TABLE OF CONTENTS

The **1997 Stream Water Quality Report** is produced by the Division of Environmental Health of the Fairfax County Health Department. Staff support is provided by the Environmental Services Section who collected, compiled and interpreted the stream sampling results for the year.

This year the report will be placed on Fairfax County's Internet site at http://www.co.fairfax.va.us/. The Health Department home page is located under the Human Services Icon from the County's Home Page.

Special recognition and thanks go to:

•Fairfax County's Geographic Information System (GIS) team for their training, support and direction given to Health Department personnel in the development of several GIS projects used for the Annual Report.

•Fairfax County's Department of Information for their assistance in development and implementing the Health Department's Home Page.

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1997 Stream Water Quality Report
Fairfax County Health Department

Fairfax County Health Department
Stream Water Quality Report

1997 Stream Water Quality Report

Abstract

The 1997 Stream Water Quality Report includes data collected from 72 sampling sites throughout 25 of 30 watersheds in Fairfax County. A total of 1,686 stream samples were collected for analyses in 1997. These sampling sites are representative of all the streams monitored within these watersheds. The data in this report shows fluctuations in the stream water quality for individual sampling sites. The overall water quality of the watershed is considered fair for fecal coliforms and good for chemical and physical parameters.

A total of 90 individuals and groups are participating in the Adopt-A-Stream program.

A total of 26 stream complaints were investigated by the Health Department in 1997.

Sampling Result Highlights

- 1,686 stream samples collected from 72 Sites.
- The stream samples in the **good water quality range** (<200 f.c./100 ml) for fecal coliform is 18% for 1997.
- Total phosphates, nitrate nitrogen, dissolved oxygen and pH levels remain consistent with the 5 year averages.

FIVE YEAR COMPARISON SUMMARY (1992 - 1997)*

FECAL COLIFORM (F.C./100ML)	1993	1994	1995	1996	1997
% Fecal Coliform <200 f.c./100ml	36	21	22	17	18
Fecal Coliform Mean**	498	946	743	915	829
PHYSICAL PARAMETERS	**1993**	**1994**	**1995**	**1996**	**1997**
Rainfall (Sum in inches)	48	43	40	54	36
Sample Temperature (°F)***	55	55	54	54	54
CHEMICAL PARAMETERS	**1993**	**1994**	**1995**	**1996**	**1997**
Total Phosphorous (mg/l)**	0.10	0.11	0.10	0.10	0.10
Nitrate Nitrogen (mg/l)**	0.72	0.72	0.69	0.87	0.74
Dissolved Oxygen (mg/l)***	8.8	8.5	8.5	8.9	9.2
pH***	7.2	7.3	7.4	7.1	7.3

***Calculations based on all samples collected for each year**

****Results for five year comparisons are calculated as a Geometric Mean.**

*****Arithmetic Mean**

SECTION 1

1997 SURVEY RESULTS

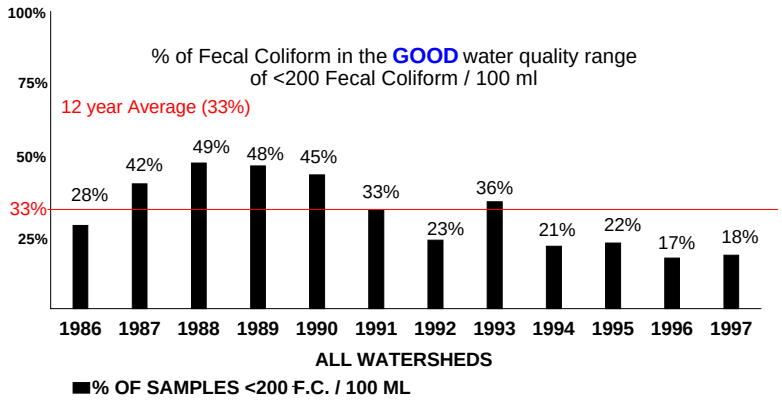
I. Fecal Coliform

Criteria: ***Water quality standards include fecal coliform bacteria standards. These "indicator organisms", while not necessarily harmful in themselves, are found in the intestinal tracts of warm-blooded animals, including humans, and therefore, can be indicative of fecal contamination and the possible presence of a pathogenic organism. In surface waters, the fecal coliform bacteria should not exceed 200 fecal coliform bacteria per 100 ml of water.***

Grab samples are collected by Health Department personnel and transported to the Fairfax County Laboratory where the samples are evaluated by the membrane filter method.

The fecal coliform bacteria standard is used to evaluate waters for all types of recreation. Prior to 1977, the coliform bacteria standards identified waters used for " secondary contact recreation ", e.g. ,- boating or fishing (200 - 1000/ 100 ml). In the 1977 amendments to Virginia's Water Quality Standards, the Department of Environmental Quality-Water (DEQW) adopted the more stringent bacteria standard for primary contact recreation to apply to all surface waters of the State. This action was taken as part of Virginia's commitment to attain the national goal of water quality suitable for all types of recreation.

The Department of Environmental Quality-Water (DEQW) has established a criteria for all surface waters, except shellfish waters, as follows "...the fecal coliform bacteria shall not exceed a geometric mean[1] of 200 fecal coliform bacteria per 100 ml of water for two or more samples over a 30 day period, or a fecal coliform (f.c.) bacteria level of 1,000 per 100 ml at any time."[2] The percentage of samples less than 200 f.c./100 ml improved slightly to 18% in 1997 from the 1996 levels and is below the 12 year average of 33%. (Graph #1).



GRAPH #1 FECAL COLIFORM 1986 - 1997

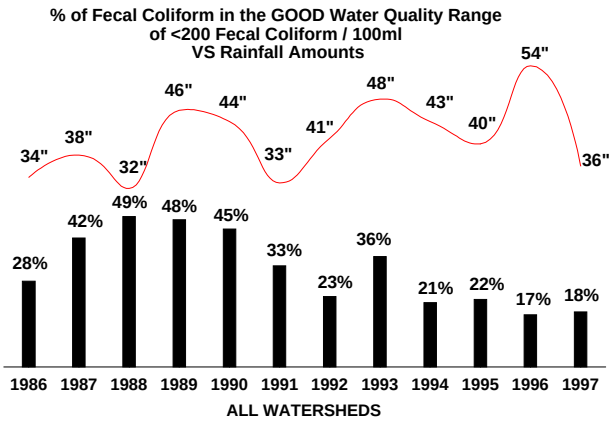
Factors affecting the increase or decrease in the amount of fecal coliform in stream waters in-

[1]The Geometric Mean is defined as the antilog of the average of the logarithms of the data values.

[2] "Water Quality Standards "Commonwealth of Virginia State Water Control Board Regulations July 1, 1988 page 19.

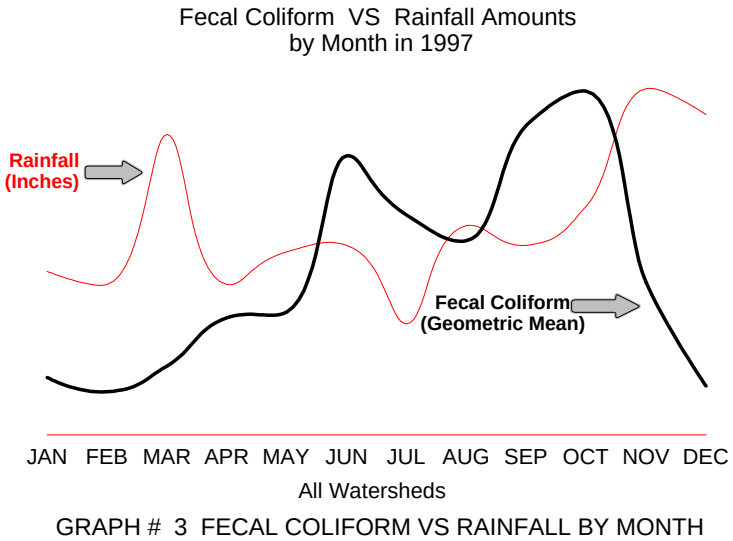
clude rainfall amounts and the sample water temperature. Both of these factors are noted in past years' reports as environmental conditions affecting the fecal coliform results.

The first, increased rainfall, may affect fecal coliforms through dilution, allowing the streams to be more efficient in their self-cleansing action resulting in a decrease in the amount of fecal coliforms in the stream water. The normal action of the streams kills the majority of fecal coliform organisms introduced into them by oxidation and the lack of ideal habitat for the organisms. The fecal coliform organism is present in the fecal material of all warm-blooded animals and generally is deposited in the stream from rainfall events which flush streets, lawns, gardens and woodlands. The average number of fecal coliform organisms discharged from the human body is about 400 billion per day. It is estimated that levels of 250,000 f.c./100 ml of water in streams is indicative of direct sewage discharge. However, none of the samples collected approached such numbers.



GRAPH #2 FECAL COLIFORM VS RAINFALL BY YEAR

The assumption that an increase in rainfall would improve the water quality through self-cleansing of the streams by increased flow during the rainfall incidences has not been proven. A comparison of the percentage of fecal coliforms and the annual rainfall has not indicated a better water quality trend in this or past annual samplings. Several factors including sampling time (i.e. before or after significant rainfall), location of samples collected within the watershed (upper, middle or lower) and the general urbanization of the county make it difficult to see any self-cleansing action in the streams . In 1997 the amount of rainfall dropped to 36" from an all time high of 54" in 1996 (Graph #2). This did not reflect an appreciable increase or decrease in the good water quality levels for the year . Data for January and February 1997 indicated lower fecal coliform averages, due to the possible flushing action of the streams in late September and December 1996 (Graph # 3).

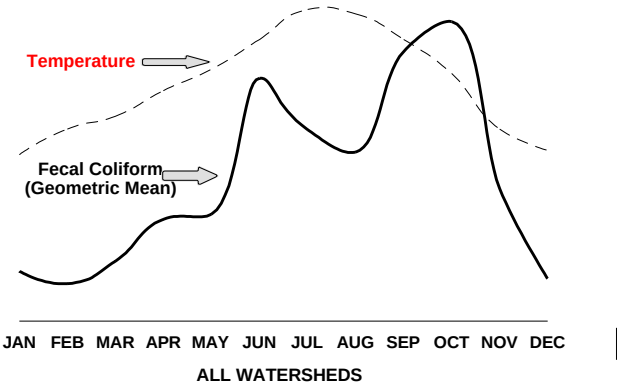


GRAPH # 3 FECAL COLIFORM VS RAINFALL BY MONTH

However, the fecal coliform geometric mean increased until November when rainfall was

the highest single month for 1997.

The second factor, water temperature, may be contributing to an increase in the fecal coliform Geometric Mean by providing optimum temperatures for coliform growth. The number of samples in the equal to or greater than (>=) 200 fecal coliform range for 1997 did not follow the seasonal trend noted in prior Stream Water Quality Reports. (Graph #4)

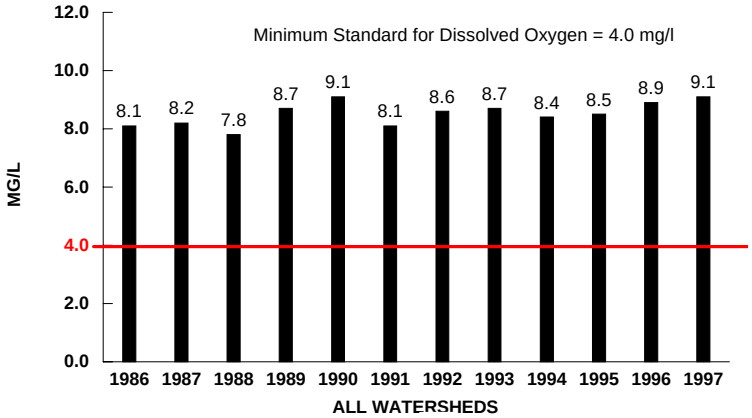


GRAPH # 4 FECAL COLIFORM VS TEMPERATURE BY MONTH IN 1997

II. Dissolved Oxygen

Criteria: ***The presence of dissolved oxygen (D.O.) in water is essential for aquatic life, and the type of aquatic community is dependent to a large extent on the concentration of dissolved oxygen present. Dissolved oxygen standards are established to ensure the growth and propagation of aquatic ecosystems. The minimum standard for dissolved oxygen is 4.0 mg/l.***

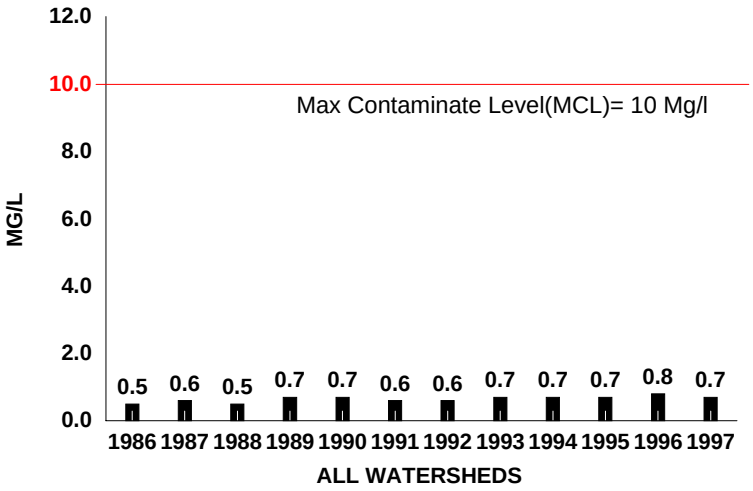
Ninety-eight percent (98%) of the samples collected for determination of dissolved oxygen (D.O.) were above 4.0 mg/l. Sample results for 1997 remained consistent with results from prior sampling years with only one sampling station showing uniformly low results (Graph #5). Mill Branch sampling station (20-03) where the annual geometric mean was 1.8 mg/l and 95% of the samples collected were below the minimum of 4.0 mg/l. This sampling site is located downstream from a debris landfill and could indicate that organic contaminants are entering the stream. The introduction of organic contaminants decreases the oxygen content of the stream. The debris landfill operation is regularly monitored by the Commonwealth of Virginia's Department of Environmental Quality-Waste.



GRAPH # 5 DISSOLVED OXYGEN

III. Nitrate Nitrogen

Criteria: ***Nitrate Nitrogen is usually the most prevalent form of nitrogen in water because it is the end product of the aerobic decomposition of organic nitrogen. Nitrate from natural sources is attributed to the oxidation of nitrogen in the air by bacteria and to the decomposition of organic material in the soil. Fertilizers may add nitrate directly to water resources. Nitrate concentrations can range from a few tenths to several hundred milligrams per liter. In nonpolluted water, they seldom exceed 10 mg/l. Nitrate is a major component of human and animal wastes, and abnormally high concentrations suggest pollution from these sources.***

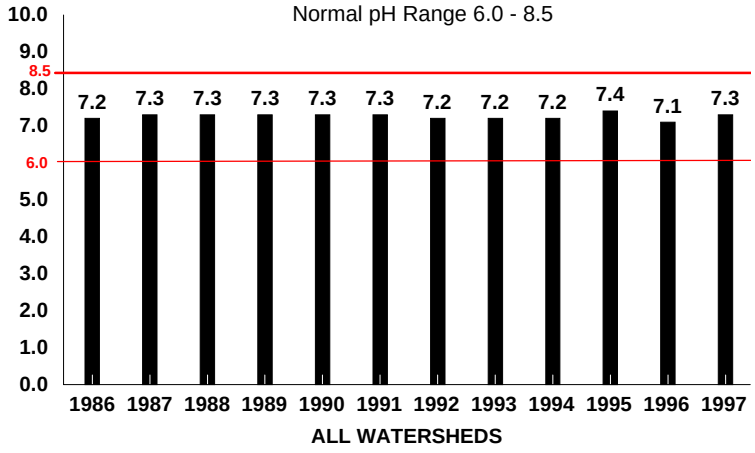


GRAPH # 6 NITRATE NITROGEN

The samples for nitrate nitrogen ranged from a low reading of 0.08 mg/l to a high of 8.8 mg/l. The overall nitrate nitrogen Geometric Mean was 0.74 mg/l. This is well below the maximum limit of 10 mg/l (Graph #6). No sample was above the maximum contamination level of 10 mg/l.

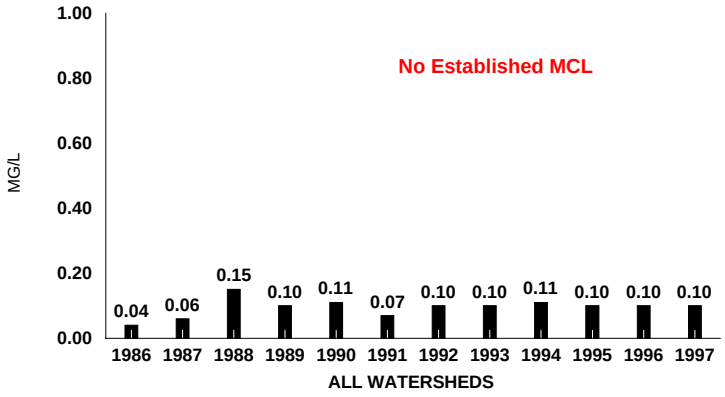
IV. pH

Criteria: ***Stream pH is an important factor in aquatic systems. Biological productivity, stream diversity, metal solubility, and toxicity of certain chemicals, as well as important chemical and biological activity, are strongly related to pH. The pH range of 6.0 - 8.5 generally provides adequate protection for aquatic life and for recreational use of streams.***



GRAPH # 7 pH

The pH ranged from a low reading of 6.3 to a high of 9.3. Three samples were above the 8.5 limits.



GRAPH # 8 TOTAL PHOSPHOROUS

V. Phosphorous (Total)

Criteria: ***Phosphorous is found in natural water in the form of various types of phosphates. Organic phosphates are formed in the natural biological processes. Therefore, they are contributed to sewage in body wastes and food residues. They may also be formed in the biological treatment process or by life existing in the receiving water.***

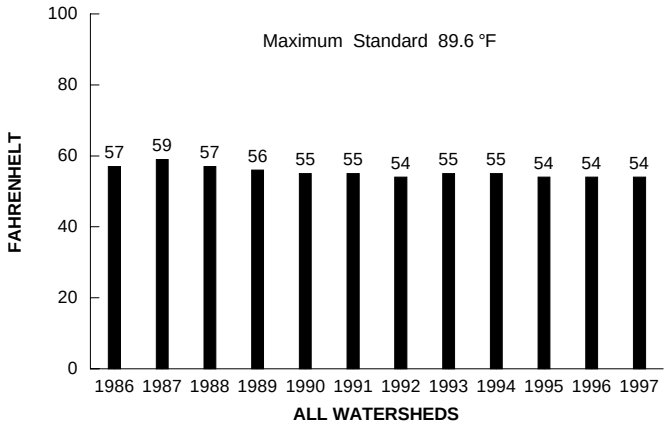
Condensed phosphates and orthophosphates are found in treated wastewater, laundry detergents, commercial cleansing compounds and fertilizers. Phosphorous is essential to the growth of organisms and can be the nutrient that limits the growth which a body of water can support. When phosphorous is a growth limiting nutrient, the discharge of raw or treated sewage, agricultural drainage or certain industrial wastes to a receiving water may stimulate the growth, in nuisance quantities, of photosynthetic aquatic microorganisms and macroorganisms.

There is no established limit for total phosphorous content in stream water. Variations of the phosphorous content may help determine possible trends of water contamination. Significant increases in total phosphorous may indicate increasing amounts of contaminants entering the stream. This year's Geometric Mean of 0.10 mg/l does not indicate a significant increase over prior year's average. Beginning in 1993, averages were a minimum of 0.10 mg/l due to a change in the Health Department Laboratory's testing procedure for total phosphorous. The new automated testing procedure uses 0.10 mg/l as the lowest detection level rather than the 0.02 mg/l limit used prior to 1992. Phosphorous results for the past 12 years are illustrated in Graph #8.

VI. Temperature

Criteria: ***The existence and composition of an aquatic community also depends greatly on the temperature characteristics of a body of water. Thus, temperature limits are included in water quality standards to protect and maintain a balanced aquatic community. The maximum standard for free flowing streams is 89.6°F (32°C).***

The temperature range for all stream water samples collected in 1997 was 30°F for the low in January and 86°F for the high in July. The average for all samples collected in 1997 was 54°F, reflecting a downward trend in the water temperature of the water samples over the past 12 years, see Graph # 9.



GRAPH # 9 WATER SAMPLE TEMPERATURE

VII. Heavy Metals

Criteria: ***The presence of heavy metals in stream water indicates possible discharge of household and industrial waste into the stream. Sampling establishes baseline data for identifying point source pollution from areas where urbanization of the stream area is or will be occurring.***

The following metals have been selected for sampling based on their occurrence in industrial and household waste discharge, their potential health hazards, and as part of the Virginia Department of Environmental Quality-Water requirements for Surface Water Standards for Surface Public Water Supplies (VR680-21-02.3).

Sampling for heavy metals began in 1989 for all stream sites. Nine years of results are available (1989 - 1997 Table 13). All results are within normal limits.

CONTAMINANT	PMCL : DETECTION LIMITS (MG/L)	SOURCE*	POTENTIAL HEALTH HAZARD*
ARSENIC	0.05 MG/L : 0.0010 MG/L	Industrial / Household	Carcinogenic
BARIUM	1.00 MG/L : 0.03 MG/L	Industrial	Circulatory
CADMIUM	0.05 MG/L : 0.001 MG/L	Industrial Deterioration of Galvanized Pipe	Urinary
CHROMIUM	0.05 MG/L : 0.001 MG/L	Industrial	Artheroslerosis
LEAD	0.05 MG/L : 0.002 MG/L	Industrial	Neurological
MERCURY	0.02 MG/L : 0.0002 MG/L	Industrial	Neurological
SELENIUM	0.01 MG/L : 0.003 MG/L	Industrial	Gastrointestinal
SILVER	0.05 MG/L : 0.001 MG/L	Industrial	Argyria

***Environmental Engineering & Sanitation 3rd Ed. by Joseph A. Salvato and Standard Methods for Examination of Water and Wastewater 16th Edition.**

VII. Lake Accotink

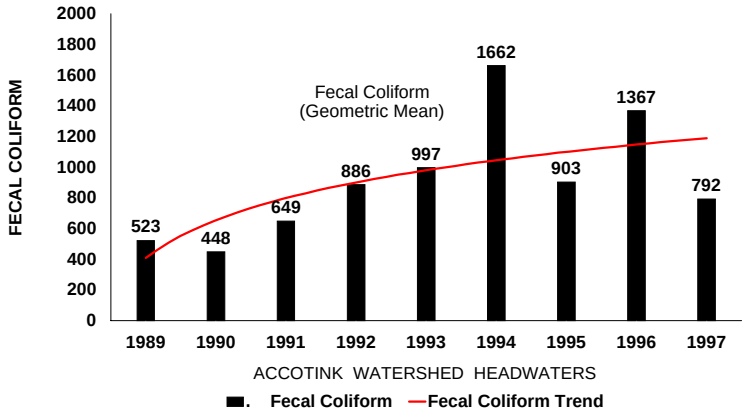
Background: ***Lake Accotink is sampled from four surface points on the lake from May through August. The four sample points are surface grab samples and are only accessible by boat. It is necessary to coordinate the sampling schedule with the availability of a boat and operator, which is provided by the Fairfax Park Authority. Results of all samples collected for testing are located in Table 11.***

A total of 32 samples were collected from June through September 1997. Sixteen percent (16%) of samples collected were in the good water quality range of less than 200 f.c./100 ml. The dissolved oxygen Geometric Mean for 1997 was 7.4 mg/l. All samples (100%) collected were greater than 4 mg/l for 1997. The overall Geometric Mean for nitrate nitrogen was 0.27 mg/l. The average pH was 7.1 and the average total phosphorous was 0.1 mg/l.

VIII. Fairfax City Stream Sites (Accotink Watershed)

Background: ***Stream sites are within a highly urbanized area and are subject to run-off from shopping centers, garages, parking lots, and other potentially high pollution areas. Storm drains feed the majority of the streams passing through the city and have been implicated, since sampling of the streams began in 1988, as sources of pollution from improperly disposed petroleum products. The streams within this area are part of the head waters for the Accotink Watershed. Results of all samples collected for testing are located in TABLE 12.***

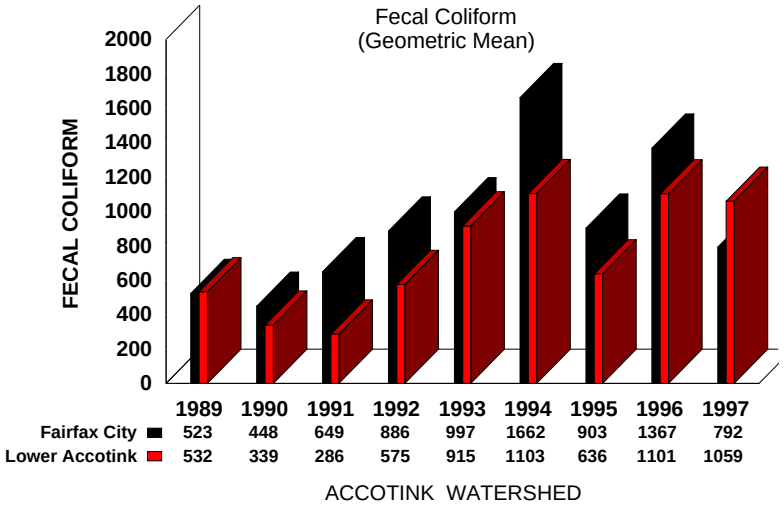
Eighty-two percent (82%) of the samples collected for fecal coliforms had results greater than or equal to 200 fecal coliforms/100 ml, while 18% of the samples collected are less than 200 fecal coliforms. The Geometric Mean for fecal coliforms from all Fairfax City stream sites improved in 1997 to pre 1992 levels (Graph #10). The Fairfax City sample sites show the same general trend for fecal coliform as the other Accotink sampling sites and for the first time in 9 years of sampling, are better than the sample results collected further downstream (Graph #11).



GRAPH # 10 FAIRFAX CITY - FECAL COLIFORM

The pH ranged from a low of 6.3 to a high of 8.6. The Mean for pH for all city sites is 7.3 for 1997. Total phosphorous levels ranged from a low of 0.09 mg/l to a high of 1.25 mg/l. Nitrate nitrogen ranged from a low of 0.09 mg/l to a high of 2.4 mg/l. The overall nitrate nitrogen average for all stream sites within Fairfax City is .08 mg/l.

The dissolved oxygen results ranged between 3.6 mg/l for the low to 14.8 mg/l for the high, with 2 sample results less than 4 mg/l.



GRAPH # 11 FAIRFAX CITY VS ACCOTINK SAMPLES

X. Water Quality Summary Statement

The 1997 Stream Water Quality Report includes data collected from 72 sampling sites from 25 of the 30 watersheds in Fairfax County. A total of 1686 stream samples were collected for analyses in 1997. These sampling sites are representative of all the streams monitored within these watersheds. The data in this report shows fluctuations in the stream water quality for individual sampling sites. The average geometric mean for fecal coliform at several of the stream sample sites is approaching and surpasses a mean average of 1000 f.c./100ml (see table 4). The chemical and physical parameters have remained constant over the past five years (see tables 7 - 10). Therefore, the overall water quality of the watersheds in Fairfax County is considered fair for fecal coliform and good for the chemical and physical parameters of the streams.

In summary, any open, unprotected body of water is subject to pollution from indiscriminate dumping of litter and waste products, sewer line breaks and contamination from runoff pesticides, herbicides, and waste from domestic and wildlife animals. Therefore, the use of streams for contact recreational purposes, such as swimming, wading, etc., which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided.

SECTION 2
1997 WATER QUALITY PROGRAMS

I. Adopt-A-Stream Program

Background: The ***program was introduced at the Fairfax Fair in June 1989 in response to the Environmental Quality Advisory Council (EQAC) recommendations to promote citizen awareness to the potential hazards of recreational usage of streams and to provide the Health Department with citizen surveillance in the field of reporting possible pollution problems. An estimated 2000 people were provided information about the program through the display at the fair. Since 1989, the program has generated considerable interest in the private sector and citizens are responding on a regular basis. The program received national recognition when it was awarded the National Association of Counties 1991 Achievement Award and the Virginia Municipal League's 1991 award for Environmental Quality. A paper on the objectives and goals of the program was presented to the Virginia Water Resources Conference April 1992. Participants in the program range from individuals to Scout groups, civic organizations, public and private school science classes.***

1997 HIGHLIGHTS:

The Fairfax County, Department of Public Works, Utilities Planning and Design Division has incorporated the Adopt-A-Stream program and the Annual Stream Water Quality Report into Part I of their National Pollutant Discharge Elimination System Permit Application (NPDES). Both the Stream Water Quality Report and the Adopt-A-Stream program are identified by Public Works as programs used by the County to help identify potential pollution sources.

At the present time 90 individuals and groups are participating in the program. These 90 participating members represent over five hundred people involved in stream awareness and individual programs.

Thirteen issues of the Adopt-A-Stream newsletter have been published since 1990 and mailed to participants with additional copies mailed to individuals and groups who expressed interest in the program.

Eighty (80) stream awareness programs have been presented by Environmental Health Specialists to 1,499 county residents since the program began. These programs alert residents to possible stream health hazards and provide information on reporting stream pollution problems.

The Adopt-A-Stream program display was manned for FAIRFAX DAY (Ecoloday) held on October 4, 1997. The display was staffed by Environmental Health Specialists and several groups adopted streams as a result of the display. The display is available for other activities and will be used in future events.

II. Stream Complaints

Background: ***Procedures for investigation of stream complaints were standardized in 1989 to allow staff to respond in a minimum amount of time to potential point source pollution. The program was developed with the Adopt-A-Stream program as a central contact point for citizens to report stream problems. Since 1989 several of the complaints have resulted in court action, identification of underground spills and quicker departmental response to reported pollution problems.***

Ninety-Two (92) site visits were made to investigate 26 complaints in 1997. The 26 complaints were initially investigated by Health Department staff and referred to the proper agency or resolved utilizing Health Department procedures and local ordinances. Two(2) complaints dealt with runoff, 2 were associated with dumping, 14 were referred due to color and odor problems, 5 responses were made to possible sewer line breaks and 3 miscellaneous complaints were received in 1997.

Two (2) of the 1997 complaints required action to be taken by the Fairfax County Health Department , 3 required action by Fairfax County Public Works, 1 by the County's Fire Marshals office, 1 by Zoning and and 1 by the Viriginia Department of Transportation.

Section 3

Appendix A-Laboratory Procedures

The laboratory procedures used to determine the number of fecal coliform organisms are defined in "Standard Methods (16th Edition)". The fecal coliform procedure utilizes the millipore filter and gives a direct count per 100 ml of sample. Procedures used to determine dissolved oxygen, nitrate nitrogen, pH and total phosphorous are defined in EPA's Manual, "Methods for Chemical Analysis of Water and Wastes", (EPA-600/4-9-020). The dissolved oxygen (D.O.) determination is by the azide modification of the "Winkler Method". The pH is read directly by meter. The nitrate nitrogen is determined by the automated cadmium reduction method and phosphates are determined by persulfate digestion followed by the ascorbic acid colorimetry. Heavy metal determination is by electrothermal atomic absorption method using a graphite furnace as defined in "Standard Methods (16th Edition)". Mercury was analyzed by Cold Vapor Technique, EPA Method 245.1 Detection limits for heavy metals is located in a table found in Section I -VII (page 8) of this report.

Appendix B-Watersheds and Sampling Sites

There are 30 watersheds within the County encompassing approximately 400 square miles. Sampling sites are established on 25 of these watersheds. Five watersheds are small and do not contain any well defined streams; therefore, these are excluded from the program. The number of sampling sites in 1997 is 72, the data from which is represented in this report. These stations are located on the major streams and

their main tributaries. The sample station identification number is a two part number identifying the watershed and the sample site. There are gaps in the sequential numbering system due to additions and eliminations of sample sites over several years. Eight sites within the Accotink Creek watershed were added in 1988 at the request of Fairfax City. The reports for the Accotink Creek watershed include the stream sample results from these sites as well as the Accotink Creek sites in the County. All samples are random grab samples collected twice a month. The stream sample site locations have been evaluated for run-off potential and possible sources of pollution. The sites are located on tax maps and diagrams of the sites are available for reference. Directions to the sites were developed to standardize the sampling sites and for use in the field by Environmental Health Specialists. Maps of sampling sites were developed using Fairfax County's Pilot Geographic Information System (GIS) . The maps are part of Section 5 of this report.

Appendix C-Data Tables And Calculations

Comparison and trends of the data are based on a five and ten year period. Data may be obtained for previous years from earlier reports. Data for years prior to 1973 are not comparable due to differentiation in laboratory methods and reporting techniques. The terms Geometric Mean and Average are defined as follows:

The geometric mean is defined as the antilog of the average of the logarithms of the data values.

The term average is used as the Arithmetical Average of data values.

Fecal coliform results for each station are presented in Table 2. The data provides for a year comparison of sample stations to assist in recognizing trends in water quality. The percentage of samples based on their fecal coliform classification (<200 F.C./100 ml and equal to or >200 F.C./100 ml) for each of the watersheds is shown with comparison to previous years in Table 3. Table 4 gives the geometric mean value for each sampling station for fecal coliform organisms. The annual data for dissolved oxygen is presented in Table 5. The data for nitrate nitrogen, pH, and total phosphorous is provided in Table 6. Tables 7 (nitrate nitrogen), 8 (pH) and 9 (total phosphorous) compare a five year period for each watershed. The average temperature, with the high and low temperature for each month, is found in Table 10. The Lake Accotink Data is presented in Table 11. A separate report for the Fairfax City stream sites is included in Table 12 and the sampling data for heavy metal screening is included in Table 13.

The calculations for this report are generated using dBase IV programming to provide the database and mathematical computations. Development of the computer database began in 1986 with the data stored by calendar year (January 1 to December 31) for report generation. Graphs were generated using Harvard Graphics software.

The Fairfax County Stream Sampling Sites maps were created as a GIS project using ArcView for Windows. As physical overlays of the County are developed , the GIS program will be developing more detailed maps of sampling sites as well as complaint sites for future reports.

SECTION - 4
DATA TABLES

TABLE 1

Number of Stream Samples Collected by Year

	1993	1994	1995	1996	1997
Number of Samples collected for Fecal Coliforms	1692	1528	1574	1536	1686
Number of Samples collected for Dissolved Oxygen	1692	1528	1574	1536	1686
Number of Samples collected for Total Phosphorous	1692	1528	1574	1536	1686
Number of Samples collected for pH	1692	1528	1574	1536	1686
Number of Samples collected for Nitrate Nitrogen	1692	1528	1574	1536	1686

NOTE:
The number of samples collected include all attempted samples collected rather than number of samples tested.

Sample site 01 - 01 (Horsepen Creek) was not collected due to the expansion of Centreville Rd to 4 lanes.

Sample site 05-16 (Difficult Run) was not collected due to the expansion of Georgetown Pike.

See past annual reports for data results

TABLE 2

NUMBER OF FECAL COLIFORM SAMPLES
FOR EACH SAMPLING SITE

REPORT FROM 01/01/97 TO 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 per 100 ml	200-1000 per 100 ml	>1000 per 100 ml
HORSEPEN CREEK				
01-01	- See note on Table 1 page 15			
SUGARLAND RUN				
02-02	20	3	6	11
02-03	23	3	8	12
NICHOL RUN				
03-03	13	3	5	5
POND BRANCH				
04-01	23	5	9	9
04-02	22	7	7	8
04-03	22	4	8	10
DIFFICULT RUN				
05-01	24	7	8	9
05-05	24	1	10	13
05-09	24	4	13	7
05-11	22	2	3	17
05-12	17	2	3	12
05-13	24	6	11	7
05-15	23	3	7	13
05-16	- See note on Table 1 page 15			
05-18	23	3	6	14
05-19	24	4	8	12
BULLNECK RUN				
06-02	19	4	10	5
SCOTTS RUN				
07-01	23	7	6	10
DEAD RUN				
08-02	23	1	8	14
TURKEY RUN				
09-01	23	8	7	8

TABLE 2

NUMBER OF FECAL COLIFORM SAMPLES
FOR EACH SAMPLING SITE

REPORT FROM 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 per 100 ml	200-1000 per 100 ml	>1000 per 100 ml
PIMMIT RUN				
10-02	22	0	6	16
10-03	22	3	6	13
10-04	23	4	6	13
10-05	24	0	5	19
FOUR MILE RUN				
11-03	24	3	6	15
CAMERON RUN				
12-04	24	4	8	12
12-05	24	7	6	11
12-07	24	4	10	10
12-12	23	6	6	11
12-13	24	7	2	15
12-14	24	3	6	15
LITTLE HUNTING CREEK				
14-02	25	5	6	14
14-03	23	0	7	16
DOGUE CREEK				
15-06	24	3	10	11
ACCOTINK CREEK				
16-03	24	1	10	13
16-07	24	2	10	12
16-08	24	0	14	10
16-09	24	1	8	15
16-12	22	3	4	15
POHICK CREEK				
17-04	24	5	5	14
17-05	24	7	5	12
17-06	24	6	8	10
17-08	25	5	7	13
17-13	23	2	5	16

TABLE 2

NUMBER OF FECAL COLIFORM SAMPLE FOR EACH SAMPLING SITE

REPORT FROM 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 per 100 ml	200-1000 per 100 ml	>1000 per 100 ml
MILL BRANCH				
20-01	24	2	5	17
20-02	24	2	9	13
20-03	24	11	7	6
SANDY RUN				
22-03	24	5	6	13
22-04	24	8	2	14
WOLF RUN				
24-01	22	7	5	10
24-02	23	4	8	11
OLD MILL BRANCH				
25-04	20	7	3	10
POPES HEAD CREEK				
26-02	23	6	7	10
26-03	22	7	8	7
26-05	23	5	5	13
JOHNNY MOORE CREEK				
27-01	23	3	10	10
LITTLE ROCKY RUN				
28-01	24	3	7	14
28-02	23	5	7	11
CUB RUN				
29-02	24	4	9	11
29-03	24	5	8	11
29-04	17	3	8	6
29-05	22	2	10	10
29-06	24	5	9	10
29-08	24	7	9	8
BULL RUN				
30-01	24	7	10	7
LAKE ACCOTINK				
LA-01	8	2	3	3
LA-02	8	1	2	5
LA-03	8	1	4	3
LA-04	8	1	4	3

TABLE 3

Five Year Comparison of Stream Water Quality Data
by Percentage of Samples in
the Good Range For Fecal Coliforms
(Less than 200 f.c. per 100 mg/1)

Five Year Survey From 1993 To 1997

WATERSHED	YEAR				
	1993	1994	1995	1996	1997
HORSEPEN CREEK-01			- See note on Table 1 page 15		
SUGARLAND RUN-02	31	19	12	11	14
NICHOL RUN-03	54	21	39	28	23
POND BRANCH-04	49	23	13	24	24
DIFFICULT RUN-05	38	14	21	16	15
BULLNECK RUN-06	42	17	36	4	21
SCOTTS RUN-07	25	35	39	32	30
DEAD RUN-08	33	13	17	9	4
TURKEY RUN-09	42	22	32	22	35
PIMMIT RUN-10	30	24	14	10	8
FOUR MILE RUN-11	23	10	10	14	13
CAMERON RUN-12	35	19	19	17	22
LITTLE HUNTING-14	43	23	10	13	10
DOGUE CREEK-15	35	23	33	22	13
ACCOTINK CREEK - 16	20	14	17	12	13
POHICK CREEK-17	37	23	25	12	21
MILL BRANCH-20	44	36	36	24	21
SANDY RUN-22	45	23	41	17	27
WOLF RUN-24	43	26	30	31	24
OLD MILL-25	52	44	37	26	35
POPES HEAD-26	33	25	23	28	26
JOHNNY MOORE-27	35	44	25	17	13
LITTLE ROCKY-28	32	23	14	13	17
CUB RUN-29	35	25	25	16	19
BULL RUN-30	46	19	42	14	29

Table 4
Geometric Mean of Fecal Coliforms
Per 100/ml by Supervisor Districts

Five Year Survey: From 1993 To 1997

District/ Station Number	Stream Name	Collection point	Year Collected NOTE: *** INDICATES NO SAMPLES COLLECTED				
			1993	1994	1995	1996	1997
BRADDOCK							
16-07	Long Branch	Braddock Rd	984	835	1240	854	811
16-08	Accotink Ck	Braddock Rd	1034	1302	772	969	962
DRANESVILLE							
02-02	Folly Lick Br	Hiddenbrook	520	895	976	969	861
02-03	Sugarland Run	Rt 7	727	1255	1483	899	949
03-03	Jefferson Br	Springvale Rd	281	537	471	455	522
04-01	Mine Run Br	River Bend Rd	277	859	1038	648	560
04-02	Clarks Branch	Beach Mill Rd	297	707	1039	739	511
04-03	Pond Branch	Blackberry La	213	568	483	488	665
05-15	Capt Hickory Br	Fringe Tree Rd	384	1342	964	696	812
05-16	Difficult Run	Georgetown Pk	375	1804	***	***	***
05-19	Wolf Trap Run	Trap Rd	317	1408	687	914	766
06-02	Bull Neck Run	Georgetown Pk	334	777	422	946	470
07-01	Scott Run	Georgetown Pk	682	878	466	734	742
08-02	Dead Run	Whann St	608	1500	928	1617	1299
09-01	Turkey Run	George wash Pk	380	571	500	1001	444
10-02	Pimmit Run	Old Dominion	908	1181	1318	1967	1809
10-03	Pimmit Run	Kirby Rd	682	720	794	1393	1106
10-04	Little Pimmit	Kirby Rd	489	1116	912	1027	996
10-05	Pimmit Run	Westmoreland	751	1242	1342	1834	1792
HUNTER MILL							
05-09	Difficult Run	Hunter Mill Rd	445	755	451	387	684
05-11	Wolf Trap Run	Browns Mill Rd	271	1207	846	3968	2236
05-12	Difficult Run	Browns Mill Rd	632	1152	759	644	1269
05-13	Colvin mill Run	Rt 7	212	984	651	615	495
05-18	Wolf Trap Cr	Bois Ave	386	1858	889	804	977
LEE							
12-14	Pikes Branch	Telegraph Rd	593	900	1251	1610	1059
16-09	Accotink Ck	Old Keen Mill	669	981	694	756	1337
MASON							
11-03	Long Branch	Glen Carlyn Rd	949	1863	1607	1476	1380
12-04	Tripps Run	Sleepy Hollow	804	1648	1649	1040	919
12-05	Holmes Run	Sleepy Hollow	472	822	1164	550	689
12-07	Holmes Run	Glen Hills Pk	431	1033	682	478	692

Table 4

Geometric Mean of Fecal Coliforms

Per 100/ml by Supervisor Districts

Five Year Survey: From 1993 To 1997

District/ Station Number	Stream Name	Collection point	Year Collected NOTE: *** INDICATES NO SAMPLES COLLECTED				
			1993	1994	1995	1996	1997
MT VERNON							
12-07	Holmes Run	Glen Hills Pk	431	1033	682	478	692
12-12	Turkey Cock	Edsall Rd	346	808	501	798	782
12-13	Cameron Run	Fenwick Drive	559	2225	958	916	950
14-02	Lit Hunting Ck	Richmond Hwy	402	950	1319	1077	1121
14-03	Lit Hunting Ck	Richmond Hwy	766	2162	1502	1506	1568
15-06	Dogue Creek	Mt Vernon Hwy	533	894	509	859	977
16-12	Long Branch	Backlick Rd	455	958	1367	1936	1243
17-06	Pohick Creek	Pohick Rd	363	633	518	1101	588
17-08	Pohick Creek	Old Colchester	538	595	464	1391	854
20-01	Giles Run	Lorton Rd	890	1383	947	1577	1226
20-02	Giles Run	Old Colchester	528	584	468	1434	884
20-03	South Branch	Old Colchester	189	222	232	260	334
PROVIDENCE							
16-03	Accotink Creek	Barclay Dr	931	1647	1008	1267	1042
SPRINGFIELD							
17-04	Pohick Creek	Old Keene Mill	507	1293	600	928	917
17-05	South Run	Lee Chapel Rd	422	1010	499	479	684
17-13	Pohick Creek	Burke Lake Rd	465	499	798	853	1493
22-03	Sandy Run	Henderson Rd	457	769	636	874	861
22-04	Sandy Run	Cathedral For	299	627	381	659	744
24-01	Wolf Run	Clifton Rd	321	603	627	434	661
24-02	Wolf Run	Henderson Rd	400	451	530	445	795
25-04	Bull Run	Old Yates Ford	263	410	562	659	531
26-02	Popes Head Ck	Popes Head Rd	518	605	650	668	688
26-03	Piney Branch	Popes Head Rd	406	459	708	471	370
26-05	Popes Head Ck	Clifton Creek	359	639	535	515	840
27-01	Johnny Moore Ck	Compton Rd	566	310	524	539	831
28-02	Little Rocky Run	Compton Rd	283	473	657	580	773
SULLY							
05-01	Difficult Run	Waples Mill & Fox Mill rd	492	783	947	1128	555
05-05	Difficult Run	Vale Rd	370	996	430	411	993
28-01	Little Rocky Run	Lee Hwy	454	989	1043	982	1130
29-02	Big Rocky Run	Braddock Rd	477	753	694	849	754
29-03	Cub Run	Braddock Rd	495	1398	793	1424	760

Table 4
Geometric Mean of Fecal Coliforms
Per 100/ml by Supervisor Districts

Five Year Survey: From 1993 To 1997

District/ Station Number	Stream Name	Collection point	Year Collected NOTE: *** INDICATES NO SAMPLES COLLECTED				
			1993	1994	1995	1996	1997
SULLY							
29-04	Cub Run	Compton Rd	307	508	441	1490	662
29-05	Flatlick Branch	Lee Jackson Rd	511	1258	928	830	840
29-06	Flatlick Branch	Braddock Rd	366	949	828	1007	641
29-08	Cub Run	Braddock Rd	389	525	366	777	527
30-01	Bull Run	Lee Hwy	295	483	373	1020	527

TABLE 5
DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
HORSEPEN CREEK			
01-01	- See note on Table 1 page 15		
SUGARLAND RUN			
02-02	20	9.1	0
02-03	23	8.7	0
NICHOL RUN			
03-03	13	9.0	0
POND BRANCH			
04-01	23	9.1	0
04-02	22	9.0	0
04-03	22	9.1	0
DIFFICULT RUN			
05-01	24	10.3	0
05-05	23	10.0	0
05-09	23	10.0	0
05-11	22	10.3	0
05-12	16	9.2	0
05-13	23	10.2	0
05-15	23	9.2	0
05-16	- See note on Table 1 page 15		
05-18	23	10.2	0
05-19	23	10.3	0
BULLNECK RUN			
06-02	18	11.2	0
SCOTTS RUN			
07-01	23	10.6	0
DEAD RUN			
08-02	22	10.2	0
TURKEY RUN			
09-01	22	10.7	0

TABLE 5
DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
PIMMIT RUN			
10-02	23	10.5	0
10-03	22	10.7	0
10-04	23	10.5	0
10-05	23	11.0	0
FOUR MILE RUN			
11-03	24	10.4	0
CAMERON RUN			
12-04	24	10.1	0
12-05	23	10.0	0
12-07	24	10.1	0
12-12	23	9.6	0
12-13	24	8.8	0
12-14	24	9.9	0
LITTLE HUNTING.CREEK			
14-02	24	8.1	0
14-03	24	7.8	16.7
DOGUE CREEK			
15-06	24	8.0	4.2
ACCOTINK CREEK			
16-03	22	8.3	4.5
16-07	22	10.3	0
16-08	24	9.2	0
16-09	25	9.5	0
16-12	22	9.7	0
POHICK CREEK			
17-04	24	10.3	0
17-05	24	10.1	0
17-06	23	10.1	0
17-08	24	9.9	0
17-13	23	7.9	0
MILL BRANCH			
20-01	25	10.0	0
20-02	24	9.9	0
20-03	21	2.3	95.2

TABLE 5
DISSOLVED OXYGEN
mg/l

REPORT FROM: 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4.0 mg/l
SANDY RUN			
22-03	24	10.2	0
22-04	24	10.0	0
WOLF RUN			
24-01	22	8.0	0
24-02	23	8.5	0
OLD MILL BRANCH			
25-04	20	8.3	0
POPES HEAD CREEK			
26-02	23	9.2	0
26-03	22	11.6	0
26-05	23	8.3	0
JOHNNY MOORE CREEK			
27-01	23	8.6	0
LITTLE ROCKY RUN			
28-01	24	9.2	0
28-02	23	8.8	0
CUB RUN			
29-02	24	10.6	0
29-03	23	10.1	0
29-04	17	11.2	0
29-05	22	8.9	0
29-06	24	8.8	0
29-08	24	9.7	0
BULL RUN			
30-01	24	9.8	0
LAKE ACCOTINK			
LA-01	8	7.4	0
LA-02	8	7.3	0
LA-03	8	7.5	0
LA-04	8	7.8	0

TABLE 6
AVERAGES FOR NITRATE NITROGEN (mg/1)
PH VALUES AND TOTAL PHOSPHOROUS (mg/1)

REPORT FROM: 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE NITRATE NITROGEN	AVERAGE pH	AVERAGE TOTAL PHOSPHOROUS
HORSEPEN CREEK				
01-01	- See note on Table 1 page 15			
SUGARLAND RUN				
02-02	20	1.6	7.3	0.1
02-03	23	1.0	7.4	0.1
NICHOL RUN				
03-03	13	0.8	7.2	0.1
POND BRANCH				
04-01	23	1.0	7.0	0.1
04-02	22	1.9	6.9	0.1
04-03	22	1.8	7.1	0.1
DIFFICULT RUN				
05-01	24	0.8	7.2	0.1
05-05	23	1.2	7.1	0.1
05-09	23	1.0	7.0	0.1
05-11	22	1.6	7.0	0.1
05-12	16	1.0	7.0	0.1
05-13	23	1.3	7.1	0.1
05-15	23	2.0	7.1	0.1
05-16	- See note on Table 1 page 15			
05-18	23	1.0	7.3	0.1
05-19	23	1.2	7.2	0.1
BULLNECK RUN				
06-02	18	2.2	7.3	0.1
SCOTTS RUN				
07-01	23	1.3	7.5	0.1
DEAD RUN				
08-02	22	2.4	7.2	0.1
TURKEY RUN				
09-01	22	1.3	7.7	0.1
PIMMIT RUN				
10-02	23	1.4	7.5	0.1

TABLE 6
AVERAGES FOR NITRATE NITROGEN (mg/1)
PH VALUES AND TOTAL PHOSPHOROUS (mg/1)

REPORT FROM: 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE NITRATE NITROGEN	AVERAGE pH	AVERAGE TOTAL PHOSPHOROUS
PIMMIT RUN				
10-03	22	1.6	7.4	0.1
10-04	23	1.8	7.5	0.1
10-05	23	1.4	7.6	0.1
FOUR MILE RUN				
11-03	24	1.4	7.2	0.1
CAMERON RUN				
12-04	24	1.8	7.3	0.1
12-05	23	0.9	7.4	0.1
12-07	24	0.7	7.3	0.1
12-12	23	0.8	7.1	0.1
12-13	24	0.7	7.2	0.1
12-14	24	1.0	7.4	0.1
LITTLE HUNTING CREEK				
14-02	24	0.9	6.9	0.1
14-03	24	0.7	6.8	0.1
DOGUE CREEK				
15-06	24	0.2	6.8	0.1
ACCOTINK CREEK				
16-03	22	0.6	7.0	0.1
16-07	22	0.8	7.2	0.1
16-08	24	0.8	7.1	0.1
16-09	25	0.7	7.2	0.1
16-12	22	0.5	7.0	0.1
POHICK CREEK				
17-04	24	0.4	7.4	0.1
17-05	24	0.2	6.9	0.1
17-06	23	0.4	7.3	0.1
17-08	24	0.4	7.1	0.1
17-13	23	0.5	7.0	0.1
MILL BRANCH				
20-01	25	0.9	7.3	0.1
20-02	24	0.7	7.2	0.1
20-03	21	0.2	7.1	0.5

TABLE 6
AVERAGES FOR NITRATE NITROGEN (mg/1)
PH VALUES AND TOTAL PHOSPHOROUS (mg/1)

REPORT FROM: 01/01/97 TO: 12/31/97

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE NITRATE NITROGEN	AVERAGE pH	AVERAGE TOTAL PHOSPHOROUS
SANDY RUN				
22-03	24	0.3	7.1	0.1
22-04	24	0.3	7.1	0.1
WOLF RUN				
24-01	22	0.2	7.1	0.1
24-02	23	0.3	7.3	0.1
OLD MILL BRANCH				
25-04	20	3.6	7.5	0.1
POPES HEAD CREEK				
26-02	23	1.5	7.3	0.1
26-03	22	0.9	7.5	0.1
26-05	23	0.7	7.4	0.1
JOHNNY MOORE CREEK				
27-01	23	0.8	7.1	0.1
LITTLE ROCKY RUN				
28-01	24	0.4	7.2	0.1
28-02	23	0.6	7.6	0.1
CUB RUN				
29-02	24	0.6	7.4	0.1
29-03	23	0.6	7.6	0.1
29-04	17	0.7	7.8	0.1
29-05	22	1.3	7.2	0.1
29-06	24	0.9	7.4	0.1
29-08	24	0.4	7.6	0.1
BULL RUN				
30-01	24	0.4	7.4	0.1
LAKE ACCOTINK				
LA-01	8	0.3	7.0	0.1
LA-02	8	0.4	7.0	0.1
LA-03	8	0.3	7.1	0.1
LA-04	8	0.3	7.1	0.1

Table 7
Geometric Mean of Nitrate Nitrogen
by Watershed

Five Year Survey From 1993 To 1997

Watershed	Year Collected 1993	1994	1995	1996	1997
01-Horsepen Creek	- See note on Table 1 page 15				
02-Sugarland Run	1.1	0.9	1.3	1.7	1.2
03-Nichol Run	0.8	0.8	0.7	1.1	0.7
04-Pond Branch	1.3	1.3	1.3	1.2	1.4
05-Difficult Run	1.0	1.1	1.0	1.2	1.2
06-Bullneck Run	2.3	2.3	2.0	2.2	2.1
07-Scotts Run	1.2	1.4	1.0	1.4	1.3
08-Dead Run	2.3	2.3	2.0	2.5	2.1
09-Turkey Run	1.2	1.2	1.2	1.2	1.2
10-Pimmit Run	1.4	1.3	1.4	1.5	1.5
11-Four Mile Run	1.3	1.2	1.1	1.6	1.4
12-Cameron Run	0.8	0.8	0.8	0.9	0.9
14-Little Hunting Creek	0.8	0.7	0.7	1.0	0.7
15-Douge Creek	0.3	0.2	0.2	0.2	0.2
16-Accotink Creek	0.6	0.7	0.6	0.9	0.7
17-Pohick Creek	0.3	0.3	0.3	0.4	0.3
20-Mill Branch	0.5	0.4	0.6	0.4	0.5
22-Sandy Run	0.2	0.3	0.3	0.4	0.3
24-Wolf Run	0.2	0.2	0.2	0.3	0.2

Table 7
Geometric Mean of Nitrate Nitrogen
by Watershed

Five Year Survey From 1993 To 1997

Watershed	Year Collected 1993	1994	1995	1996	1997
25-Old Mill Branch	2.4	1.6	3.0	1.9	3.0
26-Popes Head Creek	0.8	1.0	0.8	0.9	0.9
27-Johnny Moore Creek	0.5	0.7	0.6	0.9	0.7
28-Little Rocky Run	0.4	0.5	0.4	0.6	0.5
29-Cub Run	0.6	0.6	0.6	0.8	0.6
30-Bull Run	0.3	0.2	0.2	0.4	0.3

Table 8
Geometric Mean of pH
by Watershed

Five Year Survey From 1993 To 1997

Watershed	Year Collected 1993	1994	1995	1996	1997
01-Horsepen Creek	- See note on Table 1 page 15				
02-Sugarland Run	7.4	7.4	7.5	7.2	7.4
03-Nichol Run	7.1	7.2	7.3	6.9	7.2
04-Pond Branch	7.1	7.1	7.2	6.8	7.0
05-Difficult Run	7.1	7.2	7.3	7.0	7.1
06-Bullneck Run	7.2	7.3	7.3	7.1	7.2
07-Scotts Run	7.5	7.5	7.6	7.3	7.5
08-Dead Run	7.1	7.3	7.3	7.1	7.2
09-Turkey Run	7.6	7.7	7.6	7.4	7.7
10-Pimmit Run	7.5	7.5	7.6	7.3	7.5
11-Four Mile Run	7.4	7.5	7.6	7.0	7.2
12-Cameron Run	7.2	7.3	7.4	7.1	7.3
14-Little Hunting Creek	6.9	7.1	7.1	6.7	6.9
15-Douge Creek	6.9	7.0	7.0	6.8	6.8
16-Accotink Creek	7.2	7.3	7.3	7.1	7.2
17-Pohick Creek	7.1	7.1	7.2	7.0	7.1
20-Mill Branch	7.2	7.4	7.5	7.1	7.2
22-Sandy Run	7.1	7.3	7.4	7.1	7.1
24-Wolf Run	7.2	7.3	7.3	7.0	7.2

Table 8
Geometric Mean of pH
by Watershed

Five Year Survey From 1993 To 1997

Watershed	Year Collected 1993	1994	1995	1996	1997
25-Old Mill Branch	7.4	7.6	7.7	7.2	7.5
26-Popes Head Creek	7.3	7.4	7.4	7.1	7.4
27-Johnny Moore Creek	7.1	7.2	7.4	7.0	7.0
28-Little Rocky Run	7.5	7.5	7.5	7.2	7.4
29-Cub Run	7.5	7.5	7.5	7.2	7.5
30-Bull Run	7.2	7.4	7.4	7.1	7.4

Table 9
Geometric Mean of Total Phosphorous (mg/1)
by Watershed

Five Year Survey From 1993 To 1997

Watershed	Year Collected 1993	1994	1995	1996	1997
01-Horsepen Creek	See note in table 1				
02-Sugarland Run	0.11	0.11	0.11	0.10	0.10
03-Nichol Run	0.10	0.10	0.11	0.10	0.09
04-Pond Branch	0.10	0.11	0.10	0.10	0.10
05-Difficult Run	0.10	0.11	0.10	0.10	0.10
06-Bullneck Run	0.10	0.10	0.11	0.11	0.10
07-Scotts Run	0.10	0.11	0.11	0.10	0.09
08-Dead Run	0.10	0.11	0.10	0.11	0.10
09-Turkey Run	0.10	0.10	0.11	0.11	0.09
10-Pimmit Run	0.10	0.10	0.11	0.11	0.09
11-Four Mile Run	0.10	0.11	0.10	0.10	0.10
12-Cameron Run	0.10	0.11	0.10	0.11	0.10
14-Little Hunting Ck	0.11	0.12	0.11	0.12	0.11
15-Douge Creek	0.10	0.12	0.11	0.11	0.12
16-Accotink Creek	0.11	0.11	0.11	0.10	0.10
17-Pohick Creek	0.10	0.11	0.10	0.10	0.10
20-Mill Branch	0.11	0.10	0.11	0.11	0.13
22-Sandy Run	0.10	0.11	0.10	0.10	0.09
24-Wolf Run	0.10	0.11	0.11	0.10	0.10

Table 9
Geometric Mean of Total Phosphorous (mg/1)
by Watershed

Five Year Survey From 1993 To 1997

Watershed	Year Collected 1993	1994	1995	1996	1997
25-Old Mill Branch	0.11	0.11	0.11	0.11	0.10
26-Popes Head Creek	0.10	0.11	0.11	0.10	0.10
27-Johnny Moore Ck	0.10	0.11	0.11	0.11	0.10
28-Little Rocky Run	0.11	0.11	0.11	0.11	0.10
29-Cub Run	0.10	0.10	0.10	0.11	0.10
30-Bull Run	0.10	0.11	0.10	0.11	0.10

Table 10

Stream water Sample Temperature Ranges

(Degrees in Fahrenhelt)

Five Year Survey From 1993 To 1997

Temperature Averages (Geometric Mean)

	1993	1994	1995	1996	1997
January	40	36	39	37	39
February	38	38	38	42	45
March	45	47	51	44	48
April	55	58	53	52	54
May	66	61	61	61	59
June	69	73	70	72	66
July	77	75	76	74	72
August	74	69	76	72	72
September	66	65	66	67	66
October	57	55	58	59	58
November	49	54	45	46	45
December	43	41	37	44	40

High & Low Temperature

		1993	1994	1995	1996	1997
January	High	58	59	56	60	60
	Low	33	31	32	30	30
February	High	61	60	55	63	62
	Low	32	33	31	32	32
March	High	63	68	62	58	61
	Low	38	37	37	37	42
April	High	67	68	66	68	68
	Low	43	47	41	39	42
May	High	79	76	72	86	74
	Low	53	52	44	50	50
June	High	80	87	88	88	82
	Low	60	60	62	60	56
July	High	92	90	86	90	82
	Low	69	64	67	66	66
August	High	86	80	88	78	80
	Low	62	60	65	67	65
September	High	77	78	82	83	75
	Low	43	59	56	54	58
October	High	72	66	72	68	80
	Low	43	50	50	48	44
November	High	66	85	59	65	60
	Low	40	42	38	38	36
December	High	60	52	50	60	55
	Low	32	36	27	38	35

Table 11
Lake Accotink Park Results
(All averages are Geometric Mean)

Percentage of Fecal Coliforms in the Good Range
(Less than 200 Fecal Coliform/ 100 ml)

Station	1993	1994	1995	1996	1997
LA-01	71	0	20	33	25
LA-02	57	0	20	33	13
LA-03	43	0	40	17	13
LA-04	43	0	20	17	13

Average Dissolved Oxygen (mg/1) By Station

Station	1993	1994	1995	1996	1997
LA-01	9.1	9.1	7.5	6.8	7.3
LA-02	9.3	9.0	7.7	7.3	7.1
LA-03	9.6	8.8	7.5	6.1	7.4
LA-04	9.6	8.8	7.5	6.1	7.4

Percent of Samples Less than 4 mg/l of Dissolved Oxygen

Station	1993	1994	1995	1996	1997
LA-01	0	0	0	0	0
LA-02	0	0	0	0	0
LA-03	0	0	0	0	0
LA-04	0	0	0	0	0

Average Nitrate Nitrogen (mg/1)

Station	1993	1994	1995	1996	1997
LA-01	0.24	0.49	0.27	0.54	0.25
LA-02	0.24	0.49	0.28	0.67	0.32
LA-03	0.27	0.49	0.21	0.70	0.27
LA-04	0.28	0.46	0.31	0.68	0.25

Average pH

Station	1993	1994	1995	1996	1997
LA-01	7.7	7.5	7.4	7.0	7.0
LA-02	7.7	7.5	7.4	7.0	7.0
LA-03	7.6	7.4	7.4	6.9	7.1
LA-04	7.4	7.4	7.5	7.0	7.1

Average Total Phosphorous (mg/1)

Station	1993	1994	1995	1996	1997
LA-01	0.10	0.10	0.10	0.11	0.10
LA-02	0.10	0.10	0.11	0.11	0.10
LA-03	0.11	0.11	0.10	0.10	0.10
LA-04	0.11	0.11	0.11	0.10	0.09

TABLE 12
CITY OF FAIRFAX STREAM SAMPLE RESULTS
FOR EACH SAMPLING STATION

Report From: 01/01/97 To: 12/31/97

FECAL COLIFORM

SAMPLE STATION	TOTAL SAMPLES COLLECTED	<200 fc/100ml	200-1000 fc/100ml	>1000 fc/100ml
16-20	26	5	10	11
16-21	21	3	9	9
16-22	24	1	13	10
16-23	24	1	9	14
16-24	24	5	10	9
16-25	23	2	8	13
16-26	24	6	4	14
16-27	24	11	5	8

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE DISSOLVED OXYGEN	PERCENTAGE OF SAMPLES LESS THAN 4 mg/l
16-20	24	8.7	8.3
16-21	21	10.3	0
16-22	24	10.4	0
16-23	25	9.5	0
16-24	24	9.9	0
16-25	22	9.9	0
16-26	23	10.8	0
16-27	23	9.4	0

SAMPLE STATION	TOTAL SAMPLES COLLECTED	AVERAGE NITRATE NITROGEN	AVERAGE pH	AVERAGE TOTAL PHOSPHOROUS
16-20	24	1.0	7.4	0.1
16-21	21	1.1	7.6	0.1
16-22	24	1.4	7.3	0.1
16-23	25	1.2	7.2	0.1
16-24	24	1.0	7.2	0.1
16-25	22	1.3	7.2	0.1
16-26	23	0.6	7.1	0.1
16-27	23	0.2	7.0	0.1

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

NOTE: PMCL=Primary Maximum Contaminate Level

WATERSHED: METAL	(PMCL)	RESULTS (mg/l)
01- HORSEPEN CREEK:		
Arsenic	(0.05 mg/1)	0.002
Barium	(1.00 mg/1)	0.066
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
02- SUGARLAND RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.046
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
03- NICHOL RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.015
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.002
04- POND BRANCH:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.020
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

NOTE: PMCL=Primary Maximum Contaminate Level

METAL	(PMCL)	RESULTS (mg/l)
05- DIFFICULT RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.021
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
06- BULLNECK RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.014
Cadmium	(0.01 mg/1)	Below Detection Limits
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.001
Silver	(0.05 mg/1)	Below Detection Limits
07- SCOTTS RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.018
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.001
Silver	(0.05 mg/1)	0.001
08- DEAD RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.017
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

NOTE: PMCL=Primary Maximum Contaminate Level

WATERSHED: METAL	(PMCL)	RESULTS (mg/l)
09- TURKEY RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.021
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
10- PIMMIT RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.023
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
11- FOUR MILE RUN:		
Arsenic	(0.05 mg/1)	Below Detection Limits
Barium	(1.00 mg/1)	0.020
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
12- CAMERON RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.035
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

NOTE: PMCL=Primary Maximum Contaminate Level

WATERSHED: METAL	(PMCL)	RESULTS (mg/l)
14- LITTLE HUNTING:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.035
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
15- DOGUE CREEK:		
Arsenic	(0.05 mg/1)	0.002
Barium	(1.00 mg/1)	0.031
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	Below Detection Limits
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.001
Silver	(0.05 mg/1)	0.001
16- ACCOTINK CREEK:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.020
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
17- POHICK CREEK:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.022
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

NOTE: PMCL=Primary Maximum Contaminate Level

METAL	(PMCL)	RESULTS (mg/l)
20- MILL BRANCH:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.043
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.003
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
22- SANDY RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.029
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
24- WOLF RUN:		
Arsenic	(0.05 mg/1)	Below Detection Limits
Barium	(1.00 mg/1)	0.018
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
25- OLD MILL:		
Arsenic	(0.05 mg/1)	0.002
Barium	(1.00 mg/1)	0.036
Cadmium	(0.01 mg/1)	Below Detection Limits
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.001
Silver	(0.05 mg/1)	Below Detection Limits

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

NOTE: PMCL=Primary Maximum Contaminate Level

WATERSHED: METAL	(PMCL)	RESULTS (mg/l)
26- POPES HEAD:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.019
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
27- JOHNNY MOORE RUN:		
Arsenic	(0.05 mg/1)	Below Detection Limits
Barium	(1.00 mg/1)	0.017
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
28- LITTLE ROCKY RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.033
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001
29- CUB RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.046
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.002
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001

Table 13
Log Average of Heavy Metals by Watershed
From 1989 TO 1997

A Total of 653 Records Averaged

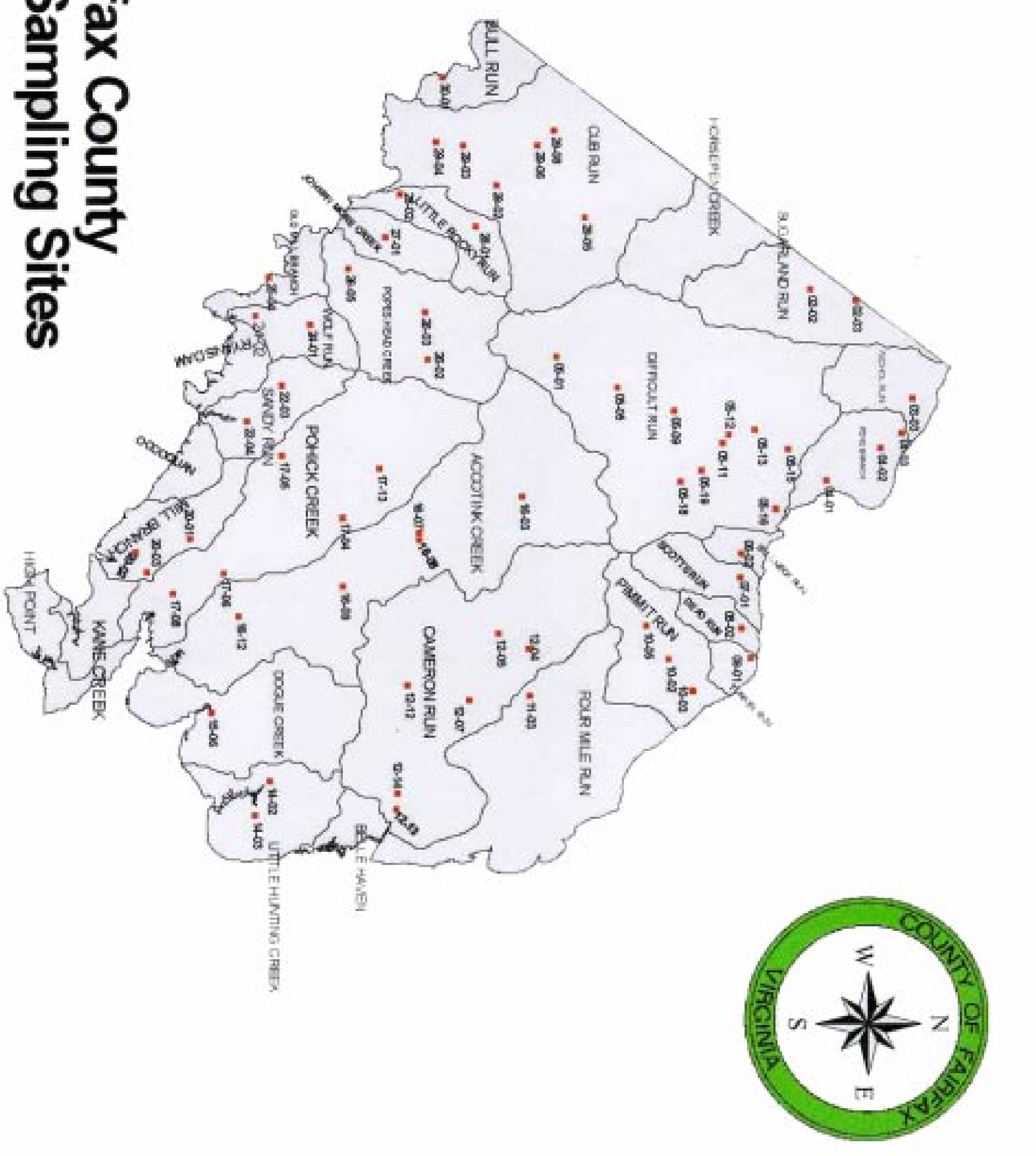
NOTE: PMCL=Primary Maximum Contaminate Level

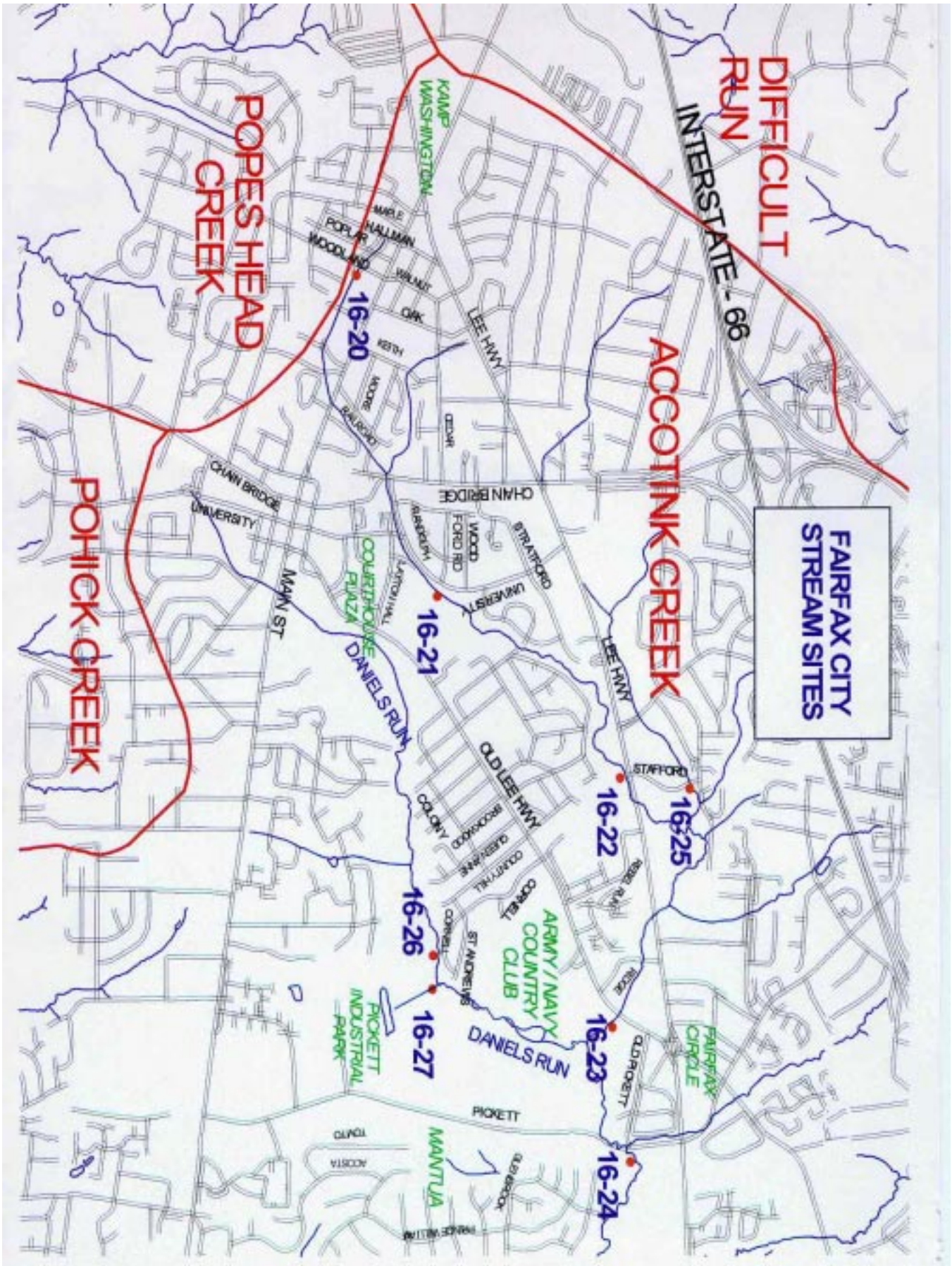
WATERSHED: METAL	(PMCL)	RESULTS (mg/l)
30- BULL RUN:		
Arsenic	(0.05 mg/1)	0.001
Barium	(1.00 mg/1)	0.027
Cadmium	(0.01 mg/1)	0.001
Chromium	(0.05 mg/1)	0.001
Lead	(0.05 mg/1)	0.001
Mercury	(0.02 mg/1)	Below Detection Limits
Selenium	(0.01 mg/1)	0.002
Silver	(0.05 mg/1)	0.001

SECTION 5

STREAM
SAMPLING SITES

Fairfax County Stream Sampling Sites




FAIRFAX CITY
STREAM SITES
DIFFICULT
RUN
INTERSTATE - 66
ACCOTINK CREEK
POPES HEAD
CREEK
POHICK CREEK
16-20
16-21
16-22
16-23
16-24
16-25
16-26
16-27
KAMP WASHINGTON
MAPLE
HALLMAN
POPLAR
WOODLAND
WALNUT
OAK
LEE HWY
CHAIN BRIDGE
UNIVERSITY
MAIN ST
COURTHOUSE PLAZA
DANIELS RUN
WOOD
FORD RD
STRATFORD
UNIVERSITY
OLD LEE HWY
COLONY
CORNELL
ST ANDREWS
ARMY / NAVY
COUNTRY
CLUB
DANIELS RUN
PICKETT
INDUSTRIAL
PARK
PICKETT
OLD PICKETT
FAIRFAX
CIRCLE
MANTUA
STAFFORD