324	5.77	74.1	7.89	0.544	27.33	683.6
1	2.50	62499	175439	5.81	74.8	7.89	0.544	27.41	683.5
1	2.00	62499	175520	6.84	88.2	7.98	0.543	27.51	683.6
1	1.50	62499	175700	7.83	101.4	8.08	0.541	27.79	683.5
1	1.00	62499	175719	9.46	124.1	8.36	0.534	28.52	683.4
1	0.50	62499	180919	6.53	85.5	7.98	0.542	28.44	683
1	0.25	62499	180950	6.93	90.9	8.01	0.542	28.49	683.2
12	1.50	62499	181019	7.71	101.7	8.16	0.54	28.76	683.1
12	1.00	62499	181045	7.96	105.1	8.21	0.539	28.85	682.9
12		62499	181115	8.33	110.2	8.23	0.539	28.96	683.2
12	0.25	62499	181149	8.91	117.8	8.25	0.538	28.96	683.1

June 30, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	63099	113248	8.32	107.2	8.06	0.34	27.53	684.1
11	2.50	63099	113331	8.1	104.6	8.04	0.34	27.5	683.7
11	2.00	63099	113406	8.22	105.9	8.02	0.34	27.52	683.9
11	1.50	63099	113417	8.21	106.5	8.02	0.34	27.52	684
11	1.00	63099	113449	8.17	105.2	8.01	0.34	27.5	682.8
11	0.50	63099	113515	8.17	105.4	8.01	0.339	27.54	683.7
11	0.25	63099	113551	8.23	105.9	7.99	0.339	27.54	683.9
10	3.00	63099	120122	7.03	90.9	7.91	0.419	27.7	683.2
10	2.50	63099	120148	7.36	95.4	7.9	0.419	27.69	683.4
10	2.00	63099	120225	7.22	93.3	7.9	0.419	27.72	683.5
10	1.50	63099	120316	7.03	91	7.92	0.419	27.8	683.4
10	1.00	63099	120405	7.73	100.4	7.97	0.419	27.89	683.5
10	0.50	63099	120505	7.89	102.5	7.98	0.419	27.98	683.6
10	0.25	63099	120524	7.88	102.5	7.98	0.419	27.98	683.2
10	0.25	63099	120614	7.99	103.9	7.96	0.419	28.01	683.3
9	3.00	63099	121847	7.42	96.5	7.96	0.419	28.03	682.7
9	2.50	63099	121933	7.61	99.1	7.97	0.419	28.11	682.6
9	2.00	63099	121958	7.77	101.8	7.99	0.42	28.3	682.9
9	1.50	63099	122052	8.01	104.7	7.99	0.42	28.31	682.7
9	1.00	63099	122146	7.5	98.1	7.99	0.42	28.35	682.6
9	0.50	63099	122229	8.18	107.2	7.98	0.42	28.39	682.6
9	0.25	63099	122255	8.22	107.7	7.98	0.42	28.44	682.7
8	3.00	63099	124256	5.93	75.7	7.59	0.341	27.01	682.3
8	2.50	63099	124311	5.95	76	7.6	0.341	27.01	682.3
8	2.00	63099	124338	6.01	76.7	7.67	0.341	27.03	680
8	1.50	63099	124410	6.26	80.1	7.67	0.34	27.07	682.1
8	1.00	63099	124447	6.39	81.8	7.7	0.34	27.1	682.2
8	0.50	63099	124541	6.66	85.3	7.75	0.34	27.18	682.3
8	0.25	63099	124612	6.81	87.6	7.75	0.34	27.39	682.2
8	0.25	63099	124650	6.96	89.6	7.76	0.339	27.44	682.3
7	3.00	63099	125204	6.38	81.5	7.66	0.34	27.01	681.9
7	2.50	63099	125215	6.33	80.9	7.65	0.34	27.02	681.8
7	2.00	63099	125256	6.48	82.8	7.73	0.339	27.06	679.4
7	1.50	63099	125325	6.61	84.5	7.72	0.339	27.09	682
7	1.00	63099	125352	6.63	85	7.74	0.34	27.17	681.8
7	0.50	63099	125416	6.63	85.1	7.73	0.34	27.31	681.9
7	0.25	63099	125428	6.7	85.9	7.71	0.34	27.37	681.8
7	0.25	63099	125453	6.74	86.6	7.71	0.339	27.39	681.8
6	3.00	63099	130352	6.92	88.8	7.77	0.339	27.3	681.5
6	2.50	63099	130421	7.08	91.2	7.86	0.337	27.36	681.5
6	2.00	63099	130455	7.44	96	7.89	0.336	27.62	681
6	1.50	63099	130518	7.48	96.7	7.9	0.336	27.68	681
6	1.00	63099	130543	7.71	99.8	7.91	0.336	27.73	681.5
6	0.50	63099	130624	7.65	98.9	7.91	0.336	27.74	681.5

6	0.25	63099	130643	7.74	100.2	7.91	0.336	27.74	681.6
5	3.00	63099	131754	7.09	91.7	7.85	0.332	27.7	681.1
5	2.50	63099	131831	7.24	93.6	7.88	0.332	27.73	680.9
5	2.00	63099	131853	7.28	94.3	7.99	0.331	27.77	681.1
5	1.50	63099	131920	7.8	101.2	8.01	0.331	27.89	681.1
5	1.00	63099	132006	8.11	105.4	8.01	0.33	28	681.1
5	0.50	63099	132120	8.17	106.5	8	0.33	28.03	681.2
5	0.25	63099	132226	8.02	104.4	7.99	0.33	28.04	681.2
4	3.00	63099	133421	8.24	107.3	8.07	0.328	28.08	678.7
4	2.50	63099	133502	8.25	107.7	8.08	0.329	28.21	681.6
4	2.00	63099	133526	8.14	106.3	8.09	0.328	28.27	681.5
4	1.50	63099	133600	8.33	108.8	8.09	0.328	28.28	681.4
4	1.00	63099	133708	8.43	110.1	8.07	0.328	28.28	681.6
4	0.50	63099	133740	8.46	110.6	8.07	0.329	28.3	681.5
4	0.25	63099	133817	8.53	111.5	8.05	0.328	28.28	681.5
3	3.00	63099	135036	8.18	108.1	8.03	0.321	28.98	681.2
3	2.50	63099	135043	8.26	109.2	8.02	0.321	28.98	680.6
3	2.00	63099	135052	8.36	110.6	8.03	0.321	28.97	681.4
3	1.50	63099	135056	8.25	109.1	8.03	0.321	28.97	681.5
3	1.00	63099	135109	8.39	111	8.03	0.321	28.98	681.7
3	0.50	63099	135138	8.24	108.9	8.03	0.321	28.98	681.6
3	0.25	63099	135209	8.19	108.4	8.04	0.321	29.01	681.5
		63099	135244	8.32	110.1	8.04	0.321	29.03	681.4
		63099	135331	8.42	111.6	8.05	0.321	29.12	681.4
		63099	135410	8.48	112.7	8.04	0.321	29.13	681.5
		63099	135447	8.43	111.7	8.04	0.321	29.13	681.3
2	3.00	63099	140437	8.42	111.6	8.01	0.32	29.13	680.8
2	2.50	63099	140533	8.25	109.4	8.03	0.32	29.14	680.9
2	2.00	63099	140557	8.25	108.6	7.99	0.32	29.12	681.1
2	1.50	63099	140636	8.28	109.8	8.01	0.32	29.14	680.9
2	1.00	63099	140708	8.34	110.6	8.02	0.32	29.14	680.9
2	0.50	63099	140738	8.43	111.7	8.01	0.321	29.14	680.9
2	0.25	63099	140828	8.39	111.2	8.02	0.32	29.14	680.9
1	3.00	63099	144338	7.83	102.7	8.1	0.335	28.55	680.7
1	2.50	63099	144420	7.94	104.2	8.1	0.336	28.56	680.9
1	2.00	63099	144504	8.23	108.6	8.11	0.335	28.6	680.7
1	1.50	63099	144549	7.89	103	8.1	0.335	28.6	680.7
1	1.00	63099	144632	8.1	106.5	8.1	0.335	28.62	680.5
1	0.50	63099	144700	8.07	106.1	8.1	0.335	28.62	680.6
1	0.25	63099	144731	8.13	106.9	8.1	0.335	28.63	680.7
12	3.00	63099	150319	4.39	57.9	7.61	0.339	28.84	680.2
12	2.50	63099	150347	4.59	60.6	7.62	0.338	28.88	678
12	2.00	63099	150420	5.32	70.3	7.74	0.338	28.89	680.4
12	1.50	63099	150501	6.07	80.3	7.84	0.337	28.98	680.2
12	1.00	63099	150536	6.88	91.6	7.97	0.336	29.23	680.3
12	0.50	63099	150554	7.07	94.1	7.99	0.336	29.31	680.3
12	0.25	63099	150610	7.17	95.2	7.98	0.336	29.27	680.3

July 6, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	70699	150551	8.18	106.4	8.18	0.346	28.04	689.4
11	2.50	70699	150719	8.29	107.8	8.18	0.344	28.07	689.5
11	2.00	70699	150731	8.39	109.1	8.18	0.344	28.07	689.5
11	1.50	70699	151108	8.99	117.2	8.23	0.343	28.17	689.1
11	1.00	70699	151215	9.7	126.8	8.3	0.341	28.34	689.1
11	0.50	70699	151410	10.12	133.5	8.28	0.34	28.83	688.8
11	0.25	70699	151535	9.39	128.9	8.21	0.344	31.14	688.6
10	3.00	70699	153424	7.21	93.3	7.98	0.417	28.03	687.4
10	2.50	70699	153509	7.97	103.8	8.08	0.416	28.09	687.5
10	2.00	70699	153654	8.21	107	8.09	0.415	28.13	687.4
10	1.50	70699	154014	9.36	122.3	8.24	0.415	28.32	687.3
10	1.00	70699	154138	9.85	133.8	8.16	0.414	30.54	687.7
10	0.25	70699	154233	9.29	129	8.11	0.415	31.83	687.4
10	3.00	70699	155006	7.04	91.6	7.96	0.414	28.02	687.4
9	2.50	70699	155134	7.81	102	8.12	0.415	28.17	687.8
9	2.00	70699	155231	8.42	110.6	8.17	0.415	28.56	687.5
9	1.50	70699	155414	9.41	125.2	8.21	0.416	29.3	687.8
9	1.00	70699	155536	10.21	136.8	8.11	0.42	29.69	687.8
9	0.25	70699	155647	9.67	131.7	8.1	0.415	30.68	687.4
8	3.00	70699	162154	9.27	123.2	8.21	0.334	29.25	687.3
8	2.50	70699	162307	9.3	124.5	8.2	0.335	29.69	687.6
8	2.00	70699	162413	9.3	125.9	8.19	0.335	30.31	687.6
8	1.50	70699	162540	9.06	123.2	8.17	0.335	30.57	687.5
8	1.00	70699	162717	8.91	121.6	8.16	0.335	30.77	687.4
8	0.25	70699	162818	8.96	122.4	8.13	0.335	30.9	687
7	3.00	70699	163304	9.13	122.5	8.22	0.334	29.83	686.2
7	2.50	70699	163355	9.29	125.9	8.21	0.335	30.37	687.1
7	2.00	70699	163539	9.19	124.7	8.21	0.334	30.47	687.3
7	1.50	70699	163659	9	122.6	8.2	0.334	30.69	687.3
7	1.00	70699	163834	9.02	123.1	8.16	0.334	30.82	687.3
7	0.25	70699	163925	8.78	120.2	8.16	0.334	30.93	684.7
6	3.00	70699	165542	9.33	122.3	8.13	0.329	28.48	687
6	2.50	70699	165714	9.91	130.2	8.23	0.327	28.6	687.2
6	2.00	70699	165752	10.2	134.8	8.27	0.326	28.93	687.1
6		70699							
6	1.50	70699	165909	10.18	135.3	8.22	0.33	29.35	687
6	1.00	70699	165953	9.46	129.6	8.17	0.329	31.05	687.4
6	0.25	70699	170029	9.46	130.3	8.09	0.328	31.33	687
5	3.00	70699	170919	7.38	97.1	8.02	0.331	28.69	687.2
5	2.50	70699	171001	8.23	108.4	8.13	0.329	28.76	687.3
5	2.00	70699	171038	8.7	114.7	8.16	0.329	28.82	687.2
5	1.50	70699	171144	8.92	119.2	8.21	0.33	29.58	687.1
5	1.00	70699	171302	8.92	121.2	8.21	0.327	30.54	687.1

5	0.25	70699	171333	9.14	126.2	8.13	0.327	31.51	687.2
4	3.00	70699	172335	7.94	104.4	7.98	0.331	28.63	684.4
4	2.50	70699	172352	7.9	104	8.15	0.328	28.68	687.2
4	2.00	70699	172423	8.9	117.6	8.21	0.327	29.21	687
4	1.50	70699	172522	9.86	134.7	8.19	0.324	30.86	687.1
4	1.00	70699	172548	9.55	131.5	8.17	0.324	31.61	687.1
4	0.25	70699	172643	9.22	128.7	8.11	0.002	32.08	687
3	3.00	70699	173908	6.19	81.4	7.74	0.329	28.69	686.7
3	2.50	70699	173955	6.12	80.6	7.71	0.329	28.79	684.1
3	2.00	70699	174050	7.18	94.9	7.99	0.328	28.96	686.5
3	1.50	70699	174156	8	105.9	8.24	0.323	29.19	686.7
3	1.00	70699							
3	0.50	70699	174352	9.36	131.4	8.14	0.322	32.43	686.3
3	0.25	70699	174414	9.14	130.8	8.12	0.322	33.62	686.8
2	3.00	70699	175103	5.69	75	7.65	0.33	28.8	686.5
2	2.50	70699	175143	6.45	85.2	7.81	0.328	28.97	686.6
2	2.00	70699	175233	6.51	86.1	7.89	0.325	29	686.3
2	1.50	70699	175316	8.01	106	8.21	0.323	29.21	686.4
2	1.00	70699	175349	9.54	129.9	8.24	0.312	30.7	686.5
2	0.25	70699	175448	10.53	149.3	8.18	0.313	33.06	686.5
1	3.00	70699	182806	5.86	77.7	7.98	0.34	29.12	686
1	2.50	70699	182836	6.85	91.1	8.03	0.338	29.31	686.2
1	2.00	70699	182904	7.82	104.3	8.14	0.337	29.51	685.2
1	1.50	70699	182948	9.63	131.1	8.41	0.333	30.66	685.8
1	1.00	70699	183025	11.04	152	8.38	0.333	31.57	686.4
1	0.25	70699	183109	10.95	154.7	8.36	0.333	32.84	685.8
12	3.00	70699	184556	3.77	50.1	7.67	0.342	29.21	686.1
12	2.50	70699	184637	4.53	60.5	7.94	0.341	29.57	686.4
12	2.00	70699	184720	5.93	79.8	7.99	0.338	30	686.2
12	1.50	70699	184800	10.19	142.5	8.34	0.323	31.83	686.4
12	1.00	70699	184852	11.55	163.3	8.32	0.321	32.91	686.3
12	0.25	70699	184928	10.78	155.9	8.29	0.325	34.26	686.3
********13		70699	133243	4.41	59.4	7.7	0.391	30.02	685.6

July 19, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	71999	113709	7.8	102.2	7.95	0.329	28.46	691.4
11	2.50	71999	113741	8.08	107	8.03	0.329	28.63	691.2
11	2.00	71999	113826	8.14	107.2	8.07	0.328	28.71	691.5
11	1.50	71999	113858	8.5	112.2	8.07	0.327	28.93	691.4
11	1.00	71999	113922	8.59	113.5	8.05	0.327	28.93	691.1
11	0.25	71999	113948	8.67	114.8	8.04	0.327	29.08	691.2
10	3.00	71999	120501	6.46	84	7.77	0.387	28.41	690
10	2.50	71999	120532	6.86	89.6	7.8	0.387	28.52	690.1
10	2.00	71999	120604	7.34	96.5	7.87	0.387	28.6	690.1
10	1.50	71999	120644	7.74	102.3	8	0.388	28.91	690
10	1.00	71999	120722	8.09	107.2	8	0.388	29.07	690
10	0.25	71999	120754	8.22	109.1	7.99	0.388	29.15	690
9	3.00	71999	121426	6.46	85.3	7.86	0.391	28.83	687.9
9	2.50	71999	121543	6.75	89.2	7.86	0.392	28.99	689.5
9	2.00	71999	121623	6.93	92	7.91	0.391	29.13	689.8
9	1.50	71999	121703	7.98	106.4	7.99	0.389	29.46	689.5
9	1.00	71999	121745	8.07	107.9	7.97	0.389	29.63	689.9
9	0.25	71999	121802	8.2	109.7	7.96	0.389	29.63	689.7
8	3.00	71999	124257	5.69	74.1	7.67	0.327	28.08	689.5
8	2.50	71999	124337	6.25	81.6	7.75	0.327	28.19	689.4
8	2.00	71999	124418	6.86	89.7	7.83	0.326	28.32	689.5
8	1.50	71999	124459	7.5	98.6	7.89	0.326	28.64	688.1
8	1.00	71999	124542	7.56	99.7	7.87	0.326	28.87	689.6
8	0.25	71999	124623	7.59	100.3	7.86	0.325	28.9	689.3
7	3.00	71999	125101	5.52	72.1	7.57	0.326	28.14	686.9
7	2.50	71999	125144	5.79	75.5	7.61	0.325	28.17	689.4
7	2.00	71999	125234	6.48	84.6	7.73	0.325	28.25	689.6
7	1.50	71999	125324	7.08	93.1	7.84	0.325	28.53	689.6
7	1.00	71999	125352	7.16	94.1	7.84	0.325	28.6	689.1
7	0.25	71999	125423	7.17	94.3	7.81	0.325	28.64	689.6
6	3.00	71999	130547	6.35	83.1	7.74	0.325	28.38	689.7
6	2.50	71999	130625	6.89	90.3	7.84	0.325	28.42	689.4
6	2.00	71999	130700	7.03	92	7.87	0.324	28.43	689.6
6	1.50	71999	130747	7.02	92	7.89	0.324	28.46	689.5
6	1.00	71999	130900	7.13	93.9	7.92	0.324	28.78	688.5
6	0.25	71999	130934	7.55	99.9	7.91	0.324	29.04	689.5
5	3.00	71999	132323	6.78	88.9	7.81	0.322	28.78	689.3
5	2.50	71999	132351	6.77	89.2	7.83	0.322	28.79	689.3
5	2.00	71999	132438	6.73	88.7	7.88	0.322	28.83	689.4
5	1.50	71999	132544	7.11	93.9	7.93	0.322	28.9	687
5	1.00	71999	132622	7.32	97.3	7.96	0.321	29.23	689.4
5	0.25	71999	132651	7.81	105.5	7.94	0.322	30.22	689.7
4	3.00	71999	133627	6.43	84.5	7.8	0.321	28.8	689.4

4	2.50	71999	133656	6.65	87.8	7.73	0.321	28.84	689.1
4	2.00	71999	133802	6.25	82.5	7.74	0.322	28.89	689.3
4	1.50	71999	133829	7.02	92.9	7.89	0.321	29.11	689.5
4	1.00	71999	133900	7.5	100.2	7.98	0.32	29.57	689.1
4	0.25	71999	133933	7.9	106.2	8.02	0.32	29.92	687.5
3	3.00	71999	135903	8.21	110.9	8.1	0.317	30.25	689.1
3	2.50	71999	135942	8.7	116.9	8.14	0.316	30.32	689
3	2.00	71999	140020	8.73	118.7	8.15	0.316	30.56	689.3
3	1.50	71999	140100	8.79	119.5	8.15	0.316	30.63	689.1
3	1.00	71999	140126	8.95	121.9	8.14	0.316	30.69	689.1
3	0.25	71999	140150	9.07	123.6	8.14	0.316	30.68	689
2	3.00	71999	141057	7.28	97.8	8	0.314	29.91	689
2	2.50	71999	141130	7.58	102	8.1	0.313	30.08	689
2	2.00	71999	141204	8.17	110.5	8.16	0.313	30.26	689.1
2	1.50	71999	141236	8.87	120.5	8.21	0.314	30.51	688.5
2	1.00	71999	141312	9.49	130.5	8.22	0.313	30.93	689
2	0.25	71999	141352	9.48	129.7	8.2	0.003	30.98	689.2
1	3.00	71999	145103	5.24	69.2	7.76	0.328	28.88	688.4
1	2.50	71999	145202	5.71	75.5	7.79	0.327	29	688.7
1	2.00	71999	145238	6.61	88.1	7.94	0.327	29.15	688.5
1	1.50	71999	145348	7.4	99.3	8.16	0.324	29.82	688.7
1	1.00	71999	145437	8.23	110.4	8.16	0.325	30.09	688.8
1	0.25	71999	145510	8.71	117.8	8.12	0.015	30.26	688.6
12	3.00	71999	151015	4.42	59.1	7.88	0.324	29.64	688.8
12	2.50	71999	151113	5.63	75.6	7.88	0.32	29.89	688.7
12	2.00	71999	151135	5.9	79.6	7.87	0.319	30.14	688.7
12	1.50	71999	151229	7.76	105.7	8.19	0.319	30.67	688.9
12	1.00	71999	151351	8.37	113.8	8.31	0.317	30.92	688.6
12	0.25	71999	151448	9.74	134.9	8.27	0.005	31.7	688.7

July 23, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
13	0.00	72399	94223	3.61	42.2	7.65	0.449	22.08	684.9
13	0.00	72399	94231	3.63	42.3	7.65	0.449	22.07	684.7
13	0.00	72399	94258	3.65	42.5	7.69	0.449	22.07	684.8
11	3.00	72399	121636	7.93	104.2	7.96	0.345	28.61	689.7
11	2.50	72399	121702	7.84	103.1	7.97	0.345	28.65	690
11	2.00	72399	121726	7.96	104.9	7.98	0.344	28.77	689.6
11	1.50	72399	121740	8.03	106	7.98	0.344	28.83	689.9
11	1.00	72399	121814	8.02	105.8	7.97	0.344	28.89	689
11	0.25	72399	121850	7.94	105	7.95	0.345	28.99	689.7
10	3.00	72399	124154	7.47	98.6	7.9	0.403	28.86	688.3
10	2.50	72399	124257	7.1	93.9	7.89	0.402	28.93	688.2
10	2.00	72399	124358	6.97	92.2	7.9	0.402	28.93	687.8
10	1.50	72399	124444	7.29	96.4	7.88	0.402	28.96	688.2
10	1.00	72399	124514	7.25	96	7.88	0.402	29.01	688.1
10	0.25	72399	124540	7.51	99.8	7.9	0.401	29.24	688.2
9	3.00	72399	125445	7	92.7	7.94	0.406	29.03	687.7
9	2.50	72399	125514	7.2	95.3	7.93	0.405	29.05	687.7
9	2.00	72399	125543	7.74	103	7.95	0.4	29.2	687.7
9	1.50	72399	125612	7.88	104.6	7.94	0.4	29.23	687.7
9	1.00	72399	125639	7.87	104.5	7.94	0.4	29.24	686.7
9	0.25	72399	125708	7.95	105.8	7.95	0.399	29.34	687.5
8	3.00	72399	132115	7.71	101.1	8	0.342	28.51	687.3
8	2.50	72399	132151	8.28	109.3	8.03	0.34	28.83	687.3
8	2.00	72399	132216	8.34	109.8	8.03	0.339	28.9	687.5
8	1.50	72399	132253	8.21	108.7	8.03	0.339	29.03	687.5
8	1.00	72399	132319	8.39	111.2	8.01	0.339	29.15	687.4
8	0.25	72399	132338	8.2	109.1	8	0.339	29.3	687.2
7	3.00	72399	133102	6.52	84.8	7.7	0.34	28.15	687.2
7	2.50	72399	133133	6.47	84.4	7.87	0.341	28.21	687
7	2.00	72399	133152	6.4	83.6	7.68	0.341	28.27	687.1
7	1.50	72399	133223	7.47	98.6	7.91	0.339	28.84	687.1
7	1.00	72399	133247	7.53	99.7	7.92	0.339	29.03	687.3
7	0.25	72399	133310	7.64	101.5	7.93	0.34	29.1	687.1
6	3.00	72399	134311	6.15	80.3	7.66	0.34	28.27	686.9
6	2.50	72399	134335	7.01	91.7	7.9	0.339	28.34	686.7
6	2.00	72399	134359	7.28	95.3	7.97	0.339	28.41	687.1
6	1.50	72399	134418	7.47	98.1	7.99	0.338	28.61	687
6	1.00	72399	134435	7.88	104.1	8.01	0.338	28.96	687.2
6	0.25	72399	134500	7.81	104.4	7.98	0.338	29.42	687
5	2.50	72399	135503	5.94	77.2	7.66	0.338	28.47	686.6
5	2.00	72399	135535	6.58	86.5	7.78	0.338	28.58	686.8
5	1.50	72399	135603	6.78	89.2	7.78	0.337	28.71	687
5	1.00	72399	135626	7.74	103	7.96	0.336	29.37	686.7

5	0.25	72399	135655	7.85	104.8	7.94	0.336	29.53	686.7
4	3.00	72399	141201	4.56	59.8	7.67	0.34	28.45	686.3
4	2.50	72399	141243	5.72	75.8	7.76	0.337	28.56	686.6
4	2.00	72399	141340	6.59	86.6	7.82	0.336	28.67	686.4
4	1.50	72399	141359	6.8	89.5	7.87	0.336	28.73	686.3
4	1.00	72399	141414	7.12	94.1	8.04	0.336	28.9	686.2
4	0.25	72399	141427	7.94	106.5	8.05	0.334	29.84	686
3	3.00	72399	144509	8.59	114.9	8.13	0.329	29.9	686.4
3	2.50	72399	144551	8.35	112.4	8.14	0.329	30.02	686.5
3	2.00	72399	144616	8.73	118	8.17	0.329	30.22	686.3
3	1.50	72399	144651	8.8	118.9	8.18	0.329	30.27	686.3
3	1.00	72399	144726	8.81	120.2	8.18	0.328	30.75	686.6
3	0.25	72399	144743	8.98	122.8	8.18	0.328	30.93	686.4
2	3.00	72399	150105	7.55	101.6	8.11	0.327	29.87	686.4
2	2.50	72399	150139	7.95	106.9	8.13	0.328	29.95	686.3
2	2.00	72399	150211	8.32	112.1	8.15	0.327	30.07	686.4
2	1.50	72399	150228	8.99	121.9	8.27	0.325	30.39	686.3
2	1.00	72399	150246	9.74	133.1	8.27	0.324	30.85	686.6
2	0.25	72399	150301	9.83	136.1	8.25	0.322	31.74	686.3
1	3.00	72399	153015	4.68	61.6	7.52	0.34	28.76	686.1
1	2.50	72399	153046	5.78	76.3	7.72	0.34	28.84	686.1
1	2.00	72399	153110	5.66	74.6	7.73	0.339	28.86	686.2
1	1.50	72399	153130	5.99	79.2	7.76	0.339	28.95	686.3
1	1.00	72399	153205	6.61	87.9	8.01	0.337	29.29	686.5
1	0.25	72399	153230	8.86	120.7	8.22	0.336	30.72	686.3
12	3.00	72399	154733	4.31	57.8	7.61	0.335	29.83	685.6
12	2.50	72399	154815	5.54	74.5	8.01	0.332	30.02	685.6
12	2.00	72399	154847	6.5	88	8.31	0.333	30.33	685.7
12	1.50	72399	154927	9.23	126.3	8.37	0.333	30.96	685.8
12	1.00	72399	155015	9.95	137.6	8.35	0.332	31.54	685.8
12	0.25	72399	155041	10.09	140.2	8.36	0.33	31.88	685.6

July 26, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	72699	103751	7.27	96.6	8.03	0.314	29.29	688.9
11	2.50	72699	103826	7.44	98.9	8.12	0.313	29.31	686.2
11	2.00	72699	103859	7.82	104.1	8.11	0.311	29.4	688.9
11	1.50	72699	103917	8.14	108.7	8.16	0.31	29.51	688.9
11	1.00	72699	103938	8.3	110.9	8.15	0.307	29.6	688.8
11	0.25	72699	104004	8.35	111.6	8.12	0.306	29.63	688.7
10	3.00	72699	110218	5.49	72.7	7.99	0.357	29.01	686.4
10	2.50	72699	110255	7.36	98.1	8.09	0.356	29.44	687.9
10	2.00	72699	110325	7.42	99	8.07	0.357	29.48	688
10	1.50	72699	110417	7.33	97.3	8.04	0.357	29.53	687.1
10	1.00	72699	110449	7.29	97.5	8.02	0.358	29.59	687.9
10	0.25	72699	110512	7.46	100	8	0.357	29.77	688
9	3.00	72699	111400	4.32	57.5	7.61	0.361	29.4	687.4
9	2.50	72699	111429	6.7	90	8.06	0.355	29.86	687.3
9	2.00	72699	111459	7.33	98.8	8.08	0.359	30.07	687.5
9	1.50	72699	111534	7.34	99.1	8.07	0.359	30.19	686.4
9	1.00	72699	111558	7.43	100.4	8.07	0.359	30.2	687.5
9	0.25	72699	111623	7.53	101.9	8.05	0.359	30.29	687.4
8	3.00	72699	113852	6.58	86.6	7.79	0.304	28.7	687.4
8	2.50	72699	113914	6.46	84.9	7.88	0.304	28.77	687.4
8	2.00	72699	113942	6.75	89	7.93	0.304	28.82	687.5
8	1.50	72699	114020	7.13	94.2	7.96	0.302	28.94	687.6
8	1.00	72699	114049	7.29	96.6	7.95	0.302	29.1	686.7
8	0.25	72699	114112	7.28	96.6	7.94	0.004	29.34	687.3
7	3.00	72699	114559	7.1	93.4	7.99	0.303	28.8	687.3
7	2.50	72699	114626	7.17	94.6	7.99	0.303	28.88	686.8
7	2.00	72699	114712	7.27	96	8	0.301	28.94	687.2
7	1.50	72699	114750	7.34	97.1	7.99	0.302	29	687.1
7	1.00	72699	114804	7.3	96.7	7.97	0.304	29.05	687
7	0.25	72699	114824	7.3	96.5	7.94	0.304	29.12	686.9
6	3.00	72699	115915	6.36	84	7.86	0.303	28.88	686.7
6	2.50	72699	115945	7.01	93.1	8.04	0.3	29.22	687.1
6	2.00	72699	120010	7.77	103.2	8.14	0.299	29.3	686.9
6	1.50	72699	120046	8.41	112.1	8.17	0.298	29.45	687.1
6	1.00	72699	120126	8.1	108.4	8.13	0.298	29.72	687.1
6	0.25	72699	120152	8.05	109	8.13	0.297	30.33	687.1
5	2.00	72699	122727	7.44	100	8.08	0.297	29.92	686.7
5	1.50	72699	122756	7.68	103.4	8.12	0.296	30.02	687
5	1.00	72699	122830	7.67	104.4	8.11	0.296	30.19	684.3
5	0.25	72699	122853	7.73	105.6	8.1	0.004	30.87	687
4	3.00	72699	124100	3.12	41.4	7.44	0.304	29.35	686.6
4	2.50	72699	124132	4.38	58.6	7.55	0.302	29.62	686.7

4	2.00	72699	124211	6.81	91.5	8.09	0.294	29.95	686.8
4	1.50	72699	124249	8.29	112	8.18	0.294	30.23	687
4	1.00	72699	124318	8.18	111.3	8.17	0.294	30.6	686.9
4	0.25	72699	124345	8.29	113.3	8.17	0.294	30.9	686.9
3	3.00	72699	125937	6.58	89.8	7.91	0.293	30.79	686.8
3	2.50	72699	130008	7.17	97.5	8.1	0.291	30.91	686.4
3	2.00	72699	130039	7.61	103.8	8.1	0.291	31.09	687
3	1.50	72699	130103	7.52	103.4	8.12	0.292	31.29	686.7
3	1.00	72699	130123	7.77	107.6	8.12	0.291	31.48	683.9
3	0.25	72699	130143	8.14	113.1	8.1	0.291	31.85	686.8
2	3.00	72699	131359	7.17	97.6	8.01	0.287	30.92	686.7
2	2.50	72699	131438	7.41	101.6	8.02	0.287	31.04	686.7
2	2.00	72699	131504	8.1	111.7	8.19	0.285	31.26	686.3
2	1.50	72699	131527	8.5	117.1	8.23	0.285	31.37	686.6
2	1.00	72699	131546	8.94	123.8	8.26	0.284	31.7	686.5
2	0.25	72699	131609	9.11	127.9	8.23	0.284	32.46	684
1	3.00	72699	141223	3.24	43.5	7.61	0.307	29.87	685.9
1	2.50	72699	141253	4.24	57.2	7.89	0.305	30.05	685.9
1	2.00	72699	141323	5.66	76.4	8.19	0.303	30.18	686
1	1.50	72699	141350	6.83	92.6	8.32	0.302	30.41	685.8
1	1.00	72699	141415	8.44	115	8.39	0.3	30.73	685.3
1	0.25	72699	141434	9.29	128.9	8.38	0.3	31.64	685.9
12	2.00	72699	142944	5.1	70.5	7.71	0.289	31.54	685.4
12	1.50	72699	143023	7.64	106.5	8.23	0.291	32.05	685.6
12	1.00	72699	143051	8.73	122.9	8.35	0.29	32.61	685.7
12	0.25	72699	143124	9.11	129.8	8.36	0.29	32.95	685.5
13	0.00	72799	101708	3.68	49.8	7.71	0.364	30.92	684.3

August 2, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	80299	112255	7.67	102.3	8.05	0.375	29.46	689.4
11	2.50	80299	112326	7.97	106.5	8.06	0.376	29.56	689.5
11	2.00	80299	112356	8.05	107.7	8.07	0.375	29.67	689.5
11	1.50	80299	112435	8.08	108.4	8.05	0.373	29.78	689.3
11	1.00	80299	112510	8.13	109.3	8.04	0.372	29.92	689.4
11	0.50	80299	112542	8.1	109.5	8.03	0.372	30.23	689.4
11	0.25	80299	112604	8.07	109.4	7.98	0.015	30.43	689.4
10	3.00	80299	114522	6.54	86.9	7.84	0.427	29.22	688.2
10	2.50	80299	114550	6.94	92.4	7.85	0.427	29.32	687.8
10	2.00	80299	114626	7.22	96.5	7.92	0.426	29.46	688.2
10	1.50	80299	114655	7.43	99.4	7.93	0.425	29.66	688.1
10	1.00	80299	114731	7.47	100.7	7.9	0.425	30.11	688.1
10	0.50	80299	114757	7.48	101.3	7.89	0.427	30.32	688.1
10	0.25	80299	114815	7.49	101.6	7.89	0.427	30.39	688.1
9	3.00	80299	115543	6.24	82.8	7.68	0.422	29.1	687.9
9	2.50	80299	115603	6.33	84	7.71	0.423	29.17	687.9
9	2.00	80299	115628	6.54	87	7.73	0.424	29.32	687.7
9	1.50	80299	115659	6.9	92.3	7.85	0.428	29.65	688
9	1.00	80299	115736	7.22	97.1	7.88	0.432	29.98	688
9	0.50	80299	115803	7.35	99.5	7.83	0.432	30.3	687.6
9	0.25	80299	115828	7.17	97.3	7.83	0.432	30.47	687.9
8	3.00	80299	121853	5	65.7	7.52	0.364	28.67	687.9
8	2.50	80299	121953	5.66	74.7	7.64	0.362	28.8	688.1
8	2.00	80299	122035	5.76	76	7.65	0.361	28.86	688.1
8	1.50	80299	122118	6.56	86.9	7.8	0.359	29.1	688.1
8	1.00	80299	122146	6.65	89.2	7.78	0.359	29.59	688
8	0.50	80299	122226	6.72	90.9	7.78	0.358	30.27	685.3
8	0.25	80299	122304	6.68	90.9	7.76	0.358	30.61	688.1
7	3.00	80299	122839	5.96	78.9	7.76	0.36	28.99	688.1
7	2.50	80299	122904	6.12	81.2	7.78	0.36	29.16	688.4
7	2.00	80299	122922	6.11	81.1	7.76	0.359	29.22	688.1
7	1.50	80299	122949	6.11	81.1	7.75	0.359	29.24	688.1
7	1.00	80299	123019	6.25	83.2	7.87	0.359	29.38	688.3
7	0.50	80299	123114	7.43	99.4	7.92	0.359	29.63	688
7	0.25	80299	123139	7.39	99.1	7.91	0.358	29.81	688.2
6	3.00	80299	124337	7.74	103.5	8.03	0.356	29.65	687.6
6	2.50	80299	124350	7.91	106	8.04	0.357	29.72	687.9
6	2.00	80299	124425	8.01	107.4	8.04	0.356	29.81	687.7
6	1.50	80299	124507	8.25	110.9	8.07	0.357	29.92	687.9
6	1.00	80299	124534	8.25	111.5	8.07	0.356	30.26	687.4
6	0.50	80299	124611	8.2	111.6	8.05	0.356	30.65	687.6
6	0.25	80299	124650	7.95	108.8	8	0.356	30.96	687.5
5	3.00	80299	125950	4.87	65.2	7.56	0.359	29.71	687.8

5	2.50	80299	130030	5.16	69.6	7.76	0.358	29.76	688.2
5	2.00	80299	130117	6.09	81.9	7.79	0.357	29.88	687.8
5	1.50	80299	130159	7.13	96.5	8.05	0.354	30.31	688.1
5	1.00	80299	130331	7.63	103.6	8.06	0.354	30.51	687.9
5	0.50	80299	130424	7.66	104.9	8	0.354	30.99	687.8
5	0.25	80299	130449	7.76	106.8	7.98	0.008	31.26	687.9
4	3.00	80299	131751	5.79	77.8	7.67	0.356	29.83	688
4	2.50	80299	131829	5.87	78.8	7.74	0.356	29.87	688.2
4	2.00	80299	131911	6.1	81.6	7.79	0.356	29.9	685.3
4	1.50	80299	131941	6.65	89.7	7.96	0.355	30.05	686.4
4	1.00	80299	132056	7.74	105	8.07	0.353	30.44	688
4	0.50	80299	132145	7.79	108	7.98	0.355	31.7	687
4	0.25	80299	132203	7.66	106.2	7.97	0.355	31.72	686.8
3	3.00	80299	133626	4.91	66.4	7.61	0.35	30.25	687.4
3	2.50	80299	133701	5.54	75.3	7.71	0.35	30.5	687.5
3	2.00	80299	133835	6.21	84.9	8.04	0.349	30.62	687.8
3	1.50	80299	133916	7.73	105.8	8.06	0.347	31.01	687.6
3	1.00	80299	133940	8.01	112.1	8.05	0.347	32.27	687.8
3	0.50	80299	134033	8.07	113.2	8.04	0.347	32.46	688.1
3	0.25	80299	134055	7.89	110.9	8.03	0.347	32.53	688
2	3.00	80299	135220	4.1	55.5	7.39	0.347	30.25	687.9
2	2.50	80299	135252	4.83	65.3	7.67	0.346	30.33	687.9
2	2.00	80299	135325	5.96	80.8	7.77	0.347	30.48	687.6
2	1.50	80299	135359	6.85	93.3	7.92	0.345	30.71	687.5
2	1.00	80299	135434	7.68	106.4	8.06	0.345	31.68	687.6
2	0.50	80299	135506	8.25	116.2	8.04	0.344	32.71	685.1
2	0.25	80299	135524	8.18	115.5	8.04	0.344	32.87	685.2
1	3.00	80299	144510	3.71	49.8	7.66	0.359	30.05	687.1
1	2.50	80299	144601	5.58	75.2	7.96	0.357	30.14	686.7
1	2.00	80299	144639	6.5	91.1	8.3	0.355	30.53	687.1
1	1.50	80299	144741	10.36	144.1	8.35	0.353	31.93	687.4
1	1.00	80299	144817	10.84	153.2	8.37	0.352	32.45	687.1
1	0.50	80299	144838	10.93	154.3	8.36	0.351	32.77	687.1
1	0.25	80299	144908	11	155.4	8.35	0.352	32.84	687.1
12	2.50	80299	150228	3.64	49.3	7.48	0.355	30.74	686.8
12	2.00	80299	150300	3.62	49.9	7.9	0.351	30.95	686.4
12	1.50	80299	150412	6.08	84.2	7.96	0.352	31.61	686.8
12	1.00	80299	150518	9.98	141	8.4	0.348	32.88	687
12	0.50	80299	150558	10.88	155.3	8.41	0.349	33.5	686.8
12	0.25	80299	150645	11.13	159.4	8.4	0.348	33.65	686.8
13	0.00	80299	100033	3.87	53.1	7.65	0.016	31.02	687.6

August 12, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	81299	114340	7.42	99.8	8.33	0.326	29.95	685.7
11	2.50	81299	114410	7.08	95.3	8.32	0.326	29.97	685.8
11	2.00	81299	114434	7.06	95	8.31	0.326	30	685.7
11	1.50	81299	114452	7.05	94.8	8.31	0.325	30.01	685.8
11	1.00	81299	114509	7	94.3	8.3	0.325	30.02	685.6
11	0.25	81299	114536	6.95	93.6	8.28	0.325	30.04	685.7
10	3.00	81299	120250	5.81	77.9	8.09	0.383	29.82	684.5
10	2.50	81299	120314	5.66	76	8.09	0.383	29.85	684.6
10	2.00	81299	120341	5.62	75.4	8.07	0.383	29.86	684.3
10	1.50	81299	120406	5.63	75.6	8.05	0.383	29.89	684.6
10	1.00	81299	120437	5.57	74.7	8.03	0.383	29.9	684.6
10	0.25	81299	120503	5.59	75.3	8.02	0.383	29.93	684.7
9	3.00	81299	121137	5.62	75.9	8	0.385	30.17	683.9
9	2.50	81299	121158	5.6	75.7	8.03	0.385	30.21	683.6
9	2.00	81299	121221	5.76	78	8.05	0.385	30.27	684
9	1.50	81299	121245	5.89	79.7	8.05	0.385	30.3	684.3
9	1.00	81299	121320	5.81	78.6	8.03	0.385	30.29	684
9	0.25	81299	121345	5.92	80	8.04	0.384	30.3	684.1
8	3.00	81299	123211	4	53	7.65	0.337	29.02	683.7
8	2.50	81299	123246	3.97	52.5	7.65	0.338	29.07	683.9
8	2.00	81299	123311	3.92	52	7.64	0.338	29.12	683.8
8	1.50	81299	123335	3.9	51.7	7.64	0.337	29.1	683.7
8	1.00	81299	123400	3.89	51.7	7.62	0.338	29.18	683.9
8	0.25	81299	123425	3.97	52.7	7.63	0.337	29.21	684
7	3.00	81299	123950	2.47	32.6	7.49	0.339	28.95	683.9
7	2.50	81299	124018	2.51	33.2	7.49	0.339	28.97	683.7
7	2.00	81299	124047	2.52	33.5	7.48	0.339	29	683.4
7	1.50	81299	124133	2.56	33.9	7.48	0.339	29.01	683.8
7	1.00	81299	124158	2.64	35	7.48	0.339	29.06	683.7
7	0.25	81299	124219	2.68	35.4	7.46	0.007	29.06	683.9
6	3.00	81299	125153	1.69	22.5	7.48	0.337	29.25	683.5
6	2.50	81299	125237	2.54	33.8	7.54	0.336	29.29	683.6
6	2.00	81299	125323	2.79	37.1	7.58	0.336	29.3	683.8
6	1.50	81299	125402	3.21	42.8	7.62	0.336	29.6	683.6
6	1.00	81299	125436	3.49	46.8	7.69	0.335	29.77	683.9
6	0.25	81299	125508	3.84	51.5	7.7	0.335	29.86	681
5	2.00	81299	130600	2.5	33.5	7.59	0.335	29.6	683.3
5	1.50	81299	130630	3.56	47.9	7.87	0.333	30.04	683.3
5	1.00	81299	130655	5.13	69.4	7.96	0.333	30.36	683.2
5	0.25	81299	130726	5.71	78.1	8.03	0.006	30.84	683.4
4	3.00	81299	131627	3.44	46.3	7.72	0.334	29.93	683
4	2.50	81299	131644	3.87	52.1	7.74	0.333	30.02	683.2
4	2.00	81299	131716	4.66	62.8	7.92	0.332	30.06	683

4	1.50	81299	131747	5.61	75.8	8.16	0.33	30.24	683.2
4	1.00	81299	131812	5.95	80.6	8.17	0.33	30.4	683.1
4	0.25	81299	131827	6.18	83.9	8.15	0.33	30.53	682.2
3	3.00	81299	133025	7.27	100.2	8.43	0.321	31.38	682.7
3	2.50	81299	133110	7.33	100.9	8.43	0.321	31.39	683
3	2.00	81299	133140	7.24	99.8	8.43	0.321	31.42	683
3	1.50	81299	133220	7.24	99.9	8.43	0.321	31.43	682.9
3	1.00	81299	133245	7.36	101.5	8.42	0.321	31.45	683.1
3	0.25	81299	133303	7.35	101.4	8.41	0.321	31.47	683.1
2	3.00	81299	134032	6.61	89.9	8.36	0.319	31.47	682.9
2	2.50	81299	134105	6.98	96.5	8.43	0.318	31.54	683
2	2.00	81299	134129	7.19	99.3	8.44	0.318	31.56	682.8
2	1.50	81299	134150	7.69	106.4	8.49	0.317	31.63	682.2
2	1.00	81299	134213	7.78	108.1	8.48	0.317	31.91	682.8
2	0.25	81299	134232	7.88	109.7	8.39	0.318	31.99	683.1

August 21, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
13	0.00	82099	115446	5.3	73.6	7.99	0.439	31.85	686.4
11	3.00	82199	102218	7.04	94.1	8.25	0.317	29.61	689.1
11	2.50	82199	102233	7.03	94.1	8.23	0.317	29.64	689
11	2.00	82199	102254	7.06	94.4	8.23	0.317	29.64	688.9
11	1.50	82199	102309	7.04	94.2	8.21	0.317	29.64	689.1
11	1.00	82199	102323	7.02	93.9	8.21	0.317	29.65	689
11	0.25	82199	102340	7.07	94.5	8.17	0.001	29.65	688.8
10	3.00	82199	104446	6.1	82	8.13	0.351	29.95	688.3
10	2.50	82199	104508	6.66	89.5	8.21	0.349	29.96	688.2
10	2.00	82199	104528	6.94	93.3	8.2	0.349	29.96	688.5
10	1.50	82199	104544	7.03	94.6	8.18	0.349	29.96	688.2
10	1.00	82199	104603	6.92	93.2	8.16	0.35	30.03	688.5
10	0.25	82199	104614	6.93	93.4	8.11	0.35	30.06	688.3
9	3.00	82199	105257	6.41	86.1	8.13	0.355	29.9	688
9	2.50	82199	105314	6.61	88.9	8.16	0.354	29.96	688
9	2.00	82199	105332	6.53	87.8	8.17	0.354	29.97	687.9
9	1.50	82199	105349	6.62	89	8.15	0.354	29.99	687.7
9	1.00	82199	105406	6.61	88.9	8.14	0.354	29.99	688
9	0.25	82199	105422	6.62	89.3	8.14	0.354	30.07	688
8	3.00	82199	111338	6.55	88.1	8.2	0.311	29.95	687.5
8	2.50	82199	111353	6.71	90.2	8.22	0.311	29.98	687.5
8	2.00	82199	111405	6.97	94	8.27	0.309	30.14	687.4
8	1.50	82199	111419	7.54	102.4	8.33	0.307	30.39	687.4
8	1.00	82199	111433	7.65	104.1	8.32	0.306	30.61	687.6
8	0.25	82199	111445	7.63	103.8	8.3	0.306	30.62	687.3
7	3.00	82199	111906	6.71	90.2	8.18	0.311	29.94	687.3
7	2.50	82199	111920	6.44	86.7	8.18	0.311	29.97	687.3
7	2.00	82199	111934	6.86	93.1	8.26	0.308	30.07	687.5
7	1.50	82199	111949	7.21	97.4	8.24	0.307	30.22	687.5
7	1.00	82199	112000	7.24	98.4	8.24	0.307	30.48	687.4
7	0.25	82199	112013	7.12	96.7	8.15	0	30.54	687.4
6	3.00	82199	113032	4.06	55	7.75	0.313	30.34	687.3
6	2.50	82199	113051	4.57	61.9	7.99	0.31	30.37	686.7
6	2.00	82199	113112	5.85	80.2	8.16	0.308	30.56	687.1
6	1.50	82199	113132	6.44	87.7	8.19	0.308	30.63	687.2
6	1.00	82199	113151	6.84	94.2	8.24	0.308	30.72	687.2
6	0.25	82199	113205	7.04	96	8.21	0.308	30.72	687
5	3.00	82199	114157	5.93	81	8.13	0.31	30.74	687
5	2.50	82199	114214	6.3	85.9	8.12	0.31	30.82	687
5	2.00	82199	114230	6.16	85.3	8.11	0.31	30.83	687
5	1.50	82199	114253	6.22	85	8.13	0.31	30.85	686.4
5	1.00	82199	114305	6.41	87.7	8.15	0.31	30.93	687.1
5	0.25	82199	114318	6.56	90	8.1	0.31	31.01	687.3

4	3.00	82199	115435	6.76	92.2	8.19	0.309	30.73	687
4	2.50	82199	115452	6.91	94.4	8.23	0.309	30.89	687
4	2.00	82199	115508	6.97	95.3	8.22	0.309	30.97	686.9
4	1.50	82199	115521	7.05	97	8.23	0.309	31.13	686.9
4	1.00	82199	115531	7.15	98.6	8.23	0.309	31.23	686.8
4	0.25	82199	115544	7.22	99.4	8.14	0.309	31.33	686.8
3	3.00	82199	120845	6.77	91.4	8.25	0.311	30.17	686.8
3	2.50	82199	120857	6.88	93.3	8.25	0.31	30.39	686.7
3	2.00	82199	120910	6.96	94.3	8.24	0.31	30.45	686.9
3	1.50	82199	120926	6.95	94.4	8.24	0.31	30.47	686.8
3	1.00	82199	120942	6.99	94.8	8.23	0.31	30.48	686.7
3	0.25	82199	120956	7.07	96.1	8.17	0.003	30.51	686.9
2	3.00	82199	122045	5.72	77.1	8.02	0.313	30.09	686.6
2	2.50	82199	122058	5.78	78	8.04	0.313	30.11	686.7
2	2.00	82199	122117	5.99	81	8.08	0.313	30.25	686.5
2	1.50	82199	122140	6.27	85.1	8.11	0.312	30.47	686.5
2	1.00	82199	122207	6.55	89.2	8.16	0.312	30.71	684
2	0.25	82199	122228	6.68	90.9	8.08	0.004	30.73	686.4
1	3.00	82199	130840	5.39	72.9	7.94	0.313	30.22	685.9
1	2.50	82199	130910	4.86	65.8	7.94	0.313	30.3	685.6
1	2.00	82199	130924	5.37	73	8.13	0.312	30.52	685.9
1	1.50	82199	130936	5.77	78.8	8.18	0.312	30.61	686
1	1.00	82199	130946	6.2	84.9	8.22	0.312	30.97	685.5
1	0.50	82199	130956	6.25	85.5	8.22	0.312	30.97	685.7
1	0.25	82199	131012	6.44	88.8	8.27	0.002	31.39	683.4
12	2.00	82199	132335	2.23	29.1	7.5	0.319	27.91	685.5
12	1.50	82199	132348	3.56	47.1	7.73	0.316	28.99	685.5
12	1.00	82199	132423	4.65	61.9	7.96	0.316	29.28	685.5
12	0.25	82199	132456	6.05	81.8	8.13	0.118	30.2	685.4

August 26, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	82699	102520	7.98	107.3	8.15	0.32	29.95	686.1
11	2.50	82699	102547	8.54	115.2	8.26	0.319	30.15	686.2
11	2.00	82699	102627	8.96	121.1	8.25	0.318	30.25	686.1
11	1.50	82699	102715	8.96	121.4	8.24	0.319	30.26	685.8
11	1.00	82699	102804	8.98	121.4	8.23	0.318	30.27	686
11	0.25	82699	102838	9.01	121.8	8.22	0.318	30.28	685.8
10	3.00	82699	104240	7.74	103.9	8.09	0.368	29.79	685.1
10	2.50	82699	104350	7.75	103.8	8.13	0.368	29.83	685
10	2.00	82699	104435	7.95	106.8	8.15	0.368	29.92	685
10	1.50	82699	104543	8.29	111.8	8.16	0.368	30.11	685
10	1.00	82699	104617	8.34	112.6	8.15	0.368	30.12	685.1
10	0.25	82699	104655	8.31	112.2	8.15	0.369	30.19	685.2
9	3.00	82699	105802	3.98	53.3	7.42	0.377	29.68	684.9
9	2.50	82699	105851	4.1	54.9	7.73	0.375	29.71	685
9	2.00	82699	110003	7.22	98.2	8.12	0.372	30.15	684.7
9	1.50	82699	110041	7.87	106.4	8.13	0.371	30.26	684.7
9	1.00	82699	110143	8.03	108.8	8.12	0.371	30.35	684
9	0.25	82699	110303	8.08	108.9	8.09	0	30.41	682.5
8	3.00	82699	112130	8.32	112	8.16	0.323	30	684.6
8	2.50	82699	112234	8.23	110.8	8.16	0.322	30.04	684.3
8	2.00	82699	112332	8.18	109.9	8.16	0.322	30.1	684.7
8	1.50	82699	112418	8.13	109.7	8.13	0.323	30.11	684.6
8	1.00	82699	112451	8.14	109.8	8.12	0.322	30.16	684.6
8	0.25	82699	112531	8.19	110.5	8.08	0.001	30.16	684.3
7	3.00	82699	113136	7.17	96.4	8.11	0.324	29.94	684.6
7	2.50	82699	113214	7.52	101.2	8.14	0.323	29.98	684.7
7	2.00	82699	113305	7.69	103.6	8.13	0.323	30.04	684.5
7	1.50	82699	113347	7.75	104.6	8.14	0.323	30.13	683.9
7	1.00	82699	113433	7.81	105.5	8.12	0.323	30.18	684.6
7	0.25	82699	113501	7.8	105.4	8.08	0.323	30.21	684.8
6	3.00	82699	114340	8.61	117.1	8.27	0.319	30.55	684.8
6	2.50	82699	114430	8.54	116.1	8.25	0.319	30.57	684.8
6	2.00	82699	114600	8.52	115.8	8.23	0.319	30.59	684.8
6	1.50	82699	114643	8.37	114	8.22	0.319	30.64	684.9
6	1.00	82699	114752	8.57	116.7	8.23	0.319	30.72	684.9
6	0.25	82699	114840	8.69	118.5	8.21	0.001	30.82	684.7
5	2.00	82699	115928	7.53	102.7	8.15	0.321	30.76	684.4
5	1.50	82699	120143	7.91	108.6	8.18	0.321	31.18	684.5
5	1.00	82699	120312	8.12	112.1	8.17	0.322	31.29	684.5
5	0.25	82699	120352	8.43	115	8.14	0	31.39	684.5
4	3.00	82699	121242	3.1	41.9	7.3	0.328	30.2	684.2
4	2.50	82699	121343	3.18	43.1	7.32	0.328	30.3	684.6
4	2.00	82699	121446	5.93	80.6	8.1	0.32	30.64	684.6

4	1.50	82699	121526	8.97	123.1	8.28	0.317	31.02	684.5
4	1.00	82699	121605	9.22	126.5	8.25	0.318	31.13	684.4
4	0.25	82699	121651	8.78	120.9	8.17	0.318	31.46	684.6
3	3.00	82699	122732	7.38	101.3	8.03	0.318	31.17	684.3
3	2.50	82699	122815	7.77	106.9	8.06	0.318	31.24	684.4
3	2.00	82699	122915	8.31	114.5	8.16	0.317	31.39	684.1
3	1.50	82699	123017	9.03	124.7	8.25	0.316	31.48	684.1
3	1.00	82699	123109	9.31	128.9	8.26	0.316	31.65	684.5
3	0.25	82699	123147	9.45	132	8.21	0.002	32.19	684.2
2	3.00	82699	123945	6.85	93	7.9	0.323	30.53	683.9
2	2.50	82699	124026	6.8	92.4	8.11	0.322	30.55	684
2	2.00	82699	124151	8.7	118.8	8.23	0.319	30.87	684.1
2	1.50	82699	124231	9.27	127.1	8.36	0.319	31.04	683.9
2	1.00	82699	124344	9.71	133.2	8.35	0.32	31.14	683.4
2	0.25	82699	124437	9.75	135	8.29	0.01	31.67	684.1
1	3.00	82699	132523	0.7	9.3	7.05	0.329	29.63	683.6
1	2.50	82699	132605	1.04	13.9	7.09	0.328	29.63	684.1
1	2.00	82699	132702	1.35	18.1	7.14	0.328	29.68	684
1	1.50	82699	132749	2.15	28.8	7.3	0.328	29.79	684
1	1.00	82699	133006	4.98	67.8	7.85	0.326	30.71	684.2
1	0.25	82699	133047	6.18	85.3	7.87	0.327	31.49	683.9
12	2.00	82699	134514	6.43	87.2	8.18	0.324	30.75	683.8
12	1.50	82699	134547	8.08	111.1	8.49	0.323	31.24	683.6
12	1.00	82699	134642	10.67	148	8.61	0.32	31.76	683.6
12	0.25	82699	134737	11.4	160.2	8.56	0.319	32.5	683.6

September 3, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
13	0.00	90299	142724	5.74	79.4	7.68	0.398	31.63	682.3
11	3.00	90399	100741	5.32	70.2	7.66	0.331	28.85	685.8
11	2.50	90399	100832	5.27	69.4	7.64	0.331	28.85	685.6
11	2.00	90399	100910	5.35	70.6	7.64	0.331	28.86	685.7
11	1.50	90399	101001	5.39	71.2	7.66	0.331	28.87	685.7
11	1.00	90399	101113	5.38	71	7.64	0.331	28.87	685.7
11	0.25	90399	101157	5.53	73	7.64	0.33	28.87	685.7
10	3.00	90399	103453	4.07	53.5	7.48	0.368	28.6	685.4
10	2.50	90399	103551	4.15	54.5	7.48	0.368	28.61	685.3
10	2.00	90399	103643	4.14	54.4	7.47	0.367	28.66	685.4
10	1.50	90399	103809	4.25	55.5	7.49	0.367	28.63	685.5
10	1.00	90399	103908	4.32	56.8	7.48	0.367	28.71	685.2
10	0.25	90399	103948	4.64	61.1	7.49	0.367	28.75	685.2
9	3.00	90399	104646	3.66	48.2	7.4	0.377	28.53	685.2
9	2.50	90399	104752	3.17	41.6	7.36	0.377	28.56	685.1
9	2.00	90399	104844	3.53	46.4	7.42	0.376	28.63	685.1
9	1.50	90399	104922	3.78	49.7	7.48	0.376	28.67	685.1
9	1.00	90399	104941	4.38	57.8	7.51	0.376	28.75	685.1
9	0.25	90399	105011	4.49	58.9	7.5	0.015	28.66	685.2
8	3.00	90399	110756	5.57	73.8	7.87	0.328	29.14	685
8	2.50	90399	110836	5.66	75.1	7.89	0.328	29.15	685
8	2.00	90399	110907	5.88	77.9	7.89	0.328	29.16	685.1
8	1.50	90399	110931	6.16	81.8	7.95	0.327	29.21	684.9
8	1.00	90399	111007	6.29	83.6	7.96	0.328	29.3	685
8	0.25	90399	111051	6.47	86.1	7.96	0.327	29.32	684.9
7	3.00	90399	111427	5.38	71.4	7.78	0.328	29.13	684.9
7	2.50	90399	111500	5.37	71.2	7.8	0.328	29.14	685
7	2.00	90399	111532	5.48	72.7	7.79	0.328	29.15	685.1
7	1.50	90399	111606	5.69	75.5	7.83	0.328	29.2	682.7
7	1.00	90399	111636	5.98	79.5	7.87	0.328	29.27	684.9
7	0.25	90399	111719	6.05	80.5	7.87	0.328	29.32	685
6	3.00	90399	112656	5.26	70.2	7.79	0.328	29.44	684.7
6	2.50	90399	112727	5.37	71.6	7.82	0.328	29.46	685
6	2.00	90399	112803	5.49	73.2	7.86	0.327	29.48	684.9
6	1.50	90399	112844	5.7	76.1	7.87	0.327	29.52	682.3
6	1.00	90399	112907	5.88	78.3	7.87	0.327	29.55	684.9
6	0.25	90399	112944	6.01	80	7.88	0.327	29.6	682.5
5	3.00	90399	113848	5.64	75.8	7.86	0.33	29.44	684.7
5	2.50	90399	113909	5.68	75.7	7.89	0.329	29.46	682
5	2.00	90399	113932	5.9	78.7	7.95	0.329	29.49	684.8
5	1.50	90399	113951	6.05	80.9	8.04	0.327	29.54	684.4
5	1.00	90399	114017	6.57	88.1	8.05	0.327	29.72	684.9
5	0.25	90399	114040	6.68	89.7	7.98	0.107	29.87	684.7

4	3.00	90399	115100	5.47	73.2	7.86	0.328	29.6	684.6
4	2.50	90399	115132	5.38	71.8	7.87	0.328	29.61	684.5
4	2.00	90399	115202	5.65	75	7.9	0.328	29.65	684.7
4	1.50	90399	115240	5.8	77.5	7.97	0.328	29.7	684.7
4	1.00	90399	115320	6.51	87.5	8.07	0.328	30.04	684.7
4	0.25	90399	115344	6.71	90.4	8.07	0.327	30.05	684.8
3	3.00	90399	120417	6.88	91.8	8.17	0.328	29.49	684.3
3	2.50	90399	120452	6.79	90.6	8.16	0.328	29.52	684.6
3	2.00	90399	120527	6.72	89.7	8.15	0.327	29.57	684.6
3	1.50	90399	120600	6.66	89	8.15	0.327	29.62	684.9
3	1.00	90399	120627	6.94	93.1	8.16	0.328	29.73	684.6
3	0.25	90399	120653	7.05	94.8	8.16	0.327	29.98	684.6
2	3.00	90399	121503	6.1	81.6	7.89	0.33	29.67	684.2
2	2.50	90399	121549	5.69	76.2	7.97	0.33	29.68	684.4
2	2.00	90399	121629	6.27	84	8.01	0.33	29.72	684.4
2	1.50	90399	121702	6.64	89.1	8.13	0.328	29.79	683.4
2	1.00	90399	121725	6.82	91.7	8.13	0.328	29.96	684.3
2	0.25	90399	121754	7.28	98.4	7.93	0	30.21	684.5
1	3.00	90399	125936	4.05	53.6	7.53	0.331	28.92	683.7
1	2.50	90399	130032	5.01	66.2	7.88	0.328	28.92	684.5
1	2.00	90399	130120	5.75	76	8.01	0.328	28.98	684.6
1	1.50	90399	130153	6.43	85.4	8.04	0.327	29.2	684.3
1	1.00	90399	130239	6.84	91	8.14	0.326	29.34	684.4
1	0.25	90399	130309	7.2	96	8.13	0.326	29.45	684.6
12	1.50	90399	131456	3.61	47.6	7.82	0.326	28.83	683.9
12	1.00	90399	131635	3.94	52.3	8.36	0.324	29.19	684
12	0.25	90399	131743	7.38	99.4	8.38	0.324	29.99	683.8

September 6, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	90699	113037	6.27	82.5	7.88	0.336	28.68	688
11	2.50	90699	113103	6.27	82.5	7.89	0.336	28.68	688.3
11	2.00	90699	113136	6.84	90.2	8.05	0.336	28.79	688.1
11	1.50	90699	113211	6.98	92.2	8.05	0.336	28.87	688.2
11	1.00	90699	113248	7.33	96.9	8.14	0.335	28.98	685.3
11	0.25	90699	113328	6.59	88.1	7.9	0.336	29.59	688
10	3.00	90699	115225	5.99	78.4	7.71	0.38	28.27	686.8
10	2.50	90699	115254	5.89	76.9	7.7	0.38	28.3	684.5
10	2.00	90699	115322	5.89	76.8	7.72	0.38	28.31	686.8
10	1.50	90699	115355	5.89	77.5	7.85	0.382	28.69	686.8
10	1.00	90699	115418	6.71	88.6	7.95	0.381	28.89	687
10	0.25	90699	115441	7	92.9	7.97	0.38	29.23	687.1
9	3.00	90699	120434	5.36	70.1	7.49	0.383	28.32	686.6
9	2.50	90699	120459	5.12	67	7.51	0.382	28.35	686.6
9	2.00	90699	120532	5.58	73.2	7.66	0.382	28.52	686.7
9	1.50	90699	120600	5.74	75.6	7.7	0.382	28.68	686.6
9	1.00	90699	120628	5.91	77.8	7.73	0.382	28.72	686.8
9	0.25	90699	120657	5.87	77.6	7.69	0.001	28.95	686.5
8	3.00	90699	122616	5.35	70.2	7.48	0.339	28.6	686.5
8	2.50	90699	122703	6.95	91.1	7.95	0.338	28.85	686.4
8	2.00	90699	122753	5.3	69.6	7.55	0.338	28.6	686.4
8	1.50	90699	122818	6.38	84.2	8.1	0.338	28.82	686.4
8	1.00	90699	122849	7.59	100.6	8.1	0.337	29.05	686.4
8	0.25	90699	122907	7.67	101.9	8.02	0.001	29.28	683.8
7	3.00	90699	123251	5.59	73.6	7.79	0.337	28.63	686.3
7	2.50	90699	123357	6.39	84.1	7.94	0.337	28.71	683.6
7	2.00	90699	123422	6.76	89.7	8.03	0.337	28.83	686.5
7	1.50	90699	123447	7.22	95.4	8.07	0.337	28.93	686.3
7	1.00	90699	123505	7.36	97.5	8.06	0.336	29.09	686.2
7	0.25	90699	123517	7.32	97.3	8.05	0.336	29.23	686.3
6	3.00	90699	124846	5.73	75.8	7.85	0.336	28.95	686.3
6	2.50	90699	124910	6.18	81.8	7.91	0.336	29.01	686.4
6	2.00	90699	124932	7.6	101	8.24	0.335	29.31	686.2
6	1.50	90699	125003	8.04	107.5	8.23	0.335	29.57	686.1
6	1.00	90699	125033	8.09	108.2	8.21	0.335	29.61	686.5
6	0.25	90699	125059	8	107.1	8.21	0.002	29.73	686.4
5	3.00	90699	130304	4.15	54.8	7.38	0.341	28.85	686.3
5	2.50	90699	130328	4.22	55.7	7.4	0.341	28.87	686.4
5	2.00	90699	130354	4.24	56	7.53	0.339	28.88	686.2
5	1.50	90699	130421	5.3	70.1	8.03	0.338	29.05	686.4
5	1.00	90699	130457	7.31	97.8	8.15	0.336	29.64	686.3
5	0.25	90699	130533	7.5	100.8	8.16	0.336	29.9	686.3
4	3.00	90699	131553	4.63	61.2	7.59	0.339	29.03	685.5

4	2.50	90699	131631	4.79	63.5	7.64	0.338	29.05	686
4	2.00	90699	131714	4.88	64.7	7.65	0.339	29.07	686
4	1.50	90699	131742	5.33	70.8	7.9	0.338	29.29	684.8
4	1.00	90699	131812	6.07	81.3	7.97	0.338	29.71	686.2
4	0.25	90699	131911	6.44	86.7	7.95	0.331	30.07	686.1
3	3.00	90699	133124	5.5	72.6	7.7	0.338	28.9	685.6
3	2.50	90699	133201	5.6	74.1	7.74	0.337	29.01	685.5
3	2.00	90699	133242	5.68	75.2	7.83	0.337	29.08	685.6
3	1.50	90699	133319	6.02	80	7.98	0.337	29.25	685.5
3	1.00	90699	133347	6.73	90.3	8.01	0.337	29.78	685.8
3	0.25	90699	133411	6.93	93.2	7.99	0.006	29.94	685.5
2	3.00	90699	134531	4.73	62.6	7.69	0.339	29	685.2
2	2.50	90699	134602	5.63	75.2	7.89	0.338	29.16	685.3
2	2.00	90699	134656	6.18	82.8	8.01	0.338	29.4	685.5
2	1.50	90699	134742	7.1	95.3	8.14	0.337	29.82	685.6
2	1.00	90699	134829	7.6	102.8	8.24	0.337	30.25	685.6
2	0.25	90699	134910	8.06	109.5	8.27	0.337	30.53	685.4
1	3.00	90699	143236	2.86	37.5	7.23	0.342	28.52	684.3
1	2.50	90699	143313	3.19	41.9	7.28	0.342	28.6	684.9
1	2.00	90699	143344	3.56	46.5	7.54	0.339	28.71	685
1	1.50	90699	143424	7.03	93.9	8.49	0.334	29.54	685.1
1	1.00	90699	143455	10.07	135.4	8.53	0.334	29.94	685
1	0.25	90699	143524	10.64	144.6	8.56	0.333	30.53	685
12	1.50	90699	144812	3.58	46.9	7.99	0.338	28.37	684.3
12	1.00	90699	144902	5.75	76.2	8.33	0.338	29.21	684.7
12	0.25	90699	144941	9.78	139.4	8.56	0.003	31.63	682.1
13	0.00	90799	91938	5.45	73.4	7.76	0.004	30.09	682.8

September 17, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
13	0.00	91699	160853	5.43	69.9	7.61	0.409	27.37	687.3
11	3.00	91799	114620	5.17	65.1	7.6	0.344	26.37	692.1
11	2.50	91799	114654	5.16	65.3	7.62	0.344	26.42	691.9
11	2.00	91799	114750	5.22	66	7.61	0.344	26.44	691.8
11	1.50	91799	114846	5.38	68	7.62	0.344	26.5	692
11	1.00	91799	114931	5.44	68.9	7.63	0.344	26.53	691.9
11	0.25	91799	115002	5.52	70	7.62	0.344	26.58	691.9
10	3.00	91799	120752	5.4	67.4	7.8	0.385	25.8	691.3
10	2.50	91799	120819	5.43	67.6	7.86	0.384	25.81	689.7
10	2.00	91799	120838	5.83	73	7.94	0.383	25.88	691.1
10	1.50	91799	120929	6.72	84.3	8.17	0.381	26.02	691.3
10	1.00	91799	120948	6.96	87.5	8.18	0.381	26.11	691
10	0.25	91799	121012	7.14	89.8	8.19	0.381	26.16	690.9
9	3.00	91799	121712	6.56	82.1	8.06	0.383	25.91	687.9
9	2.50	91799	121800	6.31	79.1	8.12	0.383	25.96	690.8
9	2.00	91799	121823	6.65	83.6	8.13	0.383	26.12	690.8
9	1.50	91799	121847	6.75	85	8.16	0.383	26.2	690.6
9	1.00	91799	121915	6.95	87.6	8.16	0.382	26.29	690.8
9	0.25	91799	121946	7.07	89.2	8.16	0.382	26.37	690.8
8	3.00	91799	123926	6.56	83.1	7.95	0.342	26.51	690.4
8	2.50	91799	123959	6.33	80.1	7.94	0.342	26.51	690.7
8	2.00	91799	124041	6.33	80.1	7.98	0.341	26.53	690.3
8	1.50	91799	124118	6.47	82	8.02	0.341	26.57	690.3
8	1.00	91799	124144	6.64	84.4	8.04	0.341	26.63	690.4
8	0.25	91799	124213	6.76	86.2	8.05	0.341	26.93	690.4
7	3.00	91799	124608	5.9	74.6	7.88	0.342	26.52	690.3
7	2.50	91799	124639	5.87	74.3	7.88	0.342	26.53	690.2
7	2.00	91799	124702	5.91	74.8	7.88	0.342	26.54	690.3
7	1.50	91799	124727	5.97	75.6	7.92	0.342	26.6	690.3
7	1.00	91799	124801	6.23	79.1	7.94	0.342	26.66	690.4
7	0.25	91799	124851	6.85	87.5	8.06	0.341	27.03	690.2
6	3.00	91799	125828	6.03	76.4	8.03	0.341	26.58	690.1
6	2.50	91799	125856	5.94	75.3	7.89	0.341	26.58	690.1
6	2.00	91799	125924	5.48	69.5	7.8	0.342	26.62	690.1
6	1.50	91799	125953	6.14	78.1	8.08	0.342	26.8	690.1
6	1.00	91799	130022	6.31	80.4	8.11	0.341	26.89	689.9
6	0.25	91799	130054	6.68	85.6	8.11	0.341	27.19	690.1
5	3.00	91799	131056	5.15	65.3	7.96	0.345	26.55	689.7
5	2.50	91799	131119	5.39	68.3	8.27	0.342	26.56	689.7
5	2.00	91799	131148	6.61	83.9	8.25	0.342	26.66	689.6
5	1.50	91799	131219	7.13	90.7	8.48	0.341	26.74	689.7
5	1.00	91799	131239	8.04	102.4	8.45	0.34	26.88	689
5	0.25	91799	131307	7.91	102.1	8.37	0.341	27.61	689.7

4	3.00	91799	132214	7.39	94	8.33	0.341	26.74	689.4
4	2.50	91799	132253	7.33	93.2	8.37	0.34	26.75	689.6
4	2.00	91799	132322	7.56	96.3	8.38	0.34	26.86	689.6
4	1.50	91799	132353	7.93	101.2	8.41	0.34	26.93	689.5
4	1.00	91799	132418	7.89	101	8.37	0.343	27.16	689.5
4	0.25	91799	132441	7.83	101.3	8.33	0.341	27.82	689.6
3	3.00	91799	133536	6.62	83.8	8.16	0.344	26.49	689.1
3	2.50	91799	133604	6.64	83.8	8.21	0.343	26.55	688.9
3	2.00	91799	133627	6.96	88.3	8.26	0.342	26.65	689
3	1.50	91799	133655	7.15	90.7	8.27	0.343	26.7	689
3	1.00	91799	133715	7.4	94.4	8.3	0.342	27.01	689.2
3	0.25	91799	133738	7.49	95.8	8.27	0.006	27.09	689.2
2	3.00	91799	134619	6.1	76.7	8.02	0.345	26.4	688.7
2	2.50	91799	134642	6.15	77.8	8.04	0.345	26.47	688.8
2	2.00	91799	134715	6.39	81.1	8.19	0.344	26.67	688.8
2	1.50	91799	134750	6.78	86.2	8.2	0.344	26.76	688.6
2	1.00	91799	134812	6.89	87.9	8.22	0.343	26.97	688.7
2	0.25	91799	134839	7.05	90.1	8.2	0.343	27.03	688.9
1	2.50	91799	142444	4.68	58.4	7.88	0.345	25.68	688.5
1	2.00	91799	142512	5.96	74.5	8.32	0.341	25.8	688.4
1	1.50	91799	142529	6.77	84.6	8.4	0.341	25.81	688.7
1	1.00	91799	142604	8.06	101.6	8.57	0.339	26.24	688.5
1	0.25	91799	142642	8.6	109	8.59	0.34	26.62	688.4
12	1.50	91799	143859	4.34	53.3	7.68	0.343	24.87	688
12	1.00	91799	143945	6.76	84.7	8.37	0.339	25.97	688.3
12	0.25	91799	144016	8.36	106.1	8.49	0.338	26.68	688.6

September 26, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
11	3.00	92699	113132	7.86	95.3	8	0.349	24.18	680.5
11	2.50	92699	113224	7.46	90.5	8.01	0.348	24.17	683.3
11	2.00	92699	113255	7.44	89.9	8	0.347	24.16	683.2
11	1.50	92699	113329	7.44	90.5	8	0.347	24.21	683.1
11	1.00	92699	113359	7.47	90.7	8	0.347	24.2	683.2
11	0.25	92699	113428	7.55	91.6	7.99	0.347	24.2	683.2
10	3.00	92699	115741	6.7	79.5	7.9	0.388	23.03	682.8
10	2.50	92699	115810	6.67	79.1	7.9	0.388	23.03	682.8
10	2.00	92699	115854	6.65	78.7	7.89	0.388	23.03	682.8
10	1.50	92699	115912	6.65	79	7.89	0.388	23.04	682.7
10	1.00	92699	115926	6.76	80.3	7.88	0.388	23.07	682.8
10	0.25	92699	115951	6.92	82.2	7.88	0.388	23.09	681.5
9	3.00	92699	120547	6.58	78.2	7.9	0.389	23.1	682.7
9	2.50	92699	120629	6.42	76.4	7.9	0.389	23.14	680
9	2.00	92699	120701	6.5	77.3	7.9	0.39	23.12	682.6
9	1.50	92699	120735	6.58	78.3	7.89	0.389	23.23	682.5
9	1.00	92699	120807	6.64	79.1	7.88	0.389	23.22	681.1
9	0.25	92699	120831	6.79	81.1	7.88	0.389	23.38	682.6
8	3.00	92699	123000	6.38	77.3	7.78	0.349	24.14	682.6
8	2.50	92699	123024	6.33	76.7	7.82	0.349	24.14	681.9
8	2.00	92699	123054	6.55	79.7	7.93	0.349	24.22	682.5
8	1.50	92699	123141	6.88	83.7	7.94	0.348	24.31	682.6
8	1.00	92699	123213	7.12	86.7	7.95	0.348	24.38	682.6
8	0.25	92699	123258	7.31	89.1	7.96	0.348	24.44	682.6
7	3.00	92699	123652	6.2	75.1	7.76	0.348	24.08	682.5
7	2.50	92699	123709	6.23	75.9	7.77	0.348	24.09	682.5
7	2.00	92699	123730	6.29	76.1	7.85	0.349	24.11	682.5
7	1.50	92699	123750	6.39	77.5	7.89	0.349	24.22	682.5
7	1.00	92699	123825	6.98	85	7.9	0.348	24.41	682.6
7	0.25	92699	123850	7.06	86	7.89	0.348	24.46	682.5
6	3.00	92699	125046	7.28	88	8.07	0.348	24.02	682.3
6	2.50	92699	125107	7.13	86.2	8.08	0.348	24.01	682.2
6	2.00	92699	125134	7.17	86.7	8.1	0.348	24.03	682.5
6	1.50	92699	125202	7.19	87.1	8.13	0.348	24.14	682.3
6	1.00	92699	125220	7.35	89.1	8.12	0.348	24.17	682.3
6	0.25	92699	125243	7.45	90.4	8.12	0.348	24.21	682.3
5	3.00	92699	130344	5.51	66.1	7.84	0.353	23.61	682.2
5	2.50	92699	130405	5.86	70.6	7.95	0.351	23.66	682
5	2.00	92699	130430	6.26	75.4	8.02	0.35	23.82	681.9
5	1.50	92699	130457	6.43	77.5	8.01	0.35	23.89	679.5
5	1.00	92699	130512	7.11	86.7	8.27	0.348	24.48	679.5
5	0.25	92699	130531	7.92	97	8.27	0.348	24.7	681.9
4	3.00	92699	131617	7.24	87.7	8.21	0.35	24.17	681.8
4	2.50	92699	131643	7.22	87.8	8.21	0.35	24.31	682.2

4	2.00	92699	131703	7.22	88.3	8.27	0.349	24.35	681.9
4	1.50	92699	131734	7.61	92.9	8.3	0.349	24.54	682
4	1.00	92699	131807	7.8	96	8.31	0.349	24.7	682
4	0.25	92699	131829	8.06	99	8.23	0.349	24.76	681.8
3	3.00	92699	132959	8.15	99.4	8.39	0.349	24.48	681.6
3	2.50	92699	133022	8.25	100.6	8.38	0.349	24.5	681.6
3	2.00	92699	133043	8.05	98.4	8.37	0.349	24.54	681.4
3	1.50	92699	133105	8.18	99.9	8.37	0.349	24.57	681.7
3	1.00	92699	133124	8.3	101.4	8.34	0.349	24.59	681.6
3	0.25	92699	133147	8.37	102.3	8.36	0.349	24.62	681.7
2	3.00	92699	134132	7.69	93.1	8.25	0.351	24.14	681.5
2	2.50	92699	134211	7.7	93.6	8.26	0.351	24.28	681.4
2	2.00	92699	134310	7.79	94.6	8.26	0.351	24.25	681
2	1.50	92699	134343	7.77	94	8.25	0.351	24.26	681.4
2	1.00	92699	134411	7.84	95.2	8.25	0.351	24.29	681.7
2	0.25	92699	134442	7.96	96.7	8.23	0.351	24.31	681.5
1	2.00	92699	142958	7.49	89.1	8.18	0.349	23.51	681.5
1	1.50	92699	143024	7.62	91.4	8.21	0.349	23.62	678.9
1	1.00	92699	143050	7.64	91.8	8.21	0.35	23.66	681.5
1	0.25	92699	143116	7.82	94	8.2	0.349	23.7	681.4
12	1.50	92699	144710	6.33	75.8	8.11	0.349	23.56	681.1
12	1.00	92699	144737	7.5	90.7	8.22	0.348	24.04	681.2
12	0.25	92699	144801	7.9	95.8	8.22	0.347	24.25	681.1
13	0.00	92799	115824	7.65	94.5	7.33	0.009	24.98	685.4

October 23, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
13	0.00	102299	135124	7.67	87.4	7.55	0.41	20.88	688.1
14	0.00	102299	142815	7.49	85.1	7.87	0.009	20.74	685.5
3	2.00	102399	142146	7.59	84.2	8.21	0.352	19.55	694.4
3	1.50	102399	142258	8.46	94.3	8.28	0.351	19.84	694.4
3	1.00	102399	142325	8.64	96.6	8.29	0.351	19.94	694.4
3	0.25	102399	142353	8.74	97.7	8.28	0.011	19.97	694.5
2	3.00	102399	143453	6.95	75.9	7.98	0.352	19.38	694.6
2	2.50	102399	143639	6.72	74.7	8	0.351	19.41	694.6
2	2.00	102399	143724	6.78	75.1	8.03	0.351	19.47	693.7
2	1.50	102399	143817	7.4	82.3	8.17	0.351	19.7	694.5
2	1.00	102399	143903	8.05	89.6	8.21	0.351	19.78	694.2
2	0.25	102399	143941	8.58	96	8.29	0.351	20.05	694.3
4	3.00	102399	150739	8.44	95.9	8.37	0.35	20.34	694.3
4	2.50	102399	150840	8.84	99.7	8.36	0.35	20.37	694.2
4	2.00	102399	150932	9.02	101.6	8.37	0.35	20.38	694.2
4	1.50	102399	151032	8.9	100.3	8.39	0.35	20.38	694.4
4	1.00	102399	151121	9.08	102.4	8.41	0.35	20.41	694.4
4	0.25	102399	151212	9.51	107.3	8.44	0.35	20.43	694.4
5	2.50	102399	152401	8.27	92.5	8.29	0.352	19.98	694
5	2.00	102399	152523	8.58	95.8	8.38	0.351	20.08	694.2
5	1.50	102399	152620	8.94	100.3	8.46	0.35	20.16	694
5	1.00	102399	152743	9.33	104.7	8.45	0.35	20.24	694.1
5	0.25	102399	152828	10.16	114.5	8.56	0.348	20.43	694.1
6	3.00	102399	154038	7.98	89.6	8.06	0.351	20.18	694.2
6	2.50	102399	154134	7.89	88.6	8.08	0.351	20.2	694.2
6	2.00	102399	154209	7.88	88.5	8.09	0.351	20.21	694.1
6	1.50	102399	154334	7.84	88	8.06	0.351	20.19	694.2
6	1.00	102399	154420	7.95	89.3	8.06	0.351	20.19	694.5
6	0.25	102399	154450	8.1	91	8.07	0.351	20.22	694.2
7	3.00	102399	155758	8.27	93.7	8.01	0.353	20.63	694
7	2.50	102399	155839	8.28	93.8	8.03	0.352	20.65	694
7	2.00	102399	155926	8.43	95.5	8.05	0.352	20.66	694.2
7	1.50	102399	160013	8.57	96.4	8.07	0.352	20.68	694.2
7	1.00	102399	160051	8.69	99.4	8.11	0.352	20.72	694.3
7	0.25	102399	160159	8.9	101	8.07	0.007	20.73	694.1
8	3.00	102399	160826	7.68	86.8	7.86	0.353	20.54	694.1
8	2.50	102399	160918	7.96	90.1	7.95	0.352	20.56	694
8	2.00	102399	160947	7.92	89.6	7.93	0.352	20.56	693.6
8	1.50	102399	161034	7.98	90.3	7.94	0.352	20.57	692.9
8	1.00	102399	161122	7.99	90.5	7.92	0.352	20.59	694.4
8	0.25	102399	161150	8.07	91.3	7.93	0.352	20.6	694
9	3.00	102399	163421	9.23	102.5	8.44	0.381	19.57	694
9	2.50	102399	163512	9.31	103.3	8.45	0.381	19.61	694.1

9	2.00	102399	163552	9.38	104.2	8.45	0.381	19.63	693.9
9	1.50	102399	163641	9.38	104.2	8.44	0.381	19.63	693.5
9	1.00	102399	163725	9.49	105.5	8.45	0.381	19.63	693.7
9	0.25	102399	163740	9.62	106.8	8.44	0.381	19.63	693.9
10	3.00	102399	164949	8.49	93.9	8.28	0.382	19.42	694.2
10	2.50	102399	165043	8.41	93.1	8.29	0.382	19.46	693.8
10	2.00	102399	165136	8.43	93.4	8.31	0.382	19.46	694.1
10	1.50	102399	165205	8.58	95	8.35	0.382	19.47	694.3
10	1.00	102399	165239	8.85	98	8.37	0.382	19.5	694.2
10	0.25	102399	165322	9.17	101.6	8.4	0.382	19.51	693.9
11	3.00	102399	171014	7.22	81	7.79	0.353	20.26	693.3
11	2.50	102399	171115	7.14	81	7.77	0.352	20.26	694
11	2.00	102399	171209	7.16	80.6	7.77	0.352	20.25	694.2
11	1.50	102399	171301	7.15	80.4	7.76	0.352	20.25	694.1
11	1.00	102399	171418	7.25	81.5	7.77	0.352	20.26	694
11	0.25	102399	171452	7.36	82.7	7.73	0.009	20.24	693.9
1	0.25	102499	162359	12	134.6	8.8	0.332	20.15	694
12	0.25	102499	173024	11.24	123.8	8.96	0.326	19.2	693.3

November 22, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
2	3.00	112299	133128	8.25	88.8	8.48	0.355	18.11	681.7
2	2.50	112299	133209	8.1	87.3	8.48	0.356	18.13	681.7
2	2.00	112299	133310	8.09	87.3	8.48	0.355	18.14	681.8
2	1.50	112299	133407	8.28	89.2	8.48	0.354	18.18	681.7
2	1.00	112299	133505	8.37	90.3	8.49	0.352	18.2	681.5
2	0.25	112299	133553	8.48	91.3	8.48	0.356	18.24	681.8
4	3.00	112299	135331	7.89	84.9	8.44	0.343	18.08	681.6
4	2.50	112299	135415	7.58	81.6	8.42	0.342	18.1	681.8
4	2.00	112299	135500	7.59	81.8	8.42	0.342	18.16	681.7
4	1.50	112299	135536	7.76	83.7	8.44	0.342	18.22	680.5
4	1.00	112299	135646	7.69	83.1	8.45	0.342	18.23	681.6
4	0.25	112299	135733	8.14	88	8.45	0.341	18.28	681.6
5	3.00	112299	141217	6.77	72.4	8.28	0.333	17.75	681.1
5	2.50	112299	141307	6.92	73.9	8.29	0.334	17.75	681.2
5	2.00	112299	141345	7.34	78.8	8.35	0.333	17.98	681.1
5	1.50	112299	141431	7.55	81.3	8.37	0.333	18.11	678.6
5	1.00	112299	141454	7.6	81.9	8.37	0.333	18.13	681.1
5	0.25	112299	141525	7.8	84.4	8.4	0.333	18.4	681.2
6	3.00	112299	142236	6.75	71.9	8.17	0.333	17.58	681
6	2.50	112299	142311	6.96	74.2	8.2	0.334	17.64	680.6
6	2.00	112299	142348	6.94	74.1	8.2	0.334	17.68	680.8
6	1.50	112299	142414	7	74.8	8.2	0.333	17.7	680.9
6	1.00	112299	142450	7.17	76.6	8.19	0.333	17.72	680.7
6	0.25	112299	142515	7.27	77.7	8.2	0.334	17.74	680.9
7	3.00	112299	143546	6.58	70.2	8.02	0.33	17.61	681
7	2.50	112299	143610	6.76	72.1	8.03	0.33	17.65	681.1
7	2.00	112299	143634	6.59	70.3	8.02	0.33	17.67	681
7	1.50	112299	143654	6.68	71.3	8.03	0.33	17.67	681.2
7	1.00	112299	143717	6.86	73.3	8.04	0.331	17.74	680.7
7	0.25	112299	143754	7	75	8.04	0.331	17.75	681.2
8	3.00	112299	144423	6.31	67.1	7.99	0.329	17.58	680.9
8	2.50	112299	144455	6.42	68.4	7.98	0.329	17.59	680.3
8	2.00	112299	144519	6.51	69.4	8	0.328	17.67	681.1
8	1.50	112299	144542	6.71	71.8	8.01	0.329	17.8	681.1
8	1.00	112299	144611	6.75	72.2	8.03	0.329	17.81	680.7
8	0.25	112299	144640	6.95	74.5	8.04	0.329	17.91	681.1
10	3.00	112299	150626	8.03	84.6	8.23	0.355	17.52	680.8
10	2.50	112299	150705	7.8	83	8.25	0.355	17.55	680.9
10	2.00	112299	150733	7.81	83.2	8.27	0.355	17.59	681
10	1.50	112299	150752	7.82	83.4	8.26	0.355	17.57	680.9
10	1.00	112299	150821	7.71	82.3	8.27	0.355	17.61	680.8
10	0.25	112299	150849	7.89	84.2	8.27	0.355	17.68	681.1
9	3.00	112299	151615	7.56	80.6	8.32	0.357	17.63	680.6

9	2.50	112299	151630	7.74	82.6	8.32	0.356	17.65	680.7
9	2.00	112299	151651	7.6	81	8.29	0.356	17.64	680.5
9	1.50	112299	151706	7.65	81.6	8.31	0.356	17.66	680.9
9	1.00	112299	151729	7.74	82.5	8.3	0.356	17.67	680.8
9	0.25	112299	151750	7.84	83.7	8.29	0.356	17.69	680.8
11	3.00	112299	153814	8.68	92.7	8.11	0.325	17.72	680.6
11	2.50	112299	153845	7.85	83.8	8.14	0.324	17.73	680.6
11	2.00	112299	153901	7.68	82	8.12	0.324	17.72	680.5
11	1.50	112299	153921	7.73	82.6	8.12	0.325	17.73	680.6
11	1.00	112299	153945	7.7	82.2	8.12	0.324	17.74	680.6
11	0.25	112299	154006	7.75	82.8	8.13	0.324	17.74	680.5
3	3.00	112299	155713	8.58	93	8.67	0.322	18.46	680.4
3	2.50	112299	155736	8.56	93.4	8.66	0.322	18.48	680.4
3	2.00	112299	155802	8.69	94.2	8.63	0.322	18.4	680.2
3	1.50	112299	155830	8.55	92.6	8.65	0.322	18.42	680.4
3	1.00	112299	155855	8.68	94.3	8.69	0.322	18.5	680.5
3	0.25	112299	160010	9	97.7	8.71	0.322	18.53	680.5
13	0.00	112399	103411	7.51	82.7	8.35	0.379	19.17	681.1
14	0.00	112399	123920	8.38	91.8	7.99	0.007	18.96	683.5
1	0.25	112399	130746	8.59	92.8	8.32	0.009	18.23	683.3

December 5, 1999

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
12	2.00	120599	113017	8.69	83.5	7.97	0.473	12.7	698.5
12	1.00	120599	113133	8.6	82.4	8.01	0.473	12.67	698
12	0.25	120599	113230	8.62	82.7	8	0.473	12.69	698.8
1	2.00	120599	115215	8.3	81.5	7.96	0.471	13.73	698.3
1	1.50	120599	115259	8.45	82.9	7.97	0.471	13.72	698.1
1	1.00	120599	115322	8.42	82.6	7.97	0.471	13.73	698.4
1	0.50	120599	115402	8.43	82.9	7.98	0.471	13.73	698.4
1	0.25	120599	115430	8.52	83.6	7.98	0.471	13.73	698.4
6	3.00	120599	122853	8.52	85.9	8	0.493	14.97	698.6
6	2.50	120599	122933	8.48	85.5	8.04	0.493	14.97	698.4
6	2.00	120599	123000	8.46	85.4	8.03	0.493	14.97	698.7
6	1.50	120599	123033	8.43	85.1	8.01	0.493	14.97	698.6
6	1.00	120599	123056	8.47	85.4	8.05	0.493	14.97	698.8
6	0.50	120599	123120	8.5	85.7	8.02	0.493	14.97	698.8
6	0.25	120599	123140	8.57	86.4	8.04	0.492	14.97	698.6
5	2.00	120599	124223	8.49	85.1	8.07	0.494	14.69	698.7
5	1.50	120599	124248	8.45	84.7	8.05	0.495	14.69	698.5
5	1.00	120599	124335	8.38	84.2	8.02	0.494	14.68	698.6
5	0.50	120599	124358	8.42	84.4	8.07	0.494	14.68	698.5
5	0.25	120599	124446	8.53	85.5	8.07	0.007	14.68	698.4
4	3.00	120599	125533	7.96	80.4	8.01	0.493	15.01	698.3
4	2.50	120599	125635	7.86	79.4	8.02	0.494	15.01	697.8
4	2.00	120599	125743	7.86	79.4	7.99	0.494	15.01	698.3
4	1.50	120599	125819	7.88	79.6	8.04	0.494	15.02	698.3
4	1.00	120599	125845	7.9	79.8	8.04	0.494	15.02	698.3
4	0.50	120599	125923	8.03	81.1	8.03	0.494	15.02	697.3
4	0.25	120599	125948	8.07	81.5	8.02	0.073	15.01	698.2
2	3.00	120599	131639	7.93	79.6	8.03	0.504	14.73	697.7
2	2.50	120599	131734	7.91	79.5	8.03	0.503	14.77	697
2	2.00	120599	131758	7.9	79.4	8.03	0.504	14.79	697.5
2	1.50	120599	131825	7.96	80.1	8.05	0.503	14.84	697.8
2	1.00	120599	131849	7.95	80	8.05	0.503	14.84	697.6
2	0.50	120599	131912	8.03	80.8	8.06	0.503	14.86	697.8
2	0.25	120599	131940	8.09	81.9	8.03	0.503	14.86	697.8
3	3.00	120599	134305	8.42	84	8.17	0.497	14.46	697.6
3	2.50	120599	134338	8.44	84.2	8.16	0.497	14.5	697.6
3	2.00	120599	134432	8.37	83.5	8.17	0.496	14.49	697.6
3	1.50	120599	134502	8.38	83.6	8.16	0.497	14.51	697.7
3	1.00	120599	134544	8.46	84.5	8.17	0.496	14.52	697
3	0.50	120599	134612	8.49	84.8	8.17	0.497	14.53	697.6
3	0.25	120599	134631	8.58	85.6	8.16	0.022	14.53	697.4
13	0.00	120699	103931	7.76	78.4	8.12	0.588	15.07	699.2

January 31, 2000

Site	Depth Meters	Date MMDDYY	Time HHMMSS	DO mg/l	DO% Sat	pH Units	SpCond mS/cm	Temp C	BPS mmHg
10	0.25	13000	123946	10.12	84.9	7.95	0.579	7	699.9
9	0.25	13000	130254	11.01	99.7	8.17	0.584	10.17	700.6
6	0.25	13000	134001	13.32	120.9	8.26	0.523	10.29	700.3
5	0.25	13000	135745	10.58	90.2	8.13	0.514	7.61	699.9
4	0.25	13000	140838	12.71	117.4	8.3	0.488	11.04	699.8
3	0.25	13000	142101	10.86	98.2	8.21	0.508	10.11	699.8
1	0.25	13000	143901	11.45	98.2	8.22	0.479	7.9	699
13	0.00	13100	131337	10.7	92.7	8.38	0.012	8.36	691.1
14	0.00	13100	135757	10.7	96	7.94	0.576	9.8	693.5
7	0.25	13100	143733	12.69	113.4	8.52	0.485	9.6	693.8
8	0.25	13100	143851	12.82	114.4	8.47	0.484	9.56	693.8
2	3.00	13100	152226	10.52	89.3	8.29	0.511	7.49	693.9
2	2.50	13100	152238	10.47	88.9	8.3	0.512	7.5	694
2	2.00	13100	152252	10.44	88.7	8.31	0.512	7.49	693.8
2	1.50	13100	152321	10.54	89.6	8.33	0.512	7.53	693.8
2	1.00	13100	152333	10.42	88.6	8.34	0.512	7.55	694
2	0.25	13100	152407	10.47	89.1	8.28	0.013	7.56	694

APPENDIX B
MTBE AND BTEX DATA FOR LAKE LEWISVILLE, TEXAS
FEBRUARY 1999 – FEBRUARY 2000

SITE SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZ ENE	p-XYLENE	m-XYLENE	o-XYLENE
1	1	1	1	1	1	1.4	0.1	0	0	0	0	0
1	1	1	1	1	1	1.5	0.1	0.0	0.0	0.0	0.0	0.0
1	1	1	1	1	1	.	.	.	.	.	.	.
2	1	1	8	1	1	8.1	0.1	0.0	0.0	0.0	0.0	0.0
2	1	1	8	1	1	6.9	0.1	0.0	0.0	0.0	0.0	0.0
2	1	1	8	1	1	.	.	.	.	.	.	.
2	1	1	8	2	1	.	.	.	.	.	.	.
2	1	1	8	2	1	.	.	.	.	.	.	.
2	1	1	8	2	1	.	.	.	.	.	.	.
2	1	1	8	3	1	.	.	.	.	.	.	.
2	1	1	8	3	1	.	.	.	.	.	.	.
2	1	1	8	3	1	.	.	.	.	.	.	.
2	1	1	8	4	1	.	.	.	.	.	.	.
2	1	1	8	4	1	.	.	.	.	.	.	.
2	1	1	8	4	1	.	.	.	.	.	.	.
2	1	1	8	5	1	.	.	.	.	.	.	.
2	1	1	8	5	1	.	.	.	.	.	.	.
2	1	1	8	5	1	.	.	.	.	.	.	.
3	1	1	2	1	1	5.9	0.1	0.0	0.0	0.0	0.0	0.0
3	1	1	2	1	1	3.8	0.0	0.0	0.0	0.0	0.0	0.0
3	1	1	2	1	1	.	.	.	.	.	.	.
4	1	1	2	1	1	3.7	0.0	0.0	0.0	0.0	0.0	0.0
4	1	1	2	1	1	5.1	0.0	0.0	0.0	0.0	0.0	0.0
4	1	1	2	1	1	.	.	.	.	.	.	.
5	1	1	1	1	1	1.8	0.0	0.0	0.0	0.0	0.0	0.0
5	1	1	1	1	1	1.8	0.0	0.0	0.0	0.0	0.0	0.0
5	1	1	1	1	1	.	.	.	.	.	.	.
6	1	1	2	1	1	.	.	.	.	.	.	.
6	1	1	2	1	1	.	.	.	.	.	.	.
6	1	1	2	1	1	.	.	.	.	.	.	.
7	1	1	5	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7	1	1	5	1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	1	1	5	1	1	.	.	.	.	.	.	.
8	1	1	5	1	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	1	1	5	1	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	1	1	5	1	1	.	.	.	.	.	.	.
9	1	1	1	1	1	3.5	0.0	0.0	0.0	0.0	0.0	0.0
9	1	1	1	1	1	3.5	0.0	0.0	0.0	0.0	0.0	0.0
9	1	1	1	1	1	.	.	.	.	.	.	.
10	1	1	2	1	1	1.8	0.0	0.0	0.0	0.0	0.0	0.0
10	1	1	2	1	1	1.2	0.0	0.0	0.0	0.0	0.0	0.0
10	1	1	2	1	1	.	.	.	.	.	.	.
11	1	1	3	1	1	1.0	0.0	0.0	0.0	0.0	0.0	0.0
11	1	1	3	1	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	1	1	3	1	1	.	.	.	.	.	.	.
12	1	1	4	1	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	1	1	4	1	1	1.1	0.0	0.0	0.0	0.0	0.0	0.0
12	1	1	4	1	1	.	.	.	.	.	.	.
13	1	1	6	6	1	.	.	.	.	.	.	.
13	1	1	6	6	1	.	.	.	.	.	.	.
13	1	1	6	6	1	.	.	.	.	.	.	.
14	1	1	6	6	1	.	.	.	.	.	.	.
14	1	1	6	6	1	.	.	.	.	.	.	.
14	1	1	6	6	1	.	.	.	.	.	.	.

4/23/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	2	1	1	1	2	1.1	0.0	0.0	0.0	0.0	0.0	0.0
1	2	1	1	1	2	1.0	0.1	0.1	0.0	0.1	0.1	0.1
1	2	1	1	1	2	1.1	0.0	0.0	0.0	0.0	0.0	0.0
2	2	1	8	1	2	2.3	0.1	1.3	0.1	0.1	0.1	0.1
2	2	1	8	1	2	1.9	0.1	0.1	0.0	0.1	0.1	0.1
2	2	1	8	1	2	2.2	0.1	0.1	0.0	0.1	0.1	0.1
2	2	1	8	2	2	.	.	.	.	.	.	.
2	2	1	8	2	2	.	.	.	.	.	.	.
2	2	1	8	2	2	.	.	.	.	.	.	.
2	2	1	8	3	2	.	.	.	.	.	.	.
2	2	1	8	3	2	.	.	.	.	.	.	.
2	2	1	8	3	2	.	.	.	.	.	.	.
2	2	1	8	4	2	.	.	.	.	.	.	.
2	2	1	8	4	2	.	.	.	.	.	.	.
2	2	1	8	4	2	.	.	.	.	.	.	.
2	2	1	8	5	2	.	.	.	.	.	.	.
2	2	1	8	5	2	.	.	.	.	.	.	.
2	2	1	8	5	2	.	.	.	.	.	.	.
3	2	1	2	1	2	1.6	0	0	0	0	0	0
3	2	1	2	1	2	1.5	0	0	0	0	0	0
3	2	1	2	1	2	1.5	0	0	0	0	0	0
4	2	1	2	1	2	1	0	0	0	0	0	0
4	2	1	2	1	2	0.1	0	0	0	0	0	0
4	2	1	2	1	2	0.1	0	0	0	0	0	0
5	2	1	1	1	2	2	0	0	0	0	0	0
5	2	1	1	1	2	2	0	0	0	0	0	0
5	2	1	1	1	2	3.4	0	0	0	0	0	0
6	2	1	2	1	2	1	0	0	0	0	0	0
6	2	1	2	1	2	1.6	0	0	0	0	0	0
6	2	1	2	1	2	1.9	0	0	0	0	0	0
7	2	1	5	1	2	0.1	0	0	0	0	0	0
7	2	1	5	1	2	0	0	0	0	0	0	0

7	2	1	5	1	2	0	0	0	0	0	0	0
8	2	1	5	1	2	0	0	0	0	0	0	0
8	2	1	5	1	2	0	0	0	0	0	0	0
8	2	1	5	1	2	0	0	0	0	0	0	0
9	2	1	1	1	2	1.7	0	0	0	0	0	0
9	2	1	1	1	2	2.4	0	0	0	0	0	0
9	2	1	1	1	2	1.5	0	0	0	0	0	0
10	2	1	2	1	2	1.1	0	0	0	0	0	0
10	2	1	2	1	2	1.1	0	0	0	0	0	0
10	2	1	2	1	2	1.1	0	0	0	0	0	0
11	2	1	3	1	2	0	0	0	0	0	0	0
11	2	1	3	1	2	0	0	0	0	0	0	0
11	2	1	3	1	2	0	0	0	0	0	0	0
12	2	1	4	1	2	0	0	0	0	0	0	0
12	2	1	4	1	2	0	0	0	0	0	0	0
12	2	1	4	6	2	0	0	0	0	0	0	0
13	2	1	6	6	2	.	.	.	.	.	.	.
13	2	1	6	6	2	.	.	.	.	.	.	.
13	2	1	6	6	2	.	.	.	.	.	.	.
14	2	1	6	6	2	.	.	.	.	.	.	.
14	2	1	6	6	2	.	.	.	.	.	.	.
14	2	1	6	6	2	.	.	.	.	.	.	.

5/9/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	3	2	1	1	3	.	.	.	.	.	.	.
1	3	2	1	1	3	1.5	0	0	0	0	0	0
1	3	2	1	1	3	1.5	0	0	0	0	0	0
2	3	2	8	1	3	1.5	0	0	0	0	0	0
2	3	2	8	1	3	7.1	0	0	0	0	0	0
2	3	2	8	1	3	7.1	0	0	0	0	0	0
2	3	2	8	2	3	7.1	0	0	0	0	0	0
2	3	2	8	2	3	.	.	.	.	.	.	.
2	3	2	8	2	3	.	.	.	.	.	.	.
2	3	2	8	3	3	.	.	.	.	.	.	.
2	3	2	8	3	3	.	.	.	.	.	.	.
2	3	2	8	3	3	.	.	.	.	.	.	.
2	3	2	8	4	3	.	.	.	.	.	.	.
2	3	2	8	4	3	.	.	.	.	.	.	.
2	3	2	8	4	3	.	.	.	.	.	.	.
2	3	2	8	5	3	.	.	.	.	.	.	.
2	3	2	8	5	3	.	.	.	.	.	.	.
2	3	2	8	5	3	.	.	.	.	.	.	.
3	3	2	2	1	3	7.6	0	0	0	0	0	0
3	3	2	2	1	3	7.6	0	0	0	0	0	0
3	3	2	2	1	3	7.6	0	0	0	0	0	0
4	3	2	2	1	3	10.4	0	0	0	0	0	0
4	3	2	2	1	3	10.4	0	0	0	0	0	0
4	3	2	2	1	3	10.4	0	0	0	0	0	0
5	3	2	1	1	3	3.6	0	0	0	0	0	0
5	3	2	1	1	3	3.6	0	0	0	0	0	0
5	3	2	1	1	3	3.6	0	0	0	0	0	0
6	3	2	2	1	3	3	0	0	0	0	0	0
6	3	2	2	1	3	3	0	0	0	0	0	0
6	3	2	2	1	3	3	0	0	0	0	0	0
7	3	2	5	1	3	0	0	0	0	0	0	0
7	3	2	5	1	3	0	0	0	0	0	0	0

7	3	2	5	1	3	0	0	0	0	0	0	0
8	3	2	5	1	3	0.1	0	0	0	0	0	0
8	3	2	5	1	3	0.1	0	0	0	0	0	0
8	3	2	5	1	3	0.1	0	0	0	0	0	0
9	3	2	1	1	3	5.1	0	0	0	0	0	0
9	3	2	1	1	3	5.1	0	0	0	0	0	0
9	3	2	1	1	3	5.1	0	0	0	0	0	0
10	3	2	2	1	3	3.1	0	0	0	0	0	0
10	3	2	2	1	3	3.1	0	0	0	0	0	0
10	3	2	2	1	3	3.1	0	0	0	0	0	0
11	3	2	3	1	3	0	0	0	0	0	0	0
11	3	2	3	1	3	0	0	0	0	0	0	0
11	3	2	3	1	3	0	0	0	0	0	0	0
12	3	2	4	1	3	1.2	0	0	0	0	0	0
12	3	2	4	1	3	1.2	0	0	0	0	0	0
12	3	2	4	1	3	1.2	0	0	0	0	0	0
13	3	2	6	6	3 .	.	.	.	.	.	.	
13	3	2	6	6	3 .	.	.	.	.	.	.	
13	3	2	6	6	3 .	.	.	.	.	.	.	
14	3	2	6	6	3 .	.	.	.	.	.	.	
14	3	2	6	6	3 .	.	.	.	.	.	.	
14	3	2	6	6	3 .	.	.	.	.	.	.	

5/27/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	3	2	1	1	4	2.7	0.0	0.0	0.0	0.0	0.0	0.0
1	3	2	1	1	4	.	.	.	.	.	.	.
1	3	2	1	1	4	.	.	.	.	.	.	.
2	3	2	8	1	4	2.8	0.0	0.0	0.0	0.0	0.0	0.0
2	3	2	8	1	4	.	.	.	.	.	.	.
2	3	2	8	1	4	.	.	.	.	.	.	.
2	3	2	8	2	4	.	.	.	.	.	.	.
2	3	2	8	2	4	.	.	.	.	.	.	.
2	3	2	8	2	4	.	.	.	.	.	.	.
2	3	2	8	3	4	.	.	.	.	.	.	.
2	3	2	8	3	4	.	.	.	.	.	.	.
2	3	2	8	3	4	.	.	.	.	.	.	.
2	3	2	8	4	4	.	.	.	.	.	.	.
2	3	2	8	4	4	.	.	.	.	.	.	.
2	3	2	8	4	4	.	.	.	.	.	.	.
2	3	2	8	5	4	.	.	.	.	.	.	.
2	3	2	8	5	4	.	.	.	.	.	.	.
2	3	2	8	5	4	.	.	.	.	.	.	.
3	3	2	2	1	4	2.5	0.0	0.0	0.0	0.0	0.0	0.0
3	3	2	2	1	4	.	.	.	.	.	.	.
3	3	2	2	1	4	.	.	.	.	.	.	.
4	3	2	2	1	4	3.3	0.0	0.0	0.0	0.0	0.0	0.0
4	3	2	2	1	4	.	.	.	.	.	.	.
4	3	2	2	1	4	.	.	.	.	.	.	.
5	3	2	1	1	4	3.2	0.0	0.0	0.0	0.0	0.0	0.0
5	3	2	1	1	4	.	.	.	.	.	.	.
5	3	2	1	1	4	.	.	.	.	.	.	.
6	3	2	2	1	4	1.3	0.0	0.0	0.0	0.0	0.0	0.0
6	3	2	2	1	4	.	.	.	.	.	.	.
6	3	2	2	1	4	.	.	.	.	.	.	.
7	3	2	5	1	4	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	3	2	5	1	4	.	.	.	.	.	.	.
7	3	2	5	1	4	.	.	.	.	.	.	.
8	3	2	5	1	4	6.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3	2	5	1	4	.	.	.	.	.	.	.
8	3	2	5	1	4	.	.	.	.	.	.	.
9	3	2	1	1	4	2.1	0.0	0.0	0.0	0.0	0.0	0.0
9	3	2	1	1	4	.	.	.	.	.	.	.
9	3	2	1	1	4	.	.	.	.	.	.	.
10	3	2	2	1	4	1.8	0.0	0.0	0.0	0.0	0.0	0.0
10	3	2	2	1	4	.	.	.	.	.	.	.
10	3	2	2	1	4	.	.	.	.	.	.	.
11	3	2	3	1	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	3	2	3	1	4	.	.	.	.	.	.	.
11	3	2	3	1	4	.	.	.	.	.	.	.
12	3	2	4	1	4	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	3	2	4	1	4	.	.	.	.	.	.	.
12	3	2	4	1	4	.	.	.	.	.	.	.
13	3	2	6	6	4	.	.	.	.	.	.	.
13	3	2	6	6	4	.	.	.	.	.	.	.
13	3	2	6	6	4	.	.	.	.	.	.	.
14	3	2	6	6	4	.	.	.	.	.	.	.
14	3	2	6	6	4	.	.	.	.	.	.	.
14	3	2	6	6	4	.	.	.	.	.	.	.

5/31/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	3	2	1	1	5	0.8	0	0	0	0	0	0
1	3	2	1	1	5	.	.	.	.	.	.	.
1	3	2	1	1	5	.	.	.	.	.	.	.
2	3	2	8	1	5	2.2	0.0	0.0	0.0	0.0	0.0	0.0
2	3	2	8	1	5	.	.	.	.	.	.	.
2	3	2	8	1	5	.	.	.	.	.	.	.
2	3	2	8	2	5	.	.	.	.	.	.	.
2	3	2	8	2	5	.	.	.	.	.	.	.
2	3	2	8	2	5	.	.	.	.	.	.	.
2	3	2	8	3	5	.	.	.	.	.	.	.
2	3	2	8	3	5	.	.	.	.	.	.	.
2	3	2	8	3	5	.	.	.	.	.	.	.
2	3	2	8	4	5	.	.	.	.	.	.	.
2	3	2	8	4	5	.	.	.	.	.	.	.
2	3	2	8	4	5	.	.	.	.	.	.	.
2	3	2	8	5	5	.	.	.	.	.	.	.
2	3	2	8	5	5	.	.	.	.	.	.	.
2	3	2	8	5	5	.	.	.	.	.	.	.
3	3	2	2	1	5	1.9	0.0	0.0	0.0	0.0	0.0	0.0
3	3	2	2	1	5	.	.	.	.	.	.	.
3	3	2	2	1	5	.	.	.	.	.	.	.
4	3	2	2	1	5	2.9	0	0	0	0	0	0
4	3	2	2	1	5	.	.	.	.	.	.	.
4	3	2	2	1	5	.	.	.	.	.	.	.
5	3	2	1	1	5	3.4	0.0	0.0	0.0	0.0	0.0	0.0
5	3	2	1	1	5	.	.	.	.	.	.	.
5	3	2	1	1	5	.	.	.	.	.	.	.
6	3	2	2	1	5	1.4	0.0	0.0	0.0	0.0	0.0	0.0
6	3	2	2	1	5	.	.	.	.	.	.	.
6	3	2	2	1	5	.	.	.	.	.	.	.
7	3	2	5	1	5	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	3	2	5	1	5	.	.	.	.	.	.	.

7	3	2	5	1	5	.	.	.	.	.	.	.
8	3	2	5	1	5	4.8	0.0	0.0	0.0	0.0	0.0	0.0
8	3	2	5	1	5	.	.	.	.	.	.	.
8	3	2	5	1	5	.	.	.	.	.	.	.
9	3	2	1	1	5	2.4	0.0	0.0	0.0	0.0	0.0	0.0
9	3	2	1	1	5	.	.	.	.	.	.	.
9	3	2	1	1	5	.	.	.	.	.	.	.
10	3	2	2	1	5	1.3	0.0	0.0	0.0	0.0	0.0	0.0
10	3	2	2	1	5	.	.	.	.	.	.	.
10	3	2	2	1	5	.	.	.	.	.	.	.
11	3	2	3	1	5	.	.	.	.	.	.	.
11	3	2	3	1	5	.	.	.	.	.	.	.
11	3	2	3	1	5	.	.	.	.	.	.	.
12	3	2	4	1	5	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	3	2	4	1	5	.	.	.	.	.	.	.
12	3	2	4	1	5	.	.	.	.	.	.	.
13	3	2	6	6	5	.	.	.	.	.	.	.
13	3	2	6	6	5	.	.	.	.	.	.	.
13	3	2	6	6	5	.	.	.	.	.	.	.
14	3	2	6	6	5	.	.	.	.	.	.	.
14	3	2	6	6	5	.	.	.	.	.	.	.
14	3	2	6	6	5	.	.	.	.	.	.	.

6/16/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	4	2	1	1	6	1.2	0	0	0	0	0	0
1	4	2	1	1	6	.	.	.	.	.	.	.
1	4	2	1	1	6	.	.	.	.	.	.	.
2	4	2	8	1	6	5.2	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	6	.	.	.	.	.	.	.
2	4	2	8	1	6	.	.	.	.	.	.	.
2	4	2	8	2	6	.	.	.	.	.	.	.
2	4	2	8	2	6	.	.	.	.	.	.	.
2	4	2	8	2	6	.	.	.	.	.	.	.
2	4	2	8	3	6	.	.	.	.	.	.	.
2	4	2	8	3	6	.	.	.	.	.	.	.
2	4	2	8	3	6	.	.	.	.	.	.	.
2	4	2	8	4	6	.	.	.	.	.	.	.
2	4	2	8	4	6	.	.	.	.	.	.	.
2	4	2	8	4	6	.	.	.	.	.	.	.
2	4	2	8	5	6	.	.	.	.	.	.	.
2	4	2	8	5	6	.	.	.	.	.	.	.
2	4	2	8	5	6	.	.	.	.	.	.	.
3	4	2	2	1	6	4.3	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2	2	1	6	.	.	.	.	.	.	.
3	4	2	2	1	6	.	.	.	.	.	.	.
4	4	2	2	1	6	5.6	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	6	.	.	.	.	.	.	.
4	4	2	2	1	6	.	.	.	.	.	.	.
5	4	2	1	1	6	5.3	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	6	.	.	.	.	.	.	.
5	4	2	1	1	6	.	.	.	.	.	.	.
6	4	2	2	1	6	3.2	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	6	.	.	.	.	.	.	.
6	4	2	2	1	6	.	.	.	.	.	.	.
7	4	2	5	1	6	1.3	0.0	0.0	0.0	0.0	0.0	0.0
7	4	2	5	1	6	.	.	.	.	.	.	.

7	4	2	5	1	6	.	.	.	.	.	.	.
8	4	2	5	1	6	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	6	.	.	.	.	.	.	.
8	4	2	5	1	6	.	.	.	.	.	.	.
9	4	2	1	1	6	5.1	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	6	.	.	.	.	.	.	.
9	4	2	1	1	6	.	.	.	.	.	.	.
10	4	2	2	1	6	2.2	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	6	.	.	.	.	.	.	.
10	4	2	2	1	6	.	.	.	.	.	.	.
11	4	2	3	1	6	1.1	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	6	.	.	.	.	.	.	.
11	4	2	3	1	6	.	.	.	.	.	.	.
12	4	2	4	1	6	1.4	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	6	.	.	.	.	.	.	.
12	4	2	4	1	6	.	.	.	.	.	.	.
13	4	2	6	6	6	.	.	.	.	.	.	.
13	4	2	6	6	6	.	.	.	.	.	.	.
13	4	2	6	6	6	.	.	.	.	.	.	.
14	4	2	6	6	6	.	.	.	.	.	.	.
14	4	2	6	6	6	.	.	.	.	.	.	.
14	4	2	6	6	6	.	.	.	.	.	.	.

6/18/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	4	2	1	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1	4	2	1	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1	4	2	1	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	7	3.5	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	7	3.3	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	7	3.4	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	2	7	.	.	.	.	.	.	.
2	4	2	8	2	7	.	.	.	.	.	.	.
2	4	2	8	2	7	.	.	.	.	.	.	.
2	4	2	8	3	7	.	.	.	.	.	.	.
2	4	2	8	3	7	.	.	.	.	.	.	.
2	4	2	8	3	7	.	.	.	.	.	.	.
2	4	2	8	4	7	.	.	.	.	.	.	.
2	4	2	8	4	7	.	.	.	.	.	.	.
2	4	2	8	4	7	.	.	.	.	.	.	.
2	4	2	8	5	7	.	.	.	.	.	.	.
2	4	2	8	5	7	.	.	.	.	.	.	.
2	4	2	8	5	7	.	.	.	.	.	.	.
3	4	2	2	1	7	3.6	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2	2	1	7	4.5	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2	2	1	7	3.7	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	7	6.6	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	7	7.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	7	6.5	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	7	6.4	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	7	6.5	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	7	6.3	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	7	4.3	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	7	4.8	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	7	5.0	0.0	0.0	0.0	0.0	0.0	0.0
7	4	2	5	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	4	2	5	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	4	2	5	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	7	3.6	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	7	3.7	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	7	3.5	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	7	2.5	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	7	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	7	2.8	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	7	1.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	7	1.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	7	1.2	0.0	0.0	0.0	0.0	0.0	0.0
13	4	2	6	6	7	.	.	.	.	.	.	.
13	4	2	6	6	7	.	.	.	.	.	.	.
13	4	2	6	6	7	.	.	.	.	.	.	.
14	4	2	6	6	7	.	.	.	.	.	.	.
14	4	2	6	6	7	.	.	.	.	.	.	.
14	4	2	6	6	7	.	.	.	.	.	.	.

6/24/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	4	2	1	1	8	1.4	0.0	0.0	0.0	0.0	0.0	0.0
1	4	2	1	1	8	1.6	0.0	0.0	0.0	0.0	0.0	0.0
1	4	2	1	1	8	1.3	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	8	4.2	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	8	4.2	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	8	4.1	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	2	8	.	.	.	.	.	.	.
2	4	2	8	2	8	.	.	.	.	.	.	.
2	4	2	8	2	8	.	.	.	.	.	.	.
2	4	2	8	3	8	.	.	.	.	.	.	.
2	4	2	8	3	8	.	.	.	.	.	.	.
2	4	2	8	3	8	.	.	.	.	.	.	.
2	4	2	8	4	8	.	.	.	.	.	.	.
2	4	2	8	4	8	.	.	.	.	.	.	.
2	4	2	8	4	8	.	.	.	.	.	.	.
2	4	2	8	5	8	.	.	.	.	.	.	.
2	4	2	8	5	8	.	.	.	.	.	.	.
2	4	2	8	5	8	.	.	.	.	.	.	.
3	4	2	2	1	8	3.7	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2	2	1	8	3.7	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2	2	1	8	3.3	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	8	6.0	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	8	6.6	0.0	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	8	5.5	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	8	4.7	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	8	4.7	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	8	4.5	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	8	2.4	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	8	2.1	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	8	2.3	0.0	0.0	0.0	0.0	0.0	0.0
7	4	2	5	1	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	4	2	5	1	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	4	2	5	1	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	8	1.3	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	8	1.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	8	1.1	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	8	2.7	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	8	2.8	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	8	2.9	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	8	3.1	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	8	2.8	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	8	2.5	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	8	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	4	2	6	6	8	.	.	.	.	.	.	.
13	4	2	6	6	8	.	.	.	.	.	.	.
13	4	2	6	6	8	.	.	.	.	.	.	.
14	4	2	6	6	8	.	.	.	.	.	.	.
14	4	2	6	6	8	.	.	.	.	.	.	.
14	4	2	6	6	8	.	.	.	.	.	.	.

6/30/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	4	2	1	1	9	1.1	0.0	0.0	0.0	0.0	0.0	0.0
1	4	2	1	1	9	1.3	0.0	0.0	0.0	0.0	0.0	0.0
1	4	2	1	1	9	1.1	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	9	4.4	0.0	0.0	0.0	0.0	0.0	0.0
2	4	2	8	1	9	4.9	0.0	0.0	0.0	0.1	0.0	0.0
2	4	2	8	1	9	5.2	0.0	0.0	0.0	0.1	0.0	0.0
2	4	2	8	2	9	.	.	.	.	.	.	.
2	4	2	8	2	9	.	.	.	.	.	.	.
2	4	2	8	2	9	.	.	.	.	.	.	.
2	4	2	8	3	9	.	.	.	.	.	.	.
2	4	2	8	3	9	.	.	.	.	.	.	.
2	4	2	8	3	9	.	.	.	.	.	.	.
2	4	2	8	4	9	.	.	.	.	.	.	.
2	4	2	8	4	9	.	.	.	.	.	.	.
2	4	2	8	4	9	.	.	.	.	.	.	.
2	4	2	8	5	9	.	.	.	.	.	.	.
2	4	2	8	5	9	.	.	.	.	.	.	.
2	4	2	8	5	9	.	.	.	.	.	.	.
3	4	2	2	1	9	4.8	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2	2	1	9	4.4	0.0	0.1	0.0	0.0	0.0	0.0
3	4	2	2	1	9	5.1	0.1	0.0	0.0	0.0	0.0	0.0
4	4	2	2	1	9	4.1	0.0	0.0	0.0	0.1	0.1	0.0
4	4	2	2	1	9	4.3	0.1	0.1	0.1	0.1	0.1	0.1
4	4	2	2	1	9	3.9	0.1	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	9	3.3	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	9	3.2	0.0	0.0	0.0	0.0	0.0	0.0
5	4	2	1	1	9	3.4	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	9	1.9	0.0	0.0	0.0	0.0	0.0	0.1
6	4	2	2	1	9	2.2	0.0	0.0	0.0	0.0	0.0	0.0
6	4	2	2	1	9	2.3	0.1	0.1	0.1	0.0	0.0	0.0
7	4	2	5	1	9	1.4	0.0	0.0	0.0	0.0	0.0	0.0
7	4	2	5	1	9	1.1	0.1	0.0	0.0	0.1	0.0	0.0

7	4	2	5	1	9	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	9	0.1	0.0	0.0	0.0	0.1	0.0	0.0
8	4	2	5	1	9	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	4	2	5	1	9	4.5	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	9	5.3	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	9	5.1	0.0	0.0	0.0	0.0	0.0	0.0
9	4	2	1	1	9	5.1	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	9	4.1	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	9	4.1	0.0	0.0	0.0	0.0	0.0	0.0
10	4	2	2	1	9	3.8	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	9	1.0	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	9	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	4	2	3	1	9	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	4	2	4	1	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	4	2	6	6	9	.	.	.	.	.	.	.
13	4	2	6	6	9	.	.	.	.	.	.	.
13	4	2	6	6	9	.	.	.	.	.	.	.
14	4	2	6	6	9	.	.	.	.	.	.	.
14	4	2	6	6	9	.	.	.	.	.	.	.
14	4	2	6	6	9	.	.	.	.	.	.	.

7/6/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	5	2	1	1	10	3.7	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	10	4.1	0.0	0.0	0.0	0.1	0.0	0.0
1	5	2	1	1	10	4.4	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	10	12.8	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	10	12.3	0.0	0.0	0.0	0.1	0.0	0.0
2	5	2	8	1	10	13.5	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	2	10	.	.	.	.	.	.	.
2	5	2	8	2	10	.	.	.	.	.	.	.
2	5	2	8	2	10	.	.	.	.	.	.	.
2	5	2	8	3	10	.	.	.	.	.	.	.
2	5	2	8	3	10	.	.	.	.	.	.	.
2	5	2	8	3	10	.	.	.	.	.	.	.
2	5	2	8	4	10	.	.	.	.	.	.	.
2	5	2	8	4	10	.	.	.	.	.	.	.
2	5	2	8	4	10	.	.	.	.	.	.	.
2	5	2	8	5	10	.	.	.	.	.	.	.
2	5	2	8	5	10	.	.	.	.	.	.	.
2	5	2	8	5	10	.	.	.	.	.	.	.
3	5	2	2	1	10	9.4	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	10	9.8	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	10	9.4	0.0	0.0	0.0	0.1	0.0	0.0
4	5	2	2	1	10	7.2	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	10	6.6	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	10	7.7	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	10	8.7	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	10	7.4	0.1	0.1	0.0	0.0	0.0	0.0
5	5	2	1	1	10	7.8	0.0	0.1	0.0	0.0	0.0	0.0
6	5	2	2	1	10	5.4	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	10	5.6	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	10	5.3	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	5	2	5	1	10	0.1	0.0	0.0	0.0	0.0	0.1	0.0
8	5	2	5	1	10	1.5	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	10	1.8	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	10	1.1	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	10	8.7	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	10	8.8	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	10	8.8	0.0	0.0	0.0	0.0	0.0	0.1
10	5	2	2	1	10	11.2	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	10	11.7	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	10	10.7	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	10	0.1	0.0	0.0	0.0	0.1	0.0	0.0
11	5	2	3	1	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	10	0.1	0.0	0.0	0.0	0.1	0.0	0.0
13	5	2	6	6	10	1.5	0.0	0.0	0.0	0.0	0.0	0.0
13	5	2	6	6	10	2.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5	2	6	6	10	2.4	0.1	0.0	0.0	0.0	0.0	0.0
14	5	2	6	6	10	.	.	.	.	.	.	.
14	5	2	6	6	10	.	.	.	.	.	.	.
14	5	2	6	6	10	.	.	.	.	.	.	.

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SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	5	2	1	1	11	1.5	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	11	1.4	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	11	1.5	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	11	6.6	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	11	6.2	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	11	6.5	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	2	11	.	.	.	.	.	.	.
2	5	2	8	2	11	.	.	.	.	.	.	.
2	5	2	8	2	11	.	.	.	.	.	.	.
2	5	2	8	3	11	.	.	.	.	.	.	.
2	5	2	8	3	11	.	.	.	.	.	.	.
2	5	2	8	3	11	.	.	.	.	.	.	.
2	5	2	8	4	11	.	.	.	.	.	.	.
2	5	2	8	4	11	.	.	.	.	.	.	.
2	5	2	8	4	11	.	.	.	.	.	.	.
2	5	2	8	5	11	.	.	.	.	.	.	.
2	5	2	8	5	11	.	.	.	.	.	.	.
2	5	2	8	5	11	.	.	.	.	.	.	.
3	5	2	2	1	11	7.4	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	11	7.1	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	11	7.3	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	11	8.2	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	11	9.4	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	11	9.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	11	7.7	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	11	7.6	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	11	8.1	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	11	5.0	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	11	4.8	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	11	4.4	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	5	2	5	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	11	5.5	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	11	5.3	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	11	5.2	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	11	5.2	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	11	5.2	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	11	5.4	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	11	1.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	11	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5	2	6	6	11	.	.	.	.	.	.	.
13	5	2	6	6	11	.	.	.	.	.	.	.
13	5	2	6	6	11	.	.	.	.	.	.	.
14	5	2	6	6	11	.	.	.	.	.	.	.
14	5	2	6	6	11	.	.	.	.	.	.	.
14	5	2	6	6	11	.	.	.	.	.	.	.

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SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	5	2	1	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	12	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	12	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	12	3.7	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	2	12	.	.	.	.	.	.	.
2	5	2	8	2	12	.	.	.	.	.	.	.
2	5	2	8	2	12	.	.	.	.	.	.	.
2	5	2	8	3	12	.	.	.	.	.	.	.
2	5	2	8	3	12	.	.	.	.	.	.	.
2	5	2	8	3	12	.	.	.	.	.	.	.
2	5	2	8	4	12	.	.	.	.	.	.	.
2	5	2	8	4	12	.	.	.	.	.	.	.
2	5	2	8	4	12	.	.	.	.	.	.	.
2	5	2	8	5	12	.	.	.	.	.	.	.
2	5	2	8	5	12	.	.	.	.	.	.	.
2	5	2	8	5	12	.	.	.	.	.	.	.
3	5	2	2	1	12	4.1	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	12	3.9	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	12	4.2	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	12	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	12	5.2	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	12	5.7	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	12	5.7	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	12	5.5	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	12	6.1	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	12	2.3	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	12	2.4	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	12	2.2	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	5	2	5	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	12	2.5	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	12	2.6	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	12	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	12	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	12	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	12	2.5	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	12	0.1	0.0	0.0	0.0	0.0	0.0	0.0
13	5	2	6	6	12	.	.	.	.	.	.	.
13	5	2	6	6	12	.	.	.	.	.	.	.
13	5	2	6	6	12	.	.	.	.	.	.	.
14	5	2	6	6	12	.	.	.	.	.	.	.
14	5	2	6	6	12	.	.	.	.	.	.	.
14	5	2	6	6	12	.	.	.	.	.	.	.

7/26/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	5	2	1	1	13	1.4	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	13	1.2	0.0	0.0	0.0	0.0	0.0	0.0
1	5	2	1	1	13	1.2	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	13	6.3	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	13	6.6	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	1	13	6.8	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	2	13	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	2	13	4.2	0.0	0.1	0.0	0.0	0.0	0.0
2	5	2	8	2	13	4.5	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	3	13	5.9	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	3	13	5.5	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	3	13	6.9	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	4	13	.	.	.	.	.	.	.
2	5	2	8	4	13	.	.	.	.	.	.	.
2	5	2	8	4	13	.	.	.	.	.	.	.
2	5	2	8	5	13	2.8	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	5	13	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	5	2	8	5	13	2.5	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	13	5.9	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	13	5.7	0.0	0.0	0.0	0.0	0.0	0.0
3	5	2	2	1	13	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	13	8.3	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	13	8.1	0.0	0.0	0.0	0.0	0.0	0.0
4	5	2	2	1	13	8.5	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	13	5.4	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	13	5.3	0.0	0.0	0.0	0.0	0.0	0.0
5	5	2	1	1	13	4.9	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	13	3.6	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	13	4.3	0.0	0.0	0.0	0.0	0.0	0.0
6	5	2	2	1	13	3.5	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	13	1.2	0.0	0.0	0.0	0.0	0.0	0.0
7	5	2	5	1	13	1.1	0.0	0.0	0.0	0.0	0.0	0.0

7	5	2	5	1	13	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	13	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	13	1.1	0.0	0.0	0.0	0.0	0.0	0.0
8	5	2	5	1	13	1.1	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	13	6.3	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	13	6.1	0.0	0.0	0.0	0.0	0.0	0.0
9	5	2	1	1	13	5.5	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	13	5.7	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	13	5.2	0.0	0.0	0.0	0.0	0.0	0.0
10	5	2	2	1	13	5.2	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	13	2.0	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	13	1.7	0.0	0.0	0.0	0.0	0.0	0.0
11	5	2	3	1	13	1.6	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	13	2.2	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	5	2	4	1	13	1.3	0.0	0.0	0.0	0.0	0.0	0.0
13	5	2	6	6	13	2.2	0.0	0.0	0.1	1.1	0.1	0.0
13	5	2	6	6	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	5	2	6	6	13	1.3	0.0	0.0	0.0	0.0	0.0	0.0
14	5	2	6	6	13	.	.	.	.	.	.	.
14	5	2	6	6	13	.	.	.	.	.	.	.
14	5	2	6	6	13	.	.	.	.	.	.	.

8/2/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	6	2	1	1	14	2.1	0.0	0.0	0.0	0.0	0.0	0.0
1	6	2	1	1	14	2.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	2	1	1	14	2.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	14	12.5	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	14	11.4	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	14	12.7	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	14	14.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	14	13.9	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	14	13.2	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	14	5.8	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	14	5.9	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	14	6.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	4	14	.	.	.	.	.	.	.
2	6	2	8	4	14	.	.	.	.	.	.	.
2	6	2	8	4	14	.	.	.	.	.	.	.
2	6	2	8	5	14	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	14	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	14	3.8	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	14	9.5	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	14	10.0	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	14	10.2	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	14	9.0	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	14	9.8	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	14	8.5	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	14	8.6	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	14	9.0	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	14	8.9	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	14	4.3	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	14	4.1	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	14	4.2	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	14	3.5	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	14	3.3	0.0	0.0	0.0	0.0	0.0	0.0

7	6	2	5	1	14	3.2	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	14	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	14	1.1	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	14	1.1	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	14	10.7	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	14	10.4	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	14	11.2	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	14	6.4	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	14	6.5	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	14	6.2	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	14	1.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	14	1.0	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	14	1.0	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	14	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	14	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	14	0.1	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	14	2.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	14	1.9	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	14	1.7	0.0	0.0	0.0	0.0	0.0	0.0
14	6	2	6	6	14	.	.	.	.	.	.	.
14	6	2	6	6	14	.	.	.	.	.	.	.
14	6	2	6	6	14	.	.	.	.	.	.	.

8/12/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZ ENE	p-XYLENE	m-XYLENE	o-XYLENE
1	6	2	1	1	15	.	.	.	.	.	.	.
1	6	2	1	1	15	.	.	.	.	.	.	.
1	6	2	1	1	15	.	.	.	.	.	.	.
2	6	2	8	1	15	2.9	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	15	3.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	15	3.0	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	15	3.2	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	15	3.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	15	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	15	3.8	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	15	3.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	15	3.4	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	4	15	.	.	.	.	.	.	.
2	6	2	8	4	15	.	.	.	.	.	.	.
2	6	2	8	4	15	.	.	.	.	.	.	.
2	6	2	8	5	15	3.0	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	15	3.2	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	15	3.1	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	15	3.5	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	15	3.1	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	15	3.3	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	15	3.1	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	15	3.3	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	15	3.2	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	15	2.9	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	15	3.1	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	15	3.1	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	15	1.5	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	15	1.5	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	15	1.3	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0

7	6	2	5	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	15	3.4	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	15	3.3	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	15	3.2	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	15	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	15	2.7	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	15	2.7	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	15	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	15	.	.	.	.	.	.	.
12	6	2	4	1	15	.	.	.	.	.	.	.
12	6	2	4	1	15	.	.	.	.	.	.	.
13	6	2	6	6	15	.	.	.	.	.	.	.
13	6	2	6	6	15	.	.	.	.	.	.	.
13	6	2	6	6	15	.	.	.	.	.	.	.
14	6	2	6	6	15	.	.	.	.	.	.	.
14	6	2	6	6	15	.	.	.	.	.	.	.
14	6	2	6	6	15	.	.	.	.	.	.	.

8/21/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	6	2	1	1	16	4.7	0.0	0.0	0.0	0.0	0.0	0.0
1	6	2	1	1	16	4.1	0.0	0.0	0.0	0.0	0.0	0.0
1	6	2	1	1	16	6.0	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	16	4.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	16	3.9	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	16	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	16	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	16	3.8	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	16	3.4	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	16	3.7	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	16	3.8	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	16	4.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	4	16	.	.	.	.	.	.	.
2	6	2	8	4	16	.	.	.	.	.	.	.
2	6	2	8	4	16	.	.	.	.	.	.	.
2	6	2	8	5	16	3.9	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	16	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	16	4.0	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	16	5.7	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	16	5.4	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	16	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	16	6.1	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	16	6.3	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	16	6.3	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	16	5.6	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	16	5.6	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	16	5.9	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	16	3.0	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	16	3.0	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	16	2.9	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	16	1.0	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	16	1.0	0.0	0.0	0.0	0.0	0.0	0.0

7	6	2	5	1	16	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	16	0.9	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	16	0.9	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	16	1.0	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	16	3.8	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	16	4.0	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	16	3.7	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	16	2.3	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	16	2.3	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	16	2.4	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	16	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	16	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	16	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	16	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	16	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	16	0.1	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	16	2.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	16	1.3	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	16	1.1	0.0	0.0	0.0	0.0	0.0	0.0
14	6	2	6	6	16	.	.	.	.	.	.	.
14	6	2	6	6	16	.	.	.	.	.	.	.
14	6	2	6	6	16	.	.	.	.	.	.	.

8/26/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	6	2	1	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1	6	2	1	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
1	6	2	1	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	17	4.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	17	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	1	17	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	17	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	17	3.3	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	2	17	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	17	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	17	3.7	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	3	17	4.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	4	17	.	.	.	.	.	.	.
2	6	2	8	4	17	.	.	.	.	.	.	.
2	6	2	8	4	17	.	.	.	.	.	.	.
2	6	2	8	5	17	3.8	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	17	3.9	0.0	0.0	0.0	0.0	0.0	0.0
2	6	2	8	5	17	3.6	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	17	3.3	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	17	3.6	0.0	0.0	0.0	0.0	0.0	0.0
3	6	2	2	1	17	3.2	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	17	3.8	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	17	4.3	0.0	0.0	0.0	0.0	0.0	0.0
4	6	2	2	1	17	3.7	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	17	4.9	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	17	4.1	0.0	0.0	0.0	0.0	0.0	0.0
5	6	2	1	1	17	4.0	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	17	2.2	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	17	2.1	0.0	0.0	0.0	0.0	0.0	0.0
6	6	2	2	1	17	2.2	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	17	1.0	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2	5	1	17	1.1	0.0	0.0	0.0	0.0	0.0	0.0

7	6	2	5	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	17	1.0	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	17	1.4	0.0	0.0	0.0	0.0	0.0	0.0
8	6	2	5	1	17	1.2	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	17	2.3	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	17	2.3	0.0	0.0	0.0	0.0	0.0	0.0
9	6	2	1	1	17	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	17	2.2	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	17	2.1	0.0	0.0	0.0	0.0	0.0	0.0
10	6	2	2	1	17	2.3	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	6	2	3	1	17	0.1	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	6	2	4	1	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	17	1.5	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	17	1.0	0.0	0.0	0.0	0.0	0.0	0.0
13	6	2	6	6	17	1.0	0.0	0.0	0.0	0.0	0.0	0.0
14	6	2	6	6	17	.	.	.	.	.	.	.
14	6	2	6	6	17	.	.	.	.	.	.	.
14	6	2	6	6	17	.	.	.	.	.	.	.

9/3/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	7	2	1	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	18	3.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	18	3.7	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	18	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	18	3.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	18	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	18	4.1	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	18	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	18	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	18	3.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	18	3.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	18	3.8	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	18	4.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	5	18	.	.	.	.	.	.	.
2	7	2	8	5	18	.	.	.	.	.	.	.
2	7	2	8	5	18	.	.	.	.	.	.	.
3	7	2	2	1	18	4.9	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	18	4.9	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	18	5.5	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	18	4.3	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	18	4.2	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	18	4.6	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	18	3.7	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	18	4.2	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	18	3.5	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	18	3.1	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	18	3.1	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	18	3.3	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	18	1.4	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	18	1.8	0.0	0.0	0.0	0.0	0.0	0.0

7	7	2	5	1	18	1.5	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	18	1.5	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	18	1.3	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	18	1.4	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	18	3.3	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	18	3.3	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	18	3.4	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	18	2.4	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	18	2.3	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	18	2.2	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	18	6.1	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	18	1.7	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	18	1.6	0.0	0.0	0.0	0.0	0.0	0.0
14	7	2	6	6	18	.	.	.	.	.	.	.
14	7	2	6	6	18	.	.	.	.	.	.	.
14	7	2	6	6	18	.	.	.	.	.	.	.

9/6/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	7	2	1	1	19	1.5	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	19	1.6	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	19	1.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	19	13.4	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	19	14.2	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	19	16.7	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	19	8.2	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	19	9.3	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	19	8.3	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	19	8.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	19	8.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	19	7.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	19	.	.	.	.	.	.	.
2	7	2	8	4	19	.	.	.	.	.	.	.
2	7	2	8	4	19	.	.	.	.	.	.	.
2	7	2	8	5	19	6.2	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	5	19	6.1	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	5	19	6.1	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	19	8.9	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	19	8.5	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	19	8.7	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	19	9.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	19	9.5	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	19	8.8	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	19	7.6	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	19	7.4	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	19	7.4	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	19	3.9	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	19	3.8	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	19	3.8	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	19	2.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	19	2.2	0.0	0.0	0.0	0.0	0.0	0.0

7	7	2	5	1	19	1.9	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	19	1.1	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	19	1.4	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	19	1.5	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	19	3.9	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	19	4.2	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	19	3.8	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	19	2.7	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	19	2.6	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	19	2.7	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	19	2.1	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	19	1.9	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	19	1.9	0.0	0.0	0.0	0.0	0.0	0.0
14	7	2	6	6	19	.	.	.	.	.	.	.
14	7	2	6	6	19	.	.	.	.	.	.	.
14	7	2	6	6	19	.	.	.	.	.	.	.

9/17/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	7	2	1	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	20	.	.	.	.	.	.	.
2	7	2	8	1	20	3.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	20	2.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	20	2.7	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	20	2.4	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	20	2.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	20	2.3	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	20	2.7	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	20	2.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	20	2.7	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	20	2.8	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	20	2.8	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	20	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	5	20	.	.	.	.	.	.	.
2	7	2	8	5	20	.	.	.	.	.	.	.
2	7	2	8	5	20	.	.	.	.	.	.	.
3	7	2	2	1	20	2.4	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	20	2.7	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	20	2.3	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	20	5.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	20	5.0	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	20	4.7	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	20	3.1	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	20	2.5	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	20	2.8	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	20	1.8	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	20	1.9	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	20	1.8	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7	7	2	5	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	20	2.1	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	20	2.2	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	20	2.2	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	20	1.4	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	20	1.4	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	20	1.7	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7	2	6	6	20	.	.	.	.	.	.	.
14	7	2	6	6	20	.	.	.	.	.	.	.
14	7	2	6	6	20	.	.	.	.	.	.	.
15	7	2	7	6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	7	2	7	6	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0

9/26/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	7	2	1	1	21	1.7	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	21	1.9	0.0	0.0	0.0	0.0	0.0	0.0
1	7	2	1	1	21	1.8	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	21	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	21	2.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	1	21	2.9	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	21	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	21	3.1	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	2	21	3.2	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	21	2.8	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	21	2.7	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	3	21	3.0	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	21	2.5	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	21	2.6	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	4	21	2.5	0.0	0.0	0.0	0.0	0.0	0.0
2	7	2	8	5	21	.	.	.	.	.	.	.
2	7	2	8	5	21	.	.	.	.	.	.	.
2	7	2	8	5	21	.	.	.	.	.	.	.
3	7	2	2	1	21	1.4	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	21	1.7	0.0	0.0	0.0	0.0	0.0	0.0
3	7	2	2	1	21	1.5	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	21	3.2	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	21	3.3	0.0	0.0	0.0	0.0	0.0	0.0
4	7	2	2	1	21	3.2	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	21	1.2	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	21	1.3	0.0	0.0	0.0	0.0	0.0	0.0
5	7	2	1	1	21	1.0	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	7	2	2	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7	2	5	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7	7	2	5	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	2	5	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	21	1.1	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	21	1.1	0.0	0.0	0.0	0.0	0.0	0.0
9	7	2	1	1	21	1.0	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	7	2	2	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7	2	3	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	7	2	4	1	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	7	2	6	6	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7	2	6	6	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7	2	6	6	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7	2	6	6	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0

11/22/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	9	1	1	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	9	1	1	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	9	1	1	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	9	1	8	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
2	9	1	8	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
2	9	1	8	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
2	9	1	8	2	23	.	.	.	.	.	.	.	
2	9	1	8	2	23	.	.	.	.	.	.	.	
2	9	1	8	2	23	.	.	.	.	.	.	.	
2	9	1	8	3	23	.	.	.	.	.	.	.	
2	9	1	8	3	23	.	.	.	.	.	.	.	
2	9	1	8	3	23	.	.	.	.	.	.	.	
2	9	1	8	4	23	.	.	.	.	.	.	.	
2	9	1	8	4	23	.	.	.	.	.	.	.	
2	9	1	8	4	23	.	.	.	.	.	.	.	
2	9	1	8	5	23	.	.	.	.	.	.	.	
2	9	1	8	5	23	.	.	.	.	.	.	.	
2	9	1	8	5	23	.	.	.	.	.	.	.	
3	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
3	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
3	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
4	9	1	2	1	23	1.9	0.0	0.0	0.0	0.0	0.0	0.0	
4	9	1	2	1	23	1.6	0.0	0.0	0.0	0.0	0.0	0.0	
4	9	1	2	1	23	1.6	0.0	0.0	0.0	0.0	0.0	0.0	
5	9	1	1	1	23	1.6	0.0	0.0	0.0	0.0	0.0	0.0	
5	9	1	1	1	23	1.4	0.0	0.0	0.0	0.0	0.0	0.0	
5	9	1	1	1	23	1.5	0.0	0.0	0.0	0.0	0.0	0.0	
6	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
6	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
6	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
7	9	1	5	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
7	9	1	5	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

7	9	1	5	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9	1	5	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9	1	5	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	9	1	5	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	9	1	1	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	9	1	1	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	9	1	1	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	9	1	2	1	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	9	1	3	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	9	1	3	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	9	1	3	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9	1	4	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9	1	4	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9	1	4	1	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	9	1	6	6	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	9	1	6	6	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	9	1	6	6	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9	1	6	6	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9	1	6	6	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9	1	6	6	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0

12/5/99

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	10	1	1	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	10	1	1	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	10	1	1	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	2	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	2	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	2	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	3	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	3	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	3	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	4	24	.	.	.	.	.	.	.
2	10	1	8	4	24	.	.	.	.	.	.	.
2	10	1	8	4	24	.	.	.	.	.	.	.
2	10	1	8	5	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	5	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	10	1	8	5	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
4	10	1	2	1	24	1.1	0.0	0.0	0.0	0.0	0.0	0.0
4	10	1	2	1	24	1.1	0.0	0.0	0.0	0.0	0.0	0.0
4	10	1	2	1	24	1.1	0.0	0.0	0.0	0.0	0.0	0.0
5	10	1	1	1	24	1.1	0.0	0.0	0.0	0.0	0.0	0.0
5	10	1	1	1	24	1.0	0.0	0.0	0.0	0.0	0.0	0.0
5	10	1	1	1	24	1.1	0.0	0.0	0.0	0.0	0.0	0.0
6	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
6	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
6	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	10	1	5	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	10	1	5	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7	10	1	5	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	10	1	5	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	10	1	5	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	10	1	5	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	10	1	1	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	10	1	1	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
9	10	1	1	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
10	10	1	2	1	24	0.1	0.0	0.0	0.0	0.0	0.0	0.0
11	10	1	3	1	24	.	.	.	.	.	.	.
11	10	1	3	1	24	.	.	.	.	.	.	.
11	10	1	3	1	24	.	.	.	.	.	.	.
12	10	1	4	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	10	1	4	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	10	1	4	1	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10	1	6	6	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10	1	6	6	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	10	1	6	6	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	10	1	6	6	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	10	1	6	6	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	10	1	6	6	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1/31/00

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	11	1	1	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	11	1	1	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	11	1	1	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	2	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	3	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	4	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11	1	8	5	25	.	.	.	.	.	.	.
2	11	1	8	5	25	.	.	.	.	.	.	.
2	11	1	8	5	25	.	.	.	.	.	.	.
3	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11	1	2	1	25	0.1	0.0	0.0	0.0	0.0	0.0	0.0
4	11	1	2	1	25	0.1	0.0	0.0	0.0	0.0	0.0	0.0
4	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11	1	1	1	25	0.1	0.0	0.0	0.0	0.0	0.0	0.0
5	11	1	1	1	25	0.1	0.0	0.0	0.0	0.0	0.0	0.0
5	11	1	1	1	25	0.1	0.0	0.0	0.0	0.0	0.0	0.0
6	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	11	1	5	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	11	1	5	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7	11	1	5	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	11	1	5	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	11	1	5	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	11	1	5	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	11	1	1	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	11	1	1	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	11	1	1	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	11	1	2	1	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	11	1	3	1	25	.	.	.	.	.	.	.
11	11	1	3	1	25	.	.	.	.	.	.	.
11	11	1	3	1	25	.	.	.	.	.	.	.
12	11	1	4	1	25	.	.	.	.	.	.	.
12	11	1	4	1	25	.	.	.	.	.	.	.
12	11	1	4	1	25	.	.	.	.	.	.	.
13	11	1	6	6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	11	1	6	6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	11	1	6	6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	11	1	6	6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	11	1	6	6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	11	1	6	6	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2/12/00

SITE	MONTH	SEASON	LOCATION	DEPTH	DATE	MTBE	BENZENE	TOLUENE	ETHYLBENZENE	p-XYLENE	m-XYLENE	o-XYLENE
1	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	2	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	2	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	2	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	3	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	3	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	3	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	4	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	4	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	4	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	12	1	8	5	26	.	.	.	.	.	.	.
2	12	1	8	5	26	.	.	.	.	.	.	.
2	12	1	8	5	26	.	.	.	.	.	.	.
3	12	1	2	1	26	1.8	0.0	0.0	0.0	0.0	0.0	0.0
3	12	1	2	1	26	1.4	0.0	0.0	0.0	0.0	0.0	0.0
3	12	1	2	1	26	1.5	0.0	0.0	0.0	0.0	0.0	0.0
4	12	1	2	1	26	1.9	0.0	0.0	0.0	0.0	0.0	0.0
4	12	1	2	1	26	1.5	0.0	0.0	0.0	0.0	0.0	0.0
4	12	1	2	1	26	1.5	0.0	0.0	0.0	0.0	0.0	0.0
5	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	12	1	2	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	12	1	2	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	12	1	2	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	12	1	5	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	12	1	5	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0

7	12	1	5	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	12	1	5	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	12	1	5	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	12	1	5	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	12	1	1	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	12	1	2	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	12	1	2	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	12	1	2	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	12	1	3	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	12	1	3	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	12	1	3	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	12	1	4	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	12	1	4	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	12	1	4	1	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	12	1	6	6	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	12	1	6	6	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	12	1	6	6	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	12	1	6	6	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	12	1	6	6	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	12	1	6	6	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX C
NONPARAMETRIC MULTIPLE RANGE TEST WITH STUDENT-NEWMAN-KEULS ANALYSIS OF MTBE DATA
FEBRUARY 1999 – FEBRUARY 2000

APR23-SNK

Class Levels Values

STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 36 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	3516.833333	319.712121	31.88	<.0001
Error	24	240.666667	10.027778		
Corrected Total	35	3757.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.935950	17.11712	3.166667	18.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	3516.833333	319.712121	31.88	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	3516.833333	319.712121	31.88	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	10.02778

Number of Means	2	3	4	5	6	7
Critical Range	5.3363692	6.4569176	7.1325868	7.6171766	7.9944186	8.3027811

Number of Means	8	9	10	11	12
Critical Range	8.563198	8.788335	8.9864396	9.1631808	9.3226223

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	33.000	3	STATION 5
	A			
	A	32.167	3	STATION 2
	A			
B	A	29.000	3	STATION 9
B				
B	C	24.833	3	STATION 3
B	C			
B	C	24.000	3	STATION 6
	C			
D	C	20.000	3	STATION 10
D	C			
D	C	18.667	3	STATION 1
D				
D		14.000	3	STATION 4
	E	8.333	3	STATION 7
	E			
	E	6.000	3	STATION 11
	E			
	E	6.000	3	STATION 8
	E			
	E	6.000	3	STATION 12

MAY9-SNK

```
Class      Levels  Values
STA           14  STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2
STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9
                         Number of observations    54
NOTE: Due to missing values, only 36 observations can be used in this analysis.
                              The GLM Procedure
Dependent Variable: RANKMTBE   Rank for Variable MTBE
                                   Sum of
     Source                 DF        Squares    Mean Square    F Value    Pr > F
     Model                  11     3678.750000     334.431818     47.56    <.0001
     Error                  24      168.750000       7.031250
     Corrected Total        35     3847.500000
            R-Square     Coeff Var     Root MSE    RANKMTBE Mean
            0.956140     14.33325      2.651650       18.50000
     Source                 DF      Type I SS    Mean Square    F Value    Pr > F
     STA                    11     3678.750000     334.431818     47.56    <.0001
     Source                 DF    Type III SS    Mean Square    F Value    Pr > F
     STA                    11     3678.750000     334.431818     47.56    <.0001
                              The GLM Procedure
                     Student-Newman-Keuls Test for RANKMTBE
NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis
                     but not under partial null hypotheses.
                      Alpha                         0.05
                      Error Degrees of Freedom        24
                      Error Mean Square          7.03125
                      Harmonic Mean of Cell Sizes 2.938776
                        NOTE: Cell sizes are not equal.
 Number of Means          2          3          4          5          6          7
 Critical Range    4.5147864   5.4628162   6.0344599   6.4444427   6.7636049   7.0244921
  Number of Means          8          9         10         11         12
  Critical Range    7.2448154    7.4352906    7.6028951    7.7524254    7.8873194
             Means with the same letter are not significantly different.
              SNK Grouping         Mean      N    STA

                        A       35.000      3    STATION 4
                        A
                        A       32.000      3    STATION 3

                        B       26.000      3    STATION 9
                        B
                        B       25.250      4    STATION 2
                        B
                        B       23.000      3    STATION 5
                        B
                    C   B       20.000      3    STATION 10
                    C
                    C   D       17.000      3    STATION 6
                        D
                    E   D       14.000      2    STATION 1
                    E
                    E   F       11.000      3    STATION 12
                        F
                    G   F        8.000      3    STATION 8
                    G
                    G            3.500      3    STATION 11
                    G
                    G            3.500      3    STATION 7
```

MAY27-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 12 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	142.5000000	12.9545455	.	.
Error	0	0.0000000	.		
Corrected Total	11	142.5000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
1.000000	.	.	6.500000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	142.5000000	12.9545455	.	.

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	142.5000000	12.9545455	.	.

The GLM Procedure

Level of STA	N	-----------RANKMTBE---------- Mean	Std Dev
STATION 1	1	8.0000000	.
STATION 10	1	5.0000000	.
STATION 11	1	1.0000000	.
STATION 12	1	2.5000000	.
STATION 2	1	9.0000000	.
STATION 3	1	7.0000000	.
STATION 4	1	11.0000000	.
STATION 5	1	10.0000000	.
STATION 6	1	4.0000000	.
STATION 7	1	2.5000000	.
STATION 8	1	12.0000000	.
STATION 9	1	6.0000000	.

MAY31-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 11 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	10	109.5000000	10.9500000	.	.
Error	0	0.0000000	.		
Corrected Total	10	109.5000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
1.000000	.	.	6.000000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	10	109.5000000	10.9500000	.	.

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	10	109.5000000	10.9500000	.	.

The GLM Procedure

Level of STA	N	-----------RANKMTBE---------- Mean	Std Dev
STATION 1	1	3.0000000	.
STATION 10	1	4.0000000	.
STATION 12	1	1.5000000	.
STATION 2	1	7.0000000	.
STATION 3	1	6.0000000	.
STATION 4	1	9.0000000	.
STATION 5	1	10.0000000	.
STATION 6	1	5.0000000	.
STATION 7	1	1.5000000	.
STATION 8	1	11.0000000	.
STATION 9	1	8.0000000	.

JUN16-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 12 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	143.0000000	13.0000000	.	.
Error	0	0.0000000	.		
Corrected Total	11	143.0000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
1.000000	.	.	6.500000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	143.0000000	13.0000000	.	.

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	143.0000000	13.0000000	.	.

The GLM Procedure

Level of STA	N	-----------RANKMTBE---------- Mean	Std Dev
STATION 1	1	3.0000000	.
STATION 10	1	6.0000000	.
STATION 11	1	2.0000000	.
STATION 12	1	5.0000000	.
STATION 2	1	10.0000000	.
STATION 3	1	8.0000000	.
STATION 4	1	12.0000000	.
STATION 5	1	11.0000000	.
STATION 6	1	7.0000000	.
STATION 7	1	4.0000000	.
STATION 8	1	1.0000000	.
STATION 9	1	9.0000000	.

JUN18-SNK

Class Levels Values
STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 36 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	3703.666667	336.696970	225.51	<.0001
Error	24	35.833333	1.493056		
Corrected Total	35	3739.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.990418	6.604900	1.221907	18.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	3703.666667	336.696970	225.51	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	3703.666667	336.696970	225.51	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	1.493056

Number of Means	2	3	4	5	6	7
Critical Range	2.0591193	2.4914999	2.7522172	2.9392035	3.0847681	3.2037544

Number of Means	8	9	10	11	12
Critical Range	3.3042403	3.3911128	3.4675545	3.5357528	3.5972757

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	34.8333	3	STATION 4
B	32.1667	3	STATION 5
C	28.6667	3	STATION 6
D	25.6667	3	STATION 3
E	23.5000	3	STATION 9
F	20.1667	3	STATION 2
G	17.0000	3	STATION 10
H	14.0000	3	STATION 12
I	6.5000	3	STATION 11
I			
I	6.5000	3	STATION 1
I			
I	6.5000	3	STATION 8
I			
I	6.5000	3	STATION 7

JUN24-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 36 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	3831.166667	348.287879	266.77	<.0001
Error	24	31.333333	1.305556		
Corrected Total	35	3862.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.991888	6.176265	1.142609	18.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	3831.166667	348.287879	266.77	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	3831.166667	348.287879	266.77	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	1.305556

Number of Means	2	3	4	5	6	7
Critical Range	1.9254897	2.3298104	2.573608	2.7484596	2.8845775	2.9958421

Number of Means	8	9	10	11	12
Critical Range	3.0898067	3.1710416	3.2425224	3.3062949	3.3638252

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	35.0000	3	STATION 4
B	32.0000	3	STATION 5
C	29.0000	3	STATION 2
D	26.0000	3	STATION 3
E	21.5000	3	STATION 10
E			
E	21.5000	3	STATION 9
F	17.0000	3	STATION 6
G	13.8333	3	STATION 1
H	11.1667	3	STATION 8
I	6.5000	3	STATION 7
I			
I	6.5000	3	STATION 11
J	2.0000	3	STATION 12

JUN30-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 36 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	3405.166667	309.560606	16.10	<.0001
Error	24	461.333333	19.222222		
Corrected Total	35	3866.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.880685	23.69900	4.384315	18.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	3405.166667	309.560606	16.10	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	3405.166667	309.560606	16.10	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	19.22222

Number of Means	2	3	4	5	6	7
Critical Range	7.3883135	8.939736	9.8752139	10.546139	11.068438	11.495372

Number of Means	8	9	10	11	12
Critical Range	11.855925	12.167632	12.441911	12.686613	12.907363

Means with the same letter are not significantly different.

```
SNK Grouping         Mean     N   STA
        A          34.000     3   STATION 9
        A
     B  A          31.167     3   STATION 2
     B  A
     B  A          30.167     3   STATION 3
     B
     B  C          24.000     3   STATION 4
     B  C
     B  C          23.000     3   STATION 10
        C
     D  C          19.000     3   STATION 5
     D  C
     D  C  E       16.000     3   STATION 6
     D  C  E
     D  C  E       13.667     3   STATION 8
     D     E
     D  F  E       11.667     3   STATION 1
     D  F  E
     D  F  E       10.333     3   STATION 7
        F  E
        F  E        7.000     3   STATION 11
        F
        F           2.000     3   STATION 12
```

JUL6-SNK

Class Levels Values
STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 39 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	4844.000000	403.666667	308.69	<.0001
Error	26	34.000000	1.307692		
Corrected Total	38	4878.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.993030	5.717719	1.143544	20.00000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	4844.000000	403.666667	308.69	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	4844.000000	403.666667	308.69	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test cntrols the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	26
Error Mean Square	1.307692

Number of Means	2	3	4	5	6	7
Critical Range	1.919252	2.3201443	2.5614377	2.7342955	2.8687526	2.978593

Number of Means	8	9	10	11	12	13
Critical Range	3.0713112	3.1514382	3.2219225	3.2847899	3.3414914	3.3931021

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	38.0000	3	STATION 2
B	35.0000	3	STATION 10
C	32.0000	3	STATION 3
D	28.8333	3	STATION 9
E	25.8333	3	STATION 5
F	23.3333	3	STATION 4
G	20.0000	3	STATION 6
H	17.0000	3	STATION 1
I	13.5000	3	STATION 13
J	11.5000	3	STATION 8
K	5.0000	3	STATION 11
K			
K	5.0000	3	STATION 12
K			
K	5.0000	3	STATION 7

JUL19-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 36 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	3739.500000	339.954545	98.90	<.0001
Error	24	82.500000	3.437500		
Corrected Total	35	3822.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.978414	10.02189	1.854050	18.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	3739.500000	339.954545	98.90	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	3739.500000	339.954545	98.90	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	3.4375

Number of Means	2	3	4	5	6	7
Critical Range	3.1243874	3.7804565	4.1760537	4.4597758	4.680647	4.8611899

Number of Means	8	9	10	11	12
Critical Range	5.0136612	5.1454766	5.2614647	5.3649448	5.4582961

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	35.000	3	STATION 4
	A			
B	A	32.000	3	STATION 5
B				
B	C	29.000	3	STATION 3
	C			
	C	26.000	3	STATION 2
	D	22.000	3	STATION 9
	D			
	D	21.000	3	STATION 10
	E	17.000	3	STATION 6
	E			
	E	14.000	3	STATION 1
	F	8.667	3	STATION 11
	F			
	F	7.000	3	STATION 7
	F			
	F	5.167	3	STATION 8
	F			
	F	5.167	3	STATION 12

JUL23-SNK
The GLM Procedure
Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54
NOTE: Due to missing values, only 36 observations can be used in this analysis.
The GLM Procedure
Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	3577.833333	325.257576	106.69	<.0001
Error	24	73.166667	3.048611		
Corrected Total	35	3651.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.979960	9.437985	1.746027	18.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	3577.833333	325.257576	106.69	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	3577.833333	325.257576	106.69	<.0001

The GLM Procedure
Student-Newman-Keuls Test for RANKMTBE
NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	24
Error Mean Square	3.048611

Number of Means	2	3	4	5	6	7
Critical Range	2.9423514	3.560196	3.9327445	4.1999362	4.4079387	4.5779627

Number of Means	8	9	10	11	12
Critical Range	4.7215506	4.845686	4.9549163	5.0523674	5.1402797

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	34.333	3	STATION 5
A			
A	32.667	3	STATION 4
B	28.667	3	STATION 3
B			
B	26.333	3	STATION 2
C	21.500	3	STATION 10
C			
C	21.500	3	STATION 9
D	17.000	3	STATION 6
E	8.500	3	STATION 11
E			
E	8.500	3	STATION 1
E			
E	8.500	3	STATION 7
E			
E	8.500	3	STATION 8
E			
E	6.000	3	STATION 12

JUL26-SNK

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 48 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	7689.583333	640.798611	14.85	<.0001
Error	35	1510.416667	43.154762		
Corrected Total	47	9200.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.835824	26.81318	6.569228	24.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	7689.583333	640.798611	14.85	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	7689.583333	640.798611	14.85	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	35
Error Mean Square	43.15476
Harmonic Mean of Cell Sizes	3.183673

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	10.570313	12.742305	14.04205	14.969678	15.689285	16.275932
Number of Means	**8**	**9**	**10**	**11**	**12**	**13**
Critical Range	16.770322	17.197006	17.571927	17.906021	18.207109	18.480976

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	47.000	3	STATION 4
	A			
B	A	38.500	3	STATION 9
B	A			
B	A	36.333	3	STATION 3
B				
B		31.917	12	STATION 2
B				
B		31.833	3	STATION 10
B				
B		30.333	3	STATION 5
B				
B	C	23.333	3	STATION 6
	C			
D	C	15.000	3	STATION 11
D	C			
D	C	10.333	3	STATION 1
D	C			
D	C	10.167	3	STATION 12
D	C			
D	C	10.167	3	STATION 13
D				
D		6.167	3	STATION 7
D				
D		5.167	3	STATION 8

AUG2-SNK

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 48 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	7562.916667	630.243056	13.45	<.0001
Error	35	1640.083333	46.859524		
Corrected Total	47	9203.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.821788	27.94041	6.845402	24.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	7562.916667	630.243056	13.45	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	7562.916667	630.243056	13.45	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	35
Error Mean Square	46.85952
Harmonic Mean of Cell Sizes	3.183673

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	11.014693	13.277998	14.632384	15.59901	16.348869	16.960179
Number of Means	8	9	10	11	12	13
Critical Range	17.475354	17.919976	18.310659	18.658798	18.972544	19.257924

Means with the same letter are not significantly different.

SNK Grouping			Mean	N	STA
	A		41.000	3	STATION 9
	A				
B	A		37.667	3	STATION 3
B	A				
B	A		34.250	12	STATION 2
B	A				
B	A		34.167	3	STATION 4
B	A				
B	A		33.167	3	STATION 5
B	A				
B	A	C	29.000	3	STATION 10
B		C			
B	D	C	23.000	3	STATION 6
	D	C			
E	D	C	17.000	3	STATION 7
E	D				
E	D		13.833	3	STATION 1
E	D				
E	D		11.167	3	STATION 13
E	D				
E	D		7.500	3	STATION 8
E					
E			5.500	3	STATION 11
E					
E			2.000	3	STATION 12

AUG12-SNK

The GLM Procedure

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 39 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	3976.104167	441.789352	14.87	<.0001
Error	29	861.395833	29.703305		
Corrected Total	38	4837.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.821934	27.25037	5.450074	20.00000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	9	3976.104167	441.789352	14.87	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	9	3976.104167	441.789352	14.87	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	29
Error Mean Square	29.7033
Harmonic Mean of Cell Sizes	3.243243

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6
Critical Range	8.7532957	10.56977	11.660471	12.440733	13.047022

Number of Means	7	8	9	10
Critical Range	13.541918	13.959407	14.32002	14.637103

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	32.167	3	STATION 9
	A			
	A	31.000	3	STATION 3
	A			
	A	27.500	3	STATION 4
	A			
	A	27.208	12	STATION 2
	A			
B	A	20.500	3	STATION 5
B				
B	C	14.000	3	STATION 10
B	C			
B	C	11.000	3	STATION 6
	C			
	C	5.000	3	STATION 7
	C			
	C	5.000	3	STATION 8
	C			
	C	5.000	3	STATION 11

AUG-21-SNK

Class Levels Values
STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 48 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	8801.604167	733.467014	67.66	<.0001
Error	35	379.395833	10.839881		
Corrected Total	47	9181.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.958676	13.43836	3.292397	24.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	8801.604167	733.467014	67.66	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	8801.604167	733.467014	67.66	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	35
Error Mean Square	10.83988
Harmonic Mean of Cell Sizes	3.183673

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	5.29768	6.3862498	7.0376623	7.5025753	7.863231	8.1572497
Number of Means	8	9	10	11	12	13
Critical Range	8.4050306	8.6188781	8.806783	8.9742258	9.1251264	9.2623842

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	47.000	3	STATION 4
	A			
B	A	42.333	3	STATION 5
B	A			
B	A	40.667	3	STATION 3
B				
B		39.333	3	STATION 1
	C	29.208	12	STATION 2
	C			
	C	28.833	3	STATION 9
	D	20.000	3	STATION 6
	D			
	D	17.000	3	STATION 10
	D			
E	D	14.000	3	STATION 13
E				
E	F	10.500	3	STATION 7
E	F			
E	F	8.500	3	STATION 8
	F			
	F	3.500	3	STATION 12
	F			
	F	3.500	3	STATION 11

AUG26-SNK

```
  Class       Levels  Values
STA            14  STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2
STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9
                     Number of observations    54
NOTE: Due to missing values, only 48 observations can be used in this analysis.
                        The GLM Procedure
Dependent Variable: RANKMTBE   Rank for Variable MTBE
                                Sum of
    Source                DF        Squares    Mean Square   F Value   Pr > F
    Model                 12    8613.770833     717.814236     45.66   <.0001
    Error                 35     550.229167      15.720833
    Corrected Total       47    9164.000000
           R-Square    Coeff Var    Root MSE    RANKMTBE Mean
           0.939958     16.18347    3.964951         24.50000
    Source                DF      Type I SS    Mean Square   F Value   Pr > F
    STA                   12    8613.770833     717.814236     45.66   <.0001
    Source                DF    Type III SS    Mean Square   F Value   Pr > F
    STA                   12    8613.770833     717.814236     45.66   <.0001
                        The GLM Procedure
                 Student-Newman-Keuls Test for RANKMTBE
NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis
                 but not under partial null hypotheses.
                  Alpha                        0.05
                  Error Degrees of Freedom        35
                  Error Mean Square          15.72083
                  Harmonic Mean of Cell Sizes 3.183673
                    NOTE: Cell sizes are not equal.
 Number of Means          2           3           4           5           6           7
 Critical Range   6.3798615   7.6907984   8.4752779   9.0351609   9.4694893   9.8235686
 Number of Means          8           9          10          11          12          13
 Critical Range   10.121965   10.379496   10.605785   10.807432   10.989158   11.154454
          Means with the same letter are not significantly different.
            SNK Grouping         Mean      N    STA
                     A         45.000      3    STATION 5
                     A
                B    A         41.167      3    STATION 4
                B
                B    C         36.958     12    STATION 2
                     C
                D    C         32.000      3    STATION 3
                D
                D    E         25.667      3    STATION 9
                     E
                F    E         22.167      3    STATION 10
                F    E
                F    E         21.167      3    STATION 6
                F
                F    G         15.167      3    STATION 8
                F    G
                F    G         14.333      3    STATION 13
                     G
                     G         11.500      3    STATION 7
                     G
                H    G          7.000      3    STATION 11
                H    G
                H    G          7.000      3    STATION 1
                H
                H               2.000      3    STATION 12
```

SEP3-SNK
The GLM Procedure
Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 48 observations can be used in this analysis.
Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	8124.437500	677.036458	23.34	<.0001
Error	35	1015.062500	29.001786		
Corrected Total	47	9139.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.888937	21.98094	5.385331	24.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	8124.437500	677.036458	23.34	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	8124.437500	677.036458	23.34	<.0001

The GLM Procedure
Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	35
Error Mean Square	29.00179
Harmonic Mean of Cell Sizes	3.183673

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	8.6653446	10.445904	11.51141	12.271862	12.861782	13.342705

Number of Means	8	9	10	11	12	13
Critical Range	13.747996	14.097784	14.405138	14.679021	14.925848	15.150358

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	46.000	3	STATION 3
A			
B A	42.833	3	STATION 4
B			
B C	34.292	12	STATION 2
B C			
B C	33.000	3	STATION 5
C			
D C	26.333	3	STATION 13
D C			
D C E	24.667	3	STATION 9
D C E			
D F C E	22.333	3	STATION 6
D F E			
D F E	19.000	3	STATION 10
F E			
F G E	14.000	3	STATION 7
F G			
F G	11.667	3	STATION 8
G			
G	5.000	3	STATION 11
G			
G	5.000	3	STATION 12
G	5.000	3	STATION 1

SEP6-SNK

Class Level Information

Class	Levels	Values
STA	14	STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 48 observations can be used in this analysis.

The GLM Procedure Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	8580.583333	715.048611	41.24	<.0001
Error	35	606.916667	17.340476		
Corrected Total	47	9187.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.933941	16.99669	4.164190	24.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	8580.583333	715.048611	41.24	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	8580.583333	715.048611	41.24	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	35
Error Mean Square	17.34048
Harmonic Mean of Cell Sizes	3.183673

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	6.7004501	8.0772618	8.9011614	9.4891785	9.945332	10.317204
Number of Means	8	9	10	11	12	13
Critical Range	10.630594	10.901067	11.138727	11.350507	11.541364	11.714966

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	43.000	3	STATION 4
	A			
B	A	40.000	3	STATION 3
B	A			
B	A	37.750	12	STATION 2
B				
B		32.000	3	STATION 5
	C	25.167	3	STATION 9
	C			
D	C	23.833	3	STATION 6
D	C			
D	C	20.000	3	STATION 10
D				
D	E	16.000	3	STATION 7
D	E			
D	E	15.000	3	STATION 13
	E			
F	E	10.833	3	STATION 1
F	E			
F	E	8.167	3	STATION 8
F				
F		3.500	3	STATION 12
F				
F		3.500	3	STATION 11

SEP17-SNK

Class	Levels	Values
STA	15	15 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 57

NOTE: Due to missing values, only 50 observations can be used in this analysis.

The GLM Procedure Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	13	9340.750000	718.519231	65.36	<.0001
Error	36	395.750000	10.993056		
Corrected Total	49	9736.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.959354	13.00227	3.315578	25.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	13	9340.750000	718.519231	65.36	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	13	9340.750000	718.519231	65.36	<.0001

The GLM Procedure Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	36
Error Mean Square	10.99306
Harmonic Mean of Cell Sizes	3.054545

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7	8
Critical Range	5.4411793	6.557753	7.2256031	7.7020972	8.0716514	8.3728706	8.6266831

Number of Means	9	10	11	12	13	14
Critical Range	8.8457102	9.0381473	9.2096141	9.3641298	9.5046669	9.6334844

Means with the same letter are not significantly different.

SNK Grouping		Mean	N	STA
	A	49.000	3	STATION 4
	B	40.833	3	STATION 5
	B			
C	B	39.083	12	STATION 2
C				
C		33.833	3	STATION 3
	D	28.000	3	STATION 9
	D			
	D	25.000	3	STATION 6
	D			
	D	22.000	3	STATION 10
	E	10.500	3	STATION 11
	E			
	E	10.500	3	STATION 12
	E			
	E	10.500	2	STATION 1
	E			
	E	10.500	3	15
	E			
	E	10.500	3	STATION 7
	E			
	E	10.500	3	STATION 8
	E			
	E	10.500	3	STATION 13

SEP26-SNK
STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9
Number of observations 54
NOTE: Due to missing values, only 51 observations can be used in this analysis.
The GLM Procedure Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	13	9718.750000	747.596154	158.29	<.0001
Error	37	174.750000	4.722973		
Corrected Total	50	9893.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.982337	8.358616	2.173240	26.00000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	13	9718.750000	747.596154	158.29	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	13	9718.750000	747.596154	158.29	<.0001

The GLM Procedure Student-Newman-Keuls Test for RANKMTBE
NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	37
Error Mean Square	4.722973
Harmonic Mean of Cell Sizes	3.169811

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7	8
Critical Range	3.4977685	4.2146377	4.6432195	4.9489098	5.1859415	5.3791101	5.5418548

Number of Means	9	10	11	12	13	14
Critical Range	5.6822792	5.8056441	5.9155567	6.0145964	6.1046707	6.187229

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	49.667	3	STATION 4
B	42.583	12	STATION 2
C	34.833	3	STATION 1
C			
C	32.167	3	STATION 3
D	28.167	3	STATION 5
D			
D	26.833	3	STATION 9
E	12.500	3	STATION 11
E			
E	12.500	3	STATION 12
E			
E	12.500	3	STATION 13
E			
E	12.500	3	STATION 10
E			
E	12.500	3	STATION 6
E			
E	12.500	3	STATION 7
E			
E	12.500	3	STATION 8
E			
E	12.500	3	STATION 14

NOV-SNK

Class Levels Values

STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 42 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	13	5111.166667	393.166667	1501.18	<.0001
Error	28	7.333333	0.261905		
Corrected Total	41	5118.500000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.998567	2.380308	0.511766	21.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	13	5111.166667	393.166667	1501.18	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	13	5111.166667	393.166667	1501.18	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	28
Error Mean Square	0.261905

Number of Means	2	3	4	5	6	7	8
Critical Range	0.8559412	1.0338958	1.1408761	1.2174196	1.2769161	1.3254934	1.3664809

Number of Means	9	10	11	12	13	14
Critical Range	1.4018902	1.4330294	1.4607969	1.4858361	1.5086232	1.5295207

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	40.6667	3	STATION 4
B	38.3333	3	STATION 5
C	29.0000	3	STATION 6
C			
C	29.0000	3	STATION 3
C			
C	29.0000	3	STATION 2
C			
C	29.0000	3	STATION 9
C			
C	29.0000	3	STATION 10
D	11.0000	3	STATION 13
D			
D	11.0000	3	STATION 1
D			
D	11.0000	3	STATION 12
D			
D	11.0000	3	STATION 11
D			
D	11.0000	3	STATION 7
D			
D	11.0000	3	STATION 8
D			
D	11.0000	3	STATION 14

DEC-SNK

Class Levels Values
STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 48 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	6285.750000	523.812500	18.37	<.0001
Error	35	998.250000	28.521429		
Corrected Total	47	7284.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.862953	21.79815	5.340546	24.50000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	12	6285.750000	523.812500	18.37	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	12	6285.750000	523.812500	18.37	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	35
Error Mean Square	28.52143
Harmonic Mean of Cell Sizes	3.183673

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	8.5932828	10.359035	11.41568	12.169809	12.754822	13.231745
Number of Means	8	9	10	11	12	13
Critical Range	13.633667	13.980546	14.285343	14.556949	14.801723	15.024367

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	46.000	3	STATION 4
A			
A	45.000	3	STATION 5
A			
A	35.000	3	STATION 3
A			
A	35.000	3	STATION 10
A			
A	35.000	3	STATION 9
A			
A	35.000	3	STATION 6
B	19.250	12	STATION 2
B			
B	14.000	3	STATION 12
B			
B	14.000	3	STATION 1
B			
B	14.000	3	STATION 13
B			
B	14.000	3	STATION 7
B			
B	14.000	3	STATION 8
B			
B	14.000	3	STATION 14

JAN-SNK

Class Levels Values

STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 45 observations can be used in this analysis.

The GLM Procedure

Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Mode	11	1912.500000	173.863636	17.00	<.0001
Error	33	337.500000	10.227273		
Corrected Total	44	2250.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.850000	13.90439	3.198011	23.00000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	11	1912.500000	173.863636	17.00	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	11	1912.500000	173.863636	17.00	<.0001

The GLM Procedure

Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	33
Error Mean Square	10.22727
Harmonic Mean of Cell Sizes	3.2

NOTE: Cell sizes are not equal.

Number of Means	2	3	4	5	6	7
Critical Range	5.1437919	6.2037996	6.8387795	7.2922736	7.6442458	7.9312956

Number of Means	8	9	10	11	12
Critical Range	8.1732777	8.3821771	8.5657695	8.7293987	8.8768854

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	43.000	3	STATION 5
B	35.500	3	STATION 4
C	20.500	3	STATION 1
C			
C	20.500	3	STATION 10
C			
C	20.500	12	STATION 2
C			
C	20.500	3	STATION 3
C			
C	20.500	3	STATION 13
C			
C	20.500	3	STATION 14
C			
C	20.500	3	STATION 6
C			
C	20.500	3	STATION 7
C			
C	20.500	3	STATION 8
C			
C	20.500	3	STATION 9

FEB 2000 -SNK

STA 14 STATION 1 STATION 10 STATION 11 STATION 12 STATION 13 STATION 14 STATION 2 STATION 3 STATION 4 STATION 5 STATION 6 STATION 7 STATION 8 STATION 9

Number of observations 54

NOTE: Due to missing values, only 51 observations can be used in this analysis.

The GLM Procedure Dependent Variable: RANKMTBE Rank for Variable MTBE

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	13	3444.000000	264.923077	700.15	<.0001
Error	37	14.000000	0.378378		
Corrected Total	50	3458.000000			

R-Square	Coeff Var	Root MSE	RANKMTBE Mean
0.995951	2.365864	0.615125	26.00000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
STA	13	3444.000000	264.923077	700.15	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
STA	13	3444.000000	264.923077	700.15	<.0001

The GLM Procedure Student-Newman-Keuls Test for RANKMTBE

NOTE: This test controls the type I experimentwise error rate under the complete null hypothesis but not under partial null hypotheses.

Alpha	0.05
Error Degrees of Freedom	37
Error Mean Square	0.378378
Harmonic Mean of Cell Sizes	3.169811

NOTE: Cell sizes are not equal.

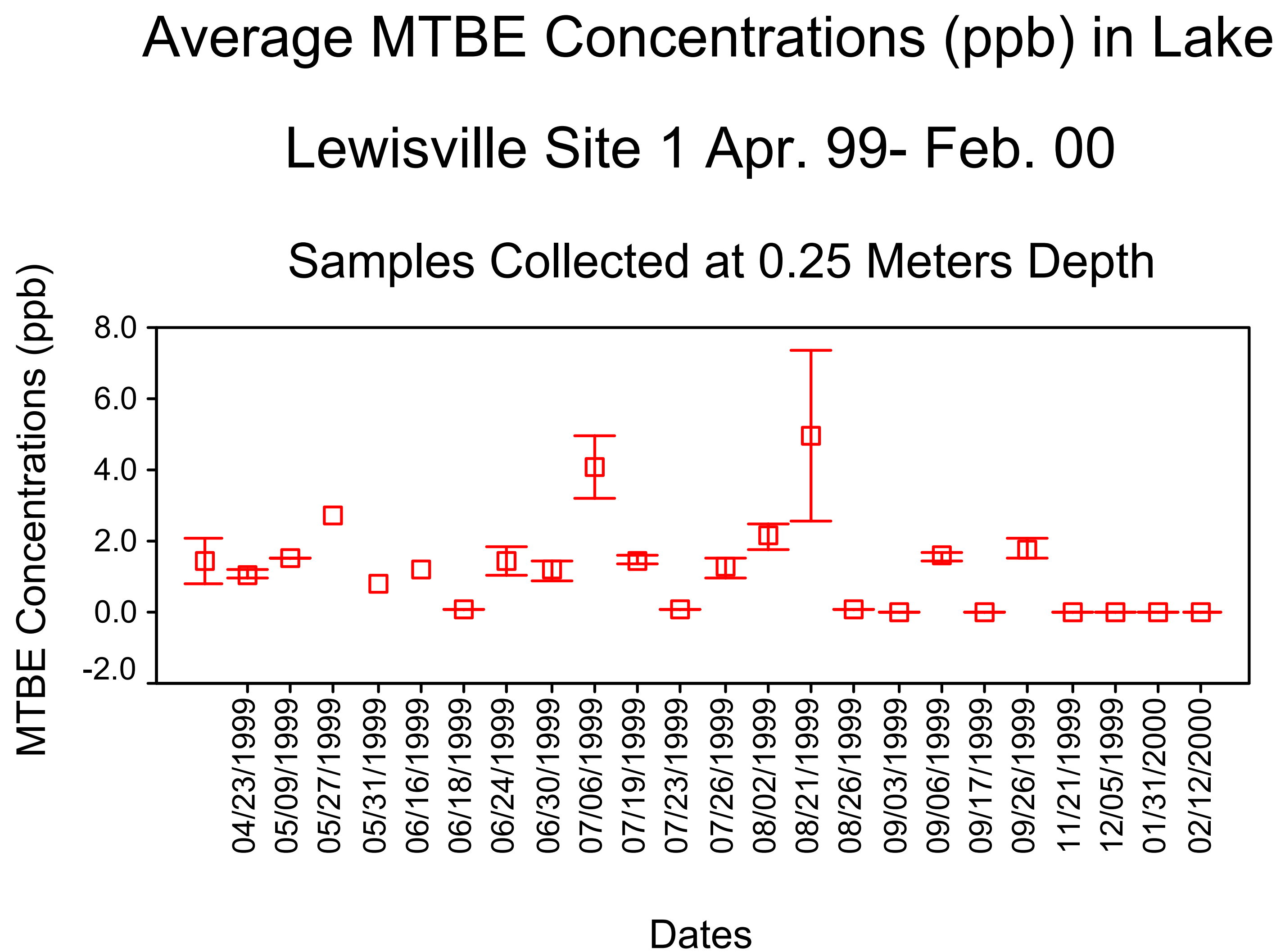
Number of Means	2	3	4	5	6	7	8
Critical Range	0.9900257	1.1929319	1.3142399	1.400764	1.4678546	1.52253	1.5685941

Number of Means	9	10	11	12	13	14
Critical Range	1.6083405	1.6432583	1.6743685	1.7024012	1.7278963	1.751264

Means with the same letter are not significantly different.

SNK Grouping	Mean	N	STA
A	49.0000	3	STATION 4
B	48.0000	3	STATION 3
C	23.0000	3	STATION 11
C			
C	23.0000	3	STATION 10
C			
C	23.0000	3	STATION 13
C			
C	23.0000	3	STATION 14
C			
C	23.0000	12	STATION 2
C			
C	23.0000	3	STATION 12
C			
C	23.0000	3	STATION 1
C			
C	23.0000	3	STATION 5
C			
C	23.0000	3	STATION 6
C			
C	23.0000	3	STATION 7
C			
C	23.0000	3	STATION 8
C			
C	23.0000	3	STATION 9

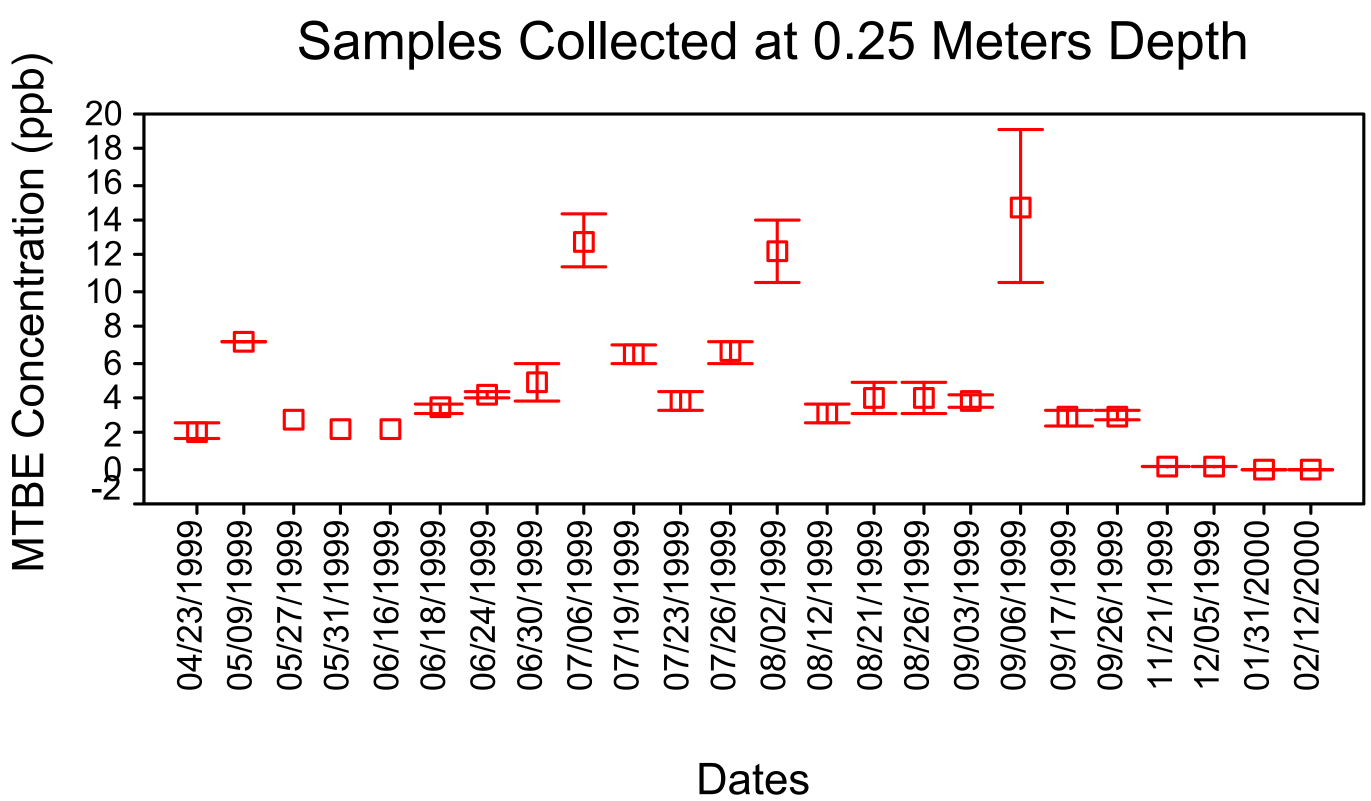
APPENDIX D
MTBE CONCENTRATIONS AT EACH SAMPLING SITE
APRIL 1999 – FEBRUARY 2000



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville Site 2 Apr. 99- Feb. 00

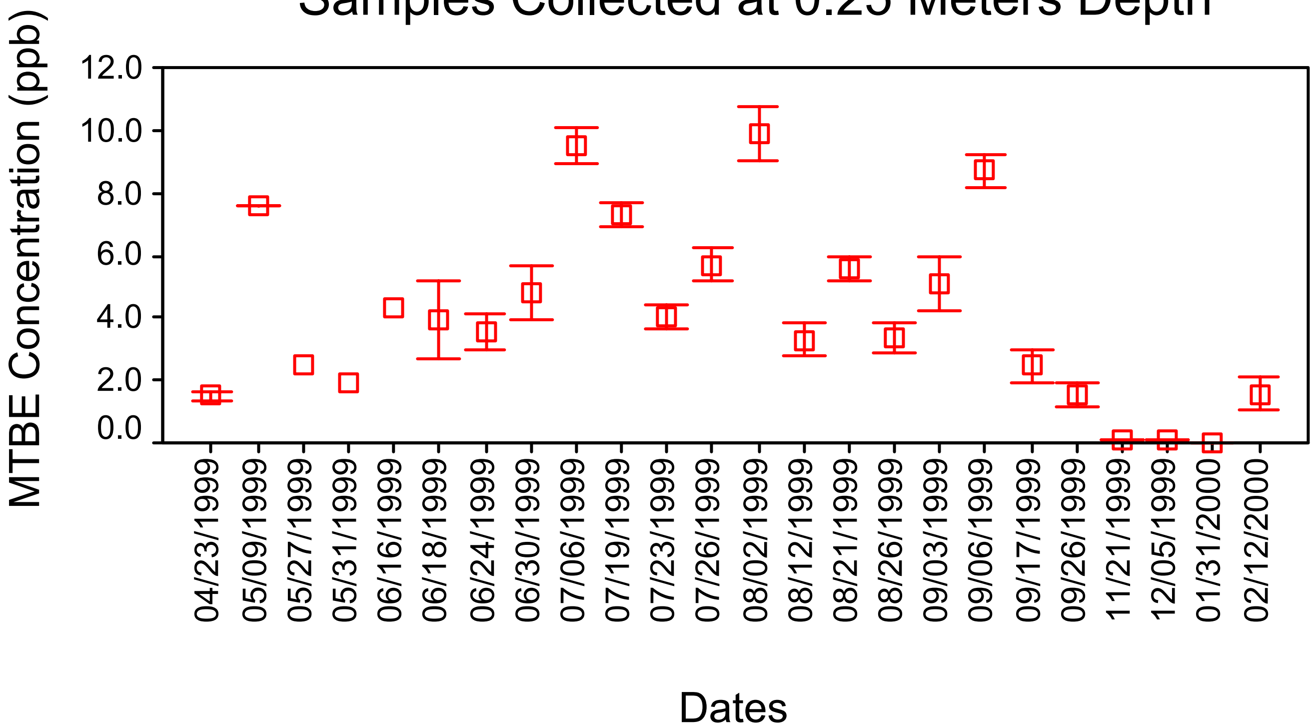


* 95% Confidence Limit

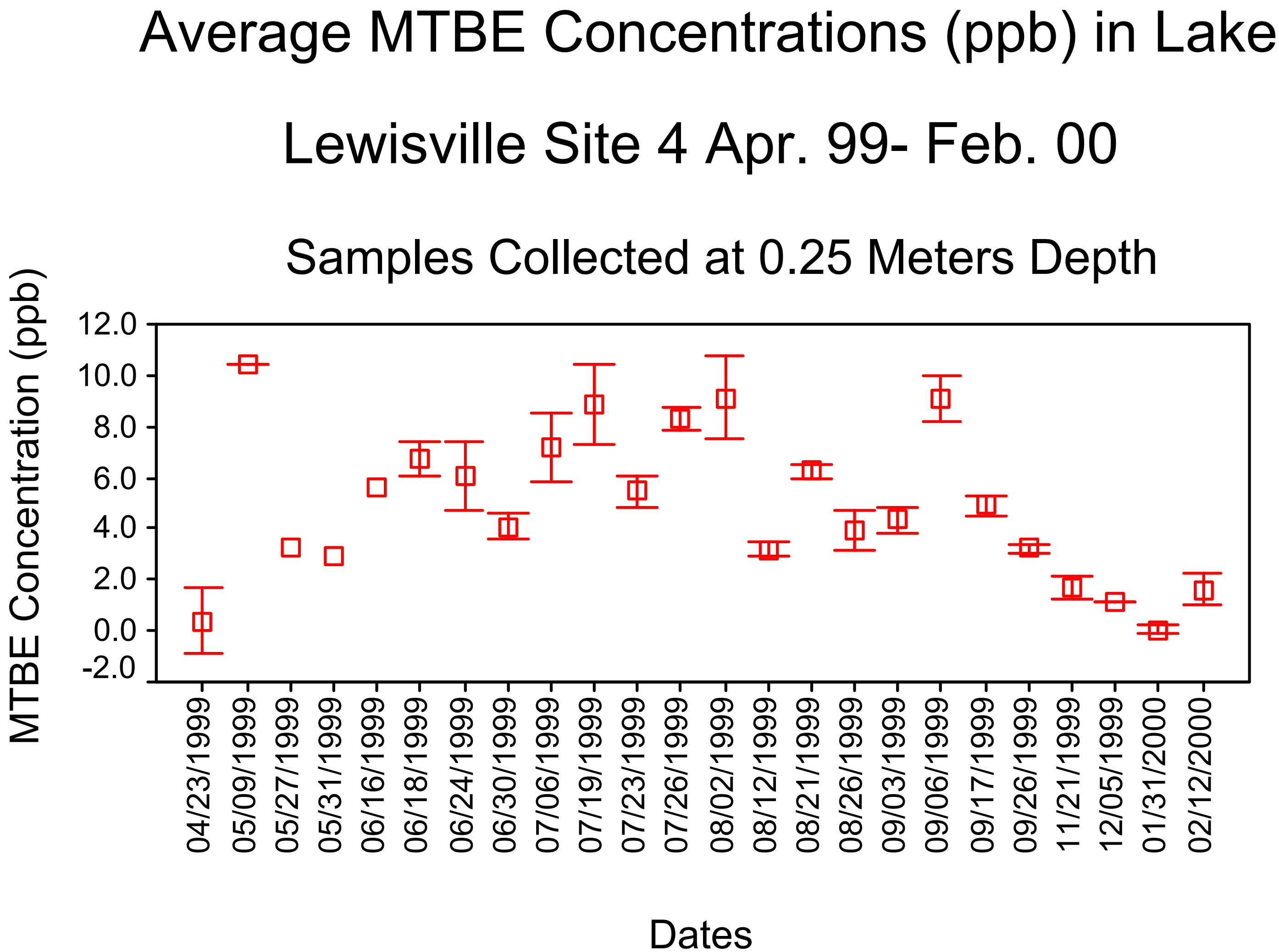
Average MTBE Concentrations (ppb) in Lake

Lewisville Site 3 Apr. 99- Feb. 00

Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

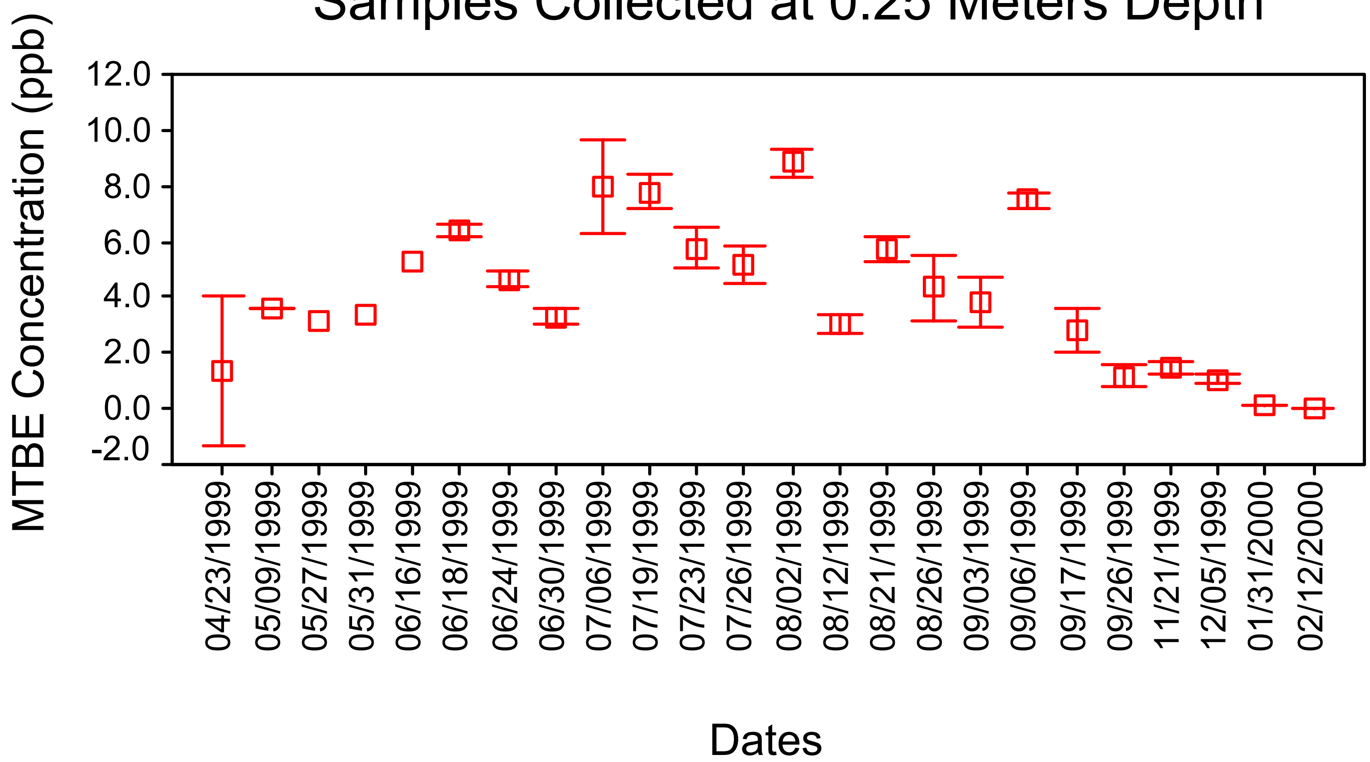


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville Site 5 Apr. 99- Feb. 00

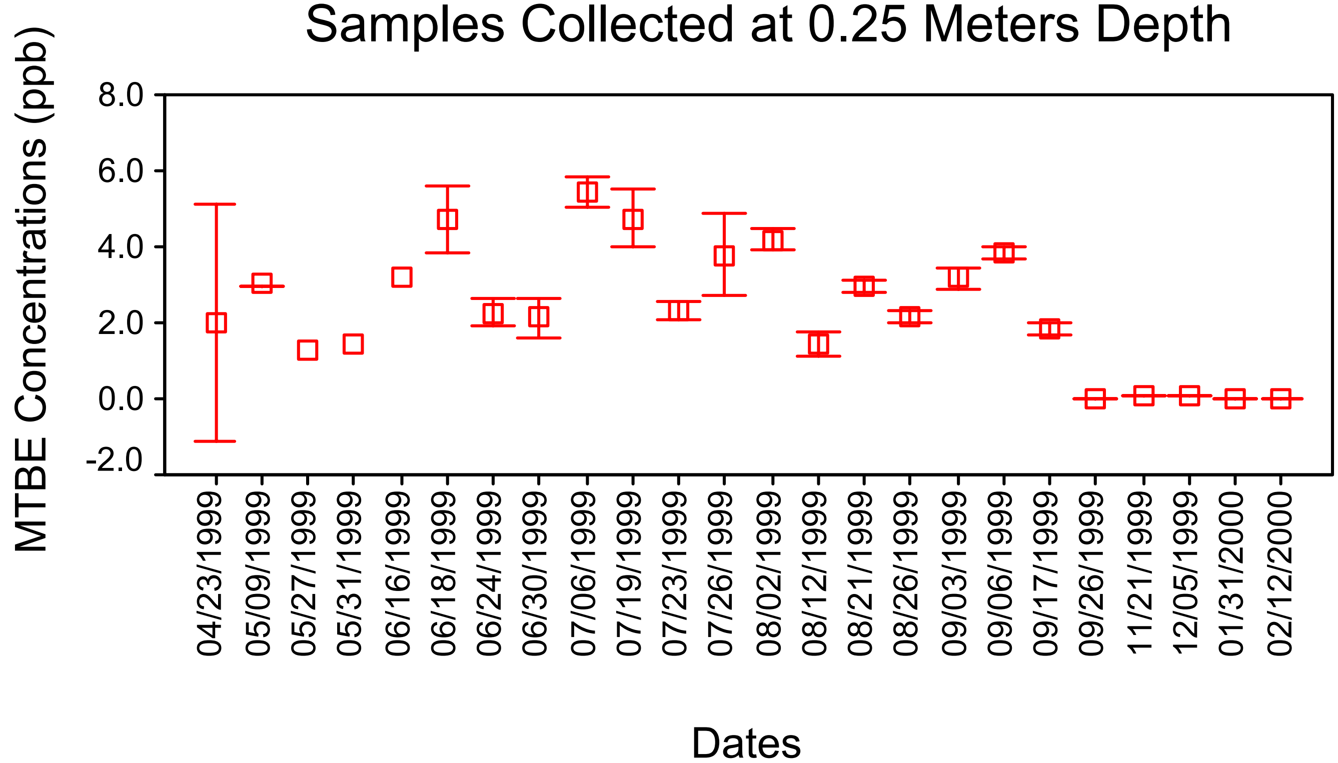
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville Site 6 Apr. 99- Feb. 00

Samples Collected at 0.25 Meters Depth

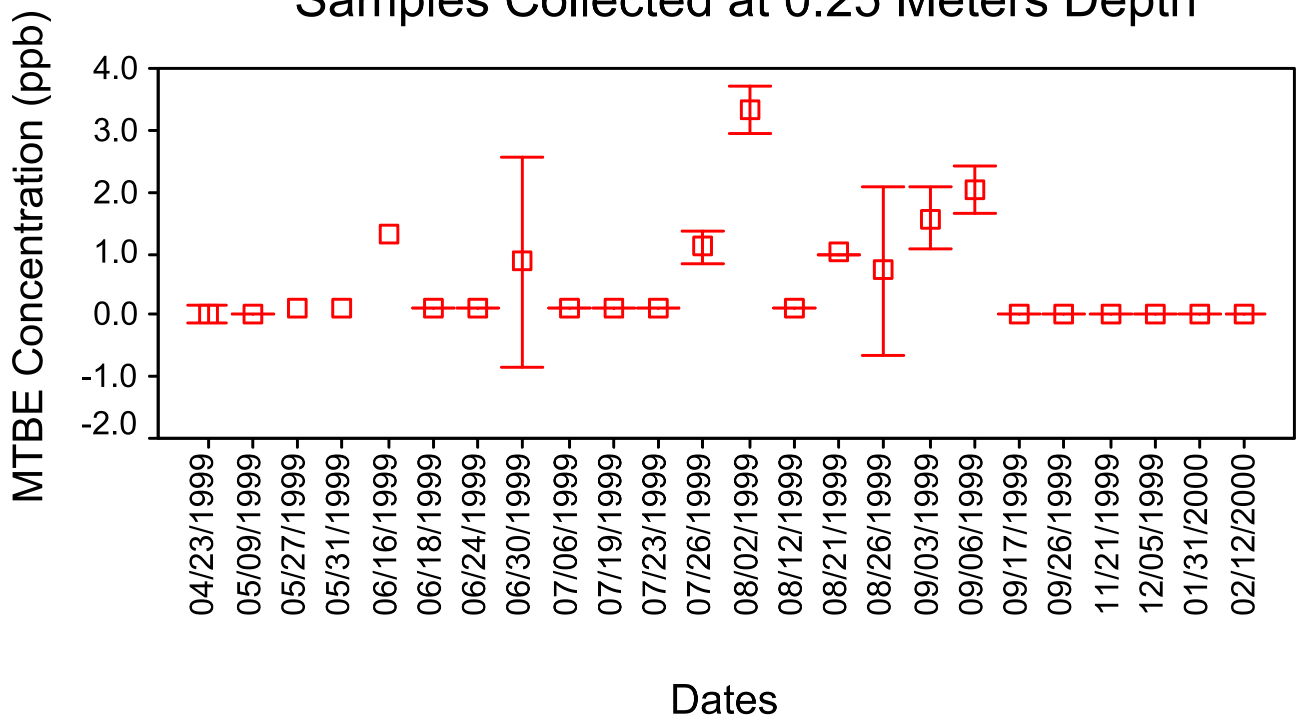


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville Site 7 Apr. 99- Feb. 00

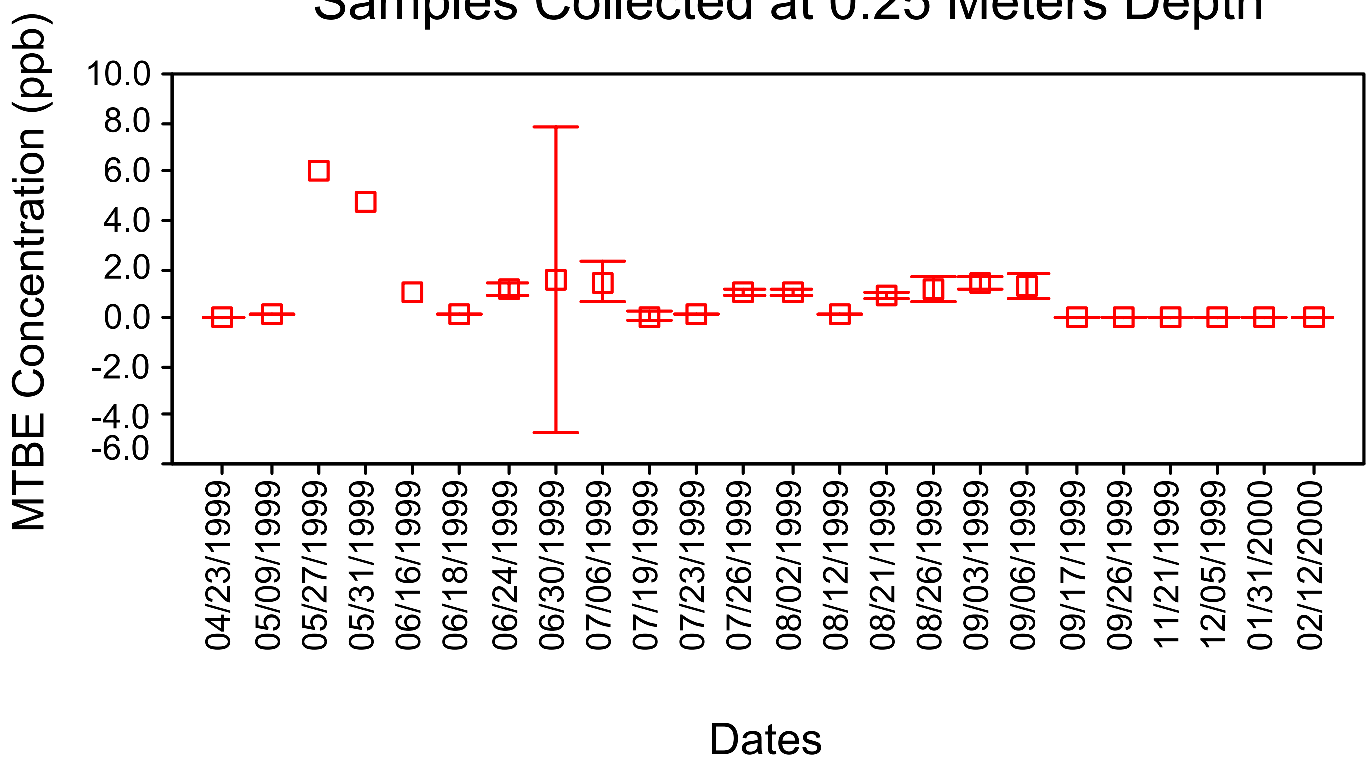
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville at Site 8 Apr. 1999- Feb. 2000

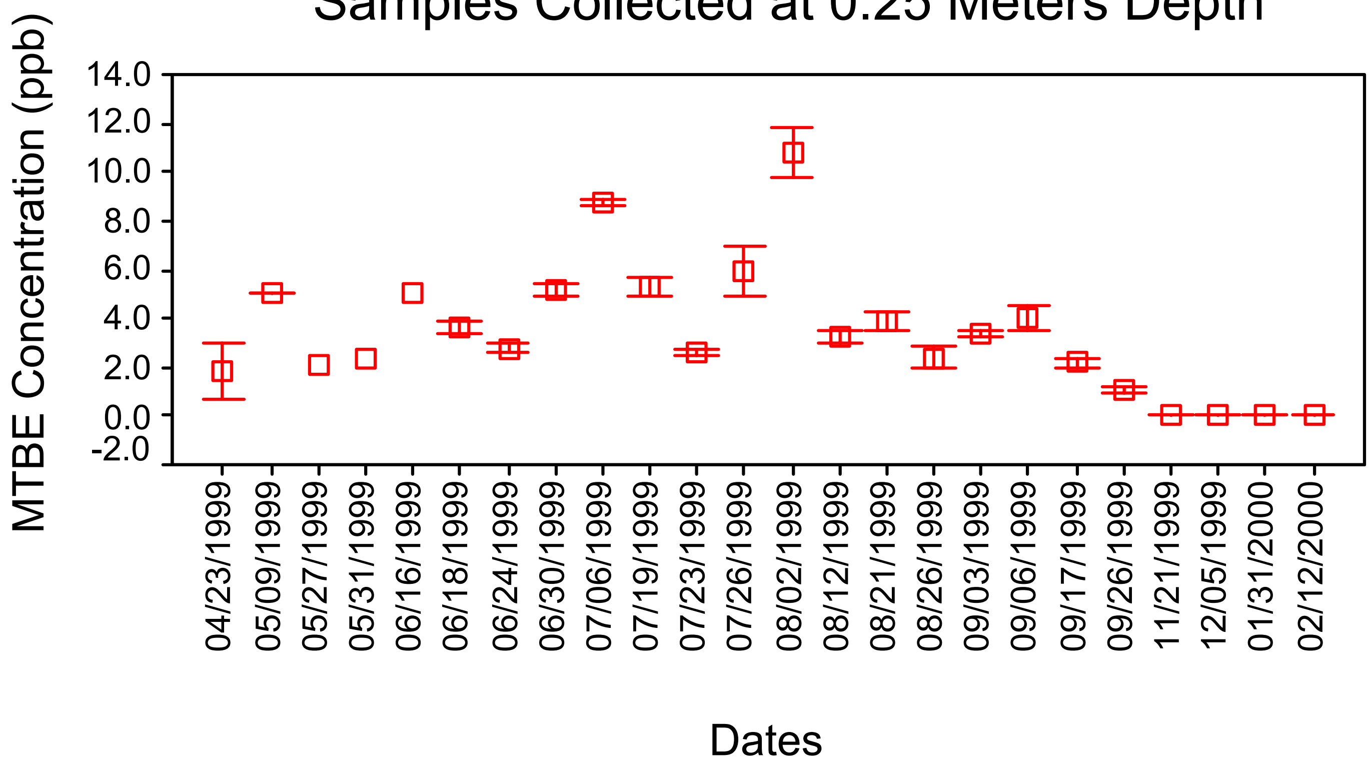
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

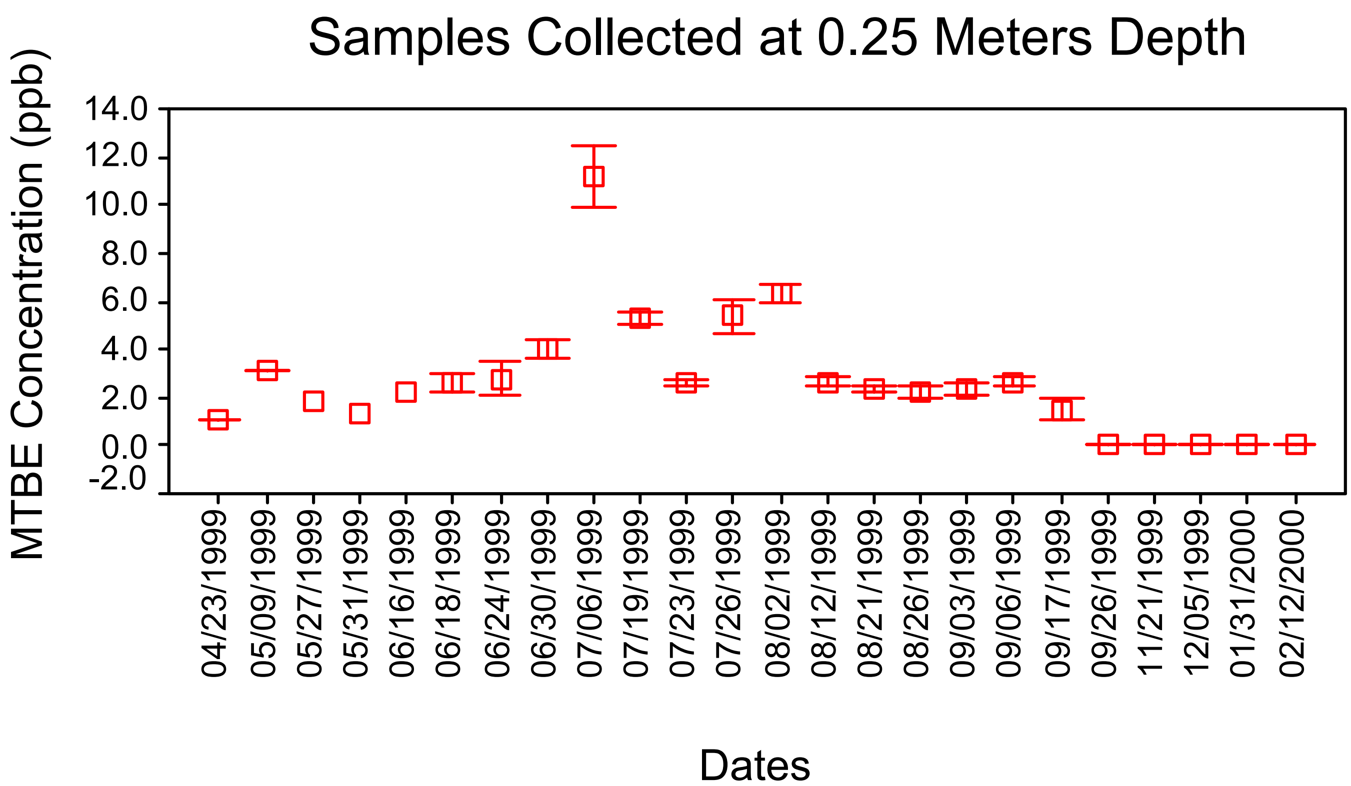
Average MTBE Concentrations (ppb) in Lake Lewisville at Site 9 Apr. 1999- Feb. 2000

Samples Collected at 0.25 Meters Depth



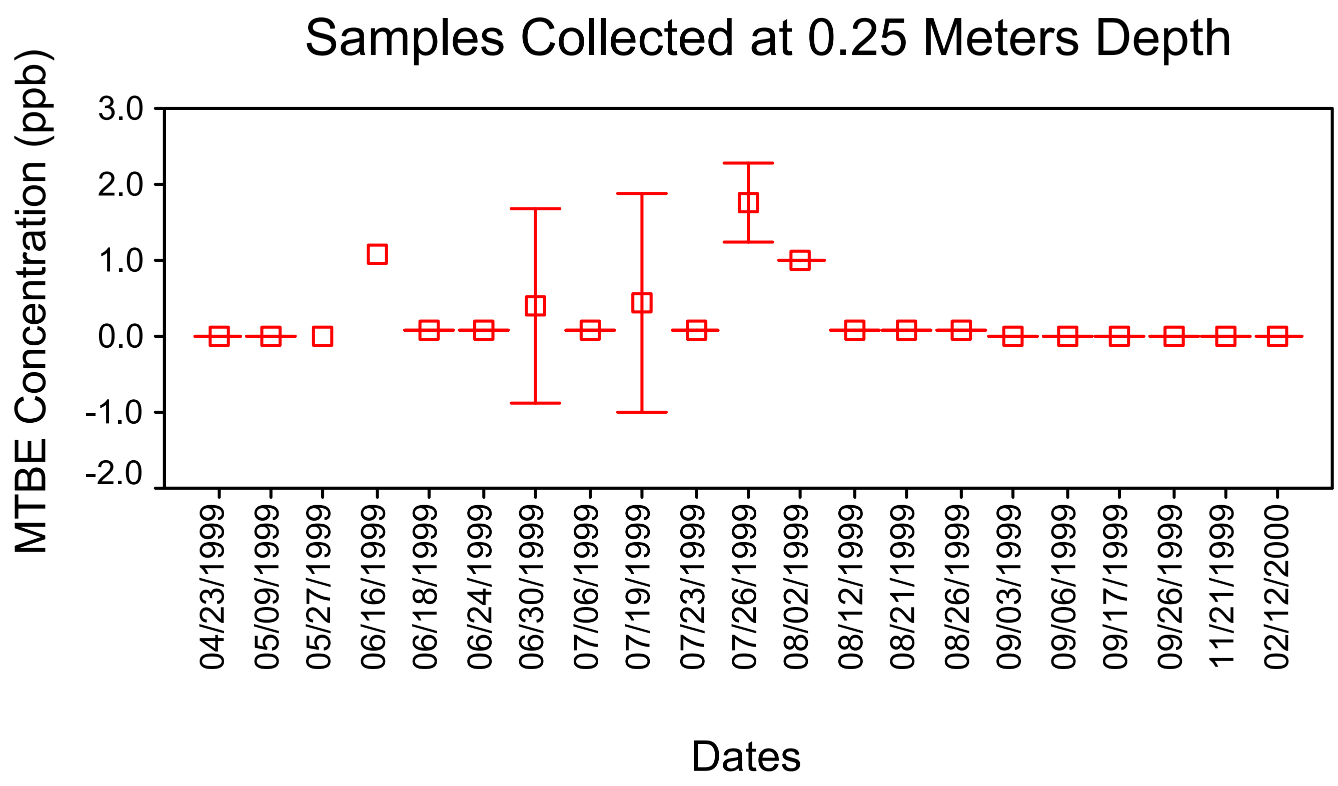
* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville at Site 10 Apr. 1999- Feb. 2000



* 95% Confidence Limit

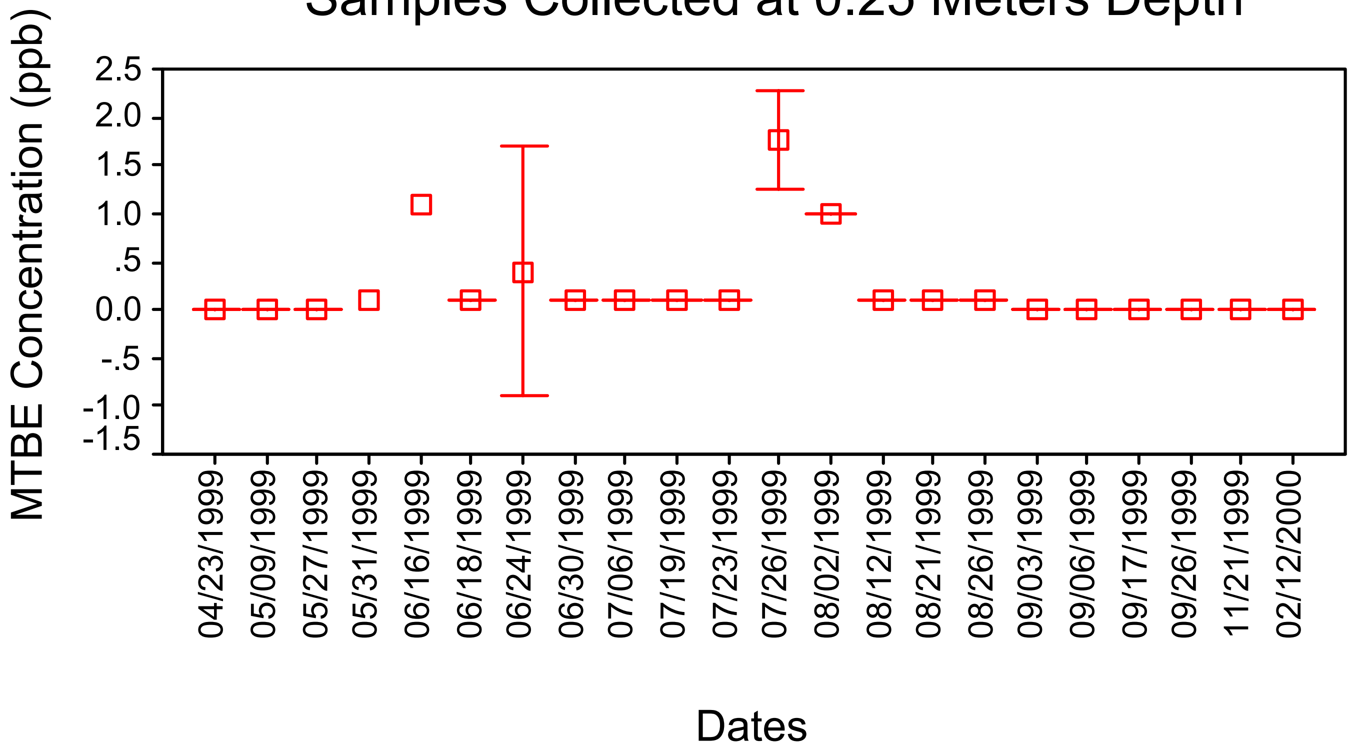
Average MTBE Concentrations (ppb) in Lake Lewisville at Site 11 Apr. 1999- Feb. 2000



* 95% Confidence Limit

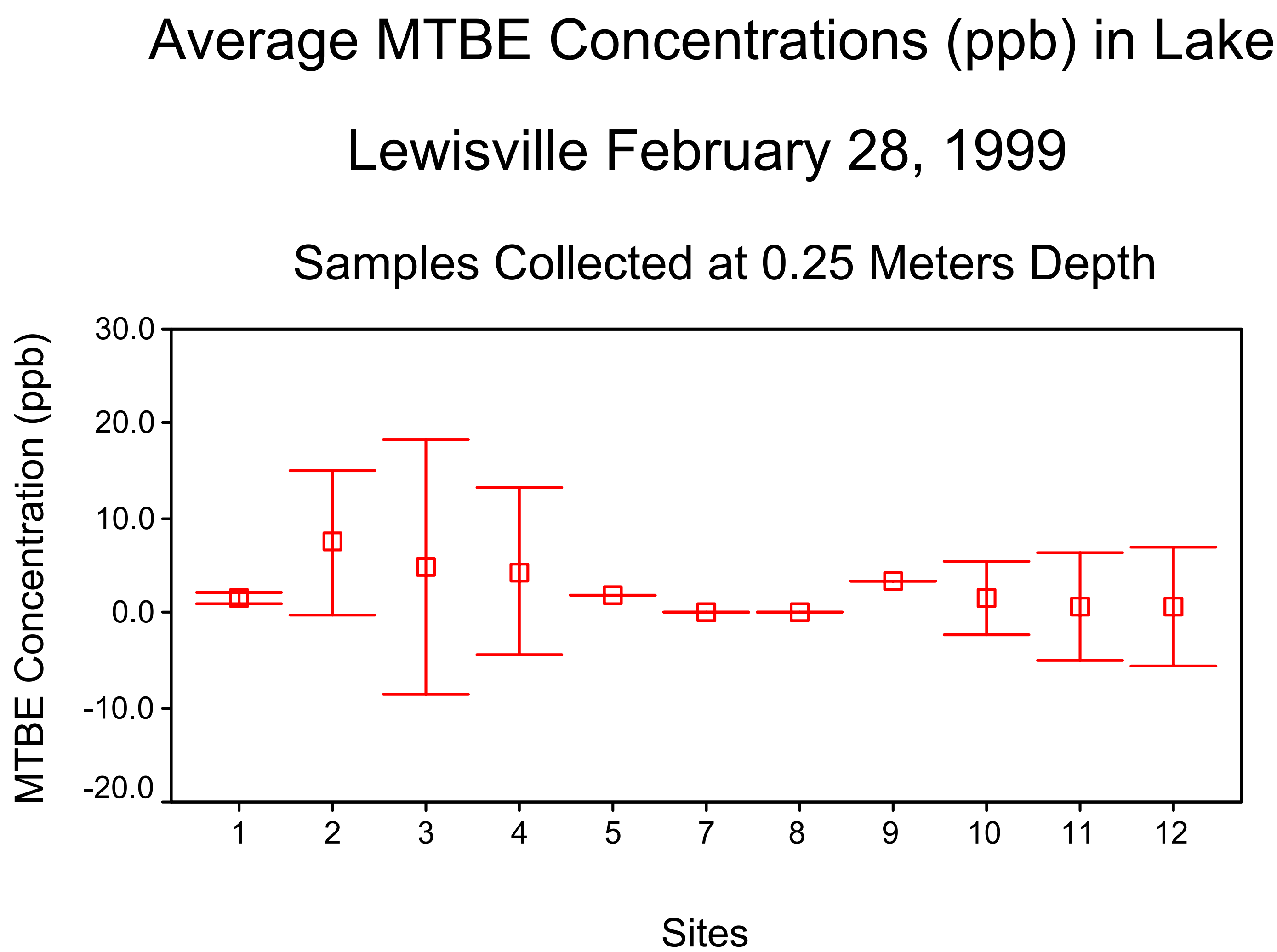
Average MTBE Concentrations (ppb) in Lake Lewisville at Site 12 Apr. 1999- Feb. 2000

Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

APPENDIX E
MTBE CONCENTRATIONS AT ALL SITES
ON EACH SAMPLING DATE
FEBRUARY 1999 – FEBRUARY 2000

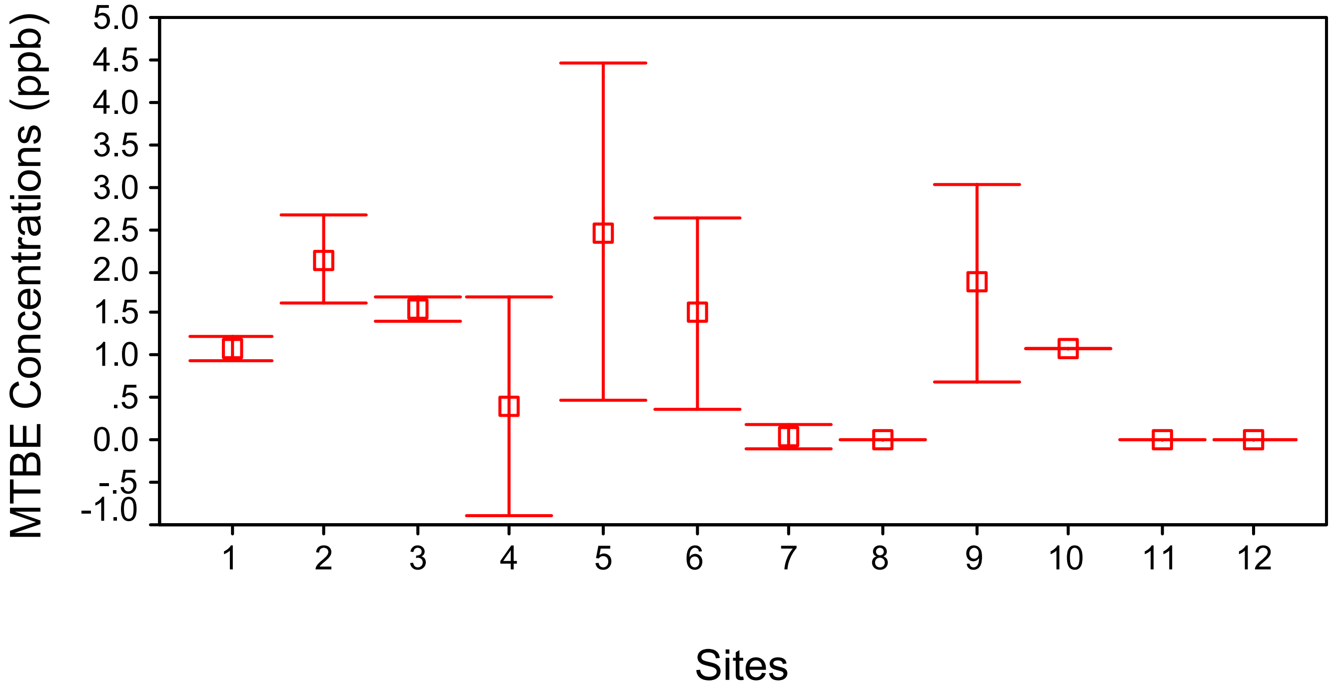


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville April 23, 1999

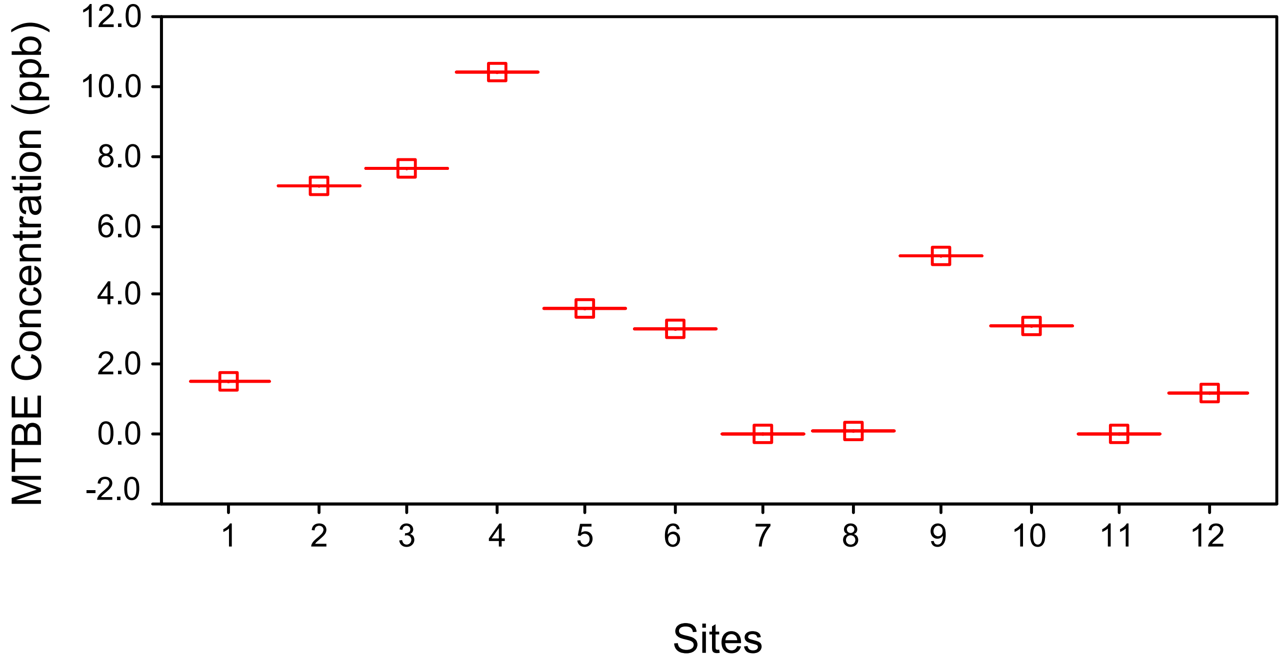
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake Lewisville May 9, 1999

Samples Collected at 0.25 Meters Depth

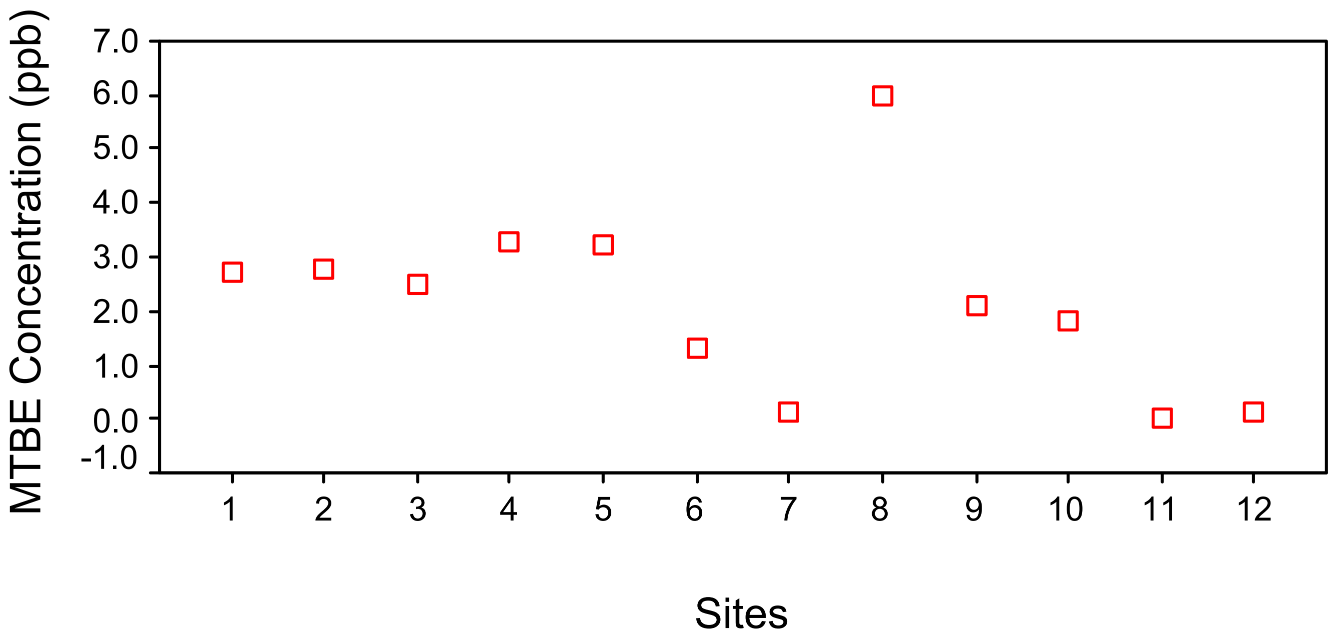


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville May 27, 1999

Samples Collected at 0.25 Meters Depth

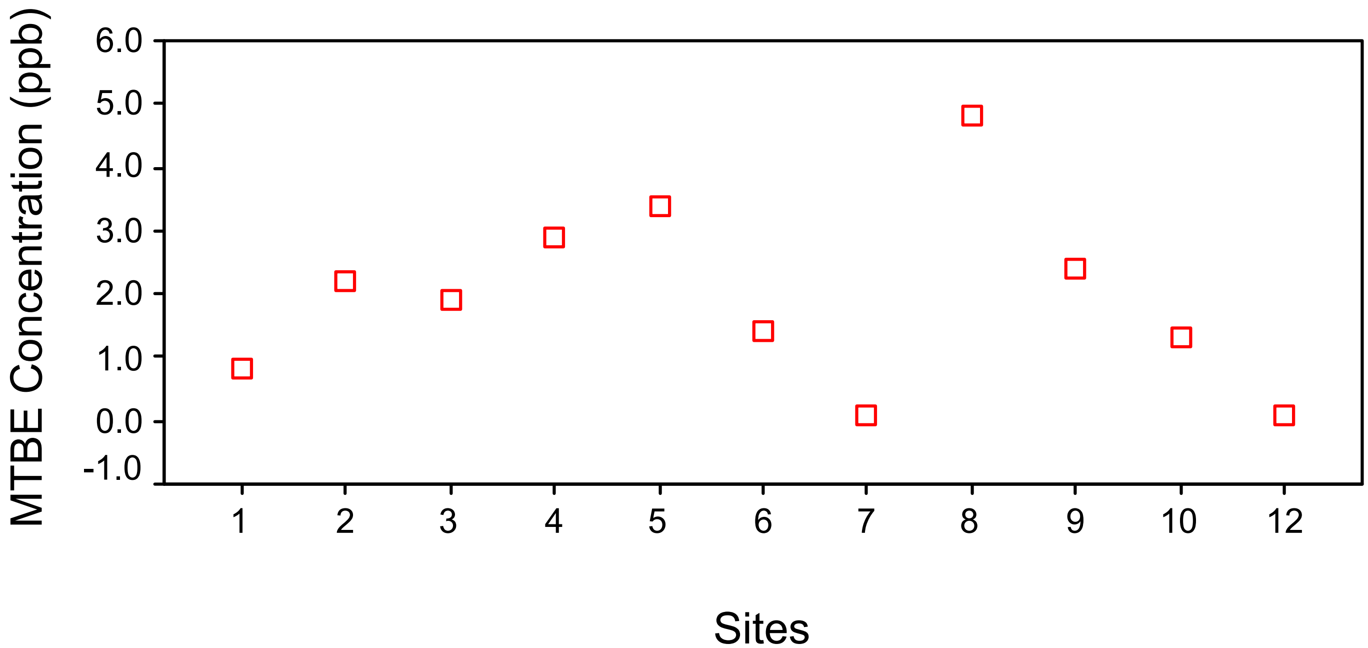


* 95% Confidence Limit

* Replicates were collected but not analyzed.

Average MTBE Concentrations (ppb) in Lake Lewisville May 31, 1999

Samples Collected at 0.25 Meters Depth



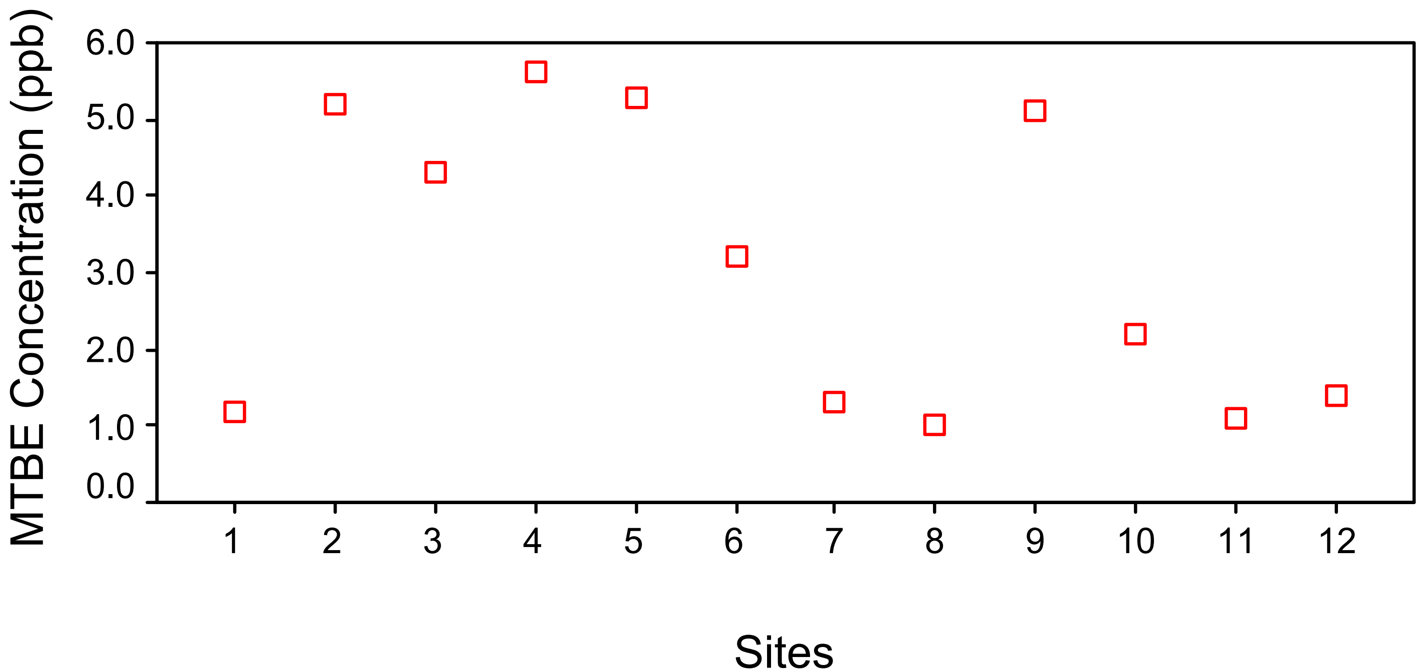
* 95% Confidence Limit

* Replicates were collected but not analyzed.

Average MTBE Concentrations (ppb) in

Lake Lewisville June 16, 1999

Samples Collected at 0.25 Meters Depth



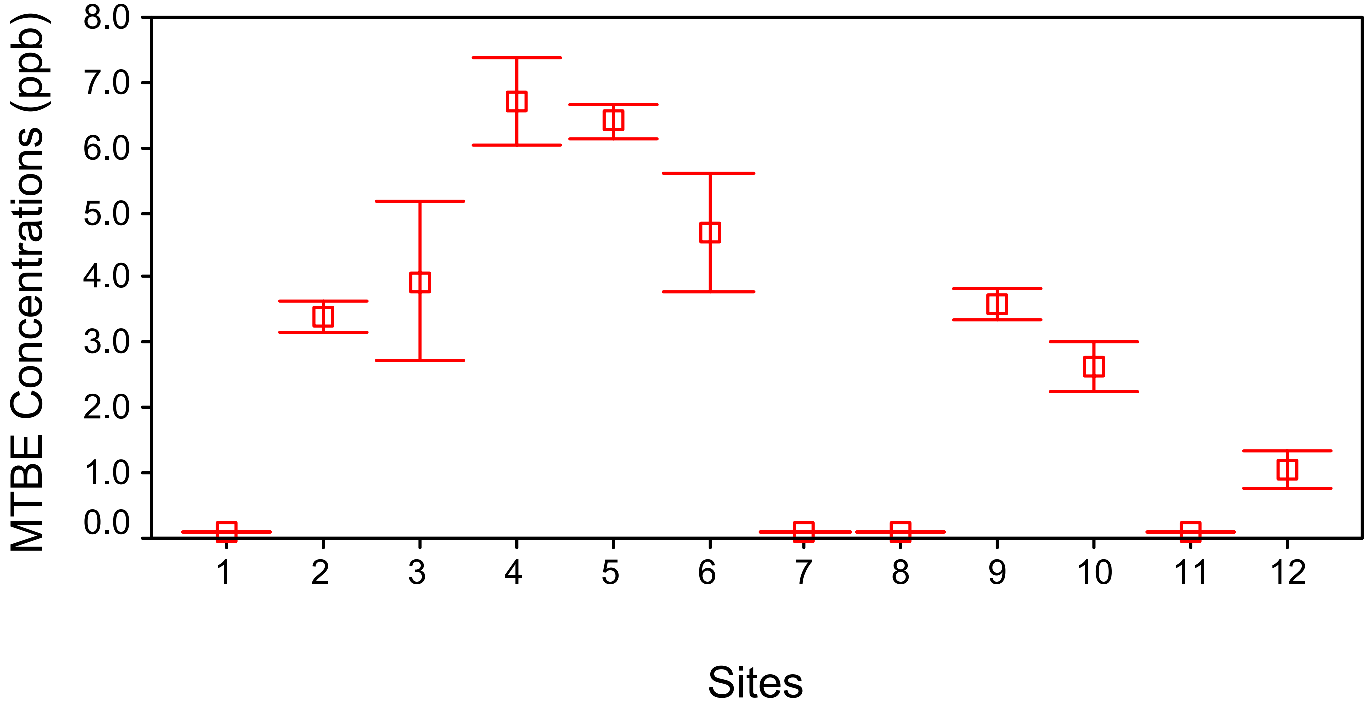
*95% Confidence Limits

*Replicates collected but not analyzed.

Average MTBE Concentration (ppb) in Lake

Lewisville June 18, 1999

Samples Collected at 0.25 Meters Depth

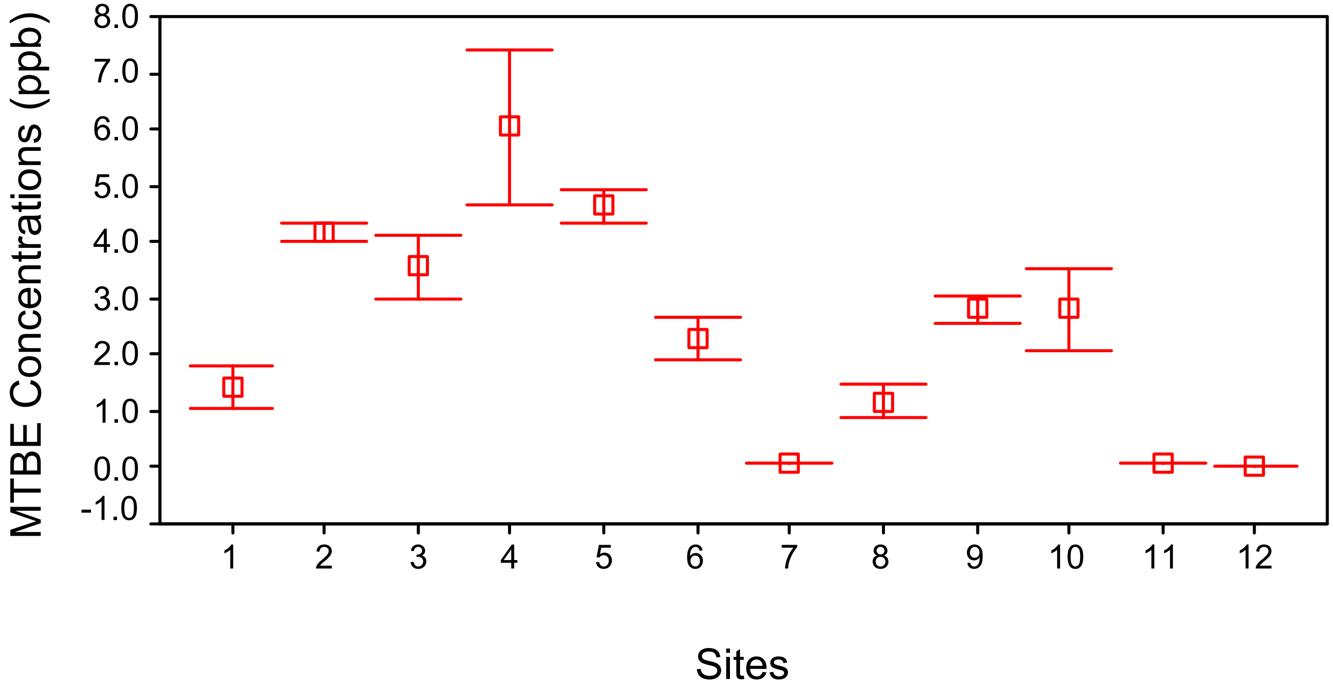


* 95% Confidence Limits

Average MTBE Concentration (ppb) in Lake

Lewisville June 24, 1999

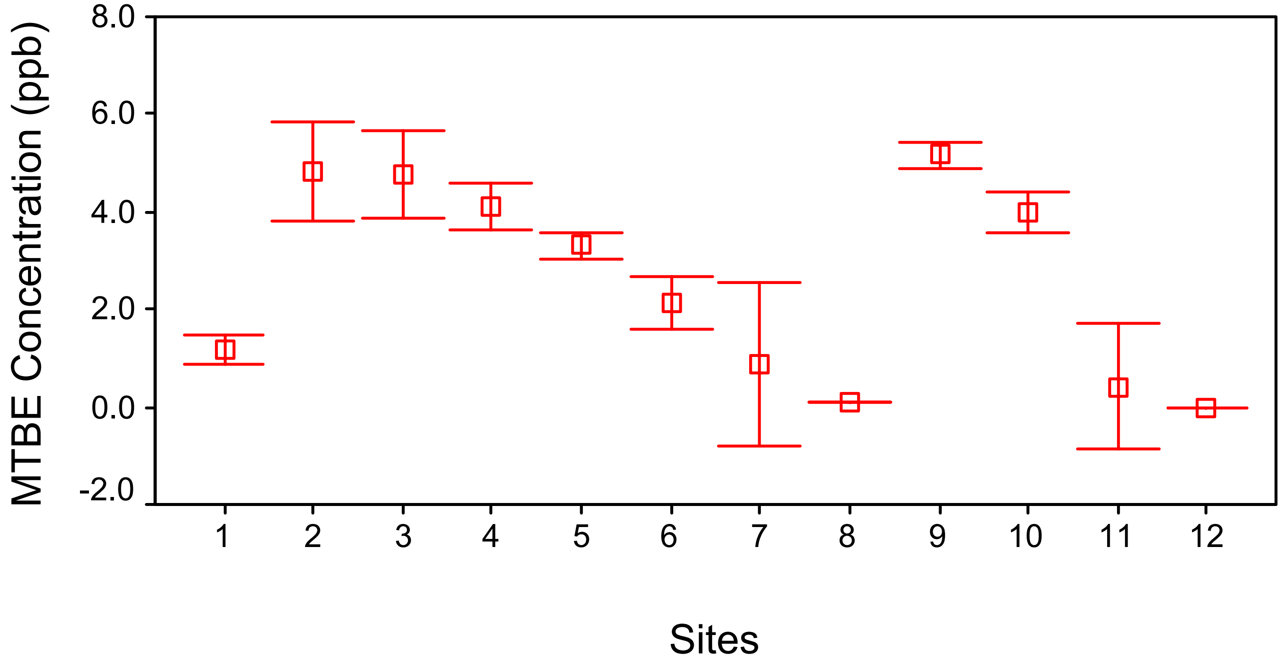
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake Lewisville June 30, 1999

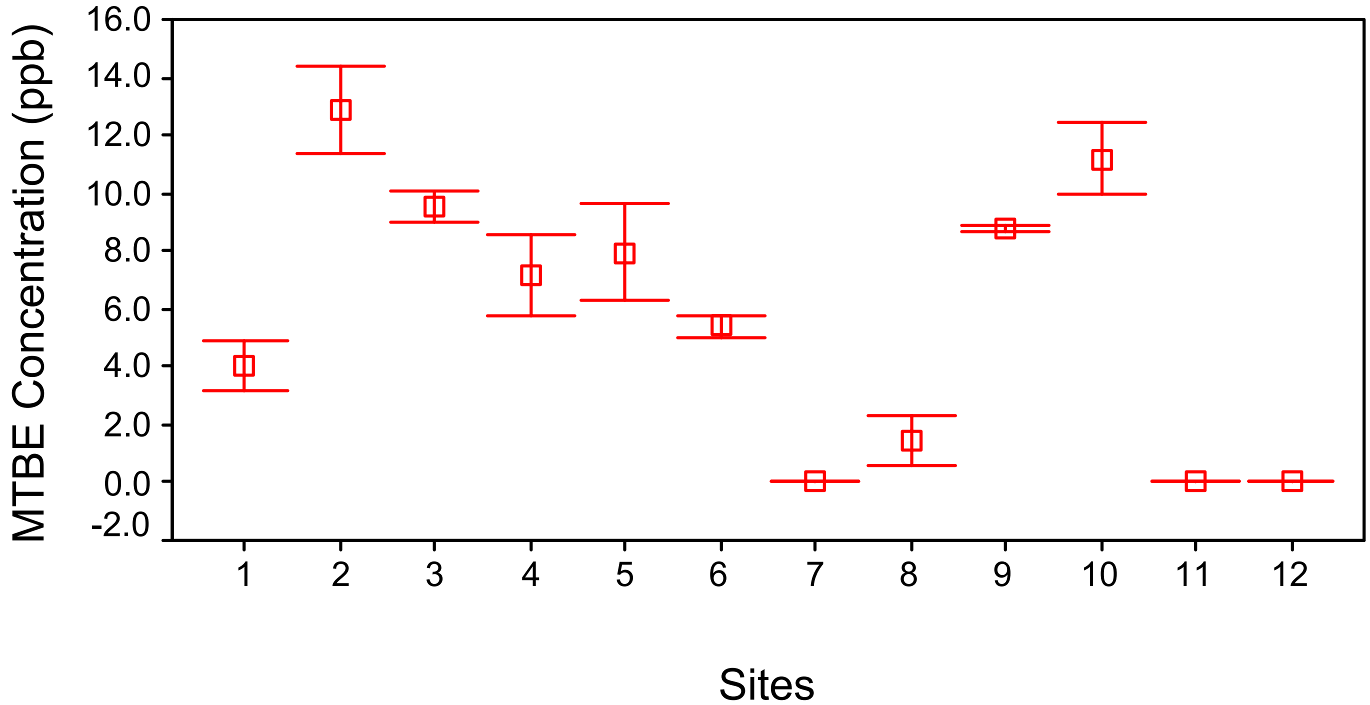
Samples Collected at 0.25 Meters Depth



*95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville July 6, 1999

Samples Collected at 0.25 Meters Depth

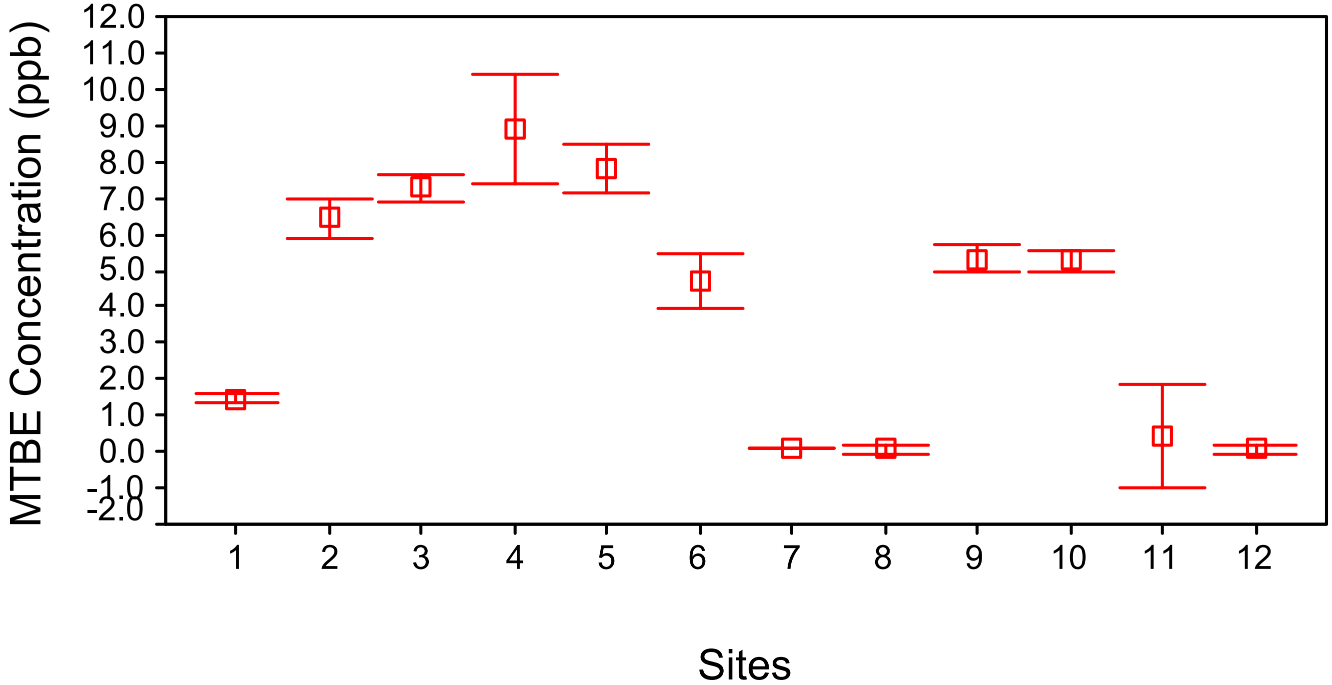


*95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake

Lewisville July 19, 1999

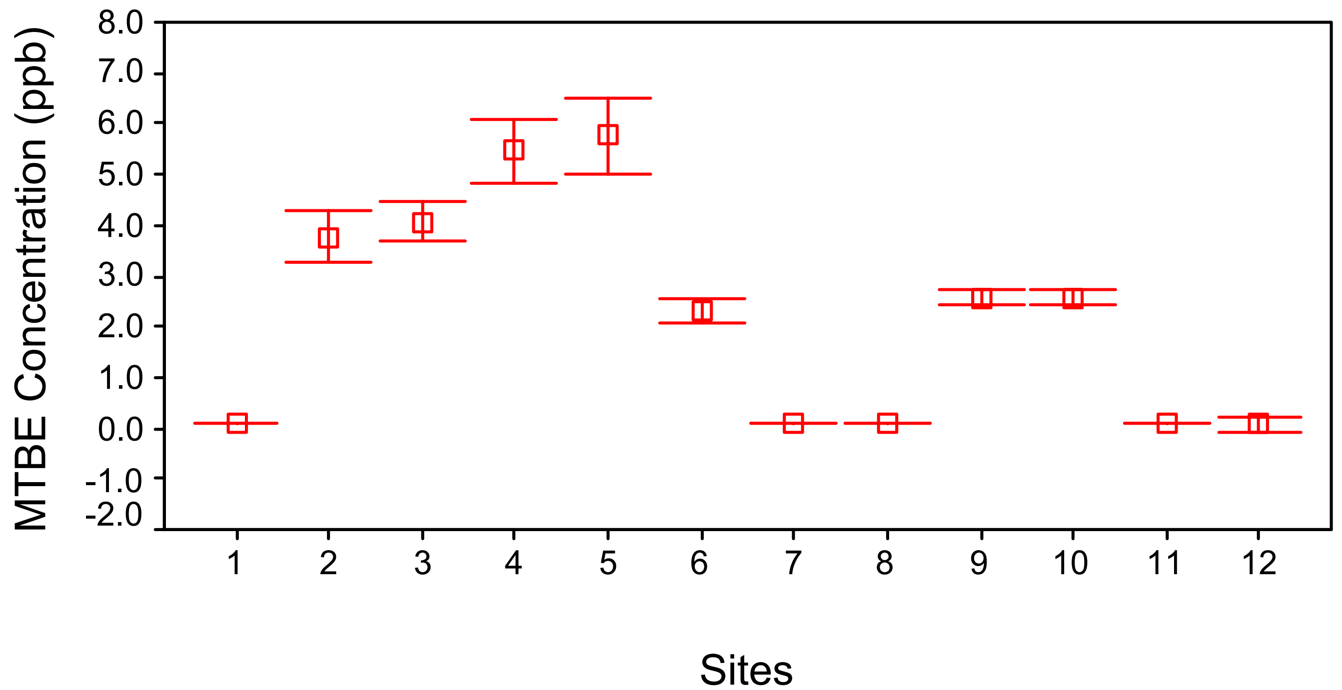
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville July 23, 1999

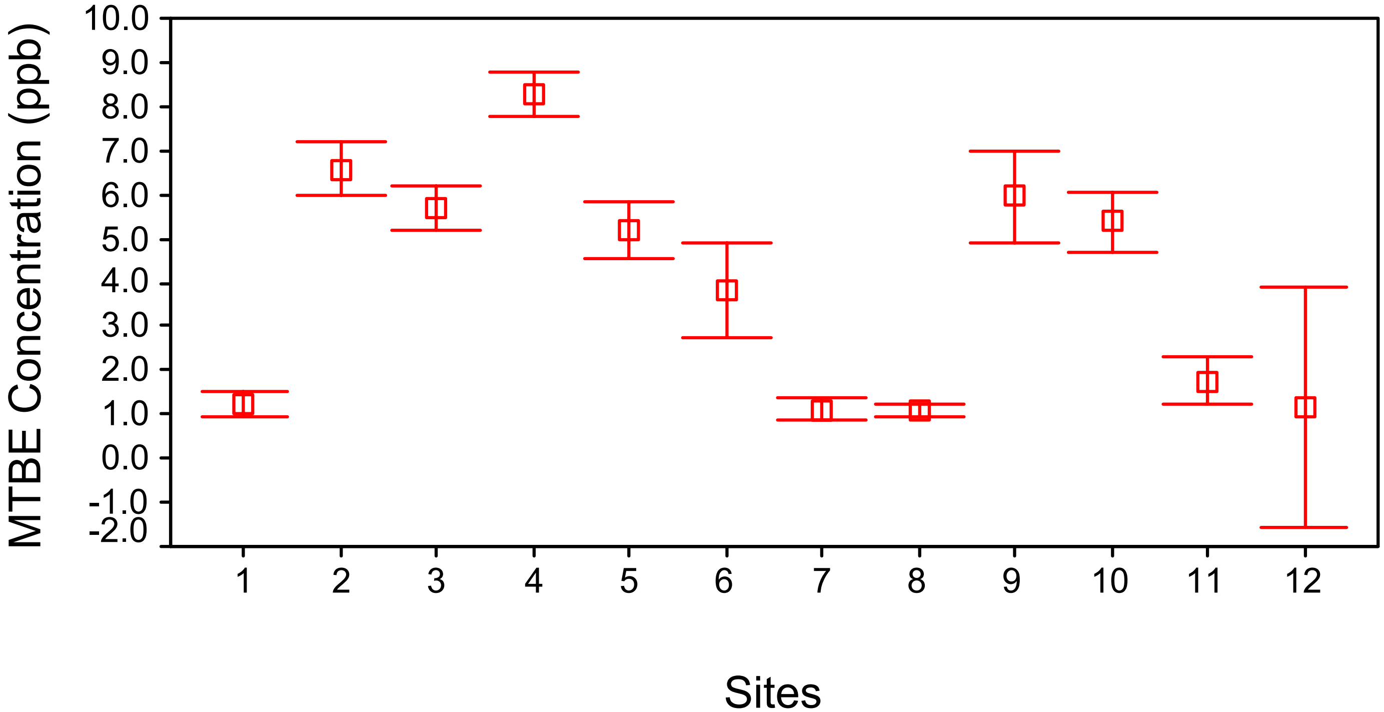
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville July 26, 1999

Samples Collected at 0.25 Meters Depth

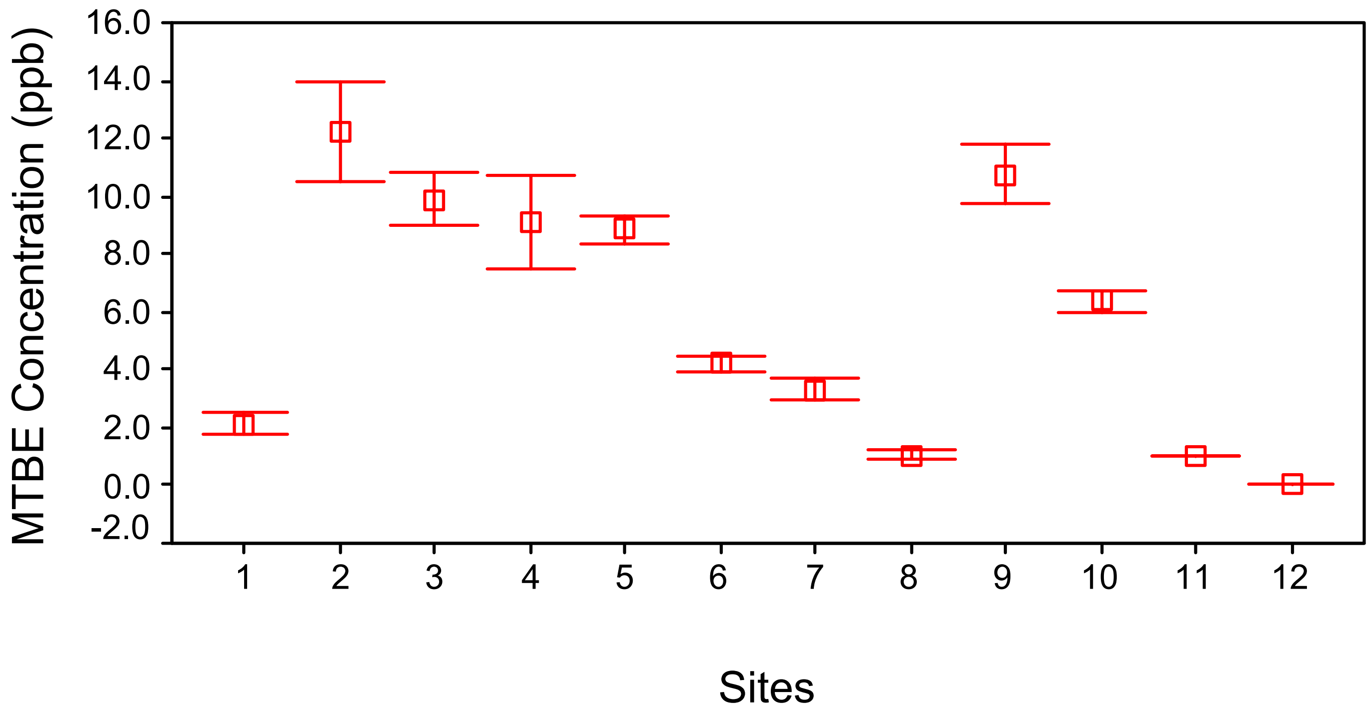


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville August 2, 1999

Samples Collected at 0.25 Meters Depth

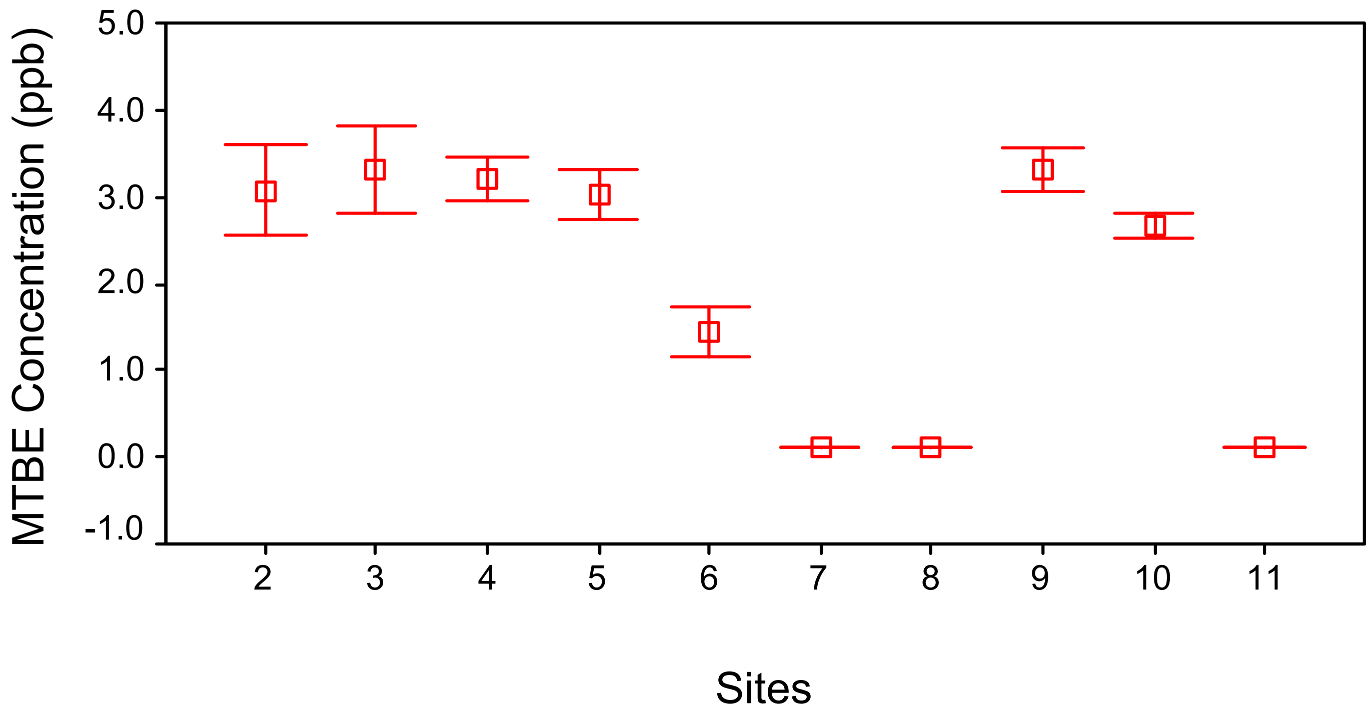


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville August 12, 1999

Samples Collected at 0.25 Meters Depth

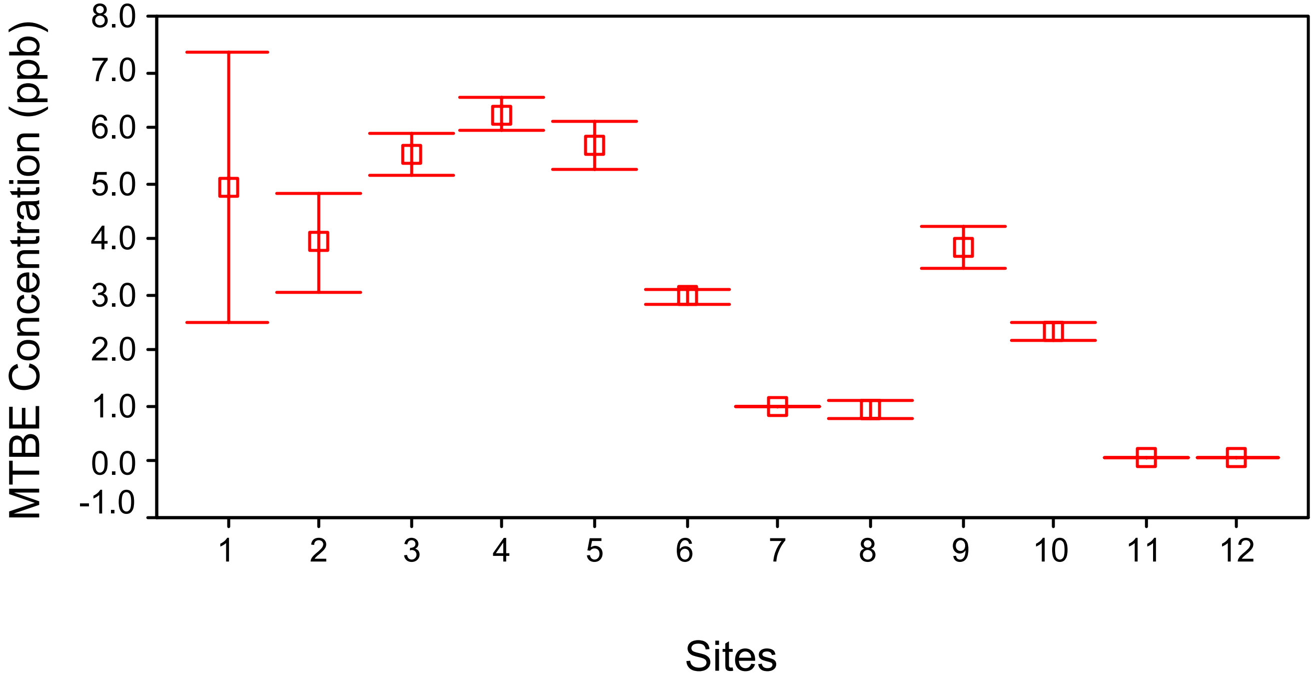


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake

Lewisville August 21, 1999

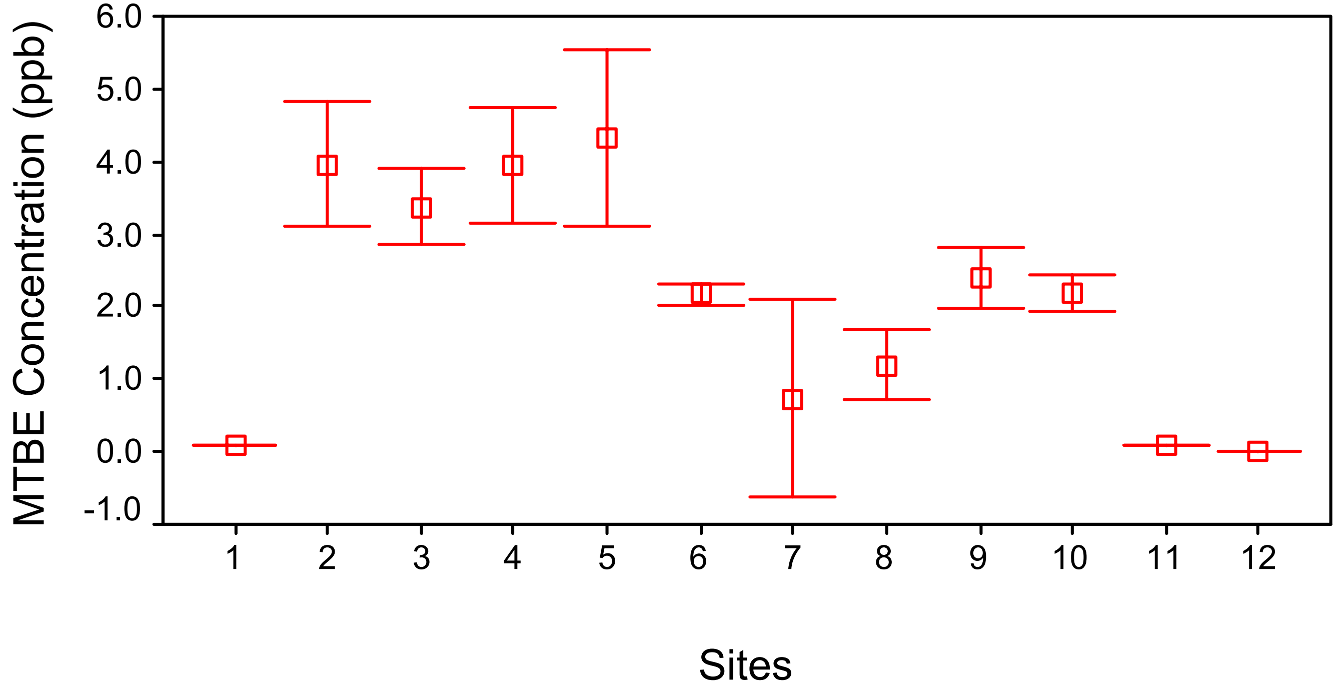
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville August 26, 1999

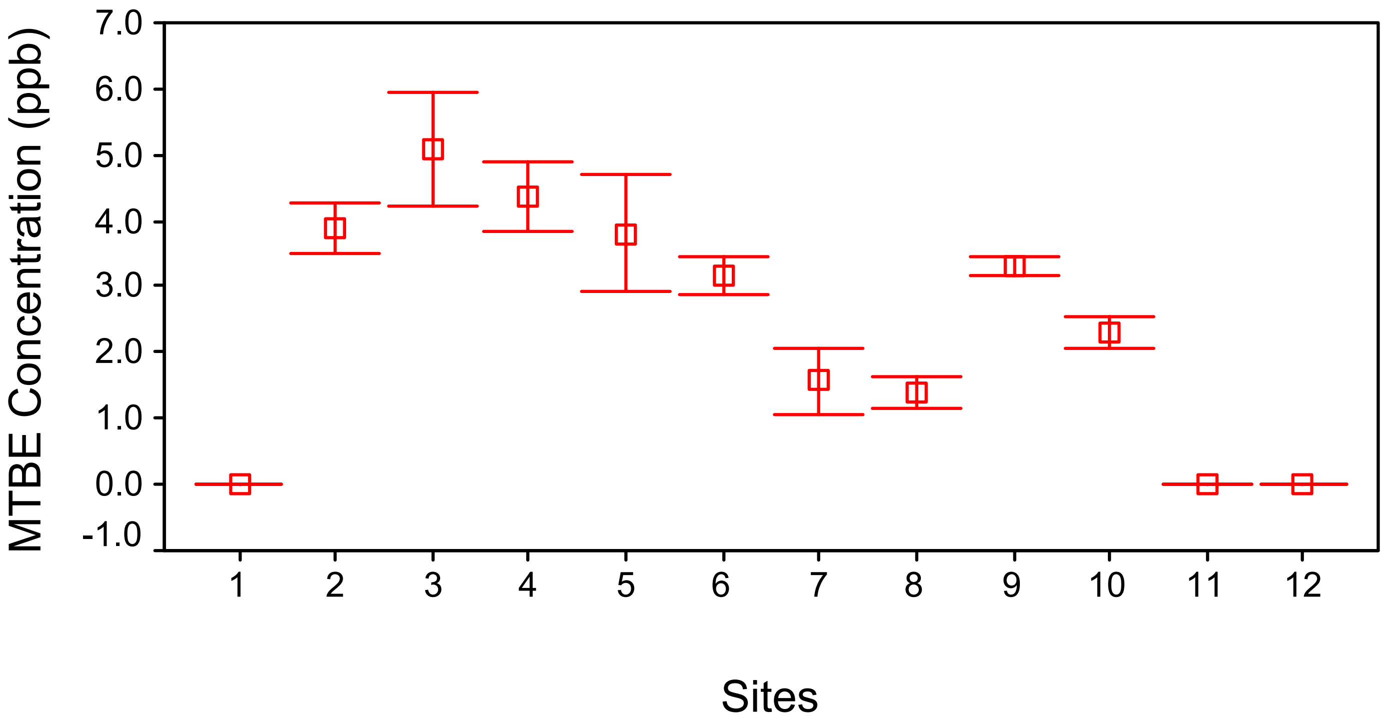
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville September 3, 1999

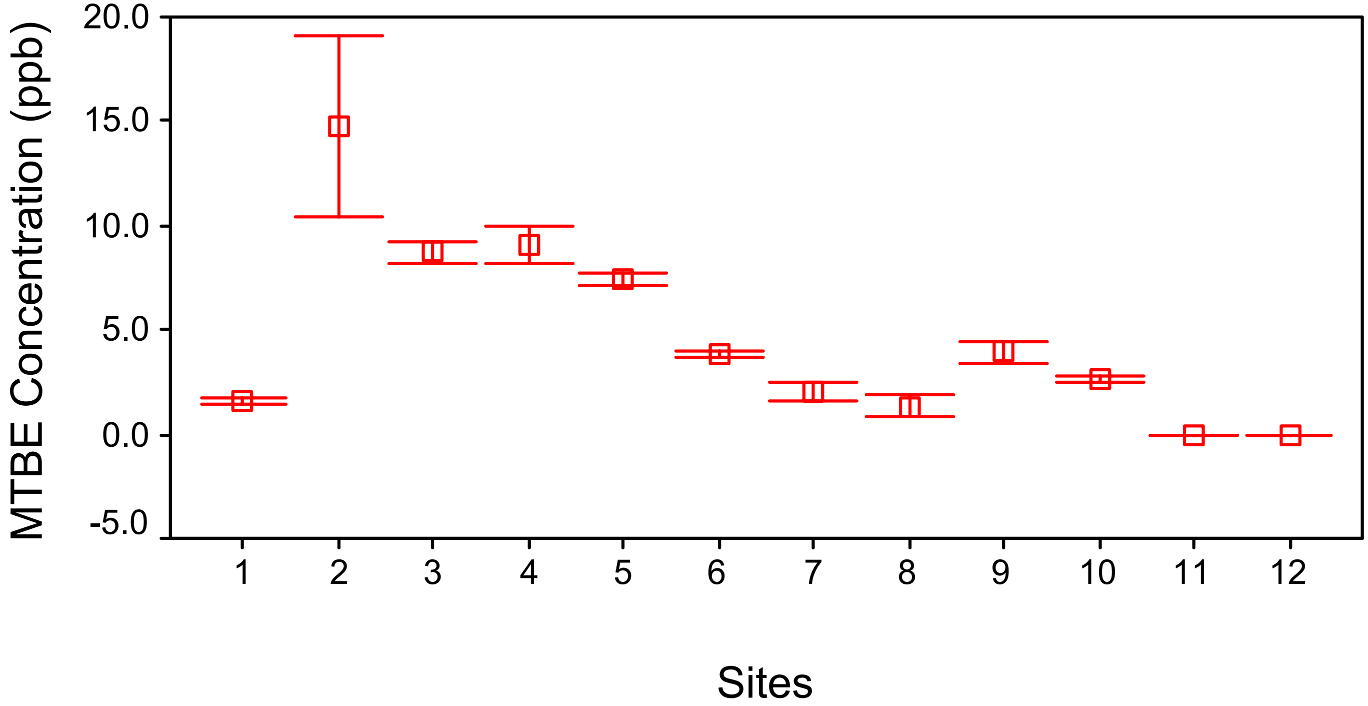
Samples Collected at 0.25 Meters Depth



*95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake Lewisville September 6, 1999

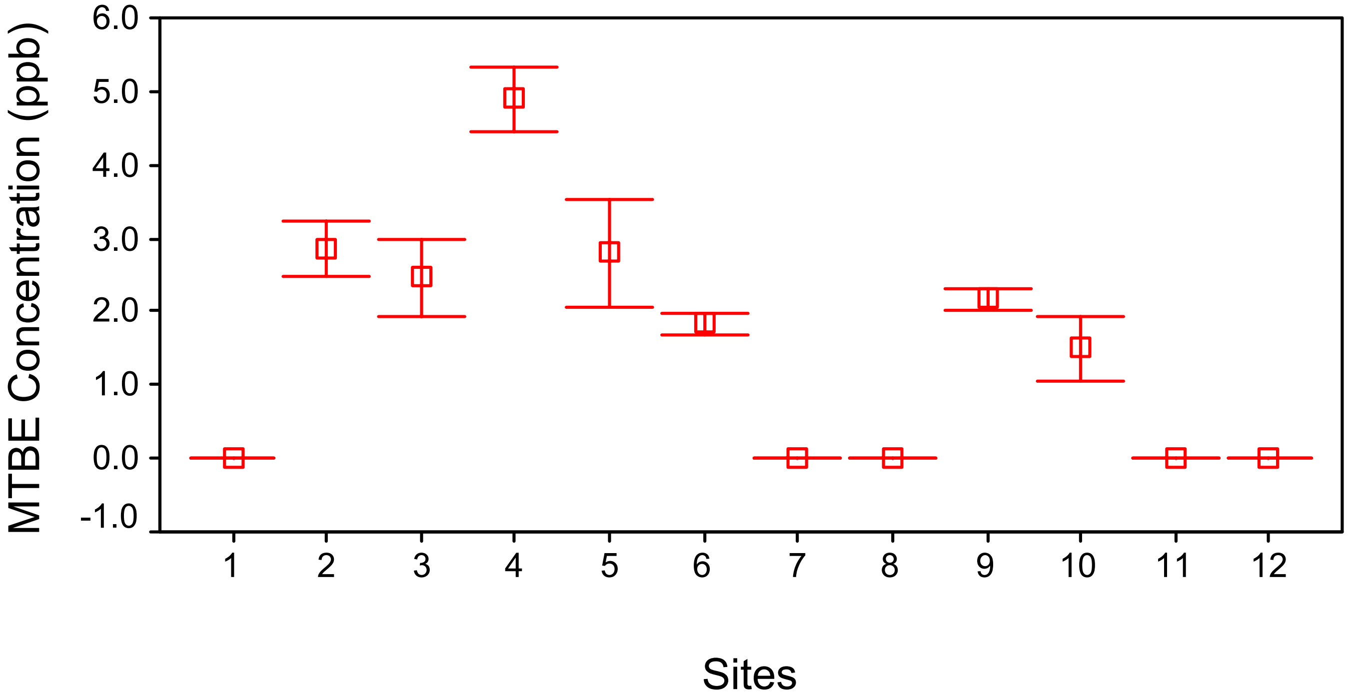
Samples Collected at 0.25 Meters Depth



*95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake Lewisville September 17, 1999

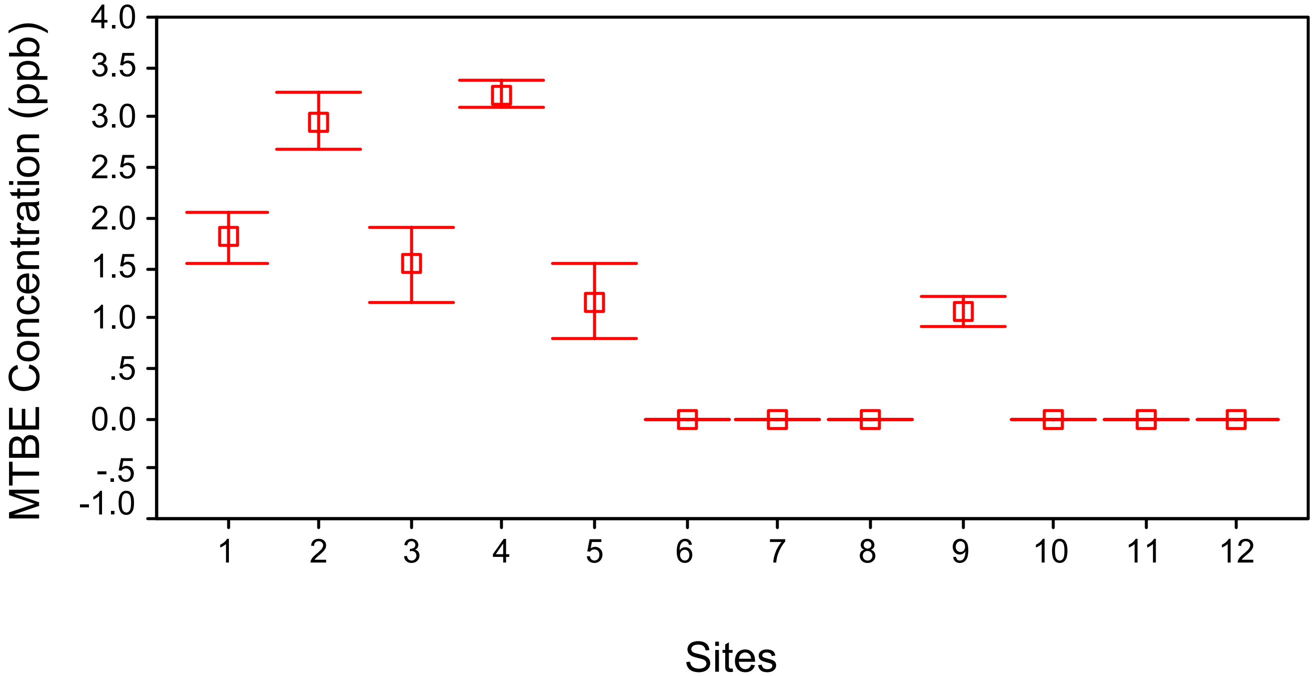
Samples Collected at 0.25 Meters Depth



* 95% Confidence Limit

Average MTBE Concentrations (ppb) in Lake Lewisville September 26, 1999

Samples Collected at 0.25 Meters Depth

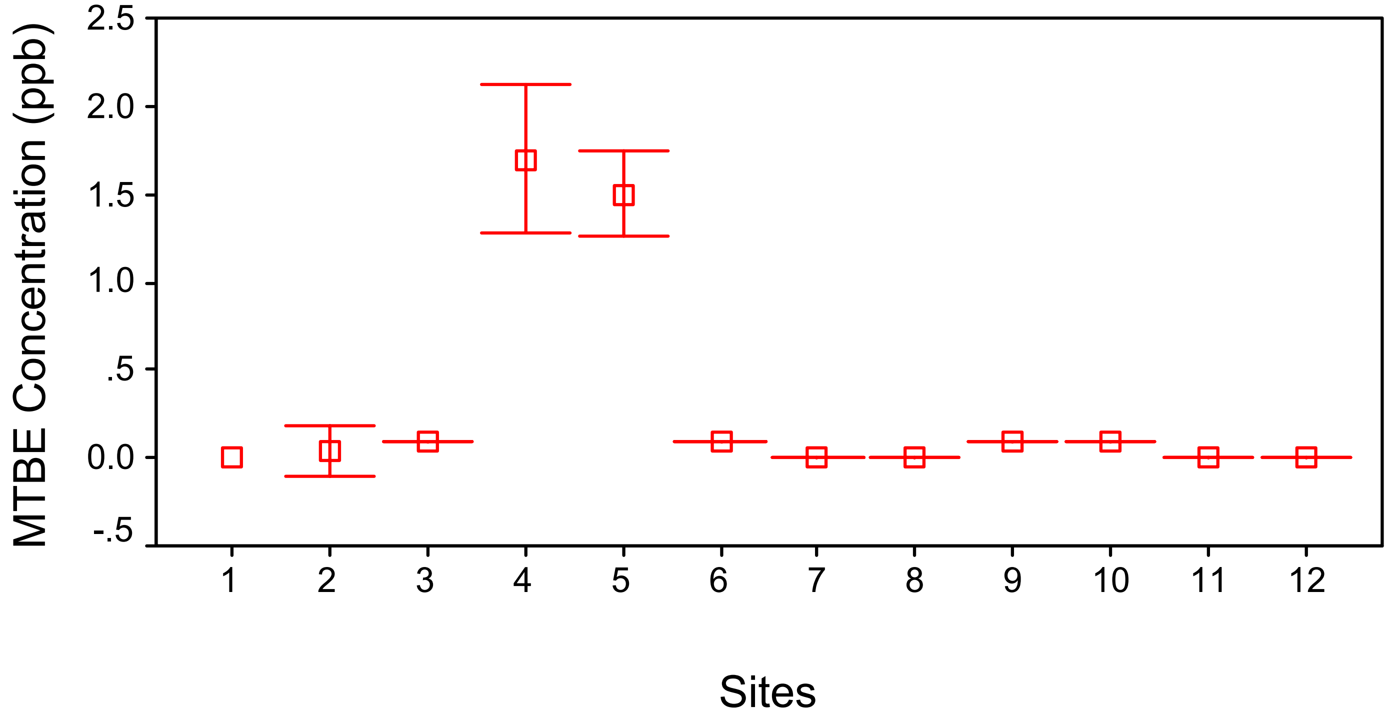


* 95% Confidence Limit

Average MTBE Concentrations (ppb) in

Lake Lewisville November 22, 1999

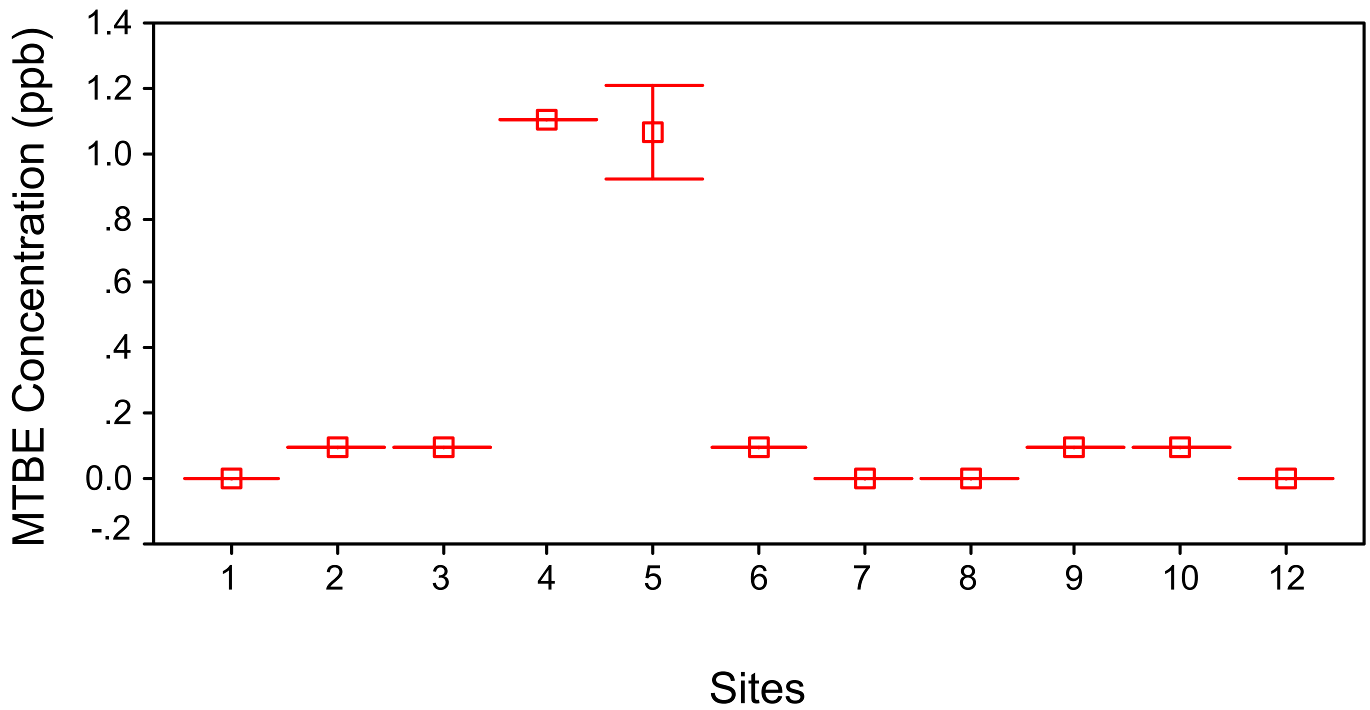
Samples Collected at 0.25 Meters Depth



*95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake Lewisville December 5, 1999

Samples Collected at 0.25 Meters Depth

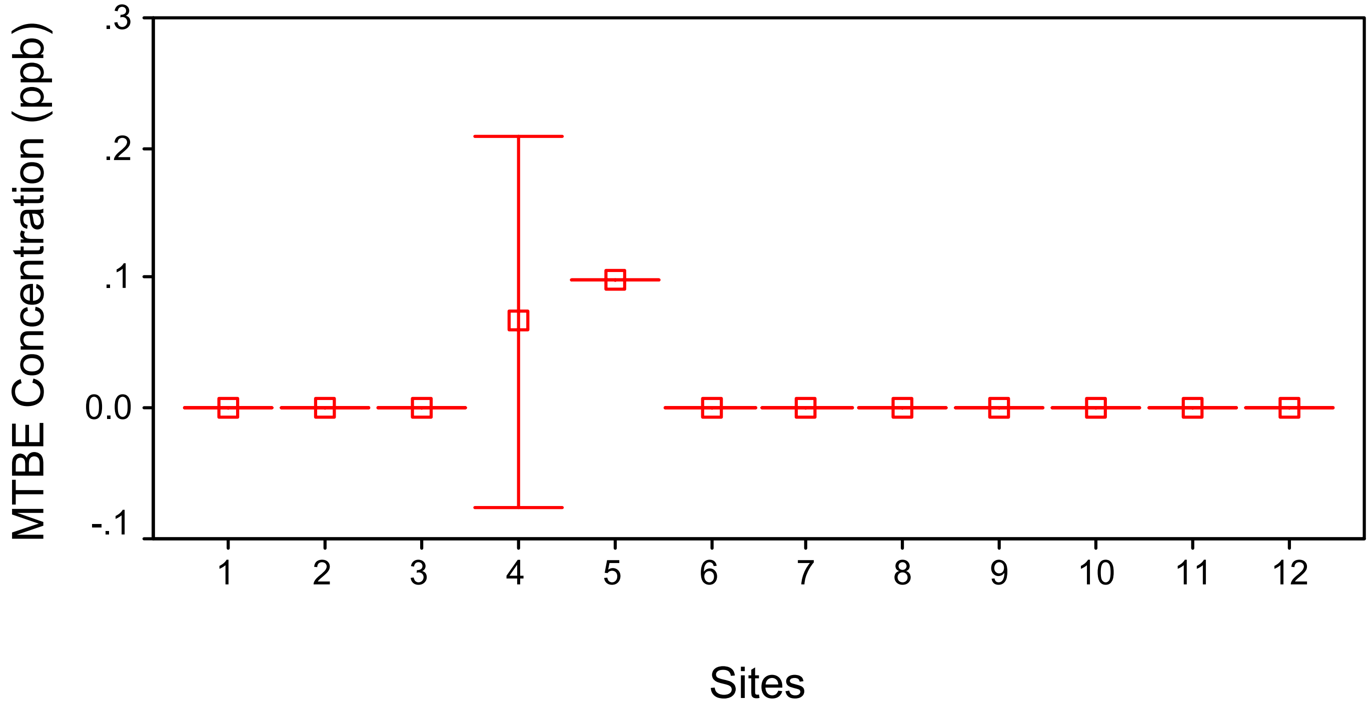


*95% Confidence Limits

Average MTBE Concentrations (ppb) in

Lake Lewisville January 31, 2000

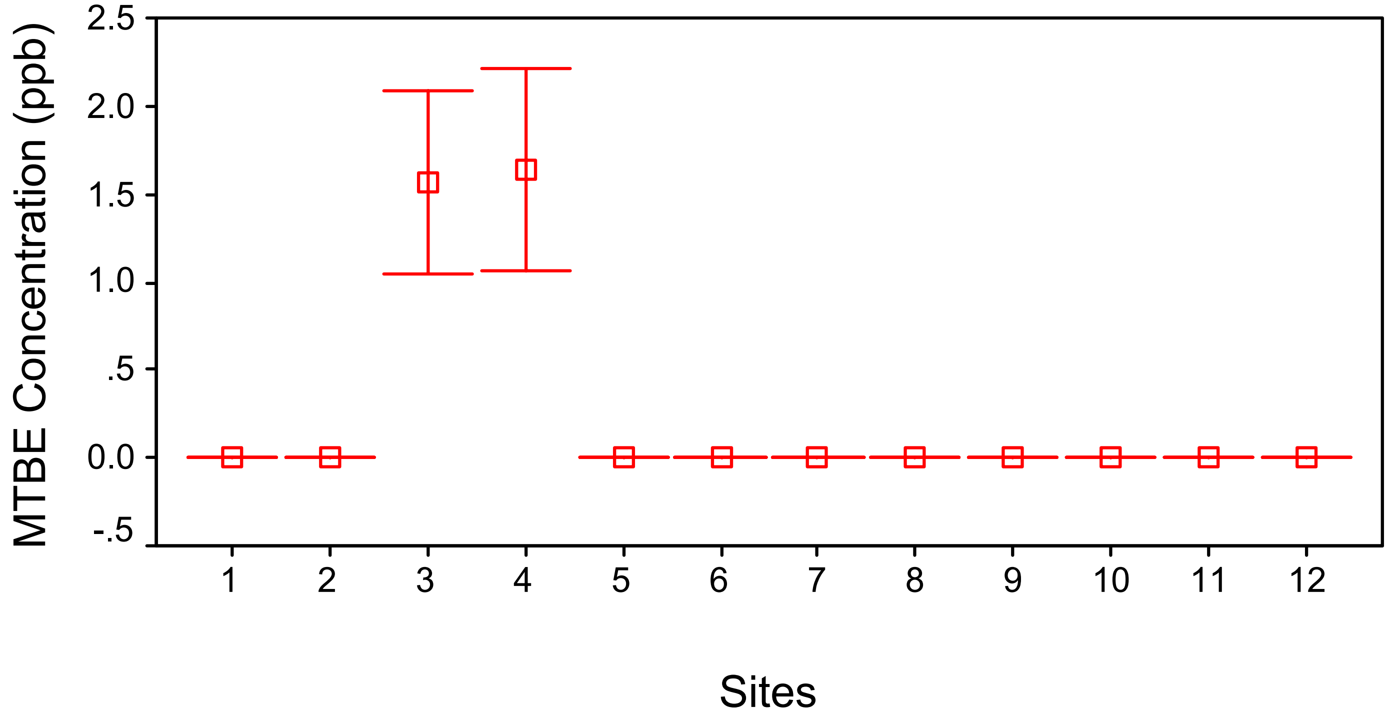
Samples Collected at 0.25 Meters Depth



*95% Confidence Limits

Average MTBE Concentrations (ppb) in Lake Lewisville February 12, 2000

Samples Collected at 0.25 Meters Depth



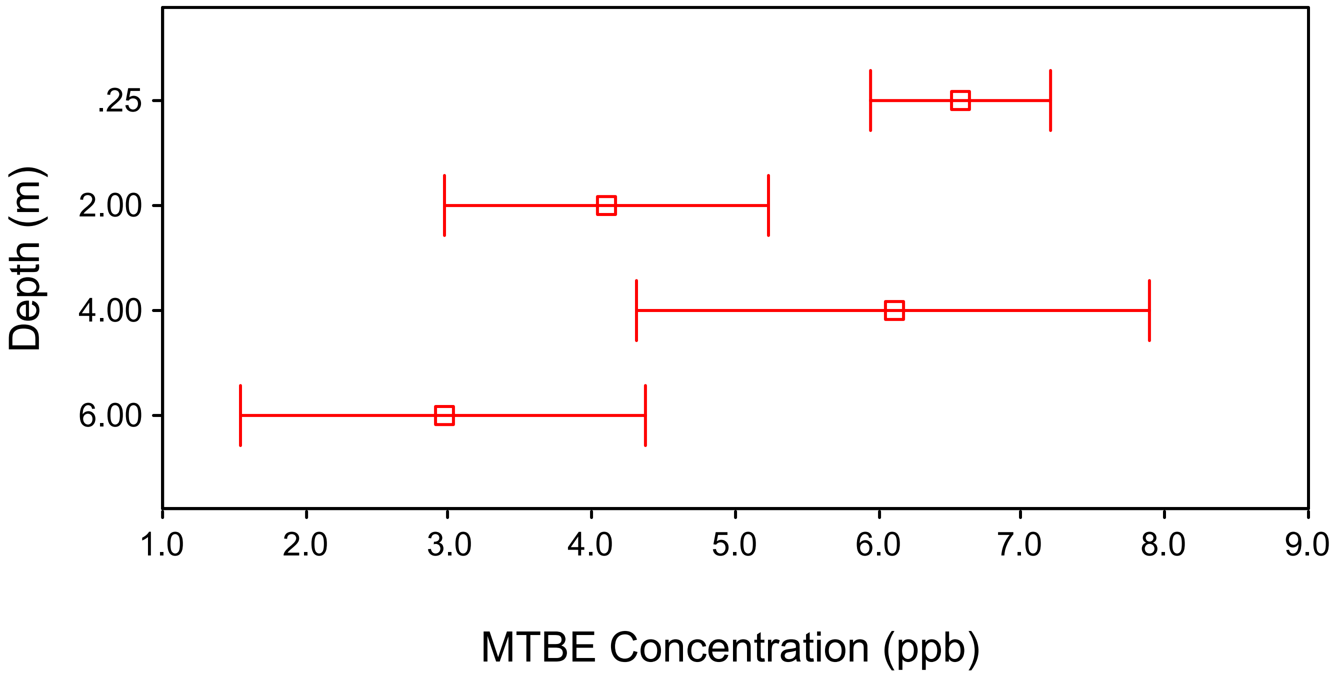
*95% Confidence Limits

APPENDIX F
DEPTH PROFILE OF MTBE CONCENTRATIONS IN LAKE LEWISVILLE AT SITE 2

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 July 26, 1999

Samples Collected at 0.25, 2, 4 & 6 Meters Depth

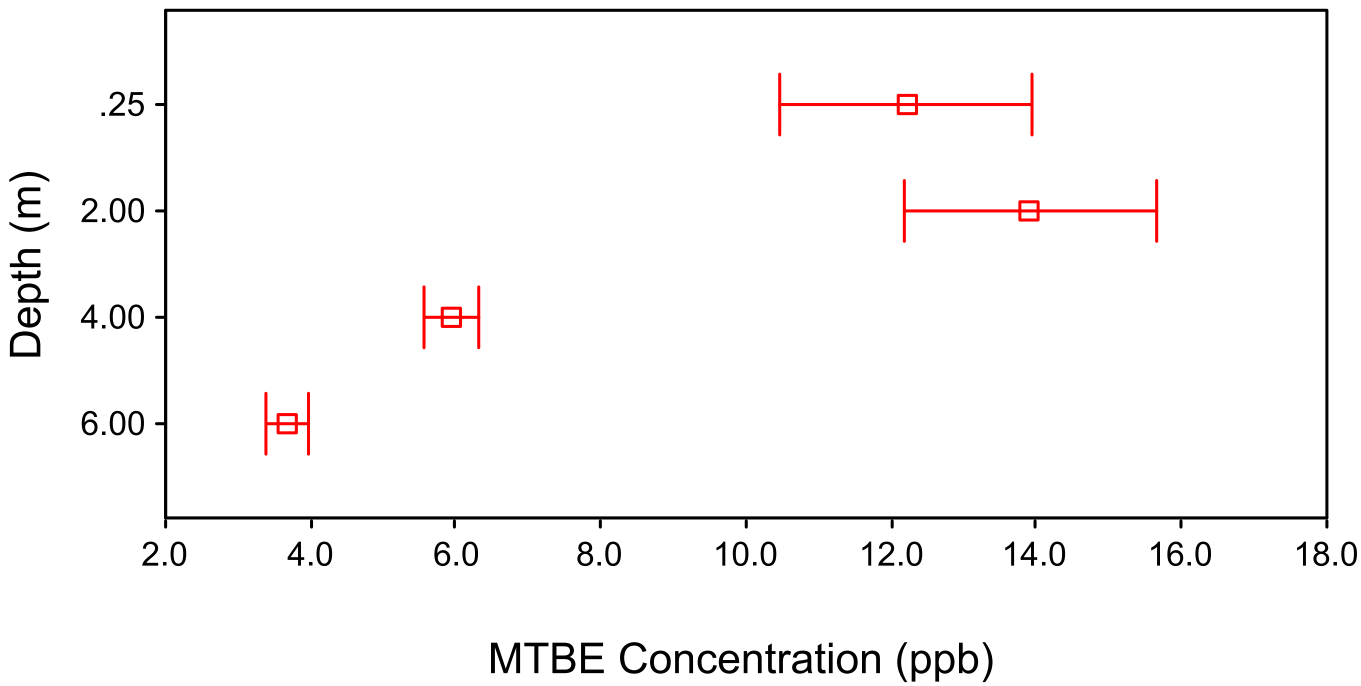


*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 August 2, 1999

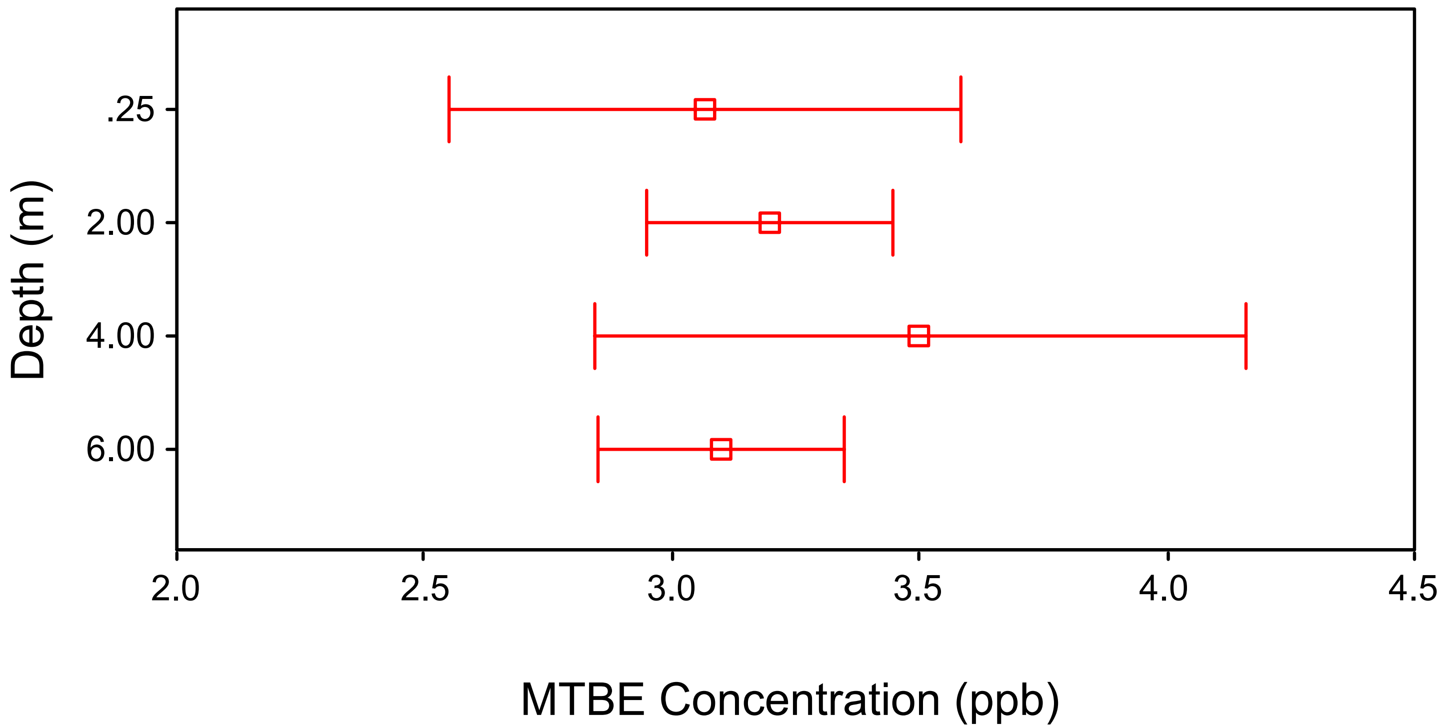
Samples Collected at 0.25, 2, 4 & 6 Meters Depth



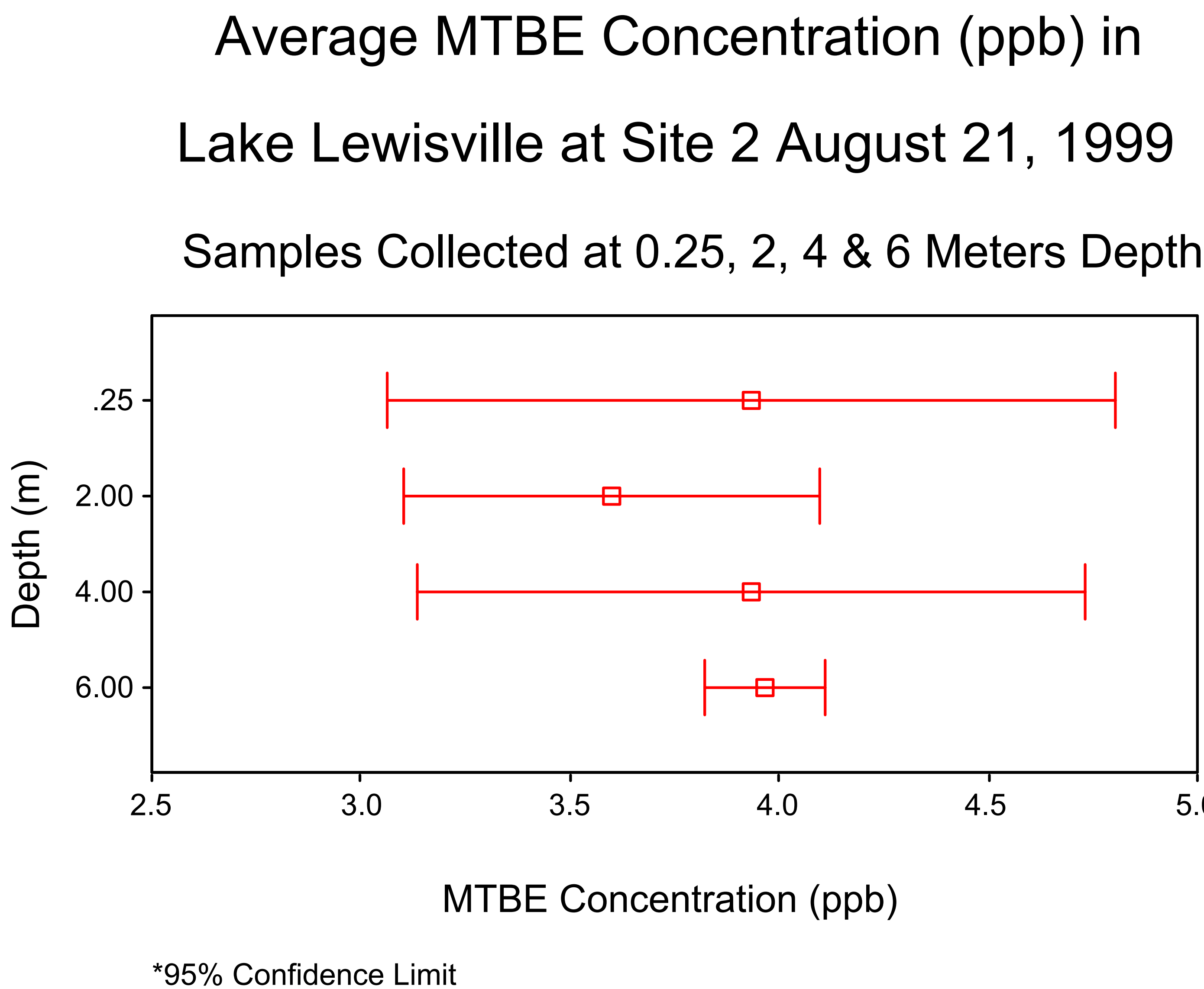
*95% Confidence Limit

Average MTBE Concentration (ppb) in Lake Lewisville at Site 2 August 12, 1999

Samples Collected at 0.25, 2, 4 & 6 Meters Depth



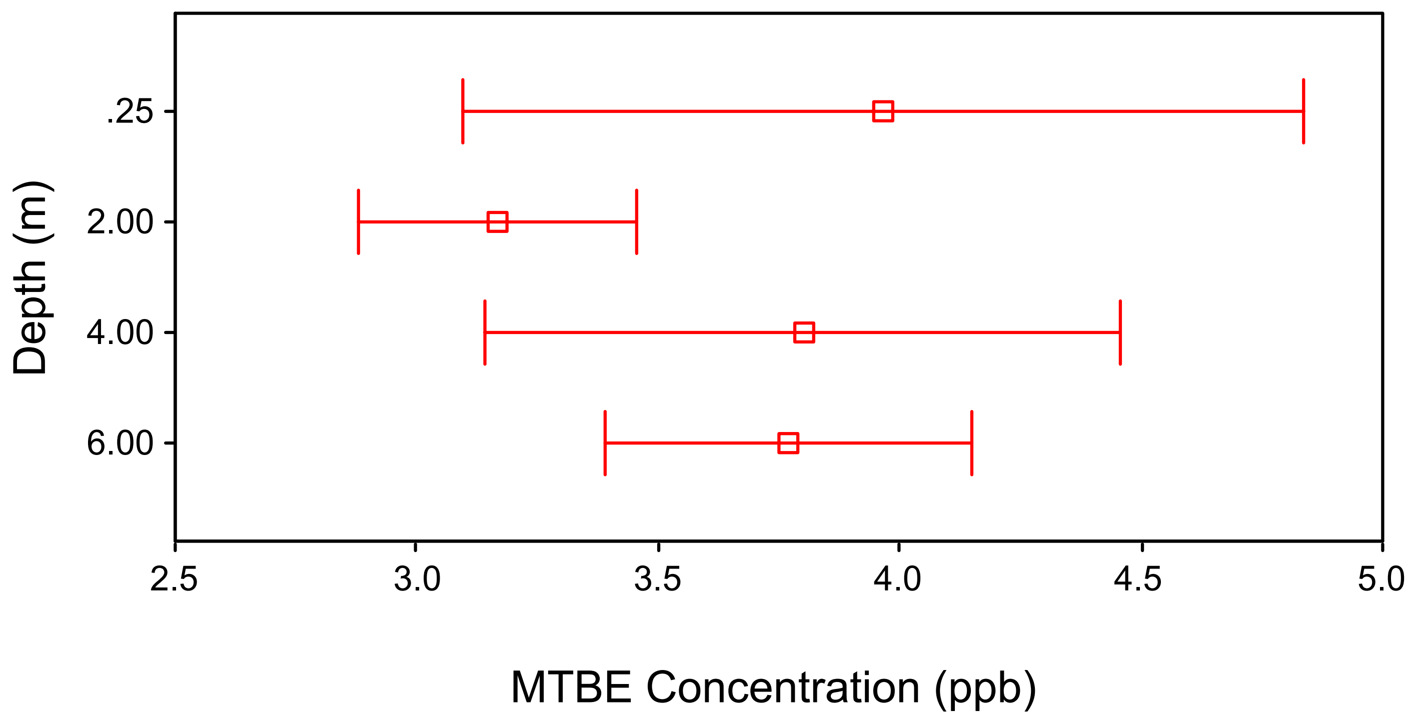
*95% Confidence Limit


Average MTBE Concentration (ppb) in
Lake Lewisville at Site 2 August 21, 1999
Samples Collected at 0.25, 2, 4 & 6 Meters Depth
Depth (m)
.25
2.00
4.00
6.00
2.5
3.0
3.5
4.0
4.5
5.0
MTBE Concentration (ppb)
*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 August 26, 1999

Samples Collected at 0.25, 2, 4 & 6 Meters Depth

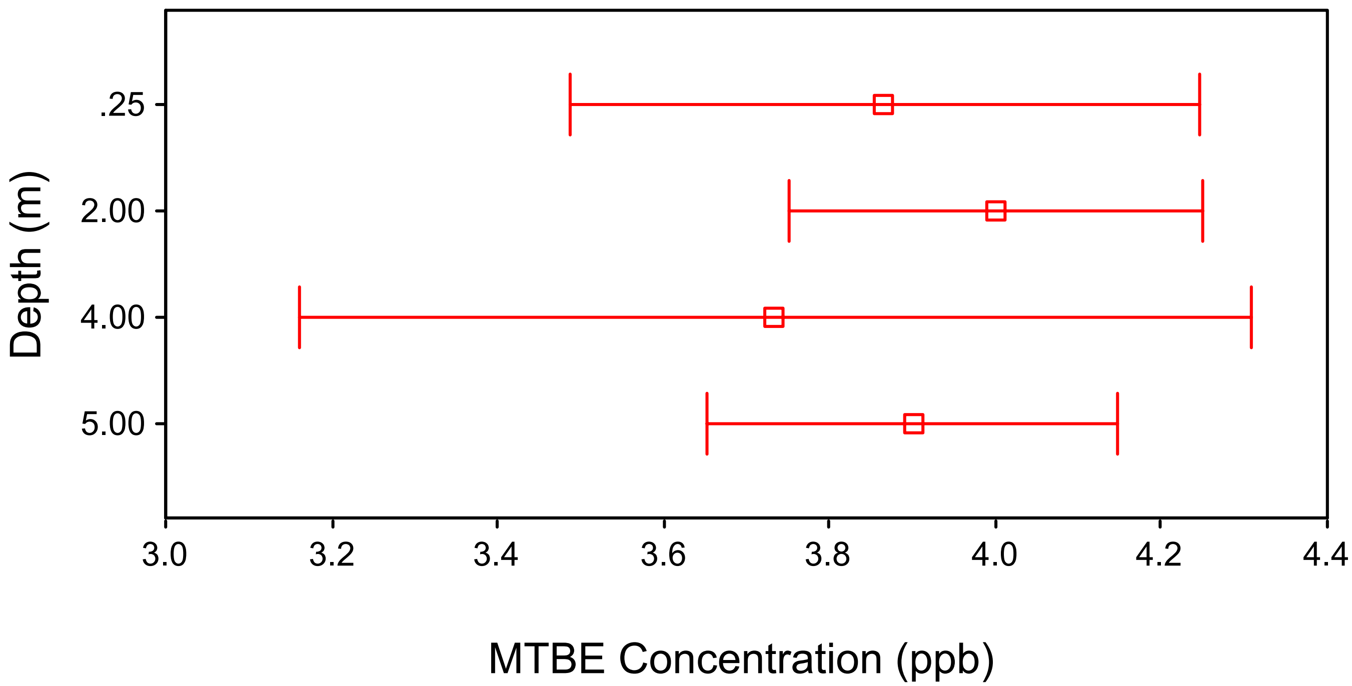


*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 September 3, 1999

Samples Collected at 0.25, 2, 4 & 5 Meters Depth

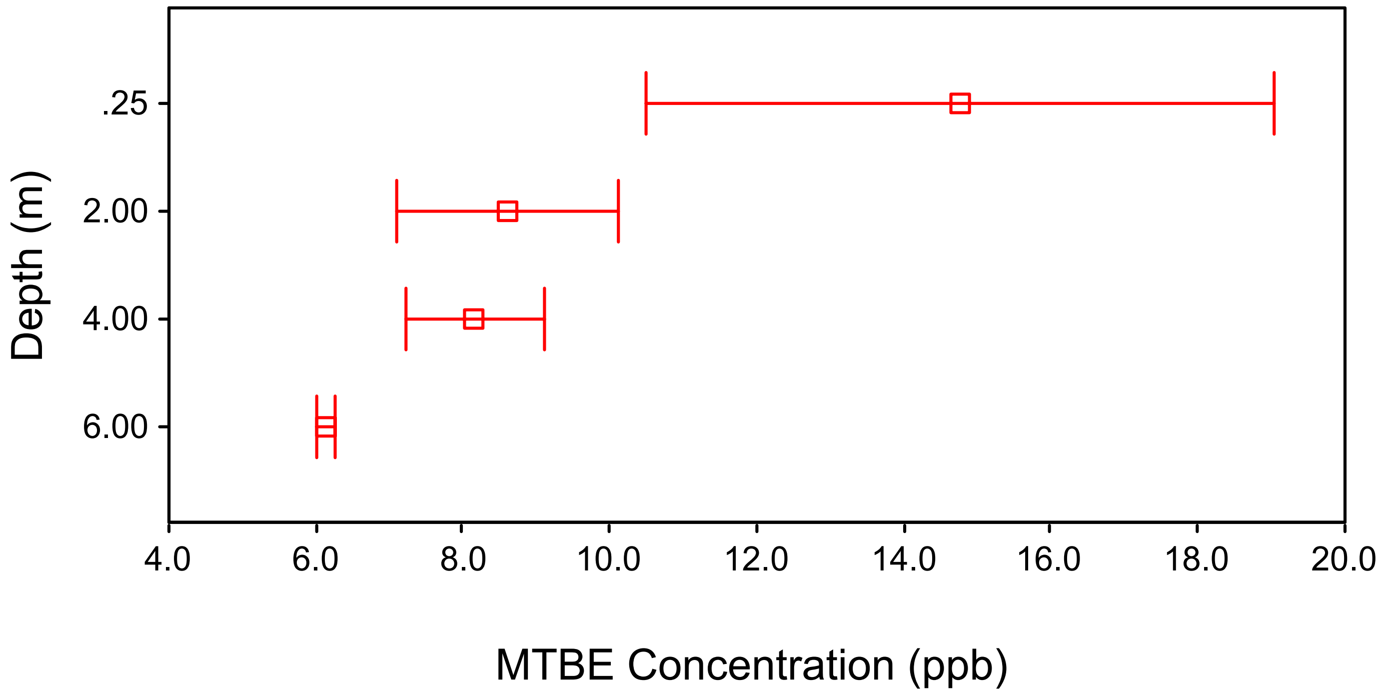


*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 September 6, 1999

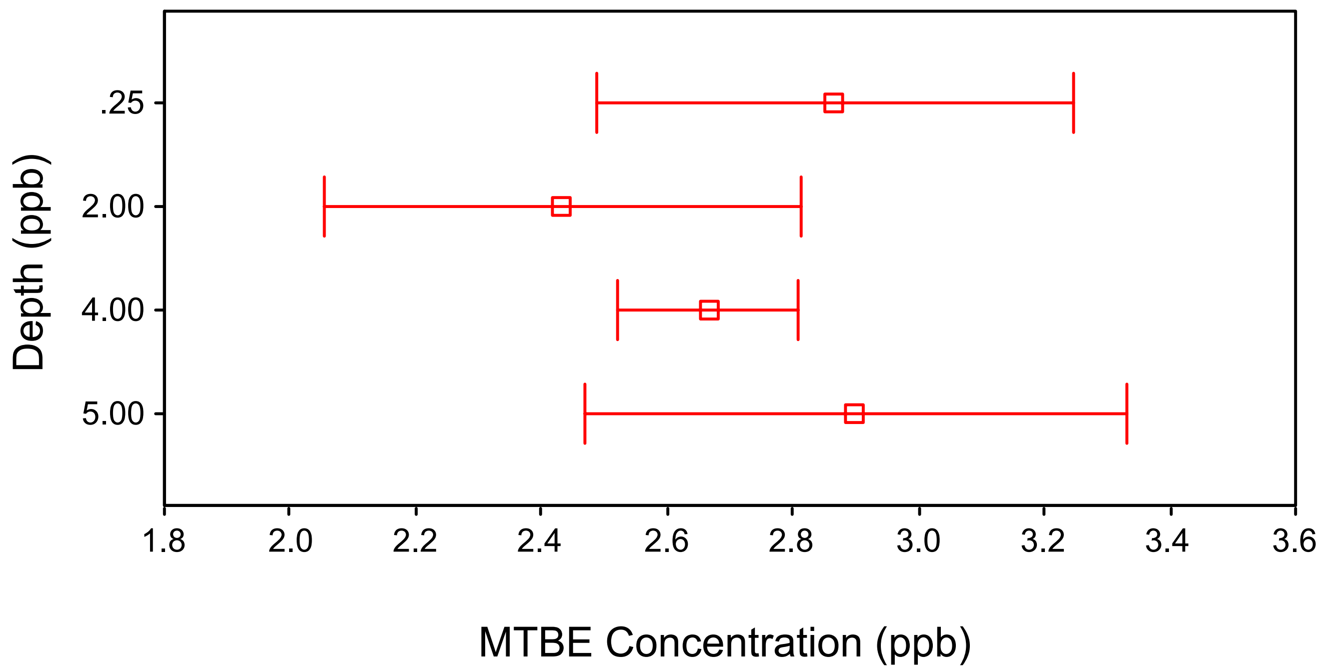
Samples Collected at 0.25, 2, 4 & 6 Meters Depth



*95% Confidence Limit

Average MTBE Concentration (ppb) in Lake Lewisville at Site 2 September 17, 1999

Samples Collected at 0.25, 2, 4 & 5 Meters Depth

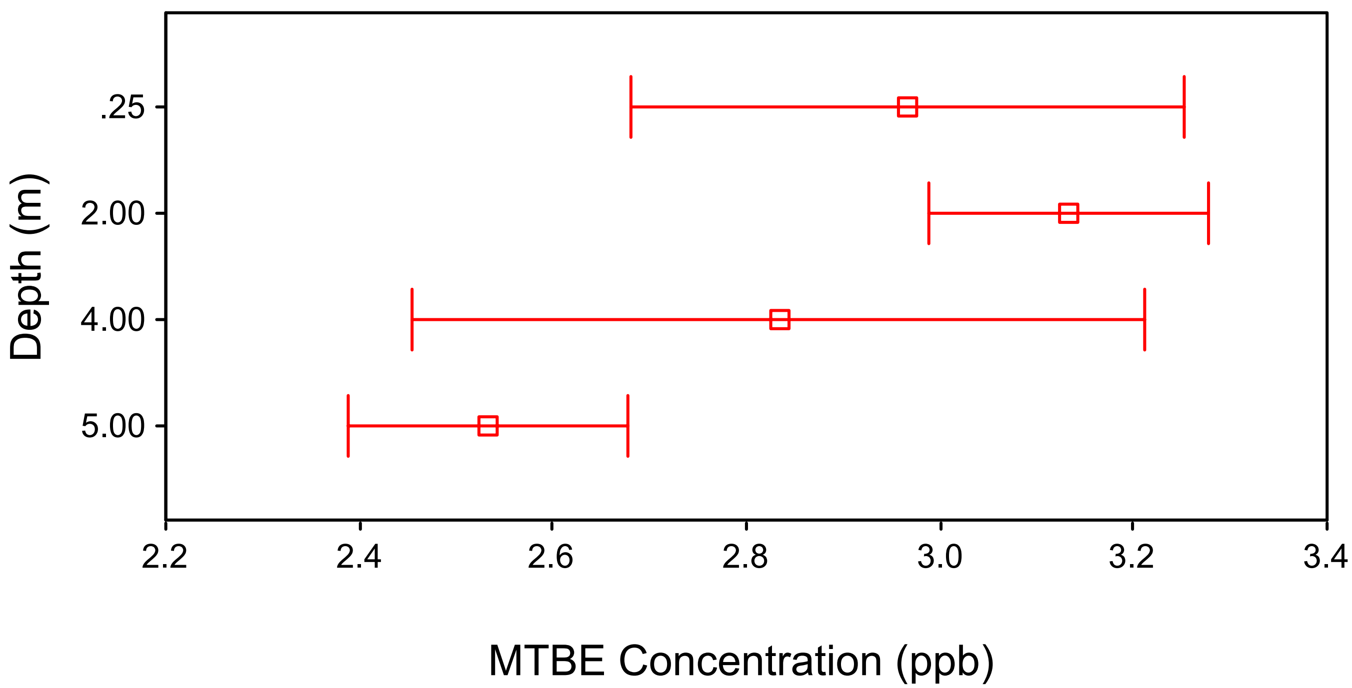


*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 September 26, 1999

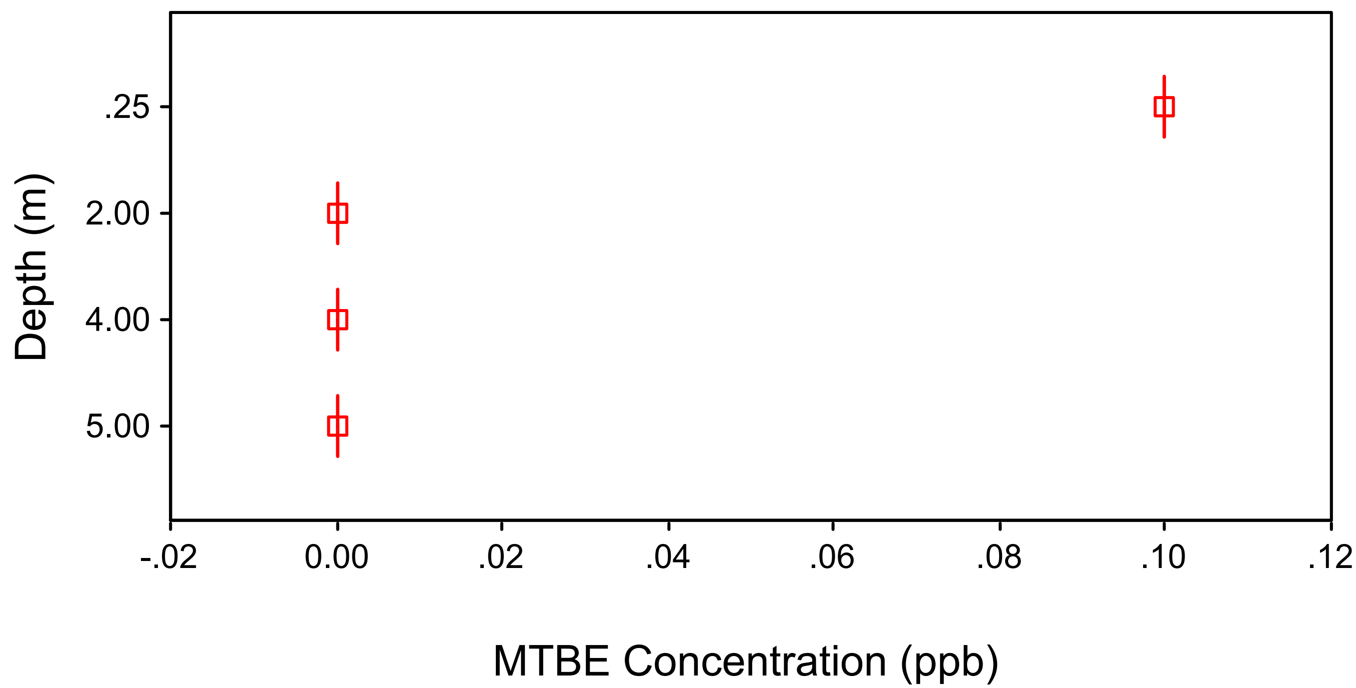
Samples Collected at 0.25, 2, 4 & 5 Meters Depth



*95% Confidence Limit

Average MTBE Concentration (ppb) in Lake Lewisville at Site 2 December 5, 1999

Samples Collected at 0.25, 2, 4 & 5 Meters Depth

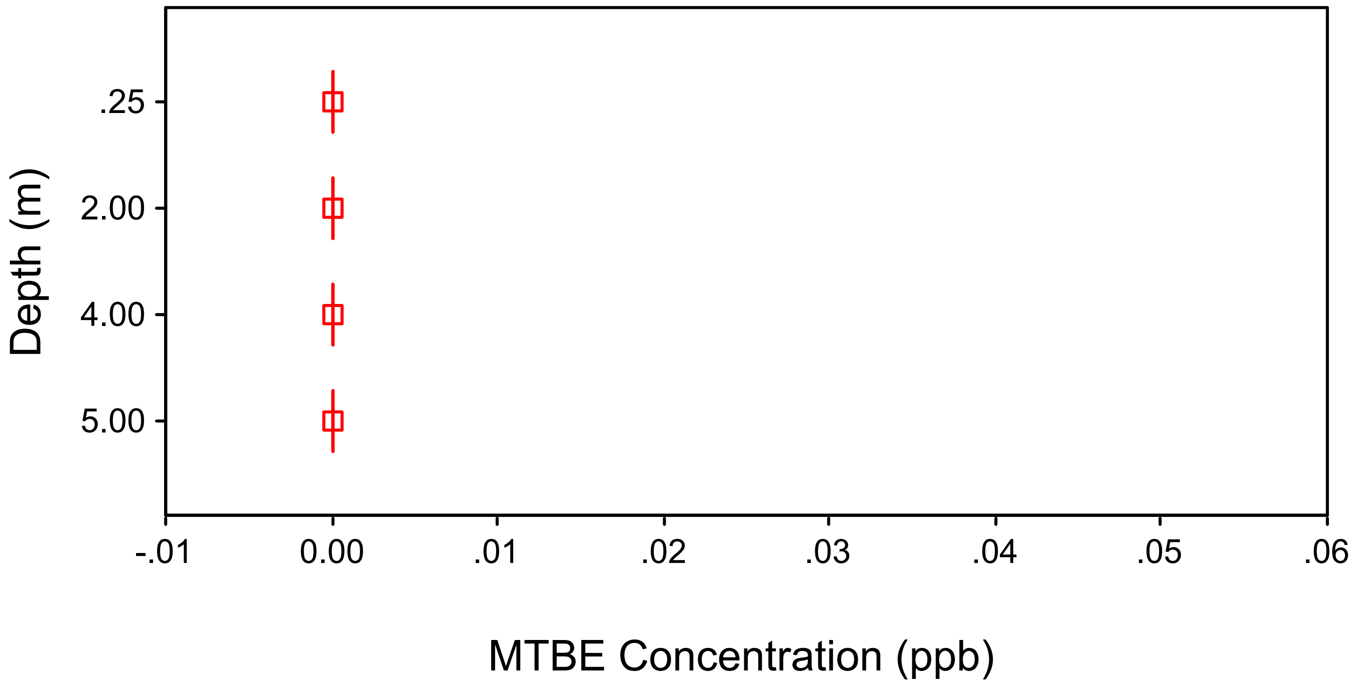


*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 January 31, 2000

Samples Collected at 0.25, 2, 4 & 6 Meters Depth

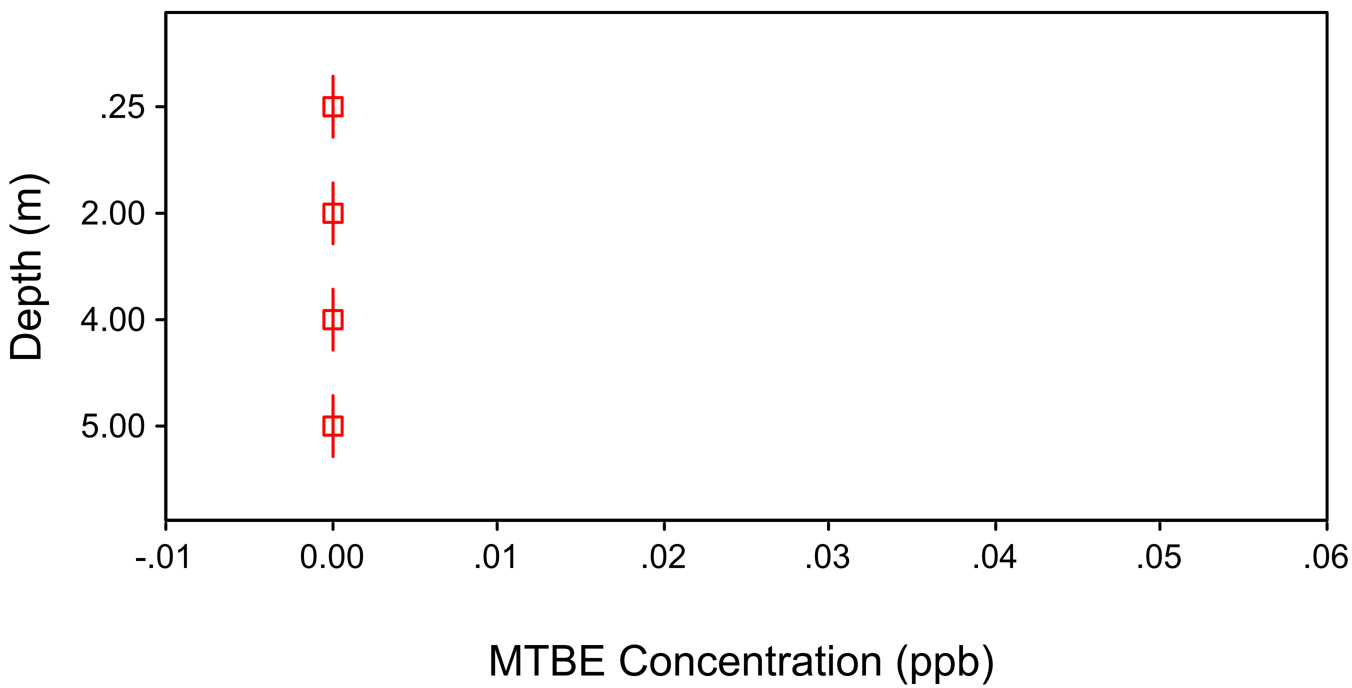


*95% Confidence Limit

Average MTBE Concentration (ppb) in

Lake Lewisville at Site 2 February 12, 2000

Samples Collected at 0.25, 2, 4 & 6 Meters Depth



*95% Confidence Limit

APPENDIX G
STANDARD OPERATING PROCEDURE FOR ANALYSIS OF VOLATILE AROMATIC HYDROCARBONS WITH SEPARATION OF XYLENE ISOMERS BY PURGE AND TRAP GAS CHROMATOGRAPHY

STANDARD OPERATING PROCEDURE

Analysis of Volatile Aromatic Hydrocarbons with Separation of Xylene Isomers by Purge and Trap Gas Chromatography

I. **Disclaimer:**

This Standard Operating Procedure has been prepared for the use of the Subsurface Protection and Remediation Division of the U.S.Environmental Protection Agency and may not be specifically applicable to the activities of other organizations. **THIS IS NOT AN OFFICIAL EPA APPROVED METHOD.** This document has not been through the Agency's peer review process or ORD clearance process.

II. **Purpose:** (Scope and Application)

This method is applicable to the automated quantitative analysis of the volatile aromatics Benzene, Toluene, Ethylbenzene, p-, m-, & o-Xylene, and 1,3,5-, 1,2,4-, & 1,2,3-Trimethylbenzene in groundwater, at a concentration range of 1 ng/mL through 2000 ng/mL. Although sample size is 5.0 mL, sample must be delivered in 40 mL VOA vials for automated analysis. A Tekmar LSC 2000 Sample Concentrator and a carousel type Dynatech PTA-30 autosampler are used. A carousel type autosampler minimizes mixing of particulates which may be present in groundwater samples and cause plugging of sample transfer lines.

This method is restricted to use by or under the supervision of analysts experienced in the use of gas chromatography, Millennium software and in the interpretation of chromatograms.

III. **Summary of Method:**

An aqueous sample, acid preserved to prevent degradation of analytes, is received in a standard 40 mL VOA vial with a holed screw cap and a 5 mil silicon/120 mil Teflon septum. The VOA vial is sampled automatically using a PTA-30 carousel type autosampler connected to a Tekmar LSC 2000 sample concentrator. Desorbed analytes are automatically transferred from the LSC 2000 BTEXTRAP trap to a Hewlett-Packard Model 5890 gas chromatograph. The column is temperature programmed, without the use of cryogenic cooling, and the separated analytes are detected by a HNU photoionization detector.

IV. References:

3.1 Ho, J.S., Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series, Method 502.2, Revision 2.0, EPA/600/4-88/039, U.S. Environmental Protection Agency, Methods for the Determination of Organic Compounds in Drinking Water, Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268, December 1988.

3.2 Bellar, T.A., Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography, Method 503.1, Revision 2.0, EPA/600/4-88/039, U.S. Environmental Protection Agency, Methods for the Determination of Organic Compounds in Drinking Water, Environmental Monitoring Systems Laboratory, Cincinnati, OH 46628, December, 1988.

3.3 H.P. 5890 Gas Chromatograph Reference and Operating Manuals.

3.4 Photoionization Detector for Gas Chromatography Instruction Manual, Model PI-52-02A, Newton, MA 02161, July, 1986.

3.5 Operating and Instruction Manual for PTA-30W/S Purge and Trap Autosampler for Water and Soils, Ver. 8.7, Baton Rouge, LA 70815, June, 1991.

3.6 Millennium Software User's Guide, Vol: 1-2, Ver. 2.1, Milford, MA 01757, 1994.

3.7 Flemming, C.D., Control Charting For Research and Development, Student Manual, SP-4000-90-40, Mantech Environmental Technology Inc., Research Triangle Park, NC, March, 1990.

3.8 Tekmar 2000 User Manual, document p/n 14-3912-000, Revision date 08.12.92, Cincinnati, Ohio.

V. Reagents and Equipment Needed:

* Methanol, purge and trap grade
* Boiled Milli-Q water (purity = 18 MEGOHMS-Om)
* Neat Compounds of interest
* Individual primary methanolic dilutions of analytes

* Neat fluorobenzene
* 100 mL Class A volumetric flask
* 25 mL Class A volumetric flask
* 500 μL syringe
* 10 μL syringe
* 40 mL VOA vials with open holed screw caps
* 5 mil silicon/120 mil Teflon septum
* Dynatech PTA 30 autosampler
* Tekmar LSC 2000 sample concentrator
* Hewlett Packard 5890 Gas Chromatograph
* HNU Photoionization Detector
* BTEXTRAP (Supelco p/n 2-1064)
* 30 m X 0.254 i.d. fused silica column with a 0.5 μm film of DB-WAX (J & W Scientific)

VI. **Precautions:**

WARNING: Some of these compounds are known carcinogens and some are classified as possible carcinogens, therefore when handling these compounds, all work should be conducted in a fume hood and protective clothing (laboratory coat, gloves, and eye protection) should be worn. Safe laboratory practice is advised.

CAUTION: To avoid damage to the DB-WAX column do not take the GC oven temperature above 260°C.

VII. **Interferences:**

Samples containing surfactants must be treated with an antifoaming agent(Silicone Antifoam, Fluka cat.# 85390); one drop (50-100 μL) per 100 mL sample is recommended prior to capping the 40 mL VOA vial. The antifoaming agent could contain compounds which interfere with the benzene compounds, therefore it is recommended that the antifoaming agent be purged with N2 for a minimum of 1 hour to minimize the contamination. The antifoaming agent contains a peak which interferes with the analyzing of 1,2,4-TMB on the DB-WAX column. Analyzing with a flame ionization detector/DB-624 column will separate the interfering compound from 1,2,4-TMB.

An interfering peak also occurs with p-Xylene, so manual integration is required to differentiate between the peak starts and stops.

VIII. **Procedure:**

Gas Chromatograhpy

Instrument Conditions, 5890 GC:

Injector: 150°C Detector: 250°C

The sample concentrator transfer line is connected to the HP 5890 gas chromatograph by cutting into the normal injector carrier inlet line. This allows for any combination of purge and trap, headspace or direct, through septum, liquid injection of sample.

Oven Temperature Programmed:

	Initial = 40°C
	Initial Time = 5 min
Ramp 1	Rate = 50°C/min
	Final Temperature = 54°C
	Final Time = 5 min
Ramp 2	Rate = 50°C/min
	Final Temperature = 88°C
	Final Time = 6 min
Ramp 3	Rate = 20°C/min
	Final Temperature = 225°C
	Final Time = 0.5 min

Gas Flows: Carrier = 1.2 mL/min high purity Helium at 40°C
Make-up = 38 mL/min Nitrogen

Purge Valve: On throughout chromatographic run

Tekmar LSC 2000 Sample Concentrator:

Trap = BTEXTRAP
Purge = 6 min
Dry Purge = 7 min
Desorb Preheat = 245°
Desorb = 4 min/250°
Bake = 5 min/260°
Autodrain = ON
Valve = 100°
Transfer Line = 100°
Mount = 40°

PTA-30 Autosampler: See operator's manual for complete operating instructions.

Auto Cycle
Cycle Time = 30 min

Last water = last sample # in sampler tray
Standard = yes
Sample Vol = 5 mL
Flushes = 2 Desorb Time = 4 min

HNU PID PI-52:

Input Attenuation = 10
Recorder Attenuation = 16
Temp °C = 220°
Lamp Intensity = 9:00 position
Lamp = ON (Turn off when not in use)

Sample Preparation:

Samples should be taken in standard 40 mL VOA vials with silicon/Teflon septa with preservative added. The range of concentration which can be quantitated is 1-2000 ng/mL but dilution may be required. Preserved groundwater samples (H_2SO_4 pH<2) to be analyzed for volatile aromatics can be held in standard 40 mL VOA vials with Teflon lined septa for at least 14 days at 4°C without significant (<10%) loss of accuracy.

Quantitation:

Stock standards are made up in methanol at 10,000 µg/mL. A 10,000 µg/mL primary dilution is prepared from neat compounds by adding appropriate volumes of each compound with a µL syringe, based on their density, made up to 25 mL and then ampule sealed in 2 mL ampules to be used when needed. Appropriate dilutions are made starting from this primary dilution to prepare the remaining stock standards of 1000, 100 and 10 µg/mL in methanol.

Calibration standards at 1, 10, 100, 500, 1000, and 2000 ng/mL are prepared by diluting the appropriate volume of the stock standard in 100 mL boiled Milli-Q water using a Class A volumetric flask. The 100 mL volumetric is inverted 3 times and the standard dilution is immediately poured into a 40 mL VOA vial to overflowing and capped for sampling by the PTA-30 autosampler.

The following individual compounds are listed with their retention times and in their elution order on the DB-WAX column.

Compound	Retention Time(minutes)
Benzene	6.03
Fluorobenzene	7.26
Toluene	9.14
Ethylbenzene	12.01
p-Xylene	12.24
m-Xylene	12.43
o-Xylene	13.79
1,3,5-Trimethylbenzene	15.96
1,2,4-Trimethylbenzene	17.51
1,2,3-Trimethylbenzene	19.04

IX. Quality Control:

Quality control stock standard mixtures are prepared in methanol from individual primary methanolic dilutions of analytes obtained from NSI Environmental Solutions, RTP, NC at a concentration of 200 ppm.

A quality control check standard of 20 ppb, 10 µl stock standard into 100 mL Milli-Que water, is analyzed at the beginning and after every 30 samples of each sample run. A regular calibration check standard is analyzed after every 10 samples. Boiled Milli-Q water, run as a blank, is analyzed intermittently throughout the analysis.

X. Corrective Actions:

Control charts prepared from quality control check standard area means and standard deviations are used to test the stability of the GC detector (ref. 3.7). If a sample run control check standard contains a compound area count greater than the mean +/- 3 times the standard deviation, the run is considered to be out of control and the analytical procedure is examined for the source of error. Instrument malfunction, operator error, and the integrity of the standards (both calibration and QC) are evaluated. If necessary, a new mean and standard deviation are established as the basis of future comparison.

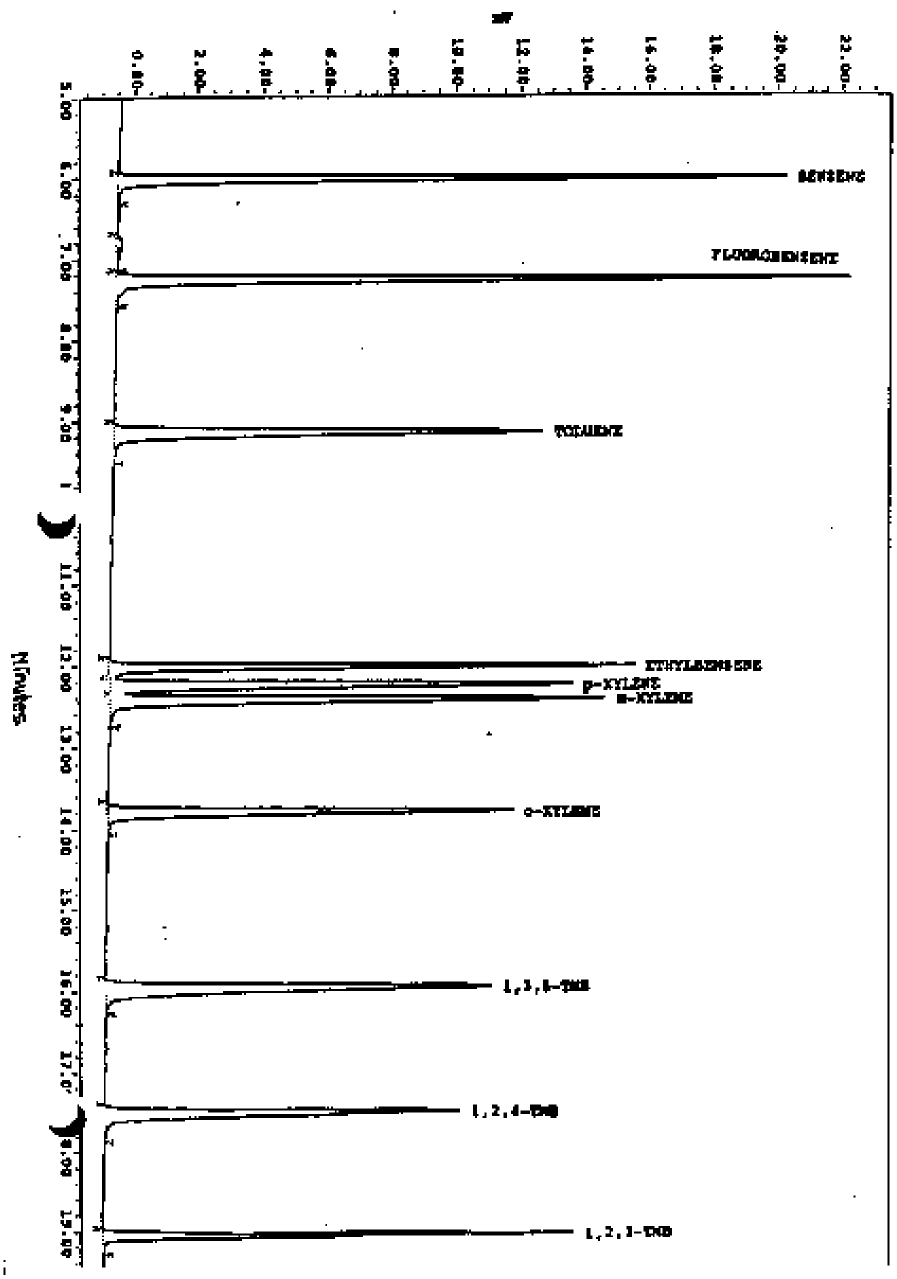
XI. Data Analysis:

Quantitation is based on a 6 point, external standard curve. A 100 ppm concentration of fluorobenzene is added by the PTA-30 internal standard syringe to be used only as a reference peak to monitor for retention time shift during analysis. A curve is generated for each compound using the Millennium standard curve software. The Millennium software has a variety of calibration formulae which can be used to provide the most accurate curve fit.

An example chromatogram of a Standard Mixture is included in Appendix A.

XII. Miscellaneous:

The analytes in this method are extremely volatile. Care should be taken to minimize handling and transfers of samples, especially during the preparation of aqueous dilutions. Standards should be stored at 4°C when not in use. Prior to making calibration, check or QC standards in the volumetric flasks, always bring the primary dilution /QC stock standards mixture to room temperature.



Standard Mixture

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