NOSE CREEK
HISTORICAL SURFACE WATER QUALITY DATA

Prepared for:

CITY OF CALGARY
CITY OF AIRDRIE
MD OF ROCKY VIEW

Prepared by:

P.M. Cross
MADAWASKA CONSULTING

April 1999

EXECUTIVE SUMMARY

The City of Calgary, City of Airdrie and MD of Rocky View commissioned a study of historical surface water quality in Nose Creek. Water quality data were compiled from several sources and data gaps were identified. Discussion of a program to address these deficiencies was provided. Potential land use influences from municipal, industrial and agricultural operations were listed. Statistics were used to determine whether there were any changes in water quality over distance (longitudinal) along the creek or over time (temporal) at the City Limits and the mouth of the creek. Water quality data were compared to Canadian Water Quality Guidelines for drinking water, livestock, irrigation, aquatic life and recreation uses to determine whether there were any limitations on water use.

TRENDS

The seasonal trends in the data are related to the different sources and volume of flow and the effect of the biological community within the water column. Dissolved solids (conductivity, major ions) are often higher in winter when groundwater contributes a larger portion of the flow volume. Higher flows generally carry more sediments and the water quality reflects the chemistry of the particles. The higher winter values may include water entering the creek during chinook melting. The biological community is active through the summer affecting pH, dissolved oxygen and nutrients. Bacterial contamination is higher in summer when natural die-off may be less rapid and livestock and wildlife are more active.

Data from 1995 to 1998 indicated significant trends for seven parameters for Nose Creek at the City Limits. Chloride, nitrate + nitrite, fecal coliform bacteria and fecal streptococci are decreasing, and total alkalinity, total suspended solids and ammonia are increasing. Because of the data limitations, these trends should be considered indicators only. There were no significant trends for Nose Creek at the Mouth, although data were not ideal for this analysis.

The longitudinal trend analysis indicates that the major issues in the Nose Creek watershed are suspended solids, bacteria, nutrients, organic matter and a few metals. Airdrie is contributing suspended solids, bacteria and zinc. Upstream water quality is better in West Nose Creek than in Nose Creek in terms of suspended solids, nutrients, organic matter, chromium and zinc. However concentration increases along West Nose Creek included suspended solids, nutrients, organic matter and bacteria. Before the two creeks join, their differences are apparent. Nose Creek has generally higher concentrations of phosphorus and organic carbon, while West Nose Creek has higher concentrations of suspended solids and bacteria. Apart from reflecting the water quality at the upstream sites, within the City of Calgary in the downstream reach there were increases in biochemical oxygen demand, nitrogen, bacteria and lead.

WATER QUALITY GUIDELINES

Raw water quality was not acceptable for **drinking water** without some treatment. The major violation of drinking water guidelines relates to fecal coliform bacteria, however, bacteria are removed with the appropriate treatment and no surface water in Alberta should be consumed without treatment. Other drinking water quality violations were generally related to aesthetic considerations, resulting in unpalatable water or staining of laundry and plumbing fixtures.

Water quality for **irrigation** was unacceptable for sensitive crops and raw produce. Use of water exceeding the guidelines for salinity related parameters (total dissolved solids, conductivity) may result in some loss of production for sensitive crops such as raspberries, strawberries, carrots and beans. Water with fecal coliform bacteria concentrations violating the irrigation guidelines would raise concerns when used on raw produce.

Water quality for **livestock watering** was generally acceptable.

Violations of the guidelines for the protection of **freshwater aquatic life** (dissolved oxygen, ammonia, metals) may have an effect on several species, causing stress or restricting their growth and survival.

Violations of the **recreationa**l guideline for fecal coliform bacteria indicated increased health risk for recreational users including respiratory, gastrointestinal, eye, ear, skin and allergy illnesses.

The high frequency of violations of the **Alberta Surface Water** Quality Guidelines for total phosphorus and total nitrogen indicated unacceptably high levels. The generally nutrient rich water in Nose Creek can support a substantial plant community. The bacteria concentrations will limit direct contact recreation or vegetable crop irrigation.

ISSUES

The water quality issues in the Nose Creek watershed, as identified by the review of historical data, are suspended solids, bacteria, nutrients, organic matter, metals, salinity and pesticides.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

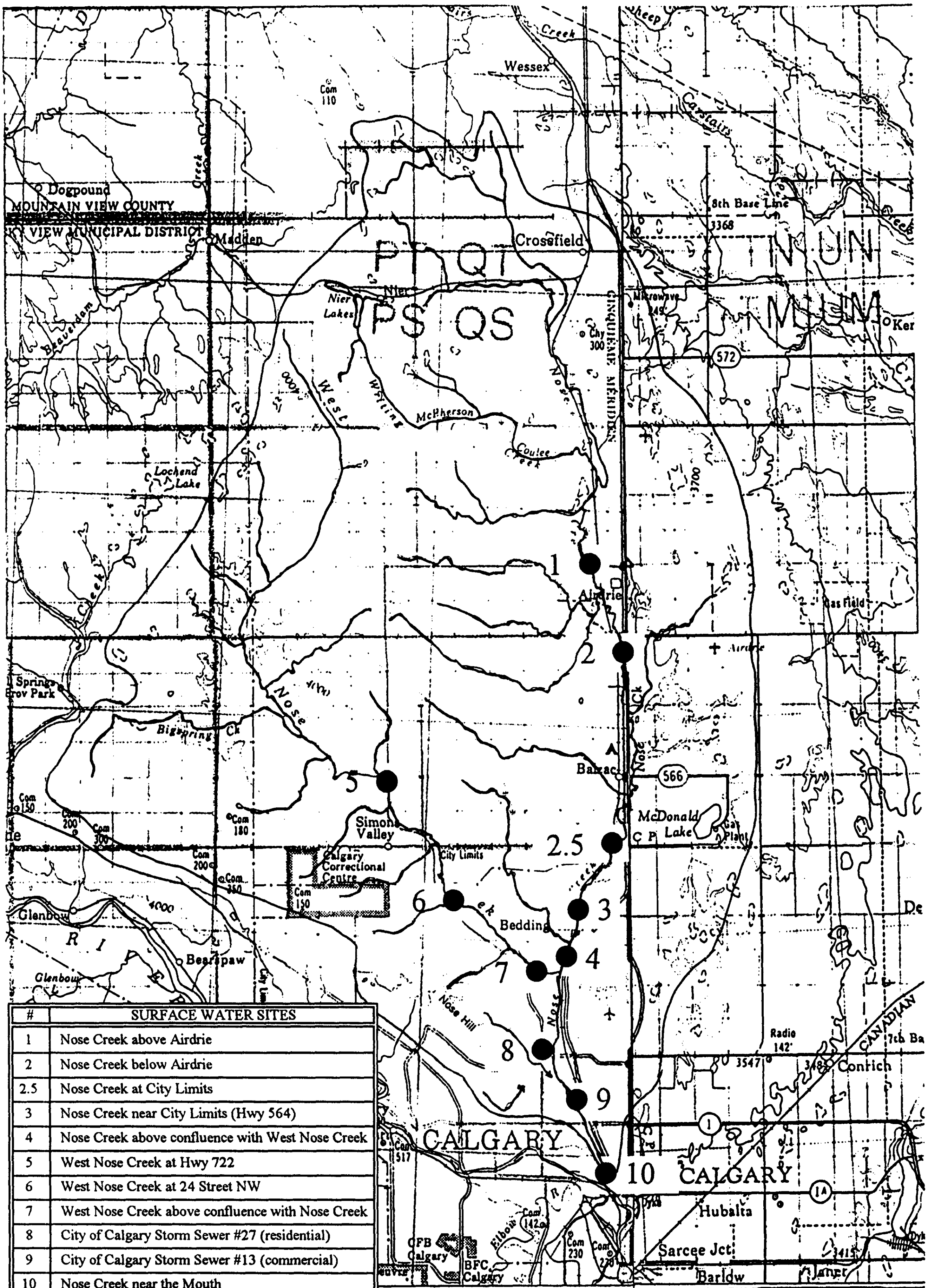
The City of Calgary, City of Airdrie and Municipal District of Rocky View have committed to undertake a cooperative approach in addressing the water quality issues in the Nose Creek watershed. As a first step in this water quality management, they commissioned a study of historical surface water quality in the watershed. The specific Terms of Reference are as follows:

1. Assemble historical data pertaining to surface water quality within the Nose Creek watershed.
2. Outline and report on longitudinal and temporal trends in water quality indicators.
3. Determine if there has been a statistically significant change in water quality.
4. Summarize and report on what the data indicates in a user friendly graphical format understandable to the general public.
5. Identify data gaps and identify a sampling design to address these deficiencies.

Nose Creek is a tributary to the Bow River, arising just north of Crossfield and flowing into the Bow River just downstream of the Calgary Zoo (Figure 1). The eastern watershed boundary is just to the east of Deerfoot Trail and Highway 2. West Nose Creek is a major tributary which extends the western watershed boundary to about Bearspaw Road (Range Road 30).

Water quality in this watershed is influenced by urban and rural land use practices. Nose Creek flows into the Bow River upstream of an important fishery in the Bow River and water withdrawals for the Western Irrigation District at the Western Headworks canal.

This report documents the surface water quality within the context of the Terms of Reference. Section 2 discusses the data sources and compilation for both surface water quality data and flow monitoring data. This section also identifies potential land use influences, identifies data gaps, and discusses a program to address the data deficiencies. Section 3 presents the graphical and statistical analysis of temporal and longitudinal trends. Section 4 compares the surface water quality data with water quality guidelines. Section 5 discusses the results in terms of specific water quality issues.



#	SURFACE WATER SITES
1	Nose Creek above Airdrie
2	Nose Creek below Airdrie
2.5	Nose Creek at City Limits
3	Nose Creek near City Limits (Hwy 564)
4	Nose Creek above confluence with West Nose Creek
5	West Nose Creek at Hwy 722
6	West Nose Creek at 24 Street NW
7	West Nose Creek above confluence with Nose Creek
8	City of Calgary Storm Sewer #27 (residential)
9	City of Calgary Storm Sewer #13 (commercial)
10	Nose Creek near the Mouth

Figure 1 Study Area

2.0 DATA SOURCES AND COMPILATION

Data were solicited from the sources listed in Table 1.

Table 1 Data Search Contacts

AGENCY	CONTACT	COMMENTS
Alberta Environmental Protection (AEP)	Al Sosiak, Water Sciences Branch (WSB)	AEP data
	Anne Marie Anderson, WSB	CAESA study of West Nose Creek
	Doreen Le Clair, WSB	Water Data System data base
	Chris Robertshaw, Water Monitoring Branch (WMB)	AEP files
	Craig Reich, Municipal Approvals Branch	Municipal and industrial discharges
	Kent Berg, Water Administration Branch	Water licences
	Hugh Howe, WMB	Discharge measurements
City of Calgary	Yin Deong, Sewer Division	City data
City of Airdrie	Mark Locking, Engineering and Public Works	City data
Environment Canada	Tim Davies, Water Survey Division	Discharge measurements

2.1 SURFACE WATER QUALITY

Data provided by Alberta Environmental Protection (AEP) from their Water Data System data base comprise the bulk of the available information throughout the watershed. The City of Calgary provided data at one location over four years. Additional data were provided by the City of Airdrie. Table 2 outlines the surface water quality data which were available for this study. Site locations are indicated on Figure 1.

Alberta Environment (Schonekess 1981) carried out a water quality study from April to September 1980 as part of a comprehensive water management study for Nose Creek and West Nose Creek undertaken by Planning Division. The water quality study included a program of regular weekly sampling and storm event sampling at seven creek sites and two storm sewer outfall sites.

Other samples have been collected at the mouth of Nose Creek from 1981 to 1996 principally as a part of studies of the Bow River. From 1980 to 1982, Alberta Environmental Protection (AEP) collected data from Nose Creek at the mouth as part of a major study to characterize the limnology of the rivers in the Bow River basin, including tributary loading (Cross, Hamilton and Charlton 1986). Subsequent data were collected for a water quality overview study in the

Bow River in 1985, and an investigation of the effects of a storm event along the Western Headworks canal in 1993 (Sosiak 1994). Synoptic surveys of the Bow River in 1994, 1995 and 1996 (Sosiak 1996) included sampling at the mouth of Nose Creek.

Table 2 Available Surface Water Quality Data

SITE # ON FIGURE 1	SURFACE WATER SITES	# OF SAMPLE DATES	YEAR
1	Nose Creek above Airdrie AB05BH0300	23	1980
	Nose Creek around Airdrie City of Airdrie	5	1998
2	Nose Creek below Airdrie AB05BH0310	26	1980
2.5	Nose Creek at City Limits City of Calgary	14 19 23 20	1995 1996 1997 1998
3	Nose Creek near City Limits (Hwy 564) AB05BH0320	33	1980
4	Nose Creek above confluence with West Nose Creek AB05BH0330	40	1980
5	West Nose Creek at Hwy 722 AB05BH0340	9	1995
6	West Nose Creek at 24 Street NW AB05BH0350	34	1980
7	West Nose Creek above confluence with Nose Creek AB05BH0360	41	1980
8	City of Calgary Storm Sewer #27 (residential) AB05BH0250	103	1980
9	City of Calgary Storm Sewer #13 (commercial) AB05BH0260	32	1980
10	Nose Creek near the Mouth AB05BH0370, 0380, 0390	1 85 1 1 11 1 16 3 2 2	1975 1980 1981 1982 1985 1986 1993 1994 1995 1996

West Nose Creek (Beddington Creek) was sampled in 1995 near the headwaters as a part of the CAESA (Canada Alberta Environmentally Sustainable Agriculture) program. The site was chosen because the 1991 census indicated that it was an area of high intensity agriculture, and landscape maps indicated that it had potential for high runoff (A.M. Anderson, personal communication). The site was dropped because of the difficulty in obtaining acceptable flow measurements and because of the recent urbanization of the basin.

The City of Calgary has been collecting samples since 1995 at Nose Creek at the City Limits. These data will be used for regulatory purposes to help determine the contribution of Calgary to loadings from Nose Creek into the Bow River.

The available data at each site (n > 10) were compiled and statistically summarized using Statistix for Windows 2.0 (Analytical Software 1992) in terms of number of samples, mean, standard deviation, minimum, median and maximum (Table 3, page 27-28). The data are given in Appendix A of the report.

Three additional sources of water quality information were provided. The City of Airdrie sampled at five sites at or near Airdrie in the fall of 1998. These data were used by the City to evaluate stormwater impacts. The sources of total dissolved solids in Nose Creek were investigated using chemical and stable isotope analyses (Grasby et al 1997). Pesticides were sampled at two sites in the watershed as a part of a study in the Western Headworks canal (Byrtus 1999).

2.2 POTENTIAL LAND USE INFLUENCES

Potential land use influences on water quality were identified from regulatory records and personal communications. AEP, Municipal Approvals Branch provided details of the municipal and industrial effluent Approvals within the Nose Creek watershed for three municipalities and three industries (Table 4). There are numerous storm sewers entering both Nose Creek and West Nose Creek within the City of Airdrie and the City of Calgary.

Table 4 Municipal and Industrial Information

MUNICIPALITY/INDUSTRY	COMMENTS
Town of Crossfield	wastewater and stormwater
City of Airdrie	stormwater
City of Calgary	stormwater
Acanthus Resources Ltd. (6-15-28-2-W5) compressor station	surface runoff
Procor Sulphur Services Inc. (NE14-28-1-W5)	surface runoff
Amoco Canada Petroleum (NE14-28-1-W5) sour gas plant	surface runoff

There are no formal records for farming operations comparable to those available for municipalities and industries. Table 5 lists operations which were identified by the agriculture field personnel at MD of Rocky View. The list is not exhaustive and does not include cow-calf operations which use the lands along most of Nose Creek and its tributaries for grazing. It should be emphasized that the size of the farming operation does not necessarily correlate with the potential for contamination of surface waters. Operation siting and management practices are important factors in determining this potential.

Table 5 Agricultural Operations Information

RIVER BASIN	OPERATION	LOCATION
Nose Creek	Feedlot	W12-26-1-W5
		NE9-26-1-W5
		SE17-27-1-W5
		NE22-27-1-W5
		NE32-28-1-W5
		SW26-28-2-W5
		SE25-28-2-W5
	Feedlot, hog	NW24-28-2-W5
	Hog	SE5-27-1-W5
		NW4-27-1-W5
		SE28-27-1-W5
	Horse	NE36-26-2-W5
		NE8-27-1-W5
	Seed Plant	SE13-26-1-W5
	Alta Genetics	S24-26-1-W5
	Greenhouse	NE12-26-1-W5
		NE24-27-2-W5
	Mushroom plant	SE14-28-1-W5
West Nose Creek	Feedlot	SE2-27-2-W5
		SE4-27-2-W5
		NW9-27-2-W5
		SW20-27-2-W5
		SE28-27-2-W5
	Acreages with livestock	E12-26-2-W5
		NW12-26-2-W5
		NE27-27-2-W5
		SE34-27-2-W5
		W3-28-2-W5
	Greenhouse	SE3-28-2-W5

2.3 FLOW MONITORING

Flow has been monitored within the Nose Creek watershed at two locations since 1911. Monitoring at both sites was seasonal from March to October. Nose Creek at Calgary was located at about Beddington Trail draining an area of 893 km^2 including West Nose Creek. Records are available from 1911 to 1919 and from 1972 to 1986. Nose Creek at the Mouth was located at about Centre Avenue draining 986 km^2 with records from 1980 to 1989.

2.4 DATA GAPS

The analysis of changes in water quality through the Nose Creek watershed is limited to one year of data collected in 1980. The sampling locations were chosen well and the parameter list was extensive. Sampling sites were located to represent changes through the watershed above and below Airdrie as well as at the boundary between rural and urban influences along Nose Creek and West Nose Creek. Since the time of the 1980 study, the limits of the City of Calgary have been extended and land use has changed with the continuing urbanization of the watershed. A more current data set would help to identify the situation now.

Temporal variability is fairly well represented in the data base over the short term (seasonal), however there were insufficient data to assess longer term trends vigorously. This is not unusual when the data were collected for other purposes.

Seasonal variability in the water quality was well represented in the data base in terms of months of sampling from April to October. In general winter data were less available, which may reflect the low flow during this season. In addition, storm generated surface runoff was addressed.

The site on Nose Creek at the City Limits provides some continuity of information over four years to allow comparisons of annual variability and an indication of short term temporal trends. Although the site at the mouth has data from several years, there is limited ability to investigate the variability from year to year. This site does however provide some continuity of information from 1975 to 1996.

Flow is not currently being monitored. As a result there is no ability to compare loadings from different portions of the watershed. The comparison of concentration change does provide information about sources within a creek reach.

On a technical note, water quality interpretation is improved when analyses use consistent detection limits. Records should be clear and consistent in reporting of values below the detection limit as < the specific detection limit rather than ND (often used to report no data).

2.5 SAMPLING PROGRAM DESIGN

The design of a monitoring program depends on the questions which are being asked (e.g. long term changes at a specific location, impacts of specific activities, relative contribution /

loading within the watershed). In the case of Nose Creek, this is not yet entirely clear from a coordinated perspective. In 1999, a monitoring program has been started which depends on the coordination of the partners in their existing monitoring efforts. The parameter lists have been coordinated and there is a commitment to sharing results.

The City of Calgary, already sampling at Nose Creek at the City Limits has added two additional sites at West Nose Creek at the City Limits and at the Mouth. A component of their effort is directed to the need to meet regulatory requirements in terms of loading. Sampling is approximately twice a month throughout the year.

Alberta Environmental Protection is conducting a study upstream and downstream of Airdrie. Sites at Highway 567 on the north and Big Springs Road on the south were recommended at the Technical Meeting. AEP will also undertake to provide stage readings (as an indication of flow) at the old Water Survey site, Nose Creek at Calgary.

The coordinated program addresses some of the data gaps identified in Section 2.4. A current data base is being collected to compare with the earlier results. The sampling at the City Limits and the Mouth will contribute to the longer term data base required to assess long term trends. Some flow information can be derived from the staff gauge readings.

While data are collected this year, and in a time frame to meet budgetary considerations, the partners need to decide the focus and direction of their water quality efforts in the Nose Creek watershed. This will determine the monitoring needs in the future. Following are some criteria which should be considered in the design of a water quality monitoring program to complement the overall direction of water quality management in the watershed.

Sampling locations should consider major influences on water quality. This has been focussed on urban boundaries in the past. A consideration of differences in land use will also be useful as the land use surrounding the urban centres changes.

Parameters to be monitored will depend on the issues identified, considering both rural and urban influences as well as water resource users. Suggested parameters include sediments, bacteria, nutrients, total dissolved solids, pesticides and metals.

Frequency of sampling should consider the influence of base flow and runoff during snowmelt and rainfall events. Snowmelt and rainfall runoff will depend on local climatic conditions during the sampling program and cannot be pre-programmed. Event flow sampling requires the installation of special equipment.

Other information which will provide important data for water quality management are an assessment of riparian health, contamination sources, land use, landowner management practices and drainage characteristics. Flow measurements taken in conjunction with water quality sampling will permit some analysis of the relationship between discharge and the parameters measured, as well as calculations of loading. An inventory of available beneficial management practices for implementation in the watershed will also assist the process.

3.0 SURFACE WATER QUALITY DATA TRENDS

Figures in this section are placed together at the back of the report after the references.

3.1 BACKGROUND

A study of water quality in the watershed in 1980 (Schonekess 1981) reached the following conclusions:

- Nose Hill seems to affect the meteorology within the Calgary area resulting in erratic movement of storms.
- Concentrations of the various chemical parameters at the rural sites are generally lower than at the urban sites for dry-weather or weekly sampling.
- Concentrations for the various chemical parameters during storm periods generally increase greatly at the urban sites and only slightly at rural sites. In some cases concentrations at the rural sites decreased indicating a dilution effect because of slightly elevated flows.
- Storm discharges from the Town of Airdrie have little adverse effect on water quality at the Calgary city limits.
- Agricultural run-off above the City of Calgary on West Nose Creek and Nose Creek has little effect on water quality when compared to storm sewer discharges within the urban areas.
- Run-off from the Beddington Heights area, which is in various stages of construction, has a marked effect on the quality of water in West Nose Creek considering that only a few storm sewers direct run-off water to it.
- Concentration of measured parameters of dry-weather discharges are generally higher than concentrations found in the creek. The difference becomes greater during storm events.
- The concentration of chemical parameters in storm sewer waters are generally higher from a primarily residential area than from a commercial or business area. This holds for both dry-weather and storm conditions.
- Storm sewer discharge concentrations during storm events are generally highest during the initial flush, however, there may be exceptions where the maximum concentration for some parameters can occur after the flush.
- Flows in Nose Creek at the Calgary city limits were low but somewhat higher than below Airdrie.
- Flows in West Nose when compared to Nose Creek remained fairly high and steady throughout the sampling period.
- During storm events, flows in the creek at the rural sites increase only slightly whereas flows in the urban areas, increase from 10 to 60 times normal dry-weather flow.
- Water quality of Nose Creek and West Nose Creek is unsuitable for use as a public water supply.
- Urban areas are generally unsuitable for direct contact recreation, however, secondary contact recreation could be allowed during certain times of the year. Rural sites are

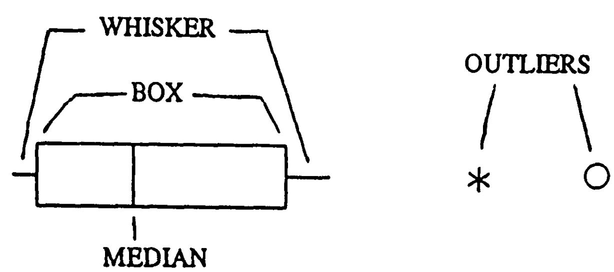
generally acceptable for both types of recreation but microbial densities will limit direct contact recreation during certain times.

- The water in Nose Creek and West Nose Creek is generally acceptable for irrigation as long as the water is not used to irrigate crops consumed directly by man.

These conclusions from the 1980 study represent a starting point for this study. The subsequent statistical testing was used to carry the analysis further and include more recent data.

3.2 METHODS

Data were graphically summarized in box and whisker plots using Statistix to illustrate the variability of the selected parameters. Each plot is composed of one box and two whiskers as shown below.



The box encloses the middle half of the data (the data between the 25th and 75th percentile). The box is bisected by a line at the value for the median (one half of the data are greater and one half of the data are less than the median). The lines at both ends of the box are called whiskers, and they indicate the range of "typical" data values. Extreme values are displayed as "*" for possible outliers and "o" for probable outliers. Outliers are values which do not "fit" statistically into the distribution of the "typical" data values. For presentation purposes, several outliers were excluded from the box and whisker plots. The number or outliers or values of these outliers are indicated on each plot.

Relevant water quality guidelines are indicated on each plot by a horizontal line at the guideline value. Data values above the horizontal line are unacceptable and data values below the horizontal line are acceptable in relation to the guideline. The relationship of the box and whisker plot to the guideline value indicates whether the data distribution is greater than or less than the guideline value. For example, if the median value is above the guideline, at least half of the data values measured at that site violate the guideline value. Discussion of water quality data in relation to the water quality guidelines is presented in Section 4.0.

In several cases (e.g. total suspended solids, bacteria), the variability in the data was so large that regular box and whisker plots were not always useful for visual inspection. In these cases, the data were transformed to the logarithm of the value and a second box and whisker plot was produced.

Statistical analyses available in Statistix and WQStat Plus (Intelligent Decision Technologies 1998) were used where appropriate. Concentrations listed as less than the detection were considered to be ½ the detection value. Detection limits used by the City of Calgary varied for nitrate and ammonia, and non-detects were often listed as ND. Based on the available information when detection limits were specified, ND was conservatively assumed to be 0.5 for ammonia and 1.0 for nitrate. In general, outlier values were included in all analyses to maintain the integrity of the data base. For analyses requiring seasonal corrections, seasons were defined from March to April, May to July, August to October, and November to February.

Data and trends were assessed graphically by inspection of time series (line graphs) and box and whisker plots. The Mann-Whitney test and Kruskal-Wallis test were used to compare the medians between sites. The Mann-Whitney test calculates the significance of the difference between the medians, and the Kruskal-Wallis test is a non-parametric ANOVA (analysis of variance) which determines if there is significant variation between the medians. The Seasonal Kendall test was used to evaluate the significance of apparent changes in concentration over time.

Testing for temporal variability was focussed on Nose Creek at the mouth and Nose Creek at the City Limits. Temporal trends were investigated in terms of monthly and annual variability. The full data set at each site was tested statistically with trend analysis. Longitudinal trends were investigated statistically in the Nose Creek watershed using data collected in 1980.

3.3 TEMPORAL (OVER TIME) TRENDS

Several aspects of the data base were reviewed to consider differences which might bias plots and analyses. Surface water quality generally varies during a year and from year to year. Therefore the time of year and specific years of data collection can affect data comparisons. The effect of seasonal variability is overcome to a degree by deseasonalizing data (adjusting for mean seasonal differences) prior to statistical analysis. However, box and whisker plots merely represent the data available.

Water quality characteristics during storm events and non-storm sampling can be quite different and may bias any statistical analyses. Therefore only data collected at the sites during 'routine' weekly sampling were included to reduce this bias.

3.3.1 Monthly Variability

Samples collected at the City Limits from 1995 to 1998 provide the best data for comparing monthly variability. Information from January to March were combined to provide enough data for the box and whisker plots. Results for selected parameters are illustrated in Figure 2 (pages 30-36).

The monthly trend for conductivity was representative of the pattern for the major ions. Concentrations were generally higher from December to March and lowest in April. Several of the major ions also showed slightly increasing concentrations through October and November. This same pattern was reflected in the total alkalinity data, while phenolphthalein alkalinity concentrations were higher from May to October (when pH is higher) than from November to April. Data for pH were lowest from December to March and higher from May to October with intermediate values in April and November. Total suspended solids tended to be higher from December to March.

Biochemical oxygen demand was highest from January to March. Concentrations decreased from April to July and increased in December. Dissolved oxygen is strongly influenced by water temperature (solubility) and the time of day of the sampling (photosynthesis and respiration of the plant community), but median concentrations tended to be lowest in July and December to March, and highest in April and October.

Total phosphorus concentrations generally decreased from highest values in January to March to lowest concentrations in October. Nitrate + nitrite concentrations were generally around the analytical detention used by the City except for some higher concentrations measured from December to March. Ammonia concentrations followed a similar pattern, though the transition to higher concentrations was also noted in November and April.

Total coliform bacteria concentrations increased from April to September and returned to lower values for the remainder of the year. The pattern for fecal coliform bacteria, fecal streptococci and *E. coli* showed that concentrations were generally higher from May to August.

Most of the concentrations of metals did not show any strong monthly pattern. Several of the metals, including aluminum and iron were slightly higher from December to March, and zinc concentrations were higher from June to October.

The seasonal trends in the data are related to the different sources and volume of flow and the effect of the biological community within the water column. Dissolved solids (conductivity, major ions) are often higher in winter when groundwater contributes a larger portion of the flow volume. Higher flows generally carry more sediments and the water quality reflects the chemistry of the particles. The higher winter values may include water entering the creek during chinook melting. The biological community is active through the summer affecting pH, dissolved oxygen and nutrients. Bacterial contamination is higher in summer when natural die-off may be less rapid, and livestock and wildlife are more active.

3.3.2 Annual Variability

It is a normal characteristic of water quality data to vary from year to year. Annual variability is illustrated for Nose Creek in Figure 3 (pages 37-44). Data collected at the City Limits (1995, 1996, 1997, 1998) provided the best comparison of annual variability, because there is a balance of seasonal sampling except in 1995 when sampling only started in June. Data collected in 1980 at Nose Creek at Hwy 564 (older City Limits), although not directly comparable with the current site, were included for comparison. Data collected at the Mouth (1980, 1981-86, 1993-96) provided limited scope for year to year comparisons, requiring the combination of years. Comparisons were made regardless of month of data collection, however storm-related data as determined for 1980 and in 1993 were not included, to try to remove some bias between years.

The City data showed that although there is variability from year to year, for the most part the concentrations at Nose Creek at the City Limits were fairly similar for the four years of data. Some minor differences were noted for total suspended solids which were lower in 1995 (no data from January to May), several major ions which ranged to higher concentrations more frequently in 1998, nitrate + nitrite which was lower in 1998, and fecal coliform bacteria and fecal streptococci which were lower in 1997 and 1998 than in 1995 and 1996. Several metals (copper, zinc, cadmium, nickel) were higher in 1997 than in the other year.

When comparisons were available between the current City Limits and the 1980 City Limits site, concentrations were generally in the same range. The exceptions were pH, ammonia, nitrate + nitrite and lead, with a lower median concentration in 1980. In the case of ammonia and nitrate + nitrite, the difference can be attributed to the difference in detection limits used. The detection limit used by the City in 1995 to 1998 was variable and not as low as that used in 1980. (The analyses use one half the detection limit value for samples listed as ND or less than detection.)

With a few exceptions, there was relatively little difference between the three groupings of data at the Mouth. In 1981-86, the median concentration was lower for total suspended solids, copper, aluminum and iron, and higher for dissolved oxygen. In 1993-96, total nitrogen was higher, and total coliform bacteria and lead were lower.

3.3.3 Trend Analysis

Inspection of box and whisker plots provides a visual analysis of trends, however statistical testing provides a more rigorous analysis. Deficiencies in the data base as discussed in Section 2.4, however limit the strength of the conclusions which can be drawn from the statistics.

Median analysis was used to compare data from the 1980s with data from the 1990s for Nose Creek at the Mouth (Table 6). This analysis indicates that in the 1990s concentrations were higher for turbidity, total nitrogen, nitrate + nitrite and fecal coliform bacteria and lower for lead.

Temporal trend analysis statistics for the period of record are summarized in Table 7. Data indicated significant trends for seven parameters, all at the City Limits. Chloride, nitrate + nitrite, fecal coliform bacteria and fecal streptococci are decreasing, and total alkalinity, total suspended solids and ammonia (based on trend direction from Mann-Kendall test, despite slope = 0 on graph) are increasing. Because of the data limitations, these trends should be considered indicators only. The significant trends are shown in Figure 4 (pages 45-48).

Table 6 Median Analysis Between Decades at the Mouth

PARAMETER	80s vs 90s	PARAMETER	80s vs 90s
Conductivity	NS	Total Phosphorus	NS
Total Dissolved Solids	NS	Dissolved Phosphorus	NS
Calcium	NS	Total Nitrogen	increasing
Magnesium	NS	Nitrate + Nitrite	increasing
Sodium	NS	Ammonia	NS
Potassium	NS	Total Kjeldahl Nitrogen	NS
Bicarbonate	NS	Dissolved Organic Carbon	NS
Sulphate	NS	Biochemical Oxygen Demand	NS
Chloride	NS	Total Coliform Bacteria	NS
Hardness	NS	Fecal Coliform Bacteria	increasing
pH	NS	Lead	decreasing
Total Alkalinity	NS	Zinc	NS
Total Suspended Solids	NS	Chromium	NS
Turbidity	increasing	Copper	NS

Mann-Whitney: NS - not significant; When test is significant ($p < 0.05$), the direction of change is indicated.

Although the comparison of 1980s vs 1990s data at the mouth using median analysis indicated several trends, the more stringent temporal trend analysis indicated no significant trends. This result suggests that seasonal differences in the two data sets used in the median analysis testing have caused the apparent trends.

3.4 LONGITUDINAL (OVER DISTANCE) TRENDS

Data from 1980 provided the best information for comparing sites through the watershed. The 'routine' data set from seven sites in the Nose Creek watershed were compared using box and whisker plots (Figure 5, pages 49-57). This presentation provides a visual site comparison which was tested statistically (Table 8). At two sites, samples were not collected through to the end of September. In these cases, data from the station being compared statistically were also truncated.

Changes from upstream to downstream of Airdrie (Table 8, column 1) include increases in total suspended solids, total coliform bacteria, fecal coliform bacteria and zinc, and decreases in total dissolved solids, total nitrogen and total organic carbon.

When the upstream (rural) components of Nose Creek and West Nose Creek are compared (Table 8, column 6), it is apparent that the water quality in West Nose Creek is better than in Nose Creek. Concentrations of nutrients (except nitrate + nitrite), total suspended solids,

Table 7 Temporal Trend Analysis

PARAMETER	CITY LIMITS	MOUTH
Conductivity	NS	
Total Dissolved Solids		ID
Calcium	NS	
Magnesium	NS	
Sodium	NS	
Potassium	NS	
Sulphate	NS	
Chloride	decreasing	
pH	NS	NS
Total Alkalinity	increasing	
Total Suspended Solids	increasing	NS
Total Phosphorus	NS	NS
Dissolved Phosphorus		NS
Total Nitrogen		NS
Nitrate + Nitrite	decreasing*	NS
Ammonia	increasing*	NS
Biochemical Oxygen Demand	NS	NS
Total Coliform Bacteria	NS	
Fecal Coliform Bacteria	decreasing	NS
Fecal Streptococci	decreasing	
E. coli	NS	
Chromium	NS	ID
Copper	NS	ID
Lead	NS	ID
Zinc	NS	ID

Seasonal Kendall test: NS - not significant; ID - insufficient data in one season; When test is significant ($p < 0.05$), trend direction is indicated.
* includes detection limit assumptions.

total organic carbon, biochemical oxygen demand, chromium and zinc were higher and dissolved oxygen was lower in Nose Creek.

The changes in water quality from rural to urban are illustrated in Table 8 columns 2 (Nose Creek) and 3 (West Nose Creek). More parameters showed significant changes along West Nose Creek than along Nose Creek, in part because of the better water quality in the upstream reach of West Nose Creek. In Nose Creek concentrations of total suspended solids,

Table 8 Median Testing of Sites

PARAMETER	SITES SIGNIFICANTLY DIFFERENT						
	us Airdrie vs ds Airdrie	Nose 564 vs Nose us West	West 24 vs West us Nose	West us Nose vs Nose Mouth	Nose us West vs Nose Mouth	Nose 564 vs West 24	Nose us West vs West us Nose
	Effect of Airdrie	Transition of Rural to Urban		Urban		Creek Comparison	
Total Phosphorus			✔ inc			✔ >	✔ >
Dissolved Phosphorus			✔ inc		✔ dec	✔ >	✔ >
Total Nitrogen	✔ dec		✔ inc	✔ inc	✔ inc	✔ >	
Nitrate + Nitrite			✔ inc	✔ inc	✔ inc		✔ <
Ammonia			✔ inc		✔ inc	✔ >	
Total Organic Carbon	✔ dec		✔ inc		✔ dec	✔ >	✔ >
pH				✔ dec			
Dissolved Oxygen	✔ inc	✔ inc				✔ <	✔ <
Biochemical Oxygen Demand		✔ dec	✔ inc	✔ inc	✔ inc	✔ >	
Total Dissolved Solids	✔ dec						
Total Suspended Solids	✔ inc	✔ dec	✔ inc		✔ inc	✔ >	✔ <
Total Coliform Bacteria	✔ inc		✔ inc		✔ inc		✔ <
Fecal Coliform Bacteria	✔ inc	✔ dec	✔ inc		✔ inc		✔ <
Fecal Streptococci			✔ inc		✔ inc		✔ <
Chromium						✔ >	
Copper						✔ >	
Lead				✔ inc	✔ inc		
Zinc	✔ inc				✔ inc		

Kruskal-Wallis: ✔ significant at 5% or "difference" greater than "contrast"; trend is indicated as inc (increasing) or dec (decreasing) if sites are consecutive; comparison between two non-consecutive sites are indicated as > (first site greater than second site) or < (first site less than second site)

biochemical oxygen demand and fecal coliform bacteria decreased and dissolved oxygen increased. In West Nose Creek concentrations of 11 parameters increased including total suspended solids, nutrients, bacteria and organic matter (total organic carbon and biochemical oxygen demand).

When the downstream (urban) components of Nose Creek and West Nose Creek are compared before they join (Table 8, column 7), the difference between the two Creeks is apparent. Nose Creek has generally higher concentrations of phosphorus and carbon, while West Nose Creek has higher concentrations of total suspended solids, bacteria, nitrate + nitrite and dissolved oxygen.

The water quality at Nose Creek at the Mouth is influenced by the input of West Nose Creek as well as local urban inputs. A comparison of this site with the two sequentially upstream sites (Table 8, columns 4 and 5) shows a decrease in dissolved phosphorus and total organic carbon and an increase in total suspended solids and bacteria along Nose Creek as the higher concentrations in West Nose Creek are added. Within the City there is a general increase in total nitrogen, nitrate + nitrite, biochemical oxygen demand and lead, and to a lesser degree ammonia and zinc.

These results indicate that the major issues in the Nose Creek watershed are suspended solids, bacteria, nutrients, organic matter and a few metals. Airdrie is contributing suspended solids, bacteria and zinc. West Nose Creek is contributing suspended solids, nutrients, organic matter and bacteria. Issues within the City of Calgary are suspended solids, nitrogen, bacteria, organic matter, lead and zinc.

3.5 OTHER ISSUES

3.5.1 Storm Events

The analysis of storm events is beyond the scope of this report, but a comparison between 'routine' data and storm-related data collected in 1980 is presented in Figure 6 (pages 58-65). These box and whisker plots illustrate the differences at each site, as well as the data collected at the two storm sewers in the basin. In general, concentrations in the storm event data are greater than in the routine data for each site. The higher concentrations measured in the storm sewer samples illustrate the inputs to Nose Creek during dry weather and storm events combined.

Schonekess (1981) summarized the stormwater portion of his study as follows:

> "The results of the study indicate that urbanization and associated storm sewer discharges have an appreciable effect on the water quality of Nose Creek and West Nose Creek. Concentrations of chemical parameters in the creeks within the urban area of Calgary can increase by as much as 49 times during storm events as compared to background values at the city boundary."

3.5.2 Pesticides

The 1980 study (Schonekess 1981) included some analysis for the herbicide 2,4-D and the insecticides Temephos (Abate) and Chlorpyrifos (Dursban). Four creek sites were sampled twice in May during dry weather and two sites were samples during a storm event in May. Nine samples were taken from storm sewers. The analytical test were less sensitive in 1980, with a detection limit of 0.001 mg/L (1 μg/L). The results for 2,4-D indicated that detectable levels are measured in the storm sewers and in two of the creek sites (West Nose Creek upstream of Nose Creek and at the mouth). Except during the storm event in May, the insecticide samples were all below detection. The author concluded that the normal watering of lawns caused 2,4-D to enter the streams via storm sewers directly or by groundwater infiltration, and that Temephos was entering the streams as a result of storm run-off. 2,4-D violated the guidelines for freshwater aquatic life, irrigation, livestock watering and drinking water in 3 of 10 creek samples and 6 of 9 storm sewer samples.

The study of pesticides (39 compounds) entering the Western Headworks canal to Chestermere Lake and the Western Irrigation District on June 22, 1998 included two sites in the Nose Creek watershed; at Country Hills Blvd and 12 Street NE and at the mouth (Byrtus 1999). Detection limits (0.005 μg/L for most compounds) were much better than in 1980. Seven pesticides (2,4-D, 2,4-DP, atrazine, bromoxynil, MCPA, MCPP, picloram) were detected at the upstream site and eleven pesticides (also clopyralid, diazinon, dicamba, lindane) were detected at the mouth. All pesticides were acceptable under existing water quality guidelines with the exception of dicamba for the most sensitive crops (e.g. sunflower).

3.5.3 Total Dissolved Solids

A study of total dissolved solids (TDS) in Nose Creek was initiated because the TDS load was significantly higher than in the Bow River or its tributaries (Grasby at el. 1997). The authors concluded that

> "During base flow conditions 2 pulses of Bow River water (the municipal supply) are added to Nose Creek via leaky pipes in the cities of Airdrie and Calgary [via groundwater infiltration]. This water increases discharge in the creek 4 fold during base flow, diluting the dissolved inorganics, and thus enhancing water quality in Nose Creek. Municipal water accounts for 35% of spring and summer discharge, and up to 77% of fall and winter discharge in Nose Creek."

They also concluded

> "...the processing facility that removes S from natural gas near Crossfield may be a major source of dissolved SO_4 in the headwaters of the creek."

Other sources downstream include local soils through the agricultural lands and oxidation of reduced forms of S in the till, related to the influx of municipal groundwater, within Calgary.

4.0 WATER QUALITY GUIDELINES

4.1 METHODS

Relevant water quality guidelines were indicated on the box and whisker plots by a horizontal line at the guideline value. Data values above the horizontal line violate the guideline and data values below the horizontal guideline are acceptable in relation to the guideline. Water quality guidelines were taken from the Canadian Water Quality Guidelines (CWQG - CCREM 1987 and updates) and from the Alberta Ambient Surface Water Quality Interim Guidelines (ASWQG - Environmental Protection and Enhancement Act 1993). Data were tabulated to indicate how frequently the guidelines were violated.

The Canadian Water Quality Guidelines (CCREM 1987 and updates) were developed to provide basic scientific information about the effects of water quality parameters on uses in order to assess water quality issues and concerns and to establish water quality objectives for specific sites. Where site specific objectives have not been developed (as is the case here), these Guidelines provide a basis for assessment.

Selected Canadian Water Quality Guidelines for irrigation, livestock watering, drinking water and freshwater aquatic life are summarized in Appendix B (Table B1). The guidelines for recreation are generally more descriptive than quantitative, however there are guidelines for pH (5.0 - 9.0) and for bacteriological parameters.

Fecal coliform bacteria have been used as a fecal pollution indicator for many years because of ease of measurement, but counts do not correlate well with the incidence of gastrointestinal illness, and the use of this group is being phased out. Recent improvements in detection and measurement techniques enable the use of organisms that give a more reliable indication of health risk. These organisms include enterococci and the fecal coliform *Escherichia coli.*

Guidelines for recreational water quality were updated in 1992 and as a result the bacteriological guideline is:

> "The geometric mean of at least five samples taken during a period not to exceed 30 d, should not exceed 2000 *E. coli* per litre. Resampling should be performed when any sample exceeds 4000 *E. coli* per litre. When experience has shown that 90%, or more, of the fecal coliform are *E. coli*, either fecal coliform or *E. coli* may be determined. When less than 90% of the fecal coliforms are *E. coli*, only *E. coli* may be determined (Health and Welfare Canada 1990)."

Bacteriological results are more typically reported as #/100mL, therefore the corresponding recreation guideline is 200/100mL.

In practice, the previous guideline for fecal coliform bacteria (200/100mL) has often been applied in absolute terms, since sampling frequency does not meet the guideline requirements. This simplification will be applied in the analyses found in this report.

According to the Federal-Provincial Subcommittee on Drinking Water, it is not appropriate to recommend numerical guidelines for raw public water supplies because treatment technology is available to produce drinking water from water of almost any quality (CCREM 1987 and updates). Comparison of water quality data with drinking water guidelines is used here to illustrate when treatment is required.

Freshwater aquatic life guidelines for cadmium, copper, lead and nickel are influenced by the hardness of the water. As the hardness of the water decreases, these metals become more toxic. The freshwater aquatic life guideline concentration used in the analysis was based on a review of water hardness data.

Under the Environmental Protection and Enhancement Act, Alberta Ambient Surface Water Quality Interim Guidelines were published in September 1993 (Appendix B, Table B2). These interim guidelines were based on a review of the Alberta Surface Water Quality Objectives (Alberta Environment 1977), current monitoring data and the Canadian Water Quality Guidelines.

Guidelines are provided for forty parameters and the basis of their application is as follows:

> "These interim guidelines represent water quality suitable for most uses either through direct use or prepared for use by common water treatment practices. They apply to surface water except in areas of close proximity to outfalls.
>
> There are many instances where the natural water quality of a lake or river does not meet some of the suggested limits. In these cases, the guidelines will not apply. It should be noted, however, that where the natural existing quality is inferior to desirable guidelines, care must be taken in allowing any further deterioration of water quality. Naturally occurring circumstances are not taken into account in these guidelines and due consideration must be given where applicable (e.g. spring runoff effect on colour, odour, etc.)."

4.2 RESULTS

Table 9 summarizes the overall compliance of the data base with the guidelines. Data from the storm sewers were omitted, but inclusion of storm event data would increase the frequency of violations for most parameters. The box and whisker plots (Figures 2-5) illustrate the data distribution of portions of the data base in relation to the guidelines.

The **irrigation** guidelines provide protection from the accumulation of salts in the root zone, loss of permeability of soil because of excess sodium or leaching of calcium, and toxicity of ions, trace elements or pesticides. Local conditions of soil type, crop and evapotranspiration may affect whether water quality which violates these guidelines can be used for irrigation (CCREM 1987 and updates).

Table 9 Data Exceeding Guideline Values

GUIDELINE	PARAMETER AND GUIDELINE VALUE	N	% COMPLIANCE
Irrigation	Total Dissolved Solids (500 - 3000 mg/L)	273	43 - 100
	Conductivity (1.0 mS/cm)	110	56
	Chloride (100 mg/L)	98	81
	Total Coliform Bacteria (1000/100 mL)	319	51
	Fecal Coliform Bacteria (100/100 mL)	324	34
	Chromium (0.1 mg/L)	340	100*
	Copper (0.2 - 1.0 mg/L)	343	99 - 100*
	Lead (0.2 mg/L)	343	96
	Zinc (1.0 - 5.0 mg/L)	353	100*
	Aluminum (5 mg/L)	88	97
	Iron (5 mg/L)	100	97
	Cadmium (0.005 mg/L)	79	53
	Manganese (0.2 mg/L)	23	96
Livestock Watering	Sulphate (1000 mg/L)	99	99
	Copper (0.5 mg/L)	343	100*
	Lead (0.1 mg/L)	343	94
	Aluminum (5 mg/L)	88	97
Drinking Water	Total Dissolved Solids (500 mg/L)	273	43
	Sodium (200 mg/L)	99	81
	Chloride (250 mg/L)	98	92
	Sulphate (500 mg/L)	99	97
	pH (6.5 - 8.5)	360	88
	Chromium (0.05 mg/L)	340	99
	Copper (1.0 mg/L)	343	100*
	Lead (0.01 mg/L)	343	58
	Zinc (5.0 mg/L)	353	100*
	Iron (0.3 mg/L)	100	18
	Cadmium (0.005 mg/L)	79	53
	Manganese (0.05 mg/L)	23	26
	Fecal Coliform Bacteria	324	0

Table 9 cont. Data Exceeding Guideline Values

GUIDELINE	PARAMETER AND GUIDELINE VALUE	N	% COMPLIANCE
Freshwater Aquatic Life	Ammonia (0.1 - 1.37 mg/L)	308	46 - 98
	Dissolved Oxygen (5.0 - 9.5 mg/L)	225	68
	pH (6.5 - 9.0)	360	99
	Chromium (0.002 - 0.02 mg/L)	340	59 - 95
	Copper (0.004 mg/L)	343	45
	Lead (0.007 mg/L)	343	52
	Zinc (0.3 mg/L)	353	76
	Aluminum (0.005 - 0.1 mg/L)	88	0 - 34
	Iron (0.3 mg/L)	100	18
	Nickel (0.15 mg/L)	91	99
	Cadmium (0.00006 mg/L)	79	0
	Phenolics (0.001 mg/L)	21	29
Recreation	E. coli (200/100 mL)	75	53**
Alberta Surface Water	Total Phosphorus (0.05 mg/L)	385	4
	Dissolved Phosphorus (0.05 mg/L)	289	15
	Total Nitrogen (1.0 mg/L)	288	20
	Total Coliform Bacteria (5000 mg/L)	319	82
	Total Coliform Bacteria (2400 mg/L)	319	67
	Total Coliform Bacteria (1000/100 mL)	319	51
	Fecal Coliform Bacteria (1000/100 mL)	324	81
	Fecal Coliform Bacteria (200/100 mL)	324	48
	Chromium (0.05 mg/L)	340	99
	Copper (0.02 mg/L)	343	84
	Lead (0.05 mg/L)	343	89
	Zinc (0.05 mg/L)	343	86
	Phenolics (0.005 mg/L)	21	57

* at least one value exceeded the guideline, but rounding results in 100% compliance
** high number of zero values relative to fecal coliform data were unusual

The irrigation guidelines were most frequently violated for bacteria, cadmium, conductivity and total dissolved solids. Use of water exceeding the guidelines for salinity related parameters (conductivity, total dissolved solids) may result in some loss of production for sensitive crops such as raspberries, strawberries, carrots and beans. Water with fecal coliform bacteria concentrations violating the irrigation guidelines would raise concerns when used on raw produce. Metals guidelines are based on toxicity when used on a continuous basis, therefore occasional violations are not a cause for concern.

Water quality for **livestock watering** was generally acceptable.

Raw water quality was not acceptable for **drinking water** without some treatment. Drinking water that contains substances in concentrations greater than the guideline limits either is capable of producing deleterious health effects or is aesthetically objectionable (CCREM 1987 and updates). The major violation of drinking water guidelines relates to fecal coliform bacteria, however, bacteria are removed with the appropriate treatment and no surface water in Alberta should be consumed without treatment.

In addition to fecal coliform bacteria, concentrations of iron, manganese, total dissolved solids, cadmium and lead violated the guidelines relatively frequently. The drinking water guidelines for total dissolved solids, iron and manganese are based primarily on aesthetic considerations. Total dissolved solids concentrations above the guideline value may be unpalatable. At higher concentrations, iron and manganese cause staining of laundry and plumbing fixtures and undesirable tastes in beverages. Their presence in water may lead to the accumulation of microbial growths, leading to the deposition of a slimy coat in piping (CCREM 1987 and updates). The lead and cadmium may be related to high suspended sediments and easily removed with treatment.

Violations of the **freshwater aquatic life** guidelines for dissolved oxygen and ammonia can both lead to stress or death for fish or aquatic life. Large quantities of ammonia reduce the oxygen-carrying capacity of the blood of fish, causing the fish to suffocate. Temperature and pH affect the toxicity of ammonia.

Violations of the metals guidelines for the protection of freshwater aquatic life may have an effect on several species, restricting their growth and survival. If these metals are principally associated with sediment particles, they are of less concern to aquatic life than if the metals are in the dissolved form.

The high frequency of violations of the guideline for phenolics is not an unusual occurrence in the rivers of southern Alberta. Phenols can be contributed to rivers from industrial sources, but organic matter decomposition is also a common source. The general nature of the analytical test does not make this distinction.

Violations of the **recreational** guideline for *E. coli* (as defined for this analysis) identify increased health risk for recreational users including respiratory, gastrointestinal, eye, ear, skin and allergy illnesses. The results indicate the potential for an increased health risk for recreational users. The relatively high frequency of zero values in the data base was unusual, serving to reduce the frequency of violations.

There was a relatively high frequency of violations of the **Alberta Surface Water** Quality Guidelines tested, except for metals. The phosphorus and total nitrogen results indicate the generally nutrient rich nature of the waters in the Nose Creek watershed. The bacteria concentrations will limit direct contact recreation or vegetable crop irrigation.

5.0 WATER QUALITY ISSUES

Following is a summary of the results in terms of the issues of suspended solids, salinity, nutrients and organic matter, bacteria, metals and pesticides.

Total suspended solids is a measure of the sediment carried in the water. The sediments not only carry the minerals which make up the particles, but contaminants can adhere to the particles and be transported downstream. In general the concentration of suspended solids increases as the water moves through the watershed. The largest increase was along West Nose Creek, however the contribution from Airdrie was also statistically significant. Concentrations are often higher during storm events and the highest concentrations were measured in storm sewers. The Alberta Surface Water Quality guidelines state that suspended solids are not to be increased by more than 10 mg/L over background values. The increase of median values from upstream to downstream of Airdrie was 7 mg/L, while the increase along West Nose Creek was 45 mg/L. The data collected at Nose Creek at the City Limits indicates that total suspended solids are increasing.

Total dissolved solids and conductivity provide a measure of the salinity of the water, and salinity is an important factor in irrigation water quality. Although there was no general increase in salinity through the basin, the concentrations often exceeded the irrigation guidelines for sensitive crops. Storm sewer concentrations tended to be lower than creek concentrations.

Nutrients (phosphorus, nitrogen) provide the basis for plant growth, and the high concentrations (frequently exceeding the Alberta Surface Water Quality guidelines) throughout the watershed are not desirable. Total organic carbon is an indicator of the organic matter which may be entering the creek or can be stimulated by the nutrients. Concentrations of phosphorus and total organic carbon were greatest in Nose Creek at the four upstream sites. Although there was a significant increase in all nutrients along West Nose Creek, this was mainly because the upstream concentrations were relatively low. Concentrations of phosphorus and total organic carbon at Nose Creek at the Mouth were more similar to West Nose Creek (i.e. lower) than Nose Creek before their confluence. Unlike the other nutrients, median nitrogen concentrations continued to increase downstream and were highest at the Mouth. Storm sewer concentrations tended to be highest for nitrogen and total phosphorus. Dissolved phosphorus and total organic carbon concentrations in storm sewers, though higher than local creek concentrations, were comparable or lower than upstream Nose Creek concentrations.

Bacteria concentrations were generally high in the Nose Creek watershed, exceeding irrigation guidelines at most sites. Bacteria increased significantly through Airdrie and along West Nose Creek. Concentrations tended to be highest in West Nose Creek and Nose Creek at the Mouth. Storm sewer concentrations of bacteria were highest. Data at the City Limits indicates that bacteria concentrations are decreasing.

Significant increases in lead were measured in the downstream portion of Nose Creek within the City of Calgary. Zinc also increased in this reach, but also through Airdrie. Concentrations of metals tended to be highest in storm sewers. Although irrigation would be relatively unaffected by the metals, with the possible exception of cadmium, concentrations of several metals may be of concern for drinking water and freshwater aquatic life.

Although there was very limited data for pesticides, it is apparent that pesticides are entering Nose Creek.

PROFESSIONAL RESPONSIBILITY

ASPB Stamp

REFERENCES

Alberta Environment. 1977. Surface Water Quality Objectives. Water Quality Branch, Standards and Approvals Division. 17 pp.

Analytical Software. 1992. STATISTIX User's Manual Version 4.0. Tallahassee, Florida.

Anderson, A.M. personal communication. Alberta Environmental Protection, Water Sciences Branch.

Byrtus, G. Alberta Environmental Protection, Municipal Development Bran
ch. Memo to G. Greenlee, Alberta Agriculture, Food and Rural Development, Irrigation Branch. Feb. 19, 1999.

CCREM (Canadian Council of Resource and Environment Ministers). 1987 (and updates). Canadian Water Quality Guidelines. Environmental Quality Guidelines Division, Water Quality Branch, Ottawa, Ontario.

Cross, P.M., H.R. Hamilton and S.E.D. Charlton. 1986. The Limnological Characteristics of the Bow, Oldman and South Saskatchewan Rivers (1979-82). Part I Nutrient and Water Chemistry. Alberta Environment, Pollution Control Division, Water Quality Control Branch. 182 pp.

Grasby, S.E., I. Hutcheon and H.R. Krouse. 1997. Application of the stable isotope composition of SO_4 to tracing anomalous TDS in Nose Creek, southern Alberta, Canada. Applied Geochemistry 12:567-575.

Intelligent Decision Technologies. 1998. WQSTAT PLUS User's Guide. Longmont, Colorado.

Schonekess, P.H. 1981. Nose Creek Water Quality Study. Alberta Environment, Pollution Control Division. 100 pp.

Sosiak, A. 1994. Chestermere Lake Water Quality Monitoring. Alberta Environmental Protection, Technical Services and Monitoring Division, Surface Water Assessment Branch. 19 pp.

Sosiak, A. 1996. Bow River Synoptic Surveys 1994-1995 Preliminary Evaluation of Results. Alberta Environmental Protection, Water Management Division, Water Sciences Branch. 103 pp.

Table 3 Summary Statistics for Each Location

NOSE CREEK ABOVE AIRDRIE

SITE 1	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	23	0.379	0.195	0.071	0.370	0.860
DP	23	0.335	0.198	0.045	0.310	0.840
TN	23	2.01	0.52	0.91	1.94	2.92
NIT	23	0.071	0.269	0.002	0.010	1.300
NH3	23	0.133	0.100	0.006	0.110	0.340
TOC	23	27.8	12.9	11.2	25.0	80.0
TEMP	18	10.7	2.3	7.0	10.0	16.0
DO	15	4.3	2.6	1.6	3.3	10.6
BOD	23	3.4	1.8	0.4	3.1	9.6
PH	23	7.8	0.3	7.2	7.7	8.6
TDS	23	606	141	290	608	865
TSS	23	18	20	1	6	64
TCOLIF	20	564	850	0	206	3200
FCOLIF	20	152	280	0	68	1290
FSTREP	13	129	144	20	108	548
CR	23	0.003	0.002	0.002	0.002	0.008
CU	23	0.007	0.007	0.001	0.003	0.025
PB	23	0.085	0.335	0.001	0.004	1.600
ZN	23	0.011	0.011	0.002	0.006	0.054

NOSE CREEK BELOW AIRDRIE

SITE 2	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	26	0.346	0.461	0.075	0.230	2.450
DP	26	0.221	0.179	0.035	0.200	0.730
TN	26	1.39	0.54	0.43	1.41	2.27
NIT	26	0.077	0.180	0.002	0.016	0.720
NH3	26	0.116	0.126	0.006	0.075	0.450
TOC	26	18.9	5.4	9.5	19.3	35.0
TEMP	18	11.3	2.8	7.0	11.5	18.0
DO	21	6.2	2.1	3.3	5.6	9.5
BOD	26	3.8	1.7	0.8	3.6	7.2
PH	26	7.9	0.4	7.2	7.9	8.5
TDS	26	448	101	240	472	585
TSS	26	27	38	5	13	186
TCOLIF	24	1259	1644	44	625	7500
FCOLIF	24	244	265	4	168	1000
FSTREP	17	86	102	4	40	400
CR	26	0.003	0.002	0.002	0.002	0.009
CU	26	0.008	0.009	0.002	0.004	0.038
PB	26	0.159	0.783	0.001	0.004	4.000
ZN	26	0.027	0.049	0.003	0.012	0.190

NOSE CREEK AT CITY LIMITS

SITE 2.5	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	76	0.372	0.388	0.010	0.255	2.310
NIT	73	0.498	0.500	0.015	0.500	4.000
NH3	74	0.384	0.490	0.025	0.250	4.000
TEMP	75	9.3	7.1	-0.5	10.0	20.5
DO	70	6.8	2.1	1.4	6.8	12.2
BOD	74	4.3	4.4	1.0	3.0	27.1
PH	76	8.4	0.4	7.5	8.4	9.5
TSS	76	79	413	1	14	3581
TCOLIF	73	1278	1734	5	550	8500
FCOLIF	74	409	804	0	105	4000
FSTREP	74	172	319	0	56	1700
CR	75	0.012	0.019	0.001	0.003	0.120
CU	75	0.039	0.099	0.001	0.014	0.718
PB	75	0.033	0.032	0.000	0.015	0.140
ZN	75	0.320	2.097	0.001	0.019	18.200
EC	75	1.14	0.57	0.20	1.03	3.39
CA	74	67.2	39.3	3.4	58.8	211.6
MG	73	51.3	33.9	7.0	44.4	211.5
NA	74	177.2	120.2	16.2	149.7	671.0
K	73	15.1	19.6	2.8	10.4	151.6
SO4	72	191.7	160.0	0.6	141.3	1091.6
CL	73	80.8	102.3	4.7	43.3	643.4
TALK	76	435	259	85	379	1447
PALK	76	9.0	9.6	0.0	7.9	40.0
ECOLI	75	13672	115432	0	100	999999
AL	75	1.18	4.42	0.08	0.30	37.50
CD	72	0.0061	0.0053	0.0001	0.0050	0.0220
FE	75	1.86	6.56	0.12	0.65	55.66
NI	75	0.036	0.032	0.003	0.028	0.152

WEST NOSE CREEK AT 24 STREET NW

SITE 6	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	32	0.093	0.051	0.019	0.086	0.260
DP	32	0.072	0.035	0.018	0.071	0.145
TN	31	0.94	0.48	0.51	0.77	2.52
NIT	31	0.044	0.085	0.002	0.018	0.430
DNH3	31	0.108	0.189	0.001	0.050	1.000
TOC	32	12.2	5.7	6.0	11.3	35.0
DO	20	8.3	1.9	3.9	8.5	12.0
BOD	31	2.5	2.6	0.6	1.9	15.8
PH	32	8.1	0.4	7.0	8.2	8.8
FR	32	515	119	50	537	666
TSS	32	9	11	1	4	63
TCOLIF	29	1269	1365	10	800	5100
FCOLIF	29	393	349	10	300	1340
FSTREP	19	398	519	4	212	2300
CR	30	0.002	0.001	0.002	0.002	0.004
CU	31	0.005	0.007	0.001	0.002	0.032
PB	31	0.032	0.161	0.001	0.002	0.900
ZN	31	0.024	0.055	0.001	0.007	0.300

WEST NOSE CREEK ABOVE CONFLUENCE WITH NOSE CREEK

SITE 7	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	39	0.287	0.276	0.095	0.185	1.550
DP	39	0.083	0.028	0.035	0.075	0.157
TN	39	1.63	1.14	0.47	1.17	6.05
NIT	39	0.185	0.277	0.002	0.067	1.250
DNH3	39	0.170	0.242	0.001	0.100	1.500
TOC	39	14.9	7.4	8.8	12.3	47.5
TEMP	13	11.3	1.8	7.0	12.0	13.0
DO	20	8.1	1.4	5.5	8.2	11.6
BOD	38	4.3	3.3	1.5	3.0	14.5
PH	39	8.0	0.3	7.0	8.0	8.5
FR	39	514	103	229	526	704
TSS	39	123	149	3	49	528
TCOLIF	35	8389	15053	92	3000	67000
FCOLIF	35	1784	3587	60	800	20000
FSTREP	27	1783	3230	24	540	12800
CR	38	0.002	0.001	0.002	0.002	0.007
CU	38	0.009	0.009	0.001	0.006	0.034
PB	38	0.057	0.291	0.001	0.003	1.800
ZN	38	0.023	0.022	0.001	0.018	0.084

CITY OF CALGARY STORM SEWER #27

SITE 8	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	102	0.826	0.712	0.075	0.700	4.300
DP	102	0.158	0.111	0.027	0.134	0.960
TN	102	6.49	2.93	2.58	5.70	19.32
NH3	100	0.526	0.409	0.020	0.430	2.200
TOC	100	24.2	17.2	6.4	18.1	95.0
BOD	102	13.0	12.4	0.6	10.7	76.0
PH	100	7.5	0.4	6.2	7.5	8.5
TDS	100	355	234	8	284	1079
TSS	100	833	1107	2	533	6950
TCOLIF	65	370067	368481	10	290000	999999
FCOLIF	65	136577	284683	69	17000	999999
FSTREP	65	22285	47662	10	7800	320000
CR	102	0.004	0.004	0.002	0.002	0.027
CU	102	0.072	0.425	0.002	0.022	4.300
PB	102	0.508	0.825	0.001	0.250	4.770
ZN	102	0.151	0.146	0.003	0.101	0.740

CITY OF CALGARY STORM SEWER #13

SITE 9	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	32	0.879	0.563	0.105	0.780	2.470
DP	32	0.194	0.188	0.060	0.129	0.940
TN	32	3.66	1.68	0.96	3.53	8.08
NH3	32	0.328	0.143	0.050	0.360	0.500
TOC	32	22.4	10.1	3.5	22.0	43.0
BOD	32	13.2	8.6	0.5	12.8	26.8
PH	32	7.3	0.4	6.7	7.3	7.9
TDS	32	294	220	82	210	845
TSS	32	673	753	1	538	3220
TCOLIF	22	332136	325481	11000	200000	999999
FCOLIF	22	12155	17552	900	5550	63000
FSTREP	22	113891	216332	8500	58500	999999
CR	32	0.003	0.003	0.002	0.002	0.011
CU	32	0.061	0.073	0.003	0.036	0.390
PB	31	0.487	0.566	0.001	0.290	2.060
ZN	32	0.252	0.241	0.005	0.185	1.070

Table 3 cont. Summary Statistics for Each Location

NOSE CREEK NEAR CITY LIMITS

SITE 3	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	29	0.261	0.119	0.082	0.250	0.470
DP	30	0.206	0.101	0.063	0.198	0.402
TN	30	1.56	0.50	0.65	1.62	3.05
NIT	29	0.038	0.081	0.002	0.013	0.380
NH3	29	0.154	0.154	0.006	0.100	0.670
TOC	28	19.2	3.6	11.8	20.2	26.0
TEMP	14	10.8	2.5	7.0	11.0	15.0
DO	20	6.1	1.8	3.0	5.6	9.7
BOD	30	4.0	2.6	0.8	3.3	13.2
PH	27	8.2	0.5	7.4	8.2	9.2
TDS	29	522	109	314	491	744
TSS	28	24	26	2	13	101
TCOLIF	31	889	1228	16	390	5200
FCOLIF	31	446	676	0	204	2800
FSTREP	23	321	346	16	172	1400
CR	30	0.003	0.002	0.002	0.002	0.010
CU	30	0.007	0.008	0.001	0.004	0.036
PB	30	0.198	1.064	0.001	0.002	5.830
ZN	30	0.041	0.132	0.001	0.012	0.730

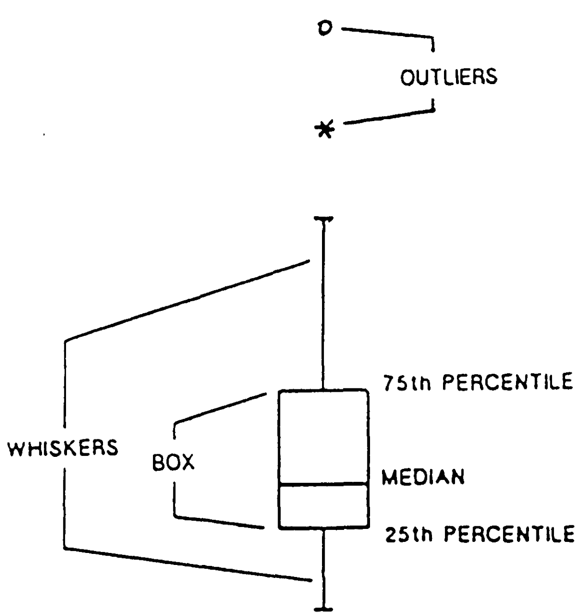
NOSE CREEK ABOVE CONFLUENCE WITH WEST NOSE CREEK

SITE 4	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	39	0.248	0.095	0.080	0.265	0.460
DP	39	0.204	0.082	0.080	0.226	0.345
TN	39	1.44	0.53	0.56	1.25	2.92
NIT	39	0.089	0.239	0.002	0.010	1.400
NH3	39	0.116	0.123	0.002	0.080	0.460
TOC	39	18.0	4.4	12.0	18.0	35.0
TEMP	19	11.4	2.3	6.0	11.0	15.0
DO	19	6.6	0.9	4.6	6.8	8.6
BOD	40	2.9	1.8	0.4	2.6	11.8
PH	39	8.0	0.3	7.3	8.0	8.6
TDS	39	477	117	60	477	726
TSS	38	10	9	1	7	46
TCOLIF	33	933	1351	10	470	6600
FCOLIF	34	114	176	4	56	780
FSTREP	27	289	276	12	244	1200
CR	36	0.002	0.002	0.002	0.002	0.008
CU	36	0.008	0.009	0.001	0.004	0.040
PB	36	0.097	0.383	0.001	0.003	1.700
ZN	36	0.017	0.034	0.001	0.008	0.200

NOSE CREEK NEAR THE MOUTH

SITE 10	N	MEAN	SD	MINIMUM	MEDIAN	MAXIMUM
TP	112	0.276	0.241	0.045	0.193	1.360
DP	100	0.108	0.135	0.005	0.089	0.974
TN	100	2.92	1.61	0.62	2.48	10.98
NIT	96	1.246	0.635	0.018	1.200	3.850
NH3	96	0.276	0.368	0.001	0.185	2.410
TOC	82	13.7	4.9	5.0	12.6	40.0
TEMP	30	9.7	6.9	-0.1	12.2	21.3
DO	40	8.3	2.7	4.1	8.2	14.8
BOD	98	6.9	4.6	0.4	5.0	22.0
PH	95	7.7	0.3	7.2	7.6	8.4
TDS	85	535	144	195	527	1050
TSS	106	109	203	0	50	1754
TCOLIF	74	26860	46440	40	8100	250000
FCOLIF	77	1970	3877	10	590	28000
FSTREP	50	3752	7572	36	363	33000
CR	82	0.004	0.011	0.001	0.002	0.100
CU	84	0.008	0.007	0.001	0.005	0.032
PB	84	0.059	0.139	0.001	0.014	0.680
ZN	94	0.031	0.028	0.001	0.022	0.140
EC	35	0.83	0.38	0.21	0.78	2.06
CA	24	61.2	17.0	25.3	58.2	103.0
MG	25	39.7	12.0	13.3	38.7	65.5
NA	25	107.7	72.2	36.8	85.0	300.0
K	25	9.4	8.9	4.3	5.9	36.8
SO4	25	166.1	44.4	62.0	173.0	232.0
CL	25	81.5	101.6	15.0	42.0	360.0
HCO3	23	319.9	78.9	154.8	322.0	519.0
CO3	21	1.2	4.3	0.3	0.3	19.9
TALK	25	262	62	127	264	426
PALK	23	0.8	3.5	0.0	0.1	16.6
HARD	24	316	86	118	308	527
TURB	23	41	44	2	35	219
TKN	24	1.7	1.6	0.3	1.2	6.8
DIC	13	57.3	13.3	24.5	59.0	74.0
DOC	15	11.1	5.5	4.8	9.5	25.0
SI	17	4.9	4.1	0.0	3.5	15.2
PHENOLIC	21	0.005	0.005	0.001	0.003	0.017
AL	13	0.54	0.70	0.01	0.21	2.57
FE	25	0.64	0.82	0.00	0.40	3.89
HG	19	0.042	0.013	0.020	0.050	0.050
MN	16	0.087	0.032	0.047	0.077	0.170
NI	16	0.005	0.007	0.001	0.002	0.024

Box and Whisker Plots LEGEND		
Alberta Ambient Surface Water Quality Interim Guideline - Surface Water Canadian Water Quality Guidelines - Irrigation, Livestock, Recreation, Drinking, Aquatic Life		
us Airdrie	- 1	Nose Creek above Airdrie
ds Airdrie	- 2	Nose Creek below Airdrie
Nose 564	- 3	Nose Creek near City Limits (Hwy 564)
Nose usW	- 4	Nose Creek above confluence with West Nose Creek
West 24	- 6	West Nose Creek at 24 Street NW
West usN	- 7	West Nose Creek above confluence with Nose Creek
Sewer27	- 8	City of Calgary Storm Sewer #27 (residential)
Sewer13	- 9	City of Calgary Storm Sewer #13 (commercial)
Nose Mouth	- 10	Nose Creek near the Mouth
ˆ storm		storm event data for previous site



Water quality guidelines are indicated by a horizontal line at the guideline value. Data values above the horizontal line violate the guideline and data values below the horizontal line are acceptable in relation to the guideline.

Outliers are extreme values which do not "fit' statistically into the distribution of the "typical" data values (box and whiskers).

The **median** is the middle value. Half of the data are greater and half of the data are less than the median value.

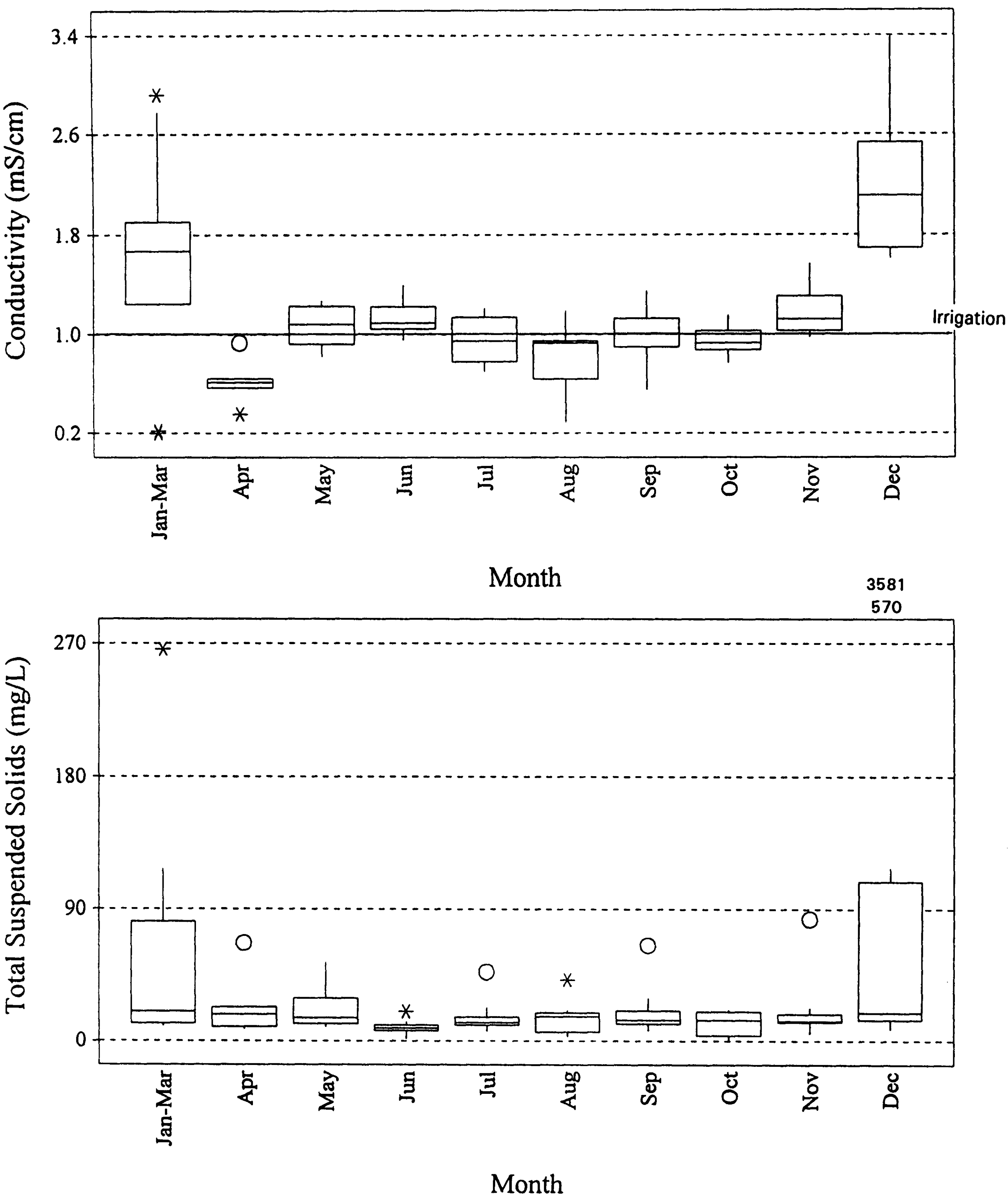
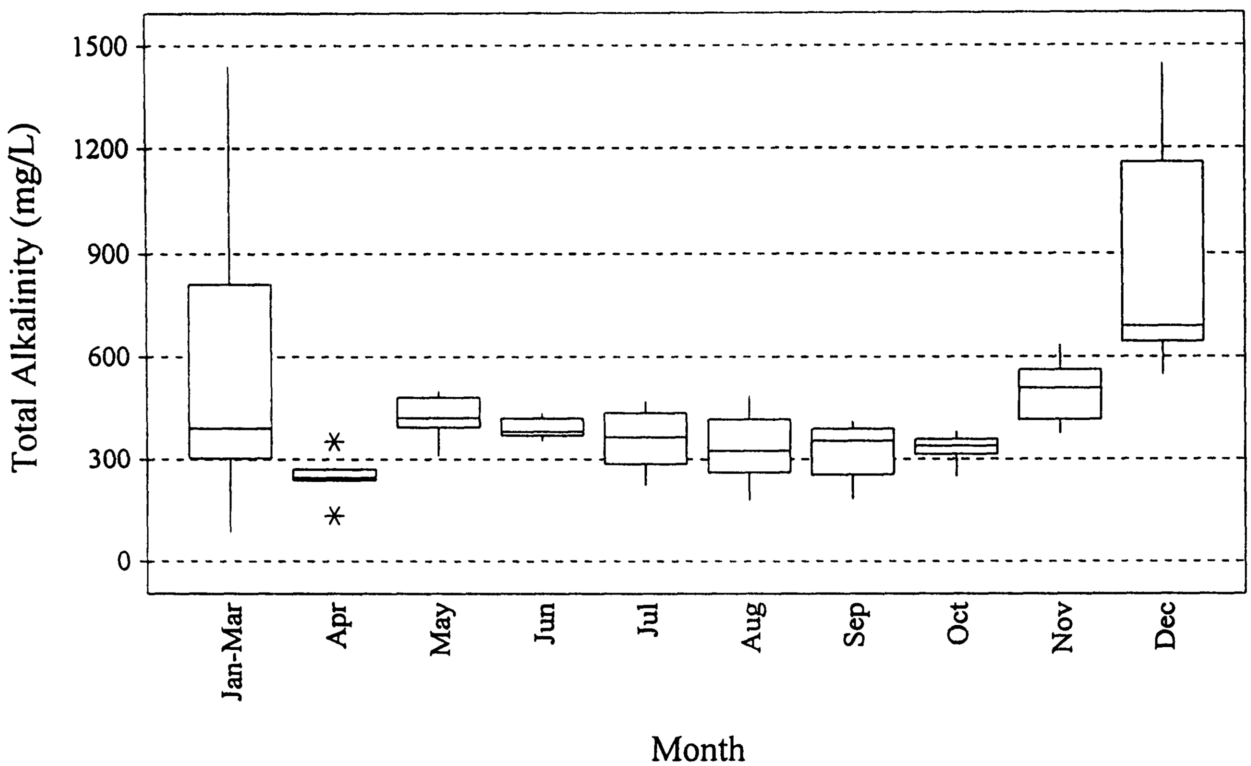


Figure 2 Monthly Variability for Nose Creek at the City Limits



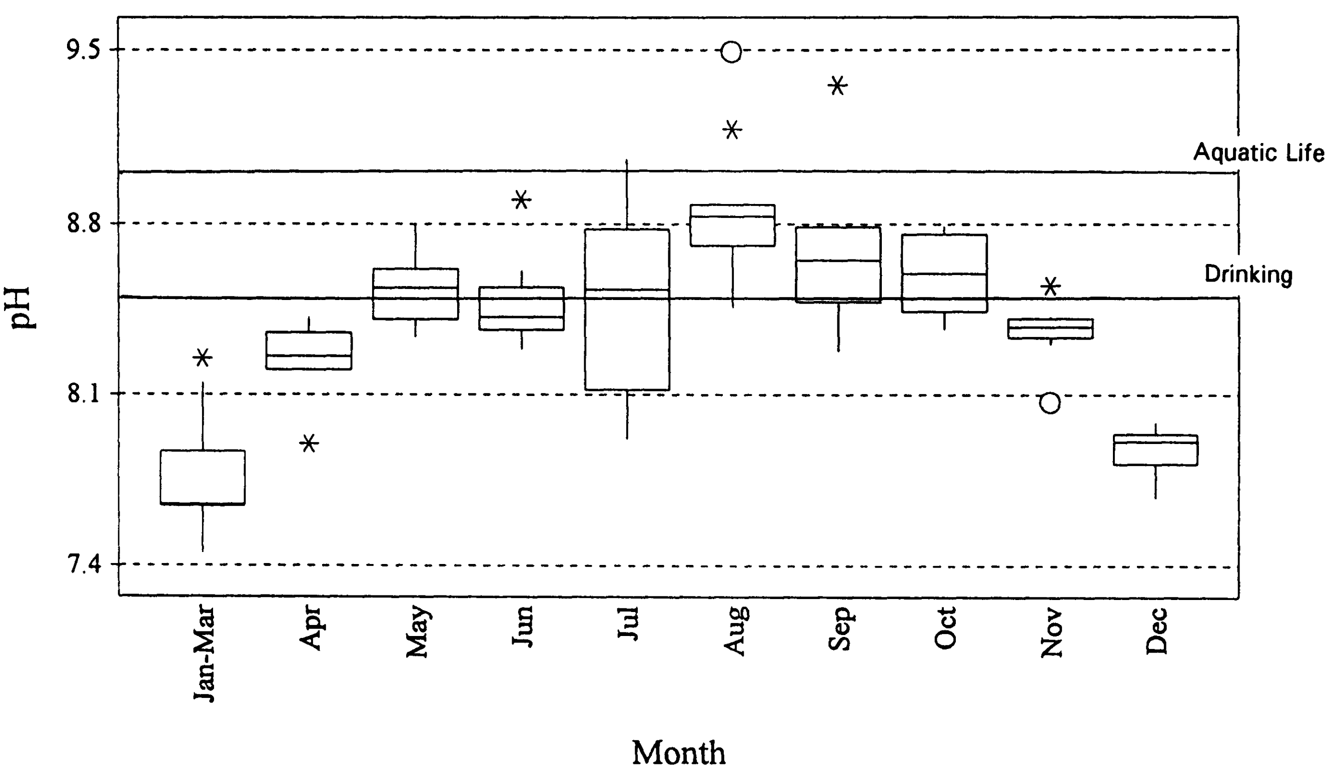
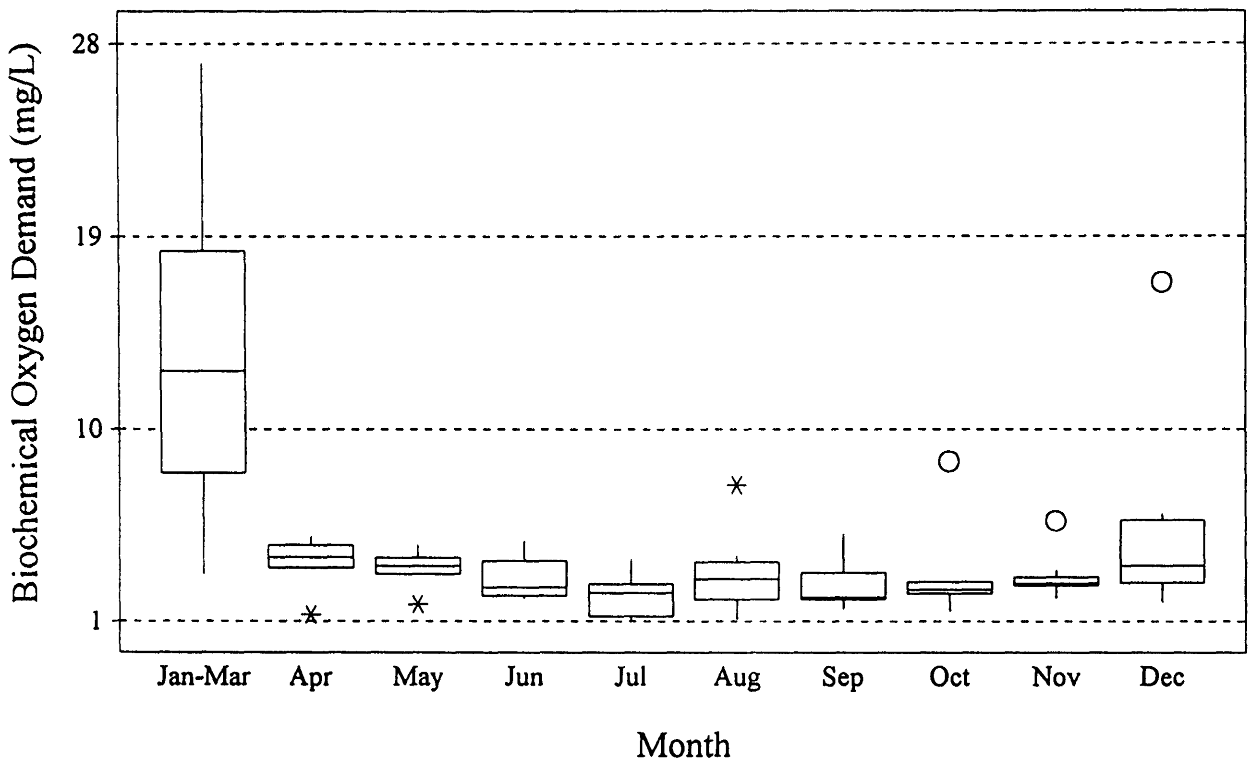


Figure 2 cont. Monthly



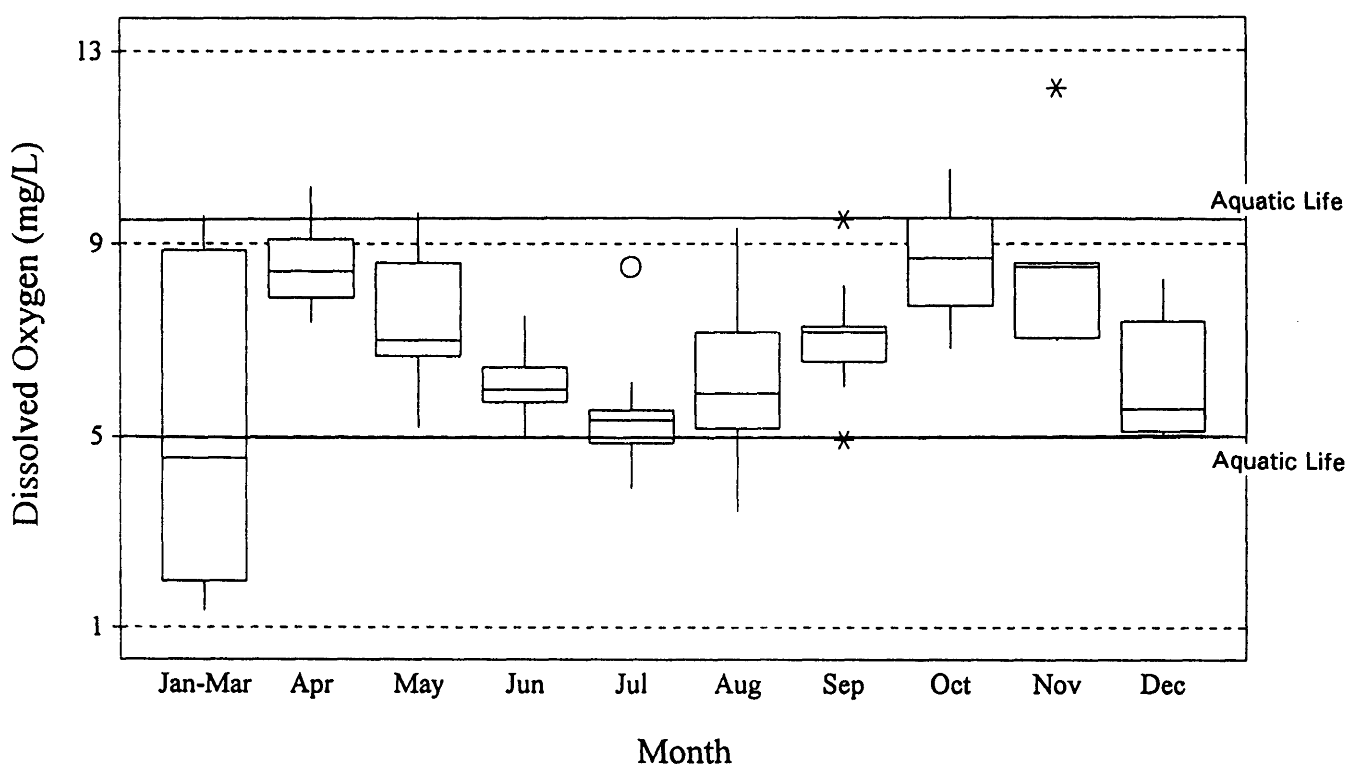
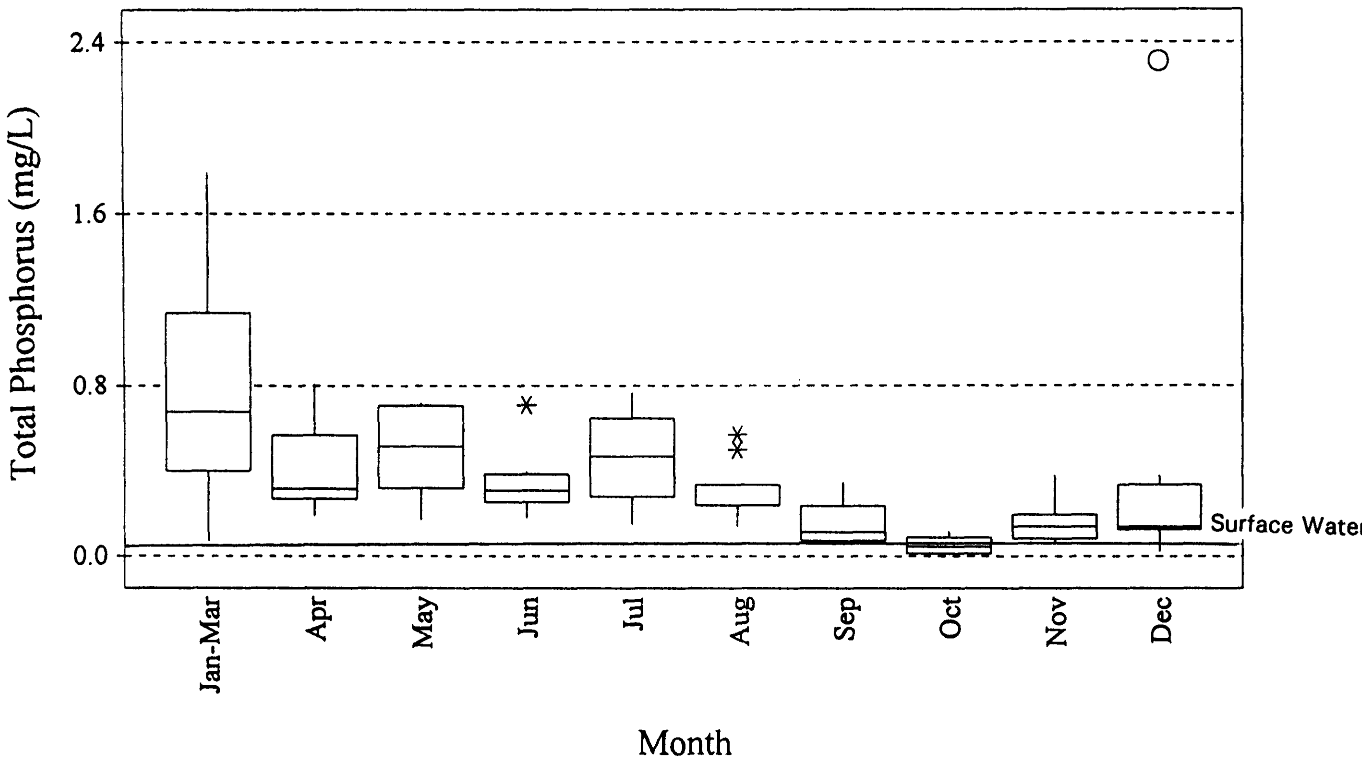


Figure 2 cont. Monthly



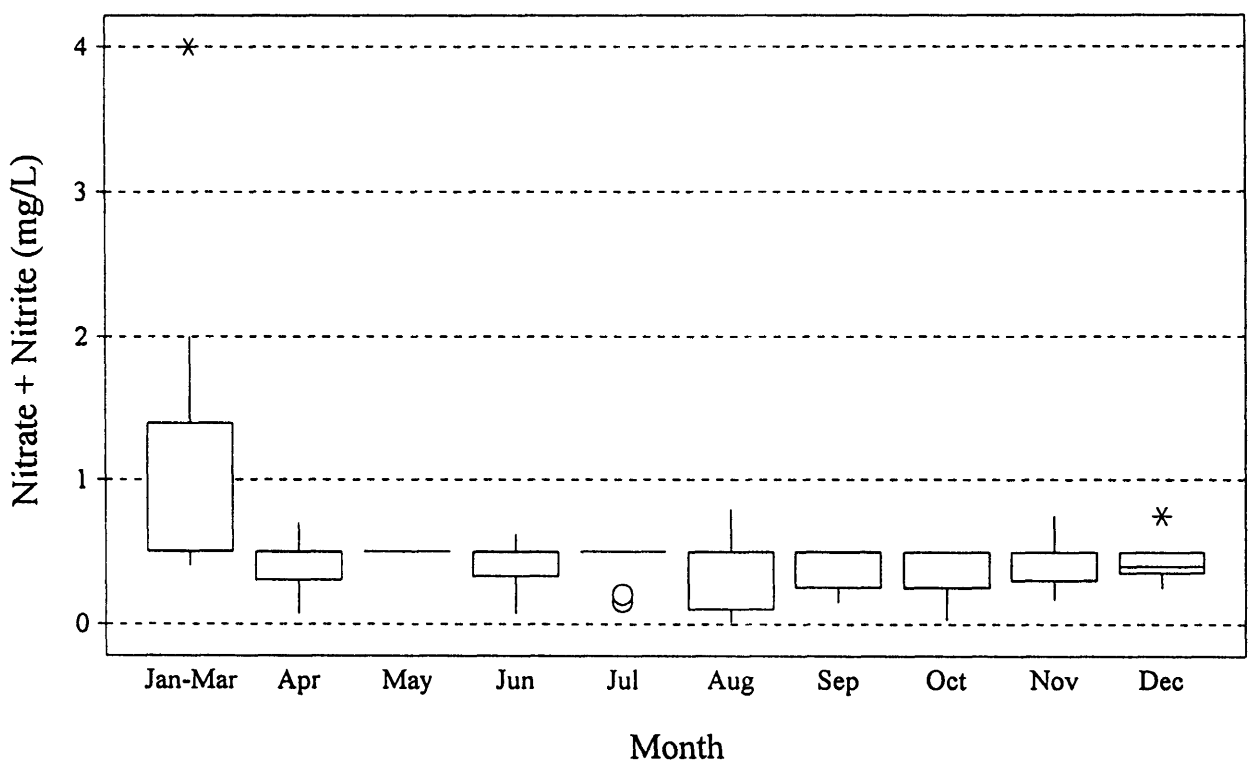
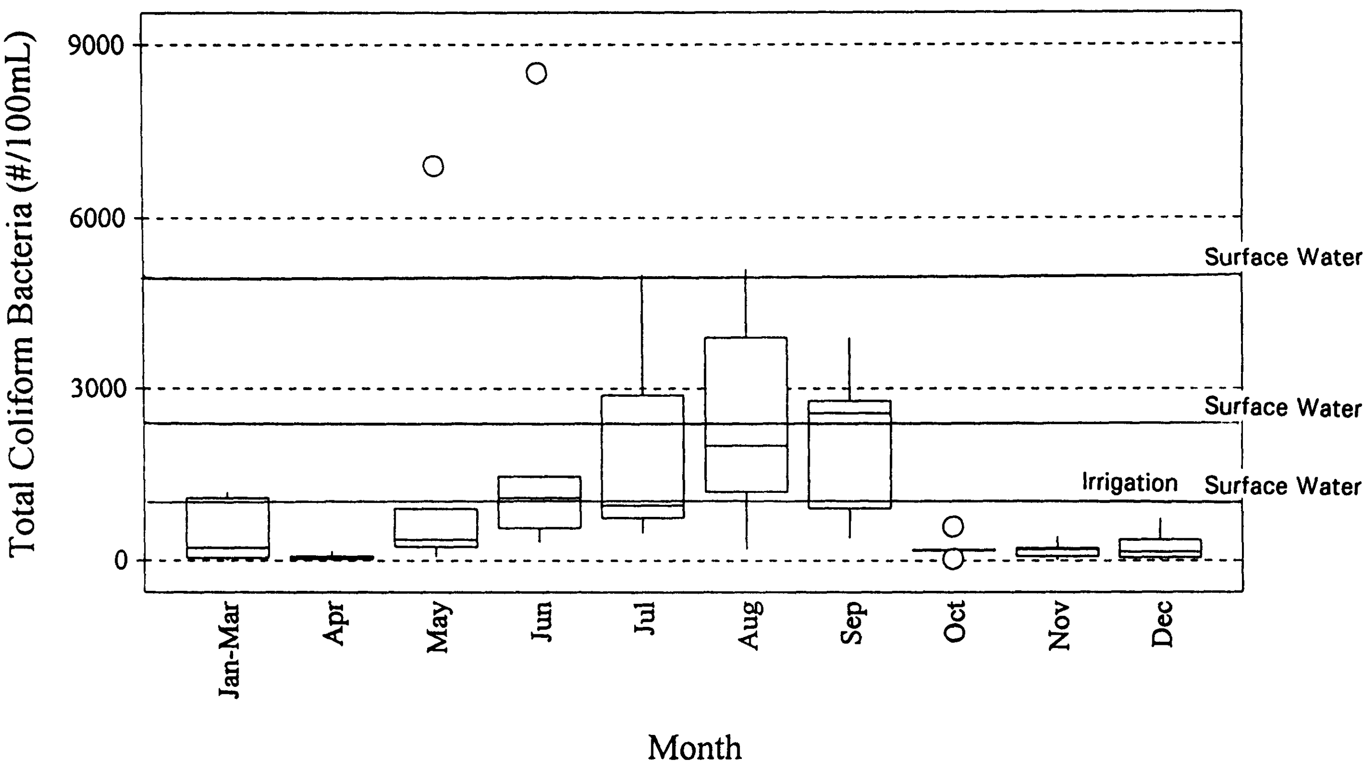


Figure 2 cont. Monthly



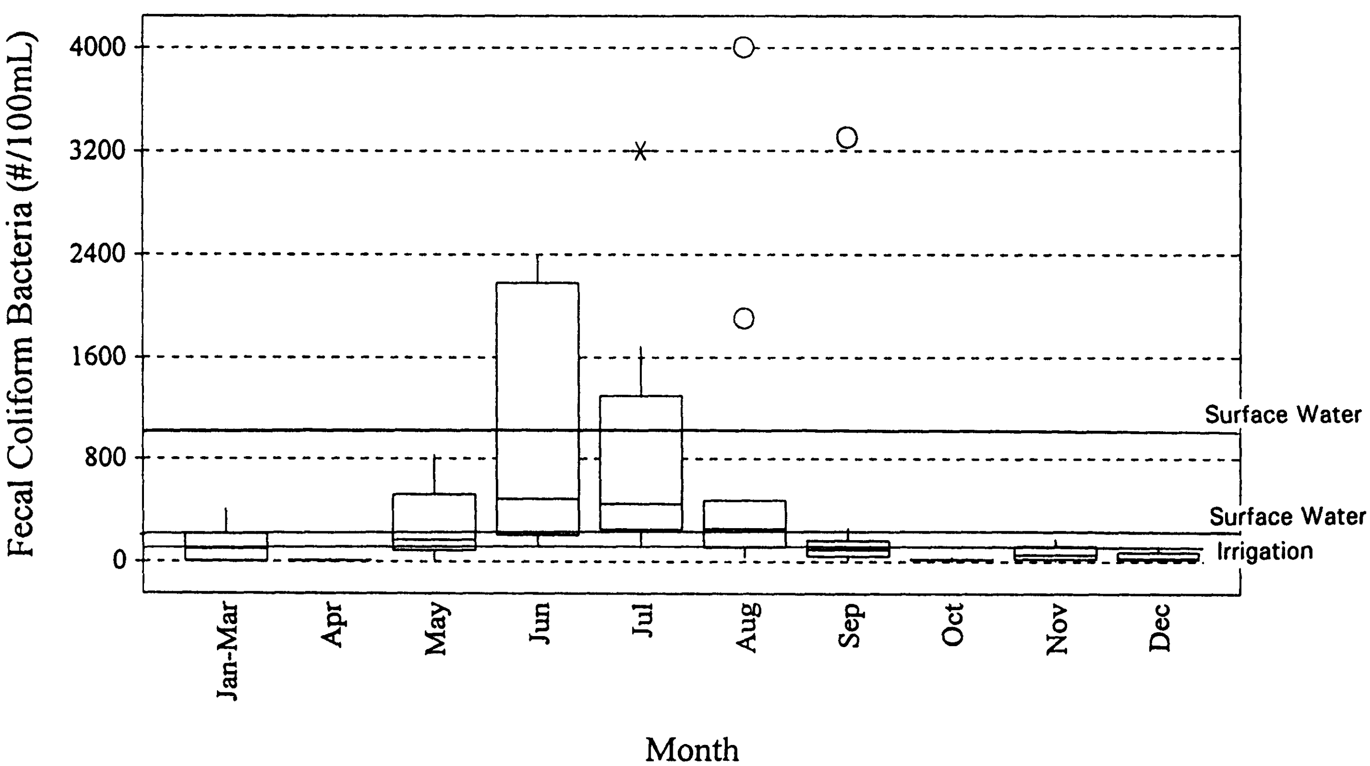
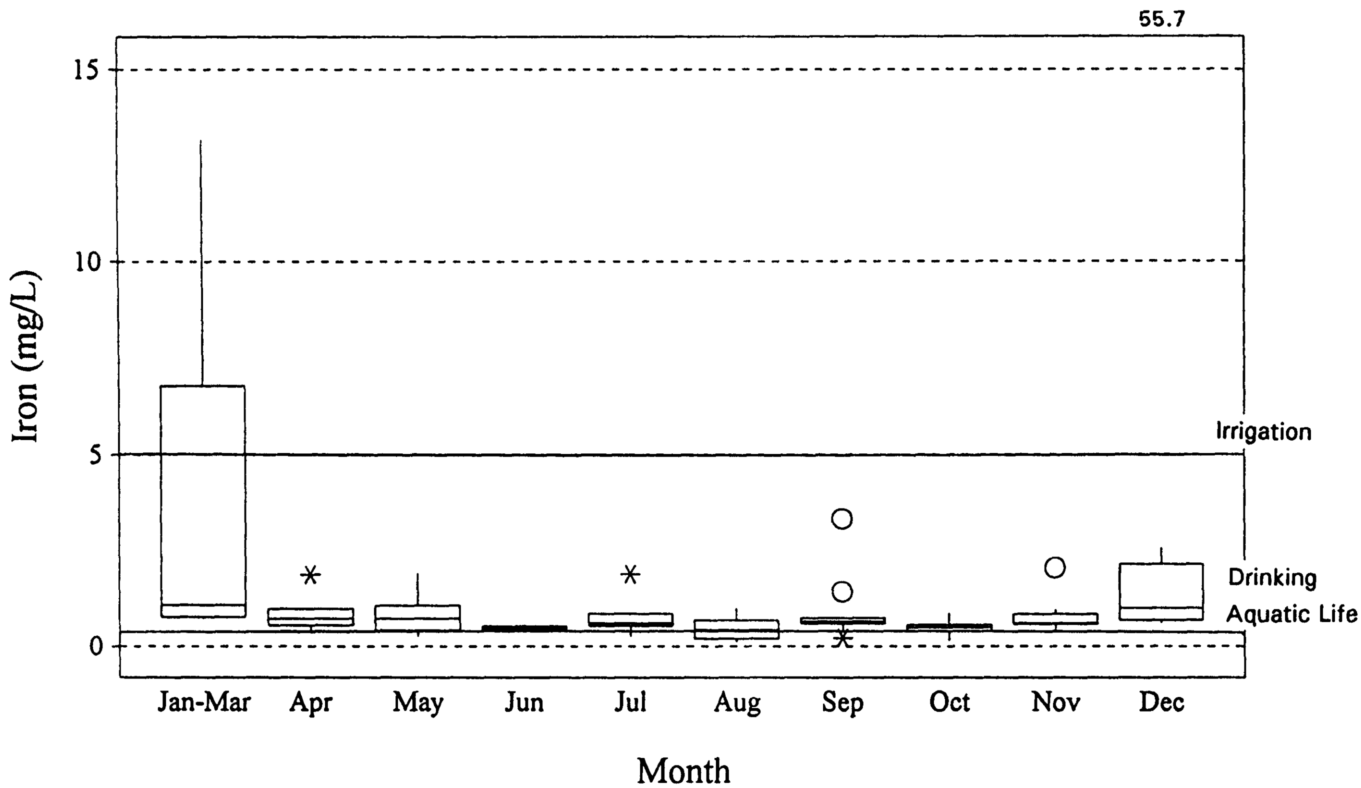


Figure 2 cont. Monthly



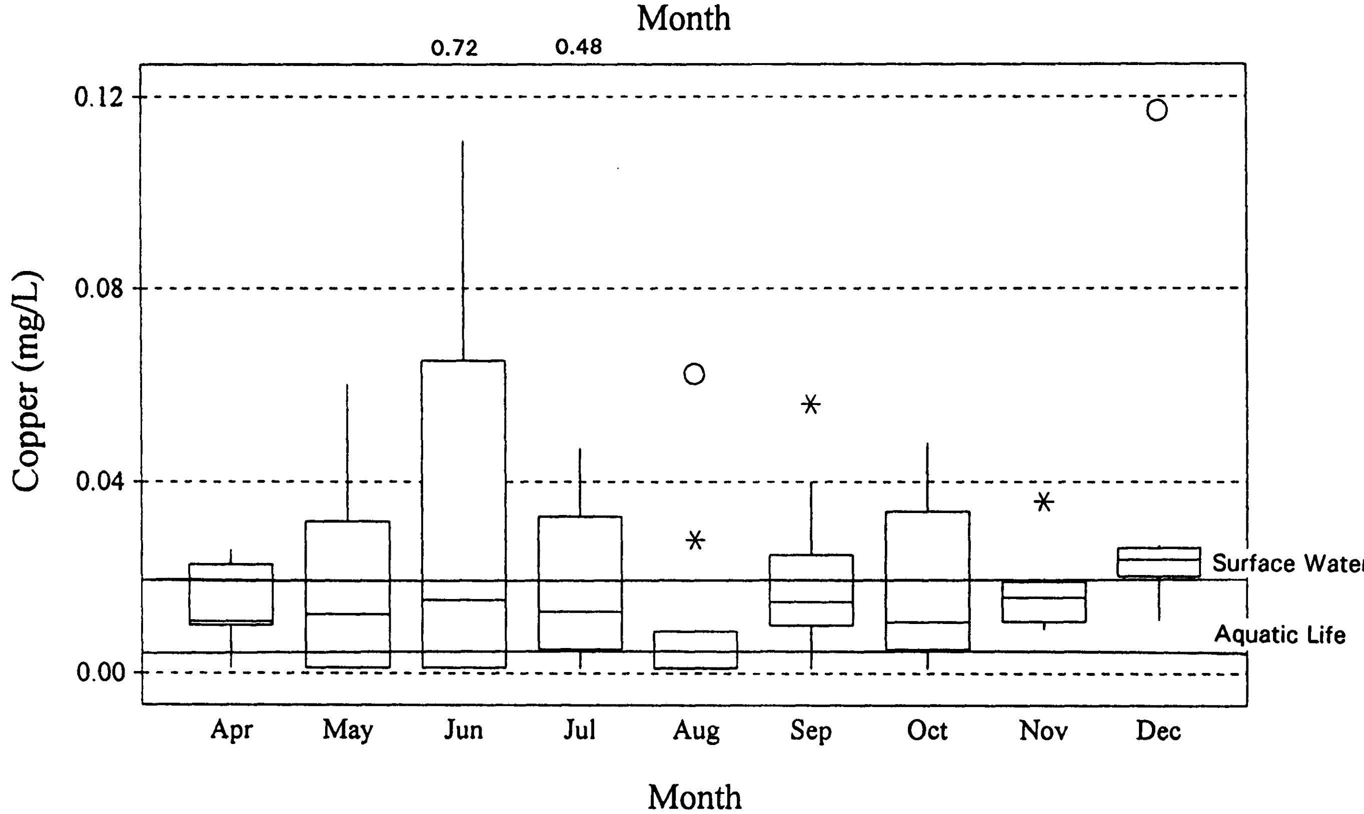


Figure 2 cont. Monthly

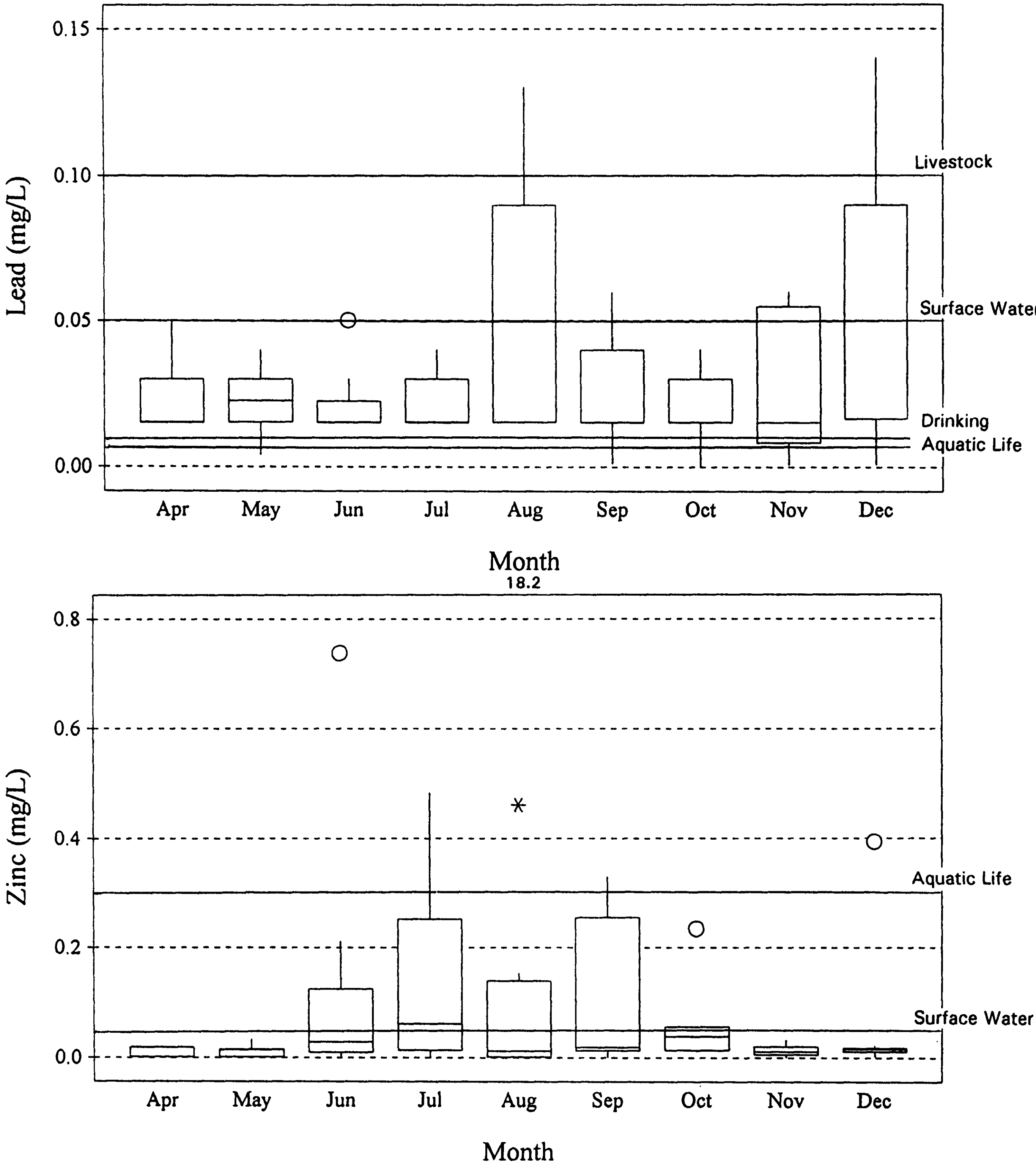


Figure 2 cont. Monthly

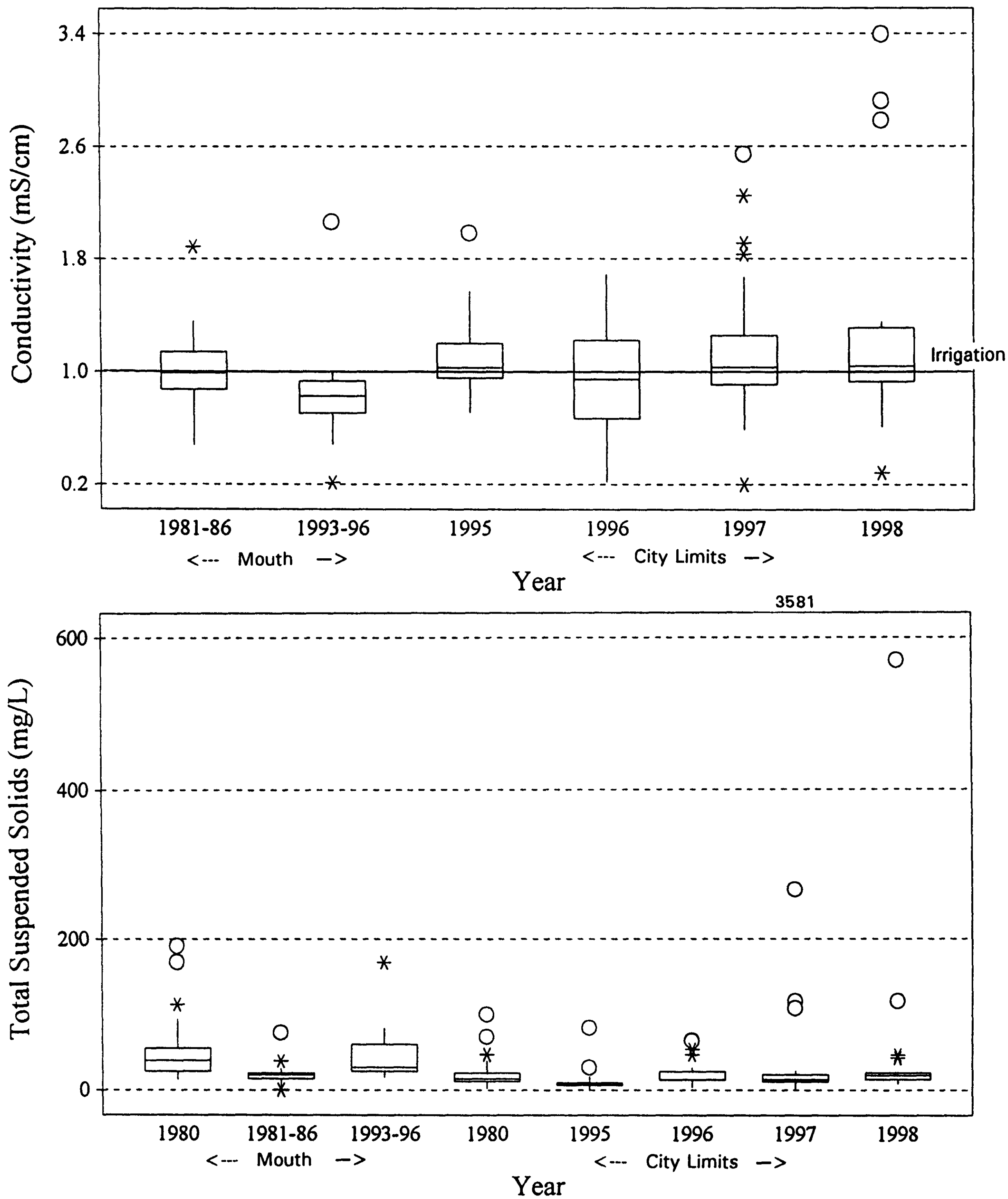
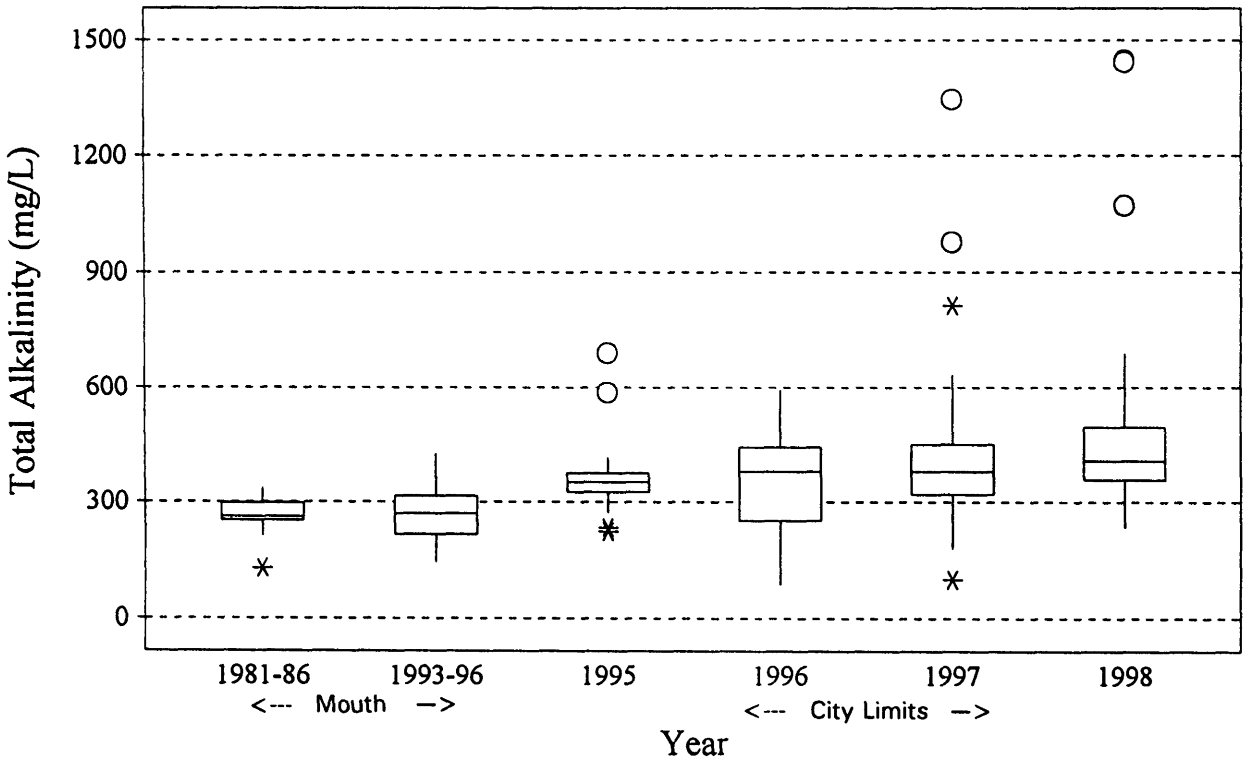


Figure 3 Annual Variability for Nose Creek at the Mouth and City Limits



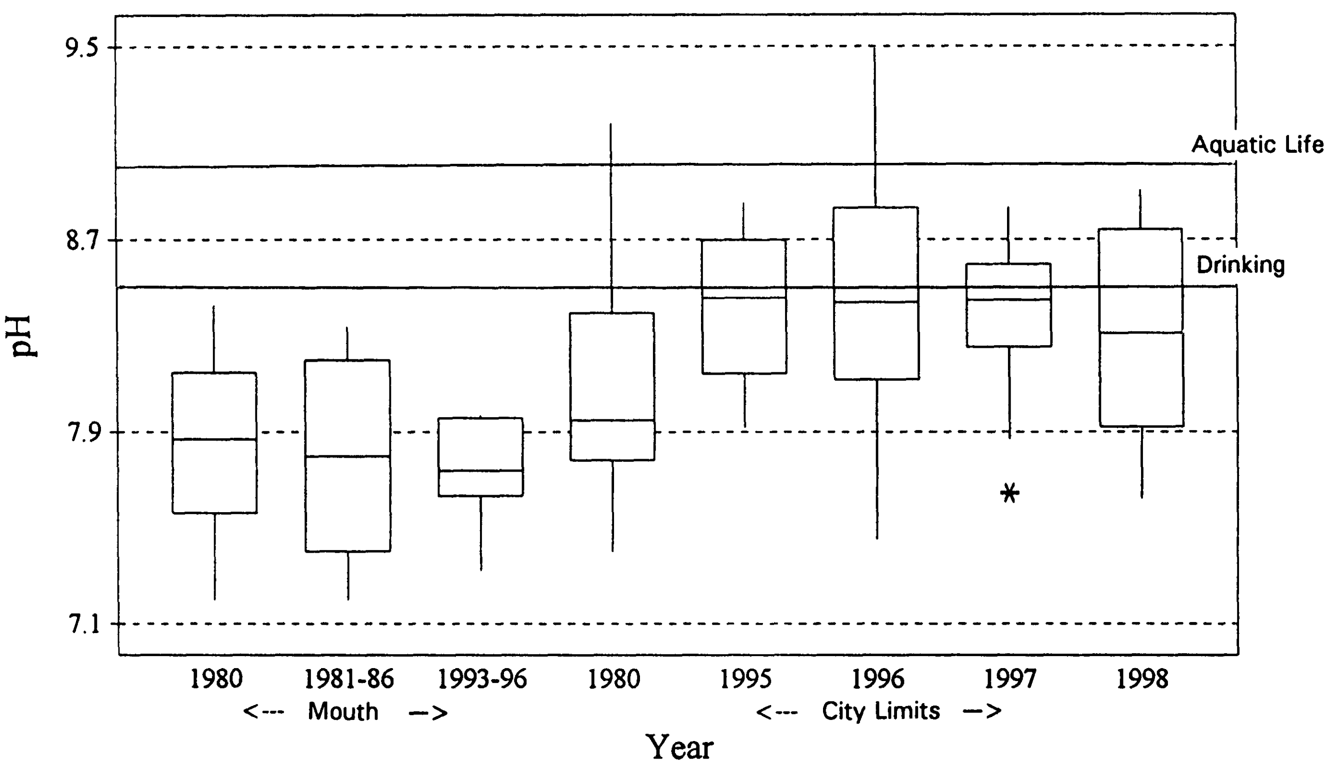


Figure 3 cont. Annual

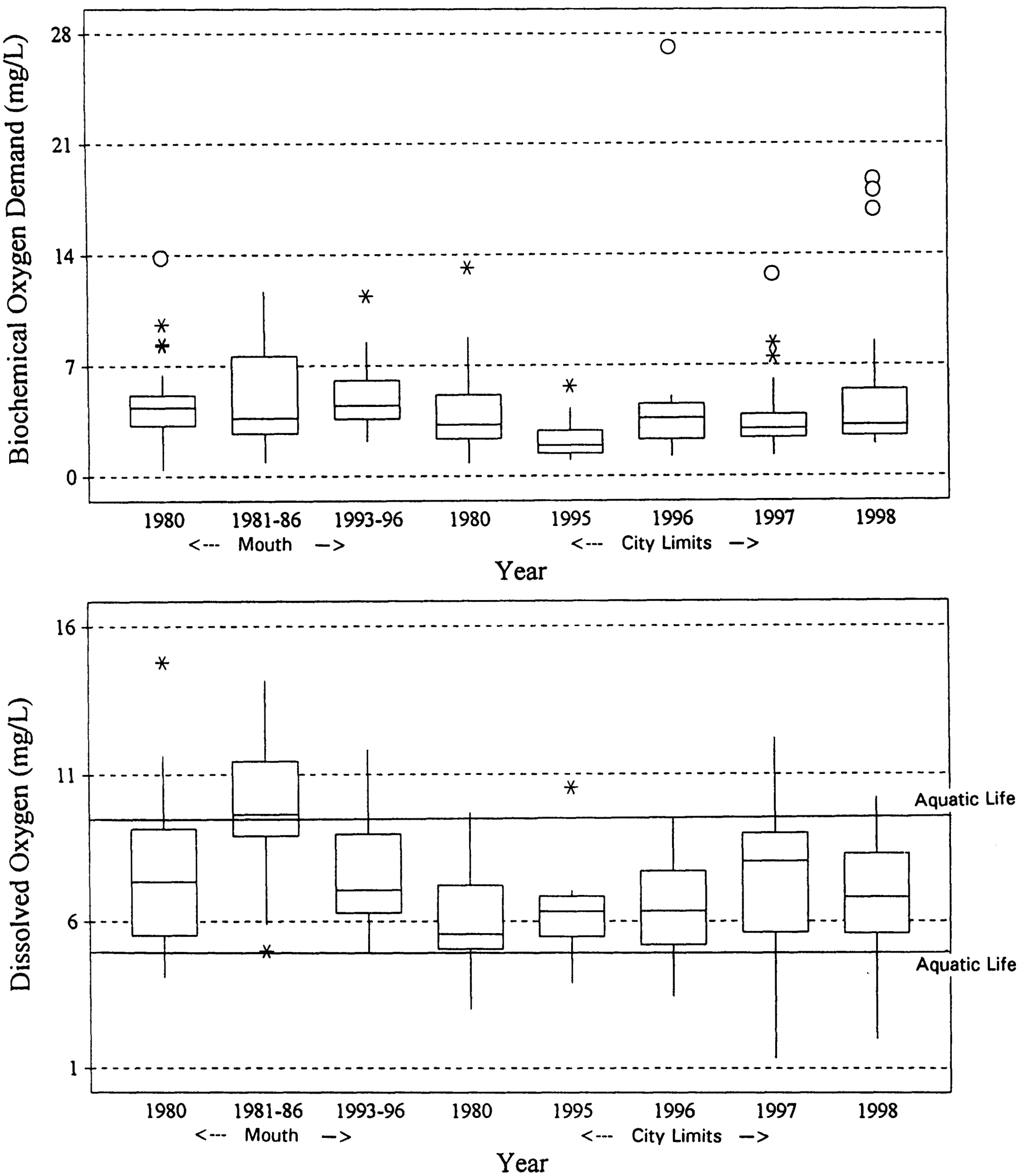
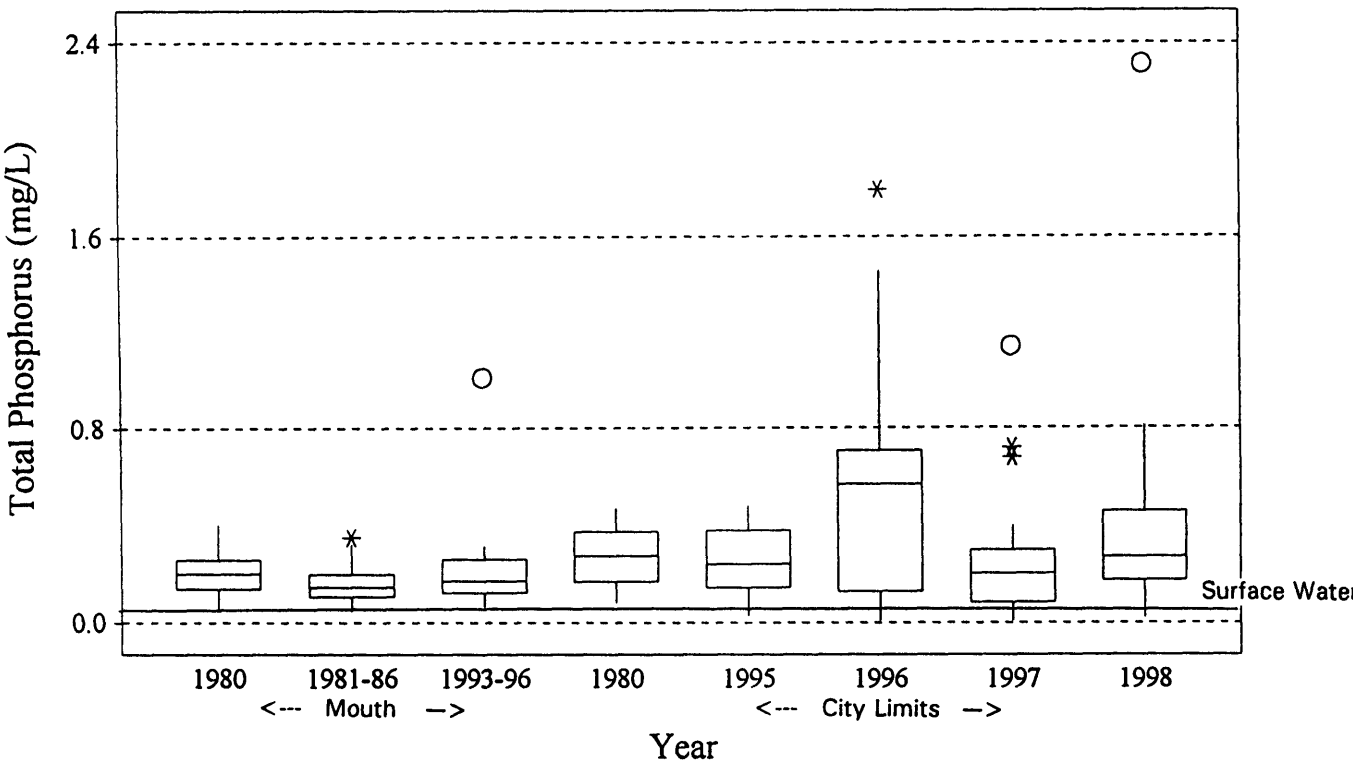


Figure 3 cont. Annual



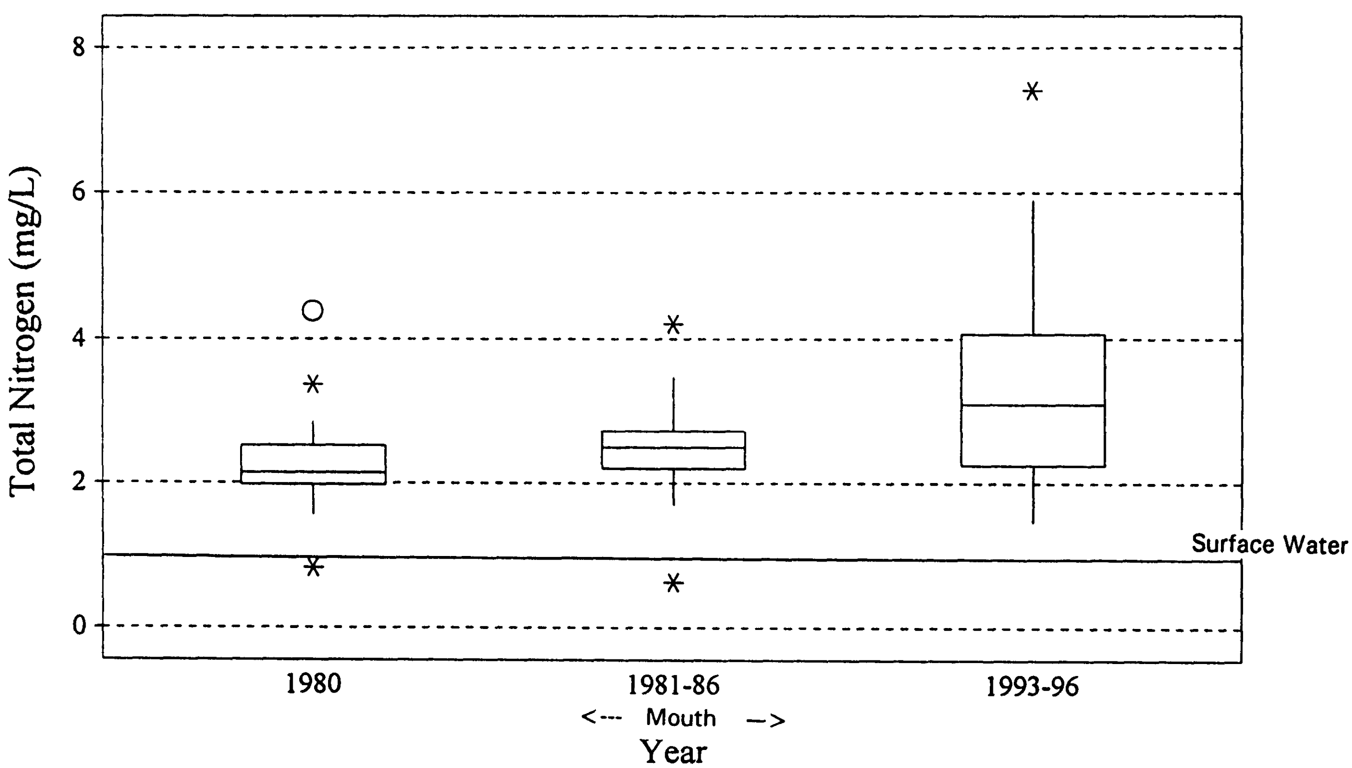


Figure 3 cont. Annual

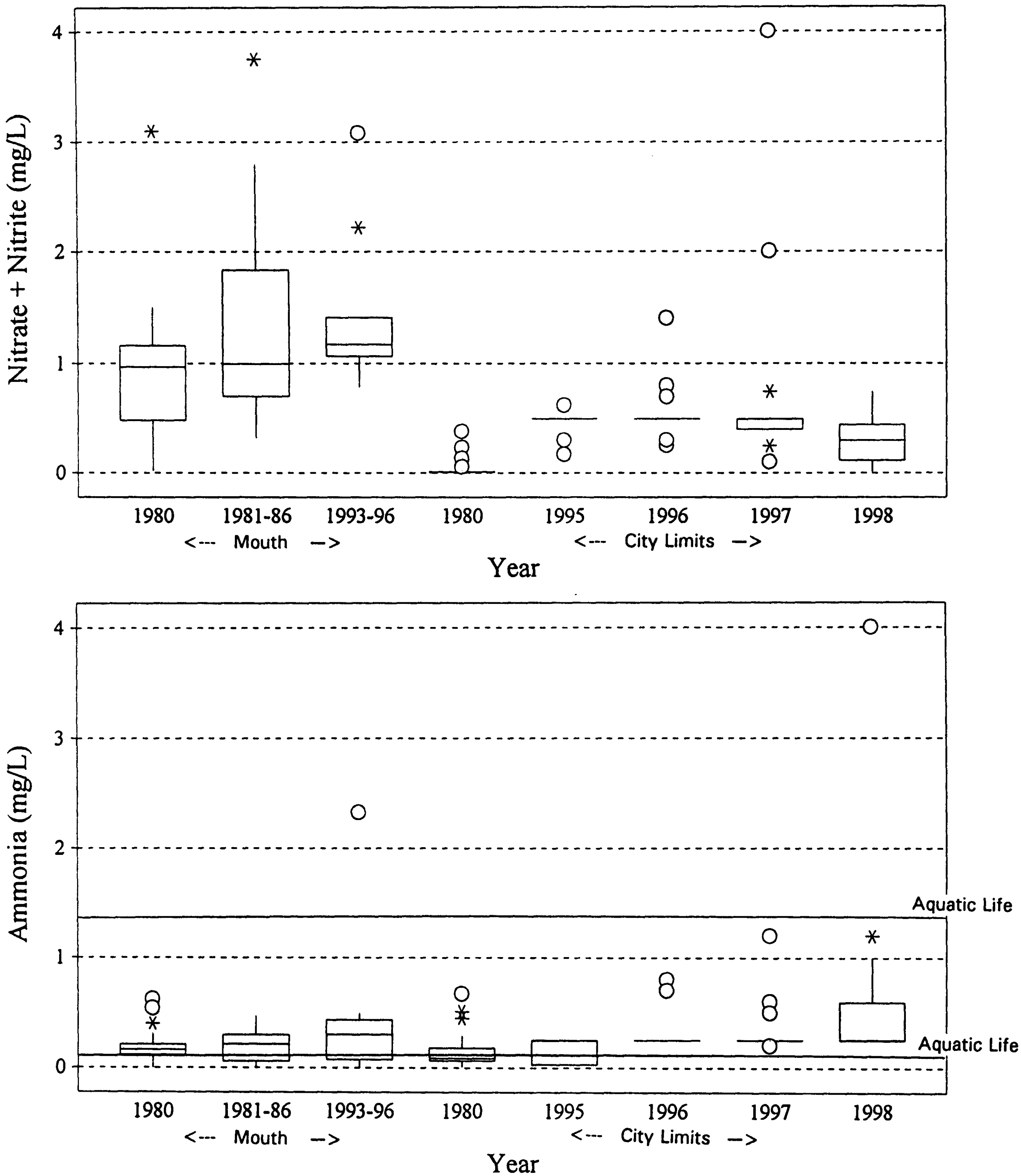


Figure 3 cont. Annual

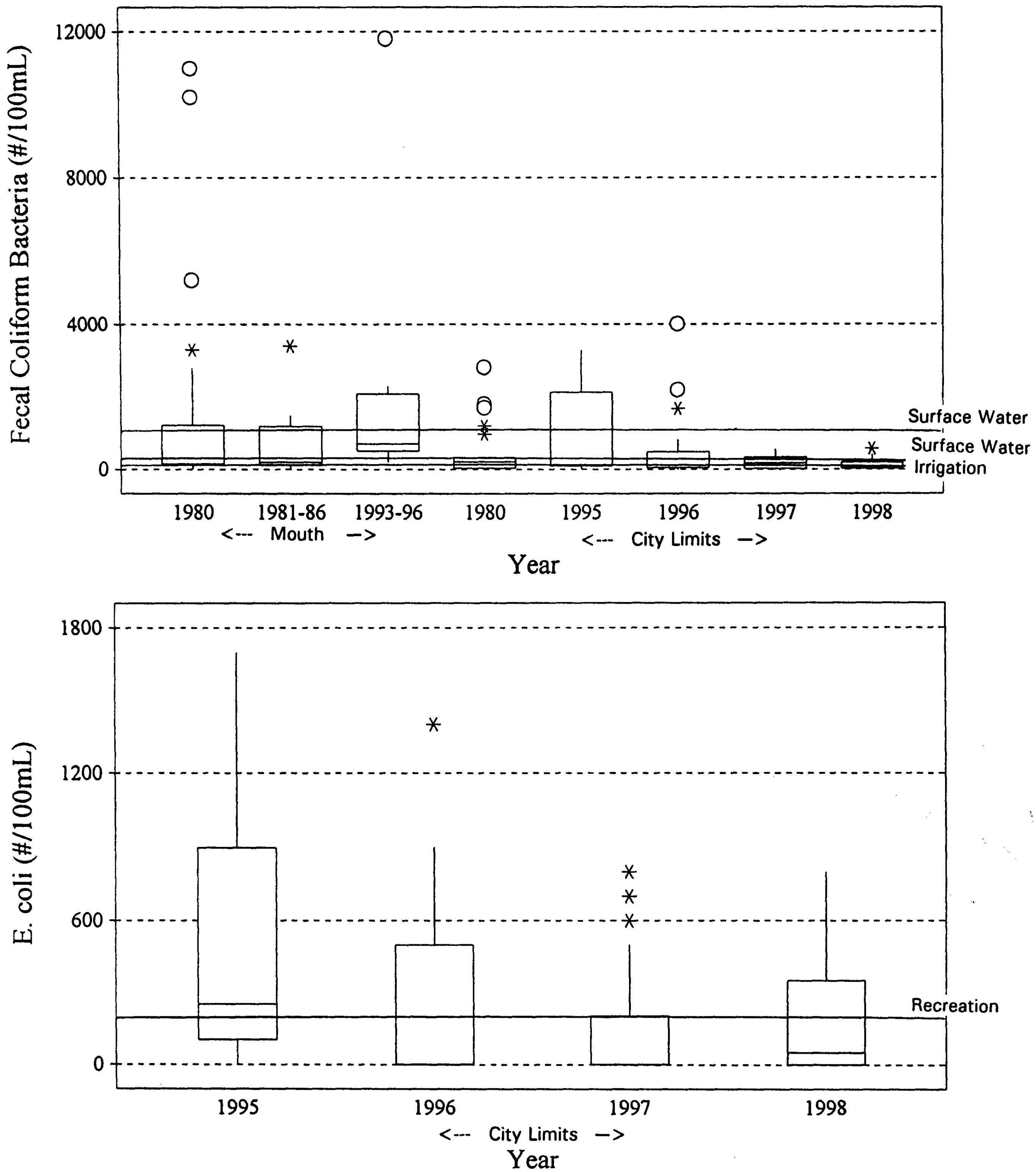


Figure 3 cont. Annual

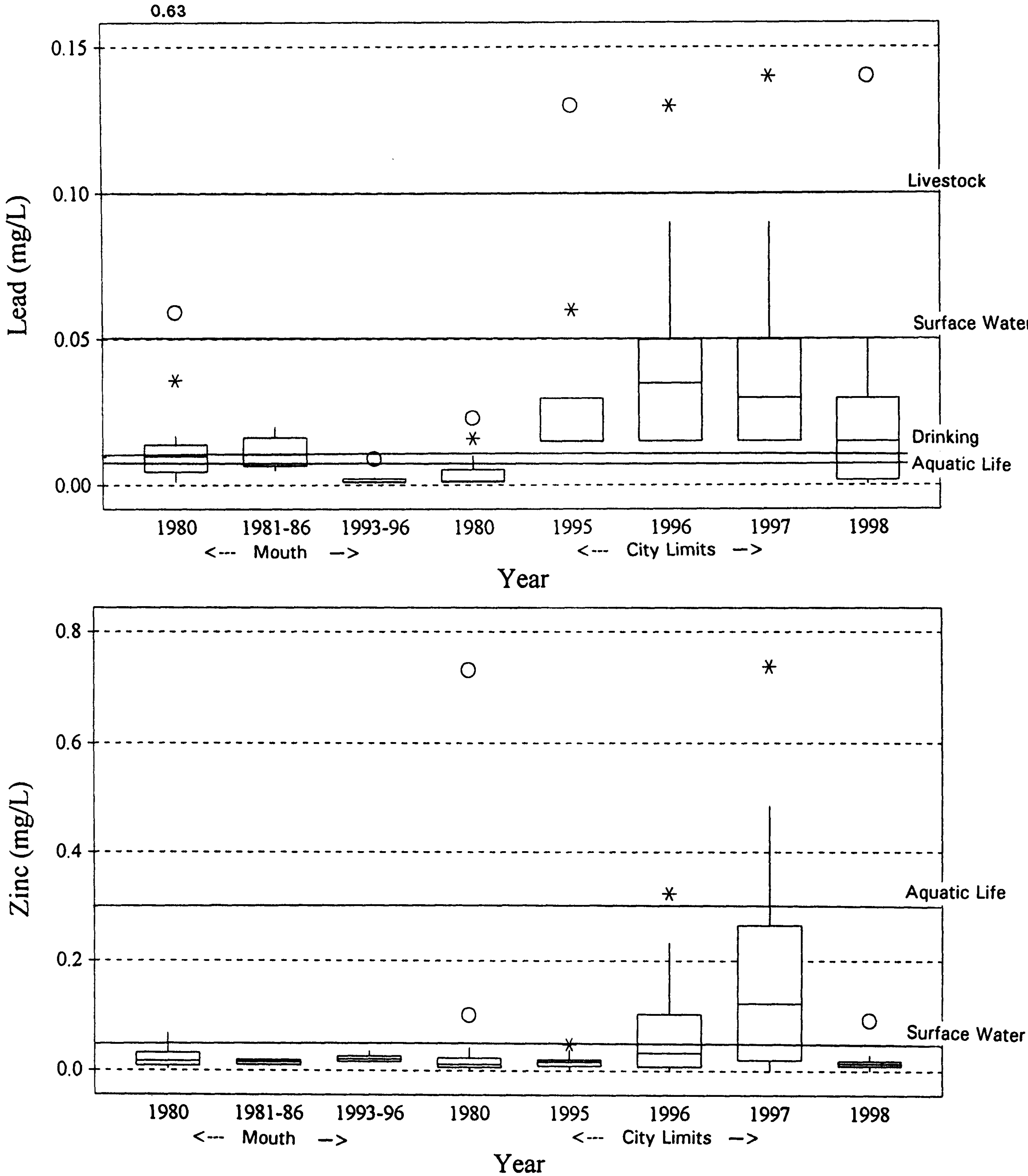
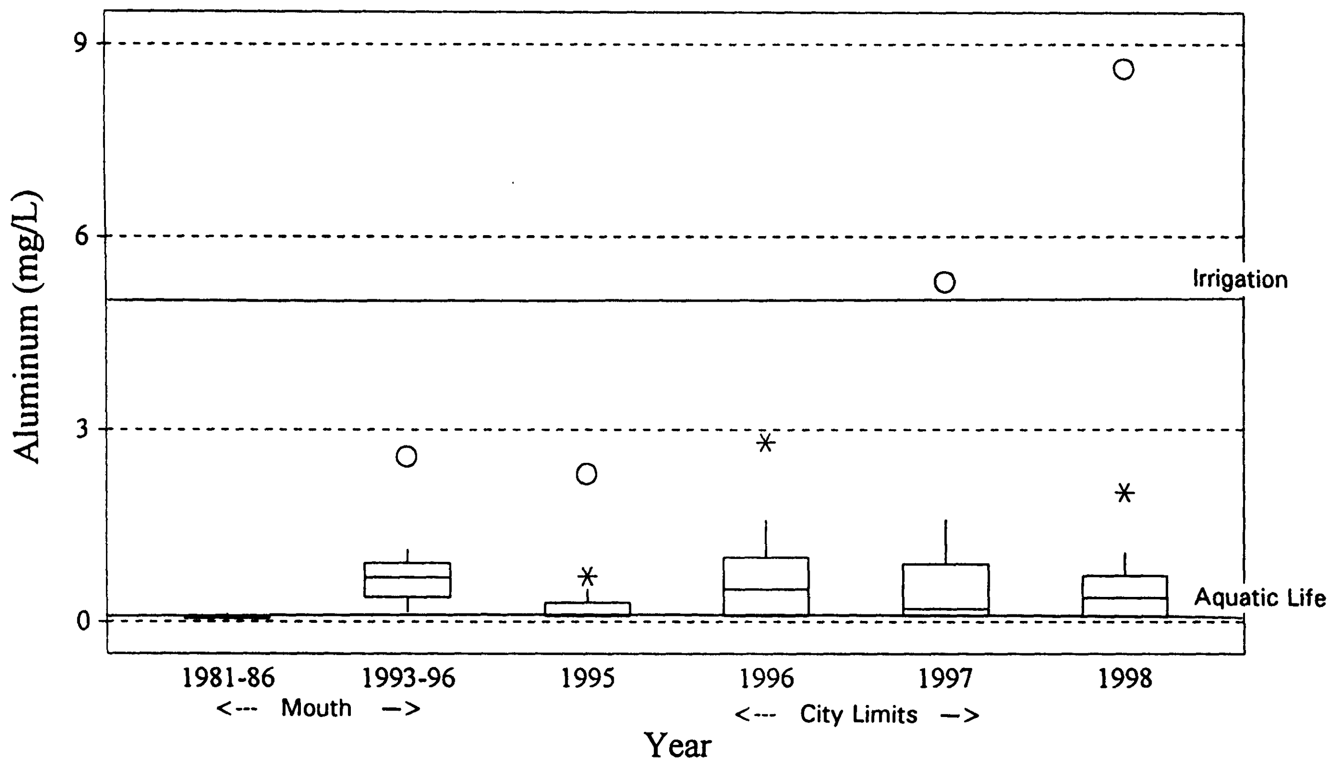


Figure 3 cont. Annual



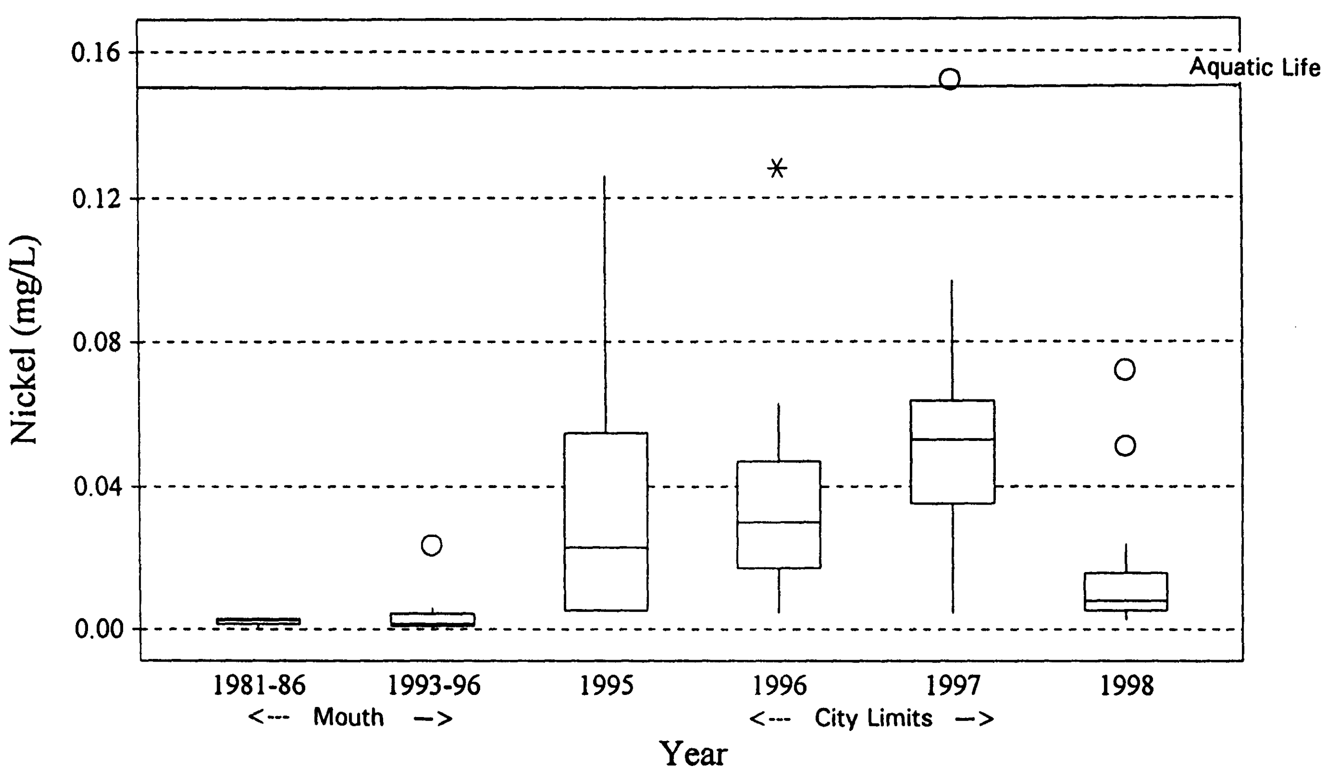
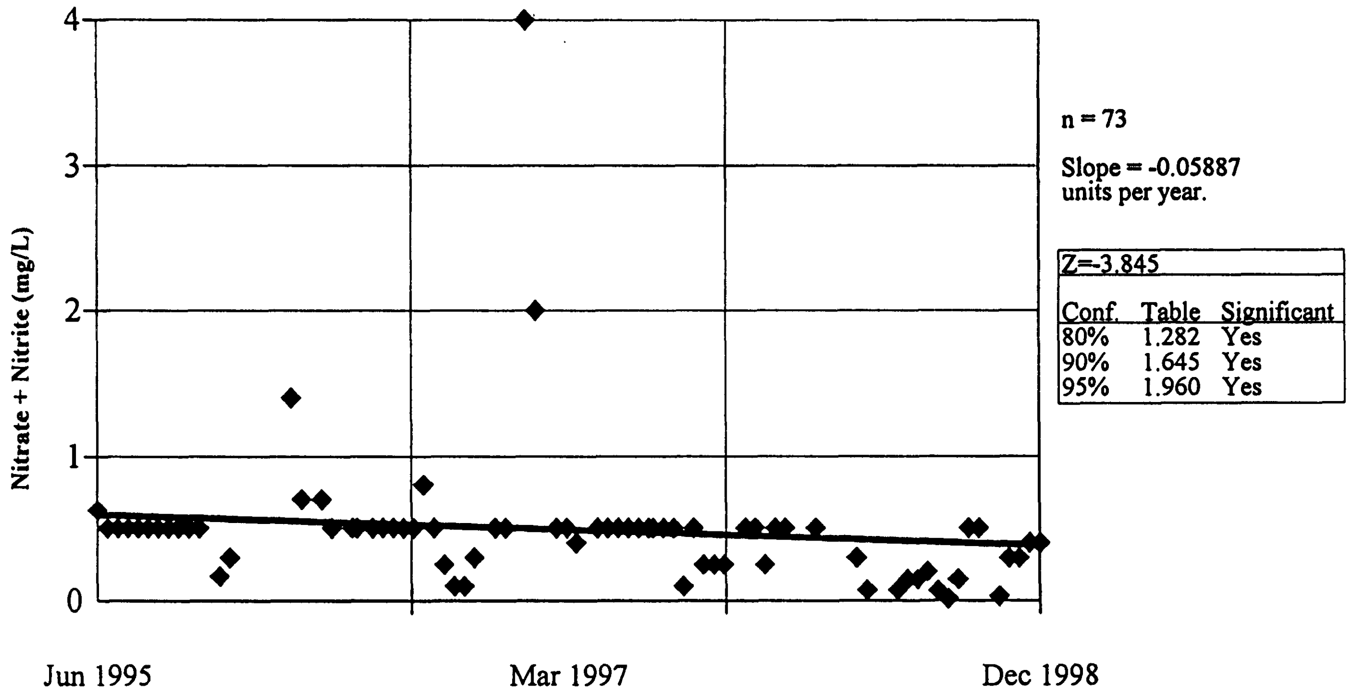


Figure 3 cont. Annual

SEASONAL KENDALL SLOPE ESTIMATOR
City_Lim



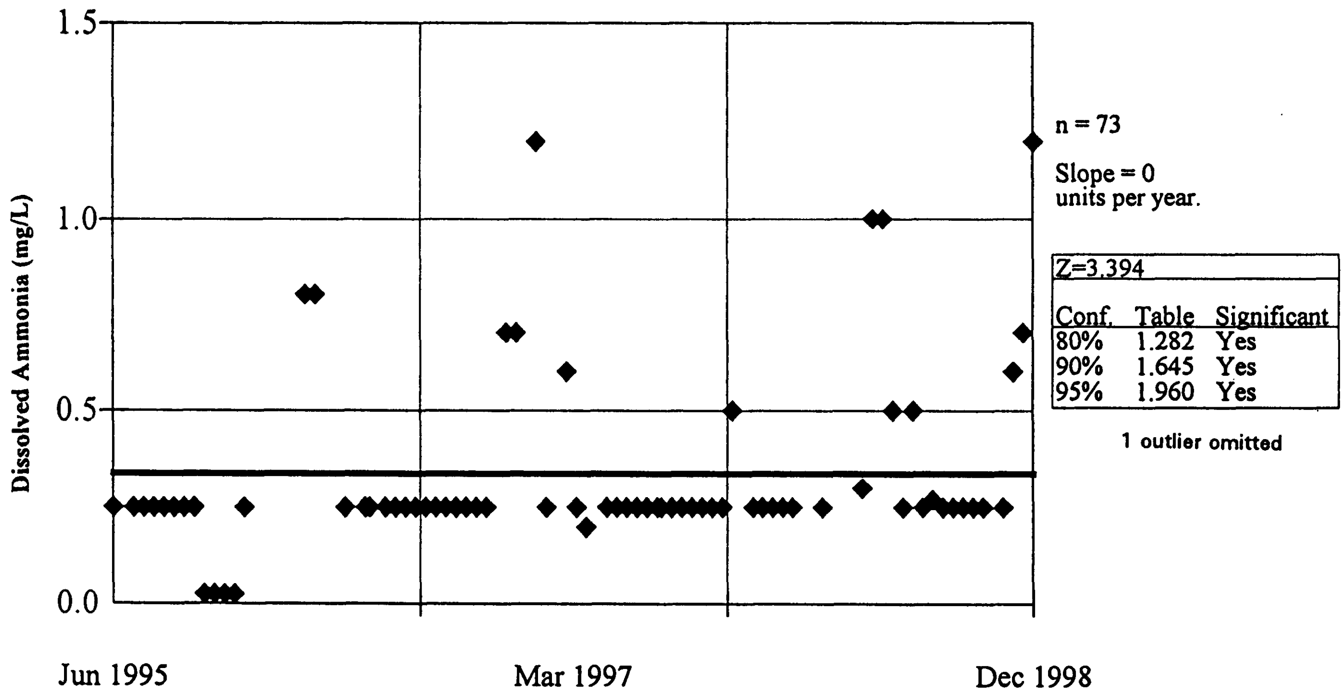
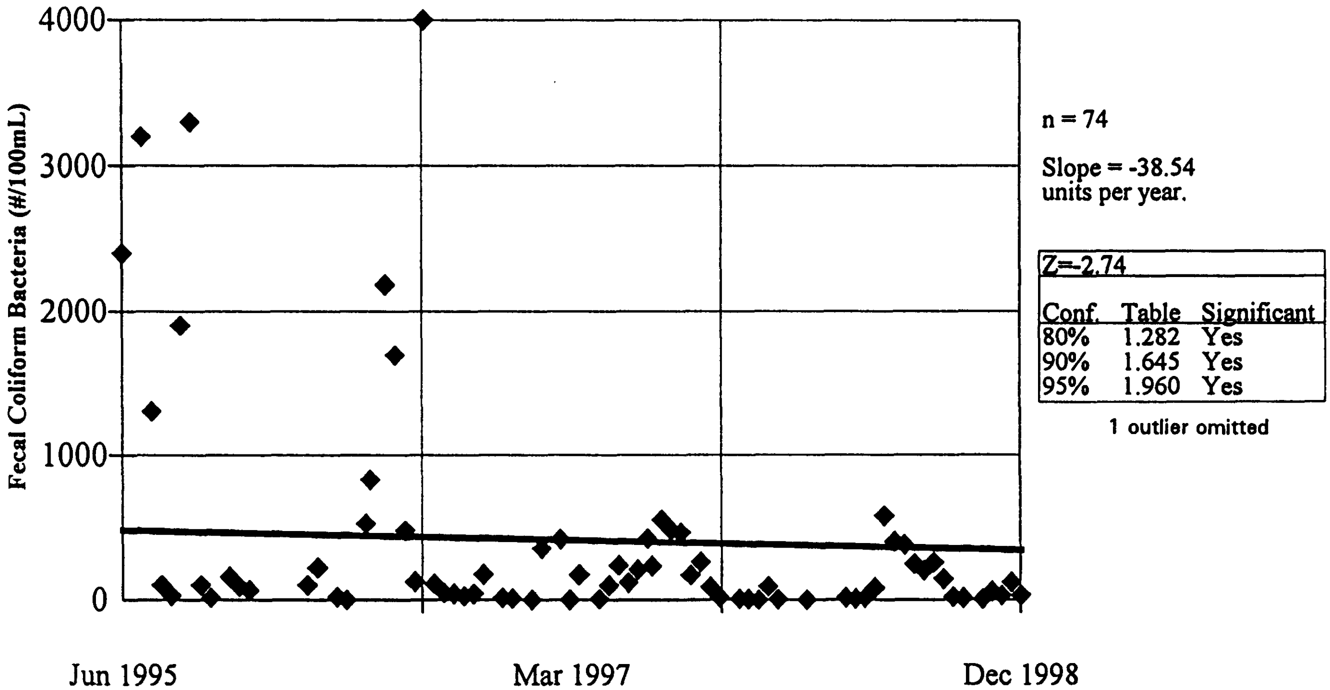


Figure 4 Trend Graphs for Nose Creek at the City Limits

SEASONAL KENDALL SLOPE ESTIMATOR
City_Lim



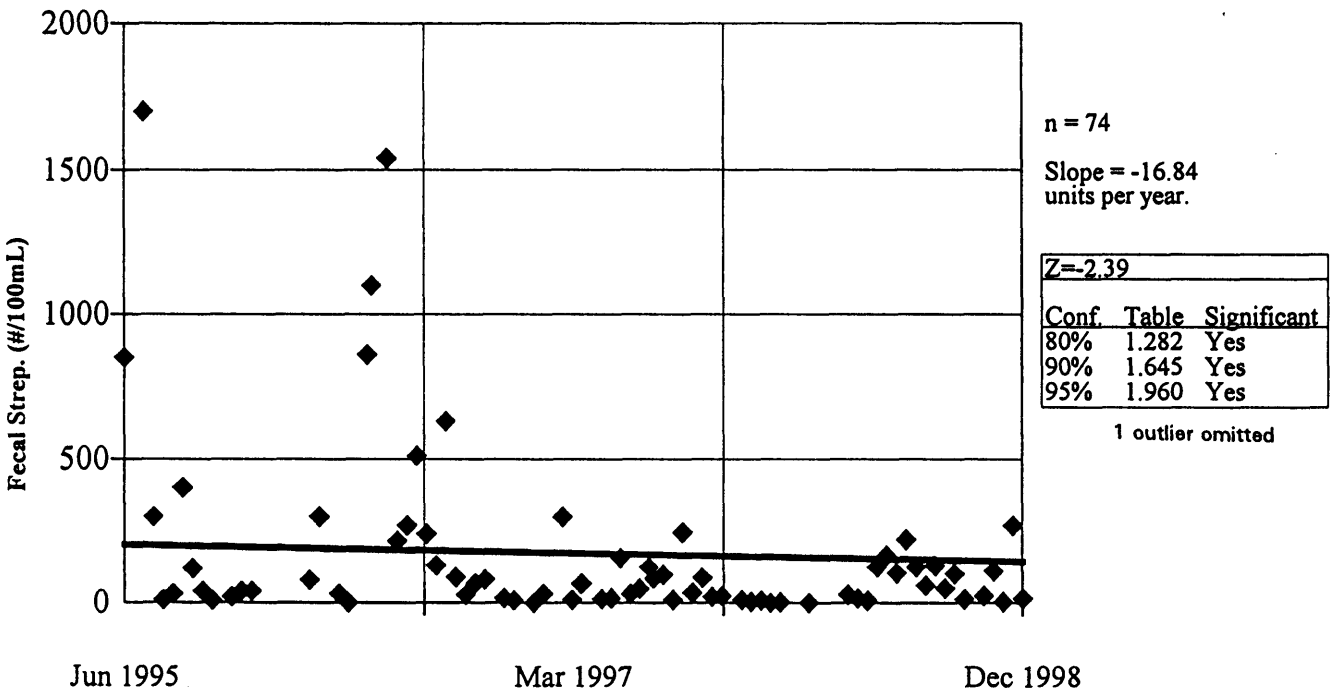
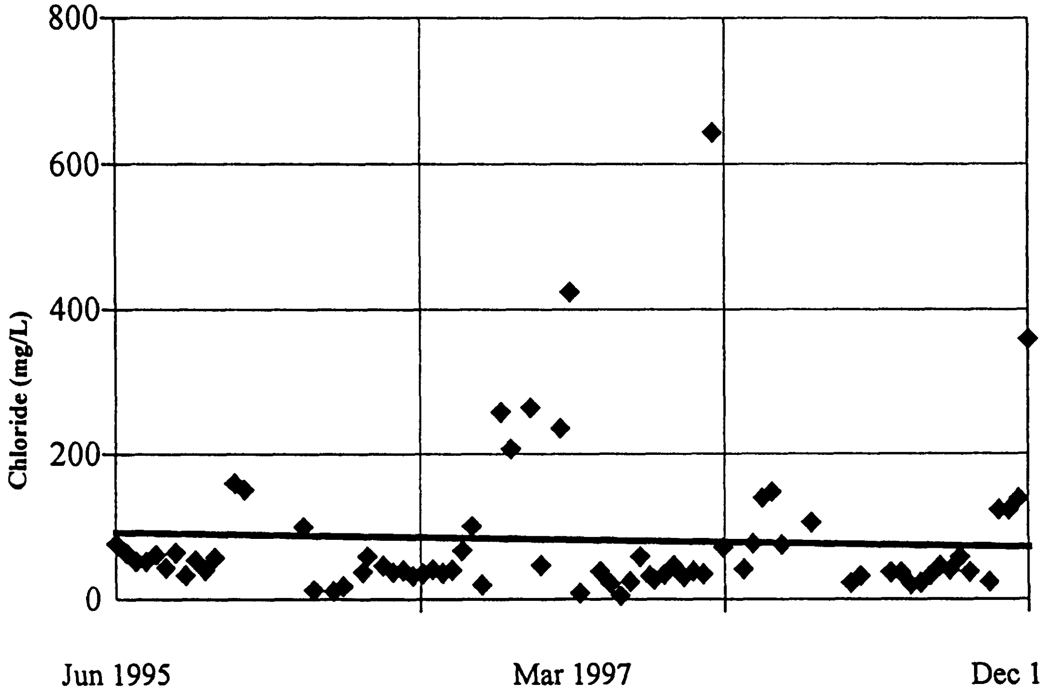


Figure 4 cont. Trends

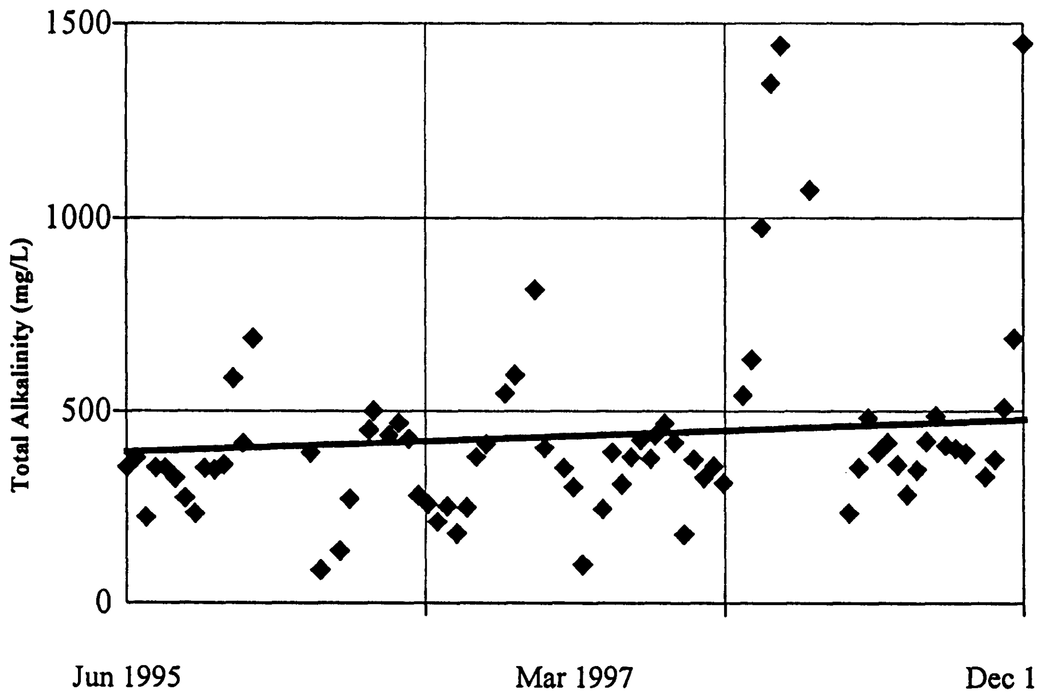
SEASONAL KENDALL SLOPE ESTIMATOR
City_Lim



n = 73

Slope = -5.796
units per year.

Z=-2.67		
Conf.	Table	Significant
80%	1.282	Yes
90%	1.645	Yes
95%	1.960	Yes



n = 76

Slope = 23.96
units per year.

Z=2.275		
Conf.	Table	Significant
80%	1.282	Yes
90%	1.645	Yes
95%	1.960	Yes

Figure 4 cont. Trends

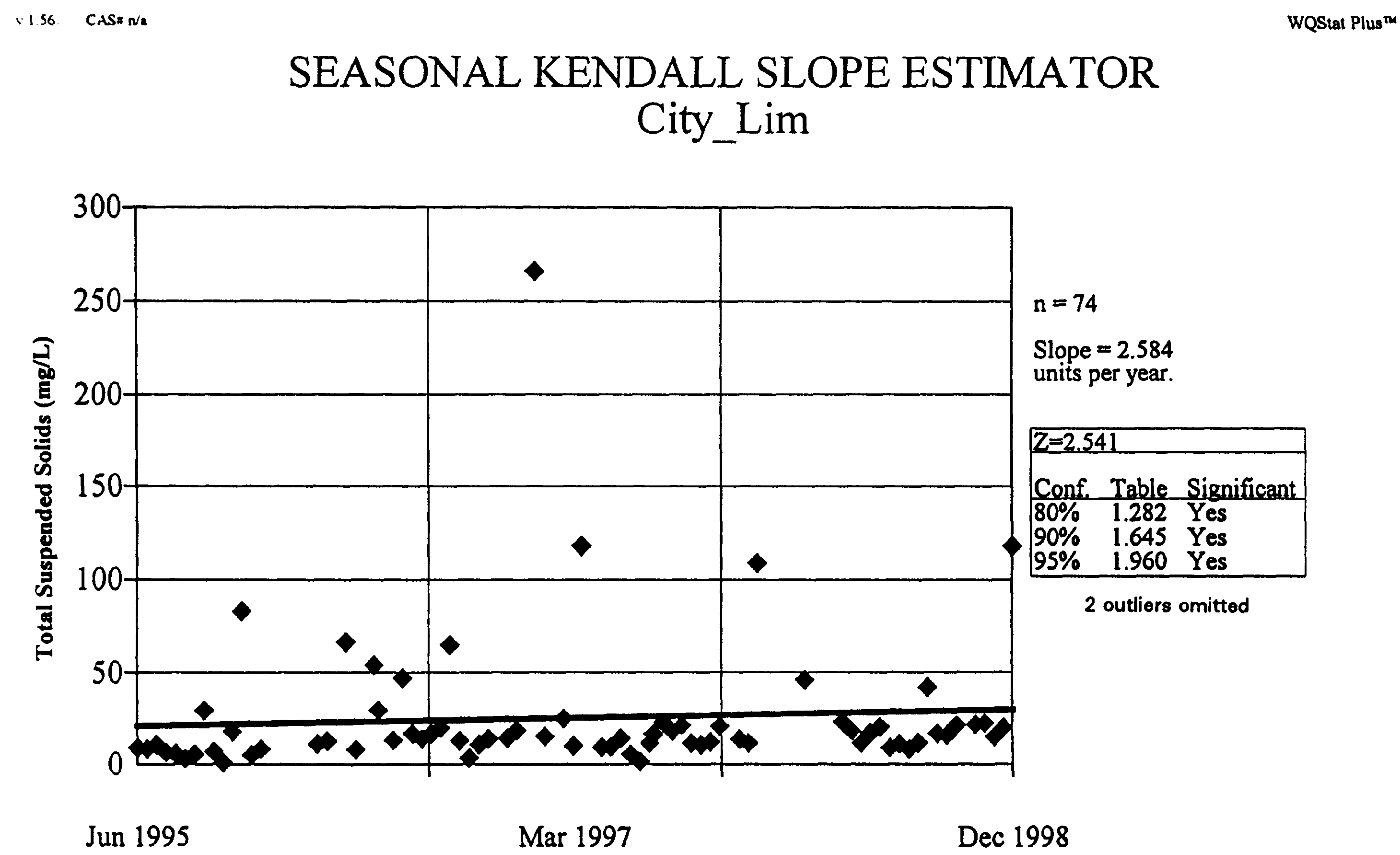


Figure 4 cont. Trends

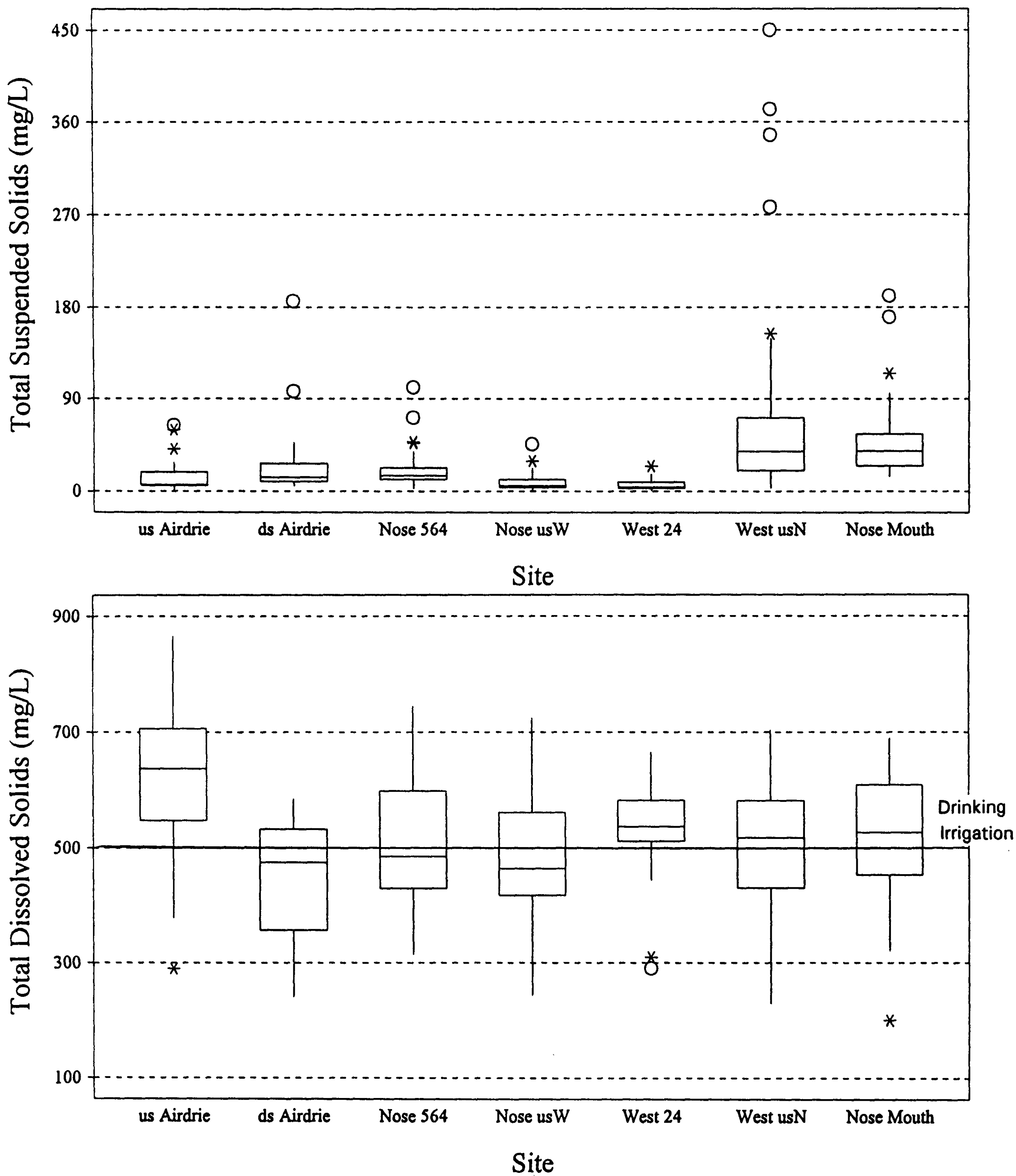
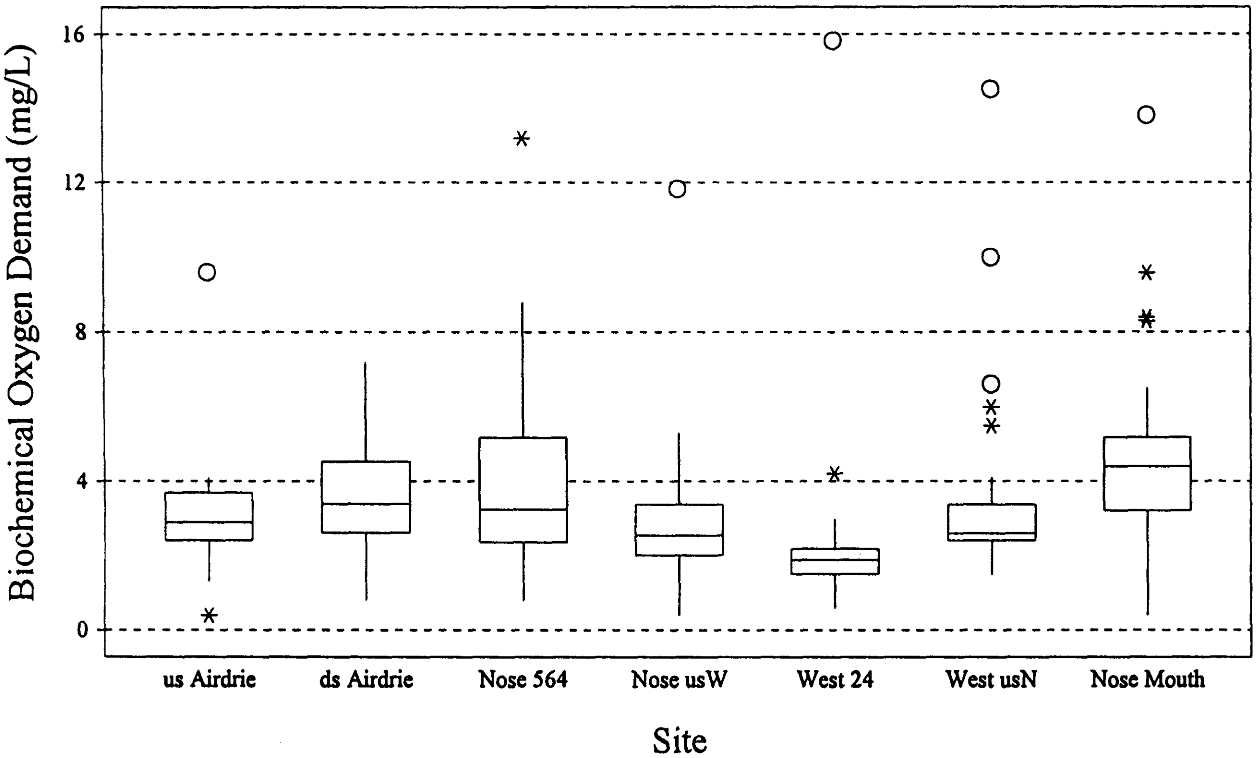


Figure 5 Comparison of 1980s Data from all Locations



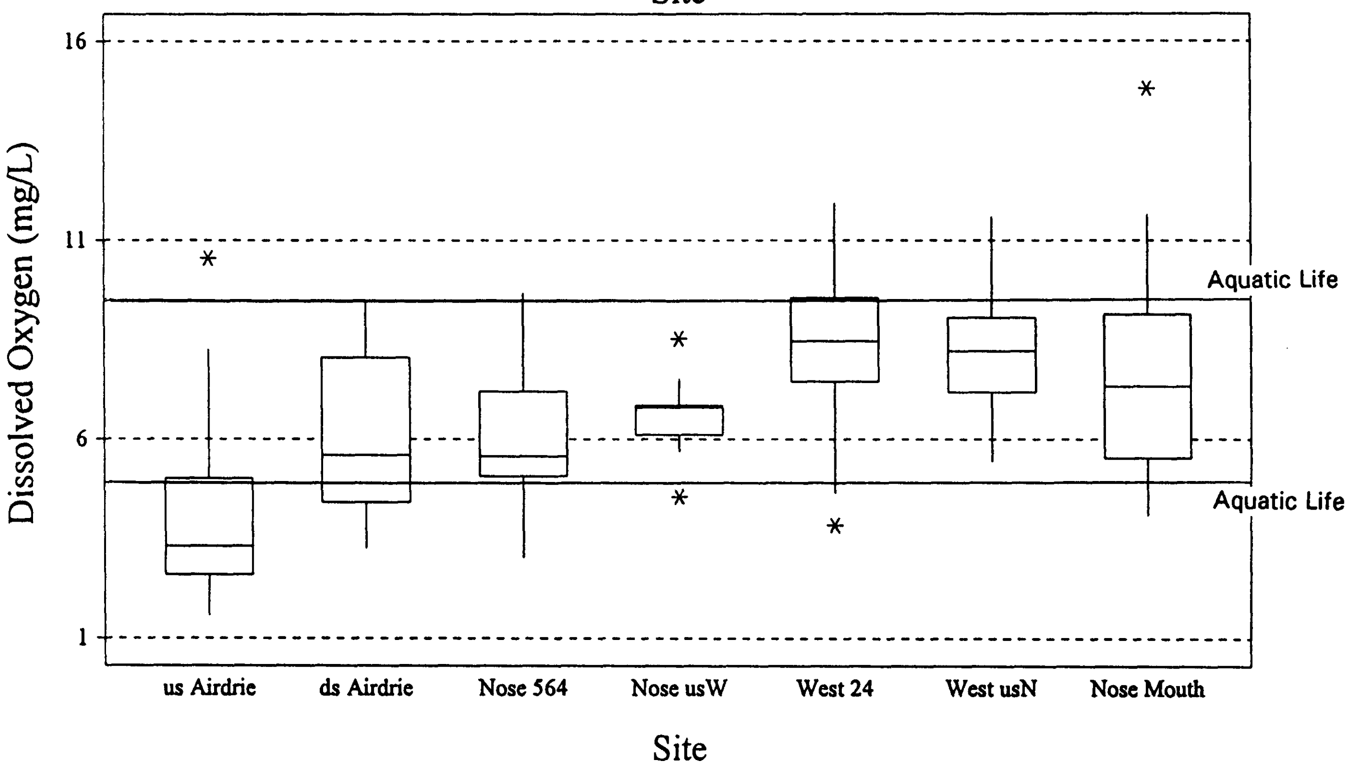


Figure 5 cont. Site Comparison

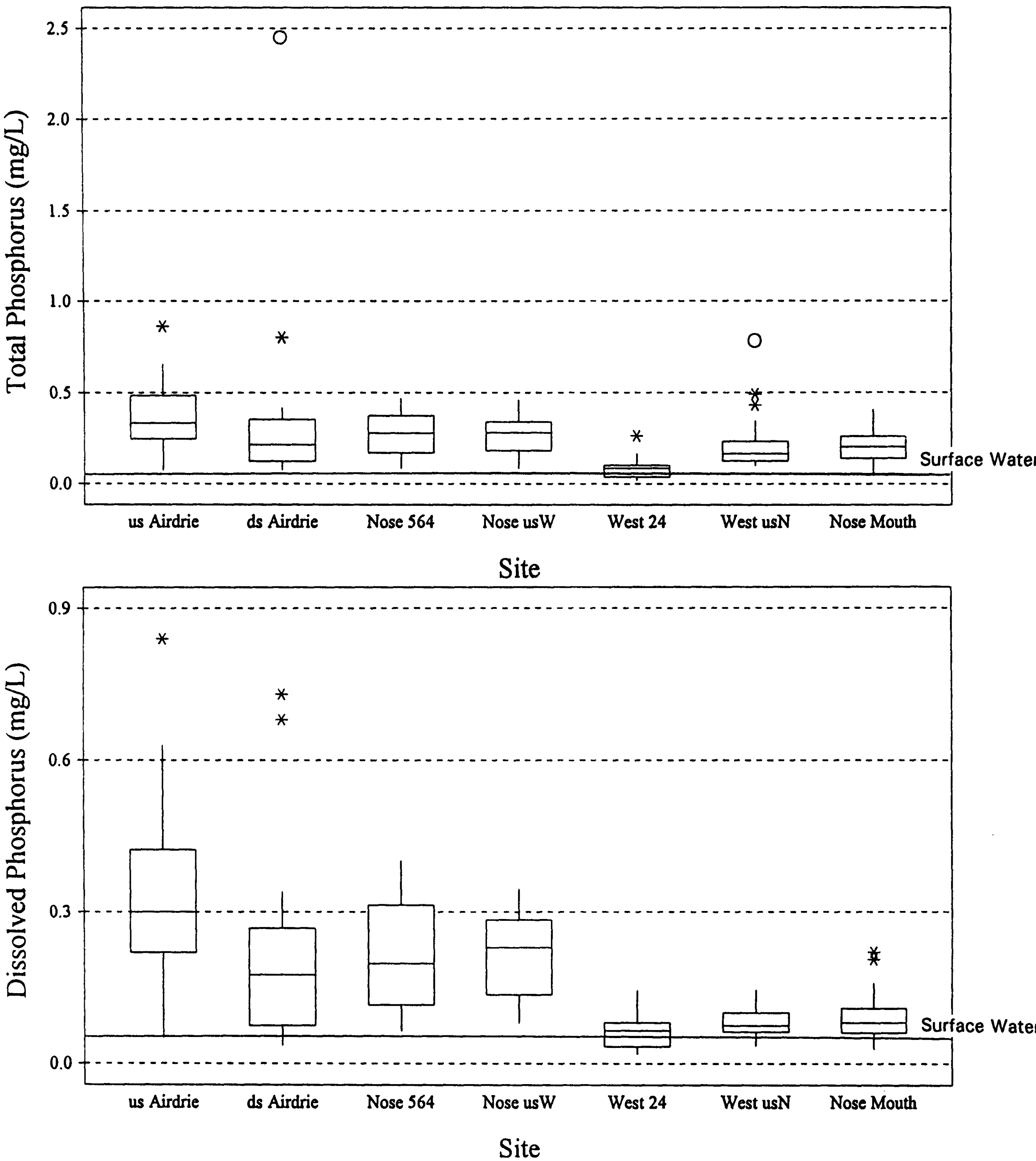


Figure 5 cont. Site Comparison

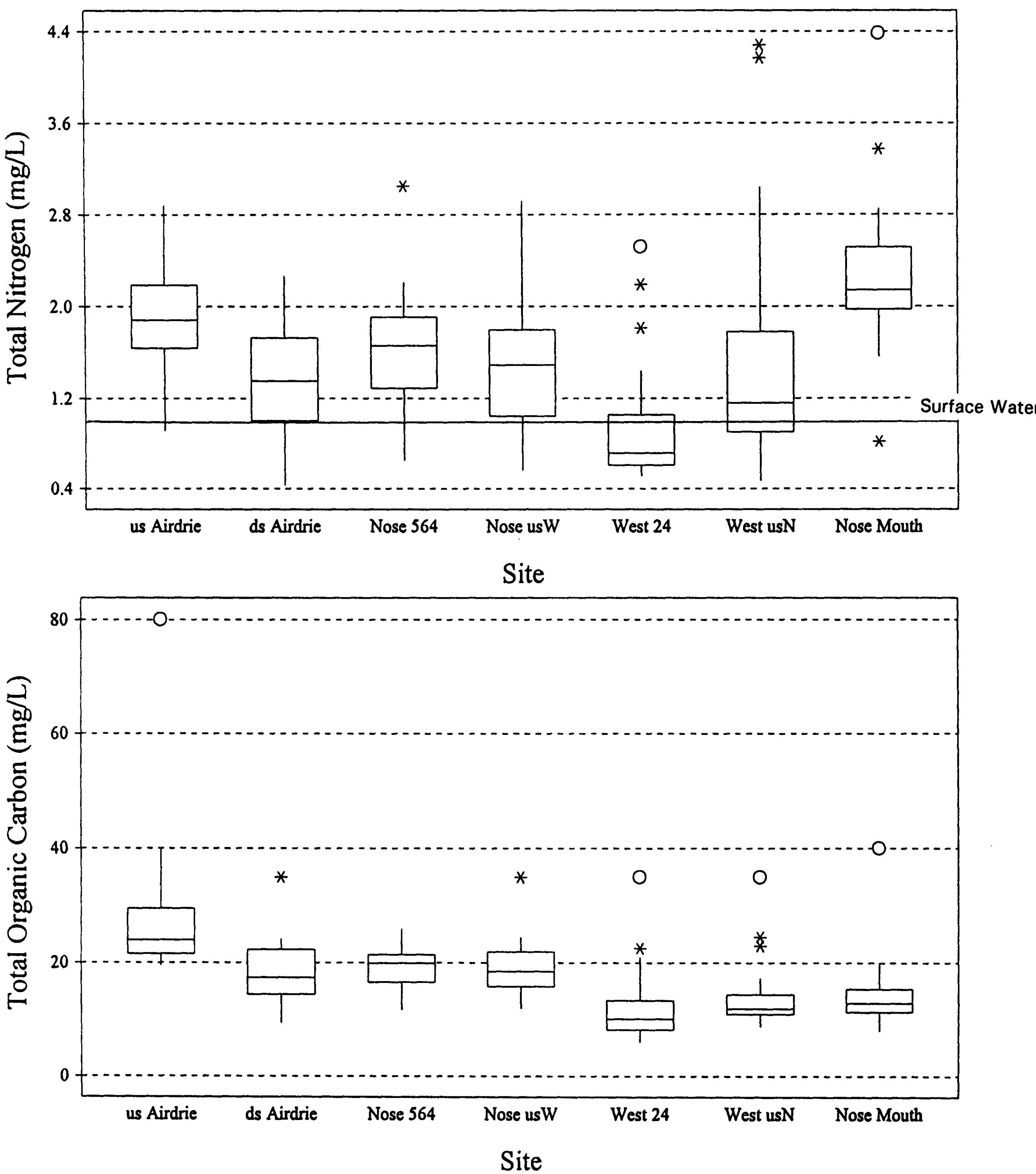


Figure 5 cont. Site Comparison

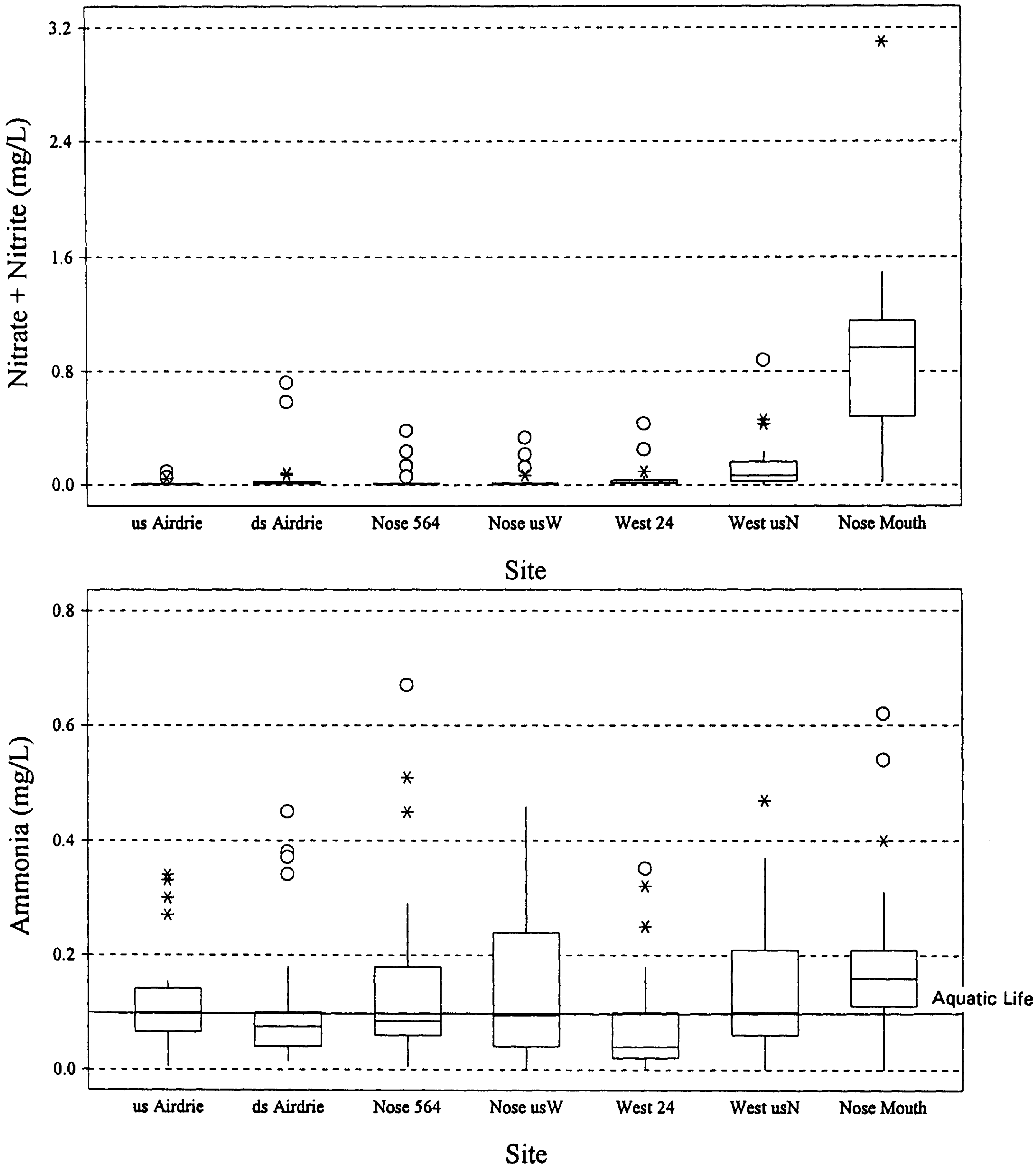
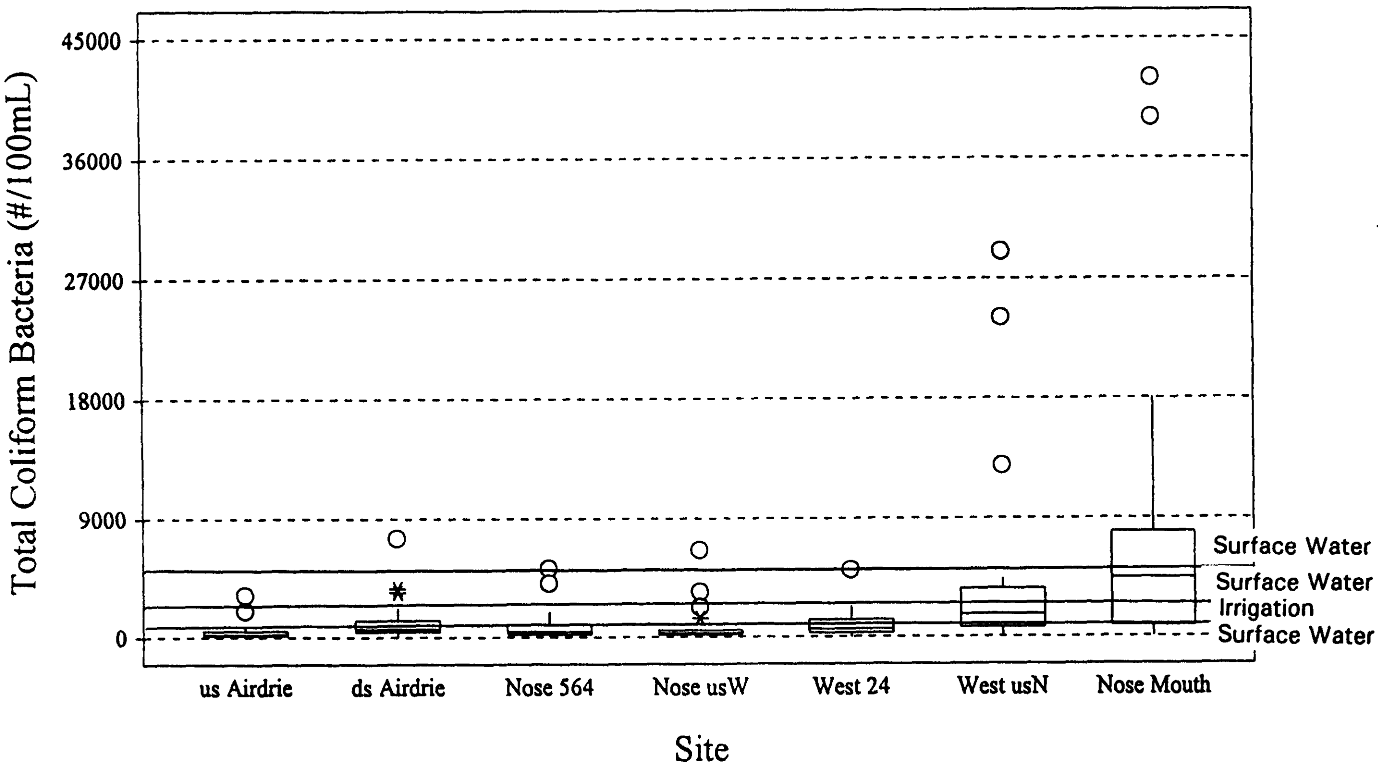


Figure 5 cont. Site Comparison



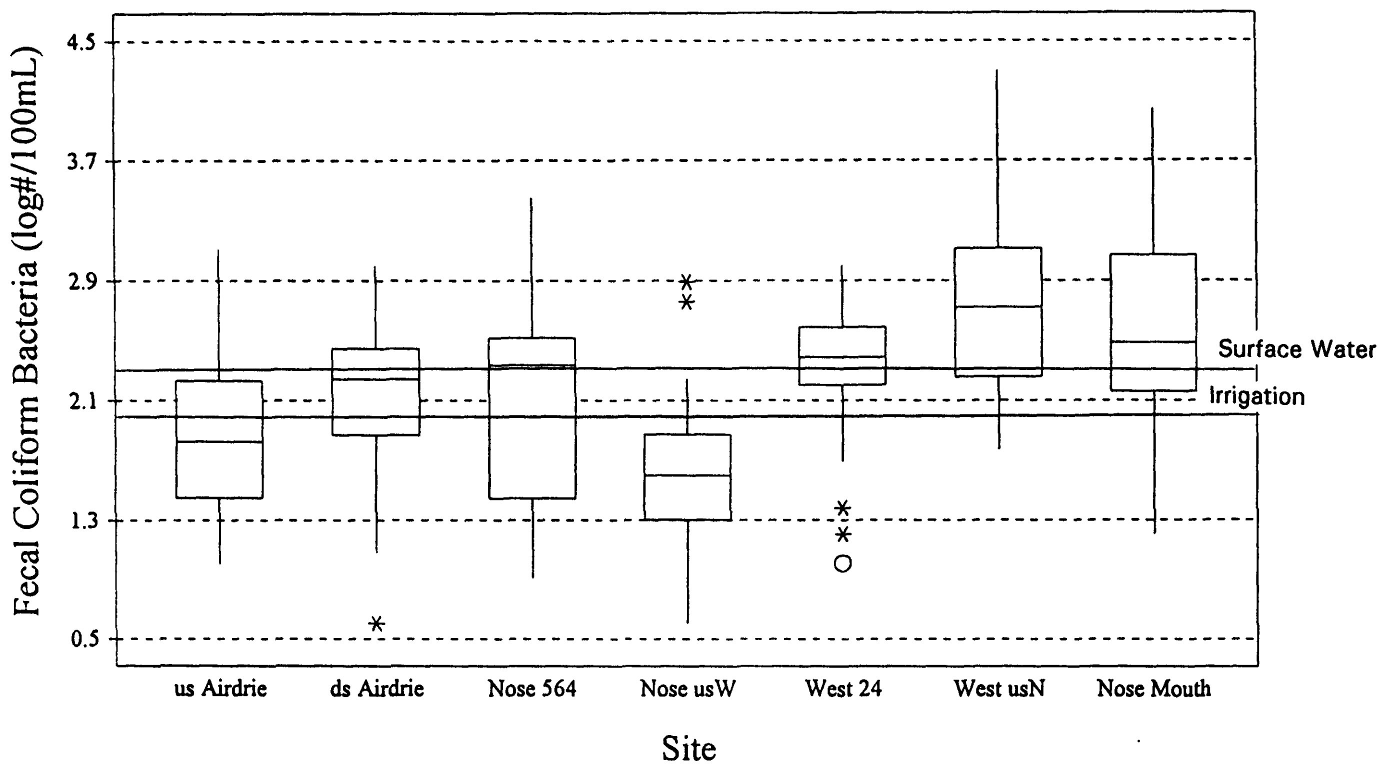


Figure 5 cont. Site Comparison

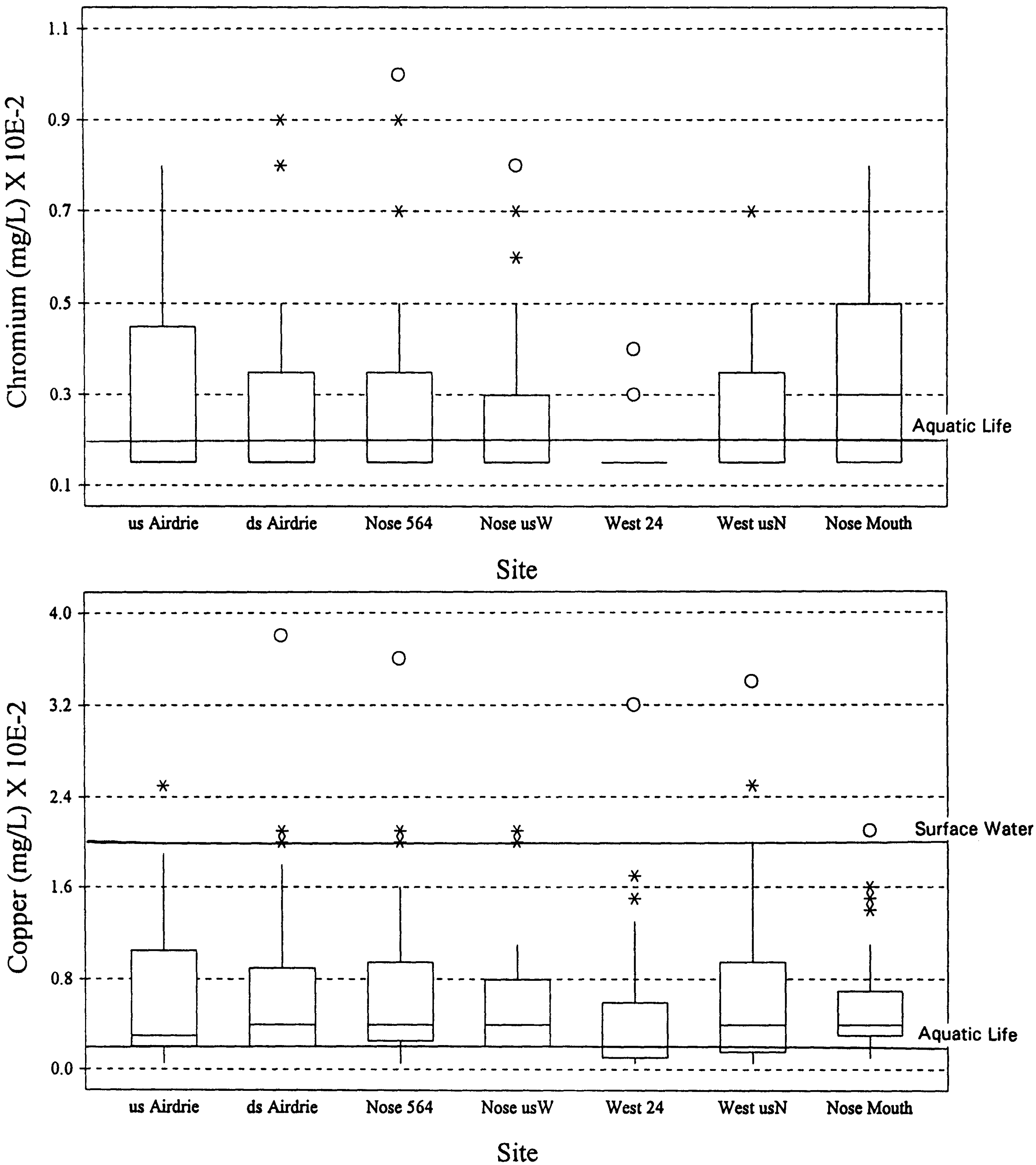


Figure 5 cont. Site Comparison

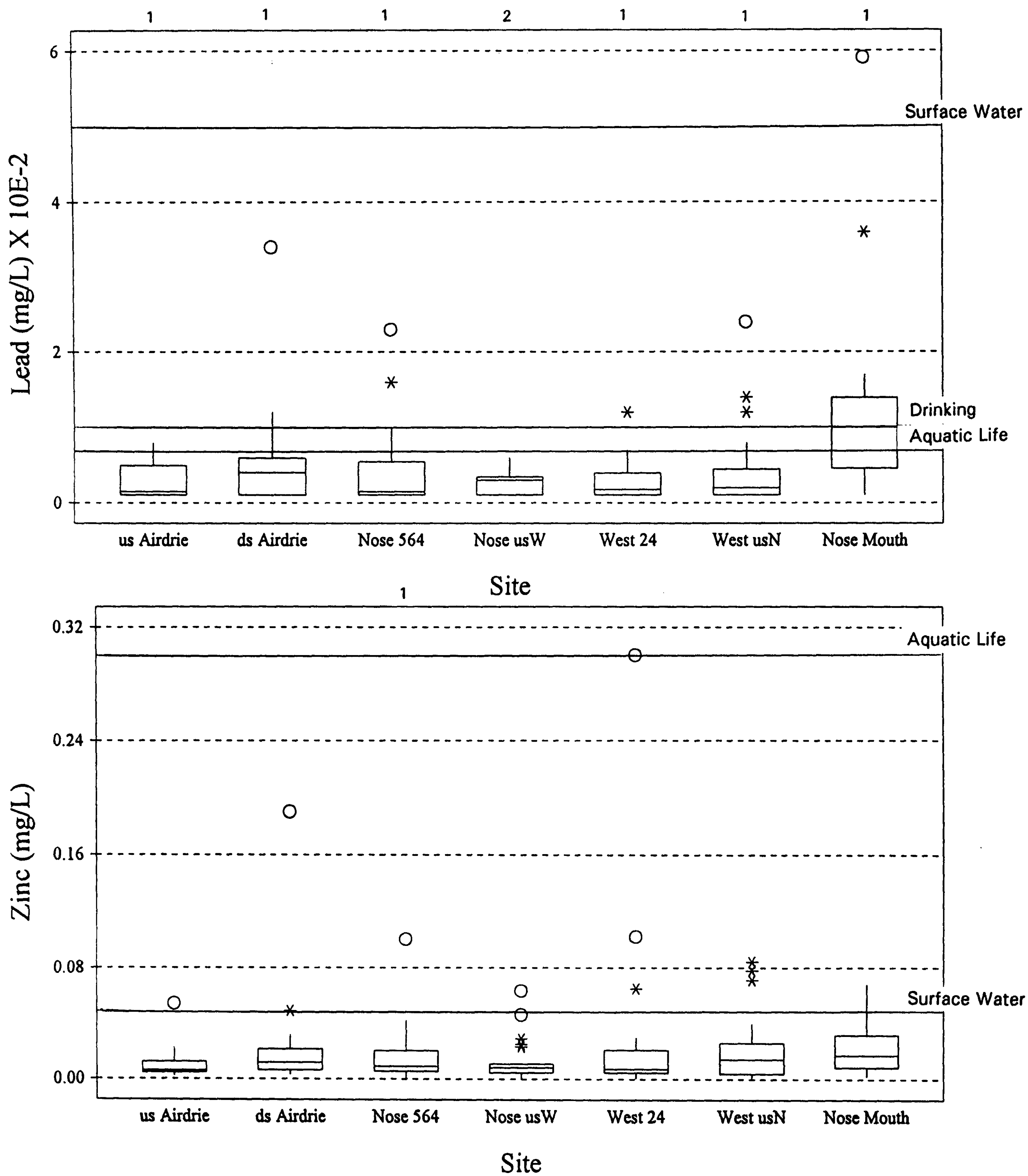


Figure 5 cont. Site Comparison

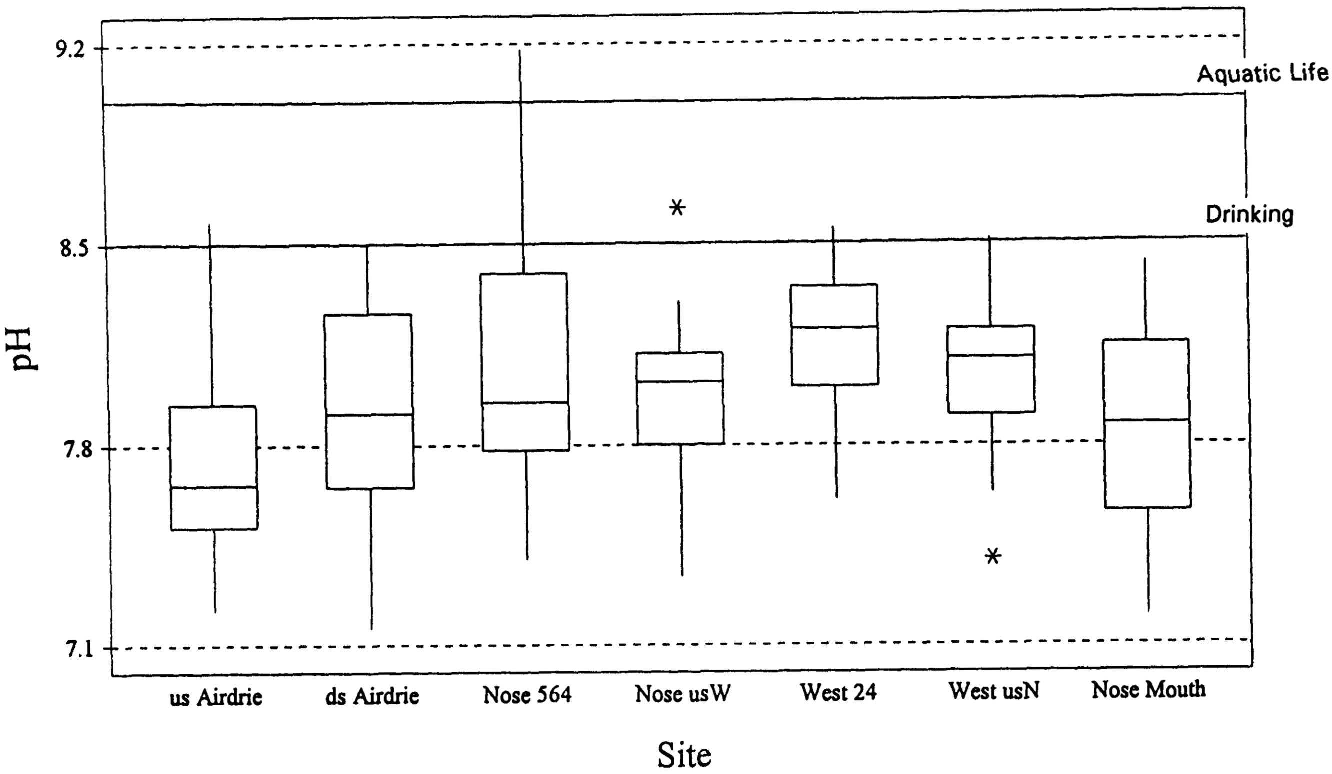


Figure 5 cont. Site Comparison

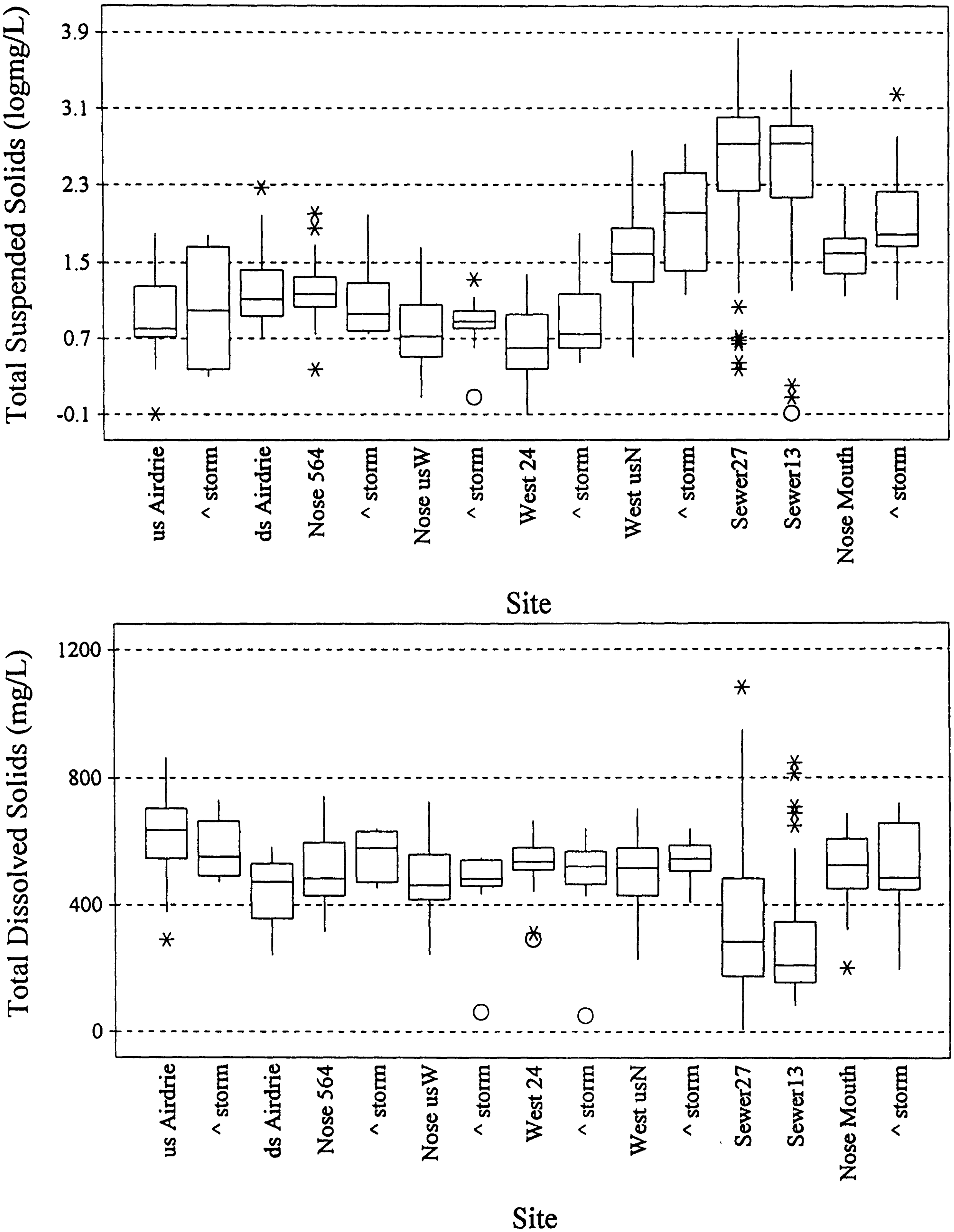
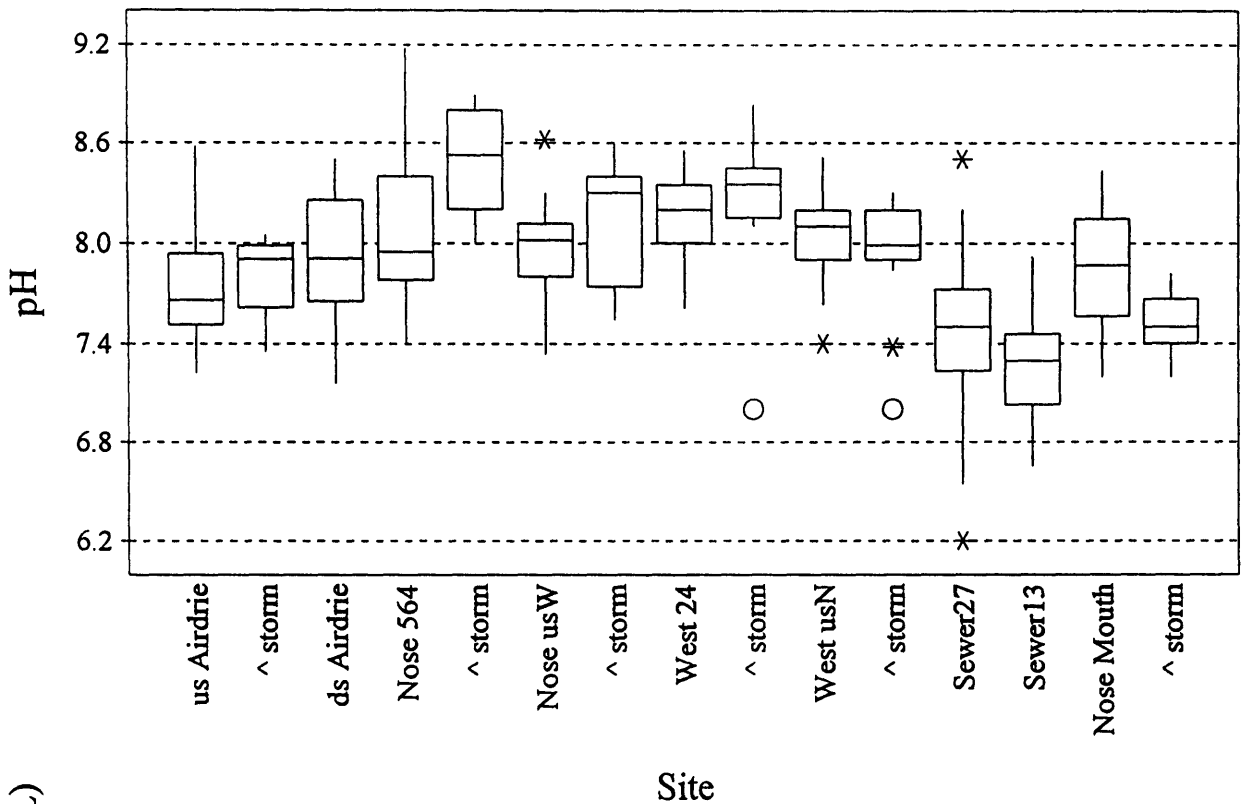


Figure 6 Data from 1980s showing Storm Event and Sewer Data



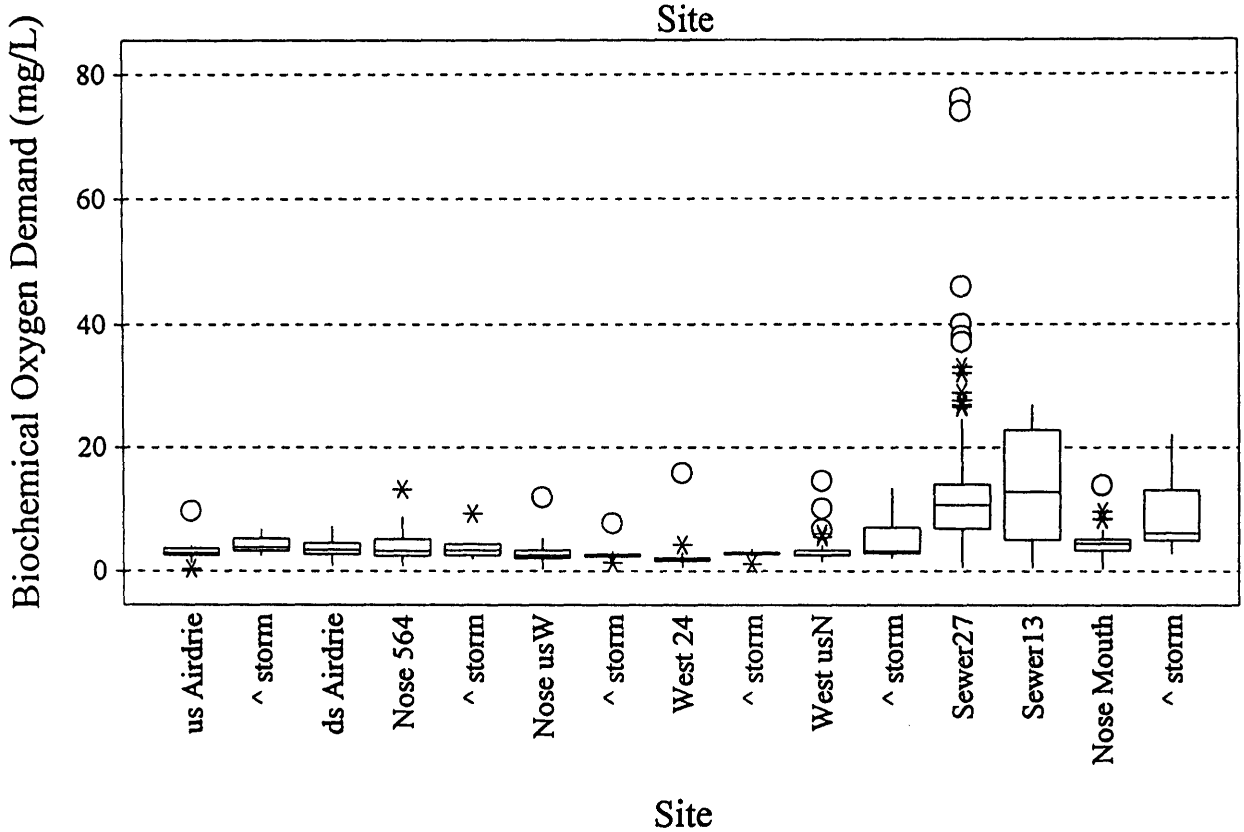
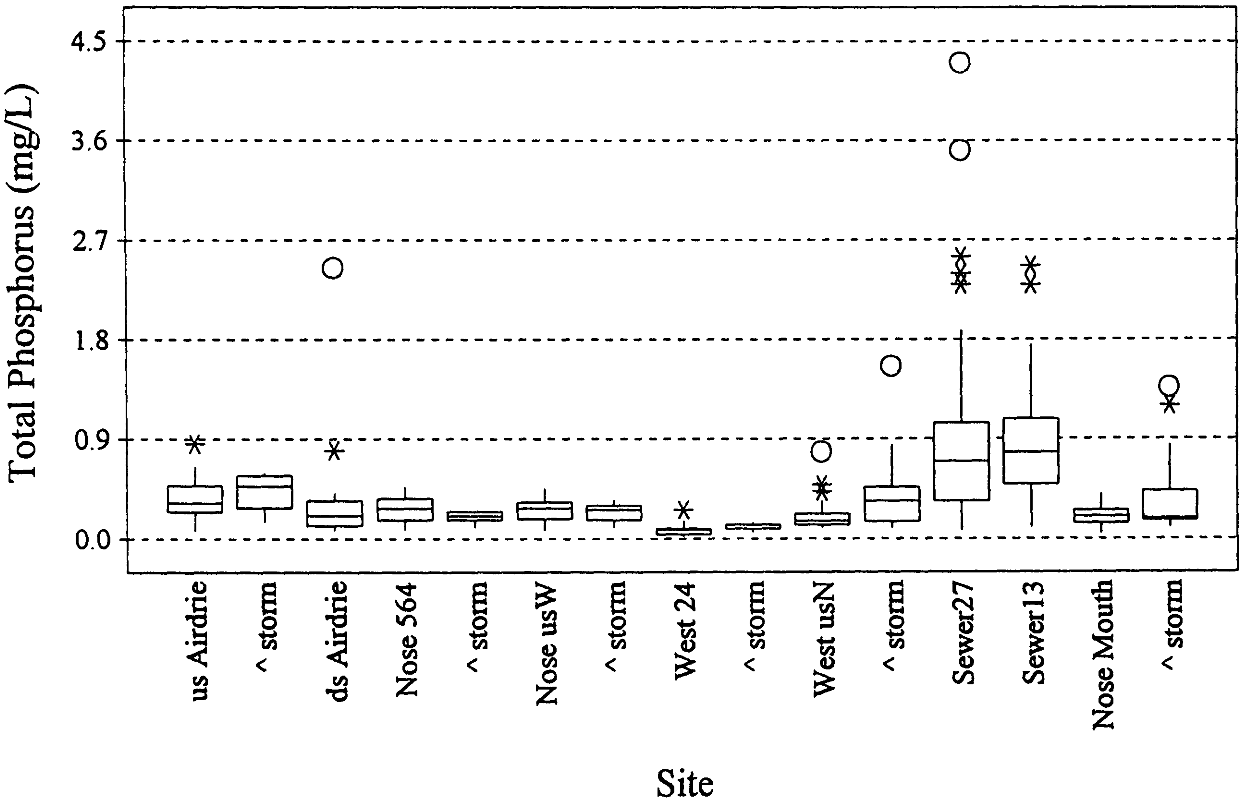


Figure 6 cont. Storm



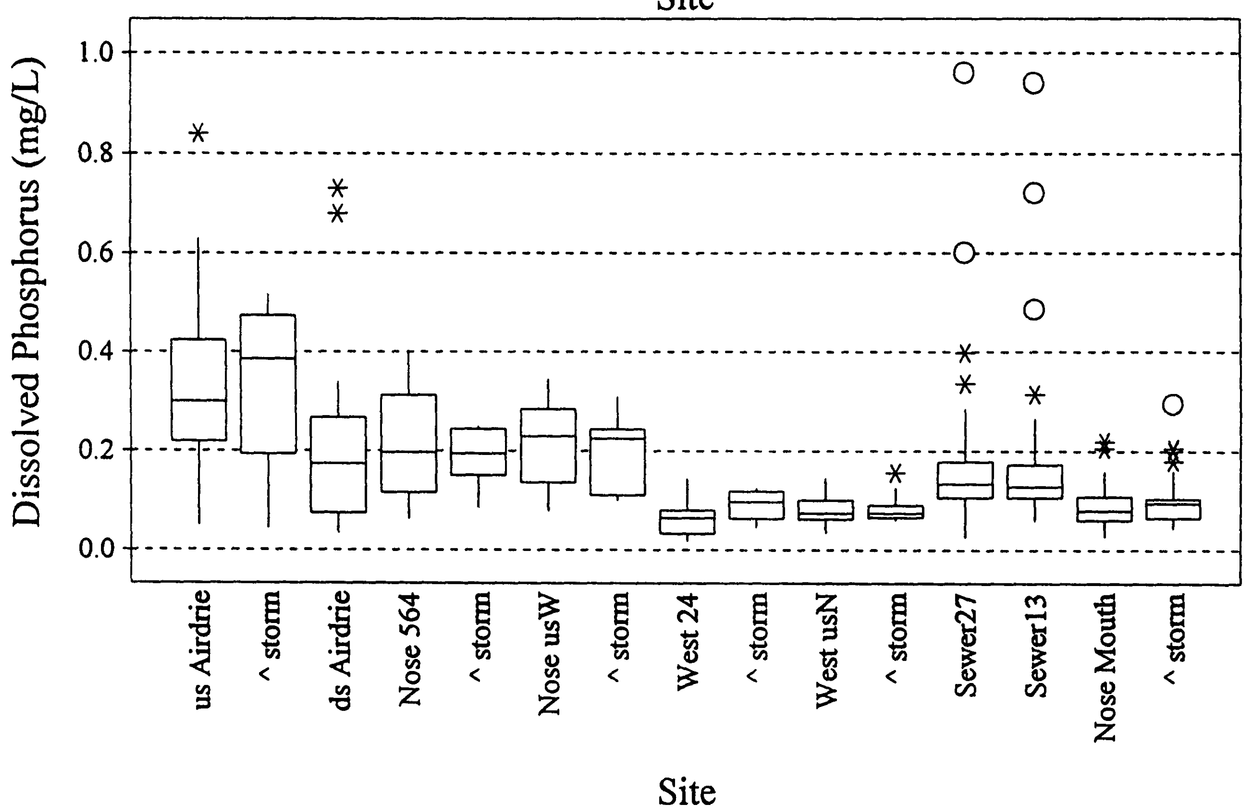
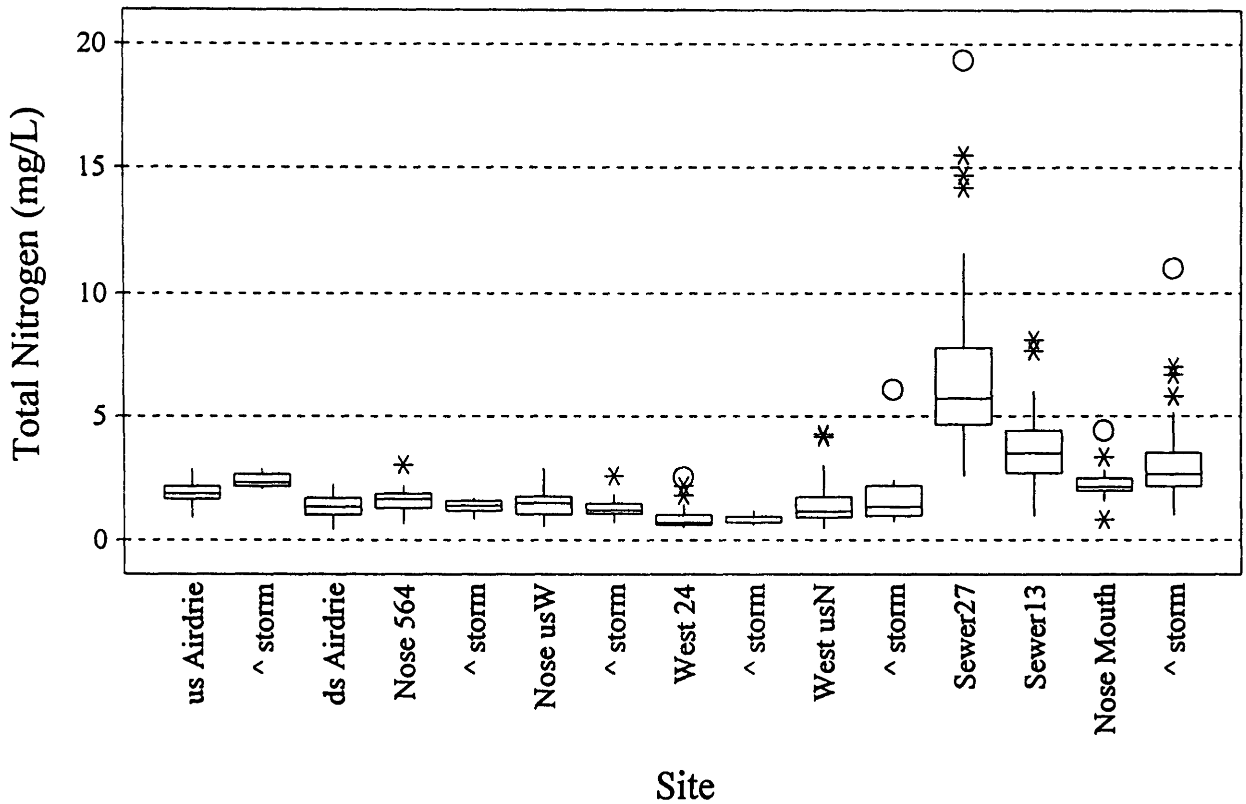


Figure 6 cont. Storm



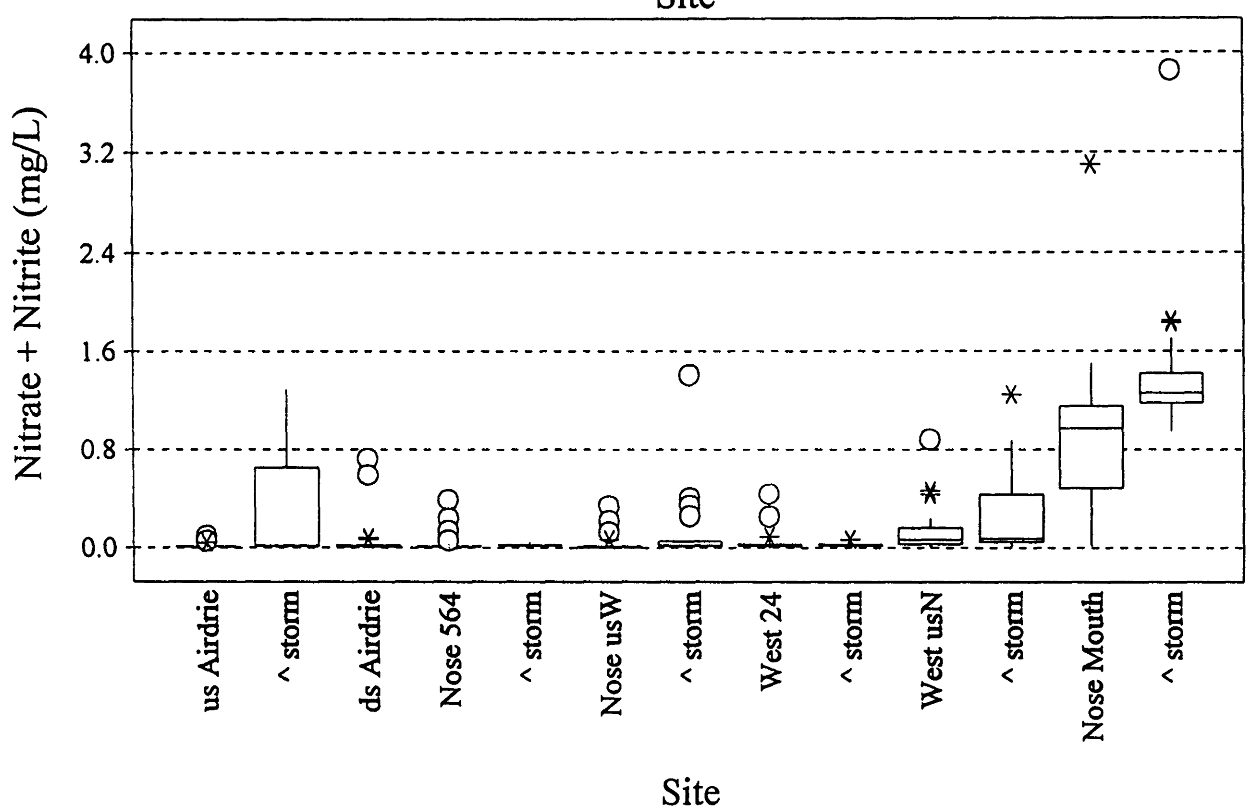


Figure 6 cont. Storm

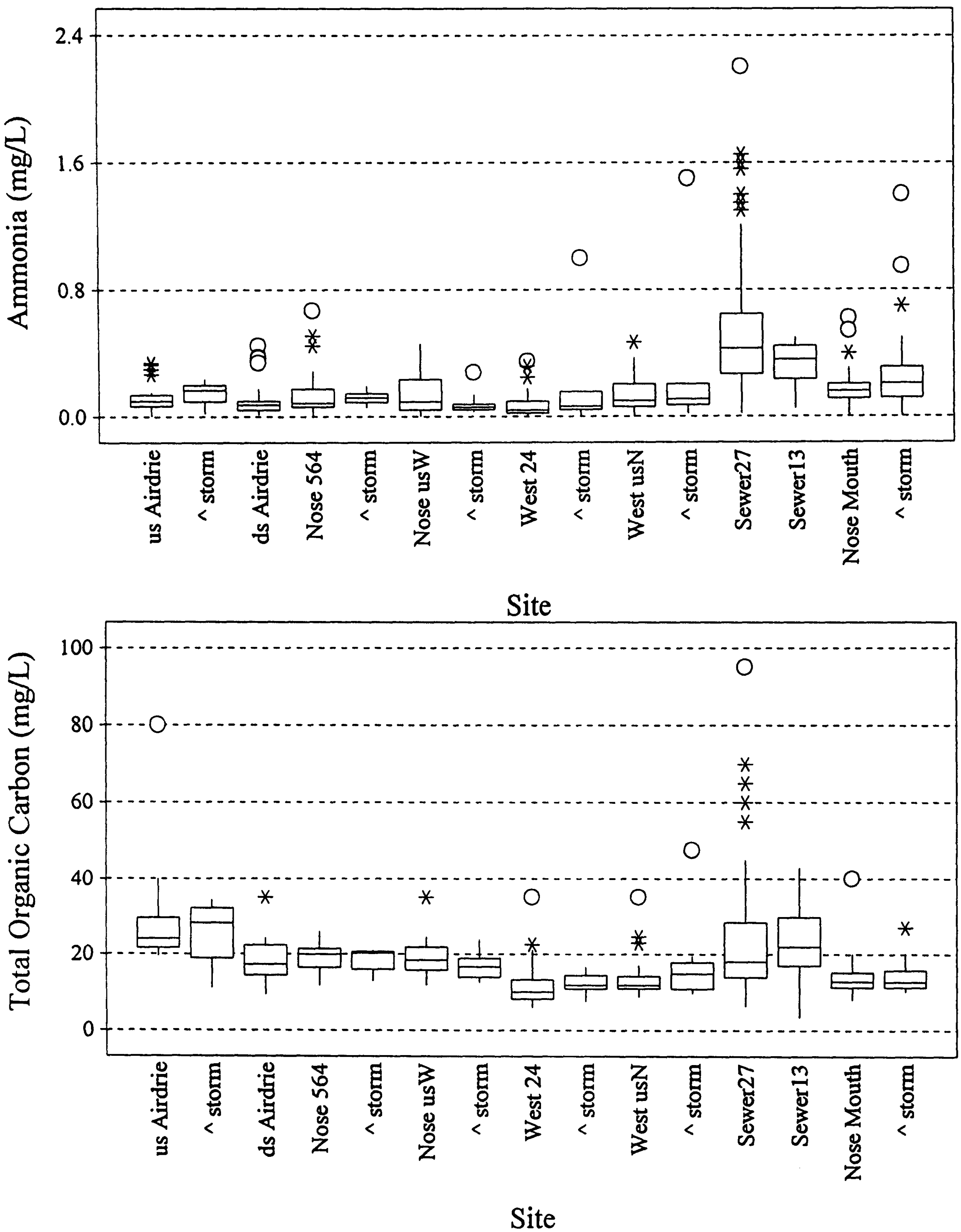
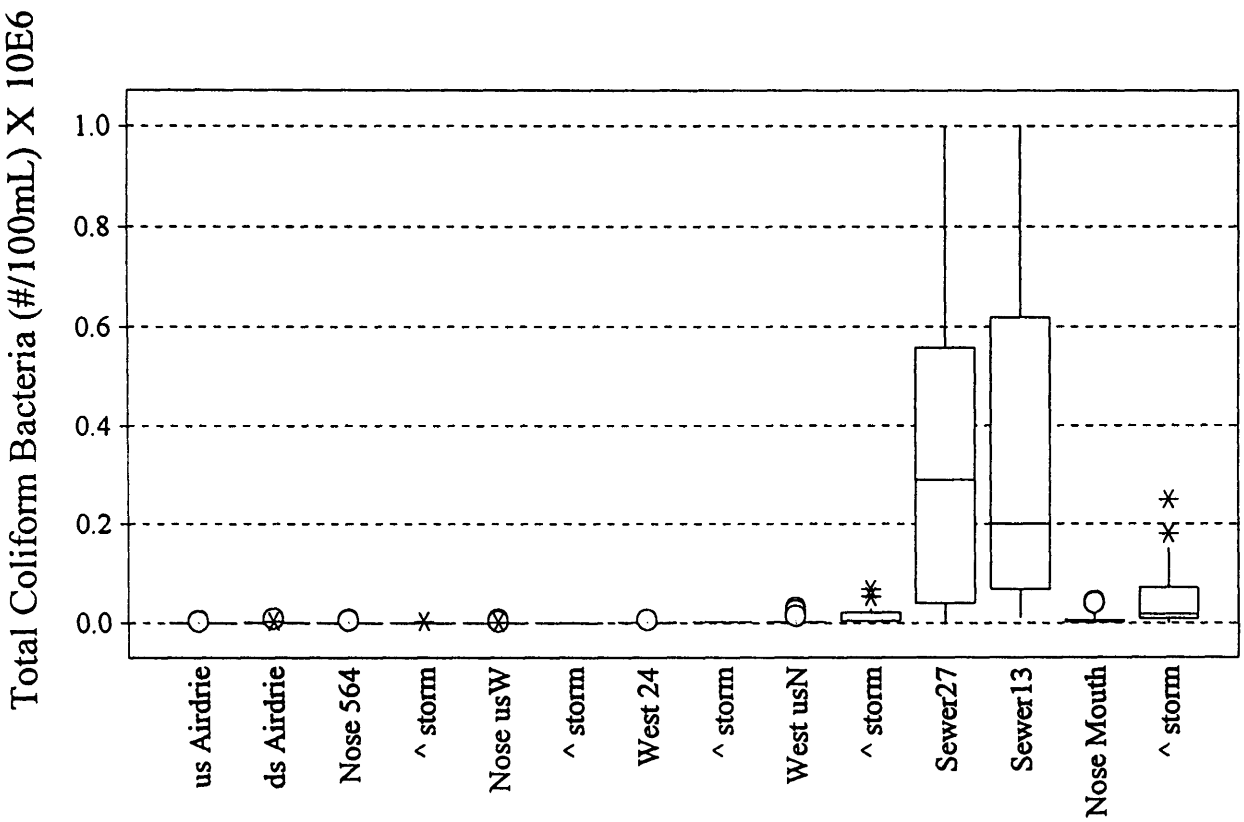


Figure 6 cont. Storm



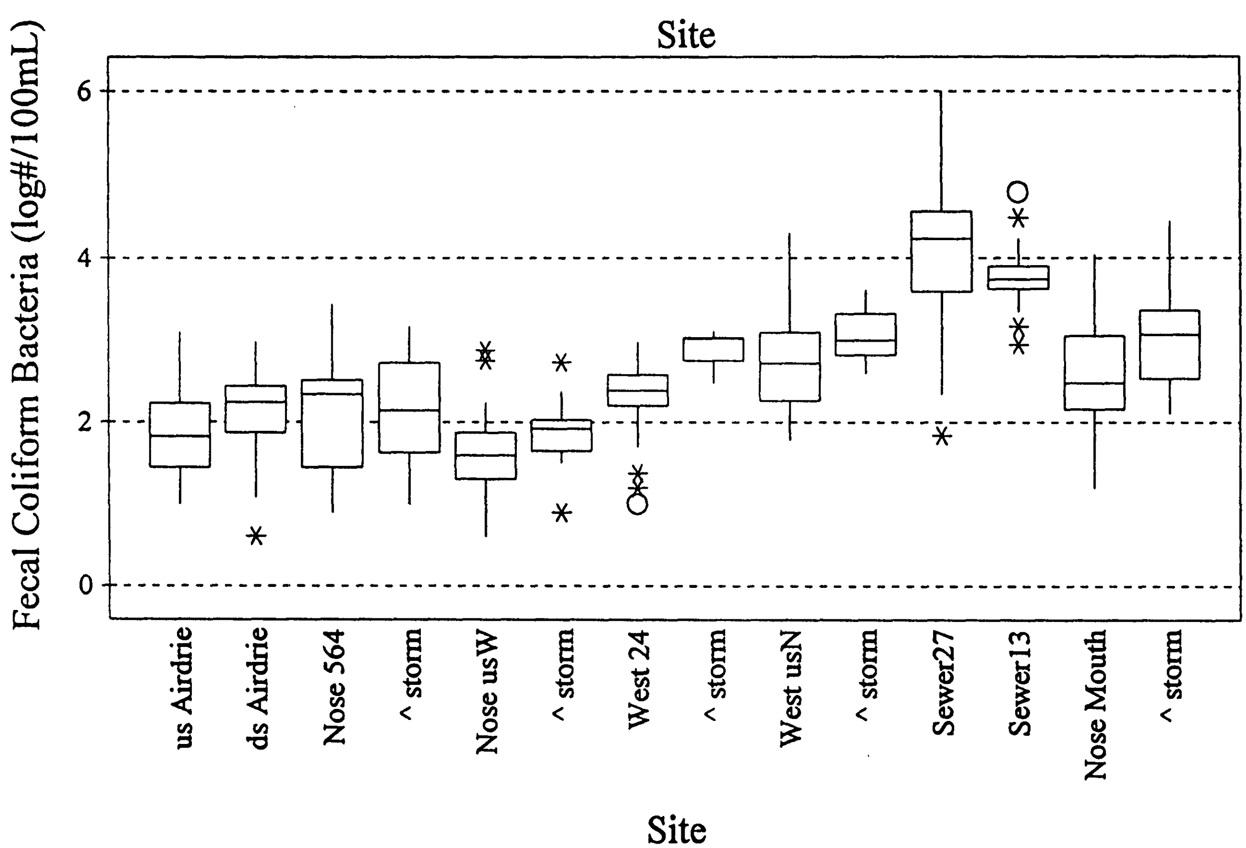
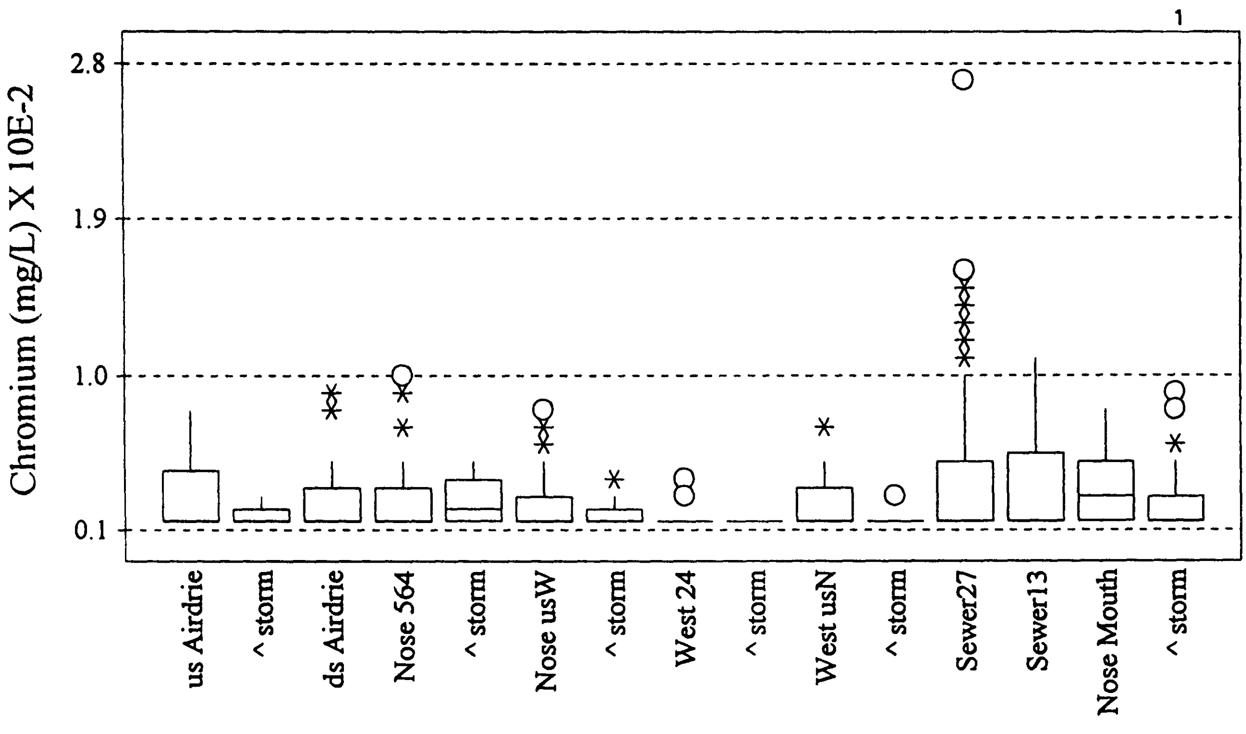


Figure 6 cont. Storm



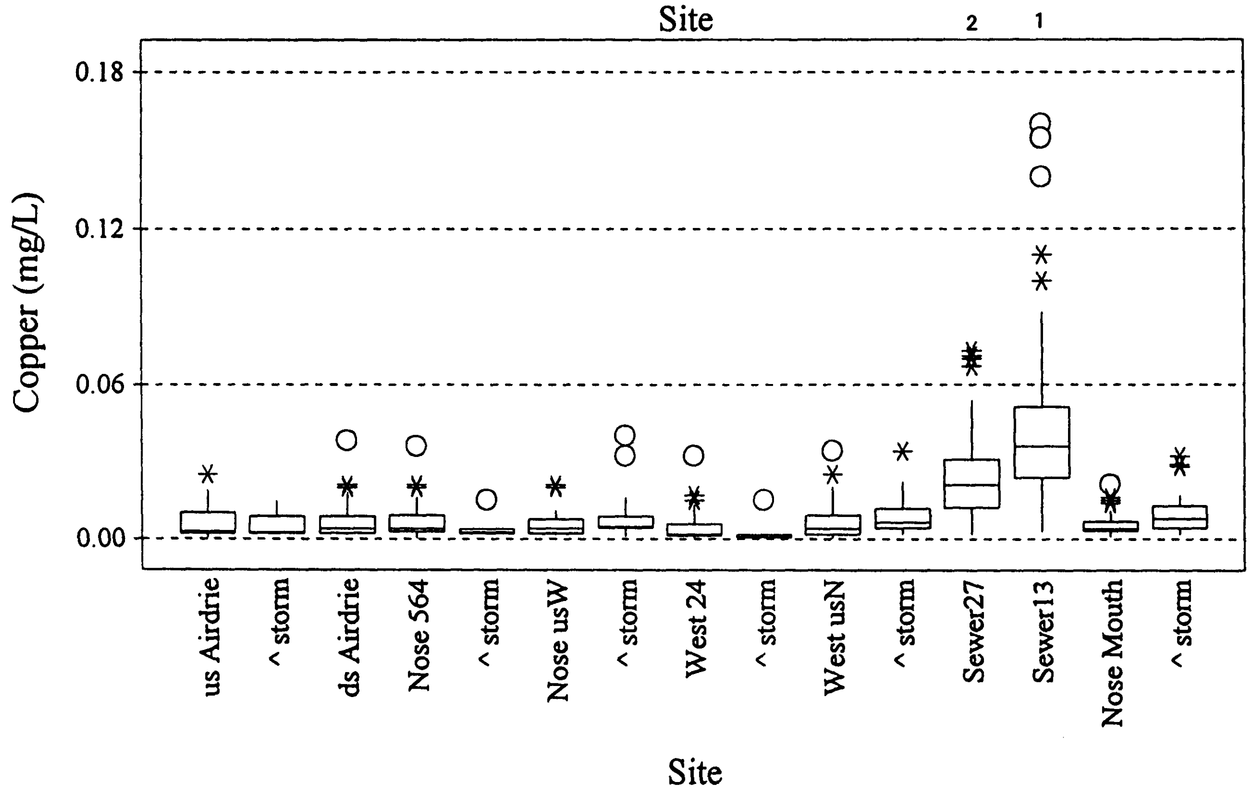
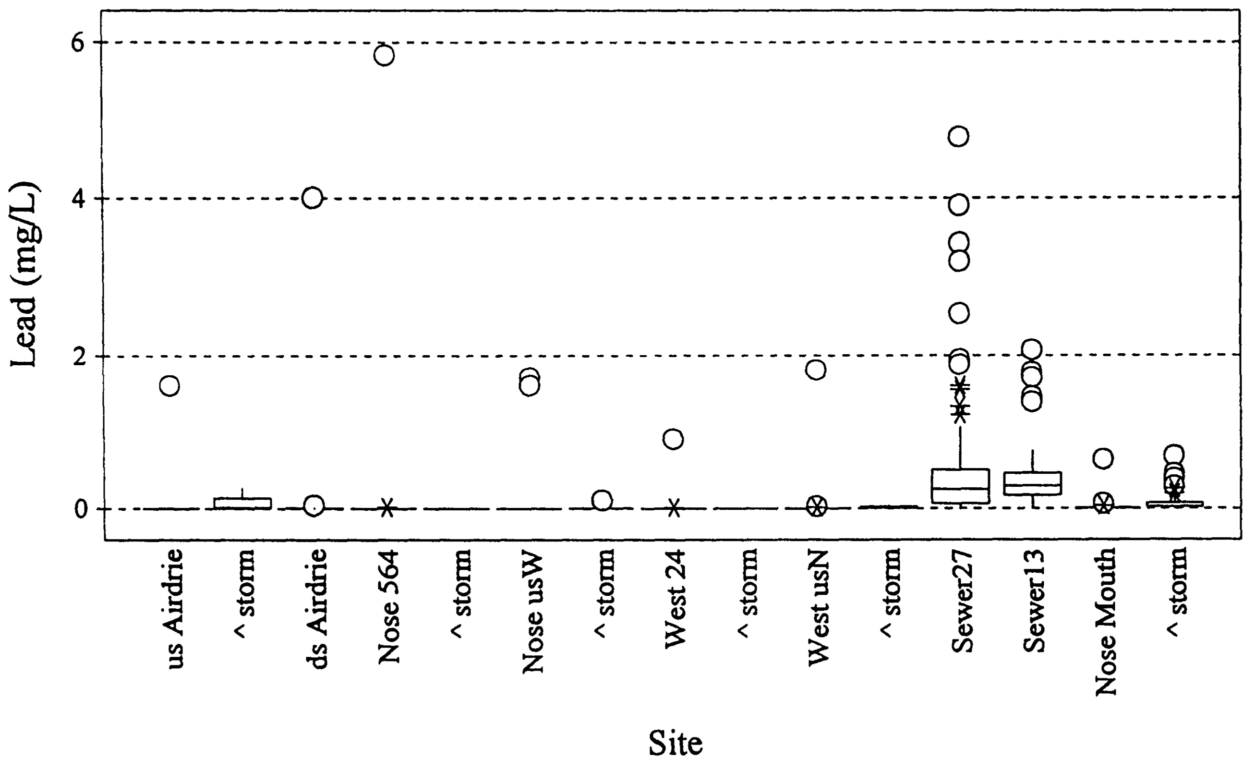


Figure 6 cont. Storm



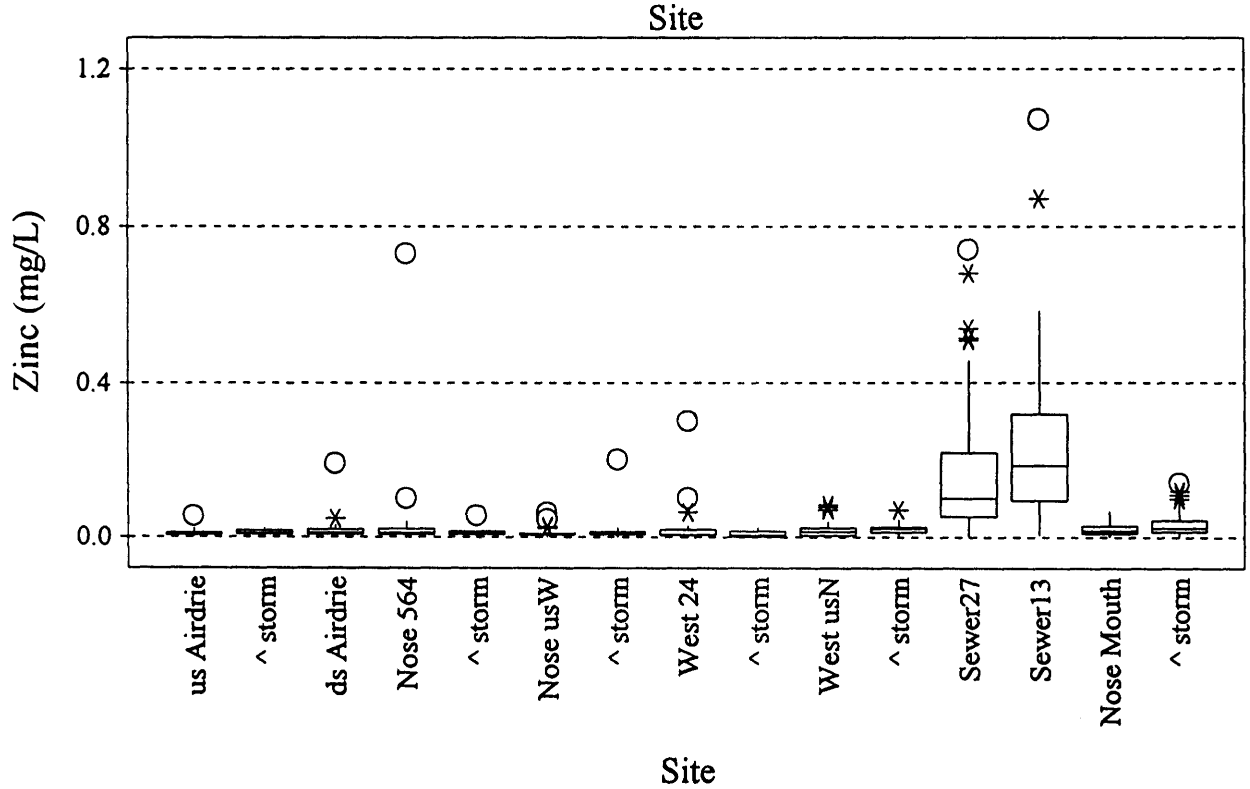


Figure 6 cont. Storm

APPENDIX A

Historical Data

STN NO	STN NAME	DATE	TIME	TEMP	DO	PH	BOD	NFR	FR	TOC	DP	TP	DNH3	TN	TCOLIF	FCOLIF	FSTREP
AB05BH0390	MOUTH	04/24/75	10:00 AM	0		8.1	4.1	L10	433			L0.1	0.2				
AB05BH0300	US AIRDRIE	04/16/80	09:35 AM	10		7.9	3.6	2.8	290	21.5	0.254	0.33	0.155	1.94	376	10	
AB05BH0300	US AIRDRIE	04/22/80	12:05 PM	7	10.55	8.3	3.6	10	377	23.8	0.49	0.5	0.006	1.94	0	0	44
AB05BH0300	US AIRDRIE	04/29/80	06:30 PM			8.05	2.4	2.8	509	26.5	0.52	0.56	0.018	2.08			
AB05BH0300	US AIRDRIE	04/30/80	11:20 AM	8	8.3	8	3.1	0.8	523	26.7	0.56	0.59	0.008	2.02	270	10	
AB05BH0300	US AIRDRIE	05/06/80	12:00 PM	13	7.15	7.91	3.9	6	570	30.5	0.63	0.66	0.11	2.46	900	12	40
AB05BH0300	US AIRDRIE	05/08/80	09:50 AM	13		7.93	3.8	35.6	733	34.5	0.43	0.6	0.17	2.92			
AB05BH0300	US AIRDRIE	05/21/80	11:20 AM	13	3.25	7.65	4.1	28	786	40	0.438	0.483	0.13	2.89	290	210	
AB05BH0300	US AIRDRIE	05/28/80	08:45 AM	9	5.15	7.42	0.4	24	704	31	0.295	0.315	0.27	2.89	2000	1290	
AB05BH0300	US AIRDRIE	06/01/80	06:20 PM			7.88	3.8	2	599	30	0.34	0.4	0.17	2.22	172	144	288
AB05BH0300	US AIRDRIE	06/04/80	09:00 AM	9		7.52	3.8	63.6	465	25	0.31	0.37	0.08	1.41	2000	172	548
AB05BH0300	US AIRDRIE	06/11/80	09:00 AM	10	4.9	7.98	2.7	6	720	30	0.41	0.49	0.1	1.7	480	124	116
AB05BH0300	US AIRDRIE	06/18/80	08:50 AM	9	3.3	8.1	2.9	40.8	710	29.3	0.365	0.375	0.34	2.54	68	60	
AB05BH0300	US AIRDRIE	06/25/80	09:00 AM		3.8	7.7	2.7	6.4	865	28	0.183	0.186	0.3	2.21	36	16	124
AB05BH0300	US AIRDRIE	07/02/80	09:00 AM	10	1.55	7.22	2.9	13.6	393	19.5	0.84	0.86	0.06	1.77	120	28	32
AB05BH0300	US AIRDRIE	07/09/80	09:00 AM	12	1.8	7.62	4	5.6	600	24	0.385	0.39	0.33	1.88	240	200	140
AB05BH0300	US AIRDRIE	07/16/80	08:40 AM	10	2.55	7.69	2.3	2.4	657	80	0.3	0.32	0.07	1.49	52	52	56
AB05BH0300	US AIRDRIE	07/23/80	12:00 PM	12	2.18	7.5	2.1	5.2	608	19.8	0.3	0.325	0.06	0.91	150	132	50
AB05BH0300	US AIRDRIE	07/30/80	09:50 AM	16	3.42	7.48	1.3	3.2	603	21.5	0.29	0.295	0.12	1.66	3200	76	
AB05BH0300	US AIRDRIE	08/06/80	07:50 AM	9	3.3	7.66	2.5	11.2	672	21.5	0.085	0.155	0.07	1.62	120	36	20
AB05BH0300	US AIRDRIE	08/13/80	08:30 AM	13	2.6	7.46	3.1	5.2	695	22	0.118	0.143	0.04	1.42	168	124	108
AB05BH0300	US AIRDRIE	08/20/80	08:30 AM	10		7.65	2.2	59.6	637	21.7	0.065	0.145	0.12	2.17	60	52	108
AB05BH0300	US AIRDRIE	08/20/80	03:45 PM			7.35	6.7	60.4	474	11.2	0.045	0.15	0.24	2.46			
AB05BH0300	US AIRDRIE	08/27/80	08:30 AM			8.58	9.6	9.2	740	20.7	0.05	0.071	0.1	1.65	570	288	
AB05BH0310	DS AIRDRIE	04/16/80	09:45 AM	7		7.69	5.7	14.8	291	22	0.262	0.31	0.38	0.64			
AB05BH0310	DS AIRDRIE	04/16/80	01:00 PM			8.25	4.9	13.2	459	20.8	0.33	0.4	0.006	1.64			
AB05BH0310	DS AIRDRIE	04/22/80	01:00 PM	7	9.5	8.25	4.5	34.4	353	21.5	0.34	0.42	0.016	2.05	44	4	188
AB05BH0310	DS AIRDRIE	04/30/80	11:40 AM	9	8.9	8	4.6	22.8	473	22	0.34	0.42	0.014	1.92	460	220	
AB05BH0310	DS AIRDRIE	05/06/80	12:25 PM	12	8.95	8.29	3.2	13.6	501	22.5	0.3	0.35	0.082	1.74	370	320	28
AB05BH0310	DS AIRDRIE	05/14/80	11:30 AM		8.45	8.44	3.8	6	540	22.5	0.26	0.301	0.09	1.72	290	280	4
AB05BH0310	DS AIRDRIE	05/21/80	12:45 PM	18	8.1	8.1	4.2	8.4	564	22.5	0.275	0.358	0.112	2.07	360	112	
AB05BH0310	DS AIRDRIE	05/28/80	09:15 AM	9	7.45	7.6	0.8	186	248	12	0.215	2.45	0.45	2.27	1100	870	
AB05BH0310	DS AIRDRIE	06/01/80	06:40 PM			7.92	4.8	32	471	24	0.39	0.51	0.2	2.2	590	96	36
AB05BH0310	DS AIRDRIE	06/04/80	09:30 AM	9		7.44	3.4	97.2	325	18	0.24	0.395	0.37	1.54	660	248	400
AB05BH0310	DS AIRDRIE	06/11/80	09:30 AM	12	5.6	7.62	3.4	23.2	585	24.3	0.215	0.3	0.09	1.12	280	224	40
AB05BH0310	DS AIRDRIE	06/18/80	09:10 AM	13	3.65	8.2	4.1	5.2	570	23.3	0.185	0.195	0.18	1.68	640	500	
AB05BH0310	DS AIRDRIE	06/25/80	09:15 AM	12	7.1	8.4	2.7	8	556	22.3	0.137	0.154	0.08	1.46	1110	1000	112
AB05BH0310	DS AIRDRIE	07/02/80	09:30 AM	12	4.25	7.38	3.7	47.6	358	20.5	0.73	0.8	0.34	2.03	730	210	180
AB05BH0310	DS AIRDRIE	07/09/80	09:30 AM	11	7.5	7.96	3.2	12	410	14	0.165	0.225	0.08	1.11	1300	290	160
AB05BH0310	DS AIRDRIE	07/16/80	09:00 AM	10	5.3	8	2.5	6.8	390	35	0.115	0.125	0.04	0.43	450	72	12
AB05BH0310	DS AIRDRIE	07/23/80	12:00 PM	13	3.6	7.68	2	12.8	345	9.5	0.09	0.115	0.03	0.45	600	30	44
AB05BH0310	DS AIRDRIE	07/30/80	10:00 AM	16	3.42	7.16	1.5	8.8	240	15.5	0.075	0.085	0.05	1.16	610	116	84
AB05BH0310	DS AIRDRIE	08/06/80	12:00 PM	11	3.25	7.74	1.5	10.8	471	13.9	0.68	0.235	0.04	1.02	3700	160	16
AB05BH0310	DS AIRDRIE	08/13/80	09:00 AM	13	4.4	7.72	3.1	8.8	476	16.8	0.083	0.104	0.04	0.96	190	176	108
AB05BH0310	DS AIRDRIE	08/16/80	12:00 PM												3700	160	16
AB05BH0310	DS AIRDRIE	08/20/80	08:50 AM	10		7.5	1.8	7.6	429	13.9	0.06	0.075	0.08	0.98	1400	48	8
AB05BH0310	DS AIRDRIE	08/27/80	09:00 AM		5	8.5	7.2	38.8	500	15.4	0.05	0.165	0.05	1.35	3400	76	
AB05BH0310	DS AIRDRIE	09/03/80	08:45 AM		4.85	7.86	3.2	17.6	526	13.5	0.073	0.118	0.03	1.17	2100	100	40
AB05BH0310	DS AIRDRIE	09/10/80	12:00 PM		6.4	7.72	6.8	30.8	553	15.5	0.061	0.194	0.07	0.49	7500	15	
AB05BH0310	DS AIRDRIE	09/17/80	09:40 AM		5.15	8.36	5.6	21.2	520	14.8	0.048	0.118	0.06	1.49	2200	670	
AB05BH0310	DS AIRDRIE	09/24/80	07:05 AM		9.3	8.27	6.6	11	500	14.8	0.035	0.077	0.04	1.35	132	12	8
AB05BH0320	NOSE 564	04/09/80	12:30 PM												76	10	40
AB05BH0320	NOSE 564	04/09/80	01:00 PM	7		7.8	13.2		400		0.363		0.45	3.05	148	20	510
AB05BH0320	NOSE 564	04/16/80	01:05 PM												16	16	
AB05BH0320	NOSE 564	04/16/80	01:25 PM	9		7.95	6	22.8	314	21	0.212	0.35	0.085	1.78	340	12	
AB05BH0320	NOSE 564	04/22/80	11:45 AM	7	8.5	8.3	4.3	13.6	394	20.6	0.25	0.31	0.016	1.91	76	0	36
AB05BH0320	NOSE 564	04/30/80	11:00 AM		6.45	7.95	3.1	2.4	526	22	0.34	0.37	0.006	1.56	800	8	
AB05BH0320	NOSE 564	05/06/80	11:15 AM	12	5.5	7.91	3.4	5.6	584	23.6	0.34	0.41	0.08	1.8	180	20	96

AB05BH0320	NOSE 564	05/14/80	10:30 AM	12	5.35	7.78	5.9	7.6	700	23.5	0.328	0.463	0.076	2.18	80	24	36
AB05BH0320	NOSE 564	05/21/80	10:40 AM	11	6.15		6.3	46.8	744	26	0.361	0.47	0.058	2.21	250	64	
AB05BH0320	NOSE 564	05/28/80	09:30 AM	9	5.1		0.8	101	408	15.5	0.145	0.435	0.28	1.93	1900	1800	
AB05BH0320	NOSE 564	05/28/80	10:00 AM												1400	490	
AB05BH0320	NOSE 564	06/04/80	09:45 AM	8		7.4	4	38.4	436	21.5	0.29	0.37	0.15	1.33	840	340	168
AB05BH0320	NOSE 564	06/11/80	09:55 AM	15	5	7.6	3.2	10.8	462	18.8	0.245	0.27	0.13	1.01	420	52	104
AB05BH0320	NOSE 564	06/14/80	06:05 PM			8	4.4	5.6	562	20.8	0.23	0.235	0.06	0.83			
AB05BH0320	NOSE 564	06/18/80	10:00 AM	13	5.65	8.3	3.1	6.4	620	21	0.25	0.285	0.29	1.9	164	15.6	
AB05BH0320	NOSE 564	06/19/80	10:30 PM			8.6	2.4	6	600	20.5	0.25	0.25	0.12	1.71	150	112	148
AB05BH0320	NOSE 564	06/22/80	12:00 PM			8.8	3	10.4	634	20	0.245	0.25	0.15	1.61			
AB05BH0320	NOSE 564	06/25/80	09:50 AM		8.2	8.3	5.6	22.8	634	21.5	0.183	0.275	0.12	1.62	530	330	580
AB05BH0320	NOSE 564	06/26/80	04:10 PM			8.45	9.2	8	642	21	0.16	0.178	0.09	1.41	280	140	1400
AB05BH0320	NOSE 564	07/02/80	09:45 AM	11	3		3.3				0.402	0.44		1.91	390	220	220
AB05BH0320	NOSE 564	07/09/80	09:45 AM	11	5.1	7.85	3.7	22	450	19	0.3	0.38	0.2	1.62	700	300	180
AB05BH0320	NOSE 564	07/16/80	09:15 AM	12	4.78	7.52	1.8	12.2	423	25	0.135	0.17	0.1	0.68	440	220	80
AB05BH0320	NOSE 564	07/23/80	09:10 AM	14	3.35	7.58	2.1	13.2	423	11.8	0.145	0.185	0.51	0.65	280	280	130
AB05BH0320	NOSE 564	07/29/80	12:30 PM			8.2	1.9	98.4	454	13.1	0.15	0.165	0.2	1.16	3200	1500	200
AB05BH0320	NOSE 564	07/30/80	10:10 AM		4.45	7.74	2.4	21.2	434	13.7	0.145	0.18	0.05	1.11	1700	1200	510
AB05BH0320	NOSE 564	08/06/80	09:05 AM		5.45	8.15	2.7	12	491	13.7	0.08	0.082	0.06	0.97	4100	2800	590
AB05BH0320	NOSE 564	08/13/80	09:15 AM		7.45	8.4	2.7	18.4	504	16.5	0.1	0.158	0.07	1.24	1200	970	924
AB05BH0320	NOSE 564	08/20/80	09:00 AM			8.4	2.3	16.4	475	16.5	0.085	0.115	0.16	1.35	5200	1700	172
AB05BH0320	NOSE 564	08/20/80	07:05 PM			8.89	3.6	19.6	471	16	0.085	0.105	0.12	1.35	720	620	690
AB05BH0320	NOSE 564	08/27/80	09:15 AM		7	9.18	8.8	48	485	17.8	0.081	0.15	0.08	1.51	390	204	510
AB05BH0320	NOSE 564	09/03/80	09:10 AM		6.6	8.75	1	71.2	537	18.5	0.123	0.26	0.04	1.7	1400	270	52
AB05BH0320	NOSE 564	09/17/80	09:10 AM		9.45	8.97	4.8	12	615	19.5	0.107	0.161	0.67	1.93	112	52	
AB05BH0320	NOSE 564	09/24/80	08:00 AM		9.7	8.79	1.9	8	722	20.3	0.063	0.095	0.04	1.76	68	32	16
AB05BH0330	NOSE US WEST	04/09/80	12:10 PM			8	11.8	22	350	22	0.314	0.46	0.45	2.92	108	4	200
AB05BH0330	NOSE US WEST	04/16/80	12:50 PM	6		7.7	5.3	14.8	295	20.5	0.226	0.3	0.19	1.96	176	8	
AB05BH0330	NOSE US WEST	04/22/80	10:40 AM	8	8.55	8.15	3.4	5.2	400	20	0.26	0.29	0.007	1.8	24	4	12
AB05BH0330	NOSE US WEST	04/30/80	10:15 AM	10	7.55	7.8	2	2	562	22.4	0.34	0.35	0.011	1.8	480	30	
AB05BH0330	NOSE US WEST	05/06/80	10:20 AM	13	7.3	8.12	2.8	3.2	584	22.4	0.3	0.34	0.24	2.62	150	24	72
AB05BH0330	NOSE US WEST	05/14/80	09:40 AM		6.55	8.1	2.9	7.6	698	22.5	0.233	0.277	0.1	1.8	10	10	76
AB05BH0330	NOSE US WEST	05/16/80	09:50 AM	13			1.3								90	64	48
AB05BH0330	NOSE US WEST	05/21/80	09:45 AM	15	7.15	8.1	2.5	1.2	726	24.5	0.152	0.253	0.102	1.63	90	24	
AB05BH0330	NOSE US WEST	05/23/80	02:45 PM			8.47	7.6	1.2	60	23.8	0.216	0.236	0.14	1.31			
AB05BH0330	NOSE US WEST	05/28/80	10:55 AM		6.8	7.34	0.4	45.5	429	16	0.135	0.34	0.3	2.08	2200	780	
AB05BH0330	NOSE US WEST	06/04/80	11:00 AM	8		7.36	3.2	29	416	21.5	0.285	0.345	0.26	1.52	540	56	84
AB05BH0330	NOSE US WEST	06/11/80	01:15 AM		5.7	7.8	2.8		533	18.5	0.225	0.255	0.08	0.95			
AB05BH0330	NOSE US WEST	06/11/80	01:50 AM			7.74	2.8	8	549	18	0.26	0.325	0.1	1.5			
AB05BH0330	NOSE US WEST	06/11/80	02:20 AM			7.6	2.7	8.4	544	19	0.245	0.3	0.08	1.13			
AB05BH0330	NOSE US WEST	06/11/80	02:50 AM			7.65	3.2	8.4	551	19	0.24	0.29	0.05	0.7			
AB05BH0330	NOSE US WEST	06/11/80	11:05 AM			7.82	3.5	11.6	670	18.5	0.255	0.265	0.12	1	530	20	240
AB05BH0330	NOSE US WEST	06/11/80	12:15 PM			7.58	3.1	6.4	544	19.5	0.235	0.26	0.07	1.2	170	84	400
AB05BH0330	NOSE US WEST	06/11/80	12:45 PM			7.54	3.2	5.6	551	19.3	0.245	0.305	0.07	0.92	360	44	300
AB05BH0330	NOSE US WEST	06/11/80	01:15 PM	11	5.7	7.8	2.8		533	18.5	0.225	0.255	0.08	0.95	180	36	380
AB05BH0330	NOSE US WEST	06/11/80	01:50 PM			7.74	2.8	8	549	18	0.26	0.325	0.1	1.5	520	100	390
AB05BH0330	NOSE US WEST	06/11/80	02:20 PM			7.6	2.7	8.4	544	19	0.245	0.3	0.08	1.13	470	170	460
AB05BH0330	NOSE US WEST	06/11/80	02:50 PM			7.65	3.2	8.4	551	19	0.24	0.29	0.05	0.7	550	84	370
AB05BH0330	NOSE US WEST	06/18/80	11:45 AM	11	5.7	7.72	2.4	2.8	570	19.8	0.345	0.355	0.09	1.46	200	176	
AB05BH0330	NOSE US WEST	06/19/80	10:10 AM			8.5	2.4	9.2	510	18.8	0.285	0.325	0.28	1.51	380	240	1200
AB05BH0330	NOSE US WEST	06/22/80	08:20 PM			8.6	2.6	14	436	16.8	0.31	0.325	0.11	1.74			
AB05BH0330	NOSE US WEST	06/25/80	11:10 AM		6.35	8.1	2.3	5.4	510	17.3	0.263	0.28	0.46	1.71	124	100	520
AB05BH0330	NOSE US WEST	06/26/80	12:00 PM			8.5	1.6	10.8	507	16	0.252	0.262	0.06	1.06	1800	550	1000
AB05BH0330	NOSE US WEST	07/02/80	10:55 AM	10	5.85	7.52	3.4	19.6	365	17	0.317	0.371	0.09	1.38	300	72	300
AB05BH0330	NOSE US WEST	07/09/80	10:50 AM	13	6.1	7.92	3.4	11.2	440	18.5	0.25	0.29	0.45	2.12	84	12	64
AB05BH0330	NOSE US WEST	07/16/80	10:05 AM	12	6.1	7.93	1.3	6.4	430	35	0.175	0.2	0.12	0.56	240	120	76
AB05BH0330	NOSE US WEST	07/23/80	10:45 AM	13	6	8.3	2.3	5.2	423	12	0.195	0.205	0.04	0.85	500	30	80
AB05BH0330	NOSE US WEST	07/30/80	08:30 AM	15	4.55	8.1	1.8	3.2	243	14	0.165	0.175	0.04	0.99	510	40	
AB05BH0330	NOSE US WEST	08/06/80	09:30 AM	11	6.88	8.3	1.9	4	457	12.6	0.1	0.1	L0.003	1.04	6600	580	244

AB05BH0330	NOSE US WEST	08/06/80	10:40 AM	11	6.88	8.3	1.9	4	452	12.6	0.1	0.1	0.03	1.04			
AB05BH0330	NOSE US WEST	08/10/80	07:30 AM			8.4	2.2	6.4	463	14	0.115	0.15	0.04	1.85	1400	48	240
AB05BH0330	NOSE US WEST	08/10/80	08:30 AM			8.3	2.2	7.2	484	13.7	0.11	0.355	0.04	2.6	2400	32	280
AB05BH0330	NOSE US WEST	08/10/80	09:30 AM			7.82	2.2	21.2	477	14.2	0.11	0.165	0.03	1.25		108	290
AB05BH0330	NOSE US WEST	08/10/80	10:30 AM			8.4	2.7	6.8	459	13.2	0.105	0.12	0.04	1.13	2500	8	340
AB05BH0330	NOSE US WEST	08/11/80	09:30 AM			7.82	2.2	21.2	477	14.2	0.11	0.165	0.03	1.25			
AB05BH0330	NOSE US WEST	08/11/80	10:30 AM			8.4	2.7	6.8	459	13.2	0.105	0.12	0.04	1.13			
AB05BH0330	NOSE US WEST	08/13/80	09:50 AM	13	6.85	7.82	2.8	4.4	483	15.3	0.113	0.116	0.03	1			
AB05BH0330	NOSE US WEST	08/20/80	09:45 AM	11		8.25	1.2	2.4	481	15.7	0.08	0.08	0.08	1.17	2300	56	64
AB05BH0330	NOSE US WEST	08/27/80	09:45 AM	13	6.8	8.62	2.6	3.6	470	16	0.088	0.11	0.04	1.17	3400	76	
AB05BH0330	NOSE US WEST	09/03/80	12:00 PM		6.8	8.04	2	10.4	544	15.8	0.097	0.118	0.02	1.25	1400	76	60
AB05BH0350	WEST 24	04/09/80	12:30 PM			8	15.8	8	310	21	0.129	0.26	0.25	2.52	76	10	40
AB05BH0350	WEST 24	04/16/80	01:00 PM			7.61	4.2	11.2	290	13.5	0.114	0.163	0.32	2.19	16	16	
AB05BH0350	WEST 24	04/22/80	11:05 AM		11.95	8.3	2.1	2.4	443	11.6	0.059	0.08	0.002	1.01	10	10	4
AB05BH0350	WEST 24	04/30/80	10:40 AM		10.05	8.2	2.2	7.2	593	11	0.064	0.091	L0.002	0.7	560	180	
AB05BH0350	WEST 24	05/06/80	10:45 AM		9.65	8.32	1.9	2.8	583	10.2	0.066	0.08	0.058	0.64	340	24	20
AB05BH0350	WEST 24	05/14/80	10:00 AM		10	8.35	1.9	4	574	8	0.053	0.068	0.028	0.55	190	160	60
AB05BH0350	WEST 24	05/21/80	10:10 AM		8.3	7.85	2.6	6	594	9.5	0.077	0.087	0.026	0.66	280	235	
AB05BH0350	WEST 24	05/28/80	10:00 AM		8.5	7.7	2.2	16.8	666	22.5	0.105	0.16	0.18	1.81	1400	490	
AB05BH0350	WEST 24	06/04/80	10:00 AM			8	2.2	14.4	615	16.5	0.075	0.105	0.08	0.6	5100	320	212
AB05BH0350	WEST 24	06/11/80	03:30 AM							15.5					10	50	
AB05BH0350	WEST 24	06/11/80	03:30 PM		8.1	8.1	2.8	12.4	640	15.4	0.11	0.125	0.11	0.61	3700	570	204
AB05BH0350	WEST 24	06/14/80	05:20 PM			7		63	50								
AB05BH0350	WEST 24	06/14/80	05:50 PM			8.1	3.6	3.6	644	16.8	0.115	0.15	0.06	0.93	800	300	
AB05BH0350	WEST 24	06/18/80	10:35 AM		7.275	8.2	1.5	1.6	585	13.8	0.145	0.145	0.09	1.11			
AB05BH0350	WEST 24	06/19/80	10:00 AM			8.2	2.8	2.8	590	13.8	0.125	0.135	0.07	1.21			
AB05BH0350	WEST 24	06/22/80	12:00 PM			8.5	2.4	14.8	551	12	0.125	0.125	L0.002	0.96	5000	1340	850
AB05BH0350	WEST 24	06/25/80	10:10 AM		8.5	8.2	1.9	24	537	9.8	0.08	0.091	0.02	1.24	1800	600	580
AB05BH0350	WEST 24	06/26/80	03:45 PM			8.35	2.8	15.2	523	11.5	0.084	0.094	1	0.61	2500	1070	2300
AB05BH0350	WEST 24	07/02/80	10:15 AM		10.15	8.35	1.9	9.2	565	12	0.084	0.085	0.12	0.51	1300	390	380
AB05BH0350	WEST 24	07/09/80	10:10 AM		9.55	8.4	3	4	550	12.5	0.097	0.115	0.05	0.94	1200	590	700
AB05BH0350	WEST 24	07/16/80	07:30 AM		5.8	8.3	1.7	4	520	35	0.065	0.075	0.04	0.54	990	220	190
AB05BH0350	WEST 24	07/23/80	06:45 AM		3.85	7.76	1.6	3.6	507	8.3	0.065	0.07	0.1	0.53	1800	500	330
AB05BH0350	WEST 24	07/29/80	12:00 PM			8.4	1.2	4.4	501	10.3	0.075	0.075	0.16	1.03			
AB05BH0350	WEST 24	07/30/80	07:30 AM		4.65	7.64	1.5	15.6	449	11.5	0.08	0.085	0.35	0.95	600	380	
AB05BH0350	WEST 24	08/06/80	09:40 AM		8.37	8.2	1.7	1.2	511	9	0.035	0.1	0.02	0.77	800	400	144
AB05BH0350	WEST 24	08/13/80	07:30 AM		6.725	7.78	1.9	0.8	513	8.6	0.03	0.036	0.01	0.69	2300	1000	376
AB05BH0350	WEST 24	08/20/80	06:45 AM				5.3										
AB05BH0350	WEST 24	08/20/80	07:25 AM			8.83	3.5				0.05	0.055		0.79			
AB05BH0350	WEST 24	08/20/80	09:15 AM			8	1.8	2.4	458	8	0.035	0.035	0.1	1.44	2000	300	440
AB05BH0350	WEST 24	08/20/80	06:45 PM								0.045	0.14					
AB05BH0350	WEST 24	08/20/80	07:25 PM			8.83	3.5	5.6	429	7.6	0.05	0.055	0.04	0.79	1600	1120	500
AB05BH0350	WEST 24	08/27/80	07:30 AM			8.55	0.6	1.6	537	8.2	0.028	0.034	0.02	0.73	590	260	
AB05BH0350	WEST 24	09/03/80	09:30 AM		9.35	8.42	1.3	3.6	511	7.4	0.03	0.031	L0.002	0.99	760	330	100
AB05BH0350	WEST 24	09/10/80	12:00 PM		8.9	8.55	0.6	2	521	6.5	0.028	0.034	L0.002	0.61	240	156	
AB05BH0350	WEST 24	09/17/80	08:45 AM		7.65	8.02	1.2	3.2	553	7.8	0.026	0.028	0.02	0.62	380	190	
AB05BH0350	WEST 24	09/24/80	07:30 AM		9.3	8.46	0.8	3	564	6	0.018	0.019	0.01	0.57	450	200	124
AB05BH0350	WEST 24	10/17/80	08:45 AM		7.65												
AB05BH0360	WEST US NOSE	04/09/80	12:00 PM			7.9	14.5	49	370	23	0.114	0.29	0.47	2.79	276	192	236
AB05BH0360	WEST US NOSE	04/16/80	12:45 PM			7.66	4.1	19.6	301	14.5	0.121	0.188	0.28	2.16	152	140	
AB05BH0360	WEST US NOSE	04/22/80	10:30 AM	7	11.6	8.3	2.6	10.8	429	12.2	0.068	0.097	0.028	1.16	92	60	24
AB05BH0360	WEST US NOSE	04/30/80	10:00 AM		10	8.15	2.8	46.4	596	12.3	0.062	0.161	0.032	1.17	2100	1200	
AB05BH0360	WEST US NOSE	05/06/80	10:10 AM	12	9.6	8.1	2.9	21.2	593	11.5	0.078	0.136	0.12	0.76	690	630	830
AB05BH0360	WEST US NOSE	05/14/80	09:30 AM		9.2	8.03	3	10.4	580	10	0.073	0.138	0.072	0.88	700	150	250
AB05BH0360	WEST US NOSE	05/21/80	09:30 AM	12	6.25	7.9	3.4	29.6	582	11.5	0.142	0.232	0.088	1.1	250	92	
AB05BH0360	WEST US NOSE	05/23/80	02:30 PM	9		7.38	13.4	528	447	47.5	0.157	0.85	1.5	6.05			
AB05BH0360	WEST US NOSE	05/28/80	10:35 AM		8.25	7.8	2	48.5	704	24.5	0.105	0.25	0.37	4.17	3800	3800	
AB05BH0360	WEST US NOSE	06/04/80	10:45 AM			8.1	1.8	372	585	16	0.115	0.18	0.21	1.34	24000	8800	2370
AB05BH0360	WEST US NOSE	06/11/80	01:00 AM			7		60	64		1						

AB05BH0360	WEST US NOSE	06/11/80	02:40 AM				7.3				0.1	0.385		2.28			
AB05BH0360	WEST US NOSE	06/11/80	11:00 AM	12		8.3	2.5	23.6	640	15.5	0.075	0.13	0.11	0.82	690	230	420
AB05BH0360	WEST US NOSE	06/11/80	11:40 AM			8		109	590	18			0.12				
AB05BH0360	WEST US NOSE	06/11/80	12:00 PM			8.1	2.8	19.6	632	17	0.075	0.13	0.1	0.74	3000	450	212
AB05BH0360	WEST US NOSE	06/11/80	12:30 PM			7.98	3.1	25.6	606	16.5	0.075	0.15	0.07	0.96	2000	400	260
AB05BH0360	WEST US NOSE	06/11/80	01:00 PM		7.6	7.98	3	61.3	643	16	0.065	0.185	0.09	1.04	4900	440	540
AB05BH0360	WEST US NOSE	06/11/80	01:40 PM				5.5				0.075	0.305		1.3	67000	1000	790
AB05BH0360	WEST US NOSE	06/11/80	02:10 PM			7.84	7.1	266	566	19.5	0.065	0.41	0.21	2.04	53000	2200	1600
AB05BH0360	WEST US NOSE	06/11/80	02:40 PM			8	7.3	228	544	18.5	0.09	0.385	0.21	2.28			
AB05BH0360	WEST US NOSE	06/18/80	11:30 AM	12	7.6	8.2	2.4	23.6	590	13.5	0.09	0.135	0.11	1.26	1400	190	
AB05BH0360	WEST US NOSE	06/19/80	10:20 PM												4300	4100	12800
AB05BH0360	WEST US NOSE	06/22/80	08:30 PM			8.2	13	97.5	572	14	0.125	0.23	0.15	1.77			
AB05BH0360	WEST US NOSE	06/25/80	11:10 AM		8.3	7.9	2.5	3.2	518	12	0.064	0.115	0.37	1.28	3000	1300	4000
AB05BH0360	WEST US NOSE	06/26/80	12:00 PM			7.9	3.2	379	549	14	0.08	0.476	0.21	2.21	17000	3500	12000
AB05BH0360	WEST US NOSE	07/02/80	10:40 AM	10	9.35	8.2	2	22	547	12	0.075	0.12	0.1	0.62	4400	1300	3300
AB05BH0360	WEST US NOSE	07/09/80	10:50 AM	11.5	9	8.3	3.1	8.8	550	13	0.102	0.115	0.23	0.92	3600	290	480
AB05BH0360	WEST US NOSE	07/16/80	10:05 AM	12	7.35	7.94	2.2	72	402	35	0.075	0.185	0.09	0.64	12900	800	780
AB05BH0360	WEST US NOSE	07/23/80	10:30 AM	13	8.3	7.92	2.6	16.8	500	8.8	0.095	0.12	L0.002	0.47	2000	590	280
AB05BH0360	WEST US NOSE	07/30/80	08:15 AM	13	5.45	7.4	5.5	450	229	11	0.095	0.185	0.24	4.28	240	160	190
AB05BH0360	WEST US NOSE	07/30/80	10:30 AM			7.94	3.5	444	409	10.3	0.075	0.55	0.17	2.44			
AB05BH0360	WEST US NOSE	08/06/80	10:25 AM	10	8.3	8.2	1.5	18	515	10	0.05	0.185	0.08	0.92	3800	480	240
AB05BH0360	WEST US NOSE	08/06/80	12:00 PM												1	1	1
AB05BH0360	WEST US NOSE	08/10/80	07:30 AM			8.3	2.5	22.8	506	9.7	0.06	0.1	0.06	0.96	4300	1030	280
AB05BH0360	WEST US NOSE	08/10/80	08:00 AM												1	1	1
AB05BH0360	WEST US NOSE	08/10/80	08:30 AM			8.25	2.2	14.4	514	10	0.062	0.095	0.02	0.89	3100	1120	430
AB05BH0360	WEST US NOSE	08/10/80	09:00 AM												1	1	1
AB05BH0360	WEST US NOSE	08/10/80	09:30 AM			7	2.1	62.7	495	10.9	0.092	1.55	0.07	1.15	5200	990	630
AB05BH0360	WEST US NOSE	08/10/80	10:00 AM												1	1	1
AB05BH0360	WEST US NOSE	08/10/80	10:30 AM			8.2		238	506	11.1	0.092	0.42	0.03	1.4	28000	2200	1270
AB05BH0360	WEST US NOSE	08/13/80	09:50 AM	13	8.15	8.2	2.6	54	504	11	0.051	0.133	0.08	1.14			
AB05BH0360	WEST US NOSE	08/20/80	09:45 AM			7.9	2.3	46	468	9.2	0.05	0.115	0.18	0.9	1200	220	132
AB05BH0360	WEST US NOSE	08/20/80	12:00 PM												1	1	1
AB05BH0360	WEST US NOSE	08/27/80	09:45 AM			8.36	2.4	154	526	11.1	0.052	0.345	0.17	1.78	3000	1400	
AB05BH0360	WEST US NOSE	09/03/80	12:00 PM		6.7	7.63	6	347	267	17.3	0.086	0.78	0.06	3.04	29000	20000	2800
AB05BH0360	WEST US NOSE	09/10/80	12:00 PM		6.7	8.14	10	149	491	9.3	0.046	0.43	0.06	1.73	670	170	
AB05BH0360	WEST US NOSE	09/17/80	08:30 AM		7	8.09	3.4	38.8	567	9.3	0.035	0.101	0.04	1.13	970	800	
AB05BH0360	WEST US NOSE	09/17/80	12:00 PM												1	1	
AB05BH0360	WEST US NOSE	09/24/80	08:30 AM		8.2	8.51	6.6	277	397	13.5	0.146	0.49	0.04	1.96	2900	2000	1000
AB05BH0360	WEST US NOSE	09/24/80	12:00 PM												1	1	1
AB05BH0370	MOUTH	04/09/80	10:15 AM			8	13.8	26	380	20	0.206	0.36	0.62	2.85	200	128	356
AB05BH0370	MOUTH	04/16/80	12:15 PM			7.67	5.2	24.8	321	16.5	0.159	0.236	0.165	1.74			
AB05BH0370	MOUTH	04/22/80	09:45 AM	6	9.7	8.15	3.8	16.8	436	15.7	0.133	0.2	0.072	1.99	390	308	92
AB05BH0370	MOUTH	04/23/80	09:45 AM												390	308	92
AB05BH0370	MOUTH	04/30/80	12:00 PM		7.2	7.95	4.4	22	600	15.5	0.22	0.3	0.103	2.14	2500	180	
AB05BH0370	MOUTH	05/06/80	09:00 AM	13	11.65	8.38	3.8	24	600	14	0.108	0.182	0.4	2	320	60	36
AB05BH0370	MOUTH	05/14/80	09:05 AM		9.8	8.36	8.3	18.8	647	12	0.034	0.19	0.18	1.97	350	100	68
AB05BH0370	MOUTH	05/21/80	09:00 AM		10.35	8	6.2	14	690	11.5	0.063	0.404	0.054	1.56	40	16	
AB05BH0370	MOUTH	05/23/80	01:45 PM			7.34	11.8	100	522	27	0.201	0.518	1.4	5.15			
AB05BH0370	MOUTH	05/28/80	11:15 AM		7.35	7.4	0.8	96	527	15.3	0.065	0.405	0.27	2.49	14000	11000	
AB05BH0370	MOUTH	06/01/80	03:30 AM				4										
AB05BH0370	MOUTH	06/01/80	03:45 AM				3.4				0.09	0.285		2.45			
AB05BH0370	MOUTH	06/01/80	04:25 AM									0.46					
AB05BH0370	MOUTH	06/01/80	04:50 AM				6.5				0.295	0.85		6.67			
AB05BH0370	MOUTH	06/01/80	05:25 AM				15.7			15	0.18	0.85	0.7	4.33			
AB05BH0370	MOUTH	06/01/80	03:30 PM			7.54	4	92	653	14.5	0.105	0.295	0.25	5.8			
AB05BH0370	MOUTH	06/01/80	03:45 PM			7.5	3.4	87.5	537	15	0.09	0.285	0.41	2.45	13900	320	240
AB05BH0370	MOUTH	06/01/80	04:00 PM			7.7	3	124	688	15	0.105	0.435	0.31	1.13			
AB05BH0370	MOUTH	06/01/80	04:25 PM			7.7	4.8	258	560	15.5	0.095	0.46	0.3	3.05			
AB05BH0370	MOUTH	06/01/80	04:50 PM			7.49	6.5	556	398	16.5	0.295	0.85	0.95	6.67	7700	1410	6300

AB05BH0370	MOUTH	06/01/80	05:25 PM			7.46		634	405	15			0.7		83000	1280	28800
AB05BH0370	MOUTH	06/04/80	11:15 AM			7.34	5	115	403	15.5	0.125	0.26	0.16	2.07	42000	10200	6800
AB05BH0370	MOUTH	06/11/80	11:00 AM			8.3	2.5	23.6	640	15.5	0.075	0.13	0.11	0.82			
AB05BH0370	MOUTH	06/11/80	12:30 PM			7.76	4.9	41.2	713	15.3	0.07	0.16	0.1	1.89	2100	220	380
AB05BH0370	MOUTH	06/11/80	01:00 PM			7.82	4.6	52	670	15.8	0.085	0.19	0.13	2.1	2600	160	530
AB05BH0370	MOUTH	06/11/80	01:30 PM			7.7	7.1	42	722	13.5	0.065	0.17	0.08	1.8	1600	210	330
AB05BH0370	MOUTH	06/14/80	04:15 PM			7.77	10.8	353	696	17.8	0.125	0.17	0.08	1.9			
AB05BH0370	MOUTH	06/14/80	06:00 PM			7.58	14.6	33.6	717	20.3	0.1	0.165	0.11	2.63			
AB05BH0370	MOUTH	06/14/80	06:30 PM			7.74	13	34	715	19.8	0.095	0.165	0.02	2.14			
AB05BH0370	MOUTH	06/14/80	07:00 PM			7.46	13.2	32.8	682	19.5	0.095	0.16	0.12	2.33			
AB05BH0370	MOUTH	06/14/80	07:30 PM			7.42	15.4	30	702	19.3	0.095	0.145	0.15	2.48			
AB05BH0370	MOUTH	06/14/80	08:00 PM			7.6	15.6	41.5	699	16.3	0.095	0.16	0.18	2.48			
AB05BH0370	MOUTH	06/14/80	08:30 PM			7.38	15.8	46.8	663	16.5	0.09	0.175	0.1	2.12			
AB05BH0370	MOUTH	06/18/80	07:30 AM	13	7.625	7.82	4.4	47.2	660	13.8	0.06	0.135	0.17	2.63	7200	600	
AB05BH0370	MOUTH	06/19/80	11:30 AM			7.4		1754	270	17.8			0.04				
AB05BH0370	MOUTH	06/19/80	11:10 PM				13.6				0.105	1.2		6.99	63000	28000	10000
AB05BH0370	MOUTH	06/22/80	05:45 PM			7.54	2.8	42.4	448	10.3	0.125	0.175	0.21	2.63	8000	270	252
AB05BH0370	MOUTH	06/22/80	06:30 PM			7.27	3.6	66.8	448	10.8	0.095	0.19	0.25	2.47	8900	330	340
AB05BH0370	MOUTH	06/22/80	07:00 PM			7.58	3.4	49.6	461	10.8	0.085	0.185	0.22	3.47	26000	350	310
AB05BH0370	MOUTH	06/22/80	07:30 PM			7.26	4.8	96.7	436	11.3	0.115	0.24	0.39	3.14	8200	590	630
AB05BH0370	MOUTH	06/22/80	08:00 PM			7.44	3.6	91	462	10.8	0.09	0.215	0.3	2.72	11700	530	450
AB05BH0370	MOUTH	06/22/80	08:30 PM			7.31	3.4	61.6	475	13	0.1	0.2	0.29	3.57	43000	2300	2800
AB05BH0370	MOUTH	06/22/80	09:00 PM			7.47	5	72	455	11.3	0.1	0.24	0.25	1.45			
AB05BH0370	MOUTH	06/25/80	07:40 AM		4.45	7.2	4.2	45.5	483	11.5	0.068	0.2	0.29	3.37	6800	1600	850
AB05BH0370	MOUTH	06/26/80	02:00 PM			7.42	6	478	379	17	0.073	0.58	0.49	4.6	27000	1800	11100
AB05BH0370	MOUTH	07/02/80	07:35 AM		5	7.44	2.9	74	459	15.5	0.154	0.283	0.54	2.67	2100	160	300
AB05BH0370	MOUTH	07/09/80	07:30 AM	12	6.05	8.15	5	56.4	610	13	0.109	0.215	0.21	2.47	1200	124	160
AB05BH0370	MOUTH	07/16/80	07:15 AM		4.1	7.66	4.8	82	563	40	0.09	0.245	0.31	1.72	8800	860	1000
AB05BH0370	MOUTH	07/23/80	07:30 AM	14	4.95	7.78	3.2	170	546	9.5	0.1	0.205	0.2	1.56	4500	220	110
AB05BH0370	MOUTH	07/29/80	08:30 AM			7.66	9	12.8	528	11.9	0.05	0.155	0.36	3.57	58000	1300	2600
AB05BH0370	MOUTH	07/29/80	09:00 AM			7.68	10.8	235	537	12	0.045	0.265	0.16	3.26	80000	3100	3300
AB05BH0370	MOUTH	07/29/80	09:30 AM			7.56	11.6	286	476	12.7	0.065	0.275	0.2	3.31	180000	2800	2400
AB05BH0370	MOUTH	07/29/80	10:00 AM			7.34	18.5	52	326	13.8	0.15	0.6	0.5	4.15	250000	6500	33000
AB05BH0370	MOUTH	07/29/80	10:30 AM			7.47	22	552	260	13.6	0.16	0.8	0.5	3.81	140000	5700	9000
AB05BH0370	MOUTH	07/29/80	11:00 AM			7.52	21.5	492	195	12.6	0.095	0.465	0.42	3.41	8300	5700	10000
AB05BH0370	MOUTH	07/29/80	11:30 AM				14.4				0.07	1.36		3.19	150000	6600	14000
AB05BH0370	MOUTH	07/29/80	12:00 PM			7.38		396	273	12.2			0.27				
AB05BH0370	MOUTH	07/30/80	07:15 AM	14	4.5	7.4	6.5	191	201	8.7	0.11	0.335	0.15	2.1	39000	5200	
AB05BH0370	MOUTH	08/01/80	04:50 PM				6.5				0.295	0.85		6.67	7700	1410	6300
AB05BH0370	MOUTH	08/01/80	05:25 PM				15.7				0.18	0.85		4.33	83000	1280	28800
AB05BH0370	MOUTH	08/06/80	07:00 AM	11	8.67	7.9	3.6	39.2	638	11.3	0.043	0.045	0.12	2.52	2100	280	236
AB05BH0370	MOUTH	08/09/80	10:15 AM				13.8				0.206	0.36		2.85	200	128	356
AB05BH0370	MOUTH	08/10/80	08:30 AM			7.5	5.1	53.2	463	11.1	0.053	0.44	L0.002	2.6	84000	1200	200
AB05BH0370	MOUTH	08/10/80	09:30 AM			7.52	4.8	44.6	459	11.1	0.051	0.115	0.1	2.76	56000	1010	200
AB05BH0370	MOUTH	08/10/80	10:30 AM			7.72	4.3	66.6	452	11.3	0.058	0.165	L0.18	2.84	140000	1400	310
AB05BH0370	MOUTH	08/10/80	11:30 AM			7.2	4.5	47.2	448	10.8	0.11	0.15	L0.13	1.53	34000	480	180
AB05BH0370	MOUTH	08/11/80	08:30 AM							11.1							
AB05BH0370	MOUTH	08/11/80	09:30 AM				4.8				0.1	0.1		1			
AB05BH0370	MOUTH	08/11/80	10:30 AM				4.8				0.1	0.1		1			
AB05BH0370	MOUTH	08/11/80	11:30 AM				4				0.1	0.1		1			
AB05BH0370	MOUTH	08/13/80	09:15 AM				4				0.05	0.153		2.4	4900	320	300
AB05BH0370	MOUTH	08/13/80	12:00 PM	14	6.02	7.52		47.6	513	11.8			0.15				
AB05BH0370	MOUTH	08/20/80	06:15 AM				1				1	0.1		1			
AB05BH0370	MOUTH	08/20/80	10:20 AM			7.8	4.8	25.2	471	13	0.05	0.12	0.16	2.2	18000	790	192
AB05BH0370	MOUTH	08/20/80	03:45 PM			7.35	6.7	60.4		11.2	0.045	0.15	0.24	2.46	19000	500	500
AB05BH0370	MOUTH	08/20/80	04:15 PM			7.5	7.7	99	481	12.6	0.045	0.18	0.32	2.82	18000	2500	300
AB05BH0370	MOUTH	08/20/80	04:45 PM			7.4	6.2	54	487	11.6	0.045	0.165	0.19	2.46	8200	300	100
AB05BH0370	MOUTH	08/20/80	05:15 PM			7.7	5.3	39.6	497	11.1	0.045	0.125	0.21	2.37	7200	300	100
AB05BH0370	MOUTH	08/20/80	05:45 PM			7.55	5.4	57	490	11.5	0.045	0.14	0.2	2.1	10000	900	100

AB05BH0370	MOUTH	08/20/80	06:15 PM			7.7	5.3	61	494	11.8	0.045	0.16	0.14	2.16	7200	3500	200
AB05BH0370	MOUTH	08/20/80	06:45 PM			7.4	5.3	51	501	10.8	0.045	0.14	0.12	10.98	8700	600	600
AB05BH0370	MOUTH	08/27/80	07:30 AM				3.1				0.061	0.1		2.13	5000	300	
AB05BH0370	MOUTH	08/27/80	10:00 AM			8.3		21.6	504	11.7			0.16				
AB05BH0370	MOUTH	09/03/80	08:00 AM		6.85	7.56	9.6	36.4	452	11.1	0.086	0.184	0.02	2.59	9000	2800	1700
AB05BH0370	MOUTH	09/10/80	07:45 AM				3				0.028	0.059		1.71	168	72	
AB05BH0370	MOUTH	09/10/80	12:00 PM		14.8	8.43		25.6	636	8.1			0.02				
AB05BH0370	MOUTH	09/17/80	07:00 AM		8.4	7.87	0.4	42.4	428	8.8	0.034	0.128	0.17	2.18	3100	480	
AB05BH0370	MOUTH	09/24/80	09:15 AM		7.9	7.94	8.4	52	553	11.3	0.081	0.148	L0.002	4.38	4500	3300	370
AB05BH0370	MOUTH	05/21/81	09:00 AM										0.054				
AB05BH0390	MOUTH	08/17/82	10:10 AM			7.8		18		26.9	0.064	0.14	0.17	2.17			
AB05BH0370	MOUTH	04/23/85	02:30 PM	7.3	9.3	7.6		38.4	832	14.6	0.106	0.315	0.31		310	190	
AB05BH0370	MOUTH	05/14/85	02:10 PM	12.4	12.8	7.8	9.2	22.4	640	14.8	0.064	0.2	0.18		12500	3400	
AB05BH0370	MOUTH	06/04/85	02:15 PM	14.5	11.7	8.33	2.7	20	740	10.6	0.076	0.146	0.3		120	10	
AB05BH0370	MOUTH	06/27/85	01:45 PM	18.2	8.5	7.7	3.7	22.8	615	9.2	0.087	0.151	0.36				
AB05BH0370	MOUTH	07/15/85	02:35 PM	21.3	5	7.4	11.7	14.4	451	21.6	0.24	0.35	0.47		29000	20	
AB05BH0370	MOUTH	08/06/85	01:10 PM	20.4	10.4	8.2	8.3	L0.4	560	10	0.026	0.18	L0.01		2400	200	
AB05BH0370	MOUTH	08/26/85	09:00 AM	14.5	5.9	7.4	2.7	28	560	9.8	0.076	0.144	0.24		350	180	
AB05BH0370	MOUTH	09/19/85	09:30 AM	6.1	9.4	7.2	7	77	270	7.2	0.1	0.32	0.24		70000	1500	
AB05BH0370	MOUTH	10/08/85	09:00 AM	3.6	11.2	7.2	6.5	16	635	11.2	0.018	0.072	0.05		9000	1200	
AB05BH0370	MOUTH	10/29/85	12:30 PM	2.6	9.3	8	3.4	23	1050	8	0.049	0.104	0.3		3000	100	
AB05BH0370	MOUTH	12/03/85	02:50 PM	0	9.9	8.34	1.7	1.3	625	5	0.03	0.047	0.01				
AB05BH0370	MOUTH	01/28/86	01:30 PM	0	14.2	8.25	0.9	3.8	650	5.5	0.033	0.051	0.12		10000	200	
AB05BH0370	MOUTH	07/21/93	11:15 AM	14.17	6.28	7.74	3.8	83			0.052	0.17	0.07		5000	200	
AB05BH0370	MOUTH	08/15/93	01:40 PM					78				0.255					
AB05BH0370	MOUTH	08/15/93	03:40 PM					92				0.255					
AB05BH0370	MOUTH	08/15/93	05:40 PM					92				0.23					
AB05BH0370	MOUTH	08/15/93	07:40 PM					78				0.22					
AB05BH0370	MOUTH	08/15/93	09:40 PM					198				0.305					
AB05BH0370	MOUTH	08/15/93	11:40 PM					258				0.405					
AB05BH0370	MOUTH	08/16/93	01:40 AM					265				0.395					
AB05BH0370	MOUTH	08/16/93	03:40 AM					131				0.215					
AB05BH0370	MOUTH	08/16/93	05:40 AM					93				0.225					
AB05BH0370	MOUTH	08/16/93	07:40 AM					81				0.195					
AB05BH0370	MOUTH	08/16/93	09:00 AM					72				0.195					
AB05BH0370	MOUTH	08/17/93	11:30 AM	14.93	6.72	7.63	3.6	170			0.094	0.315	0.06		3900	2300	
AB05BH0370	MOUTH	09/13/93	09:15 AM	8.12	4.95	7.32	4.6	28			0.011	0.12	L0.01		3000	2000	
AB05BH0370	MOUTH	09/13/93	09:20 AM			7.43	4.7	24			0.01	0.12	L0.01				
AB05BH0370	MOUTH	11/17/93	01:50 PM	0.5	11.83	7.97	2.2	24			0.023	0.085	0.36		500	500	
AB05BH0370	MOUTH	01/25/94	09:00 AM	0	8.99	7.68	4.5	20			0.005	0.068	0.44		3800	2100	
AB05BH0370	MOUTH	03/22/94	09:00 AM	0.43	10.18	7.96	8.5	30			0.098	0.248	0.3		2400	530	
AB05BH0370	MOUTH	08/22/94	11:45 AM	18.8	5.42	7.76	6.1	62			0.124	0.264	0.5			11800	
AB05BH0340	WEST 722	03/30/95	02:00 PM					3				0.052					
AB05BH0340	WEST 722	04/05/95	11:30 AM					5				0.061	0.027				
AB05BH0340	WEST 722	04/13/95	10:30 AM					1				0.066	0.054				
AB05BH0340	WEST 722	04/18/95	01:30 PM					99				0.219	0.21				
AB05BH0340	WEST 722	04/26/95	12:00 PM					36				0.157	0.146				
AB05BH0340	WEST 722	06/06/95	03:15 PM					20				0.158	0.033				
AB05BH0340	WEST 722	06/20/95	09:45 AM			8.26		9				0.126	0.017				
AB05BH0340	WEST 722	07/19/95	01:45 PM			8.46		9				0.129	0.022				
AB05BH0340	WEST 722	08/10/95	09:25 AM			8.14		6				0.086	0.017				
AB05BH0370	MOUTH	08/10/95	11:58 AM	15.38	7.06	7.97	2.5	32	588		0.053	0.135	0.143			480	
AB05BH0370	MOUTH	08/10/95	12:00 PM			8.07		31	591		0.054	0.13	0.142				
AB05BH0370	MOUTH	02/28/96	08:42 AM	-0.14	7.16	7.49	11.4	17	670		0.974	1.01	2.32			700	
AB05BH0370	MOUTH	02/28/96	08:47 AM			7.51	13	17	665		0.963	1.03	2.41				

STN NO	STN NAME	DATE	TIME	EC	TALK	PALK	TURB	HARD	NA	MG	CA	K	SO4	CL	HCO3	CO3	DOC	DIC	TKN	NIT	SI	HENOLI	PHYTO
AB05BH0390	MOUTH	04/24/75	10:00 AM	650	222	0		280	53	26		5.9	124	15								0.003	
AB05BH0390	MOUTH	08/17/82	10:10 AM	894	270	0			75	46.1	64.1	5.6	189	30			25	59		1.1	4	0.013	
AB05BH0370	MOUTH	04/23/85	02:30 PM	1356	250	L0.1	63	307.14	180	40	57	13.2	220	169	304.75	L0.5	13.8	55	1.78	0.76	3.8	0.007	8.25
AB05BH0370	MOUTH	05/14/85	02:10 PM	1097	261	16.6	18	341.07	107	48	57.4	7.2	200	54	277.69	19.92	14.4	72	1.56	1.06	2.25	0.009	
AB05BH0370	MOUTH	06/04/85	02:15 PM	1142	337	L0.1	25	366.68	125	49	66	6.7	226	53	410.8	L0.5	10.2	71	1.56	0.93	2.72	0.002	8.447
AB05BH0370	MOUTH	06/27/85	01:45 PM	1007	278	L0.1	26	293.47	103	33.4	62.4	5.9	171	70	338.88	L0.5	8.7	60	1.36	0.83	3.5	0.01	15.196
AB05BH0370	MOUTH	07/15/85	02:35 PM	727	211	L0.1	7.4	250.5	65	28	54.1	5.7	134	34.2	257.21	L0.5		45	1.7	0.5	3.24	0.015	52.75
AB05BH0370	MOUTH	08/06/85	01:10 PM	871	250	L0.1	1.6	293.94	83	37.4	56	4.68	192	31.4	304.75	L0.5	9.4	51.5	0.3	0.32	L0.02	0.004	
AB05BH0370	MOUTH	08/26/85	09:00 AM	979	252	L0.1	16	256.61	95	30.7	52.1	6.8	185	33.7	307.19	L0.5	9.4	52	1	0.7	3.25	0.003	16.436
AB05BH0370	MOUTH	09/19/85	09:30 AM	480	127	L0.1	56	117.99	43	13.3	25.3	4.32	75	17	154.81	L0.5	6.8	24.5	1.16	1.28	3.5	0.01	
AB05BH0370	MOUTH	10/08/85	09:00 AM	992	324	L0.1	16	395.65	85	53	71	6	180	37	394.96	L0.5	11	74	0.88	1.84	3.3	0.007	5.12
AB05BH0370	MOUTH	10/29/85	12:30 PM	1885	298	L0.1	45	366.84	255	46	71	17.8	146	310	363.26	L0.5	7	63	1.2	2.14	3.2	0.017	
AB05BH0370	MOUTH	12/03/85	02:50 PM	1223	227	L0.1	18	353.98	100	58	46.1	4.93	221	50.5	276.71	L0.5	4.8	52	0.46	3.75	7.75	0.007	1.35
AB05BH0370	MOUTH	01/28/86	01:30 PM	679	302	L0.1	4.6	389.18	91	49	75	5	195	51	368.14	L0.5	5.3	66	0.68	2.8	4.9	0.001	4.868
AB05BH0370	MOUTH	07/21/93	11:15 AM	705	204	L0.1	98.5	233.7	62.1	28.3	46.9	4.3	104	31.9	248.7	L0.5			0.4	1.06		0.001	
AB05BH0370	MOUTH	08/15/93	01:40 PM	680																			
AB05BH0370	MOUTH	08/15/93	03:40 PM	699																			
AB05BH0370	MOUTH	08/15/93	05:40 PM	728																			
AB05BH0370	MOUTH	08/15/93	07:40 PM	839																			
AB05BH0370	MOUTH	08/15/93	09:40 PM	547																			
AB05BH0370	MOUTH	08/15/93	11:40 PM	567																			
AB05BH0370	MOUTH	08/16/93	01:40 AM	374																			
AB05BH0370	MOUTH	08/16/93	03:40 AM	421																			
AB05BH0370	MOUTH	08/16/93	05:40 AM	415																			
AB05BH0370	MOUTH	08/16/93	07:40 AM	485																			
AB05BH0370	MOUTH	08/16/93	09:00 AM	553																			
AB05BH0370	MOUTH	08/17/93	11:30 AM	482	143	L0.1	218.8	165.2	36.8	19.6	33.8	4.7	62	25.1	174.3	L0.5			1.2	0.789		L0.001	
AB05BH0370	MOUTH	09/13/93	09:15 AM	777	222	L0.1	34.7	292.4	62.1	37.7	54.9	4.7	147	41.5	270.6	L0.5			1.28	1.17		L0.001	
AB05BH0370	MOUTH	09/13/93	09:20 AM		222	L0.1	34.6	295.7	62.1	38.5	54.9	4.8	150	42	270.6	L0.5			1.08	1.18		L0.001	
AB05BH0370	MOUTH	11/17/93	01:50 PM	212	426	L0.1	40.2	527	300	65.5	103	10.4	232	348	519	L0.5			3.68	2.22		L0.001	
AB05BH0370	MOUTH	01/25/94	09:00 AM	2060	337	L0.1	32.9	477	294	56	98.5	6.62	204	360	411	L0.5			1	3.08		L0.001	
AB05BH0370	MOUTH	03/22/94	09:00 AM	827	274	L0.1	38.7	293	79.5	36.8	56.5	19.9	135	44.2	334	L0.5			2.8	0.924		L0.001	
AB05BH0370	MOUTH	08/22/94	11:45 AM	993															1.96	1.13			
AB05BH0370	MOUTH	08/10/95	11:58 AM	873	264		37	310	79	39	60	4.5	156	35.3	322		9.5		0.98	1.26	4		
AB05BH0370	MOUTH	08/10/95	12:00 PM	873	265		38	308	80	39	59	4.5	154	35.6	323		10		0.93	1.27	4		
AB05BH0370	MOUTH	02/28/96	08:42 AM	934	299	L0.1	37	309	87.4	36	64.2	34.4	178	59.8	364	L0.5	20.5		6	1.41	15		
AB05BH0370	MOUTH	02/28/96	08:47 AM		297	L0.1	33	359	89.7	38.7	79.9	36.8	173	58	362	L0.5			6.75	1.36	15.2		

STN NO	TN NAM	DATE	TIME	AL	V	MN	FE	NI	AS-T	CD	HG-T	CO	SE-T	BE-D	BA	MO	AU
AB05BH0390	MOUTH	04/24/75	10:00 AM			0.068	0.4	L0.001				L0.001					
AB05BH0390	MOUTH	08/17/82	10:10 AM	0.13		0.06	0.27	0.002									
AB05BH0370	MOUTH	04/23/85	02:30 PM	L0.01	0.001	0.17	0.46	0.003	0.0012	L0.001	L0.1						
AB05BH0370	MOUTH	05/14/85	02:10 PM				L0.01				L0.1						
AB05BH0370	MOUTH	06/04/85	02:15 PM				0.023				L0.1						
AB05BH0370	MOUTH	06/27/85	01:45 PM				0.08				L0.1						
AB05BH0370	MOUTH	07/15/85	02:35 PM	0.08	0.001	0.115	0.34	0.003	0.0026	L0.001	L0.1						
AB05BH0370	MOUTH	08/06/85	01:10 PM				0.05				L0.1						
AB05BH0370	MOUTH	08/26/85	09:00 AM				0.06				L0.1						
AB05BH0370	MOUTH	09/19/85	09:30 AM				0.11				L0.1						
AB05BH0370	MOUTH	10/08/85	09:00 AM	0.06	0.002	0.047	0.31	L0.001	0.0011	L0.001	L0.1						
AB05BH0370	MOUTH	10/29/85	12:30 PM				0.23				L0.1						
AB05BH0370	MOUTH	12/03/85	02:50 PM				0.01				L0.1						
AB05BH0370	MOUTH	01/28/86	01:30 PM				0.2				L0.1						
AB05BH0370	MOUTH	07/21/93	11:15 AM	1.13		0.089	1.79	0.003									
AB05BH0370	MOUTH	08/17/93	11:30 AM	2.57		0.099	3.89	0.006									
AB05BH0370	MOUTH	09/13/93	09:15 AM	0.15		0.069	0.51	0.001									
AB05BH0370	MOUTH	09/13/93	09:20 AM	0.65		0.073	0.84	L0.001									
AB05BH0370	MOUTH	11/17/93	01:50 PM	0.68		0.068	1.02	L0.001			L0.05						
AB05BH0370	MOUTH	01/25/94	09:00 AM	0.53		0.08	0.73	0.002			L0.05						
AB05BH0370	MOUTH	03/22/94	09:00 AM	0.7		0.113	1.2	L0.001			0.05						
AB05BH0370	MOUTH	08/10/95	11:58 AM		0.006	0.057	1.02	0.001	0.002	L0.001	L0.04	0.001	0.0009	L0.001	0.095	5	
AB05BH0370	MOUTH	08/10/95	12:00 PM		0.005	0.058	1.1	0.003	0.0019	L0.001	L0.04	0.001	0.0009	L0.001	0.096	5	
AB05BH0370	MOUTH	02/28/96	08:42 AM	0.21	0.003	0.12	0.65	0.0235	0.001	L0.0002	L0.05		0.0013		0.12		L0.2
AB05BH0370	MOUTH	02/28/96	08:47 AM	0.14	0.009	0.111	0.6	0.0223	0.0007	L0.0002	L0.05		0.0011		0.11		L0.2

STN NO	STN NAME	DATE	TIME	CR	CU	ZN	PB
AB05BH0390	MOUTH	04/24/75	10:00 AM		L0.001		0.01
AB05BH0250	SEWER 27	05/08/80	10:00 AM	L0.003	0.002	0.003	L0.002
AB05BH0250	SEWER 27	05/23/80	02:45 PM	L0.003	0.035	0.4	0.94
AB05BH0250	SEWER 27	05/23/80	03:15 PM	L0.003	0.027	0.22	0.62
AB05BH0250	SEWER 27	05/23/80	03:45 PM	0.005	0.025	0.22	0.5
AB05BH0250	SEWER 27	05/23/80	04:15 PM	L0.003	0.027	0.17	0.45
AB05BH0250	SEWER 27	05/24/80	10:00 AM	L0.003	0.014	0.013	0.006
AB05BH0250	SEWER 27	05/25/80	11:00 AM	L0.003	0.012	0.053	0.085
AB05BH0250	SEWER 27	05/25/80	11:35 AM	L0.003	0.012	0.053	1.55
AB05BH0250	SEWER 27	05/25/80	11:50 AM	L0.003	0.011	0.053	1.04
AB05BH0250	SEWER 27	05/25/80	12:00 PM	L0.003	0.01	0.049	1.22
AB05BH0250	SEWER 27	05/25/80	12:05 PM	L0.003	0.011	0.053	0.76
AB05BH0250	SEWER 27	05/25/80	12:35 PM	0.011	0.01	0.069	0.54
AB05BH0250	SEWER 27	05/25/80	01:05 PM	L0.003	0.009	0.049	0.32
AB05BH0250	SEWER 27	05/25/80	01:35 PM	0.005	0.01	0.052	0.21
AB05BH0250	SEWER 27	05/25/80	02:05 PM	0.006	0.015	0.048	0.87
AB05BH0250	SEWER 27	05/25/80	06:30 PM	0.005	0.006	0.011	0.023
AB05BH0250	SEWER 27	05/25/80	07:30 PM	0.005	0.008	0.026	0.2
AB05BH0250	SEWER 27	05/25/80	08:00 PM	0.01	0.028	0.13	3.43
AB05BH0250	SEWER 27	05/25/80	08:20 PM	L0.003	0.035	0.25	0.78
AB05BH0250	SEWER 27	05/25/80	08:35 PM	L0.003	0.042	0.23	0.63
AB05BH0250	SEWER 27	05/25/80	08:50 PM	0.011	0.027	0.13	0.28
AB05BH0250	SEWER 27	05/25/80	09:15 PM	0.014	0.023	0.082	2.53
AB05BH0250	SEWER 27	05/25/80	09:40 PM	0.006	0.025	0.092	1.94
AB05BH0250	SEWER 27	05/25/80	10:10 PM	0.012	0.028	0.088	1.87
AB05BH0250	SEWER 27	05/25/80	10:30 PM	L0.003	0.021	0.07	1.06
AB05BH0250	SEWER 27	05/25/80	11:10 PM	L0.003	0.021	0.045	4.77
AB05BH0250	SEWER 27	05/26/80	02:40 PM	L0.003	0.031	0.15	0.42
AB05BH0250	SEWER 27	05/26/80	03:00 PM	L0.003	0.021	0.16	0.35
AB05BH0250	SEWER 27	05/26/80	03:15 PM	L0.003	0.02	0.15	0.29
AB05BH0250	SEWER 27	05/26/80	03:35 PM	0.005	0.019	0.22	0.21
AB05BH0250	SEWER 27	05/26/80	04:00 PM	0.005	0.02	0.18	0.21
AB05BH0250	SEWER 27	05/26/80	04:20 PM	0.006	0.036	0.12	0.45
AB05BH0250	SEWER 27	05/26/80	04:30 PM	0.006	0.018	0.13	0.25
AB05BH0250	SEWER 27	05/26/80	05:00 PM	0.013	0.025	0.19	0.25
AB05BH0250	SEWER 27	05/26/80	05:30 PM	0.009	0.025	0.15	0.25
AB05BH0250	SEWER 27	05/28/80	06:00 PM	L0.003	0.009	0.062	0.051
AB05BH0250	SEWER 27	05/28/80	06:15 PM	0.027	0.036	0.35	0.87
AB05BH0250	SEWER 27	05/28/80	06:30 PM	L0.003	0.023	0.22	0.38
AB05BH0250	SEWER 27	05/28/80	06:45 PM	L0.003	0.026	0.17	0.29
AB05BH0250	SEWER 27	05/28/80	07:00 PM	L0.003	0.023	0.18	0.26
AB05BH0250	SEWER 27	05/28/80	07:30 PM	L0.003	0.022	0.15	0.27
AB05BH0250	SEWER 27	05/28/80	08:00 PM	L0.003	0.018	0.11	0.2
AB05BH0250	SEWER 27	05/28/80	08:30 PM	L0.003	0.015	0.07	0.15
AB05BH0250	SEWER 27	06/01/80	03:00 PM	0.008	0.036	0.28	3.2
AB05BH0250	SEWER 27	06/01/80	03:15 PM	0.007	0.32	0.32	3.9
AB05BH0250	SEWER 27	06/01/80	03:30 PM	0.015	0.02	0.18	0.37
AB05BH0250	SEWER 27	06/01/80	03:45 PM	0.016	0.015	0.081	0.2
AB05BH0250	SEWER 27	06/01/80	04:00 PM	L0.003	0.012	0.09	0.12
AB05BH0250	SEWER 27	06/01/80	04:30 PM	0.005	0.011	0.072	0.11
AB05BH0250	SEWER 27	06/01/80	05:00 PM	L0.003	0.016	0.072	0.15
AB05BH0250	SEWER 27	06/01/80	05:30 PM	L0.003	0.027	0.034	0.068
AB05BH0250	SEWER 27	06/01/80	06:00 PM	L0.003	0.016	0.05	0.057
AB05BH0250	SEWER 27	06/10/80	10:35 AM	L0.003	0.012	0.053	0.028
AB05BH0250	SEWER 27	06/14/80	03:30 PM	L0.003	0.009	0.006	L0.002
AB05BH0250	SEWER 27	06/14/80	03:45 PM	L0.003	0.048	0.68	1.33
AB05BH0250	SEWER 27	06/14/80	04:00 PM	L0.003	0.054	0.54	0.92
AB05BH0250	SEWER 27	06/14/80	04:15 PM	0.007	0.045	0.29	0.35
AB05BH0250	SEWER 27	06/14/80	04:30 PM	0.003	0.039	0.31	0.3
AB05BH0250	SEWER 27	06/14/80	05:00 PM	0.003	0.026	0.24	0.25
AB05BH0250	SEWER 27	06/14/80	05:30 PM	L0.003	0.022	0.16	0.21
AB05BH0250	SEWER 27	06/14/80	06:00 PM	L0.003	0.012	0.056	0.069
AB05BH0250	SEWER 27	06/14/80	06:30 PM	L0.003	0.012	0.064	0.038
AB05BH0250	SEWER 27	06/22/80	05:00 PM	L0.003	0.005	0.04	0.02
AB05BH0250	SEWER 27	06/22/80	05:15 PM	L0.003	0.015	0.145	0.009
AB05BH0250	SEWER 27	06/22/80	05:30 PM	0.005	0.02	0.15	0.17
AB05BH0250	SEWER 27	06/22/80	05:45 PM	L0.003	0.032	0.225	0.28
AB05BH0250	SEWER 27	06/22/80	06:00 PM	L0.003	0.05	0.45	0.825
AB05BH0250	SEWER 27	06/22/80	06:30 PM	L0.003	0.019	0.14	0.26
AB05BH0250	SEWER 27	06/22/80	07:00 PM	L0.003	0.015	0.15	0.1
AB05BH0250	SEWER 27	06/22/80	07:30 PM	L0.003	0.011	0.064	0.074
AB05BH0250	SEWER 27	06/22/80	08:00 PM	L0.003	0.01	0.061	0.059
AB05BH0250	SEWER 27	07/09/80	07:55 AM	L0.003	0.008	0.016	0.003
AB05BH0250	SEWER 27	07/18/80	06:00 PM	0.003	0.002	0.008	0.005
AB05BH0250	SEWER 27	07/18/80	06:30 PM	L0.003	0.002	0.012	0.005
AB05BH0250	SEWER 27	07/18/80	06:45 PM	0.003	0.044	0.515	0.61
AB05BH0250	SEWER 27	07/18/80	06:55 PM	0.003	0.07	0.42	0.51
AB05BH0250	SEWER 27	07/18/80	07:15 PM	L0.003	0.03	0.3	0.405
AB05BH0250	SEWER 27	07/18/80	07:30 PM	L0.003	0.035	0.16	0.26
AB05BH0250	SEWER 27	07/18/80	08:00 PM	0.005	0.027	0.22	0.17
AB05BH0250	SEWER 27	07/18/80	08:30 PM	0.004	0.037	0.076	0.074
AB05BH0250	SEWER 27	07/18/80	09:00 PM	L0.003	0.033	0.057	0.056
AB05BH0250	SEWER 27	07/18/80	09:30 PM	L0.003	0.005	0.025	0.021

AB05BH0250	SEWER 27	08/10/80	07:45 AM			0.12	
AB05BH0250	SEWER 27	08/10/80	05:50 PM	L0.003	0.002	0.022	0.015
AB05BH0250	SEWER 27	08/10/80	07:15 PM	L0.003	0.006	0.006	L0.002
AB05BH0250	SEWER 27	08/10/80	07:30 PM	0.003	0.031	0.14	0.21
AB05BH0250	SEWER 27	08/10/80	07:45 PM	0.004	0.035	0.12	0.23
AB05BH0250	SEWER 27	08/10/80	08:00 PM	0.005	0.028	0.086	0.13
AB05BH0250	SEWER 27	08/10/80	08:15 PM	0.004	0.025	0.074	0.084
AB05BH0250	SEWER 27	08/10/80	08:45 PM	L0.003	0.022	0.053	0.051
AB05BH0250	SEWER 27	08/10/80	09:15 PM	0.003	0.019	0.029	0.05
AB05BH0250	SEWER 27	08/10/80	09:45 PM	L0.003	0.018	0.025	0.027
AB05BH0250	SEWER 27	08/10/80	10:15 PM	L0.003	0.015	0.02	0.018
AB05BH0250	SEWER 27	08/20/80	10:30 AM	L0.003	0.015	0.22	0.005
AB05BH0250	SEWER 27	08/20/80	03:00 PM	L0.003	0.01	0.019	0.005
AB05BH0250	SEWER 27	08/20/80	03:15 PM	L0.003	0.067	0.51	0.75
AB05BH0250	SEWER 27	08/20/80	03:30 PM	0.003	4.3	0.74	1.6
AB05BH0250	SEWER 27	08/20/80	03:45 PM	L0.003	0.073	0.46	0.5
AB05BH0250	SEWER 27	08/20/80	04:00 PM	L0.003	0.071	0.24	0.33
AB05BH0250	SEWER 27	08/20/80	04:30 PM	0.003	0.039	0.089	0.25
AB05BH0250	SEWER 27	08/20/80	05:00 PM	L0.003	0.34	0.19	0.14
AB05BH0250	SEWER 27	08/20/80	05:30 PM	L0.003	0.035	0.055	0.059
AB05BH0250	SEWER 27	08/20/80	06:00 PM	L0.003	0.038	0.041	0.042
AB05BH0260	SEWER 13	05/25/80	12:00 PM	L0.003	0.042	0.24	2.06
AB05BH0260	SEWER 13	05/26/80	02:15 PM	L0.003	0.021	0.077	0.12
AB05BH0260	SEWER 13	05/26/80	02:45 PM	L0.003	0.019	0.09	0.078
AB05BH0260	SEWER 13	05/26/80	03:00 PM	L0.003	0.029	0.086	1.7
AB05BH0260	SEWER 13	05/26/80	03:15 PM	L0.003	0.02	0.15	0.29
AB05BH0260	SEWER 13	05/26/80	03:30 PM	L0.003	0.049	0.29	
AB05BH0260	SEWER 13	05/26/80	03:50 PM	L0.003	0.042	0.27	1.38
AB05BH0260	SEWER 13	05/26/80	04:15 PM	0.006	0.036	0.12	0.45
AB05BH0260	SEWER 13	05/26/80	04:50 PM	0.007	0.033	0.11	0.41
AB05BH0260	SEWER 13	05/26/80	05:20 PM	0.007	0.036	0.16	0.3
AB05BH0260	SEWER 13	06/09/80	09:00 AM	L0.003	0.018	0.019	0.021
AB05BH0260	SEWER 13	06/11/80	12:00 PM	L0.003	0.003	0.005	0.006
AB05BH0260	SEWER 13	06/14/80	05:00 AM	0.003	0.026	0.24	0.25
AB05BH0260	SEWER 13	06/19/80	08:10 PM	L0.003	0.39	1.07	1.77
AB05BH0260	SEWER 13	06/19/80	08:15 PM	L0.003	0.044	0.44	0.46
AB05BH0260	SEWER 13	06/19/80	08:30 PM	L0.003	0.038	0.28	0.33
AB05BH0260	SEWER 13	06/19/80	08:45 PM	L0.003	0.032	0.24	0.25
AB05BH0260	SEWER 13	06/19/80	09:00 PM	L0.003	0.03	0.18	0.18
AB05BH0260	SEWER 13	06/19/80	09:30 PM	L0.003	0.044	0.16	0.19
AB05BH0260	SEWER 13	06/19/80	10:00 PM	L0.003	0.036	0.12	0.15
AB05BH0260	SEWER 13	06/19/80	10:20 PM	0.011	0.035	0.098	0.18
AB05BH0260	SEWER 13	06/26/80	01:25 PM	0.004	0.016	0.015	0.016
AB05BH0260	SEWER 13	06/26/80	01:30 PM	0.004	0.14	0.87	1.45
AB05BH0260	SEWER 13	06/26/80	01:45 PM	0.006	0.11	0.425	0.47
AB05BH0260	SEWER 13	06/26/80	02:00 PM	0.007	0.085	0.25	0.26
AB05BH0260	SEWER 13	06/26/80	02:15 PM	0.006	0.1	0.395	0.38
AB05BH0260	SEWER 13	06/26/80	02:45 PM	0.007	0.16	0.585	0.75
AB05BH0260	SEWER 13	06/26/80	03:15 PM	0.005	0.155	0.5	0.605
AB05BH0260	SEWER 13	06/26/80	03:45 PM	0.003	0.088	0.35	0.355
AB05BH0260	SEWER 13	06/26/80	04:15 PM	0.005	0.054	0.19	0.24
AB05BH0260	SEWER 13	07/09/80	08:15 AM	L0.003	0.012	0.019	L0.002
AB05BH0260	SEWER 13	07/31/80	11:00 AM	L0.003	0.004	0.008	0.004
AB05BH0300	US AIRDRIE	04/16/80	09:35 AM	0.005	0.019	0.013	0.004
AB05BH0300	US AIRDRIE	04/22/80	12:05 PM	0.008	0.002	0.003	L0.002
AB05BH0300	US AIRDRIE	04/29/80	06:30 PM	L0.003	0.002	0.006	0.009
AB05BH0300	US AIRDRIE	04/30/80	11:20 AM	L0.003	0.001	0.003	L0.002
AB05BH0300	US AIRDRIE	05/06/80	12:00 PM	0.005	0.001	0.004	L0.002
AB05BH0300	US AIRDRIE	05/08/80	09:50 AM	L0.003	0.002	0.005	0.008
AB05BH0300	US AIRDRIE	05/21/80	11:20 AM	L0.003	0.003	0.004	0.008
AB05BH0300	US AIRDRIE	05/28/80	08:45 AM	0.007	0.025	0.054	1.6
AB05BH0300	US AIRDRIE	06/01/80	06:20 PM	L0.003	0.003	0.013	0.005
AB05BH0300	US AIRDRIE	06/04/80	09:00 AM	L0.003	0.002	0.005	0.008
AB05BH0300	US AIRDRIE	06/11/80	09:00 AM	L0.003	0.003	0.006	L0.002
AB05BH0300	US AIRDRIE	06/18/80	08:50 AM	L0.003	0.003	0.004	L0.002
AB05BH0300	US AIRDRIE	06/25/80	09:00 AM	0.003	0.006	0.002	L0.002
AB05BH0300	US AIRDRIE	07/02/80	09:00 AM	0.005	0.017	0.013	L0.002
AB05BH0300	US AIRDRIE	07/09/80	09:00 AM	L0.003	0.015	0.019	L0.002
AB05BH0300	US AIRDRIE	07/16/80	08:40 AM	0.004	0.002	0.006	L0.002
AB05BH0300	US AIRDRIE	07/23/80	12:00 PM	L0.003	L0.001	0.023	0.005
AB05BH0300	US AIRDRIE	07/30/80	09:50 AM	0.003	0.016	0.008	0.006
AB05BH0300	US AIRDRIE	08/06/80	07:50 AM	L0.003	L0.001	0.012	0.004
AB05BH0300	US AIRDRIE	08/13/80	08:30 AM	L0.003	0.004	0.011	0.007
AB05BH0300	US AIRDRIE	08/20/80	08:30 AM	L0.003	0.006	0.011	0.002
AB05BH0300	US AIRDRIE	08/20/80	03:45 PM	0.003	0.015	0.025	0.28
AB05BH0300	US AIRDRIE	08/27/80	08:30 AM	L0.003	0.002	0.006	0.003
AB05BH0310	DS AIRDRIE	04/16/80	09:45 AM	0.008	0.002	0.005	0.004
AB05BH0310	DS AIRDRIE	04/16/80	01:00 PM	0.003	0.003	0.006	0.01
AB05BH0310	DS AIRDRIE	04/22/80	01:00 PM	0.009	0.003	0.01	0.004
AB05BH0310	DS AIRDRIE	04/30/80	11:40 AM	0.005	0.004	0.007	0.01
AB05BH0310	DS AIRDRIE	05/06/80	12:25 PM	L0.003	0.002	0.004	L0.002
AB05BH0310	DS AIRDRIE	05/14/80	11:30 AM	L0.003	0.002	0.006	L0.002
AB05BH0310	DS AIRDRIE	05/21/80	12:45 PM	L0.003	0.038	0.018	4
AB05BH0310	DS AIRDRIE	05/28/80	09:15 AM	L0.003	0.01	0.032	0.034

AB05BH0310	DS AIRDRIE	06/01/80	06:40 PM	L0.003	0.005	0.015	L0.002
AB05BH0310	DS AIRDRIE	06/04/80	09:30 AM	L0.003	0.005	0.029	0.006
AB05BH0310	DS AIRDRIE	06/11/80	09:30 AM	L0.003	0.003	0.011	L0.002
AB05BH0310	DS AIRDRIE	06/18/80	09:10 AM	L0.003	0.003	0.004	0.003
AB05BH0310	DS AIRDRIE	06/25/80	09:15 AM	0.004	0.008	0.19	0.003
AB05BH0310	DS AIRDRIE	07/02/80	09:30 AM	0.008	0.018	0.02	L0.002
AB05BH0310	DS AIRDRIE	07/09/80	09:30 AM	L0.003	0.008	0.013	L0.002
AB05BH0310	DS AIRDRIE	07/16/80	09:00 AM	L0.003	0.002	0.006	0.004
AB05BH0310	DS AIRDRIE	07/23/80	12:00 PM	0.003	0.002	0.19	0.003
AB05BH0310	DS AIRDRIE	07/30/80	10:00 AM	0.003	0.02	0.049	0.002
AB05BH0310	DS AIRDRIE	08/06/80	12:00 PM	0.003	0.021	0.012	0.005
AB05BH0310	DS AIRDRIE	08/13/80	09:00 AM	L0.003	0.008	0.009	0.006
AB05BH0310	DS AIRDRIE	08/20/80	08:50 AM	0.003	0.006	0.005	L0.002
AB05BH0310	DS AIRDRIE	08/27/80	09:00 AM	L0.003	0.004	0.023	0.006
AB05BH0310	DS AIRDRIE	09/03/80	08:45 AM	L0.003	0.002	0.016	0.004
AB05BH0310	DS AIRDRIE	09/10/80	12:00 PM	L0.003	0.017	0.015	L0.002
AB05BH0310	DS AIRDRIE	09/17/80	09:40 AM	0.004	0.003	0.008	0.012
AB05BH0310	DS AIRDRIE	09/24/80	07:05 AM	L0.003	0.002	0.003	0.011
AB05BH0320	NOSE 564	04/09/80	01:00 PM	0.005	0.01	0.017	L0.003
AB05BH0320	NOSE 564	04/16/80	01:25 PM	0.007	0.002	0.006	L0.002
AB05BH0320	NOSE 564	04/22/80	11:45 AM	0.009	0.002	0.004	0.006
AB05BH0320	NOSE 564	04/30/80	11:00 AM	L0.003	0.002	0.003	0.004
AB05BH0320	NOSE 564	05/06/80	11:15 AM	L0.003	0.002	0.002	L0.002
AB05BH0320	NOSE 564	05/14/80	10:30 AM	L0.003	L0.001	0.001	L0.002
AB05BH0320	NOSE 564	05/21/80	10:40 AM	L0.003	0.036	0.025	5.83
AB05BH0320	NOSE 564	05/28/80	09:30 AM	0.01	0.007	0.022	0.023
AB05BH0320	NOSE 564	06/04/80	09:45 AM	L0.003	0.008	0.016	0.016
AB05BH0320	NOSE 564	06/11/80	09:55 AM	L0.003	0.003	0.006	L0.002
AB05BH0320	NOSE 564	06/14/80	06:05 PM	L0.003	0.003	0.005	L0.002
AB05BH0320	NOSE 564	06/18/80	10:00 AM	L0.003	0.004	0.005	L0.002
AB05BH0320	NOSE 564	06/19/80	10:30 PM	L0.003	0.002	0.002	L0.002
AB05BH0320	NOSE 564	06/22/80	12:00 PM	L0.003	0.002	0.011	0.002
AB05BH0320	NOSE 564	06/25/80	09:50 AM	0.003	0.003	0.005	L0.002
AB05BH0320	NOSE 564	06/26/80	04:10 PM	0.004	0.015	0.012	0.006
AB05BH0320	NOSE 564	07/02/80	09:45 AM	0.007	0.016	0.014	L0.002
AB05BH0320	NOSE 564	07/09/80	09:45 AM	0.003	0.006	0.019	0.005
AB05BH0320	NOSE 564	07/16/80	09:15 AM	L0.003	0.003	0.009	L0.002
AB05BH0320	NOSE 564	07/23/80	09:10 AM	0.003	0.004	0.1	0.004
AB05BH0320	NOSE 564	07/29/80	12:30 PM	0.005	0.002	0.056	L0.002
AB05BH0320	NOSE 564	07/30/80	10:10 AM	L0.003	0.021	0.042	0.007
AB05BH0320	NOSE 564	08/06/80	09:05 AM	0.004	0.02	0.037	L0.002
AB05BH0320	NOSE 564	08/13/80	09:15 AM	L0.003	0.009	0.036	0.005
AB05BH0320	NOSE 564	08/20/80	09:00 AM	0.003	0.012	0.014	L0.002
AB05BH0320	NOSE 564	08/20/80	07:05 PM	0.003	0.004	0.017	0.005
AB05BH0320	NOSE 564	08/27/80	09:15 AM	L0.003	0.004	0.008	0.008
AB05BH0320	NOSE 564	09/03/80	09:10 AM	L0.003	0.005	0.009	0.003
AB05BH0320	NOSE 564	09/17/80	09:10 AM	0.003	0.004	0.73	0.01
AB05BH0320	NOSE 564	09/24/80	08:00 AM	L0.003	0.001	0.003	L0.002
AB05BH0330	NOSE US W	04/09/80	12:10 PM	0.005	0.011	0.046	L0.003
AB05BH0330	NOSE US W	04/16/80	12:50 PM	0.007	0.003	0.008	0.003
AB05BH0330	NOSE US W	04/22/80	10:40 AM	0.008	0.004	0.004	L0.002
AB05BH0330	NOSE US W	04/30/80	10:15 AM	L0.003	0.002	0.002	0.003
AB05BH0330	NOSE US W	05/06/80	10:20 AM	L0.003	0.002	0.004	0.004
AB05BH0330	NOSE US W	05/14/80	09:40 AM	L0.003	0.02	0.009	1.7
AB05BH0330	NOSE US W	05/16/80	10:05 AM	0.004	0.001	0.005	0.004
AB05BH0330	NOSE US W	05/21/80	09:45 AM	L0.003	0.002	L0.001	0.003
AB05BH0330	NOSE US W	05/23/80	02:45 PM	L0.003	0.001	L0.001	0.004
AB05BH0330	NOSE US W	05/28/80	10:55 AM	L0.003	0.021	0.025	1.6
AB05BH0330	NOSE US W	06/04/80	11:00 AM	0.005	0.008	0.008	0.004
AB05BH0330	NOSE US W	06/11/80	01:15 AM	L0.003	0.005	0.005	L0.002
AB05BH0330	NOSE US W	06/11/80	01:50 AM	L0.003	0.01	0.022	0.01
AB05BH0330	NOSE US W	06/11/80	02:20 AM	L0.003	0.006	0.008	0.006
AB05BH0330	NOSE US W	06/11/80	02:50 AM	L0.003	0.004	0.004	0.004
AB05BH0330	NOSE US W	06/11/80	11:05 AM	L0.003	0.003	0.001	L0.002
AB05BH0330	NOSE US W	06/11/80	12:15 PM	L0.003	0.004	0.005	0.008
AB05BH0330	NOSE US W	06/11/80	12:45 PM	L0.003	0.005	0.005	0.002
AB05BH0330	NOSE US W	06/18/80	11:45 AM	L0.003	0.002	0.002	L0.002
AB05BH0330	NOSE US W	06/19/80	10:10 AM	L0.003	0.002	0.002	0.006
AB05BH0330	NOSE US W	06/22/80	08:20 PM	L0.003	0.004	0.016	L0.002
AB05BH0330	NOSE US W	06/25/80	11:10 AM	0.003	0.002	0.004	0.003
AB05BH0330	NOSE US W	06/26/80	12:00 PM	0.003	0.016	0.016	L0.002
AB05BH0330	NOSE US W	07/02/80	10:55 AM	0.006	0.008	0.023	L0.002
AB05BH0330	NOSE US W	07/09/80	10:50 AM	L0.003	0.002	0.011	0.002
AB05BH0330	NOSE US W	07/23/80	10:45 AM	L0.003	0.002	0.003	0.005
AB05BH0330	NOSE US W	07/30/80	08:30 AM	0.003	0.021	0.01	0.003
AB05BH0330	NOSE US W	08/06/80	10:40 AM	L0.003	0.021	0.029	0.005
AB05BH0330	NOSE US W	08/10/80	07:30 AM	L0.003	0.008	0.009	L0.002
AB05BH0330	NOSE US W	08/10/80	08:30 AM	0.003	0.032	0.026	0.003
AB05BH0330	NOSE US W	08/11/80	09:30 AM	L0.003	0.005	0.013	L0.002
AB05BH0330	NOSE US W	08/11/80	10:30 AM	0.003	0.04	0.2	0.1
AB05BH0330	NOSE US W	08/13/80	09:50 AM	L0.003	0.005	0.011	L0.002
AB05BH0330	NOSE US W	08/20/80	09:45 AM	L0.003	0.003	0.063	0.002
AB05BH0330	NOSE US W	08/27/80	09:45 AM	L0.003	0.004	0.006	0.006
AB05BH0330	NOSE US W	09/03/80	12:00 PM	L0.003	0.004	0.008	L0.002

AB05BH0350	WEST 24	04/09/80	12:30 PM	0.004	0.013	0.017	L0.003
AB05BH0350	WEST 24	04/16/80	01:00 PM	0.003	0.001	0.004	0.004
AB05BH0350	WEST 24	04/22/80	11:05 AM		0.001	0.001	0.002
AB05BH0350	WEST 24	04/30/80	10:40 AM	L0.003	0.001	0.002	L0.002
AB05BH0350	WEST 24	05/06/80	10:45 AM	L0.003	L0.001	L0.001	L0.002
AB05BH0350	WEST 24	05/14/80	10:00 AM	L0.003	L0.001	0.002	L0.002
AB05BH0350	WEST 24	05/21/80	10:10 AM	L0.003	0.004	0.008	0.005
AB05BH0350	WEST 24	05/28/80	10:00 AM	L0.003	0.032	0.024	0.9
AB05BH0350	WEST 24	06/04/80	10:00 AM	L0.003	0.002	0.018	0.003
AB05BH0350	WEST 24	06/11/80	03:30 AM	L0.003	0.002	0.03	0.003
AB05BH0350	WEST 24	06/14/80	05:50 AM	L0.003	0.001	L0.001	L0.002
AB05BH0350	WEST 24	06/18/80	10:35 AM	L0.003	0.001	0.102	L0.002
AB05BH0350	WEST 24	06/19/80	10:00 AM	L0.003	L0.001	L0.001	0.004
AB05BH0350	WEST 24	06/22/80	12:00 PM	L0.003	L0.001	L0.001	L0.002
AB05BH0350	WEST 24	06/25/80	10:10 AM	0.003	0.001	L0.001	L0.002
AB05BH0350	WEST 24	06/26/80	03:45 PM	L0.003	0.015	0.017	L0.002
AB05BH0350	WEST 24	07/02/80	10:15 AM	L0.003	0.009	0.021	0.003
AB05BH0350	WEST 24	07/09/80	10:10 AM	L0.003	0.01	0.012	L0.002
AB05BH0350	WEST 24	07/16/80	07:30 AM	L0.003	0.004	0.006	0.002
AB05BH0350	WEST 24	07/23/80	06:45 AM	0.003	0.002	0.005	L0.002
AB05BH0350	WEST 24	07/29/80	12:00 PM	L0.003	L0.001	0.026	0.006
AB05BH0350	WEST 24	07/30/80	07:30 AM	L0.003	L0.001	0.021	0.012
AB05BH0350	WEST 24	08/06/80	09:40 AM	L0.003	0.017	0.007	L0.002
AB05BH0350	WEST 24	08/13/80	07:30 AM	L0.003	0.003	0.007	0.004
AB05BH0350	WEST 24	08/20/80	07:25 AM	0.1	0.1	0.1	0.1
AB05BH0350	WEST 24	08/20/80	09:15 AM	L0.003	0.006	0.3	0.005
AB05BH0350	WEST 24	08/20/80	07:25 PM	L0.003	0.002	0.011	0.004
AB05BH0350	WEST 24	08/27/80	07:30 AM	L0.003	0.002	0.004	0.007
AB05BH0350	WEST 24	09/03/80	09:30 AM	L0.003	0.002	0.002	L0.002
AB05BH0350	WEST 24	09/10/80	12:00 PM	L0.003	0.015	0.009	L0.002
AB05BH0350	WEST 24	09/17/80	08:45 AM	L0.003	0.002	0.004	0.004
AB05BH0350	WEST 24	09/24/80	07:30 AM	L0.003	L0.001	0.065	L0.002
AB05BH0360	WEST US N	04/09/80	12:00 PM	0.004	0.009	0.025	L0.003
AB05BH0360	WEST US N	04/16/80	12:45 PM	0.004	0.001	0.003	0.002
AB05BH0360	WEST US N	04/22/80	10:30 AM	0.003	0.001	0.002	0.003
AB05BH0360	WEST US N	04/30/80	10:00 AM	0.003	0.001	0.003	0.008
AB05BH0360	WEST US N	05/06/80	10:10 AM	L0.003	0.002	0.004	0.002
AB05BH0360	WEST US N	05/14/80	09:30 AM	L0.003	L0.001	0.001	0.003
AB05BH0360	WEST US N	05/21/80	09:30 AM	L0.003	0.015	0.014	L0.002
AB05BH0360	WEST US N	05/23/80	02:30 PM	L0.003	0.012	0.031	0.035
AB05BH0360	WEST US N	05/28/80	10:35 AM	L0.003	0.025	0.023	1.8
AB05BH0360	WEST US N	06/04/80	10:45 AM	L0.003	0.003	0.011	L0.002
AB05BH0360	WEST US N	06/11/80	11:00 AM	L0.003	0.002	0.003	L0.002
AB05BH0360	WEST US N	06/11/80	11:40 AM	L0.003	0.021	0.024	0.039
AB05BH0360	WEST US N	06/11/80	12:00 PM	L0.003	0.003	0.013	0.044
AB05BH0360	WEST US N	06/11/80	12:30 PM	L0.003	0.005	0.017	0.036
AB05BH0360	WEST US N	06/11/80	01:00 PM	L0.003	0.002	0.003	L0.002
AB05BH0360	WEST US N	06/11/80	02:10 PM	L0.003	0.007	0.028	0.026
AB05BH0360	WEST US N	06/11/80	02:40 PM	L0.003	0.01	0.028	0.041
AB05BH0360	WEST US N	06/18/80	11:30 AM	L0.003	0.001	0.002	L0.002
AB05BH0360	WEST US N	06/22/80	08:30 PM	L0.003	0.004	0.023	L0.002
AB05BH0360	WEST US N	06/25/80	11:10 AM	0.005	0.002	0.084	0.006
AB05BH0360	WEST US N	06/26/80	12:00 PM	0.003	0.022	0.045	0.011
AB05BH0360	WEST US N	07/02/80	10:40 AM	0.004	0.009	0.018	L0.002
AB05BH0360	WEST US N	07/09/80	10:50 AM	L0.003	0.007	0.012	L0.002
AB05BH0360	WEST US N	07/16/80	10:05 AM	0.003	0.003	0.018	L0.002
AB05BH0360	WEST US N	07/23/80	10:30 AM	L0.003	0.001	0.004	0.001
AB05BH0360	WEST US N	07/30/80	08:15 AM	0.004	0.034	0.071	0.014
AB05BH0360	WEST US N	07/30/80	10:30 AM	0.003	0.034	0.071	0.018
AB05BH0360	WEST US N	08/06/80	10:25 AM	L0.003	0.02	0.014	L0.002
AB05BH0360	WEST US N	08/10/80	07:30 AM	L0.003	0.004	0.01	0.006
AB05BH0360	WEST US N	08/10/80	08:30 AM	L0.003	0.005	0.007	0.002
AB05BH0360	WEST US N	08/10/80	09:30 AM	L0.003	0.006	0.011	L0.002
AB05BH0360	WEST US N	08/10/80	10:30 AM	L0.003	0.012	0.024	0.007
AB05BH0360	WEST US N	08/11/80	10:30 AM			0.1	
AB05BH0360	WEST US N	08/13/80	09:50 AM	L0.003	0.008	0.012	0.002
AB05BH0360	WEST US N	08/20/80	09:45 AM	L0.003	0.005	0.078	0.006
AB05BH0360	WEST US N	08/27/80	09:45 AM	L0.003	0.01	0.033	0.012
AB05BH0360	WEST US N	09/10/80	12:00 PM	L0.003	0.012	0.027	0.003
AB05BH0360	WEST US N	09/17/80	08:30 AM	0.007	0.002	0.023	L0.002
AB05BH0360	WEST US N	09/24/80	08:30 AM	L0.003	0.009	0.04	0.024
AB05BH0370	MOUTH	04/09/80	10:15 AM	0.008	0.015	0.025	L0.003
AB05BH0370	MOUTH	04/16/80	12:15 PM	0.005	0.002	0.008	0.003
AB05BH0370	MOUTH	04/22/80	09:45 AM	0.006	0.004	0.008	0.005
AB05BH0370	MOUTH	04/30/80	12:00 PM	0.003	0.004	0.008	0.01
AB05BH0370	MOUTH	05/06/80	09:00 AM	L0.003	0.004	0.008	0.01
AB05BH0370	MOUTH	05/14/80	09:05 AM	L0.003	0.002	0.004	0.008
AB05BH0370	MOUTH	05/21/80	09:00 AM	L0.003	0.003	0.005	0.006
AB05BH0370	MOUTH	05/23/80	01:45 PM	L0.003	0.01	0.043	0.075
AB05BH0370	MOUTH	05/28/80	11:15 AM	0.006	0.021	0.032	0.63
AB05BH0370	MOUTH	06/01/80	03:30 AM				0.68
AB05BH0370	MOUTH	06/01/80	04:50 AM				0.19
AB05BH0370	MOUTH	06/01/80	03:30 PM	0.006	0.01	0.052	0.68
AB05BH0370	MOUTH	06/01/80	03:45 PM	0.008	0.007	0.018	0.44

AB05BH0370	MOUTH	06/01/80	04:00 PM	0.009	0.009	0.035	0.028
AB05BH0370	MOUTH	06/01/80	04:25 PM	0.1	0.009	0.037	0.38
AB05BH0370	MOUTH	06/01/80	04:50 PM	L0.003	0.017	0.11	0.19
AB05BH0370	MOUTH	06/01/80	05:25 PM	L0.003	0.032	0.12	0.67
AB05BH0370	MOUTH	06/04/80	11:15 AM	L0.003	0.008	0.04	0.036
AB05BH0370	MOUTH	06/11/80	11:00 AM	L0.003	0.002	0.003	L0.002
AB05BH0370	MOUTH	06/11/80	12:30 PM	L0.003	0.004	0.01	0.015
AB05BH0370	MOUTH	06/11/80	01:00 PM	L0.003	0.004	0.013	0.018
AB05BH0370	MOUTH	06/11/80	01:30 PM	L0.003	0.004	0.011	0.018
AB05BH0370	MOUTH	06/14/80	04:15 PM	L0.003	0.004	0.015	0.016
AB05BH0370	MOUTH	06/14/80	06:00 PM	L0.003	0.003	0.005	0.014
AB05BH0370	MOUTH	06/14/80	06:30 PM	L0.003	0.003	0.012	0.016
AB05BH0370	MOUTH	06/14/80	07:00 PM	L0.003	0.002	0.007	0.016
AB05BH0370	MOUTH	06/14/80	07:30 PM	L0.003	0.003	0.009	0.05
AB05BH0370	MOUTH	06/14/80	08:00 PM	L0.003	0.002	0.006	0.02
AB05BH0370	MOUTH	06/14/80	08:30 PM	L0.003	0.003	0.009	0.016
AB05BH0370	MOUTH	06/18/80	07:30 AM	L0.003	0.003	0.021	0.01
AB05BH0370	MOUTH	06/19/80	11:30 AM	0.006	0.002	0.001	L0.002
AB05BH0370	MOUTH	06/22/80	05:45 PM	L0.003	0.005	0.022	0.008
AB05BH0370	MOUTH	06/22/80	06:30 PM	L0.003	0.005	0.025	0.014
AB05BH0370	MOUTH	06/22/80	07:00 PM	L0.003	0.005	0.026	0.013
AB05BH0370	MOUTH	06/22/80	07:30 PM	L0.003	0.006	0.044	0.016
AB05BH0370	MOUTH	06/22/80	08:00 PM	L0.003	0.005	0.045	0.012
AB05BH0370	MOUTH	06/22/80	08:30 PM	L0.003	0.005	0.018	0.011
AB05BH0370	MOUTH	06/22/80	09:00 PM	L0.003	0.005	0.023	0.017
AB05BH0370	MOUTH	06/25/80	07:40 AM	0.008	0.005	0.015	0.004
AB05BH0370	MOUTH	06/26/80	02:00 PM	0.005	0.029	0.081	0.056
AB05BH0370	MOUTH	07/02/80	07:35 AM	0.007	0.002	0.068	L0.002
AB05BH0370	MOUTH	07/09/80	07:30 AM	L0.003	0.004	0.041	0.014
AB05BH0370	MOUTH	07/16/80	07:15 AM	0.003	0.006	0.021	0.014
AB05BH0370	MOUTH	07/23/80	07:30 AM	0.005	0.006	0.043	0.015
AB05BH0370	MOUTH	07/29/80	08:30 AM	L0.003	0.01	0.091	0.028
AB05BH0370	MOUTH	07/29/80	09:00 AM	0.003	0.016	0.045	0.025
AB05BH0370	MOUTH	07/29/80	09:30 AM	L0.003	0.016	0.07	0.079
AB05BH0370	MOUTH	07/29/80	10:00 AM	L0.003	0.028	0.1	0.17
AB05BH0370	MOUTH	07/29/80	10:30 AM	L0.003	0.029	0.14	0.26
AB05BH0370	MOUTH	07/29/80	11:00 AM	0.003	0.029	0.11	0.11
AB05BH0370	MOUTH	07/29/80	11:30 AM	0.003	0.029	0.087	0.08
AB05BH0370	MOUTH	07/29/80	12:00 PM	1	1	0.8	1
AB05BH0370	MOUTH	07/30/80	07:15 AM	0.004	0.011	0.051	0.059
AB05BH0370	MOUTH	08/06/80	07:00 AM	L0.003	0.004	0.02	0.016
AB05BH0370	MOUTH	08/10/80	08:30 AM	0.003	0.003	0.006	0.004
AB05BH0370	MOUTH	08/10/80	09:30 AM	L0.003	0.009	0.014	0.009
AB05BH0370	MOUTH	08/10/80	10:30 AM	0.003	0.008	0.024	0.019
AB05BH0370	MOUTH	08/10/80	11:30 AM	0.003	0.007	0.017	0.016
AB05BH0370	MOUTH	08/13/80	12:00 PM	L0.003	0.014	0.017	0.01
AB05BH0370	MOUTH	08/20/80	10:20 AM	0.004	0.016	0.038	0.012
AB05BH0370	MOUTH	08/20/80	03:45 PM	0.003	0.015	0.025	0.28
AB05BH0370	MOUTH	08/20/80	04:15 PM	0.004	0.015	0.035	0.029
AB05BH0370	MOUTH	08/20/80	04:45 PM	L0.003	0.011	0.017	0.024
AB05BH0370	MOUTH	08/20/80	05:15 PM	0.003	0.01	0.019	0.01
AB05BH0370	MOUTH	08/20/80	05:45 PM	0.003	0.011	0.022	0.012
AB05BH0370	MOUTH	08/20/80	06:15 PM	0.004	0.011	0.025	0.019
AB05BH0370	MOUTH	08/27/80	10:00 AM	0.003	0.004	0.01	0.012
AB05BH0370	MOUTH	09/03/80	08:00 AM	L0.003	0.007	0.017	0.017
AB05BH0370	MOUTH	09/10/80	12:00 PM	L0.003	0.005	0.002	L0.002
AB05BH0370	MOUTH	09/17/80	07:00 AM	0.003	0.003	0.013	0.013
AB05BH0370	MOUTH	09/24/80	09:15 AM	L0.003	0.001	0.008	0.007
AB05BH0390	MOUTH	08/17/82	10:10 AM		0.004	0.008	0.008
AB05BH0370	MOUTH	04/23/85	02:30 PM	0.001	0.003	0.02	0.02
AB05BH0370	MOUTH	07/15/85	02:35 PM	L0.001	0.004	0.02	0.013
AB05BH0370	MOUTH	10/08/85	09:00 AM	0.001	L0.001	0.01	0.005
AB05BH0370	MOUTH	07/21/93	11:15 AM	L0.002	0.004	0.031	0.009
AB05BH0370	MOUTH	08/15/93	01:40 PM			0.028	
AB05BH0370	MOUTH	08/15/93	03:40 PM			0.022	
AB05BH0370	MOUTH	08/15/93	05:40 PM			0.022	
AB05BH0370	MOUTH	08/15/93	07:40 PM			0.02	
AB05BH0370	MOUTH	08/15/93	09:40 PM			0.052	
AB05BH0370	MOUTH	08/15/93	11:40 PM			0.058	
AB05BH0370	MOUTH	08/16/93	01:40 AM			0.061	
AB05BH0370	MOUTH	08/16/93	03:40 AM			0.059	
AB05BH0370	MOUTH	08/16/93	05:40 AM			0.04	
AB05BH0370	MOUTH	08/16/93	07:40 AM			0.03	
AB05BH0370	MOUTH	08/16/93	09:00 AM			0.03	
AB05BH0370	MOUTH	08/17/93	11:30 AM	0.025	0.012	0.022	0.002
AB05BH0370	MOUTH	09/13/93	09:15 AM	0.01	0.007	0.023	L0.002
AB05BH0370	MOUTH	09/13/93	09:20 AM	L0.002	0.007	0.02	0.002
AB05BH0370	MOUTH	11/17/93	01:50 PM	0.002	0.006	0.015	L0.002
AB05BH0370	MOUTH	01/25/94	09:00 AM	L0.002	0.005	0.02	L0.002
AB05BH0370	MOUTH	03/22/94	09:00 AM	0.003	0.003	0.016	L0.002
AB05BH0370	MOUTH	08/10/95	11:58 AM	0.003	0.007	0.014	L0.002
AB05BH0370	MOUTH	08/10/95	12:00 PM	0.003	0.005	0.014	0.007
AB05BH0370	MOUTH	02/28/96	08:42 AM	0.008	0.007	0.035	0.0026
AB05BH0370	MOUTH	02/28/96	08:47 AM	0.006	0.008	0.033	0.0023

STN NO	STN NAME	DATE	TIME	ECOLI	ODOUR	COLOUR	O&G	TR	F	OP	NO2
AB05BH0390	MOUTH	04/24/75	10:00 AM		10		2	450	0.78		L0.1
AB05BH0310	DS AIRDRIE	09/24/80	07:05 AM				1				
AB05BH0320	NOSE 564	06/18/80	10:00 AM				1				
AB05BH0320	NOSE 564	09/24/80	08:00 AM				1				
AB05BH0350	WEST 24	06/14/80	05:50 PM				2				
AB05BH0350	WEST 24	09/24/80	07:30 AM				0				
AB05BH0360	WEST US NOSE	09/24/80	08:30 AM				1				
AB05BH0370	MOUTH	06/14/80	04:15 PM				1				
AB05BH0370	MOUTH	06/14/80	06:00 PM				4				
AB05BH0370	MOUTH	06/14/80	06:30 PM				4				
AB05BH0370	MOUTH	06/14/80	07:30 PM				34				
AB05BH0370	MOUTH	06/14/80	08:00 PM				29				
AB05BH0370	MOUTH	06/14/80	08:30 PM				323				
AB05BH0370	MOUTH	06/19/80	11:10 PM				2				
AB05BH0370	MOUTH	06/22/80	05:45 PM				2				
AB05BH0370	MOUTH	06/22/80	06:30 PM				3				
AB05BH0370	MOUTH	06/22/80	07:00 PM				4				
AB05BH0370	MOUTH	09/24/80	09:15 AM				L1				
AB05BH0390	MOUTH	08/17/82	10:10 AM						0.25	0.03	
AB05BH0370	MOUTH	07/21/93	11:15 AM			20					
AB05BH0370	MOUTH	08/17/93	11:30 AM			30					
AB05BH0370	MOUTH	09/13/93	09:15 AM			20					
AB05BH0370	MOUTH	09/13/93	09:20 AM			20					
AB05BH0370	MOUTH	11/17/93	01:50 PM			20					
AB05BH0370	MOUTH	01/25/94	09:00 AM			10					
AB05BH0370	MOUTH	03/22/94	09:00 AM			50					
AB05BH0370	MOUTH	08/22/94	11:45 AM	1700							
AB05BH0340	WEST 722	03/30/95	02:00 PM			24					
AB05BH0340	WEST 722	04/05/95	11:30 AM			28					
AB05BH0340	WEST 722	04/13/95	10:30 AM			21					
AB05BH0340	WEST 722	04/18/95	01:30 PM			17					
AB05BH0340	WEST 722	04/26/95	12:00 PM			24					
AB05BH0340	WEST 722	06/06/95	03:15 PM			63					
AB05BH0340	WEST 722	06/20/95	09:45 AM			72					
AB05BH0340	WEST 722	07/19/95	01:45 PM			71					
AB05BH0340	WEST 722	08/10/95	09:25 AM			44					
AB05BH0370	MOUTH	08/10/95	11:58 AM	109				620	0.26		0.053
AB05BH0370	MOUTH	08/10/95	12:00 PM					622	0.26		0.053
AB05BH0370	MOUTH	02/28/96	08:42 AM	490							
AB05BH0250	SEWER 27	06/01/80	03:15 PM				2				
AB05BH0250	SEWER 27	06/01/80	04:00 PM				11				
AB05BH0250	SEWER 27	06/01/80	05:00 PM				2				
AB05BH0250	SEWER 27	06/14/80	04:00 PM				5				
AB05BH0250	SEWER 27	06/14/80	04:15 PM				2				
AB05BH0250	SEWER 27	06/14/80	04:30 PM				3				
AB05BH0250	SEWER 27	06/14/80	06:00 PM				1				
AB05BH0250	SEWER 27	06/22/80	05:00 PM				13				
AB05BH0250	SEWER 27	06/22/80	05:15 PM				5				
AB05BH0250	SEWER 27	06/22/80	05:30 PM				41				
AB05BH0260	SEWER 13	06/19/80	09:30 PM				10				

NOSE CREEK AT CITY LIMITS

Date yy/mm/dd	Temp. deg. C	TSS mg/l	pH Units	Cond. us/cm	P. Alk. g CaCO3/	T. Alk. g CaCO3/	BOD mg/l	D.O. mg/l	Total P mg/l	Na mg/l	K mg/l	Ca mg/l	Mg mg/l	NH3-N mg/l	Cl mg/l	NO3 mg/l	SO4 mg/l	otal Coll. #/100ml	ecal Coll. #/100ml	ecal Strep #/100ml	E.Coll.	Ratio
95/06/07	12.5	8.8	8.48	1403	5.1	352.9	4.3	6.58	0.31	189.2	8.66	60.25	43.78	<0.5	75.78	<1.25	<1.25	TNTC	2400	850	1700	2.82
95/06/21	14.5	8.2	8.38	1200	4	377.1	3.4	4.96	0.38	N.R.	N.R.	N.R.	N.R.	N.R.	63.26	<1	239.8	TNTC	TNTC	TNTC	TNTC	TNTC
95/07/05	12.5	10.5	7.98	727	0	222.1	1	3.91	0.4	105.1	7.06	30.8	21.8	<0.5	51.6	<1	108.9	4700	3200	1700	300	1.88
95/07/19	18	6.6	8.14	982	0	351.8	1	5.57	0.48	132.6	9.35	50	37.6	<0.5	51.4	<1	172	2900	1300	300	700	4.33
95/08/02	16	5.8	8.7	959	13.1	351.1	2	5.47	0.29	151	7.59	47.42	36.7	<0.5	60.8	<1	146.4	200	100	10	200	10
95/08/16	14	3	8.85	943	15.5	324.1	1.1	6.34	0.14	114.4	7.03	38	32.5	<0.5	43.3	<1	128.3	550	30	30	400	0
95/08/30	13.2	5.5	8.71	950	9.6	272.4	1.4	NR	0.24	146.8	7.42	46.3	31.4	<0.5	63.9	<1	141.1	2000	1900	400	1100	4.8
95/09/13	16.5	29.5	8.57	712	7.9	232.9	2	6.64	0.24	93.6	6.96	34.4	23.3	<0.5	32.9	<1	87.4	3900	3300	120	1200	27.5
95/09/27	9	7	8.8	1130	11.2	350.1	1.6	6.05	0.06	177.9	10.82	54.02	45.6	<0.5	52.93	<1	216.9	400	100	40	100	2.5
95/10/11	5.8	1	8.44	1150	10.3	346.8	1.5	6.85	0.03	166.6	9.82	52	41.96	<.05	39.46	<1	146.3	20	16	8	0	2
95/10/25	1	17.8	8.7	1030	10.4	359.6	2.9	10.55	0.06	187.1	11.05	58.75	51	<.05	56.78	<1	223.6	N.S.	N.S.	N.S.	N.S.	N.S.
95/11/08	1	83	8.42	1570	0	585.3	5.7	7.05	0.22	233.2	15.7	90.9	74.7	<.05	N.R.	N.R.	N.R.	195	158	20	100	7.9
95/11/22	1	5	8.07	1025	0	415.0	2.8	7	0.18	222.1	15.3	81.3	59.2	<.05	158.8	0.17	214.82	200	90	40	100	2.2
95/12/06	1	8.2	7.92	1980	0	688.0	1.9	5.11	0.38	265.4	18.2	108.6	76.9	<0.5	150.9	0.3	296.4	160	64	40	100	0.02
96/02/28	-0.5	11	7.65	1240	0.00	390.6	27.1	N.R.	1.79	137.1	90.7	73.9	36.5	0.8	98.7	1.4	129.3	1200	100	80	0	1.2
96/03/13	3.2	12.5	7.45	217	0.00	85.0	>24	8.75	1.46	17.7	31.1	21.6	8.4	0.8	12.0	0.7	16.2	410	220	300	0	0.73
96/04/10	9	66.5	7.9	353	0.00	133.2	5	7.37	0.57	NR	NR	NR	NR	NR	11.0	0.7	24.9	20	20	30	0	0.66
96/04/24	8.9	8	8.26	563	0.00	270.5	3.5	8.42	0.32	62.9	14.4	44.2	28.0	ND	17.7	<1.0	41.2	80	0	0	0	0
96/05/22	12	54	8.34	1230	12.8	451.2	4.6	5.20	0.69	173.3	12.5	68.3	47.4	ND	37.0	N.D.	186.4	6900	525	860	500	0.61
96/05/28	12.2	29.5	8.41	1120	7.9	500.2	4	7.22	0.71	169.2	12.9	71.9	51.8	ND	58.0	N.D.	171.2	910	830	1100	900	0.83
96/06/19	12.8	13	8.61	1250	11.9	436.9	4.8	6.35	0.71	193.7	12.0	74.7	56.8	<.5	45.9	ND	313.7	8500	2187	1540	5500	1.42
96/07/03	19	47	8.47	1210	8.5	469.0	3.7	5.35	0.77	158.9	10.7	58.0	50.1	ND	36.6	ND	140.6	2800	1690	215	1400	7.9
96/07/17	18	16.5	8.9	1140	29	428.0	2.3	4.85	0.75	156.3	10.4	62.7	52.6	ND	39.0	ND	198.3	740	475	270	400	1.76
96/07/31	17	13.8	9.06	697	21	279.0	1.2	6.15	0.65	92.0	6.1	35.2	26.5	ND	32.0	ND	99.1	640	125	510	0	0.25
96/08/14	16	16.6	9.18	812	22	258.0	3.7	3.45	0.57	109.1	7.8	34.2	26.5	ND	35.2	ND	102.3	5100	4000	240	1400	16.7
96/08/28	16	19.6	9.49	635	38.6	210.6	3.8	4.85	0.34	84.9	5.4	30.6	20.8	ND	40.1	0.8	122.6	3910	110	130	600	0.85
96/09/11	10	65	9.36	946	40	251.0	5.1	4.93	0.35	107.6	5.9	20.5	17.1	ND	35.6	ND	110.2	2794	47	630	0.07	
96/09/25	6.5	12.8	8.44	548	8	180.0	2.3	9.50	0.1	75.9	4.6	26.3	15.9	ND	39.7	<.5	95.3	2400	41	89	0	0.46
96/10/09	6.5	3.4	8.76	767	13	248.0	2.3	8.22	0.01	96.3	7.8	43.3	26.9	ND	66.4	<0.2	145.9	190	26	27	0	0.96
96/10/23	1	10.6	8.5	869	20	380.0	2.6	7.70	0.12	170.0	12.5	78.9	52.5	ND	99.2	<0.2	230.4	193	40	67	100	0.6
96/11/06	1	13.8	8.41	974	5	413.5	2.1	NR	0.08	165.7	11.2	71.9	48.5	ND	19.6	0.3	25.1	420	176	82	100	2.2
96/12/04	1	14	7.91	1690	0	546.0	3.6	6.00	0.12	339.1	17.4	118.5	83.6	0.7	258.0	<1	333.6	64	13	15	0	0.87
96/12/18	0	18.4	7.97	1610	0	594.0	3.2	7.40	0.13	329.8	14.9	113.8	80.6	0.7	206.1	<1	421.3	259	9	8	0	1.12
97/01/15	-0.5	266	7.65	1910	0	814.1	7.5	1.35	1.14	406.2	16.3	140.6	100	1.2	263.6	4	531.3	60	0	0	10	0.0
97/01/29	1.4	15	8.25	1240	0	404	<1.6	9.60	0.07	93.5	4.6	93	56.8	N.D.	46.5	2	227.2	1100	351	30	200	11.7
97/02/26	0	25	8.15	1670	0	351.1	12.7	4.55	0.68	254.9	17.3	63.1	42.7	0.6	234.9	<1.0	231.4	1150	416	300	400	1.4
97/03/12	1	10	7.64	1831	0	301	3.2	1.91	0.12	299.4	13.1	63.6	32.8	<.5	424.8	N.D.	164.7	20	0	10	0	0.0
97/03/25	1	118	7.87	200	0	98	8.4	9.00	0.68	16.2	11.4	17	7	0.2	8.2	0.4	13.7	228	172	66	0	2.6
97/04/23	7.5	9.2	8.42	647	2.3	244.2	1.3	9.10	0.19	20.8	ND	3.4	ND	N.D.	37.5	N.D.	N.D.	11	6	13	0	0.5
97/05/07	9	9.3	8.57	918	17	391.5	1.8	8.60	0.17	114.2	8.7	66.3	42.2	N.D.	21.3	N.D.	127.1	232	98	16	100	6.1
97/05/21	4.2	14	8.51	822	7.0	309	3.6	9.65	0.72	35.0	2.8	18.1	13.2	N.D.	4.7	N.D.	14.6	440	237	157	100	1.5
97/06/04	18	5.5	8.42	952	7.0	380	2.2	5.45	0.25	98.7	10.4	59.6	43	N.D.	23.6	N.D.	114.5	330	118	30	200	3.9
97/06/18	16.6	1.5	8.35	1060	8	425.1	2.6	6.00	0.40	117.1	9.8	60.7	44.4	ND	58.2	<1.0	234.1	1100	205	49	0	4.2
97/07/02	15.5	11.5	8.6	914	14.1	376	2.4	8.50	0.15	89.1	151.6	28.5	11.8	ND	31.9	<1.0	94.1	850	420	124	700	3.4
97/07/08	18	16.4	8.63	1030	13.8	436.8	2.7	5.55	0.22	127.9	8.8	60.9	48.4	ND	26.9	<1.0	88.5	480	233	85	200	2.7
97/07/22	20.5	23	8.78	1170	23.8	467.1	3.9	ND	0.28	137.5	8.8	47.6	47.7	ND	33.4	ND	113.8	5000	550	98	600	5.6
97/08/05	20.5	18	8.83	1190	22	418	3.0	5.62	0.24	161.3	8.4	42.2	47.7	ND	45.8	ND	135.7	1200	480	11.1	800	4.3
97/08/19	15.5	21	8.8	592	19.6	177.2	4.1	8.03	0.21	68.3	4.6	29.8	17.1	ND	31.2	<0.2	81.6	4400	460	245	500	1.9
97/09/02	15	11.5	8.79	1030	15	373	3.3	7.18	0.10	146.5	10.2	50.1	44.4	ND	37.6	<1.0	129.7	2200	170	36	200	4.7
97/09/16	13	10.5	8.48	894	6	325.4	1.7	7.28	0.07	115.4	8.7	49.3	36.3	ND	34.5	<.5	119.7	2750	258	88	200	3.0
97/09/30	10	12.2	8.53	980	8.8	355.7	2.0	7.30	0.06	133.2	10.4	43.3	56.8	ND	643.4	<0.5	108.6	900	88	20	200	4.4
97/10/14	5	20.5	8.37	876	8	313	2.4	9.55	0.01	128.7	10.1	58.9	40.7	<1	70.1	<0.5	109.8	585	18	23	200	0.8
97/11/12	1	13.5	8.55	1120	14.1	541.3	3.4	12.22	0.08	149.0	10.1	71	57	ND	40.3	<1.0	113.3	18	7	10	0	0.7
97/11/25	0.7	11.5	8.36	1270	1.3	632.9	2.8	8.54	0.06	215.1	13.3	90.2	73.3	ND	76	<1	199.1	30	4	4	0	0.0
97/12/09	0.6	109	7.99	2250	0	975	6.1	8.26	0.30	400.6	21.2	160.2	119.8	ND	139	<.5	464.5	16	0	8	0	0.0
97/12/23	0	3581	7.75	2540	0	1344.5	16.8	5.00	2.31	436.7	18.1	153.9	119.7	ND	146.7	<1	537.6	30	90	0	0	0.0
98/01/06	-18o	570	7.62	2920	0	1441	18.0	2.00	0.40	580.7	21.9	211.6	161.9	ND	74.3	ND	133.3	5	3	2	0	—
98/02/17*	1.3	46	7.78	2780	0	1070	18.7	ND	0.47	440.0	15.2	124.4	79.3	ND	105.5	<1.0	441	36	0	0	0	mple from
98/04/14	5.5	23.2	8.2	610	0.0	234.1	4.6	10.20	0.27	67.5	12.4	47	27	0.3	22	0.3	83.5	168	14	28	0	0.5
98/04/28	13	18.0	8.36	924	4.0	352	4.0	7.86	0.81	150.4	22	87.5	47.4	1	31.5	<0.15	120.7	76	8	15	0	0.5
98/05/12	13.7	11.5	8.62	1270	19.9	482.8	3.2	6.68	0.32	394.8	30.5	195.8	134.9	1	NR	NR	NR	77	14	7	0	20.0
98/05/26	12	17.2	8.8	1040	22.1	392.6	3.6	6.81	0.34	143.6	9	61.7	45.2	0.5	NR	NR	NR	303	82	125	100	0.7
98/06/09	16	20.2	8.9	1090	26.0	417	2.1	7.51	0.18	134.7	8.8	57.5	43.6	ND	36.2	<.15	141.4	1480	576	165	800	3.5
98/06/23	17.4	9.0	8.29	1020	6.0	359.5	2.2	6.00	0.26	135.9	8.7	51.3	35.2	0.5	36.2	<0.3	151.4	564	400	104	400	3.9
98/07/07	20	11	7.92	794	0	283	2.8	4.30	0.55	99.6	9.7	39.6	23.9	ND	20.5	<0.3	103.3	750	380	220	400	1.7
98/07/21	19	8.2	8.12	777	0	346.8	2.0	5.10	0.46	77.9	9.4	50.2	32	0.27	22.3	0.2	78.6	1080	245	125	300	2.0
98/08/04	20.2	11.6	8.46	928	9.5	421.6	2.7	6.20	0.50	110.5	11.6	64.3	42	ND	32	0.07	131.9	1340	202	60	600	3.4
98/08/18	16.7	42	8.88	285	29.3	487.3	7.4	9.33	0.24	189.3	12.7	76.2	59.2	ND	45.2	<.03	347.2	2450	255	129	700	2.0
98/09/01	17	16.6	8.75	1040	8.5	410	2.0	7.17	0.24	163.1	9.8	52.7	44.6	ND	39.8	<0.3	215.5	2800	144	51	0	2.8
NEW METHOD FOR METALS - ICP/MS --See attachments for additional metal analysis																						
98/09/15	12.1	15.5	8.28	1350	9.0	403.0	2.6	8.13	0.17	218.7	11.4	53.8	52.9	ND	57.2	ND	337.7	3600	20	101	200	0.2
98/09/29	10.5	21	8.74	1180	14	390	3.6	6.56	0.13	166.1	9.7	45.8	43.6	ND	36.8	ND	242.4	880	11	12	0	0.9
98/10/27	5.9	21.5	8.79	980	16.1	329	8.5	9.18	0.09	156.2	10	47.1	44.2	ND	23.3	<.06	224.5	170	6	24	0	0.3
98/11/10	0	22.5	8.38	1020	5	374	2.8	8.48	0.38	153.1	13.9	78.2	54.1	0.6	122.8	0.3	257.9	260	56	112	0	0.5
98/11/24	0	14.8	8.31	1350	0	509	2.5	8.60	0.14	212.6	16.2	100.7	70.9	0.7	122.9	0.3	316	110	30	4	0	1.5
98/12/08	0	19.8	7.88	N.R.	0	687.8	2.4	N.R.	0.14	257.4	17.1	113	81.2	1.2	138	0.4	401.7	490	120	270	300	0.44
98/12/22	0	118	7.68	3390	0	1447	5.5	5.16	0.02	671.0	39.9	139.4	211.5	4	358.6	0.4	1091.6	740	32	15	100	2.1

Date	Cr	Cu	Zn	Pb	Al	Cd	Fe	Ni	Ag	As	B	Ba	Be	Co	Hg	Mn	Mo	Sb	Se	Sn	Sr	Ti	U	V
yy/mm/dd	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
95/06/07	0.017	0.006	0.012	<.03	<.165	0.003	0.357	<.01																
95/06/21	<.003	0.718	0.038	<.03	0.2	0.001	0.494	0.03																
95/07/05	0.035	0.013	0.021	<.03	0.3	<.001	0.863	0.048																
95/07/19	0.046	0.013	<.002	<.03	<.16	<.001	0.256	0.015																
95/08/02	0.004	<.002	<.002	<.03	<.16	<.001	0.121	0.055																
95/08/16	<.003	0.009	0.019	0.13	0.7	<.001	0.161	<.01																
95/08/30	0.004	0.006	0.006	<.03	<.16	0.003	0.181	<.01																
95/09/13	0.006	0.01	0.017	0.06	<.165	<.001	1.419	0.019																
95/09/27	0.006	<.002	0.019	<.03	0.3	0.001	0.216	0.027																
95/10/11	0.007	0.034	0.013	<.03	<.165	0.005	0.162	<.01																
95/10/25	<.003	0.005	0.048	<.03	<.16	<.001	0.377	0.017																
95/11/08	<.003	0.016	0.008	<.03	2.3	0.005	2.037	0.055																
95/11/22	<.003	0.019	0.027	0.06	<.16	0.009	0.42	0.126																
95/12/06	0.023	0.027	0.015	0.03	0.5	0.003	0.658	0.058																
96/02/28	<.003	0.063	0.038	0.03	<.16	0.012	0.722	0.03																
96/03/13	<.003	0.003	0.043	<.03	0.5	0.001	0.743	0.032																
96/04/10	<.003	0.011	0.02	0.05	1.3	0.008	1.871	0.058																
96/04/24	0.028	0.026	<.002	<.03	<.16	0.002	0.54	0.063																
96/05/22	<0.003	0.032	0.016	0.04	1.6	<0.001	1.898	0.017																
96/05/28	0.035	0.011	<.002	<.03	0.7	0.004	1.023	<.01																
96/06/19	0.003	0.025	<.002	0.05	0.4	0.016	0.531	0.128																
96/07/03	<.003	0.006	<.002	<.03	1.5	0.003	1.89	0.035																
96/07/17	<.003	<.002	0.103	<.03	<.16	0.007	0.633	<.009																
96/07/31	<.003	0.035	0.233	<.03	0.5	0.002	0.585	0.03																
96/08/14	<.003	<.002	0.154	0.13	0.2	0.005	0.687	<.009																
96/08/28	<.003	<.002	0.126	0.05	0.6	0.009	0.678	0.047																
96/09/11	<.003	0.008	0.322	<0.03	2.8	0.008	3.332	0.028																
96/10/09	<.003	0.013	0.031	0.03	0.7	0.014	0.421	0.044																
96/10/23	0.01	<.002	0.058	0.04	0.5	0.004	0.582	0.017																
96/11/06	0.017	0.036	0.033	0.06	<.16	0.007	0.574	0.063																
96/12/04	<.003	0.024	0.016	0.09	<.16	0.01	0.587	<.009																
96/12/18	0.005	0.026	0.007	0.09	1	0.001	0.788	0.018																
97/01/15	0.032	0.038	0.031	0.06	5.30	0.012	6.785	0.036																
97/01/29	0.009	0.056	0.019	<.03	<.165	0.008	0.729	0.047																
97/02/26	<.003	0.013	<.002	0.03	0.70	0.022	1.076	0.042																
97/03/12	0.04	0.105	0.026	0.06	0.18	0.006	0.759	0.084																
97/03/25	0.009	0.040	0.044	0.03	1.60	0.008	2.544	0.091																
97/04/23	<.003	<.002	<.002	<.03	<.16	0.008	0.358	0.058																
97/05/07	0.005	0.014	<.002	0.03	<.16	0.009	0.406	0.028																
97/05/21	<.003	0.060	0.034	<.03	1.20	0.002	1.079	0.086																
97/06/04	0.036	0.065	0.737	<.03	<.16	0.012	0.384	0.152																
97/06/18	<.003	0.111	0.212	<.03	<.16	0.019	0.510	0.058																
97/07/02	<.003	0.033	0.485	<0.03	<.16	0.011	0.513	0.059																
97/07/08	<0.033	0.047	0.265	0.03	0.20	0.01	0.515	0.061																
97/07/22	<0.003	0.480	0.253	0.04	0.60	0.01	0.873	0.034																
97/08/05	0.078	0.062	18.200	0.07	0.90	0.013	0.702	0.057																
97/08/19	0.014	0.028	0.462	0.09	1.20	0.013	0.991	0.053																
97/09/02	0.004	0.040	0.200	0.04	0.60	0.013	0.631	0.038																
97/09/16	<.003	0.023	0.256	0.04	<.16	0.012	0.571	0.051																
97/09/30	0.025	0.056	0.330	<.03	0.20	0.009	0.429	0.018																
97/10/14	<.003	0.048	0.234	<.03	0.40	0.019	0.865	0.067																
97/11/12	0.024	0.010	0.003	<.03	0.20	0.003	0.609	0.027																
97/11/25	<.003	0.020	<.002	0.05	0.20	0.005	0.555	0.027																
97/12/09	<.001	0.021	0.022	0.05	1.60	0.006	2.169	<.009																
97/12/23	0.045	0.117	0.393	0.14	37.50	0.012	55.660	0.097																
98/01/06	0.021	0.052	0.091	0.14	8.60	0.016	13.195	0.072																
98/02/17*	0.007	0.011	0.020	<.03	<.16	0.006	7.401	0.051																
98/04/14	<.003	0.010	0.019	<.03	0.60	<.001	0.994	<.009																
98/04/28	<.003	0.023	0.021	0.03	<.16	0.002	0.721	0.009																
98/05/12	0.02	<.002	0.014	0.004	0.20	0.002	0.263	0.016																
98/05/26	0.023	<.002	0.015	0.03	0.20	0.001	0.418	0.024																
98/06/09	0.026	<.002	0.007	0.03	0.30	0.003	0.568	0.020																
98/06/23	0.006	<.002	0.029	<.03	1.00	0.004	0.553	0.015																
98/07/07	0.01	0.005	0.021	0.03	<.16	0.003	0.740	<.01																
98/07/21	<.003	<.002	0.013	<.03	<.16	0.003	0.354	0.016																
98/08/04	<.003	0.001	<.002	<..03	<.16	<.002	0.265	<.010																
98/08/18	0.12	<0.002	<0.002	<0.03	<.16	0.006	0.430	<0.010																
98/09/01	<.003	0.025	<.002	0.05	<.16	0.003	0.752	<.009																
	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	NEW	METHOD	ICP/MS													
98/09/15	1.84	15.1	12.5	1.22	447	nd	646	8.07	0.088	0.8	131	162	nd	0.597	nd	39.8	6.65	0.821	4.4	0.154	529	5.07	4.77	4.21
98/09/29	2.08	11.4	10.4	1.87	545	nd	687	7.95	0.073	nd	130	148	nd	0.955	nd	36.6	5.64	0.621	8.9	0.085	502	5.36	5.52	3.59
98/10/27	1.42	8.64	12.1	0.439	555	nd	547	5.7	0.088	nd	57.4	149	nd	0.497	nd	24.7	5.55	0.559	118	0.147	423	4.68	5.01	2.94
98/11/10	2.94	11.8	16.7	1.1	844	0.101	948	7.32	0.217	1.27	129	176	nd	0.498	nd	35.8	5.9	0.408	30	0.185	520	7.57	6.52	3.57
98/11/24	2.07	9.3	11.3	0.74	461	0.136	764	6.25	nd	2.44	177	206	nd	0.374	nd	27.8	6.9	0.509	29.1	nd	731	4.46	8.12	2.74
98/12/08	3.82	11.3	17.1	1.01	1071	0.295	1206	2.56	0.122	2.87	148	267	nd	0.422	0.036	60.8	9.09	0.609	28.8	0.557	1041	8.15	11.2	4.45
98/12/22	10.6	19.8	2.54	2.43	2028	0.373	2561	12.30	0.585	0.091	327	526	nd	1.3	nd	207	14.6	0.855	88.6	0.408	2003	18.7	20.9	6.9

AGAT® Laboratories
3801 - 21st STREET N.E. CALGARY, ALBERTA T2E 6T5
TEL: (403) 299-2000 FAX: (403) 299-2010

CITY OF AIRDRIE

ATTENTION: MIKE SHEPHERD

File Number : 31166.126
Date Sampled : 98-09-25
Date Received: 98-09-25
Date Reported: 98-10-08

WATER ANALYSIS

fs @ Eastlake
@ 1 Sol

W of office Lanes

N of Airdrie

PARAMETER	LAB NUMBER-> SAMPLE ID ->	246126 CREEK WATER-MAIN ST.& NOSE CREEK @ 2:40PM	246127 (Tower) CREEK WATER-TAVER LANE & NOSE CREEK @2:00PM	246128 CREEK WATER-HW #567 & NOSE CREEK @ 1:20 PM
Dissolved Oxygen	mg/L	14.9	17.3	15.7
Biochemical Oxygen Demand	mg/L	7	5	12
Total Organic Carbon	mg/L	25	16	18
Total Kjeldahl Nitrogen	mg/L	2.46	1.79	2.16
Nitrate	mg/L	6.2	1.0	1.4
Nitrite	mg/L	<0.3	<0.3	<0.3
Oil & Grease	mg/L	2.6	98.2	192

A17

AGAT® Laboratories
3801 - 21st STREET N.E. CALGARY, ALBERTA T2E 6T5
TEL: (403) 299-2000 FAX: (403) 299-2010

CITY OF AIRDRIE

ATTENTION: MIKE SHEPHERD

File Number : 31480.612
Date Sampled : 98-10-05
Date Received: 98-10-05
Date Reported: 98-10-14

WATER ANALYSIS
NOSE CREEK

storm sewer from west

PARAMETER	LAB NUMBER-> SAMPLE ID ->	246612 SOUTH OF BIG HILLS SPRINGS RD.@ 2:10	246613 NORTH OF BIG HILLS SPRINGS RD.@ 2:00
Dissolved Oxygen	mg/L	23.0	22.5
Biochemical Oxygen Demand	mg/L	11	11
Total Organic Carbon	mg/L	18	18
Total Kjeldahl Nitrogen	mg/L	2.09	2.01
Nitrate	mg/L	2.8	2.6
Nitrite	mg/L	<0.3	<0.3
Oil & Grease	mg/L	<0.2	<0.2

< VALUES REFER TO METHOD DETECTION LIMITS

Table 18

Summary of Concentrations of Herbicide and Pesticide Samples From Routine Creek and Storm Sewer Discharge Samples

Pesticide/Herbicides (mg/L)	May 6				May 21				May 23*	
	Site 3	Site 5	Site 6	Site 7	Site 3	Site 5	Site 6	Site 7	Site 5	Site 6
2,4 - D	< 0.001	0.81	0.19	<0.001	< 0.001	0.36	<0.001	<0.001	<0.001	<0.001
Temephos	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.26	.30
Chlorpyrifos	ALL SAMPLES - <0.001 mg/l.									

* Storm Samples

Pesticide/ Herbicide	Storm Sewer N-27 Sampling dates								Storm Sewer N-13
	May 8*	May 23	May 25	May 26	June 1	June 14	June 22	June 26	May 26
2,4 -D	0.39	0.43	< 0.001	0.19	0.63	0.21	0.17	< 0.001	< 0.001
Temephos	ALL SAMPLES < 0.001 mg/l.								
Chlorpyrifos	ALL SAMPLES < 0.001 mg/l.								

* Dry-weather samples
< Indicates values " less than "

Table 2. Results (ug/L) of pesticide sampling of WID canal, selected storm outfalls and Nose Creek, June 1998

Site	2,4-D	2,4-DP	Atrazine	Bromacil	Bromoxynil	Clopyralid	Diazinon	Dicamba	Dimethoate	Lindane	MCPA	MCPP	Picloram	Triallate
Nose Cr u/s Calgary	0.226	0.039	0.011		0.030						0.099	0.224	0.152	
Nose Cr @ Memorial	0.143	0.012	0.033		0.032	0.017x	0.008	0.043		0.006	0.080	0.234	0.063	
WID @ diversion	0.031		0.004x		0.005						0.014	0.021	0.009	
IC-8	0.023		0.006	0.612	0.014					0.005	0.006	0.012		
WID @ 61 Ave	0.036		0.005		0.005						0.014	0.030	0.010	
IC-17	0.164	0.015	0.045		0.039			0.014x	0.075	0.044	0.043	0.054	0.068	0.014
WID @ Barlow	0.039		0.007								0.013	0.029	0.010	
IC-21	0.035				0.010						0.008	0.013		0.012
IC-21A	0.140	0.034			0.054			0.022			0.097	0.091	0.078	
IC-23	0.360	0.021	0.648		0.048		0.041	0.625			0.076	1.463	0.007	
WID @ 84 St.	0.140	0.005	0.101		0.010		0.006	0.084		0.006	0.029	0.204	0.012	
WID @ 132 St.	0.116		0.065		0.009			0.057		0.006	0.024	0.137	0.010	
Spike Sample*	0.143 (0.12) 119%		0.044 (0.10) 44%					0.120 (0.20) 60%						
Detection Level	0.005	0.005	0.005	0.030	0.005	0.020	0.005	0.020	0.050	0.005	0.005	0.005	0.005	0.005

* Top number is lab reported value, number in brackets is spike design concentration, and bottom number is percent recovery.
Blank spaces are non-detections.
x - below detection level

APPENDIX B

Water Quality Guidelines

Table B1 Selected Canadian Water Quality Guidelines
(CCREM 1987 and updates)

PARAMETER	IRRIGATION	LIVESTOCK WATERING	DRINKING WATER	FRESHWATER AQUATIC LIFE
Aluminum (total)	5.0	5.0		0.005 - 0.1
Ammonia (total)				1.37 - 2.2
Arsenic (total)	0.1	0.5 - 5.0	0.025	0.05
Barium			1.0	
Beryllium	0.1	0.1		
Boron (total)	0.5 - 6.0	5.0	5.0	
Cadmium (total)	0.005	0.08	0.005	0.0001 - 0.0006
Calcium		1000		
Chloride (total)	100 - 700		250	
Chromium (total)	0.1	1.0	0.05	0.002 - 0.02
Cobalt (total)	0.05	1.0		
Conductivity (EC)	1.0 mS/cm			
Copper (total)	0.2 - 1.0	0.5 - 5.0	1.0	0.002 - 0.004
Fluoride (total)	1.0	1.0 - 2.0	1.5	
Iron (total)	5.0		0.3	0.3
Lead (total)	0.2	0.1	0.01	0.001 - 0.007
Manganese (total)	0.2		0.05	
Mercury (total)		0.003	0.001	0.0001
Molybdenum (total)	0.01 - 0.05	0.5		
Nickel (total)	0.2	1.0		0.025 - 0.15
Nitrate			45.0	avoid prolific weed growth
Nitrate + nitrite		100		
Nitrite		10.0	4.5	0.06
Oxygen, dissolved				5.0 - 9.5
pH			6.5 - 8.5	6.5 - 9.0

Table B1 (cont.) Selected Canadian Water Quality Guidelines

PARAMETER	IRRIGATION	LIVESTOCK WATERING	DRINKING WATER	FRESHWATER AQUATIC LIFE
Selenium (total)	0.02 - 0.05	0.05	0.01	0.001
Silver (total)				0.0001
Sodium			200	
Sodium Adsorption Ratio (SAR)	3 - 9			
Sulphate		1000	500	
Total dissolved solids	500 - 3500	3000	500	
Vanadium (total)	0.1	0.1		
Zinc (total)	1.0 - 5.0	50.0	5.0	0.03
Coliforms, fecal	100/100 mL		0/100 mL	
Coliforms, total	1000/100 mL		10/100 mL	
2,4-D		100	100	4
Temephos			280	
Atrazine	10	60	5	2
Bromoxynil	0.35	11	5	5
MCPA	0.03 - 0.16	25	under review	2.6
Picloram		190	190	29
Diazinon			20	
Dicamba	0.006	122	120	10
Lindane		4	4	0.01

Units are mg/L except for conductivity (mS/cm), pH (pH units), SAR (no units), coliform bacteria (#/100 mL), pesticides (μg/L). 1 mg/L = 1000 μg/L.

Table B2 Alberta Ambient Surface Water Quality Interim Guidelines

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT

TABLE 1

ALBERTA AMBIENT SURFACE WATER QUALITY INTERIM GUIDELINES

These interim guidelines represent water quality suitable for most uses either through direct use or prepared for use by common water treatment practices. They apply to surface waters except in areas of close proximity to outfalls.

There are many instances where the natural water quality of a lake or river does not meet some of the suggested limits. In these cases, the guidelines will not apply. It should be noted, however, that where the natural existing quality is inferior to desirable guidelines, care must be taken in allowing any further deterioration of water quality. Naturally occurring circumstances are not taken into account in these guidelines and due consideration must be given where applicable (e.g. spring runoff effect on colour, odour, etc.).

Bacteriology (Coliform Group)

(a) In waters to be withdrawn for treatment and distribution as a potable supply or used for outdoor recreation other than direct contact, at least 90 percent of the samples (not less than five samples in any consecutive 30 day period) should have a total coliform count of less than 5,000 organisms per 100 ml and a fecal coliform count of less than 1,000 organisms per 100 ml.

(b) *In waters used for direct contact* recreation or vegetable crop irrigation the geometric mean of not less than five samples taken over not more than a 30-day period should not exceed 1,000 organisms per 100 ml total coliforms, nor 200 organisms per 100 ml fecal coliforms, nor exceed these numbers in more than 20 percent of the samples examined during any month, nor exceed 2,400 organisms per 100 ml total coliforms on any day.

Dissolved Oxygen

A minimum of 5.0 $mg.L^{-1}$ at any time.

Note: Dissolved oxygen continues to be a significant factor in the protection of aesthetics and in the maintenance of fish and other aquatic life in Alberta.

Guideline information has shown that dissolved oxygen requirements vary from 5.0 $mg.L^{-1}$ to 9.5 $mg.L^{-1}$ according to the type of aquatic biota present, either cold water or warm water related, and life stages (egg, fry, adult).

Biochemical Oxygen Demand

Dependent on the assimilative capacity of the receiving water, the BOD must not exceed a limit which would create a dissolved oxygen content of less than 5.0 $mg.L^{-1}$.

Suspended Solids

Not to be increased by more than 10 $mg.L^{-1}$ over background value.

pH

To be in the range of 6.5 to 8.5 pH units but not altered by more than 0.5 pH units from background value.

Temperature

Not to be increased by more than 3°C above ambient water temperature.

Alberta
ENVIRONMENTAL PROTECTION

[1]Table B2 cont. Alberta Ambient Surface Water Quality Interim Guidelines

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT

Odour

The cold (20°C) threshold odour number not to exceed 8.

Colour

Not to be increased more than 30 colour units above natural value.

Turbidity

Not to exceed more than 25 Jackson turbidity units over natural turbidity.

Organic Chemicals

Constituent	Maximum Concentration ($mg.L^{-1}$)
Carbon Chloroform Extract (CCE) (includes Carbon Alcohol Extract)	0.2
Methyl Mercaptan	0.05
Methylene Blue Active Substances	0.5
Oil and Grease	substantially absent, no iridescent sheen
Phenolics	0.005
Resin Acids	0.1

Pesticides

To provide reasonably safe concentrations of these materials in receiving waters an application shall not exceed 1/100 of the 48-hour TL_m. No pesticides can be used in Alberta unless they have been registered under the Pest Control Products Act. Any pesticides used on, in, or near water must be approved under The Environmental Protection and Enhancement Act.

Radioactivity

Gross Beta not to exceed 37.0 Bq/L.
Radium-226 not to exceed 0.11 Bq/L.
Strontium-90 not to exceed 0.37 Bq/L.

Inorganic Chemicals

Constituent	Maximum Concentration ($mg.L^{-1}$)
Arsenic	0.01
Barium	1.0
Boron	0.5
Cadmium	0.01
Chromium	0.05
Copper	0.02
Cyanide	0.01
Fluoride	1.5
Iron	0.3
Lead	0.05
Manganese	0.05
Mercury	0.0001
Nitrogen (Total Inorganic and Organic)	1.0
Phosphorous as PO_4 (Total Inorganic and Organic)	0.15[1]
Selenium	0.01
Silver	0.05
Sodium (as percent of Cations)	between 30 & 75
Sulphide	0.05
Zinc	0.05

Note: The predominant cations of Sodium, Calcium, and Magnesium and anions of Sulphate, Chloride and Bicarbonate are too variable in the natural water quality state to attempt to define limits. Nevertheless, in order to prevent impairment of water quality, where effluents containing these ions are discharged to a water body the permissible concentration will be determined by the regulatory authority in accordance with existing quality and use.

Unspecified Substances

Substances not specified in this table should not exceed values which are considered to be deleterious for the most critical use as established by the regulatory authority.

September 1, 1993

[1] Phosphorus concentrations are more typically expressed in terms of P rather than PO_4. As a results of the difference in molecular weights of PO_4 and P, the guideline maximum concentration used in this report is 0.05 mg/L.