Chemical Analyses - Polecat Creek Water Quality Monitoring Project

Prepared By:

Jean Tingler
Phillip McClellan
Saied Mostaghimi
Darryl Glover
C. Scott Crafton

Chesapeake Bay Local Assistance Department
801 East Broad Street, Suite 701
Richmond, Virginia 23219

and

Virginia Polytechnic and State University
Department of Biological Systems Engineering
Blacksburg, Virginia

This Project was funded, in part, by the Department of Environmental Quality's Coastal Resources Management Program through Grant # NA47OZ0287-01 of the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended.

EXECUTIVE SUMMARY

Water quality samples taken from five surface water stations and one rain water station were analyzed for the year beginning October, 1994 and ending September, 1995. Results from these analyses and analytical methodologies are provided in this report.

All work was contracted to the Virginia Polytechnic and State University, Department of Biological Systems Engineering. The Principal Investigator was Saied Mostaghimi, Ph.D. The Project Engineer was Phillip McClellan.

INTRODUCTION

In recent years preservation and protection of Chesapeake Bay has been a focus of attention in Virginia. As a result of concern over these environmental issues, the Commonwealth of Virginia mandated local governments to implement legislation and regulations to control land use practices in their respective jurisdictions. These regulations are designed to protect water quality. A number of governmental agencies and other organizations routinely conduct water flow and water quality monitoring within the Commonwealth. However, none of these monitoring programs focuses on describing the efficacy of emerging land use regulations in protecting water quality.

In April 1993 CBLAD initiated a water quality monitoring program in the Polecat Creek drainage. The primary goal of the monitoring program is to describe the efficacy of emerging land use regulations and policies in protecting adjacent water quality during urban development activities. Of course, the land use regulations and policies being tested are those developed by the CBLAD and the county governments in response to the Chesapeake Bay Preservation Act. The Polecat Creek monitoring system will provide information about the background state of water quality and about trends in water quality responsive to local land use regulations. This will be accomplished by measuring baseline levels of chemical, physical, and biological parameters and statistically evaluating any changes as the drainage is developed.

The Polecat Creek watershed lies in the south central section of Caroline County, Virginia (Figure 1). The headwaters rise in the piedmont, flow through the fall zone, and converge with the Mattaponi River in the coastal plain. The drainage area is about 30,000 acres and is located in the headwaters of the Mattaponi River which is one of the main tributaries to the York River. The predominant land cover in the watershed is forest, followed by open fields and pastureland. About two thirds of the watershed is designated as primary growth area in the Caroline County comprehensive plan. Significant urban development activity is expected in the area over the next ten years.

The project is divided into three components: a system of water quality monitoring networks that will provide quantitative information about chemical, physical, and biological parameters; a database of land use activities and land cover characteristics in the watershed with a method to monitor changes in each over the life span of the project; and a geographic information system (GIS) which will link water quality data and land use/land cover data to a digital geographic base map.

The system of water quality monitoring networks is comprised of two different types of station networks, "axle" stations, and "wheel" stations. The "axle" is a network of stations that comprise the "back bone" of the monitoring program, and it is data collected from these stations which will be used to perform statistical trend analyses. These are fixed stations (that means that the station location does not change) at which samples are taken using standard operating procedures describing collection techniques at specific time intervals, using specific collection, preservation, and analytical techniques. These methodologies will not change over the life of the project (with the possible exception of chemical analytical methodologies).

POLECAT CREEK

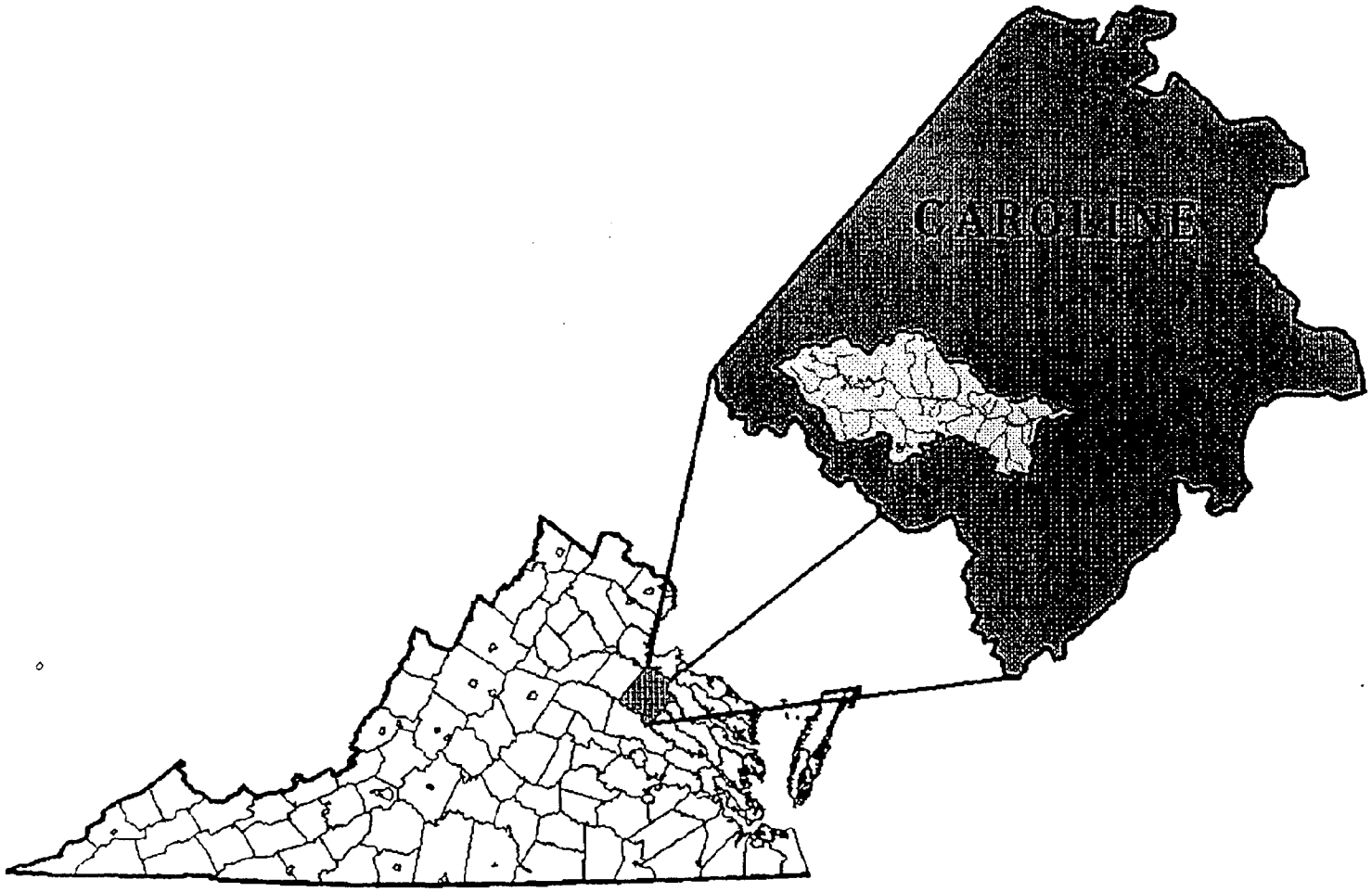


FIGURE 1.

Trend ("axle") monitoring will occur in four networks of stations in the Polecat Creek drainage (Figure 2). These will include:

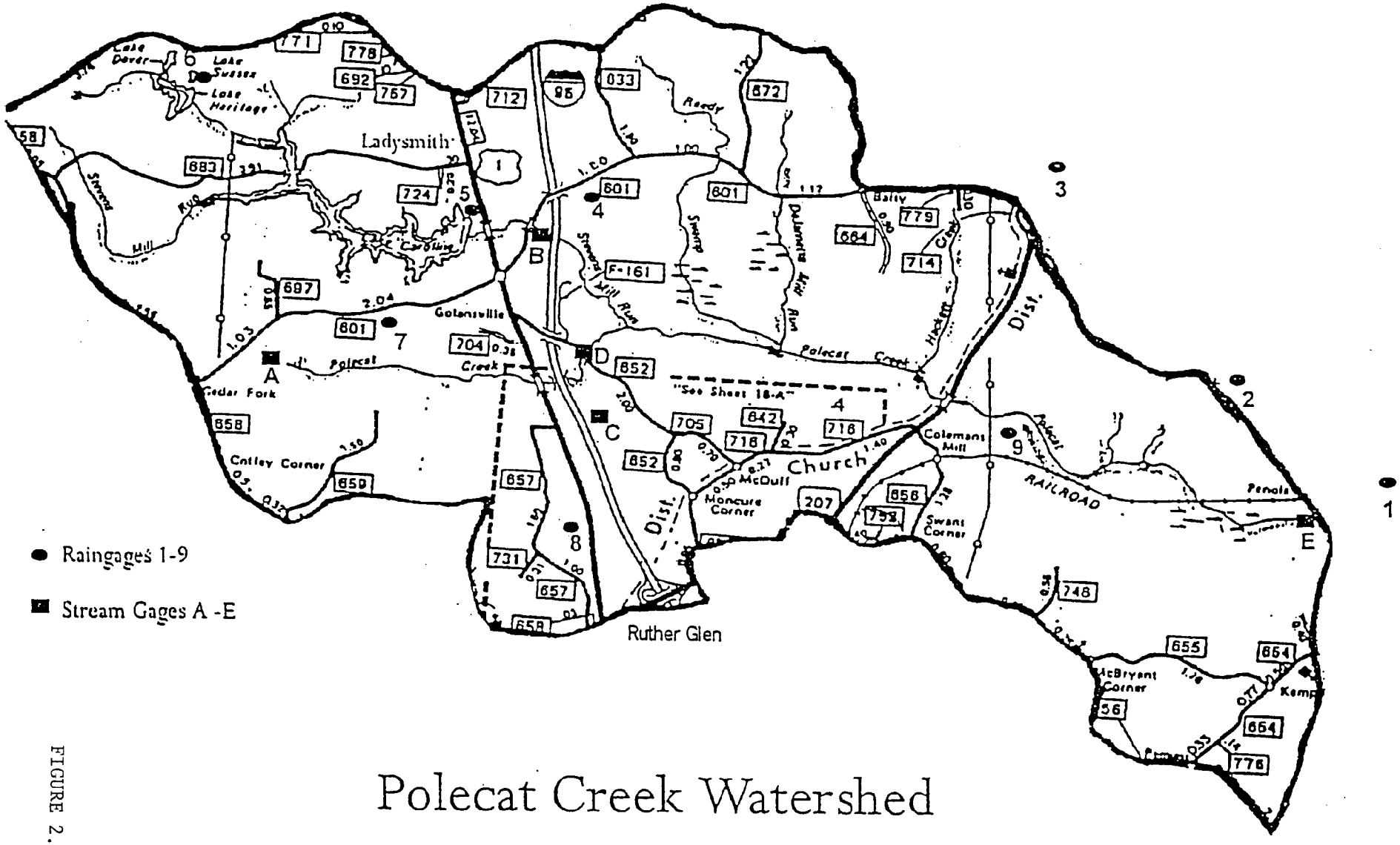
1. a network of five stations equipped with automatic sampling equipment which will monitor chemical and physical parameters (among those constituents to be monitored will be flow, a suite of nutrients, temp, pH, DO, fecal coliform and fecal streptococci bacteria). Data from these stations will be used to identify long-term changes or trends in water quality. Flow data are essential in identifying long term trends in water quality data because they allow concentration data to be converted to loading data and allow concentration data to be normalized for season. Routine trend monitoring water samples will be collected every 28-35 days.

2. a network of ten biomonitoring sites, including two off-stream sites. Biomonitoring efforts will include monitoring benthic macroinvertebrate community structure (EPA's Rapid Bioassessment Protocol III) and fish community structure (Index of Biotic Integrity - IBI). These monitoring efforts will in the short-term describe biological community structures and in the long-term record any changes in the community structures. Biomonitoring is integral to any water quality monitoring program, but is particularly important to the Polecat Creek project since this project will assess the effectiveness of best management practices and land use regulations in the watershed. It has long been recognized that "assessing the integrated response of biological communities to highly variable pollutant inputs offers a particularly useful approach for monitoring nonpoint source impacts and the effectiveness of certain BMPs (USEPA 1989)." Data analysis will be performed using the EPA recommended metrics analysis. Samples for RBP III and fish IBI will be collected quarterly and three times per year, respectively.

3. an off-stream network of rainfall gages and a weather station. These will record quality, quantity and intensity of rainfall. Water quality parameters will include nutrients, pH, and sulfate. These data are required in an effective nonpoint source monitoring program for two reasons. Rain water is a potential source of nutrients as well as pH and temperature changes to surface water. Secondly, quantity and intensity of rain fall will describe how much and in what time frame water moves through the system.

4. a network of ground water monitoring stations. CBLAD is currently planning the implementation of a ground water monitoring component to this project.

In the network design, "wheels" are networks of stations that are actually special studies or intensive stream surveys. Typically, a special study network is an intensive sampling effort with a limited time frame and a specific information purpose related to a particular water quality problem that needs further definition. The "wheels" of the Polecat Creek project will be used to determine the potential sources or reasons for the changes in water quality. Examples of some special study networks include: monitoring during highflow



Polecat Creek Watershed

FIGURE 2.

events; monitoring logging and/or construction activities; monitoring base flow and high flow events near potential agricultural, commercial, or industrial nonpoint sources; and monitoring septic system discharges through groundwater to nearby streams.

The development of a land use/land cover data base and a GIS are integral components of the Polecat Creek Project. These will allow the linkage of land use/land cover data, water quality data and geographic data. The GIS will also be used to develop a nonpoint source pollution model for the watershed (using soils, digital elevation model, stream network, land use, land cover, flood plain, USF&WS wetlands, and other available digital data sets).

PROJECT DELIVERABLE

This project proposal was written to fund chemical analysis of water quality data collected in the trend monitoring network of the Polecat Creek project. Samples were taken from five surface water stations (Table 1) and one rain gage. Samples were analyzed for a suite of nutrients, temp, pH, DO, and fecal coliform bacteria (Table 2).

All data (1994 and 1995) from the five surface water stations and rain gage are in Appendix A. Quality assurance, operating procedures, and analytical methodologies are located in Appendix B, Appendix C, and Appendix D, respectively.

TABLE 1. MONITORING STATIONS

QPA (Station A) -	This station is located in the headwaters of Polecat Creek, 100 feet downstream of State Route 601, approximately 2 ½ miles east of its intersection with State Route 1. This station is on the Hewlett, Virginia USGS 7 ½ minute quadrangle. This is a first order stream.
QPB (Station B) -	This station is located on Stevens Mill Run downstream of the Lake Caroline dam on the Ruther Glen, Virginia USGS 7 ½ minute quadrangle. This is a third order stream.
QPC (Station C) -	This station is located on an unnamed tributary to Polecat Creek, approximately 400 feet NNW of the Atkinson home on the Ruther Glen, Virginia 7 ½ minute quadrangle. This is a first order stream.
QPD (Station D) -	This station is located on Polecat Creek approximately 100 feet upstream of State Route 654. The station is on the Ruther Glen, Virginia USGS 7 ½ minute quadrangle. Polecat Creek is third order at this station.
QPE (Station E) -	This station is located on Polecat Creek approximately 200 feet upstream of State Route 601. The station is on the Penola, Virginia USGS 7 ½ minute quadrangle. Polecat Creek is fourth order at this station.
PP1	This is the rain fall collection station. It is located at the Polecat Creek Waste Water Treatment Plant.

TABLE 2. PARAMETERS MEASURED IN THE LAB

Total Suspended Solids (measures turbidity)
Ammonia
Nitrate
Total Kjeldahl Nitrogen
Filtered Total Kjeldahl Nitrogen
Total Phosphorus
Ortho-phosphorus
Filtered Total Phosphorus
pH
Total Organic Carbon
Bacteria, fecal coliform

APPENDIX A

CHEMICAL DATA

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPA
YEAR: 94
DATA TYPE: NUTRIENTS
DATA FILE: QPANUT94 S001365A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AA	B1	08/24/94 10:21		ND	ND	0.045	0.7757	0.0437	0.3429	0.	0.7595	A
AB	B6	09/14/94 13:45		ND	ND	0.315	0.5012	0.1810	0.3929	0.	0.5261	A
AC	B11	09/21/94 09:45		0.0300	ND	0.144	1.6907	0.5470	0.3346	0.	0.8679	L
AD	B16	09/22/94 17:00		0.0040	0.217	0.097	0.4362	ND	0.03	0.	0.	L
AD	B17	09/24/94 13:50		0.0060	0.063	0.042	0.3904	0.4820	0.05	0.	0.	L
AE	B28	10/22/94 15:00		0.0070	0.	0.146	ND	ND	0.045	0.003	0.	A
AE	B29	10/29/94 16:10		0.0080	0.	0.14	ND	ND	0.065	0.	0.	A
AE	B30	11/04/94 11:55		0.0060	0.	0.073	ND	ND	0.07	0.	0.	A
AE	B31	11/11/94 16:20		0.0029	0.099	0.286	0.0347	ND	0.025	0.	0.	A
AF	B75	11/21/94 19:00		0.0549	0.	0.	3.8575	ND	0.235	0.	0.	A
AF	B76	11/27/94 14:46		0.	0.048	0.059	1.8821	ND	0.	0.	0.	A
AF	B77	12/03/94 12:05		ND	0.014	0.04	1.3470	0.9305	0.	0.001	0.	A
AF	B78	12/10/94 12:45		0.0009	0.03	0.045	1.0178	1.7124	0.	0.	0.	A
AF	B74	11/20/94 11:30		ND	0.029	0.028	1.0178	ND	0.	0.	0.	A
AG	B113	12/16/94 10:00		0.0039	0.074	0.082	0.6715	0.0512	0.005	0.	0.	A
AH	B119	12/23/94 13:17		0.0019	0.	0.107	1.5302	0.5935	0.	0.	0.01	A
AI	B124	12/30/94 12:00		0.0029	0.059	0.077	ND	ND	0.	0.	0.	A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AA	B1	08/24/94 10:21		3.9			18.609		A
AB	B6	09/14/94 13:45		6.2			5.805		A
AC	B11	09/21/94 09:45					5.479		L
AD	B16	09/22/94 17:00					7.12		L
AD	B17	09/24/94 13:50					9.691		L
AE	B28	10/22/94 15:00		7.7			12.916		A
AE	B29	10/29/94 16:10		7.6			11.996		A
AE	B30	11/04/94 11:55		8.3			11.636		A
AE	B31	11/11/94 16:20		8.2			0.216		A
AF	B75	11/21/94 19:00					17.414		A
AF	B76	11/27/94 14:46		8.6			10.984		A
AF	B77	12/03/94 12:05		8.5			11.384		A
AF	B78	12/10/94 12:45		7.9			10.924		A
AF	B74	11/20/94 11:30		8.3			11.684		A
AG	B113	12/16/94 10:00		8.4			9.312		A
AH	B119	12/23/94 13:17		9.3			10.089		A
AI	B124	12/30/94 12:00		9.1			8.309		A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPB
YEAR: 94
DATA TYPE: NUTRIENTS
DATA FILE: QPBNUT94 S001365A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AA	B2	08/24/94 09:55		ND	ND	0.006	ND	1.1417	0.3679	0.	0.6011	A
AB	B7	09/14/94 14:10		ND	ND	0.216	0.1810	0.5927	0.3596	0.	0.5678	A
AC	B12	09/21/94 09:55		ND	ND	0.019	ND	0.5470	0.3429	0.	0.6345	L
AD	B18	09/22/94 16:35		ND	0.	0.011	0.0695	ND	0.18	0.	0.	L
AD	B19	09/24/94 13:10		0.0019	0.596	0.006	0.3904	ND	0.025	0.	0.	L
AE	B37	10/29/94 15:36		0.0409	0.153	0.093	ND	ND	0.04	0.	0.	A
AE	B38	10/29/94 15:36		0.0309	0.099	0.015	ND	ND	0.045	0.	0.	A
AE	B39	11/05/94 10:08		0.0299	0.14	0.015	ND	ND	0.05	0.	0.	A
AE	B40	11/05/94 10:08		0.0329	0.078	0.013	ND	ND	0.035	0.	0.01	A
AE	B41	11/05/94 10:08		0.042	0.181	0.021	ND	ND	0.	0.	0.05	A
AE	B42	11/05/94 10:08		0.0350	0.128	0.025	ND	ND	0.	0.	0.04	A
AE	B43	11/05/94 10:08		0.0350	0.093	0.021	ND	ND	0.04	0.	0.	A
AE	B44	11/05/94 10:08		0.0220	0.214	0.02	ND	ND	0.015	0.001	0.	A
AE	B52	11/05/94 10:08		0.0310	0.131	0.023	ND	ND	0.	0.003	0.	A
AE	B45	11/05/94 10:08		0.0310	0.166	0.025	ND	ND	0.015	0.	0.	A
AE	B46	11/05/94 10:08		0.024	0.152	0.028	ND	ND	0.	0.005	0.	A
AE	B47	11/05/94 10:08		0.0300	0.116	0.023	ND	0.0740	0.	0.006	0.	A
AE	B48	11/05/94 10:08		0.021	0.088	0.031	ND	2.7941	0.005	0.023	0.	A
AE	B49	11/05/94 10:08		0.0550	0.057	0.027	ND	0.0328	0.035	0.008	0.	A
AE	B50	11/05/94 10:08		0.0630	0.108	0.029	ND	ND	0.05	0.002	0.	A
AE	B51	11/05/94 10:08		0.062	0.062	0.03	ND	ND	0.	0.002	0.	A
AE	B53	11/05/94 10:08		0.0069	0.013	0.037	ND	ND	0.	0.	0.	A
AE	B54	11/11/94 16:00		0.0040	0.	0.022	ND	ND	0.	0.001	0.	A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AE	B32	10/22/94 15:30		0.0049	0.062	0.116	ND	1.3773	0.045	0.	0.	A
AE	B33	10/29/94 15:36		0.0189	0.161	0.088	0.1242	ND	0.035	0.	0.	A
AE	B34	10/29/94 15:36		0.0449	0.116	0.091	ND	ND	0.045	0.	0.	A
AE	B35	10/29/94 15:36		0.0789	0.1	0.038	ND	ND	0.1	0.	0.	A
AE	B36	10/29/94 15:36		0.0649	0.094	0.092	0.3928	0.0347	0.07	0.	0.	A
AF	B79	11/20/94 10:55		0.0019	0.047	0.009	0.7709	1.2597	0.	0.	0.	A
AF	B80	11/21/94 18:50		0.057	0.	0.034	1.5117	1.0128	0.085	0.	0.	A
AF	B81	11/27/94 15:08		ND	0.101	0.019	1.3882	1.3832	0.015	0.	0.	A
AF	B82	12/02/94 12:15		ND	0.034	0.014	1.0589	1.2597	0.	0.	0.	A
AF	B83	12/10/94 14:50		ND	0.01	0.019	0.5239	1.1362	0.	0.001	0.	A
AG	B114	12/16/94 12:00		0.0029	0.	0.084	0.1744	ND	0.	0.	0.	A
AH	B120	12/23/94 12:47		0.0019	0.	0.121	0.3552	0.1868	0.	0.	0.	A
AI	B125	12/30/94 11:33		0.023	0.034	0.06	ND	ND	0.01	0.	0.	A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AA	B2	08/24/94 09:55		5.1			5.508		A
AB	B7	09/14/94 14:10		6.1			2.988		A
AC	B12	09/21/94 09:55					3.3		L
AD	B18	09/22/94 16:35					4.634		L
AD	B19	09/24/94 13:10					7.642		L
AE	B37	10/29/94 15:36					5.189		A
AE	B38	10/29/94 15:36					6.479		A
AE	B39	11/05/94 10:08					5.59		A
AE	B40	11/05/94 10:08					5.412		A
AE	B41	11/05/94 10:08					5.19		A
AE	B42	11/05/94 10:08					5.148		A
AE	B43	11/05/94 10:08					4.912		A
AE	B44	11/05/94 10:08					5.385		A
AE	B52	11/05/94 10:08					5.871		A
AE	B45	11/05/94 10:08					5.692		A
AE	B46	11/05/94 10:08					6.755		A
AE	B47	11/05/94 10:08					5.629		A
AE	B48	11/05/94 10:08					5.567		A
AE	B49	11/05/94 10:08					5.689		A
AE	B50	11/05/94 10:08					5.863		A
AE	B51	11/05/94 10:08					6.109		A
AE	B53	11/05/94 10:08		8.6			3.956		A
AE	B54	11/11/94 16:00		8.5			3.717		A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AE	B32	10/22/94 15:30		7.7			3.23		A
AE	B33	10/29/94 15:36		7.5			4.788		A
AE	B34	10/29/94 15:36					5.376		A
AE	B35	10/29/94 15:36					5.297		A
AE	B36	10/29/94 15:36					6.905		A
AF	B79	11/20/94 10:55		8.1			4.129		A
AF	B80	11/21/94 18:50					6.129		A
AF	B81	11/27/94 15:08		8.8			4.203		A
AF	B82	12/02/94 12:15		8.2			3.773		A
AF	B83	12/10/94 14:50		8.6			3.769		A
AG	B114	12/16/94 12:00		8.7			3.171		A
AH	B120	12/23/94 12:47		8.7			3.043		A
AI	B125	12/30/94 11:33		8.3			3.106		A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPC
YEAR: 94
DATA TYPE: NUTRIENTS
DATA FILE: QPCNUT94 S001365A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AA	B3	08/24/94 11:22		0.0029	ND	0.023	0.5012	0.6842	0.4429	0.027	0.6178	A
AB	B8	09/14/94 13:00		0.0019	ND	0.082	0.4097	0.4555	0.3679	0.015	0.6011	A
AC	B13	09/21/94 09:02		ND	ND	0.042	0.1352	1.1417	0.4096	0.016	0.4179	L
AD	B20	09/22/94 17:36		0.0410	0.001	0.048	0.2529	0.5737	0.15	0.034	0.015	L
AD	B21	09/24/94 16:45		0.0080	0.064	0.008	0.5279	0.4362	0.055	0.06	0.015	L
AE	B60	11/05/94 11:15		0.0070	0.	0.008	ND	ND	0.055	0.021	0.	A
AE	B61	11/13/94 11:35		0.0049	0.	0.056	0.0587	0.7164	0.02	0.004	0.	A
AE	B55	10/21/94 15:35		0.0090	0.	0.013	ND	ND	0.085	0.028	0.	A
AE	B56	10/21/94 17:00		0.042	0.	0.014	ND	ND	0.105	0.01	0.	A
AE	B57	10/21/94 17:00		0.0160	0.027	0.031	ND	ND	0.05	0.029	0.065	A
AE	B58	10/21/94 17:00		0.158	0.056	0.039	0.0880	ND	0.32	0.01	0.015	A
AE	B59	10/29/94 17:10		0.0080	0.	0.009	0.2482	ND	0.095	0.023	0.	L
AF	B84	11/20/94 12:15		0.	0.02	0.	1.3882	1.6301	0.025	0.034	0.	A
AF	B85	11/21/94 19:30		0.039	0.109	0.	1.9232	1.3832	0.055	0.021	0.	A
AF	B86	11/27/94 15:52		0.0029	0.007	0.037	0.9355	2.4532	0.035	0.028	0.075	A
AF	B87	12/03/94 11:00		0.0049	0.048	0.092	ND	ND	0.	0.037	0.	A
AF	B88	12/03/94 11:00		0.0179	0.	0.	ND	ND	0.	0.044	0.	A
AF	B89	12/12/94 15:30		0.0029	0.	0.093	ND	ND	0.	0.106	0.	A
AG	B115	12/19/94 07:45		0.0059	0.	0.087	0.4908	0.2320	0.03	0.011	0.	A
AH	B121	12/23/94 15:10		0.0099	0.006	0.035	0.2196	0.5935	0.06	0.003	0.03	A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AA	B3	08/24/94 11:22		5.0			8.27		A
AB	B8	09/14/94 13:00		6.3			7.857		A
AC	B13	09/21/94 09:02					7.687		L
AD	B20	09/22/94 17:36					7.502		L
AD	B21	09/24/94 16:45					7.006		L
AE	B60	11/05/94 11:15		7.5			7.723		A
AE	B61	11/13/94 11:35					12.547		A
AE	B55	10/21/94 15:35		7.4			7.558		A
AE	B56	10/21/94 17:00					7.556		A
AE	B57	10/21/94 17:00					7.3		A
AE	B58	10/21/94 17:00					7.317		A
AE	B59	10/29/94 17:10					8.17		L
AF	B84	11/20/94 12:15		8.0			7.56		A
AF	B85	11/21/94 19:30					8.714		A
AF	B86	11/27/94 15:52		8.4			6.468		A
AF	B87	12/03/94 11:00		8.6			6.237		A
AF	B88	12/03/94 11:00		8.6			8.882		A
AF	B89	12/12/94 15:30		8.5			6.442		A
AG	B115	12/19/94 07:45		8.7			5.867		A
AH	B121	12/23/94 15:10		9.0			5.024		A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPD
YEAR: 94
DATA TYPE: NUTRIENTS
DATA FILE: QPDNUT94 S001365A

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AA	B4	08/24/94 10:43		0.0029	ND	0.039	0.3182	0.9130	0.4346	0.017	0.6095	A
AB	B9	09/14/94 13:25		0.0029	ND	0.074	1.0045	ND	0.4096	0.016	0.5511	A
AC	B14	09/21/94 09:18		ND	ND	0.046	0.1810	1.8280	0.4096	0.009	0.4263	L
AD	B22	09/22/94 17:19		0.041	0.089	0.079	1.0779	ND	0.17	0.047	0.04	L
AD	B23	09/24/94 16:15		0.0110	0.007	0.007	0.2987	ND	0.025	0.03	0.005	L
AE	B62	10/21/94 15:52		0.	0.	0.005	0.0587	0.2482	0.03	0.01	0.	A
AE	B63	10/29/94 16:45		0.0059	0.	0.006	0.8248	ND	0.075	0.013	0.	A
AE	B64	11/05/94 10:36		0.0039	0.	0.006	ND	ND	0.035	0.026	0.	A
AE	B65	11/12/94 12:35		0.0059	0.	0.01	ND	ND	0.105	0.095	0.06	A
AE	B66	11/12/94 12:40		0.0350	0.	0.009	ND	ND	0.08	0.025	0.	A
AF	B90	11/20/94 11:49		0.0090	0.	0.	ND	ND	0.	0.04	0.	A
AF	B91	11/21/94 19:15		0.037	0.	0.	0.4984	ND	0.02	0.007	0.	L
AF	B92	11/27/94 15:30		0.0199	0.	0.	0.2026	ND	0.	0.035	0.	L
AF	B93	11/27/94 15:30		0.0009	0.006	0.015	0.5115	0.1308	0.1	0.021	0.03	A
AF	B94	12/03/94 11:28		0.	0.052	0.009	0.4639	0.7969	0.07	0.023	0.	A
AF	B95	12/10/94 12:25		0.	0.045	0.019	0.8445	0.5115	0.065	0.018	0.	A
AG	B116	12/16/94 12:08		0.02	0.02	0.051	0.3100	0.5032	0.025	0.015	0.	A
AH	B122	12/23/94 14:47		0.0029	0.024	0.059	0.6715	0.3676	0.02	0.	0.015	A

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AA	B4	08/24/94 10:43		3.7			9.239		A
AB	B9	09/14/94 13:25		6.0			7.223		A
AC	B14	09/21/94 09:18					8.011		L
AD	B22	09/22/94 17:19					6.725		L
AD	B23	09/24/94 16:15					7.174		L
AE	B62	10/21/94 15:52		7.4			7.628		A
AE	B63	10/29/94 16:45		7.6			7.442		A
AE	B64	11/05/94 10:36		8.6			8.747		A
AE	B65	11/12/94 12:35		8.6			7.985		A
AE	B66	11/12/94 12:40		8.6			7.921		A
AF	B90	11/20/94 11:49		8.4			8.183		A
AF	B91	11/21/94 19:15					13.443		L
AF	B92	11/27/94 15:30					12.327		L
AF	B93	11/27/94 15:30		8.9			7.417		A
AF	B94	12/03/94 11:28		8.6			6.628		A
AF	B95	12/10/94 12:25		8.7			7.075		A
AG	B116	12/16/94 12:08		8.9			6.016		A
AH	B122	12/23/94 14:47		8.9			5.937		A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPE
YEAR: 94
DATA TYPE: NUTRIENTS
DATA FILE: QPENUT94 S001365A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AA	B5	08/24/94 09:27		0.0009	ND	0.098	ND	0.5012	0.3929	0.054	0.6011	A
AB	B10	09/14/94 11:25		ND	ND	0.118	0.0895	0.5470	0.3762	0.067	0.6095	A
AC	B15	09/21/94 10:12		0.0020	0.12	0.054	1.6450	0.3640	0.3846	0.052	0.4013	L
AD	B24	09/22/94 18:15		0.0110	0.046	0.035	ND	ND	0.02	0.043	0.065	L
AD	B25	09/24/94 11:55		0.0080	0.047	0.05	0.2070	0.1612	0.055	0.071	0.08	L
AE	B67	10/21/94 14:20		ND	0.	0.03	ND	ND	0.05	0.071	0.035	A
AE	B68	10/28/94 16:40		0.0019	0.	0.04	ND	ND	0.105	0.047	0.	A
AE	B69	11/04/94 16:40		0.0009	0.	0.051	ND	ND	0.115	0.052	0.05	A
AE	B70	11/11/94 11:50		0.04	0.	0.029	ND	0.1631	0.14	0.017	0.04	A
AF	B97	11/21/94 18:37		0.0479	0.	0.03	1.6680	0.7493	0.215	0.041	0.	L
AF	B98	11/21/94 18:37		0.0300	0.	0.053	1.8583	0.4639	0.13	0.047	0.01	L
AF	B99	11/27/94 16:30		0.0279	0.	0.041	1.8107	0.3211	0.175	0.03	0.	A
AF	B100	11/27/94 16:30		0.0019	0.	0.09	1.3349	0.4163	0.095	0.045	0.015	A
AF	B101	12/03/94 15:30		ND	0.026	0.16	1.4301	0.4163	0.095	0.07	0.07	A
AF	B102	12/03/94 15:30		0.	0.	0.098	1.4301	0.1784	0.075	0.048	0.04	L
AF	B103	12/03/94 15:30		0.0019	0.162	0.103	3.2381	0.4639	0.08	0.051	0.02	L
AF	B104	12/03/94 15:30		0.0039	0.	0.085	1.6204	0.2736	0.08	0.056	0.035	L
AF	B105	12/03/94 15:30		0.0039	0.	0.107	1.2874	0.4639	0.11	0.053	0.035	L
AF	B106	12/07/94 16:00		0.0009	0.036	0.121	1.3349	0.8445	0.125	0.068	0.04	L
AF	B107	12/07/94 16:00		0.0029	0.	0.102	1.6680	0.5590	0.07	0.058	0.135	L
AF	B108	12/07/94 16:00		0.0049	0.	0.066	1.3349	0.2736	0.03	0.077	0.15	L
AF	B109	12/12/94 14:45		0.0019	0.028	0.099	0.2320	ND	0.12	0.083	0.005	L
AF	B96	11/20/94 09:40		0.0009	0.	0.046	0.7018	0.7018	0.115	0.072	0.	A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AG	B117	12/16/94 13:28		0.0059	0.	0.184	0.0388	0.2772	0.105	0.076	0.04	A
AH	B123	12/23/94 11:47		0.0049	0.	0.2	0.9427	0.5483	0.1	0.088	0.165	A
AI	B128	12/30/94 10:20		0.0059	0.006	0.297	0.2322	ND	0.16	0.068	0.05	A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AA	B5	08/24/94 09:27		5.3			8.137		A
AB	B10	09/14/94 11:25		6.2			7.94		A
AC	B15	09/21/94 10:12					7.446		L
AD	B24	09/22/94 18:15					6.437		L
AD	B25	09/24/94 11:55					6.447		L
AE	B67	10/21/94 14:20		7.4			6.678		A
AE	B68	10/28/94 16:40		7.4			6.639		A
AE	B69	11/04/94 16:40		8.8			6.533		A
AE	B70	11/11/94 11:50		8.5			6.784		A
AF	B97	11/21/94 18:37					6.932		L
AF	B98	11/21/94 18:37					6.481		L
AF	B99	11/27/94 16:30					7.396		A
AF	B100	11/27/94 16:30		8.2			6.858		A
AF	B101	12/03/94 15:30		8.5			6.593		A
AF	B102	12/03/94 15:30					7.42		L
AF	B103	12/03/94 15:30					6.336		L
AF	B104	12/03/94 15:30					6.065		L
AF	B105	12/03/94 15:30					6.973		L
AF	B106	12/07/94 16:00					6.71		L
AF	B107	12/07/94 16:00					6.587		L
AF	B108	12/07/94 16:00					6.034		L
AF	B109	12/12/94 14:45					6.261		L
AF	B96	11/20/94 09:40		8.3			6.577		A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AG	B117	12/16/94 13:28		8.8			5.258		A
AH	B123	12/23/94 11:47		8.9			4.696		A
AI	B128	12/30/94 10:20		4.6			4.518		A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: PP9
YEAR: 94
DATA TYPE: NUTRIENTS
DATA FILE: PP9NUT94 S001365A

SITE: PP9 | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AD	B26	09/23/94 18:41		0.0029	0.068	0.099	ND	ND	0.	0.	0.	L
AD	B27	09/13/94 18:30		0.0030	0.038	0.083	0.9404	ND	0.	0.	0.	L
AE	B71	10/22/94 16:20		ND	0.42	0.462	0.4417	ND	0.135	0.	0.	A
AE	B72	10/28/94 18:02		ND	0.162	0.4	1.5066	ND	0.	0.	0.	L
AE	B73	11/12/94 13:25		0.	0.	0.	0.4416	ND	0.055	0.	0.	L
AF	B110	11/21/94 07:30		0.0029	0.201	0.378	0.3224	ND	0.	0.	0.	L
AF	B111	12/03/94 15:00		0.0139	0.069	0.056	ND	ND	0.	0.	0.	L
AF	B112	12/12/94 16:00		0.018	0.762	0.672	1.2139	0.6387	0.	0.	0.	L
AG	B118	12/19/94 08:45		0.0029	0.366	0.815	0.2648	0.4128	0.	0.	0.	L

SITE: PP9 | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AD	B26	09/23/94 18:41					ND		L
AD	B27	09/13/94 18:30					1.167		L
AE	B71	10/22/94 16:20		5.0			2.155		A
AE	B72	10/28/94 18:02					6.095		L
AE	B73	11/12/94 13:25					20.367		L
AF	B110	11/21/94 07:30					1.991		L
AF	B111	12/03/94 15:00					0.168		L
AF	B112	12/12/94 16:00					2.591		L
AG	B118	12/19/94 08:45					0.663		L

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPA
YEAR: 95
DATA TYPE: NUTRIENTS
DATA FILE: QPANUT95 S001365A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AX	Z245	04/16/95 17:50		0.128	ND	0.016	0.1414	ND	0.014	ND	ND	L
AX	Z246	04/16/95 17:50		0.0659	ND	0.017	0.6522	ND	0.011	ND	ND	L
AY	Z265	04/22/95 14:45		0.0039	0.0081	0.026	ND	ND	0.008	ND	ND	A
AZ	Z293	04/25/95 16:20		0.0579	0.215	0.04	0.1370	ND	0.025	ND	ND	L
AZ	Z294	04/25/95 16:20		0.0159	0.2	0.007	ND	ND	0.005	ND	ND	L
BA	Z308	04/28/95 0?:0?		ND	0.305	0.014	ND	ND	ND	0.024	0.018	A
BA	Z309	04/28/95 0?:0?		0.038	0.17	0.021	1.3296	0.0839	0.017	0.014	ND	L
BA	Z310	04/28/95 0?:0?		0.0480	0.755	0.018	1.3630	0.5001	0.033	0.021	ND	L
BA	Z311	04/28/95 0?:0?		0.04	0.04	0.025	0.4270	0.2825	0.008	0.014	ND	L
BA	Z312	04/28/95 0?:0?		0.0279	0.45	0.027	0.9263	0.5882	ND	0.01	ND	L
BB	Z330	05/05/95 19:30		ND	ND	0.001	0.5268	0.7398	0.007	ND	ND	A
BB	Z331	05/05/95 19:30		0.0539	ND	0.025	0.7287	0.6687	0.006	ND	ND	L
BB	Z332	05/05/95 19:30		0.12	0.0016	0.028	1.3886	0.6051	0.024	ND	ND	L
BB	Z333	05/05/95 19:30		0.108	ND	0.014	0.8460	0.4570	0.032	ND	ND	L
BB	Z334	05/05/95 19:30		0.104	ND	0.008	1.1976	0.8412	0.015	ND	ND	L
BB	Z335	05/05/95 19:30		0.0119	ND	0.003	0.8212	0.7786	0.025	ND	ND	L
BB	Z336	05/05/95 19:30		0.0100	ND	0.009	0.6970	0.5748	0.006	0.001	ND	L
BB	Z337	05/05/95 19:30		0.0760	ND	0.007	1.2461	1.2109	0.007	0.002	ND	L
BB	Z338	05/05/95 19:30		0.042	ND	0.01	0.6452	1.0637	ND	ND	0.02	L
BB	Z339	05/05/95 19:30		ND	0.0040	0.01	0.5771	0.6910	ND	0.001	0.015	L
BC	Z374	05/11/95 16:20		0.0860	0.1434	0.007	1.2245	3.1051	0.008	0.006	ND	L
BC	Z375	05/11/95 16:20		0.172	0.078	0.188	1.3628	1.3289	0.019	ND	ND	L
BC	Z376	05/11/95 16:20		0.044	0.0614	0.021	2.4981	3.4875	0.011	ND	ND	L
BC	Z377	05/11/95 16:20		0.102	0.072	0.087	2.0436	1.0375	0.007	ND	ND	L

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BC	Z378	05/11/95 16:20		0.264	0.1295	0.067	1.1037	2.0912	0.021	0.006	ND	L
BC	Z379	05/11/95 16:20		0.306	0.3663	0.017	ND	0.5846	0.044	ND	ND	L
BC	Z380	05/11/95 16:58		0.306	ND	0.012	0.3290	ND	0.039	ND	ND	L
BD	Z416	05/17/95 13:46		0.158	0.847	0.02	ND	0.0885	0.009	ND	ND	L
BD	Z417	05/17/95 13:46		0.322	0.629	0.031	0.6179	ND	0.014	ND	ND	L
BD	Z418	05/17/95 13:46		0.15	0.343	0.018	ND	ND	0.001	ND	ND	L
BD	Z419	05/17/95 13:46		0.0560	0.153	0.009	ND	ND	0.004	ND	ND	L
BD	Z420	05/17/95 13:46		0.0899	0.047	0.013	ND	ND	0.015	ND	ND	L
BE	Z467	05/20/95 14:20		0.0699	3.212	ND	2.2421	1.1961	0.011	0.003	ND	L
BE	Z468	05/20/95 14:20		0.0199	0.009	0.014	0.1098	ND	0.008	ND	ND	A
BH	Z486	05/26/95 19:25		0.0220	0.035	0.008	ND	ND	0.001	ND	ND	A
BH	Z487	05/26/95 19:25		1.108	0.25	0.078	4.7870	ND	0.126	0.007	ND	L
BJ	Z525	06/06/95 16:15		0.0459	ND	0.011			0.016	ND	ND	A
BJ	Z526	06/06/95 16:15		1.32	1.035	0.069			0.183	ND	ND	A
BK	Z553	06/09/95 17:58		0.0199	ND	0.01			ND	ND	ND	A
BM	Z571	06/18/95 12:57		0.0199	ND	0.041				ND		A
BM	Z572	06/23/95 19:57		0.0139	0.177	0.04				ND		A
BM	Z573	06/23/95 19:57		ND	0.151	0.122				0.005		L
BO	Z596	07/03/95 13:20		ND	0.163	0.045				0.035		A
BP	Z613	07/07/95 19:47		ND	0.139	0.04				ND		A
BS	Z636	07/14/95 17:55		0.0059	0.181	0.027				ND		A
BT	Z641	07/23/95 12:25		ND	0.327	0.064				ND		A
BW	Z670	07/28/95 18:05		0.0599	0.138	0.026				ND		A
BY	Z685	08/04/95 18:05		ND	0.223	0.063				0.001		A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
CA	Z700	08/11/95 17:29		0.0119	0.241	0.08				ND		A
CB	Z707	08/18/95 11:45		ND	0.242	0.074				ND		A
CD	Z713	08/25/95 15:30		ND	0.115	0.105				ND		L
CF	Z721	09/01/95 14:30		0.0620	0.039	ND				ND		A
CG	Z725	09/08/95 10:30		0.0100	0.213	0.118				ND		A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AJ	Z1	01/06/95 16:23		9.6			9.421		A
AK	Z64	01/21/95 13:45		8.7					A
AK	Z65	01/21/95 13:45							A
AK	Z66	01/21/95 13:45							A
AK	Z67	01/21/95 13:45							A
AK	Z68	01/21/95 13:45							A
AK	Z69	01/21/95 13:45							A
AK	Z70	01/21/95 13:45							A
AL	Z28	01/16/95 16:15		8.4			21.188		A
AL	Z29	01/16/95 16:15					9.094		A
AL	Z30	01/16/95 16:15					10.788		A
AL	Z31	01/16/95 16:15					15.748		A
AL	Z32	01/16/95 16:15					21.168		A
AL	Z33	01/16/95 16:15					22.838		A
AM	Z112	01/27/95 17:52							L
AM	Z113	01/27/95 17:52							L
AM	Z114	01/27/95 17:52							L
AM	Z115	01/27/95 17:52							L
AM	Z116	01/27/95 17:52							L
AN	Z128	02/03/95 16:40		8.5					A
AN	Z129	02/01/95 18:30							A
AN	Z130	02/03/95 16:40							A
AN	Z131	02/03/95 16:40							A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AN	Z132	02/03/95 16:40							A
AN	Z133	02/03/95 16:40							A
AN	Z134	02/03/95 16:40							A
AO	Z156	02/10/95 17:05							A
AP	Z161	02/20/95 15:40							A
AQ	Z167	02/26/95 12:30		7.7					A
AR	Z172	03/03/95 18:15		8.4					A
AS	Z179	03/10/95 16:52							L
AS	Z180	03/10/95 16:52							L
AS	Z181	03/10/95 16:52							L
AS	Z182	03/10/95 16:52							L
AS	Z183	03/10/95 16:52							L
AS	Z184	03/10/95 16:52							L
AT	Z211	0?/0?/0? 0?:0?							L
AT	Z212	0?/0?/0? 0?:0?							L
AT	Z213	0?/0?/0? 0?:0?							L
AT	Z214	0?/0?/0? 0?:0?							L
AT	Z215	0?/0?/0? 0?:0?							L
AT	Z216	03/19/95 10:58		8.1					A
AU	Z225	03/24/95 09:16		7.7					A
AV	Z231	04/02/95 12:10		7.5					A
AW	Z237	04/07/95 18:55							L
AX	Z243	04/16/95 17:50		7.1					A
AX	Z244	04/16/95 17:50							L

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AX	Z245	04/16/95 17:50							L
AX	Z246	04/16/95 17:50							L
AY	Z265	04/22/95 14:45		7.5					A
AZ	Z293	04/25/95 16:20							L
AZ	Z294	04/25/95 16:20							L
BA	Z308	04/28/95 0?:0?		7.3					A
BA	Z309	04/28/95 0?:0?							L
BA	Z310	04/28/95 0?:0?							L
BA	Z311	04/28/95 0?:0?							L
BA	Z312	04/28/95 0?:0?							L
BB	Z330	05/05/95 19:30		8.6					A
BB	Z331	05/05/95 19:30							L
BB	Z332	05/05/95 19:30							L
BB	Z333	05/05/95 19:30							L
BB	Z334	05/05/95 19:30							L
BB	Z335	05/05/95 19:30							L
BB	Z336	05/05/95 19:30							L
BB	Z337	05/05/95 19:30							L
BB	Z338	05/05/95 19:30							L
BB	Z339	05/05/95 19:30							L
BC	Z374	05/11/95 16:20							L
BC	Z375	05/11/95 16:20							L
BC	Z376	05/11/95 16:20							L
BC	Z377	05/11/95 16:20							L

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BC	Z378	05/11/95 16:20							L
BC	Z379	05/11/95 16:20							L
BC	Z380	05/11/95 16:58							L
BD	Z416	05/17/95 13:46							L
BD	Z417	05/17/95 13:46							L
BD	Z418	05/17/95 13:46							L
BD	Z419	05/17/95 13:46							L
BD	Z420	05/17/95 13:46							L
BE	Z467	05/20/95 14:20							L
BE	Z468	05/20/95 14:20		7.6					A
BH	Z486	05/26/95 19:25		7.6					A
BH	Z487	05/26/95 19:25							L
BJ	Z525	06/06/95 16:15		7.7					A
BJ	Z526	06/06/95 16:15		7.7					A
BK	Z553	06/09/95 17:58		8.0					A
BM	Z571	06/18/95 12:57		8.1					A
BM	Z572	06/23/95 19:57		8.4					A
BM	Z573	06/23/95 19:57							L
BO	Z596	07/03/95 13:20		8.8					A
BP	Z613	07/07/95 19:47		8.3					A
BS	Z636	07/14/95 17:55		7.9					A
BT	Z641	07/23/95 12:25		8.1					A
BW	Z670	07/28/95 18:05		7.9					A
BY	Z685	08/04/95 18:05		7.9					A

SITE: QPA | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
CA	Z700	08/11/95 17:29		7.9					A
CB	Z707	08/18/95 11:45		6.0					A
CD	Z713	08/25/95 15:30							L
CF	Z721	09/01/95 14:30		5.0					A
CG	Z725	09/08/95 10:30		6.4					A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPB
YEAR: 95
DATA TYPE: NUTRIENTS
DATA FILE: QPBNUT95 S001365A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AJ	Z2	01/06/95 16:40		0.0100	0.056	0.062	0.0982	ND	ND	ND	ND	A
AK	Z91	01/21/95 14:00		0.0080	0.213	0.124	ND	0.6483	0.01	0.005	ND	L
AK	Z92	01/21/95 14:00		0.0019	0.178	0.079	ND	1.2706	0.03	ND	ND	L
AK	Z93	01/21/95 14:00		0.0079	0.177	0.079	ND	0.7756	0.01	ND	ND	L
AK	Z94	01/21/95 14:00		ND	0.078	0.103	ND	0.6687	0.015	0.003	ND	L
AK	Z95	01/21/95 14:00		0.0029	0.086	0.097	ND	0.1743	0.015	0.002	ND	L
AK	Z7	01/12/95 10:20		0.0680	0.2	0.077	0.5447	ND	0.135	ND	ND	A
AK	Z8	01/12/95 10:20		0.0160	0.111	0.086	0.2768	ND	0.005	ND	ND	L
AK	Z9	01/12/95 10:20		0.0110	0.121	0.109	0.2322	ND	ND	ND	ND	L
AK	Z10	01/12/95 10:20		ND	0.109	0.07	0.1875	ND	ND	ND	ND	L
AK	Z11	01/12/95 10:20		0.0049	0.171	0.052	ND	ND	0.08	0.003	ND	L
AK	Z12	01/12/95 10:20		0.0009	0.111	0.026	ND	ND	0.025	0.001	ND	L
AK	Z13	01/12/95 10:20		0.0109	0.11	0.025	ND	ND	0.05	ND	ND	L
AK	Z14	01/12/95 10:20		0.0090	0.112	0.016	ND	ND	0.01	ND	ND	L
AK	Z15	01/12/95 10:20		0.0119	0.135	0.016	ND	ND	0.04	ND	ND	L
AK	Z16	01/12/95 10:20		0.0039	0.136	0.018	ND	ND	ND	0.002	ND	L
AK	Z17	01/12/95 10:20		ND	0.144	0.023	ND	0.0057	0.025	ND	ND	A
AK	Z18	01/12/95 10:20		0.0019	0.13	0.029	ND	ND	0.005	0.002	ND	L
AK	Z19	01/12/95 10:20		0.0029	0.131	0.028	ND	ND	ND	0.004	ND	L
AK	Z20	01/12/95 10:20		0.0079	0.137	0.086	ND	ND	ND	0.013	ND	L
AK	Z21	01/12/95 10:20		ND	0.15	0.083	ND	ND	ND	0.008	ND	L
AK	Z22	01/12/95 10:20		ND	0.128	0.08	ND	ND	ND	0.005	0.005	L
AK	Z23	01/12/95 10:20		ND	0.146	0.084	ND	ND	0.075	0.003	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AK	Z24	01/12/95 10:20		ND	0.126	0.077	ND	ND	0.06	0.003	0.025	L
AK	Z71	01/21/95 14:00		0.0029	0.128	0.088	1.9567	2.1615	ND	ND	0.025	A
AK	Z72	01/21/95 14:00		0.0119	0.137	0.077	1.9176	2.9451	ND	ND	0.08	L
AK	Z73	01/21/95 14:00		0.0099	0.176	0.077	ND	3.2949	0.08	ND	ND	L
AK	Z74	01/21/95 14:00		0.0039	0.177	0.078	ND	2.2971	0.06	ND	ND	L
AK	Z75	01/21/95 14:00		0.0079	0.17	0.058	ND	ND	0.05	ND	ND	L
AK	Z76	01/21/95 14:00		0.0029	0.176	0.076	ND	ND	0.065	ND	ND	L
AK	Z77	01/21/95 14:00		0.0069	0.178	0.073	0.6216	ND	0.04	ND	ND	L
AK	Z78	01/21/95 14:00		0.0069	0.163	0.078	0.2685	ND	0.06	ND	ND	L
AK	Z79	01/21/95 14:00		0.0019	0.189	0.077	0.1601	0.0135	0.02	ND	ND	L
AK	Z80	01/21/95 14:00		0.0049	0.12	0.081	ND	ND	0.03	ND	0.005	L
AK	Z81	01/21/95 14:00		0.0090	0.193	0.082	ND	0.9060	0.035	ND	ND	L
AK	Z82	01/21/95 14:00		0.0039	0.193	0.082	ND	1.1874	0.035	0.007	ND	L
AK	Z83	01/21/95 14:00		0.0029	0.183	0.082	ND	1.3217	0.095	0.004	ND	L
AK	Z84	01/21/95 14:00		0.0059	0.193	0.08	ND	1.3562	0.04	0.003	ND	L
AK	Z85	01/21/95 14:00		0.0049	0.178	0.08	ND	0.8505	0.075	0.002	0.005	L
AK	Z86	01/21/95 14:00		0.0039	0.202	0.08	ND	1.0328	0.02	0.001	0.015	L
AK	Z87	01/21/95 14:00		0.0069	0.254	0.09	0.4191	ND	ND	0.001	0.17	L
AK	Z88	01/21/95 14:00		0.0069	0.157	0.137	ND	1.1530	ND	0.001	0.14	L
AK	Z89	01/21/95 14:00		0.0079	0.189	0.078	ND	1.3071	0.035	0.001	ND	L
AK	Z90	01/21/95 14:00		0.0089	0.186	0.076	ND	0.7636	0.04	0.002	ND	L
AL	Z34	01/16/95 16:40		0.0680	0.115	0.098	1.5802	ND	ND	0.002	ND	A
AL	Z35	01/16/95 16:40		0.0690	0.107	0.051	1.6742	ND	ND	0.005	ND	L
AL	Z36	01/16/95 16:40		0.0710	0.138	0.061	1.4862	ND	ND	0.015	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AL	Z37	01/16/95 16:40		0.0680	0.083	0.023	1.3922	ND	ND	0.02	ND	L
AL	Z38	01/16/95 16:40		0.0660	0.1	0.07	1.3452	ND	ND	0.025	ND	L
AL	Z39	01/16/95 16:40		0.0640	0.088	0.071	1.2512	ND	ND	0.011	ND	L
AL	Z40	01/16/95 16:40		0.0690	0.07	0.081	1.2512	0.0993	ND	0.005	0.095	L
AL	Z41	01/16/95 16:40		ND	0.111	0.08	1.3922	ND	ND	0.005	0.135	L
AL	Z42	01/16/95 16:40		ND	0.106	0.082	ND	ND	0.05	0.002	ND	L
AL	Z43	01/16/95 16:40		0.0069	0.081	0.1	ND	ND	0.075	0.002	ND	L
AL	Z44	01/16/95 16:40		ND	0.08	0.087	ND	ND	0.03	0.005	ND	L
AL	Z45	01/16/95 16:40		ND	0.085	0.081	0.3254	ND	0.035	0.003	ND	L
AL	Z46	01/16/95 16:40		ND	0.086	0.084	ND	ND	0.06	0.002	ND	L
AL	Z47	01/16/95 16:40		ND	0.066	0.088	0.5467	ND	0.15	0.003	ND	L
AL	Z48	01/16/95 16:40		ND	0.092	0.093	1.2105	ND	0.255	0.005	ND	L
AL	Z49	01/16/95 16:40		ND	0.077	0.097	0.6795	ND	0.16	0.008	ND	L
AL	Z50	01/16/95 16:40		ND	0.102	0.102	0.1927	ND	0.135	0.006	ND	L
AL	Z51	01/16/95 16:40		0.181	0.119	0.097	0.3697	ND	0.075	0.007	ND	L
AL	Z52	01/16/95 16:40		0.117	0.155	0.056	0.3254	ND	0.11	0.005	ND	L
AL	Z53	01/16/95 16:40		ND	0.104	0.023	0.1042	ND	0.07	0.005	ND	L
AL	Z54	01/16/95 16:40		0.019	0.125	0.018	ND	ND	0.04	0.004	ND	L
AL	Z55	01/16/95 16:40		0.167	0.14	0.028	0.3697	ND	0.05	0.006	0.015	L
AL	Z56	01/16/95 16:40		0.309	0.167	0.08	0.4582	ND	0.005	0.012	0.055	L
AL	Z57	01/16/95 16:40		0.064	0.106	0.081	ND	ND	ND	0.002	0.12	L
AL	Z58	01/16/95 16:40		ND	0.118	0.087	2.3182	2.1615	0.065	ND	ND	L
AM	Z117	01/27/95 17:25		0.0009	0.141	0.074	ND	ND	0.025	ND	0.05	L
AM	Z118	01/27/95 17:25		0.0039	0.144	0.062	ND	ND	ND	ND	0.125	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE	SAMPLE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AM	Z119	01/27/95	17:25		0.0039	0.142	0.09	ND	ND	ND	ND	0.065	L
AM	Z120	01/27/95	17:25		0.0029	0.139	0.084	ND	0.0474	0.035	ND	ND	A
AN	Z135	02/01/95	18:15		0.0059	0.049	0.084	2.2002	2.4279	0.019	ND	ND	L
AN	Z136	02/01/95	18:15		0.0029	0.099	0.084	2.9016	2.8617	0.004	ND	ND	L
AN	Z137	02/01/95	18:15		0.0059	0.096	0.081	2.4025	2.3404	0.005	ND	ND	L
AN	Z138	02/01/95	18:15		0.0029	0.086	0.086	2.8208	2.1531	ND	ND	ND	L
AN	Z139	02/10/95	18:15		0.0049	0.099	0.096	2.8986	2.6104	0.003	ND	ND	L
AN	Z140	02/03/95	12:05		0.0039	ND	0.11	2.7785	2.6210	ND	ND	ND	A
AN	Z141	02/03/95	12:05		0.0049	ND	0.139	3.1795	2.3790	0.008	0.002	ND	A
AN	Z142	02/03/95	12:05		0.0019	ND	0.116	2.8794	2.3470	0.005	0.004	ND	A
AN	Z143	02/03/95	12:05		0.0109	0.097	0.093	2.6035	2.4707	0.002	ND	ND	L
ANB	Z148	02/09/95	10:15		0.0079	0.029	0.167	2.8170	2.4647	0.011	ND	ND	L
ANB	Z149	02/09/95	10:15		0.0099	0.044	0.148	2.7176	2.5001	0.008	ND	0.019	L
ANB	Z150	02/09/95	10:15		0.0099	0.03	0.126	0.5563	1.0362	0.001	ND	ND	L
ANB	Z151	02/09/95	10:15		0.0120	0.038	0.203	0.2605	0.7025	0.008	ND	ND	L
ANB	Z152	02/09/95	10:15		0.0149	0.057	0.145	0.3004	2.7048	0.007	ND	ND	L
ANB	Z153	02/09/95	10:15		0.0079	0.099	0.278	0.4235	1.0779	0.004	ND	ND	L
ANB	Z154	02/09/95	10:15		0.0089	0.091	0.167	0.4635	0.6607	0.008	ND	ND	L
ANB	Z155	02/09/95	10:15		0.0059	0.152	0.155	0.6285	0.4522	ND	ND	ND	L
AP	Z157	02/10/95	16:45		0.0029	0.007	0.173	0.5832	ND	0.001	ND	0.001	A
AP	Z162	02/19/95	09:40		ND	0.059	0.143	1.7002	0.8693	0.013	ND	0.003	A
AQ	Z168	02/26/95	12:20		ND	0.0737	0.117	ND	ND	ND	ND	ND	A
AR	Z173	03/03/95	17:20		0.0050	0.0065	0.064	ND	0.0742	ND	ND	ND	A
AS	Z185	03/10/95	18:22		0.0070	0.0754	0.132	ND	0.3741	ND	ND	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AS	Z186	03/10/95 18:22		0.0300	0.1155	0.117	0.2355	0.3627	0.009	0.017	ND	L
AS	Z187	03/10/95 18:22		0.0330	0.1336	0.124	0.3849	0.6535	0.016	0.018	ND	L
AS	Z188	03/10/95 18:22		0.0299	0.1327	0.127	ND	0.2376	0.008	0.022	ND	L
AS	Z189	03/10/95 18:22		0.057	0.0631	0.129	0.8925	0.4962	0.011	0.018	ND	L
AT	Z217	03/19/95 11:35		0.0059	0.0344	0.104	0.5673	0.2515	ND	ND	ND	A
AU	Z226	03/24/95 09:50		ND	0.0377	0.08	ND	ND	0.011	ND	ND	A
AV	Z232	04/02/95 12:25		0.061	0.0327	0.071	ND	ND	ND	ND	ND	A
AW	Z238	04/07/95 18:25		0.0019	ND	0.065	0.1176	ND	0.011	ND	ND	A
AX	Z247	04/16/95 12:40		IS	IS	IS			IS	IS	IS	A
AX	Z248	04/16/95 12:40		0.37	0.0663	0.105	1.9995	ND	0.09	ND	ND	L
AX	Z249	04/16/95 12:40		0.144	0.1532	0.108	0.0917	0.0160	0.02	ND	ND	L
AX	Z250	04/16/95 12:40		IS	IS	IS			IS	IS	IS	L
AX	Z251	04/16/95 12:40		0.0700	0.1057	0.118	ND	ND	0.005	ND	ND	L
AY	Z266	04/22/95 15:05		0.0019	0.0155	0.063	ND	ND	ND	ND	ND	A
AY	Z267	04/22/95 15:05		0.0260	0.0106	0.105	ND	ND	0.007	ND	ND	L
AY	Z268	04/22/95 15:05		0.0240	ND	0.105	ND	1.9315	0.006	ND	ND	L
AY	Z269	04/22/95 15:05		0.0200	0.0196	0.096	ND	ND	0.002	ND	ND	L
AY	Z270	04/22/95 15:05		0.0179	0.0163	0.098	2.8148	ND	0.009	ND	ND	L
AY	Z271	04/22/95 15:05		0.0239	0.0680	0.087	0.0035	ND	0.005	ND	0.003	L
AY	Z272	04/22/95 15:05		0.0220	0.0557	0.091	ND	ND	0.006	ND	ND	L
AY	Z273	04/22/95 15:05		0.0159	0.0360	0.086	3.4295	ND	0.005	ND	ND	L
AY	Z274	04/22/95 15:05		0.0219	0.0442	0.086	0.3495	ND	0.005	ND	ND	L
AY	Z275	04/22/95 15:05		1.222	0.0524	0.073	ND	ND	0.002	ND	ND	L
AY	Z276	04/22/95 15:05		0.0219	0.0516	0.078	ND	ND	0.033	0.002	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AY	Z277	04/22/95 15:05		0.0099	0.05	0.068	1.3063	ND	0.029	0.003	0.026	L
AY	Z278	04/22/95 15:05		0.0099	0.0049	0.07	ND	ND	0.014	0.014	ND	L
AY	Z279	04/22/95 15:05		0.0159	0.0614	0.076	ND	ND	0.005	0.007	ND	L
AY	Z280	04/22/95 15:05		0.0139	0.0081	0.069	ND	ND	0.008	ND	ND	L
AY	Z281	04/22/95 15:05		0.0220	0.0057	0.071	ND	ND	0.004	ND	ND	L
AY	Z282	04/22/95 15:05		0.0180	0.0434	0.075	ND	ND	0.006	ND	ND	L
AY	Z283	04/22/95 15:05		0.0140	0.0122	0.054	ND	ND	0.009	ND	ND	L
AZ	Z295	04/25/95 16:50		0.0159	0.18	0.046	ND	ND	0.009	ND	ND	L
AZ	Z296	04/25/95 16:50		0.0119	0.16	0.063	ND	ND	0.004	ND	ND	L
AZ	Z297	04/25/95 16:50		0.0320	0.395	0.063	ND	ND	0.012	ND	0.001	L
AZ	Z298	04/25/95 16:50		0.0119	0.39	0.078	ND	ND	0.005	ND	ND	L
AZ	Z299	04/25/95 16:50		0.08	0.57	0.072	ND	ND	0.006	ND	ND	L
AZ	Z300	04/25/95 16:50		0.0459	0.365	0.075	ND	ND	0.005	ND	ND	L
AZ	Z301	04/25/95 16:50		0.0240	0.285	0.073	ND	ND	0.007	ND	ND	L
AZ	Z302	04/25/95 16:50		0.0260	0.63	0.074	ND	ND	0.011	ND	ND	L
BA	Z313	04/28/95 19:35		ND	0.19	0.047	0.0161	ND	0.004	0.005	ND	A
BA	Z314	04/28/95 19:35		0.0179	0.425	0.07	0.5981	1.9736	0.003	0.006	ND	L
BA	Z315	04/28/95 19:35		0.0260	0.46	0.04	0.4617	0.6211	0.002	0.007	ND	L
BA	Z316	04/28/95 19:35		0.0340	0.345	0.063	0.6293	0.3466	ND	0.003	0.001	L
BA	Z317	04/28/95 19:35		0.0179	0.715	0.061	1.2667	1.1773	0.004	0.001	ND	L
BA	Z318	04/28/95 19:35		0.0179	0.975	0.059	0.6327	0.9028	0.002	0.004	0.005	L
BA	Z319	04/28/95 19:35		0.0200	0.325	0.053	ND	1.6229	ND	0.005	0.007	L
BA	Z320	04/28/95 19:35		0.0159	0.175	0.055	0.0284	0.6300	0.008	0.002	ND	L
BA	Z321	04/28/95 19:35		0.0120	0.405	0.052	0.4741	ND	ND	0.006	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE	SAMPLE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BA	Z322	04/28/95	19:35		0.0099	0.22	0.057	0.2824	ND	ND	0.006	0.016	L
BB	Z340	05/05/95	19:00		0.0580	ND	0.038	0.3543	0.1869	0.015	0.004	ND	A
BB	Z341	05/05/95	19:00		0.0180	0.0090	0.046	ND	ND	0.016	ND	ND	L
BB	Z342	05/05/95	19:00		0.0180	0.0073	0.046	ND	0.0473	0.019	0.029	0.007	L
BB	Z343	05/05/95	19:00		0.0120	ND	0.054	ND	ND	0.012	ND	0.005	L
BB	Z344	05/05/95	19:00		0.0319	0.05	0.053	ND	ND	0.015	0.006	ND	L
BB	Z345	05/05/95	19:00		0.0219	0.0229	0.051	0.7171	ND	0.007	ND	ND	L
BB	Z346	05/05/95	19:00		0.0260	2.3204	0.056	0.5775	3.8425	0.059	0.942	0.19	L
BB	Z347	05/05/95	19:00		0.0160	0.0016	0.043	0.6613	0.1311	0.011	ND	ND	L
BB	Z348	05/05/95	19:00		0.0139	0.0057	0.044	0.4659	ND	0.034	ND	ND	L
BB	Z349	05/05/95	19:00		0.0119	0.0024	0.042	0.2706	ND	0.003	ND	ND	L
BB	Z350	05/05/95	19:00		0.0060	ND	0.045	6.2703	ND	0.017	ND	ND	L
BB	Z351	05/05/95	19:00		0.12	0.0024	0.055	0.6613	ND	0.034	ND	ND	L
BB	Z352	05/05/95	19:00		0.0859	ND	0.056	0.0194	ND	0.015	ND	0.002	L
BB	Z353	05/05/95	19:00		0.0240	ND	0.049	ND	ND	0.004	ND	0.012	L
BB	Z354	05/05/95	19:00		0.0239	ND	0.043	ND	ND	ND	ND	0.008	L
BB	Z355	05/05/95	19:00		0.042	ND	0.045	0.0034	ND	0.021	ND	ND	L
BB	Z356	05/05/95	19:00		0.042	ND	0.049	ND	ND	0.023	ND	ND	L
BB	Z357	05/05/95	19:00		0.0160	ND	0.046	ND	ND	0.014	ND	ND	L
BC	Z381	05/11/95	16:40		0.0220	0.0409	0.038	0.7403	1.8858	0.018	ND	ND	L
BC	Z382	05/11/95	16:40		0.0200	0.1483	0.039	1.1478	1.1067	0.014	ND	0.024	L
BC	Z383	05/11/95	16:40		0.026	0.021	0.162	1.5826	2.0256	0.006	ND	0.018	L
BC	Z384	05/11/95	16:40		0.0320	0.0327	0.028	2.6910	0.4960	0.006	ND	0.019	L
BC	Z385	05/11/95	16:40		0.0059	0.0098	0.034	0.4434	ND	0.022	0.001	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BC	Z386	05/11/95 16:40		0.0279	0.0319	0.03	ND	ND	0.018	ND	ND	L
BC	Z387	05/11/95 16:40		0.012	0.027	0.101	ND	0.3910	0.011	ND	ND	L
BC	Z388	05/11/95 16:40		0.0099	0.0155	0.028	ND	0.1665	0.01	ND	ND	L
BC	Z389	05/11/95 16:40		0.0240	0.0360	0.025	ND	ND	0.008	ND	ND	L
BC	Z390	05/11/95 16:40		0.016	0.044	0.072	ND	0.8614	0.007	ND	ND	L
BC	Z391	05/11/95 16:40		0.03	0.002	0.102	ND	2.4285	0.009	ND	ND	L
BC	Z392	05/11/95 16:40		0.024	0.052	0.049	ND	1.3317	0.005	ND	ND	L
BC	Z393	05/11/95 16:40		0.0099	0.0368	0.029	ND	ND	0.003	ND	ND	L
BC	Z394	05/11/95 16:40		0.03	ND	0.124	ND	1.0178	0.006	ND	ND	L
BC	Z395	05/11/95 16:40		0.0300	ND	0.024	ND	ND	0.005	0.001	ND	L
BC	Z396	05/11/95 16:40		0.0099	ND	0.022	ND	0.8134	0.006	ND	ND	L
BC	Z397	05/11/95 16:40		0.0279	0.0073	0.027	ND	ND	0.003	ND	ND	L
BC	Z398	05/11/95 16:40		0.0140	ND	0.016	0.2422	ND	0.014	0.005	ND	L
BC	Z399	05/11/95 20:05		0.0119	ND	0.013	ND	ND	0.002	0.004	0.029	L
BD	Z421	05/17/95 13:15		0.0199	ND	0.011	ND	ND	0.008	ND	ND	L
BD	Z422	05/17/95 13:15		0.0160	0.047	0.025	ND	ND	0.017	ND	ND	L
BD	Z423	05/17/95 13:15		0.0240	0.016	0.017	ND	ND	0.015	ND	ND	L
BD	Z424	05/17/95 13:15		0.0159	ND	0.02	ND	ND	0.011	ND	ND	L
BD	Z425	05/17/95 13:15		0.0080	0.015	0.02	ND	ND	0.011	ND	ND	L
BD	Z426	05/17/95 13:15		0.042	ND	0.033	ND	ND	0.017	ND	ND	L
BD	Z427	05/17/95 13:15		0.04	0.004	0.046	ND	ND	0.012	ND	ND	L
BD	Z428	05/17/95 13:15		0.08	0.003	0.079	ND	ND	0.017	ND	ND	L
BD	Z429	05/17/95 13:15		0.0199	0.016	0.025	ND	ND	0.016	ND	ND	L
BD	Z430	05/17/95 13:15		0.0420	ND	0.017	ND	ND	0.01	ND	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BD	Z431	05/17/95 13:15		0.0119	ND	0.018	ND	ND	0.01	ND	ND	L
BD	Z432	05/17/95 13:15		0.0279	ND	0.023	ND	ND	0.005	ND	ND	L
BD	Z433	05/17/95 13:15		0.0159	0.004	0.013	ND	ND	0.007	ND	ND	L
BD	Z434	05/17/95 13:15		0.0320	ND	ND	ND	ND	0.02	0.017	ND	L
BD	Z435	05/17/95 13:15		0.0139	ND	ND	ND	ND	0.007	0.008	0.002	L
BD	Z436	05/17/95 13:15		0.0059	ND	0.011	ND	ND	ND	0.007	0.027	L
BD	Z437	05/17/95 13:15		0.0320	ND	ND	ND	ND	ND	0.005	0.018	L
BD	Z438	05/17/95 13:15		0.0220	0.015	0.026			IS	ND	IS	L
BE	Z469	05/20/95 13:40		0.0139	0.01	0.017	ND	ND	0.002	ND	ND	A
BH	Z488	05/26/95 18:45		0.0099	0.004	0.004			0.013	ND	ND	A
BH	Z489	05/26/95 18:45		0.324	ND	0.243	0.5308	ND	0.058	ND	0.03	L
BH	Z490	05/26/95 18:45		0.0499	0.0009	0.047			0.022	0.002	ND	L
BH	Z491	05/26/95 18:45		0.0520	ND	0.012			0.017	0.016	ND	L
BH	Z492	05/30/95 18:00		0.0160	ND	0.011			0.014	0.004	ND	L
BH	Z493	05/30/95 18:00		0.0280	0.009	0.01			0.011	0.001	ND	L
BH	Z494	05/30/95 18:00		0.0320	ND	0.024			0.012	0.019	ND	L
BH	Z495	05/30/95 18:00		ND	ND	0.009			0.007	0.015	ND	L
BH	Z496	05/30/95 18:00		0.0160	ND	ND			0.011	0.01	ND	L
BH	Z497	05/30/95 18:00		0.0300	ND	ND			0.008	0.006	ND	L
BH	Z498	05/30/95 18:00		0.0039	0.003	ND			0.005	0.004	ND	L
BH	Z499	05/30/95 18:00		0.0099	ND	0.037			ND	ND	ND	L
BH	Z500	05/30/95 18:00		0.0039	ND	0.023			0.007	ND	ND	L
BH	Z501	05/30/95 18:00		0.0140	ND	0.02			0.018	0.002	ND	L
BH	Z502	05/30/95 18:00		0.0180	ND	0.014			0.021	ND	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BH	Z503	05/30/95 18:00		0.0120	0.009	0.036			0.002	ND	0.027	L
BH	Z504	05/30/95 18:00		0.0220	ND	0.028			0.001	ND	0.02	L
BH	Z505	05/30/95 18:00		0.0100	ND	0.032			0.023	ND	ND	L
BH	Z506	05/30/95 18:00		0.0060	ND	0.01			0.014	ND	ND	L
BJ	Z257	06/06/95 16:30		0.08	0.0114	0.112	0.1121	ND		0.002		A
BJ	Z527	06/06/95 16:30		0.0382	0.004	0.006			0.012	ND	ND	L
BJ	Z258	06/06/95 16:30		0.04	ND	0.01	ND	ND		0.003		L
BJ	Z528	06/06/95 16:30		ND	ND	0.014			0.004	ND	ND	L
BJ	Z259	06/06/95 16:30		IS	IS	IS				IS		L
BJ	Z529	06/06/95 16:30		0.0899	ND	0.031			0.008	ND	ND	L
BJ	Z530	06/06/95 16:30		0.0119	ND	0.015			0.004	ND	ND	L
BJ	Z531	06/06/95 16:30		ND	ND	0.017			0.02	ND	ND	L
BJ	Z532	06/06/95 16:30		ND	ND	0.007			0.009	0.002	ND	L
BJ	Z533	06/06/95 16:30		ND	ND	0.019			ND	ND	0.029	L
BJ	Z534	06/06/95 16:30		0.0079	ND	0.01			ND	0.012	0.026	L
BJ	Z535	06/06/95 16:30		ND	ND	0.011			0.02	ND	ND	L
BJ	Z536	06/06/95 16:30		0.0200	ND	0.019			0.015	ND	ND	L
BJ	Z537	06/06/95 16:30		0.0080	ND	0.022			0.012	ND	ND	L
BJ	Z538	06/06/95 16:30		0.0059	ND	0.01			0.005	ND	ND	L
BJ	Z539	06/06/95 16:30		0.0120	ND	0.018			0.0009	ND	ND	L
BJ	Z540	06/06/95 16:30		ND	ND	0.006			0.002	ND	ND	L
BJ	Z541	06/06/95 16:30		0.0159	0.05	0.015			0.013	ND	ND	L
BJ	Z542	06/06/95 16:30		0.0340	ND	0.011			0.008	ND	ND	L
BJ	Z543	06/06/95 16:30		0.038	ND	0.023			0.005	ND	ND	L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BJ	Z544	06/06/95 16:39		0.0240	ND	0.014			0.006	ND	ND	L
BK	Z554	06/09/95 17:30		ND	ND	0.032			ND	ND	ND	A
BK	Z555	06/09/95 17:30		0.0179	ND	0.036			ND	ND	ND	L
BK	Z556	06/09/95 17:30		ND	ND	0.023				ND		L
BK	Z557	06/09/95 17:30		0.0280	ND	0.022				ND		L
BK	Z558	06/09/95 17:30		0.0199	ND	0.028				ND		L
BK	Z559	06/09/95 17:30		0.0300	ND	0.024				ND		L
BK	Z560	06/09/95 17:30		0.0240	ND	0.018				ND		L
BM	Z574	06/18/95 14:25		0.188	ND	0.213				ND		A
BM	Z575	06/23/95 19:30		ND	0.45	0.101				0.034		A
BM	Z576	06/23/95 19:30		0.0339	0.032	0.365				ND		L
BM	Z577	06/24/95 16:00		0.326	0.033	0.301				ND		L
BM	Z578	06/24/95 16:00		0.0259	0.154	0.098				0.006		L
BO	Z597	07/03/95 13:40		0.0039	0.078	0.046				0.011		A
BO	Z598	07/03/95 13:40		0.0299	0.036	0.162				ND		L
BO	Z599	07/03/95 13:40		0.466	0.024	0.028				ND		L
BP	Z614	07/07/95 20:20		ND	0.031	0.049				ND		A
BP	Z615	07/07/95 20:20		ND	0.061	0.087				ND		L
BP	Z616	07/07/95 20:20		0.108	0.098	0.044				ND		L
BP	Z617	07/07/95 20:20		0.0040	0.049	0.027				ND		L
BQ	Z623	07/11/95 17:15		0.0059	0.099	0.11				ND		L
BQ	Z624	07/11/95 17:15		0.0860	0.105	0.046				ND		L
BS	Z637	07/14/95 18:13		0.0279	0.142	0.045				ND		A
BT	Z642	07/23/95 12:55		0.0099	0.09	0.034				ND		A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BW	Z671	07/28/95 18:21		0.0139	0.038	0.038				ND		A
BW	Z672	07/28/95 18:21		ND	0.026	0.096				ND		L
BW	Z673	07/28/95 18:21		0.0720	0.027	0.1				ND		L
BW	Z674	07/28/95 18:21		0.222	0.035	0.033				ND		L
BY	Z686	08/04/95 17:21		ND	ND	0.075				ND		A
CA	Z701	08/11/95 17:10		0.0059	0.053	0.052				ND		A
CB	Z708	08/18/95 11:30		0.0139	0.014	0.032				ND		A
CD	Z714	08/25/95 15:15		ND	0.028	0.041				ND		L
CF	Z722	09/01/95 08:25		0.0060	0.188	0.114				ND		A
CG	Z726	09/08/95 10:55		0.0080	0.095	ND				ND		A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AJ	Z2	01/06/95 16:40		9.4			3.263		A
AK	Z91	01/21/95 14:00							L
AK	Z92	01/21/95 14:00							L
AK	Z93	01/21/95 14:00							L
AK	Z94	01/21/95 14:00							L
AK	Z95	01/21/95 14:00							L
AK	Z7	01/12/95 10:20		7.9			4.88		A
AK	Z8	01/12/95 10:20					4.78		L
AK	Z9	01/12/95 10:20					4.775		L
AK	Z10	01/12/95 10:20					5.227		L
AK	Z11	01/12/95 10:20					5.121		L
AK	Z12	01/12/95 10:20					5.221		L
AK	Z13	01/12/95 10:20					5.087		L
AK	Z14	01/12/95 10:20					5.209		L
AK	Z15	01/12/95 10:20					5.428		L
AK	Z16	01/12/95 10:20					5.183		L
AK	Z17	01/12/95 10:20		7.9			5.158		A
AK	Z18	01/12/95 10:20					5.258		L
AK	Z19	01/12/95 10:20					5.172		L
AK	Z20	01/12/95 10:20					5.282		L
AK	Z21	01/12/95 10:20					4.988		L
AK	Z22	01/12/95 10:20					5.017		L
AK	Z23	01/12/95 10:20					4.819		L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AK	Z24	01/12/95 10:20					5.444		L
AK	Z71	01/21/95 14:00		8.8					A
AK	Z72	01/21/95 14:00							L
AK	Z73	01/21/95 14:00							L
AK	Z74	01/21/95 14:00							L
AK	Z75	01/21/95 14:00							L
AK	Z76	01/21/95 14:00							L
AK	Z77	01/21/95 14:00							L
AK	Z78	01/21/95 14:00							L
AK	Z79	01/21/95 14:00							L
AK	Z80	01/21/95 14:00							L
AK	Z81	01/21/95 14:00							L
AK	Z82	01/21/95 14:00							L
AK	Z83	01/21/95 14:00							L
AK	Z84	01/21/95 14:00							L
AK	Z85	01/21/95 14:00							L
AK	Z86	01/21/95 14:00							L
AK	Z87	01/21/95 14:00							L
AK	Z88	01/21/95 14:00							L
AK	Z89	01/21/95 14:00							L
AK	Z90	01/21/95 14:00							L
AL	Z34	01/16/95 16:40		8.5					A
AL	Z35	01/16/95 16:40							L
AL	Z36	01/16/95 16:40							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AL	Z37	01/16/95 16:40							L
AL	Z38	01/16/95 16:40							L
AL	Z39	01/16/95 16:40							L
AL	Z40	01/16/95 16:40							L
AL	Z41	01/16/95 16:40							L
AL	Z42	01/16/95 16:40							L
AL	Z43	01/16/95 16:40							L
AL	Z44	01/16/95 16:40							L
AL	Z45	01/16/95 16:40							L
AL	Z46	01/16/95 16:40							L
AL	Z47	01/16/95 16:40							L
AL	Z48	01/16/95 16:40							L
AL	Z49	01/16/95 16:40							L
AL	Z50	01/16/95 16:40							L
AL	Z51	01/16/95 16:40							L
AL	Z52	01/16/95 16:40							L
AL	Z53	01/16/95 16:40							L
AL	Z54	01/16/95 16:40							L
AL	Z55	01/16/95 16:40							L
AL	Z56	01/16/95 16:40							L
AL	Z57	01/16/95 16:40							L
AL	Z58	01/16/95 16:40							L
AM	Z117	01/27/95 17:25							L
AM	Z118	01/27/95 17:25							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AM	Z119	01/27/95 17:25							L
AM	Z120	01/27/95 17:25							A
AN	Z135	02/01/95 18:15							L
AN	Z136	02/01/95 18:15							L
AN	Z137	02/01/95 18:15							L
AN	Z138	02/01/95 18:15							L
AN	Z139	02/10/95 18:15							L
AN	Z140	02/03/95 12:05							A
AN	Z141	02/03/95 12:05							A
AN	Z142	02/03/95 12:05							A
AN	Z143	02/03/95 12:05							L
ANB	Z148	02/09/95 10:15							L
ANB	Z149	02/09/95 10:15							L
ANB	Z150	02/09/95 10:15							L
ANB	Z151	02/09/95 10:15							L
ANB	Z152	02/09/95 10:15							L
ANB	Z153	02/09/95 10:15							L
ANB	Z154	02/09/95 10:15							L
ANB	Z155	02/09/95 10:15							L
AP	Z157	02/10/95 16:45							A
AP	Z162	02/19/95 09:40							A
AQ	Z168	02/26/95 12:20		7.7					A
AR	Z173	03/03/95 17:20		7.6					A
AS	Z185	03/10/95 18:22							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AS	Z186	03/10/95 18:22							L
AS	Z187	03/10/95 18:22							L
AS	Z188	03/10/95 18:22							L
AS	Z189	03/10/95 18:22							L
AT	Z217	03/19/95 11:35		7.7					A
AU	Z226	03/24/95 09:50		8.0					A
AV	Z232	04/02/95 12:25		7.6					A
AW	Z238	04/07/95 18:25		7.0					A
AX	Z247	04/16/95 12:40		7.2					A
AX	Z248	04/16/95 12:40							L
AX	Z249	04/16/95 12:40							L
AX	Z250	04/16/95 12:40							L
AX	Z251	04/16/95 12:40							L
AY	Z266	04/22/95 15:05		7.3					A
AY	Z267	04/22/95 15:05							L
AY	Z268	04/22/95 15:05							L
AY	Z269	04/22/95 15:05							L
AY	Z270	04/22/95 15:05							L
AY	Z271	04/22/95 15:05							L
AY	Z272	04/22/95 15:05							L
AY	Z273	04/22/95 15:05							L
AY	Z274	04/22/95 15:05							L
AY	Z275	04/22/95 15:05							L
AY	Z276	04/22/95 15:05							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AY	Z277	04/22/95 15:05							L
AY	Z278	04/22/95 15:05							L
AY	Z279	04/22/95 15:05							L
AY	Z280	04/22/95 15:05							L
AY	Z281	04/22/95 15:05							L
AY	Z282	04/22/95 15:05							L
AY	Z283	04/22/95 15:05							L
AZ	Z295	04/25/95 16:50							L
AZ	Z296	04/25/95 16:50							L
AZ	Z297	04/25/95 16:50							L
AZ	Z298	04/25/95 16:50							L
AZ	Z299	04/25/95 16:50							L
AZ	Z300	04/25/95 16:50							L
AZ	Z301	04/25/95 16:50							L
AZ	Z302	04/25/95 16:50							L
BA	Z313	04/28/95 19:35		8.9					A
BA	Z314	04/28/95 19:35							L
BA	Z315	04/28/95 19:35							L
BA	Z316	04/28/95 19:35							L
BA	Z317	04/28/95 19:35							L
BA	Z318	04/28/95 19:35							L
BA	Z319	04/28/95 19:35							L
BA	Z320	04/28/95 19:35							L
BA	Z321	04/28/95 19:35							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BA	Z322	04/28/95 19:35							L
BB	Z340	05/05/95 19:00		8.7					A
BB	Z341	05/05/95 19:00							L
BB	Z342	05/05/95 19:00							L
BB	Z343	05/05/95 19:00							L
BB	Z344	05/05/95 19:00							L
BB	Z345	05/05/95 19:00							L
BB	Z346	05/05/95 19:00							L
BB	Z347	05/05/95 19:00							L
BB	Z348	05/05/95 19:00							L
BB	Z349	05/05/95 19:00							L
BB	Z350	05/05/95 19:00							L
BB	Z351	05/05/95 19:00							L
BB	Z352	05/05/95 19:00							L
BB	Z353	05/05/95 19:00							L
BB	Z354	05/05/95 19:00							L
BB	Z355	05/05/95 19:00							L
BB	Z356	05/05/95 19:00							L
BB	Z357	05/05/95 19:00							L
BC	Z381	05/11/95 16:40							L
BC	Z382	05/11/95 16:40							L
BC	Z383	05/11/95 16:40							L
BC	Z384	05/11/95 16:40							L
BC	Z385	05/11/95 16:40							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BC	Z386	05/11/95 16:40							L
BC	Z387	05/11/95 16:40							L
BC	Z388	05/11/95 16:40							L
BC	Z389	05/11/95 16:40							L
BC	Z390	05/11/95 16:40							L
BC	Z391	05/11/95 16:40							L
BC	Z392	05/11/95 16:40							L
BC	Z393	05/11/95 16:40							L
BC	Z394	05/11/95 16:40							L
BC	Z395	05/11/95 16:40							L
BC	Z396	05/11/95 16:40							L
BC	Z397	05/11/95 16:40							L
BC	Z398	05/11/95 16:40							L
BC	Z399	05/11/95 20:05							L
BD	Z421	05/17/95 13:15							L
BD	Z422	05/17/95 13:15							L
BD	Z423	05/17/95 13:15							L
BD	Z424	05/17/95 13:15							L
BD	Z425	05/17/95 13:15							L
BD	Z426	05/17/95 13:15							L
BD	Z427	05/17/95 13:15							L
BD	Z428	05/17/95 13:15							L
BD	Z429	05/17/95 13:15							L
BD	Z430	05/17/95 13:15							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE	SAMPLE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BD	Z431	05/17/95	13:15							L
BD	Z432	05/17/95	13:15							L
BD	Z433	05/17/95	13:15							L
BD	Z434	05/17/95	13:15							L
BD	Z435	05/17/95	13:15							L
BD	Z436	05/17/95	13:15							L
BD	Z437	05/17/95	13:15							L
BD	Z438	05/17/95	13:15							L
BE	Z469	05/20/95	13:40		8.2					A
BH	Z488	05/26/95	18:45		8.7					A
BH	Z489	05/26/95	18:45							L
BH	Z490	05/26/95	18:45							L
BH	Z491	05/26/95	18:45							L
BH	Z492	05/30/95	18:00							L
BH	Z493	05/30/95	18:00							L
BH	Z494	05/30/95	18:00							L
BH	Z495	05/30/95	18:00							L
BH	Z496	05/30/95	18:00							L
BH	Z497	05/30/95	18:00							L
BH	Z498	05/30/95	18:00							L
BH	Z499	05/30/95	18:00							L
BH	Z500	05/30/95	18:00							L
BH	Z501	05/30/95	18:00							L
BH	Z502	05/30/95	18:00							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BH	Z503	05/30/95 18:00							L
BH	Z504	05/30/95 18:00							L
BH	Z505	05/30/95 18:00							L
BH	Z506	05/30/95 18:00							L
BJ	Z257	06/06/95 16:30		8.1					A
BJ	Z527	06/06/95 16:30							L
BJ	Z258	06/06/95 16:30							L
BJ	Z528	06/06/95 16:30							L
BJ	Z259	06/06/95 16:30							L
BJ	Z529	06/06/95 16:30							L
BJ	Z530	06/06/95 16:30							L
BJ	Z531	06/06/95 16:30							L
BJ	Z532	06/06/95 16:30							L
BJ	Z533	06/06/95 16:30							L
BJ	Z534	06/06/95 16:30							L
BJ	Z535	06/06/95 16:30							L
BJ	Z536	06/06/95 16:30							L
BJ	Z537	06/06/95 16:30							L
BJ	Z538	06/06/95 16:30							L
BJ	Z539	06/06/95 16:30							L
BJ	Z540	06/06/95 16:30							L
BJ	Z541	06/06/95 16:30							L
BJ	Z542	06/06/95 16:30							L
BJ	Z543	06/06/95 16:30							L

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BJ	Z544	06/06/95 16:39							L
BK	Z554	06/09/95 17:30		8.8					A
BK	Z555	06/09/95 17:30							L
BK	Z556	06/09/95 17:30							L
BK	Z557	06/09/95 17:30							L
BK	Z558	06/09/95 17:30							L
BK	Z559	06/09/95 17:30							L
BK	Z560	06/09/95 17:30							L
BM	Z574	06/18/95 14:25		8.4					A
BM	Z575	06/23/95 19:30		8.5					A
BM	Z576	06/23/95 19:30							L
BM	Z577	06/24/95 16:00							L
BM	Z578	06/24/95 16:00							L
BO	Z597	07/03/95 13:40		8.2					A
BO	Z598	07/03/95 13:40							L
BO	Z599	07/03/95 13:40							L
BP	Z614	07/07/95 20:20		8.0					A
BP	Z615	07/07/95 20:20							L
BP	Z616	07/07/95 20:20							L
BP	Z617	07/07/95 20:20							L
BQ	Z623	07/11/95 17:15							L
BQ	Z624	07/11/95 17:15							L
BS	Z637	07/14/95 18:13		8.0					A
BT	Z642	07/23/95 12:55		7.5					A

SITE: QPB | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BW	Z671	07/28/95 18:21		8.2					A
BW	Z672	07/28/95 18:21							L
BW	Z673	07/28/95 18:21							L
BW	Z674	07/28/95 18:21							L
BY	Z686	08/04/95 17:21		7.9					A
CA	Z701	08/11/95 17:10		7.9					A
CB	Z708	08/18/95 11:30		6.3					A
CD	Z714	08/25/95 15:15							L
CF	Z722	09/01/95 08:25		5.7					A
CG	Z726	09/08/95 10:55		5.7					A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPC
YEAR: 95
DATA TYPE: NUTRIENTS
DATA FILE: QPCNUT95 S001365A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AI	B126	01/02/95 12:39		.0029	.006	.044			.015	.005	.005	A
AI	B126	01/02/95 12:39					0.3661	ND				A
AJ	Z3	01/06/95 15:45		0.0050	ND	0.03	0.5001	ND	0.02	0.009	ND	A
AK	Z25	01/12/95 14:05		0.105	0.012	0.129	ND	ND	0.21	0.017	0.105	A
AK	Z26	01/12/95 14:05		0.0029	0.008	0.084	ND	ND	0.025	0.016	0.07	A
AK	Z96	01/22/95 15:10		0.0059	0.018	0.023	ND	0.0676	0.025	0.013	0.005	A
AK	Z97	01/22/95 15:10		0.016	ND	0.02	ND	0.4472	0.06	0.008	ND	A
AK	Z98	01/22/95 15:10		0.0080	0.028	0.018	ND	0.3413	0.005	0.01	0.01	A
AK	Z99	01/22/95 15:10		0.0059	0.001	0.017	ND	0.5261	0.055	0.02	0.01	A
AK	Z100	01/22/95 15:10		0.0289	ND	0.019	ND	0.7601	0.13	0.018	0.025	A
AK	Z101	01/22/95 15:10		0.036	ND	0.049	ND	0.4015	0.12	0.016	0.03	A
AK	Z102	01/22/95 15:10		0.0109	0.019	0.039	ND	0.6841	0.095	0.018	0.08	A
AK	Z103	01/22/95 15:10		0.0099	0.003	0.03	ND	0.5288	0.035	0.012	0.1	A
AK	Z104	01/22/95 15:10		0.0050	0.018	0.026	ND	ND	0.125	0.012	ND	A
AL	Z59	01/16/95 15:30		ND	0.079	0.057	2.0743	2.3182	0.065	0.007	ND	A
AN	Z121	01/28/95 09:56		0.0059	0.044	0.027	ND	ND	0.045	ND	ND	A
AN	Z122	01/28/95 09:56		0.0099	ND	0.012	ND	ND	0.065	ND	ND	L
AN	Z123	01/29/95 09:56		0.0089	0.013	0.015	0.0111	ND	0.08	ND	ND	L
AN	Z124	01/28/95 09:56		0.0130	0.006	0.015	ND	ND	0.035	ND	0.02	L
AN	Z125	01/28/95 09:56		0.0100	ND	0.016	ND	ND	0.05	ND	0.03	L
AN	Z144	02/04/95 15:10		0.0029	ND	0.094	2.7709	2.2385	ND	0.008	ND	A
AO	Z158	02/12/95 14:30		0.0019	ND	0.042	0.2892	0.7025	0.014	ND	0.002	A
AP	Z163	02/20/95 17:05		ND	ND	0.047	1.1561	0.3687	0.004	ND	ND	A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AQ	Z169	02/26/95 14:45		0.0030	0.0245	0.029	ND	0.0965	0.004	ND	ND	A
AR	Z174	03/04/95 16:15		0.02	0.0122	0.038	ND	ND	0.002	ND	ND	A
AR	Z175	03/04/95 16:15		0.378	0.0467	0.027	2.7282	ND	0.11	ND	ND	A
AS	Z190	03/10/95 10:45		0.0120	0.0950	0.064	ND	0.5185	ND	0.013	ND	L
AS	Z191	03/10/95 10:45		0.0140	0.1081	0.041	ND	0.2925	ND	0.008	ND	L
AS	Z192	03/10/95 10:45		0.063	0.0549	0.082	0.6936	ND	0.012	0.016	ND	L
AS	Z193	03/10/95 10:45		0.024	0.0786	0.095	0.3421	ND	ND	0.02	ND	L
AS	Z194	03/12/95 10:45		0.0319	0.05	0.036	ND	0.0230	ND	0.013	ND	L
AT	Z218	03/19/95 16:40		0.0109	0.0901	0.027	0.5729	0.3847	ND	0.006	ND	A
AU	Z227	03/26/95 12:10		ND	0.0122	0.012	ND	2.4522	0.007	ND	0.001	A
AV	Z233	04/02/95 12:45		0.0089	0.0090	0.015	0.2856	ND	0.014	0.008	0.004	A
AW	Z239	04/07/95 19:35		0.0039	ND	0.029	0.7939	ND	0.013	ND	0.021	A
AX	Z252	04/16/95 13:25		IS	IS	IS			IS	IS	IS	A
AX	Z253	04/16/95 13:25		0.0199	ND	0.028	ND	ND	0.002	ND	ND	L
AX	Z254	04/16/95 13:25		0.172	0.2270	0.177	1.5103	ND	0.064	ND	ND	L
AY	Z284	04/22/95 15:55		0.112	0.2262	0.038	0.5937	ND	0.051	0.012	0.003	A
BA	Z323	04/30/95 11:30		0.0119	0.43	0.084	ND	0.3053	ND	0.027	0.026	A
BA	Z324	04/30/95 11:30		0.0939	0.095	0.052	1.1879	0.3099	0.052	0.047	0.002	L
BB	Z358	05/06/95 16:30		0.0139	0.0147	0.024	0.3461	ND	0.031	0.028	0.007	A
BB	Z359	05/06/95 16:30		0.0199	ND	0.022	0.1483	0.3322	0.025	0.022	0.001	L
BB	Z360	05/06/95 16:30		0.0160	ND	0.019	0.7662	0.1131	0.039	0.024	0.003	L
BB	Z361	05/06/95 16:30		0.0160	ND	0.027	0.3124	ND	0.031	0.014	0.002	L
BB	Z362	05/06/95 16:30		0.0300	ND	0.046	1.3071	ND	0.037	0.039	ND	L
BB	Z363	05/06/95 16:30		0.0200	ND	0.021	0.9295	ND	0.029	0.033	0.005	L

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BC	Z400	05/11/95 16:20		0.0300	0.0024	0.026	0.2114	ND	0.027	0.041	ND	L
BC	Z401	05/11/95 16:20		0.0740	0.0311	0.033	0.1867	ND	0.039	0.042	ND	L
BC	Z402	05/11/95 16:20		0.052	ND	0.182	1.9293	0.7228	0.033	0.004	ND	L
BC	Z403	05/11/95 16:20		0.0240	0.0532	0.027	ND	ND	0.019	0.046	ND	L
BD	Z439	05/17/95 19:20		0.0559	ND	0.075	ND	ND	0.066	0.025	ND	L
BD	Z440	05/17/95 19:20		0.0240	ND	0.043	ND	ND	0.038	0.055	ND	L
BD	Z441	05/17/95 19:20		0.0179	ND	0.04	ND	ND	0.023	0.046	ND	L
BE	Z470	05/20/95 15:15		0.0659	0.089	0.091	0.5665	ND	0.054	0.025	0.001	L
BE	Z471	05/20/95 15:15		0.102	0.116	0.069	0.4588	ND	0.083	0.027	0.014	A
BH	Z507	05/26/95 20:45		0.4700	0.02	0.011			0.161	0.035	ND	A
BH	Z508	05/26/95 20:45		0.104	ND	0.327			0.065	0.03	ND	L
BH	Z509	05/26/95 20:45		0.0560	ND	0.235			0.027	0.046	ND	L
BJ	Z545	06/05/95 17:05		0.0200	ND	0.14			0.028	0.016	0.0009	L
BJ	Z546	06/05/95 17:05		0.138	ND	0.231			0.056	0.016	ND	L
BJ	Z547	06/05/95 17:05		0.0719	ND	0.059			0.028	0.019	0.002	L
BK	Z561	06/10/95 16:30		0.0180	ND	0.13				0.011		L
BM	Z579	06/18/95 14:45		0.0260	ND	0.053				ND		A
BM	Z580	06/24/95 17:40		0.0039	0.001	0.111				ND		A
BM	Z581	06/24/95 18:17		0.0140	0.001	0.517				ND		L
BO	Z600	07/03/95 17:38		0.0620	ND	0.214				0.02		A
BO	Z601	07/03/95 17:38		0.26	0.002	0.077				0.112		L
BP	Z618	07/07/95 18:00		0.0280	0.003	0.08				0.051		A
BS	Z638	07/14/95 19:40		0.0119	0.355	0.124				ND		A
BT	Z643	07/23/95 13:50		ND	0.109	0.211				0.009		A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BT	Z644	07/23/95 13:50		0.0219	ND	0.423				ND		L
BW	Z675	07/28/95 17:25		0.0720	ND	0.121				0.015		A
BW	Z676	07/28/95 17:25		0.0740	ND	0.241				ND		L
BY	Z687	08/06/95 09:30		ND	0.058	0.384				0.017		A
BY	Z688	08/06/95 09:30		0.0240	0.044	0.258				0.021		L
CA	Z702	08/11/95 16:25		0.078	0.032	0.374				0.001		A
CA	Z703	08/11/95 16:25		0.12	0.012	0.346				ND		L
CB	Z709	08/18/95 12:30		0.0859	0.028	0.417				ND		A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AI	B126	01/02/95 12:39							A
AI	B126	01/02/95 12:39		8.8					A
AJ	Z3	01/06/95 15:45		9.2			4.812		A
AK	Z25	01/12/95 14:05		7.8			4.949		A
AK	Z26	01/12/95 14:05		7.8			5.143		A
AK	Z96	01/22/95 15:10		9.4					A
AK	Z97	01/22/95 15:10							A
AK	Z98	01/22/95 15:10							A
AK	Z99	01/22/95 15:10							A
AK	Z100	01/22/95 15:10							A
AK	Z101	01/22/95 15:10							A
AK	Z102	01/22/95 15:10							A
AK	Z103	01/22/95 15:10							A
AK	Z104	01/22/95 15:10							A
AL	Z59	01/16/95 15:30							A
AN	Z121	01/28/95 09:56							A
AN	Z122	01/28/95 09:56							L
AN	Z123	01/29/95 09:56							L
AN	Z124	01/28/95 09:56							L
AN	Z125	01/28/95 09:56							L
AN	Z144	02/04/95 15:10		8.6					A
AO	Z158	02/12/95 14:30							A
AP	Z163	02/20/95 17:05							A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AQ	Z169	02/26/95 14:45		7.6					A
AR	Z174	03/04/95 16:15		8.2					A
AR	Z175	03/04/95 16:15							A
AS	Z190	03/10/95 10:45							L
AS	Z191	03/10/95 10:45							L
AS	Z192	03/10/95 10:45							L
AS	Z193	03/10/95 10:45							L
AS	Z194	03/12/95 10:45							L
AT	Z218	03/19/95 16:40		7.8					A
AU	Z227	03/26/95 12:10		7.4					A
AV	Z233	04/02/95 12:45		7.6					A
AW	Z239	04/07/95 19:35		6.6					A
AX	Z252	04/16/95 13:25		7.2					A
AX	Z253	04/16/95 13:25							L
AX	Z254	04/16/95 13:25							L
AY	Z284	04/22/95 15:55		7.0					A
BA	Z323	04/30/95 11:30		8.7					A
BA	Z324	04/30/95 11:30							L
BB	Z358	05/06/95 16:30		8.7					A
BB	Z359	05/06/95 16:30							L
BB	Z360	05/06/95 16:30							L
BB	Z361	05/06/95 16:30							L
BB	Z362	05/06/95 16:30							L
BB	Z363	05/06/95 16:30							L

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BC	Z400	05/11/95 16:20							L
BC	Z401	05/11/95 16:20							L
BC	Z402	05/11/95 16:20							L
BC	Z403	05/11/95 16:20							L
BD	Z439	05/17/95 19:20							L
BD	Z440	05/17/95 19:20							L
BD	Z441	05/17/95 19:20							L
BE	Z470	05/20/95 15:15							L
BE	Z471	05/20/95 15:15		7.8					A
BH	Z507	05/26/95 20:45		7.8					A
BH	Z508	05/26/95 20:45							L
BH	Z509	05/26/95 20:45							L
BJ	Z545	06/05/95 17:05							L
BJ	Z546	06/05/95 17:05							L
BJ	Z547	06/05/95 17:05							L
BK	Z561	06/10/95 16:30							L
BM	Z579	06/18/95 14:45		8.3					A
BM	Z580	06/24/95 17:40		8.2					A
BM	Z581	06/24/95 18:17							L
BO	Z600	07/03/95 17:38		8.2					A
BO	Z601	07/03/95 17:38							L
BP	Z618	07/07/95 18:00		8.2					A
BS	Z638	07/14/95 19:40		8.0					A
BT	Z643	07/23/95 13:50		7.9					A

SITE: QPC | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BT	Z644	07/23/95 13:50							L
BW	Z675	07/28/95 17:25		8.0					A
BW	Z676	07/28/95 17:25							L
BY	Z687	08/06/95 09:30		7.6					A
BY	Z688	08/06/95 09:30							L
CA	Z702	08/11/95 16:25		8.1					A
CA	Z703	08/11/95 16:25							L
CB	Z709	08/18/95 12:30		6.3					A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPD
YEAR: 95
DATA TYPE: NUTRIENTS
DATA FILE: QPDNUT95 S001365A

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BB	Z366	05/06/95 17:00		0.0180	ND	0.026	0.8163	ND	0.015	0.009	0.003	L
BB	Z367	05/06/95 17:00		0.0039	ND	0.023	0.6967	ND	0.006	0.003	0.007	L
BB	Z368	05/06/95 17:00		0.0160	ND	0.011	0.8571	2.7038	0.031	ND	0.014	L
BC	Z404	05/11/95 18:00		0.0720	0.0049	0.038	8.6563	ND	0.015	0.013	ND	L
BC	Z405	05/11/95 18:00		0.0260	0.0516	0.024	ND	ND	0.012	0.014	ND	L
BC	Z406	05/11/95 18:00		0.0340	0.0081	0.025	ND	ND	0.012	0.013	ND	L
BD	Z442	05/17/95 18:55		0.0740	0.1	0.04	ND	ND	0.017	0.017	ND	L
BD	Z443	05/17/95 18:55		0.084	ND	0.032	ND	ND	0.012	0.015	ND	L
BD	Z444	05/17/95 18:55		ND	ND	0.031			IS	0.014	IS	L
BD	Z445	05/17/95 18:55		0.042	ND	0.051	ND	ND	0.016	0.014	ND	L
BD	Z446	05/17/95 18:55		0.0320	ND	0.077			IS	0.01	IS	L
BD	Z447	05/17/95 18:55		NS	NS	NS			NS	NS	NS	L
BD	Z448	05/17/95 18:55		ND	0.015	0.036			IS	0.018	IS	L
BD	Z449	05/17/95 18:55		0.0059	0.02	0.037			IS	0.023	IS	L
BD	Z450	05/17/95 18:55		0.0019	ND	0.027	ND	ND	0.018	0.019	ND	L
BD	Z451	05/17/95 18:55		ND	ND	0.034	ND	ND	0.015	0.016	ND	L
BD	Z452	05/17/95 18:55		ND	ND	0.027	ND	ND	0.018	0.013	ND	L
BD	Z453	05/17/95 18:55		ND	ND	0.027			IS	0.001	IS	L
BD	Z454	05/17/95 18:55		0.0019	0.268	0.031	ND	ND	0.015	0.004	ND	L
BD	Z455	05/17/95 18:55		ND	ND	0.028			IS	0.009	IS	L
BD	Z456	05/17/95 18:55		ND	0.007	0.031	ND	ND	0.011	0.014	ND	L
BD	Z457	05/17/95 18:55		ND	0.033	0.034	ND	ND	0.007	0.007	0.001	L
BD	Z458	05/17/95 18:55		ND	0.083	0.032	ND	ND	0.032	0.011	0.004	L
BE	Z472	05/20/95 14:45		0.0320	0.021	0.057	0.1226	0.2528	0.045	ND	ND	L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BE	Z473	05/20/95 14:45		0.0220	0.071	0.037	ND	ND	0.046	0.007	0.03	A
BH	Z510	05/26/95 19:45		0.1100	0.0009	0.673			0.026	0.035	ND	A
BH	Z511	05/26/95 19:45		0.0079	ND	0.304			0.013	0.018	ND	L
BH	Z512	05/30/95 18:30		0.0539	ND	0.143			0.01	0.029	ND	L
BH	Z513	05/30/95 18:30		0.0160	ND	0.067			0.008	0.019	ND	L
BJ	Z548	06/05/95 17:30		0.0479	ND	0.151			0.03	0.011	0.007	L
BJ	Z549	06/05/95 17:30		0.0559	ND	0.113			0.019	0.001	0.029	L
BK	Z562	06/09/95 19:40		0.0140	ND	0.118				0.003		A
BM	Z586	06/24/95 17:40		0.244	0.009	0.086				ND		L
BM	Z587	06/24/95 17:40		ND	0.095	0.177				ND		L
BM	Z588	06/24/95 17:40		0.0519	0.035	0.227				ND		L
BM	Z582	06/18/95 15:00		0.53	ND	0.072				ND		A
BM	Z583	06/23/95 20:08		0.228	0.007	0.269				ND		A
BM	Z584	06/23/95 20:08		0.0579	ND	0.289				ND		L
BM	Z585	06/23/95 20:08		0.274	0.009	0.219				ND		L
BO	Z602	07/03/95 18:20		0.0218	0.018	0.067				ND		A
BO	Z603	07/03/95 18:20		0.0039	0.214	0.299				ND		L
BO	Z604	07/03/95 18:20		0.114	ND	0.29				ND		L
BO	Z605	07/03/95 18:20		0.128	0.052	0.144				ND		L
BO	Z606	07/03/95 18:20		0.0300	0.065	0.1				ND		L
BO	Z607	07/03/95 18:20		0.0220	0.057	0.126				ND		L
BO	Z608	07/03/95 18:20		0.0220	0.04	0.216				ND		L
BO	Z609	07/03/95 18:20		0.0899	0.026	0.117				ND		L
BO	Z610	07/03/95 18:20		0.0459	ND	0.134				ND		L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BP	Z619	07/07/95 16:30		0.0120	0.054	0.086				0.026		A
BQ	Z625	07/11/95 17:15		0.0479	0.049	0.33				ND		L
BQ	Z626	07/11/95 17:15		0.042	0.081	0.184				ND		L
BQ	Z627	07/11/95 17:15		0.0140	0.333	0.987				ND		L
BS	Z639	07/14/95 18:45		0.0099	0.053	0.258				ND		A
BT	Z645	07/23/95 13:13		0.308	0.001	0.15				ND		A
BT	Z646	07/23/95 13:13		0.0079	ND	0.401				ND		L
BT	Z647	07/23/95 13:13		0.0260	ND	0.538				ND		L
BW	Z677	07/28/95 17:45		0.232	ND	0.098				0.007		A
BY	Z689	08/06/95 09:05		ND	0.054	0.177				0.015		A
CA	Z704	08/11/95 16:50		0.0119	0.051	0.174				ND		A
CB	Z710	08/18/95 12:00		0.0079	0.074	0.149				ND		A
CD	Z715	08/25/95 15:58		0.0080	0.039	0.28				ND		L
CG	Z727	09/08/95 11:30		0.0200	0.321	0.509				ND		A
CG	Z728	09/08/95 11:03		0.0520	0.223	0.568				ND		L
CG	Z729	09/08/95 11:30		0.0300	0.171	1.034				ND		L
CG	Z730	09/08/95 11:30		0.0200	0.261	1.007				ND		L
CG	Z731	09/11/95 08:30		0.036	0.219	0.016				ND		L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AI	B127	01/02/95 12:51					5.102		L
AI	B127	01/02/95 12:51		8.9					A
AJ	Z4	01/06/95 15:17		9.1			5.204		A
AK	Z27	01/12/95 08:40					5.77		A
AK	Z105	01/22/95 14:05		9.3					A
AK	Z106	01/22/95 14:05							L
AK	Z107	01/22/95 14:05							L
AK	Z108	01/22/95 14:05							L
AK	Z109	01/22/95 14:05							L
AL	Z60	01/16/95 15:55		8.4					A
AL	Z61	01/16/95 15:55							A
AM	Z126	01/28/95 10:18							A
AN	Z145	02/03/95 16:40		8.5					A
AO	Z159	02/10/95 14:10							A
AP	Z164	02/20/95 16:47							A
AQ	Z170	02/26/95 14:45		7.8					A
AR	Z176	03/04/95 16:55		7.5					A
AS	Z195	03/11/95 16:59							L
AS	Z196	03/11/95 16:59							L
AS	Z197	03/11/95 16:59							L
AS	Z198	03/11/95 16:59							L
AS	Z199	03/11/95 16:59							L
AS	Z200	03/11/95 16:59							L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AS	Z201	03/11/95 16:59							L
AS	Z202	03/11/95 16:59							L
AS	Z203	03/11/95 16:59							L
AS	Z204	03/11/95 16:59							L
AT	Z219	03/19/95 16:55		7.5					A
AT	Z220	03/19/95 16:55							L
AT	Z221	03/19/95 16:55							L
AT	Z222	03/19/95 16:55							L
AT	Z223	03/19/95 16:55							L
AU	Z228	03/24/95 09:40							L
AU	Z228	03/24/95 09:40		7.8					A
AV	Z234	04/02/95 12:35		7.7					A
AW	Z240	04/07/95 19:12		6.6					A
AX	Z255	04/16/95 13:10		7.3					A
AX	Z256	04/16/95 13:10							L
AX	Z257	04/16/95 13:10							L
AX	Z258	04/16/95 13:10							L
AY	Z285	04/22/95 14:45		7.4					A
AZ	Z303	04/25/95 17:25							L
AZ	Z304	04/25/95 17:25							L
BA	Z325	04/30/95 12:00		8.5					A
BA	Z326	04/30/95 12:00							L
BB	Z364	05/06/95 17:00		8.8					A
BB	Z365	05/06/95 17:00							L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BB	Z366	05/06/95 17:00							L
BB	Z367	05/06/95 17:00							L
BB	Z368	05/06/95 17:00							L
BC	Z404	05/11/95 18:00							L
BC	Z405	05/11/95 18:00							L
BC	Z406	05/11/95 18:00							L
BD	Z442	05/17/95 18:55							L
BD	Z443	05/17/95 18:55							L
BD	Z444	05/17/95 18:55							L
BD	Z445	05/17/95 18:55							L
BD	Z446	05/17/95 18:55							L
BD	Z447	05/17/95 18:55							L
BD	Z448	05/17/95 18:55							L
BD	Z449	05/17/95 18:55							L
BD	Z450	05/17/95 18:55							L
BD	Z451	05/17/95 18:55							L
BD	Z452	05/17/95 18:55							L
BD	Z453	05/17/95 18:55							L
BD	Z454	05/17/95 18:55							L
BD	Z455	05/17/95 18:55							L
BD	Z456	05/17/95 18:55							L
BD	Z457	05/17/95 18:55							L
BD	Z458	05/17/95 18:55							L
BE	Z472	05/20/95 14:45							L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BE	Z473	05/20/95 14:45		8.0					A
BH	Z510	05/26/95 19:45		8.2					A
BH	Z511	05/26/95 19:45							L
BH	Z512	05/30/95 18:30							L
BH	Z513	05/30/95 18:30							L
BJ	Z548	06/05/95 17:30							L
BJ	Z549	06/05/95 17:30							L
BK	Z562	06/09/95 19:40		8.0					A
BM	Z586	06/24/95 17:40							L
BM	Z587	06/24/95 17:40							L
BM	Z588	06/24/95 17:40							L
BM	Z582	06/18/95 15:00		8.4					A
BM	Z583	06/23/95 20:08		7.8					A
BM	Z584	06/23/95 20:08							L
BM	Z585	06/23/95 20:08							L
BO	Z602	07/03/95 18:20		8.2					A
BO	Z603	07/03/95 18:20							L
BO	Z604	07/03/95 18:20							L
BO	Z605	07/03/95 18:20							L
BO	Z606	07/03/95 18:20							L
BO	Z607	07/03/95 18:20							L
BO	Z608	07/03/95 18:20							L
BO	Z609	07/03/95 18:20							L
BO	Z610	07/03/95 18:20							L

SITE: QPD | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BP	Z619	07/07/95 16:30		8.4					A
BQ	Z625	07/11/95 17:15							L
BQ	Z626	07/11/95 17:15							L
BQ	Z627	07/11/95 17:15							L
BS	Z639	07/14/95 18:45		8.1					A
BT	Z645	07/23/95 13:13		8.4					A
BT	Z646	07/23/95 13:13							L
BT	Z647	07/23/95 13:13							L
BW	Z677	07/28/95 17:45		8.1					A
BY	Z689	08/06/95 09:05		7.8					A
CA	Z704	08/11/95 16:50		7.9					A
CB	Z710	08/18/95 12:00		6.3					A
CD	Z715	08/25/95 15:58							L
CG	Z727	09/08/95 11:30		6.5					A
CG	Z728	09/08/95 11:03							L
CG	Z729	09/08/95 11:30							L
CG	Z730	09/08/95 11:30							L
CG	Z731	09/11/95 08:30							L

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: QPE
YEAR: 95
DATA TYPE: NUTRIENTS
DATA FILE: QPENUT95 S001365A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BD	Z459	05/17/95 11:53		ND	ND	0.079	ND	ND	0.039	0.035	0.049	L
BD	Z460	05/17/95 11:53		0.0079	ND	0.089	ND	ND	0.033	0.067	ND	L
BD	Z461	05/17/95 11:53		0.0059	ND	0.063	ND	ND	0.031	0.072	ND	L
BD	Z462	05/17/95 11:53		0.0139	ND	0.098	ND	ND	0.039	0.049	ND	L
BD	Z463	05/17/95 11:53		0.0039	ND	0.101	0.4045	ND	0.033	0.078	0.007	L
BD	Z464	05/17/95 11:53		0.0079	ND	0.035	ND	0.0247	0.03	0.073	ND	L
BD	Z465	05/17/95 11:53		0.0099	ND	0.047	ND	ND	0.027	0.085	0.006	L
BE	Z474	05/20/95 15:45		0.0260	ND	0.001	ND	ND	0.05	0.044	0.037	L
BE	Z475	05/20/95 15:45		0.0240	ND	0.085	ND	ND	0.058	0.09	ND	A
BH	Z514	05/26/95 17:45		0.0019	ND	0.192			0.013	0.072	ND	A
BH	Z515	05/26/95 17:45		0.0060	ND	ND			0.013	0.026	ND	L
BH	Z516	05/30/95 17:45		0.0019	ND	ND			0.02	0.032	ND	L
BJ	Z550	06/06/95 17:15		0.0039	ND	0.118			0.005	0.063	ND	L
BJ	Z551	06/06/95 17:15		0.0139	ND	0.081			0.02	0.029	ND	L
BK	Z563	06/10/95 17:55		ND	ND	0.086				0.055		L
BM	Z589	06/16/95 20:00		0.112	ND	0.221				ND		A
BM	Z590	06/23/95 19:04		0.0040	0.06	0.228				0.003		A
BM	Z591	06/24/95 16:50		0.0859	0.07	ND				0.015		L
BO	Z611	07/03/95 15:50		0.0139	ND	0.117				0.025		A
BP	Z620	07/07/95 20:50		ND	0.006	0.097				0.02		A
BP	Z621	07/07/95 20:50		0.0019	0.003	0.005				0.014		L
BQ	Z628	07/11/95 17:00		0.0180	ND	0.084				0.006		L
BS	Z640	07/15/95 11:22		0.156	ND	0.059				0.002		A
BT	Z648	07/21/95 16:55		0.104	0.059	0.104				0.032		A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BT	Z649	07/23/95 10:55		0.0079	0.067	0.018				0.003		L
BU	Z651	07/26/95 07:00		0.0019	ND	0.007				0.011		L
BW	Z678	07/28/95 19:05		0.0039	ND	0.068				0.046		A
BY	Z690	08/04/95 16:25		1.23	ND	0.254				0.06		A
BY	Z691	08/04/95 16:25		0.0160	ND	0.018				0.019		L
CA	Z705	08/11/95 12:09		0.0059	0.088	0.107				0.04		A
CB	Z711	08/18/95 11:00		ND	0.14	0.09				0.038		A
CC	Z712	08/23/95 13:00		0.0280	0.009	0.02				ND		A
CD	Z716	08/25/95 14:43		0.0040	0.089	0.119				0.01		L
CF	Z723	09/01/95 11:40		0.0120	0.09	0.067				ND		A
CG	Z732	09/08/95 15:30		0.0119	0.122	ND				ND		A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AJ	Z5	01/06/95 12:10		8.9			4.445		A
AK	Z110	01/21/95 15:25		8.0					A
AL	Z62	01/16/95 17:10							A
AM	Z127	01/27/95 16:50							L
AN	Z146	02/03/95 12:58		8.8					A
AO	Z160	02/10/95 15:55							L
AP	Z165	02/20/95 14:30							L
AQ	Z171	02/26/95 11:25		7.4					A
AR	Z177	03/03/95 16:15		8.2					A
AS	Z205	03/10/95 16:59							L
AS	Z206	03/10/95 16:59							L
AS	Z207	03/10/95 16:59							L
AS	Z208	03/10/95 16:59							L
AS	Z209	03/10/95 16:59							L
AT	Z224	03/19/95 15:30		7.7					A
AU	Z229	03/24/95 07:45		7.8					A
AV	Z235	03/31/95 07:50		7.3					A
AW	Z241	04/07/95 17:35		7.0					A
AX	Z259	04/16/95 19:30		7.3					A
AX	Z260	04/16/95 19:30							L
AX	Z261	04/16/95 19:30							L
AX	Z262	04/16/95 19:30							L
AX	Z263	04/16/95 19:30							L

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE	SAMPLE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AY	Z286	04/22/95	11:00		7.1					A
AY	Z287	04/22/95	11:00							L
AY	Z288	04/22/95	11:00							L
AY	Z289	04/22/95	11:00							L
AY	Z290	04/22/95	11:00							L
AY	Z291	04/22/95	11:00							L
AY	Z292	04/22/95	11:00							L
AZ	Z305	04/25/95	17:45							L
AZ	Z306	04/25/95	17:45							L
BA	Z327	04/30/95	12:30							L
BA	Z328	04/30/95	12:30							L
BA	Z329	04/30/95	12:30							L
BB	Z369	05/06/95	14:43		8.6					A
BB	Z370	05/06/95	14:43							L
BB	Z371	05/06/95	14:43							L
BB	Z372	05/06/95	14:43							L
BC	Z407	05/11/95	18:40							L
BC	Z408	05/11/95	18:40							L
BC	Z409	05/11/95	18:40							L
BC	Z410	05/11/95	18:40							L
BC	Z411	05/11/95	18:40							L
BC	Z412	05/11/95	18:40							L
BC	Z413	05/11/95	18:40							L
BC	Z414	05/11/95	20:50							L

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BD	Z459	05/17/95 11:53							L
BD	Z460	05/17/95 11:53							L
BD	Z461	05/17/95 11:53							L
BD	Z462	05/17/95 11:53							L
BD	Z463	05/17/95 11:53							L
BD	Z464	05/17/95 11:53							L
BD	Z465	05/17/95 11:53							L
BE	Z474	05/20/95 15:45							L
BE	Z475	05/20/95 15:45		7.7					A
BH	Z514	05/26/95 17:45		7.7					A
BH	Z515	05/26/95 17:45							L
BH	Z516	05/30/95 17:45							L
BJ	Z550	06/06/95 17:15							L
BJ	Z551	06/06/95 17:15							L
BK	Z563	06/10/95 17:55							L
BM	Z589	06/16/95 20:00		8.7					A
BM	Z590	06/23/95 19:04		8.5					A
BM	Z591	06/24/95 16:50							L
BO	Z611	07/03/95 15:50		8.4					A
BP	Z620	07/07/95 20:50		8.0					A
BP	Z621	07/07/95 20:50							L
BQ	Z628	07/11/95 17:00							L
BS	Z640	07/15/95 11:22		7.8					A
BT	Z648	07/21/95 16:55		8.0					A

SITE: QPE | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BT	Z649	07/23/95 10:55							L
BU	Z651	07/26/95 07:00							L
BW	Z678	07/28/95 19:05		8.0					A
BY	Z690	08/04/95 16:25		8.9					A
BY	Z691	08/04/95 16:25							L
CA	Z705	08/11/95 12:09		8.0					A
CB	Z711	08/18/95 11:00		6.0					A
CC	Z712	08/23/95 13:00		7.6					A
CD	Z716	08/25/95 14:43							L
CF	Z723	09/01/95 11:40		6.0					A
CG	Z732	09/08/95 15:30		5.5					A

VIRGINIA TECH
AGRICULTURAL ENGINEERING DEPT.
SITE: PP9
YEAR: 95
DATA TYPE: NUTRIENTS
DATA FILE: PP9NUT95 S001365A

SITE: PP9 | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
AH	B129	01/02/95 10:37		0.0059	0.18	0.411			0.	0.	0.	L
AH	B129	01/02/95 10:37					0.0089	ND				L
AI	Z6	01/07/95 14:00		0.0070	0.062	0.129	0.0536	ND	0.065	ND	ND	L
AK	Z111	01/21/95 16:00		0.0039	0.031	0.087	ND	ND	0.005	ND	0.055	L
AL	Z63	01/16/95 15:00		0.237	ND	0.025	1.7608	2.1615	ND	ND	ND	L
AN	Z147	02/04/95 15:10		ND	0.208	0.642	3.1611	2.4964	0.004	ND	ND	L
AP	Z166	02/19/95 13:10		ND	0.217	0.358	ND	ND	ND	ND	0.008	L
AR	Z178	03/03/95 15:25		0.0030	0.2393	0.918	17.592	0.3212	0.004	ND	ND	L
AS	Z210	03/19/95 16:00		ND	0.0745	0.136	0.1996	0.4744	ND	ND	ND	L
AU	Z230	03/25/95 12:50		ND	0.2836	0.487	0.0774	5.3400	0.005	ND	ND	L
AV	Z236	03/31/95 09:00		0.0039	0.8877	1.386	1.3780	0.1845	0.002	0.009	ND	L
AW	Z242	04/07/95 19:00		IS	IS	IS			IS	IS	IS	L
AX	Z264	04/14/95 16:00		0.0019	0.1172	0.159	ND	ND	0.006	ND	ND	L
AZ	Z307	04/25/95 18:15		ND	1.245	0.283	ND	ND	ND	0.003	0.027	L
BB	Z373	05/06/95 18:30		0.0120	0.1057	0.255	1.7602	3.1836	ND	ND	ND	L
BC	Z415	05/11/95 19:45		0.002	0.085	0.231	ND	0.2697	ND	ND	ND	L
BD	Z466	05/17/95 11:20		0.0099	0.25	0.243	ND	ND	ND	0.002	ND	L
BH	Z517	05/26/95 16:30		0.0019	0.238	0.327			ND	ND	ND	L
BH	Z518	05/30/95 17:00		ND	0.22	0.53			ND	ND	ND	L
BJ	Z552	06/05/95 15:00		ND	0.064	0.246			ND	ND	ND	L
BK	Z564	06/09/95 15:30		ND	0.514	0.455				ND		L
BM	Z593	06/12/95 15:00		0.0059	ND	0.024				ND		L
BM	Z594	06/13/95 15:00		0.0059	0.177	0.052				0.006		L

SITE: PP9 | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	PROJ.	TSS G/L	NH4 PPM	NO3 PPM	TKN PPM	FILTKN PPM	TOT-P PPM	PO4 PPM	FLTOTP PPM	ST
BM	Z592	06/24/95 12:00		0.042	ND	0.185				ND		L
BM	Z595	06/24/95 12:00		0.0019	0.167	0.564				ND		L
BN	Z595	06/27/95 15:30										L
BO	Z612	07/02/95 12:00		0.0060	0.087	0.535				ND		L
BP	Z622	07/07/95 19:00		0.0220	0.147	0.257				ND		L
BQ	Z629	07/11/95 19:00		0.0239	0.372	0.56				ND		L
BT	Z650	07/23/95 10:30		0.0239	0.262	0.378				ND		L
BU	Z652	07/26/95 09:00		0.0219	0.464	0.429				ND		L
BW	Z679	07/29/95 10:00		ND	0.259	0.384				ND		L
CA	Z706	08/10/95 12:09		0.0019	0.162	0.263				ND		L
CF	Z724	09/01/95 14:30		0.0040	1.182	0.805				ND		L

SITE: PP9 | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
AH	B129	01/02/95 10:37					0.12		L
AH	B129	01/02/95 10:37							L
AI	Z6	01/07/95 14:00					0.44		L
AK	Z111	01/21/95 16:00							L
AL	Z63	01/16/95 15:00							L
AN	Z147	02/04/95 15:10							L
AP	Z166	02/19/95 13:10							L
AR	Z178	03/03/95 15:25							L
AS	Z210	03/19/95 16:00							L
AU	Z230	03/25/95 12:50							L
AV	Z236	03/31/95 09:00							L
AW	Z242	04/07/95 19:00							L
AX	Z264	04/14/95 16:00							L
AZ	Z307	04/25/95 18:15							L
BB	Z373	05/06/95 18:30							L
BC	Z415	05/11/95 19:45							L
BD	Z466	05/17/95 11:20							L
BH	Z517	05/26/95 16:30							L
BH	Z518	05/30/95 17:00							L
BJ	Z552	06/05/95 15:00							L
BK	Z564	06/09/95 15:30							L
BM	Z593	06/12/95 15:00							L
BM	Z594	06/13/95 15:00							L

SITE: PP9 | DATA TYPE: NUTRIENTS

GRP #	LAB #	SAMPLE DATE TIME	COD PPM	PH	COND.	TEMPER C	TOC PPM		ST
BM	Z592	06/24/95 12:00							L
BM	Z595	06/24/95 12:00							L
BN	Z595	06/27/95 15:30							L
BO	Z612	07/02/95 12:00							L
BP	Z622	07/07/95 19:00							L
BQ	Z629	07/11/95 19:00							L
BT	Z650	07/23/95 10:30							L
BU	Z652	07/26/95 09:00							L
BW	Z679	07/29/95 10:00							L
CA	Z706	08/10/95 12:09							L
CF	Z724	09/01/95 14:30							L

Polecat Creek: Total Coliform, Fecal Coliform (MPN/100 ML) and Fecal Strep (Colonies/100 ML)

Site	Date	Sample #	Total Coliform	Fecal Coliform	Fecal Strep
QPA	9/21/94	1	2200	<200	230
QPA	10/20/94	2	400	<200	54
QPA	11/17/94	3	400	<200	70
QPA	12/15/94	4	<200	<200	8
QPA	01/12/95	5	500	<20	11
QPA	02/9/95	6	20	0	12
QPA	03/7/95	7	<20	<20	8
QPA	04/6/95	8	20	20	2
QPA	05/04/95	9	20	20	80
QPA	06/01/95	10	40	40	0
QPA	06/29/95	11	500	500	191
QPA	0726/95	12	110	40	150
QPA	08/24/95	13	1700	110	310
QPA	09/20/95	14	80	40	146
QPA	10/19/95	15	20	20	23
QPB	9/21/94	1	3000	170	172
QPB	10/20/94	2	230	230	45
QPB	11/17/94	3	200	<200	16
QPB	12/15/94	4	<200	<200	0
QPB	01/12/95	5	60	<20	3
QPB	02/9/95	6	20	0	2
QPB	03/7/95	7	40	<20	3
QPB	04/6/95	8	20	20	10
QPB	05/04/95	9	20	20	64
QPB	06/01/95	10	800	800	210
QPB	06/29/95	11	90	90	191
QPB	0726/95	12	70	70	70
QPB	08/24/95	13	140	20	124
QPB	09/20/95	14	40	20	80
QPB	10/19/95	15	<20	<20	16
QPC	9/21/94	1	1400	20	270
QPC	10/20/94	2	500	40	54
QPC	11/17/94	3	400	<200	430
QPC	12/15/94	4	<200	<200	36
QPC	01/12/95	5	800	<20	15
QPC	02/9/95	6	0	0	7
QPC	03/7/95	7	90	<20	3
QPC	04/6/95	8	20	20	3
QPC	05/04/95	9	40	40	26
QPC	06/01/95	10	40	40	153
QPC	06/29/95	11	800	800	82
QPC	0726/95	12	1100	170	144
QPC	08/24/95	13			
QPC	09/20/95	14	220	40	134
QPC	10/19/95	15	1100	300	52

QPD	9/21/94	1	200	<200	360
QPD	10/20/94	2	300	80	270
QPD	11/17/94	3	<200	<200	230
QPD	12/15/94	4	200	<200	29
QPD	01/12/95	5	340	<20	31
QPD	02/9/95	6	20	20	3
QPD	03/7/95	7	110	<20	15
QPD	04/6/95	8	40	20	0
QPD	05/04/95	9	70	70	64
QPD	06/01/95	10	70	70	180
QPD	06/29/95	11	40	40	102
QPD	0726/95	12	130	130	200
QPD	08/24/95	13			
QPD	09/20/95	14	60	60	92
QPD	10/19/95	15	270	170	48
QPE	9/21/94	1	700	40	80
QPE	10/20/94	2	120	<20	162
QPE	11/17/94	3	<200	<200	18
QPE	12/15/94	4	200	<200	20
QPE	01/12/95	5	700	<20	31
QPE	02/9/95	6	0	0	8
QPE	03/7/95	7	140	<20	10
QPE	04/6/95	8	70	20	8
QPE	05/04/95	9	40	40	48
QPE	06/01/95	10	700	700	280
QPE	06/29/95	11	340	340	160
QPE	0726/95	12	140	140	290
QPE	08/24/95	13	40	<20	26
QPE	09/20/95	14	170	110	106
QPE	10/19/95	15	40	40	13

Appendix B

Field and Laboratory Quality Assurance Evaluation Form

This checklist is adopted from Taylor (1987) for use by the Audit Committee to appraise the program of the field and laboratory. Each item should be considered individually and the appropriate score entered in the box. Intermediate values may be chosen.

An average score of 3.5 is acceptable, but not laudatory. A score of 2.5 or lower is considered to be unacceptable and indicates that serious risk exists in filed and laboratory operations. Intermediate scores will require a review of the QA program to identify and rectify major deficiencies.

Even in the case of an acceptable average score, a low score for any item (<3) should be considered for possible corrective actions.

[ ] 1.	Field and Laboratory QA Program	
	Written plan adopted/implemented/in use	5
	Definite, but informal program	3
	Information/variable program	1
[ ] 2.	Mastery of Specific Technology	
	State-of-the-art accuracy and precision always attained	5
	Average accuracy and precision attained	3
	Accuracy and precision needs improvement	1
[ ] 3.	Use of Written (Before Use) Methodology	
	Exclusively	5
	Majority of time/for all critical data	3
	Few or none used	1
[ ] 4.	Adherence to specific SOPs	
	SOPs developed and used regularly	5
	SOPs for most critical operations	3
	SOPs little/not used	1
[ ] 5.	Control Chart Use	
	Maintained for all critical operations	5
	Variable but significant use in organization	3
	Little or no use	1
[ ] 6.	Uncertainty Limits for Data	
	Limits for all data outputs/policy enforced	5
	Most of the time/at least where critical	3
	Minority of cases	1
[ ] 7.	Reports/Proposals	
	Pre- and post-screened for QA aspects	5
	Those deemed critical are screened	3
	Variable/seldom done	1
[ ] 8.	Facilities Maintenance	
	Excellent (showplace condition)	5
	Good (acceptable, but not excellent)	3
	Poor (reservation, no-no areas)	1
[ ] 9.	Equipment Maintenance and Calibration	
	Regular maintenance and calibration with records kept, control charts as appropriate	5
	Good maintenance and calibration, but documentation of	

	such has some deficiencies	3
	Irregular maintenance and calibration practices	1
[ ] 10.	Records	
	Laboratory and filed records judged excellent by any standards	5
	Some reservation, could be difficulties in spots	3
	Variable, need considerable improvement	1
[ ] 11.	Training New Employees	
	Formal QA indoctrination	5
	Informal QA indoctrination	3
	Assumed not needed/not done	1
[ ] 12.	Professional Interactions	
	Majority and all key staff active in some professional organization	5
	Reasonable level of activity	3
	Little or don't know	1
[ ] 13.	Management and Statistics	
	High level of knowledge and ability to use at a supervisory level	5
	General awareness and reasonable usage	3
	Variable comprehension/use	1
[ ] 14.	QA Manual	
	Easily available to all employees	5
	Available to some	3
	Not available	1
[ ] 15.	Overall Opinion of QA Status	
	No known weaknesses that are not subject of corrective actions	5
	Known QA weaknesses, but less than vigorous action to correct	3
	Little or no basis for judgement	1

AVERAGE SCORE [ ]

Explanation/Comments on Evaluation Above (by item number)
Attach Additional Sheets as necessary.

Evaluation By:

NAME(s): _____

TITLE(s): _____

DATE: _____

APPENDIX C

OPERATING PROCEDURES

ANALYTICAL EQUIPMENT

C.1. General Operating Procedures for Technicon AutoAnalyzer II

This analyzer is a dual channel system: one channel is dedicated to orthophosphorus analysis, the other to total phosphorus analysis.

System Startup:

1. Tighten tubes across pump so that the end blocks are in the end position on each side; put on the pump cover (paten).
2. Turn on the pump power switch; allow distilled water to run through the analyzer.
3. Turn on sample power.
4. Check and make sure the water flow is going through the correct channel. Hookup the sample flow tube; pull through tube and waste tube in the correct channel. Check and make sure the 660 ml filter is in the correct channel. Turn the polarity switch in the correct direction.
5. Place the correct reagents lines in the specific reagents (the lines are labeled for each reagent).
6. Turn on recorder and set amplitude to 50%. Allow 15 minutes to warm up.
7. Turn on colorimeter light source; allow 15-20 minutes to warm up.
8. Empty all waste containers into the appropriate waste jugs and make sure there is plenty of fresh wash and reagents available.
9. Plug in heating bath.

System Calibration and Operation:

The Auto Analyzer II is calibrated using prepared standards before each analysis run. Orthophosphorus and total phosphorus are analyzed on the Auto Analyzer II. The same maintenance is performed on the Auto Analyzer II as is performed on the CFA 200. Additional information can be found in the attached "Technician Autoanlzyer Troubleshooting Guide". All calibration and maintenance operations are recorded in the Technician AutoAnalyzer II calibration/maintenance log books when performed.

1. Set the node switch to normal position.
2. Adjust the baseline using the alignment adjust knobs on top of the colorimeter. Turn the channel adjust clockwise to lower the baseline, counter clockwise to raise the baseline. If a baseline cannot be obtained use the opposite channel adjustment in the reverse manner.
3. Insert pen in recorder and adjust chart paper.
4. Load standards and samples in the samples (clockwise). Standards are analyzed form highest to lowest value.
5. Start the sampler by hitting the power button.
6. Adjust the standard peak height so that the highest level standard is at least 70% full scale. Peak heights can be adjusted with the calibration (std.calb) switch.
7. Check reagents and wash periodically; do not allow the reagents to run out.

System Shutdown:

1. Place all reagent and wash lines in distilled water; allow water to flow through analyzer (at least 20 minutes).
2. Turn off colorimeter.
3. Unplug heating bath.
4. Turn off all analyzer power switches; remove pump top and release the pump tube end blocks.
5. Turn off sampler power.
6. Empty waste containers.

C.2. General Operating Procedures for Scientific CFA 200 Auto Analyzer

System Start Up:

1. Tighten pump tubes across pump so that the pump tube end blocks are in the middle slots; lower the pump cover (platen).
2. Turn on the main power switch and the pump switch; run on the Var (variable) speed option. The pump speed selector should be set on 8.5. Allow distilled-deionized water to flow through the analyzer.
3. Turn on the sampler and set the sampler command knob in the wash position.
4. Check the analytical cartridge and make sure all valves are in the correct position; check to see if any tubes are leaking and make sure the heating bath is operating if it is necessary.
5. Make sure the correct filter is in position.
6. Place the long white reagent tube in reagent A and wait 5 minutes. Place the blue reagent line in reagent B. (Note: Make sure the correct wash solutions being used.)
7. Turn on the recorder and set the amplitude to 50%. Allow 15 minutes to warm up.
8. Turn on colorimeter and light source; allow 15-20 minutes for warm up.
9. Empty all waste containers and make sure plenty of wash and reagents are on hand.

System Calibration and Operation:

The CFA 200 auto analyzer is calibrated using prepared standards before each analysis run. Ammonia, nitrate, and total Kjeldahl nitrogen tests are run on the CFA 200. The following items should be inspected routinely during each run: tightness of fittings, cleanliness and integrity of tuning, and proper fit and operation of mechanical parts. The pump tubes should be changed monthly or whenever they show signs of wear. The lamp should be dusted with a lint free cloth every 3 months and connections should be tightened. If the lamp shows blackness, it should be replaced. Every week a 5N sodium hydroxide solution should e run through the analyzer for 3 minutes followed by 15 minutes of deionized water. Next, a 1N hydrochloric acid solution should be run through the analyzer for 7 minutes followed by 15 minutes of deionized water. Every other week, air should be pumped through the analyzer. All calibration and maintenance operations are recorded when performed in the CFA 200 Calibration/Maintenance Log Book. Additional information can be found in the "Operation and Service Manual for CFS 200".

1. Set the mode switch to normal; turn display switch ΔΔ; loosen the prism lock screw.
2. Adjust the absorbance display with the prism adjustment wheel so that the display reads .010 units. Tighten the lock screw. (Note: Make sure you have a stable baseline before you start this procedure.)
3. Turn the mode switch to the damp 2 position and correct the baseline with the baseline adjustment switch.
4. Insert pen in recorder and adjust chart paper.
5. Load standards and samples in the sampler (left to right, back to front).
6. Set sample time, wash time, and sample number.
7. Turn the sample command knob to the auto position; press program reset twice and then press 'START".
8. Adjust the standard peak heights to the desired level with the standard calibration (std.calb.) adjustment.
9. Check reagents and wash periodically; do not allow reagent A to run out.

System Shutdown:

1. Place all reagent and wash lines in distilled water; allow water to flow through analyzer (at least 20 minutes).
2. Turn off colorimeter and light source.
3. Turn off all analyzer power switches; remove pump top and release the pump tube end blocks.
4. Turn the samples command knob to sample; turn off sampler.
5. Empty waste containers.

C.3. Digestion Block - Technicon BD-40

Calibration and Maintenance

The digestion block should be calibrated once per quarter. Insert a digestion tube filled with 35 mL of mineral oil and a high temperature thermometer into the block. Set the block for 380°C and allow it to reach the entered temperature (at least one hour). Read the temperature from the thermometer, it should be within ± 5% of the set temperature. If the temperature is outside of the 5% range, the procedure should be repeated after the block has cooled. If the temperature is still outside of the 5% range on the second trial, the block cannot be used and the manufacturer should be contacted for repair. The holes in the digest block should be cleaned of foreign material every month. Addition information can be found in the "Operation Manual for the Technicon Block Digester". All maintenance operations are recorded in the Block maintenance log. On the week of May 22, 1989, every position in the digestion block was tested and found to be within ± 5% of each other.

C.4. Incubator - Precision

Calibration and Maintenance

The incubator temperature is checked twice per day while the incubator is in operation. Temperatures are recorded in the incubator maintenance log. If the incubator temperature deviates by more than 5% from the desired temperature, it is sent to Laboratory Services for service and repair. Any spills are cleaned up immediately; the incubator should be cleaned once per quarter, or as needed. The incubator is used in the biological (bacterial) testing of water; it is operated at 35.0°C at all times. The thermometer was calibrated by measuring the boiling and freezing pints of water. It was found to be accurate.

C.5. Oven - Fisher Isotemp 300 Series

Calibration and Maintenance

The oven motor blower is oiled once per month using household mechanical oil. The oven should be cleaned once per month. The oven temperature is checked once per day and recorded in the Oven Log Book. If the temperature deviates more than 5% for the desired set temperature , the oven must be returned for repair. The temperature range for this oven is 40°C tp 200°C. The range for the thermometer is -5°C to 230°C. The thermometer was calibrated by measuring the boiling and freezing points of water. It was found to be accurate.

C.6. pH Meter - Fisher Accumet Model 750 [Laboratory Unit]

Calibration and Maintenance:

The pH meter is calibrated daily using prepared purchased buffer solutions. The buffer solutions are stored capped at room temperature. Subaliquots are taken weekly to calibrate the pH meter (or as needed). The buffers are replaced before they reach their expiration date. The pH probe and meter are checked quarterly using EPA quality control standards. The meter is calibrated and the EPA standard is measured in the same manner as a normal water sample. The pH reading should fall within the 95% confidence interval provided by the EPA; if the reading falls outside of the confidence interval, the pH meter is recalibrated using new standard buffers. The EPA standard is measured again. If the reading is still not within the confidence interval, the probe is checked. Make sure the probe is filled with plenty of KCL/AgCl saturated solution and check to see if the ceramic wick is clean. Recalibrate the meter after corrections have been made to the probe and retest the EPA standards. If the reading is still out of bounds, replace the pH probe and try again. If this does not work, send the pH meter to the manufacturer for repair.

The pH probe is stored in electrode storage solution when the meter is not in use. The pH meter should be cleaned every month. Additional information can be found in the attached "Fisher Accumet Model 750 Operating Manual".

C.7. Water Bath - Precision

Calibration and Maintenance

The temperature of the water bath is checked twice per day when it is in operation. The temperature should not fluctuate by more than ± 2°C from the set temperature. If the temperature exceeds this, the experiment must be repeated to ensure accuracy. The bath is filled with distilled ionized water so that the water level is within two inches from the top. The water in the bath should be checked daily during the experiments. The bath is emptied and cleaned quarterly. If the bath fails to maintain the desired temperature [± 2°C] it should be sent to Laboratory Services for repair. See Precision Water Bath Operating Procedures Manual for more information. The water bath is used in the biological (bacterial) testing of water; it is maintained at a constant temperature of 44.5°C. The thermometer is calibrated manually and found to be accurate.

C.8. Conductivity Meter - Fisher

Calibration and Maintenance

The conductivity meter is calibrated electronically every quarter. The calibration is checked with and EPA Quality Control standard every quarter. If the results are outside of the 95% confidence interval, the meter is recalibrated and the standards are retested. If the results are still not acceptable the meter should be returned to the manufacturer for repair or a new conductivity probe should be used. The conductivity probe is rinsed well with deionized distilled water after each use. Additional information can be found in the "Fisher Digital Conductivity Meter Operating Manual". The EPA conductivity standards are also used to check the conductivity meter during daily operation, the readings should be within the 95% confidence interval. If the reading is outside the 95% interval, the conductivity meter is recalibrated.

C.9. Automatic Diluter - Hamilton Micro Lab M

Calibration and Maintenance

The pipet in the diluter is washed with deionized-distilled water before and after each dilution is performed. The diluter is calibrated automatically each day the diluter is used. The calibration is checked by diluting standards and EPA control samples of known value. The samplers are tested for reproducibility and recovery within the limits of the tests. If the samples do not fall within the accepted limits for reproducibility (± 3%) and recovery for all tests, the diluter is recalibrated and the samples are rediluted and retested. If the samples still do not meet the accepted requirements, the diluter must be sent to the manufacturer for repair. The diluter is cleaned once per moth. All calibration results and maintenance operations are recorded in the diluter maintenance notebook. Additional information can be found in the Hamilton Micro Lab M diluter manual.

B.10. Refrigerators/Walk-In Cooler - Various Manufacturers

Calibration and Maintenance

The laboratory refrigerators/walk-in cooler are maintained at 4°C ± 2°C. To ensure this setting, the thermometer is monitored with a laboratory grade, liquid filled thermometer having and accuracy of ± 1°C or better and a resolution of 1°C or better and placed in each unit. Placement of the thermometer is in the approximate center of the samples/stocks within the refrigerator. The temperature is monitored and recorded (in refrigerator by log book) each day. Adjustments to the thermostat setting are made if required. If adjustments are made, more frequent monitoring is performed until the temperature has stabilized.

C.11. Balance - Fisher Scientific Series XA

Calibration and Maintenance

The balance should be calibrated once per day for every day that it is in operation. The balance should be kept free of dust and dirt; it should be cleaned once per week. Chemicals should never be weighed directly on the balance, they should be placed in an aluminum or plastic weight boat. Additional information can be found in the attached "Fisher Scientific Series XA Instruction Manual". All calibration and maintenance operations are recorded in the Fisher Scientific XA balance log book when it is performed. The balance is calibrated with an interval 100g or a 50g NBS class S weight. The balance is checked with the 50g NBS weight. The balance range is 0.0001 to 50g and 0.001 to 250g.

APPPENDIX D

STANDARD OPERATING PROCEDURES FOR

NUTRIENT SAMPLES ANALYSIS

Appendix D-1 Procedures for Sample Check-in/Sample Custody

Scope: This operating procedure will discuss methods for sample identification, sample custody, and sample tracking for nutrients and pesticides in the Agricultural Engineering Water Quality Laboratory.

Purpose: The purpose of this procedure is to ensure sample integrity, accountability, and sample custody responsibility.

1. Samples are retrieved at the sampling sites by the field observer; they are then assigned field numbers which are recorded on the log-in sheets. The bottle numbers for the samples are also recorded on the log-in sheets. Each sample will have an individual field number and bottle number. The retrieval dates, times, and methods are also recorded on the log-in sheets. After the samples are retrieved and checked-in they are transported to the refrigerator located at the main site and stored at 4°C.
2. The samples are retrieved and transported to Virginia Tech on a monthly basis. The samples are collected by the field technician and are checked off against the log-in sheets. Any missing samples or any sample problems are recorded in the trip log kept by the field technician. After the samples have been checked off, the field technician records a field out date, his initials, and any comments on each log-in sheet. The samples are then transported by truck to Virginia Tech and are stored in the walk-in cooler at 4°C upon arrival. Sample problems are discussed with the project engineer and the lab manager within 24 hours of sample arrival.
3. Log-in sheets are separated by the lab manager by site; each sample is assigned a separate lab number, and all samples are assigned a group code. All nutrient water samples have letter prefixes before their lab numbers (i.e. Z1234). The samples are numbered by site in the order of their field numbers. Lab numbers for all samples are recorded on the log-in sheets. If there are more than 120 samples, the samples are separated into two groups; each group code consists of two letters (i.e. AB).
4. Samples are retrieved from the cooler and brought to the lab. The samples are separated by site and a lab number is recorded on the top and side of each sample. Samples are checked off on the log sheets as they are numbered. If there is more than one bottle for a sample (field number), a composite sample is required. (Precipitation is often shipped in more than one bottle because of the large amount of sample collected for each rainfall event.) The number of bottles containing a sample is listed on the log-in sheet; an equal portion of sample from each bottle is required for the composite sample. The volume of the composite sample never exceeds 500 mL. Each sample bottle is shaken vigorously and a portion of the sample is measured out using a graduated cylinder. The sample portion is then added to a clean sample container. This procedure is repeated for every sample bottle that has the same field number. The composite sample is then labeled with a lab number, field number, and site code.
5. Any sample irregularities are recorded in the laboratory log-in notebook. After all samples for each shipment have been logged in, the log sheets are assigned a log-in date and initiated by the lab manager. Copies of the original log sheets are made and passed on to the project engineer. At this time sample problems are discussed with the project engineer; all decisions on sample status are made. Sample numbers and reasons for nonanalysis are recorded in the lab log-in notebook. After the samples are analyzed, they are stored in the walk-in cooler at 4 °C for six months. The samples are stored so that information recorded on bottles can be cross checked with lab, log-in, and electronic information.

Appendix D-2 Sample Preparation/Sample Storage

Scope: This operating procedure will describe the methods for sample analysis and sample storage preparation.

Purpose: The purpose of this procedure is to define the correct methods for sample preparation and storage so that all obtained results are as accurate and correct as possible.

After all samples are brought into the lab and logged in, they are prepared for analysis and storage. Samples are filtered in the lab within 48 hours of receipt from the field. The samples are filtered for ammonia, nitrate, orthophosphorus, filtered TKN and filtered total phosphorus. The remaining sample is acidified with H_2SO_4 to lower the pH below two, and it is stored at 4°C. The filtered portion of the sample is not acidified due to interferences caused by acidification. The filtered portion of the sample, used for filtered TKN and filtered total phosphorus testing, is acidified to a pH below two and stored at 4°C.

Procedures:

1. Samples to be filtered are removed from the refrigerator. No more than thirty samples should be removed at one time.
2. Filtered sample storage containers (Dilute-it vials) are numbered for every sample that is removed from the refrigerator. A duplicate filtered sample is required, and duplicates are filtered for all samples whose lab numbers are multiples of ten. Spikes are also created and are filtered for all samples whose lab numbers are multiples of ten.
3. A cone folded filter paper is placed in the top of each storage container (particle retention size of 2.5-1.6 microns, Whatman GF-A; Gelman type A/E; Fisherbrand G6). One sample is shaken vigorously (at least twenty times) and poured into the filter on the appropriately numbered storage container. An indentation is made in each filter to allow proper flow of filtered sample into its storage container. A spatula is used to indent the filter; it is rinsed with distilled-deionized water between each sample. For every new package of filters that is used, a filter blank is created. Distilled-deionized water if filtered and the filtrate tested for nutrient contamination. If a filtered sample shows contamination from solid materials (cloudy appearance or particulate material in filtered portion of the sample), the sample must be refiltered using a new filter and the previous filtrate discarded.
4. The filtered samples are transferred from the sample storage containers to autoanalyzer cups. Three cups are needed for each sample, duplicate, and spike. The autoanalyzer cups are labeled with the appropriate lab numbers and the filtered samples are transferred so that no contamination between samples can occur. The filtered samples stored in autoanalyzer cups are capped and kept at 4°C until they are analyzed.
5. The unfiltered samples are again shaken and filtered as in step 3; the same filter can be used. At least 20mL of filtered sample is collected for each of the samples. The filtered samples are acidified with one drop (measured with a Pasteur pipet) of conc. H_2SO_4. These samples are capped and stored at 4°C until they are analyzed. The unfiltered samples are acidified with seven drops of conc. H_2SO_4 (sample volume of 450-850 mL). These samples are stored at 4°C until they are analyzed.

Ammonia, nitrate, and orthophosphorus are analyzed within seven working days of sample filtration. TKN and total phosphorus (filtered and non-filtered) are analyzed within 28 days of sample receipt. All samples are stored in polypropylene containers. Samples stored in autoanalyzer cups are stored in containers made of polystyrene. All types of water samples used for nutrient analysis are treated in the same manner.

Appendix D-3 Procedures for the Determination of Total Suspended Solids

A well-mixed water sample is filtered through a weighed standard glass-fiber and the residue retained on the filter is dried to a constant weight at 103-105°C. The increase in weight of the filter represents the total suspended solids.

Interferences:

1. Limit the sample size to no more than 200 mg of residue.
2. Rinse the filtration apparatus well with distilled-deionized water for samples that contain large amounts of suspended materials (> 100mg)
3. Remove any non-representative particulates such as leaves and sticks from the filtered solids.

Apparatus:

1. Vaccum Pump
2. Glass-fiber Filters
3. Aluminum Weighing Pans
4. Gelman Filtration Units
5. Oven
6. Analytical Balance.

Procedures:

1. Wash clean glass-fiber filters (Gelman Type A/E) with 20 mL distilled water.
2. Dry filters in an oven at 105°C. for 24 hours
3. Store dried filters in a desicator.
4. Label aluminum weighing pans with the appropriate lab number (only 12 samples at a time).
5. Place a dry, washed filter in each pan.
6. Weigh the pan and filter on an analytical balance and record weight.
7. Set up filtration apparatus for 12 samples.
8. Filter 12 samples. Record the sample volume used. Never use more than 150 mL of sample (50 mL for average samples, 100 mL for clean samples, and 25 mL for "dirty" samples.
9. Dry filter, pan, and residue in an oven at 105°C for at least 24 hours[1].
10. Remove samples from the oven and dry in a desicator for 30 minutes.
11. Weigh the pan, filter, and residue on an analytical balance; record the weight.

Calculations:

1. mg total suspended solids/L = $\frac{(A - B) \times 1000}{\text{sample volume, mL}}$

   where

   A = weight of filter, pan and residue (#11)
   B = weight of filter and pan (#6)
2. reported total suspended solids = measured s. solids/L = blank s solids/L

QA/QC:

1. One duplicate is run for every 40 samples.
2. One blank sample is run for every 40 samples. A blank sample is prepared by filtering 50 mL of distilled-deionized water and obtaining the weight of suspended solids.

---

[1] At the beginning of this project a comparison was made between the constant weight method and the 24 hour method. No significant difference was detected (differences less than the standard deviation). The time period for sample drying was adapted from Method 209c. *Standard Methods for the Examination of Water and Wastewater*

Precision and Accuracy:

Ave. Standard Deviation = 0.74 mg/L
Minimum detection limit = 0.015 mg/L
Standard deviation is determined quarterly

Reference:

This procedure is based on these methods.

1. EPA Methods for Chemical Analysis of Water and Wastes, VSEPA-600/4-79-020, Residue, Filterable; Method 160.2.

2. Standard Methods for the Examination of Water and Wastewater, 16th Edition, p.96; Method 209c.

Appendix D-4 Procedures for the Determination of Total Phosphorus

This method covers the determination of total phosphorus in water. The range for this method is 0.05 to 20 mg-P/L.

Ammonium molybdate and antimony potassium tartrate react in an acid medium with dilute solutions of phosphorus to form an antimony phospho-molybdate complex. This complex is reduced to a blue dye by ascorbic acid.

Interferences:

1. Turbidity must be removed from the sample before it can be analyzed.

Reagents:

1. Total Phosphorus Salt

   5g Sodium Chloride (NaCl)
   1000 mL distilled water

   Dissolve 5 g of NaCl in ≃ 800 mL of distilled water and fill to 1 liter.
2. Ascorbic Acid
   15 g Araboascorbic Acid
   0.5 mL Acetone
   250 mL distilled water

   Dissolve 15 g of araboascorbic acid in ≃ 175 mL of distilled water; add about 7 drops of acetone and fill to 250 mL with distilled water. Prepare daily.
3. Molybdate-Antimony

   8.0g Ammonium Molybdate
   0.2g Antimony Potassium Tartrate

   Dissolve 8 g of Ammonium Molybdate and 0.2 g of Antimony Potassium Tartrate in ≃ 800 mL of distilled water and fill to 1 liter with distilled-deionized water.

4. Wash Solution (2.0 N H_2SO_4)

   60 mL Concentrated Sulfuric Acid (H_2SO_4)
   2-3 drops Wetting Agent (Levor IV)

   Slowly add 60 mL of conc. H_2SO_4 to ≃ 800 mL distilled water. Cool the solution and fill to 1 liter with distilled water.

Standards:

1. Stock standard A (100 ppm).

   Dissolve 0.4393 g of potassium phosphate monobasic (KH_2PO_4) that has been dried at 105°C for 1 hour in ≃ 800 mL distilled water. Fill to 1 liter with distilled water. This standard can be stored for up to 6 months.
2. Stock Standard B (20 ppm)

   Transfer 20 mL of stock standard A into a 100 mL volumetric flask. Dilute to 100 mL with distilled water. This standard is prepared fresh when working standards are prepared.
3. Prepare working standards in 100 mL volumetric flasks.

volume of stock standard B	concentration of working standard, ppm

1.0 mL	0.2
2.0	0.4
3.0	0.6
4.0	0.8
5.0	1.0

Dilute the standards with total P wash solution to 100 mL. The standards are stable for 28 days.

Apparatus:

1. Technicon Auto Analyzer II System
2. Strip chart recorder
3. Block digester
4. 660 nm filter

Procedures:

Note: The same digested samples are used for TKN and total phosphorus testing.

1. Label clean dry 50 mL folin-wu tubes with sample numbers.
2. Add 10 mL of shaken sample to its tube with a calibrated pipet (up to 35 samples).
3. Add 1.5-2.0 g catalyst to each tube with a spoon
4. Add 3 mL of concentrated sulfuric acid to each tube with a calibrated auto-pipet.
5. Heat in a digestion block overnite at 120°C to drive off H_2O .
6. Raise the block temperature to 200°C for 1 hour.
7. Cap each tube with a small funnel.
8. Raise the block temperature to 380°C and digest samples for 3 hours.
9. Turn off digestion block and allow samples to cool (2-3 hours). After the samples have cooled transfer them from the block to the fume hood.
10. Rinse the funnels with distilled water.
11. Slowly add distilled water to the samples. Bring the volume in the tube up to approximately 35 mL and let stand overnite.
12. Vortex mix the samples until the solids are dissolved. Add distilled water to each sample so that the volume of sample is exactly 50 mL.
13. Cover and invert 20 times.
14. Transfer the samples into auto analyzer cups.

Calculations:

1. A standard curve is prepared based on the peak heights of each standard. The sample concentrations are determined using linear regression techniques.

QA/QC:

Note: 40 tubes are prepared for each digest, 35 samples, 2 duplicates, 2 EPAs, and one blank. Two EPA quality control samples are digested to ensure there will be a value available in case one of the samples is destroyed or contaminated. If both samples are available, an average is taken from their measured values.

1. One duplicate is prepared for the first 20 samples, and 1 for the next 15.
2. Two EPA samples are digested with each set of samples.
3. One blank is run with each digest; the ppm value of the blank is subtracted from the sample and standard values.
4. Please see Appendix D-13 for more detailed information.

Precision and Accuracy:

Ave. Standard Deviation = 0.056 mg/L based on 60 samples
Ave. Percent Recovery = 91-94% based on 20 samples
Minimum Detection Limit = 0.05 mg/L is defined as 2 times the recorder noise when operating at maximus sensitivity. Precision and Accuracy values are updated quarterly.

Reference:

1. EPA Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, Phosphorus. All forms; Method 365.1

Appendix D-5 Procedures for the Determination of Orthophosphates

This method covers the determination of orthophosphates in water. The range for this method is 0.01 to 1.0 mg P/L.

Ammonia molybdate and antimony potassium tartrate react in an acid medium with dilute solutions of phosphorus to form an antimony phospho-molybdate complex. This complex is reduced to an intensely blue colored dye by ascorbic acid. Orthophosphate is the only form of phosphorus to form a blue dye in this method.

Interferences:

1. High concentrations of iron can precipitate and cause a phosphorus loss.
2. Turbidity must be removed from the sample before it can be analyzed.

Reagents:

1. Orthophosphate Salt

20g	Sodium Chloride (NaCl)
40 mL	Sulfuric Acid (H_2SO_4)
5 drops	Wetting Agent (Levor IV)
1000 mL	Distilled Water

Dissolve 20 g of sodium chloride in ≃ 750 mL of distilled water. Slowly add 40 mL of concentrated sulfuric acid and 5 drops of Levor IV. Fill to 1 liter.

2. Ascorbic Acid

15 g	Araboascorbic Acid
0.5 mL	Acetone
250 mL	Distilled Water

Dissolve 15 g of araboascorbic in ≃ 150 mLs of distilled water. Add 0.5 mL of acetone and fill to 250 mL. Prepare daily.

3. Molybdate-Antimony

8.0 g	Ammonium Molybdate
0.2 g	Antimony Potassium Tartrate

Dissolve 8.0 g of ammonium molybdate and 0.2 g of antimony potassium tartrate in ≃ 750 mL of distilled water and fill to 1 liter.

4. Wash Solution

100 mL	Distilled Water
2-3 drops	Levor IV

Add 2-3 frops of Levor IV to 1 liter of distilled water.

Reagents are stored in dark polyethylene bottles at all times. Some reagents are stored at 4°C as indicated.

Standards:

1. Stock Standard A
   Dissolve 0.439 g of potassium phosphate monobasic (KH_2PO_4) that has been dried at 105°C for 1 hour in ≃ 750 mL of distilled water. Fill to 1 liter with distilled-deionized water. Stable for 6 months.
2. Stock Standard B.
   Transfer 20 mL of stock standard A into a 100 m volumetric flask. Fill the flask to volume with distilled water. Prepare fresh when preparing working standards.
3. Prepare the working standards in 100 mL volumetric flasks.

volume of stock standard B	concentration of working standard mg/L
1.0 mL	0.2
2.0	0.4
3.0	0.6
4.0	0.8
5.0	1.0

Working standards are stable for 60 days if stored at 4°C. Standards are tested for every run with EPA quality control samples; the samples analyzed value must fall within the stated 95% confidence interval. If the samples fall outside the confidence interval, they are rerun. If the EPA standards still fall outside the confidence interval new working standards are prepared.

Procedures:

1. Filter samples as described in Appendix D-2.
2. Transfer the filtrate into an auto analyzer cup. See Appendix D-2.
3. Analyze samples using an auto analyzer.

Apparatus:

1. Technicon Auto Analyzer II System
2. Strip Chart Recorder
3. 660 mm Filter.

Calculations:

1. A standard curve is prepared based on the peak heights of each standard. The sample concentrations are determined using linear regression techniques.
2. Blank values are subtracted from measured values for reporting. Distilled-deionized water is used for blank measurements.

QA/QC:

1. One duplicate is run for every 20 samples.
2. One EPA standard is run for every 40 samples.
3. One spike is run for every 40 samples.
4. One blank is run daily.
5. Please see Appendix D-13 for more information.

Precision and Accuracy:

Ave. Standard Deviation = 0.013 mg/L based on 52 samples
Ave. Percent Recovery = 89-94% based on 20 samples
Minimum Detection Limit = 0.05 mg/L

Precision and Accuracy results are calculated quarterly. Minimum detection limit is defined as 2 times the recorder noise when operating at maximum sensitivity.

Reference:

1. EPA Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, Phosphorus, All Forms; Method 365.1.
2. "Orthophate in (Waste) Water", Technicon AAII Product Information.

Appendix D-6 Procedures for the determination of Total Kjeldahl Nitrogen

This method covers the analysis of total Kjeldahl nitrogen in water. The procedure converts nitrogen components of biological origin such as amino acids, proteins, and peptides to ammonia. The range for this test is 0.1 to 10 mg/L TKN. The range may be extended by sample dilution.

Water samples are heated in the presence of sulfuric acid, potassium sulfate, and mercuric sulfate at 200°C for 1 hour and then at 380°C until digestion is complete. The samples are then cooled and diluted to 50 mL using distilled-deionized water. The samples are then analyzed for TKN.

Regeants:

1. Buffer Stock Solution

134 g	Sodium Phosphate, dibasic (Na_2 HPO_4• $7H_2O$)
200 g	Sodium Hydroxide (NaOH)
1000 mL	Distilled water

Dissolve 200 g of NaOH in ≃ 800 mL of distilled water, cool water. Next, dissolve 20 g of NaOH and fill to volume with distilled water.

2. Sodium Potassium Tartrate

200 g Potassium Sodium Tartrate

Dissolve 200 g of potassium sodium tartrate in ≃ 800 mL of distilled water, fill to 1 liter.

3. Working Buffer Reagent A

Amount	Amount	Amount	
20% kNa tart solution	62.5	125	250 mL
Buffer Stock Solution	50	100	200 mL
20% NaOh Solution	62.5	125	250 mL
Dichloroisocyanurate	0.25g	0.5 g	1.0 g
Distilled water	250	500	1000 mL

Combine reagents in specified order, add distilled water and dissolve the dichloroisocyanurate. Fill to volume with distilled water. Stable for 2 days, do not refrigerate.

4. Sodium Salicylate Reagent B

80 g	sodium salicylate
0.3 g	sodium nitroferricynide

Dissolve 80 g of sodium salicylate in ≃ 800 mL of distilled water, add 0.3 g of sodium nitroferricyanide and dissolve. Fill to 1 liter with distilled water. Store in a dark bottle at 4°C, stable for 30 days.

Reagents are stored in dark polyethylene bottles at all times. Some reagents are stored at 4°C as indicated.

Standards:

1. Stock Solution (100 ppm)
   Dissolve 0.383 g of ammonium chloride dried at 105°C for 2 hours in ≃ 800 mL of distilled water, fill to 1 liter with distilled-deionized water. Stable for 6 months.
2. Working Standards

Prepared the working standards in 100 mL volumetric flasks. Fill to 100 mL with TP wash. Standards are stable for 30 days if stored at 4°C.

volume of stock standard (mL)	concentration of working standard mg/L
1.0 ml	1.0
2.0	2.0
3.0	3.0
4.0	4.0
5.0	5.0

Fill to 100 mL with TP wash.

Apparatus:

1. CFA 200 Scientific Auto Analyzer System
2. Strip chart recorder or data handling system
3. Block digester
4. 660 nm filter

Procedures:

Note: The same digested samples are used for TKN and total phosphorus testing.

1. Label clean dry 50 mL folin-wu tubes with sample numbers
2. Add 10 mL of shaken sample to its tube with a calibrated pipet (up to 35 samples)
3. Add 1.5-2.0 g catalyst to each tube with a spoon
4. Add 3 mL of concentrated sulfuric acid to each tube with a calibrated autopipet.
5. Heat in a digestion block overnite at 120°C to drive off H_2O
6. Raise the block temperature at 200°C for 1 hour
7. Cap each tube with a small funnel
8. Raise the block temperature to 380°C and digest samples for 3 hours
9. Turn off digestion block and allow samples to cool (2-3 hours). After the samples have cooled, transfer them from the block to the fume hood
10. Rinse the funnels with distilled water
11. Slowly add distilled water to the samples. Bring the volume in the tube up to approximately 35 mL. Stand overnite
12. Vortex mix the samples until the solids are dissolved. Add distilled water to each sample so that the volume of sample is exactly 50 ml.
13. Cover and invert 20 times
14. Transfer the samples into auto analyzer cups

Calculations:

1. A standard curve is prepared based on the peak height of each standard. The sample concentrations are determined using linear regression techniques.
2. Blank values are subtracted from all measured values for each digestion set.

QA/QC:

Note: 40 tubes are prepared for each digest; 35 samples, 2 duplicates, 2 EPAs, and one blank. Two EPA quality conrol samples are digested to ensure there will be a value available in case one of the samples is destroyed or contaminated. If both samples are available, an average is taken from their measured values.

1. One duplicate is prepared for the first 20 samples and 1 for the next 15
2. Two EPA samples are digested with each set of samples
3. One blank is run with each digest; the ppm value of the blank is subtracted from the sample and standard values.
4. One spike is run for every 40 samples. Please see Appendix D-13 for more information.

Precision and Accuracy:

Ave. Standard Deviation - 0.126 mg/L based on 40 samples

Ave. Percent Recovery - 97-101% based on 20 samples
Minimum Detection Limit - 0.10 mg/l.

Minimum Detection Limit is defined as 2 times the recorder noise when operating at maximum sensitivity.

Reference:

1. EPA Methods for Chemical Analysis of Water and Wastes, USEPA - 600/4-79-020, Nitrogen, Kjeldal Total; Method 351.2
2. "Block Digester, Total Kjeldahl Nitrogen", Scientific Instruments Product Information.

Appendix D-7 Procedures for the Determination of Ammonia

This method covers the determination of ammonia in water. The range for this test is 0.01 to 1.5 mg/L NH_3 as N. Higher concentrations can be determined by sample dilution.

Alkaline phenol and hypochlorite react with ammonium to form idophenol blue that is proportional to the ammonium concentration. The blue color formed is intensified with sodium nitroferricyanide.

Reagents:

1. Hypochlorite Reagent A

6.5 g	Sodium Hydroxide (NaOH)
23 mL	Sodium Hypochlorite (5% household bleach)
1000 mL	Distilled H_2O
5 drops	Wetting Agent (Brij-35)

Dissolve 6.5 g NaOH in ≃ 750 mL of water. After cooling, add 23 mL sodium hypochlorite and fill to 1 liter. Store in a dark bottle, at 4°C stable for 14 days.

2. Phenol Reagent B

16.5	Phenol (C_6H_5OH)
0.135	Sodium Nitroferricyanide ($Na_2Fe(CN)_5$ - NO $2H_2O$)
1000 mL	distilled water

Dissolve 16.5 of phenol in ≃ 750 mL of water. Next, dissolve 0.135 of sodium nitroferricyanide and fill to 1 liter. Store in a dark bottle, at 4°C, stable for 14 days.

3. Wash Solution

1000 mL	Distilled water
5 drops	Wetting agent (Brij-35)

Add five drops of Brij-35 to 1L of distilled water.

Standards:

1. Stock standard A (100 ppm)
   Dissolve 0.382 g of ammonium chloride, NH_4Cl dried at 105°C for 1 hours in ≃ 750 mL distilled water. Fill to 1 liter.
2. Stock standard B (20 ppm)
   Transfer 20 mL of stock standard A into a 100 mL flask. Fill the flask to volume with distilled water.

3. Prepare the working standards in 100 mL volumetric flasks.

volume of stock standard B	concentration of working standard mg/L
1.0 ml	0.2
2.0	0.4
3.0	0.6
4.0	0.8
5.0	1.0

Working standards are stable for 14 days if stored at 4°C. Standards are tested for every run with EPA quality control samples; the samples analyzed value must all within the stated 95% confidence interval. If the samples fall oustide the confi-

dence interval, they are rerun. If the EPA standards still fall outside the confidence interval, new working standards are prepared. If a measured sample concentration is greater than 1.5 mg/L, the sample can be diluted and rerun so that the mg/L value wil fall within the analytical range for this test.

Apparatus:

1. CFA 200 Scientific Auto Analyzer.
2. Strip chart recorder or data handling system
3. 660 nm filter

Procedures:

1. Filter samples as described in Appendix D-2.
2. Transfer the filtrate into an autoanalyzer cup (see Appendix D-2)
3. Analyze samples using an autoanalyzer.

Calculations:

1. A standard curve is prepared based on the peak height of each standard. The sample concentrations are determined using linear regression techniques.
2. Blank values are subtracted from measured values for reporting. Distilled-deionized water is used for blank measurements.

QA/QC:

1. One duplicate is run for every 20 samples
2. One EPA standard is run for every 40 samples
3. One spike is run for every 40 samples
4. One blank is run daily.
5. Please see Appendix D-13 for more information.

Precision and Accuracy:

Ave. Standard Deviation - 0.060 mg/L based on 49 samples
Ave. Percent Recovery - 98-102% based on 20 samples
Minimum Detection Limit - 0.01 mg/L

Precision and accuracy results are calculated quarterly. The minimum detection limit is defined as 2 times the recorder noise when operating at maximum sensitivity.

Reference:

1. EPA Methods for Chemical Analysis of Water and Wastes VSEPA-600/4-79-020, Nitrogen, Ammonia; Method 350.1.

3. Add 2.5 mL of sample, standard for H_2O for blanks to each appropriate tube. Duplicates are required for all samples, standards, and blanks. Cap the tubes. Shake all tubes. Preheat oven to 150°C.
4. Digest samples at 150°C for 2 hours. Make sure there is an oven pan below the samples while they are being digested. Make sure the exhaust fan above the oven is on.
5. After 2 hours, remove the samples from the oven and allow them to cool to the touch.
6. Read samples, blanks, and standards on a spectrophotometer at 600 nm. Reading using %T, use the blank as 100% T.
7. Calculate the results using the formula $A = \log(I/t)$. Plot a line using the standards of absorbance vs. concentration. Average the absorbance of the sample duplicates and compare their absorbance with the standard plot. Use the blank valves as a zero reading.

QA/QC:

1. Duplicates are run for every sample.
2. 1 EPA sample is run for every 20 samples. If the EPA sample result is not within the specified 95% confidence interval, the sample analysis must be repeated.
3. The spectrophotometer is auto calibrated and zeroed for each use.

Reference:

This procedure is based on these methods.

1. EPA Methods for Chemical Analysis of Water and Wastes, USEPA-600/4-79-020, Chemical Oxygen Demand; Method 410.4
2. Standard Methods for the Examination of Water and Wastewater, 16th Edition, p. 537; Method 508C.

Appendix D-10 Methods of Using Laboratory Notebooks

There are several types of notebooks used in lab to store various types of information. Notebooks are used to store raw data read from strip charts, data read directly from instruments, and information regarding samples status and equipment maintenance. All notebook entries are made in ink.

Personal notebooks are used to store results read from a strip chart. The tests that are recorded in personal notebooks include Total kjeldahl nitrogen (filtered and nonfiltered), total phosphorus (filtered and nonfiltered), ammonia, nitrates, and orthophosphorus. The first two pages of the personal notebook are used as a table of contents. The table of contents includes the type of tests recorded in the notebook, the page number, and from which chart the data was read. Each page of the lab notebook has 3 columns: the first for the lab number, the second for the peak height, and the third for the calculated value of the data. The chart number and the data of reading are recorded on each page of the personal notebook.

The pH-conductivity notebook is used to record test results directly from instrument readouts. The results are tabulated using 3 columns: the first for the lab number, the second for the pH reading, and the third for the conductivity reading. The analysts initials and date are also recorded in the notebook for every set of samples tested.

The COD notebook is used to store COD data. The first column is used for the lab number, the second is used for the percent transmittance reading for the first duplicate, the third column is used for the second duplicate reading, and the fourth column is used to record the calculated ppm value. The analysts initials and date of testing are recorded for each set of testing.

The solids notebook is used to record the results of the calculated values for nonfilterable solids tests. Five columns are used to record the solids data: the first column is used for the lab number, the second is used to record the dry filter and pan weight, the third is used to record the dry filter, pan, and sample weight, the fourth column is used to record the volume of sample filtered, and the fifth column is used to record calculated grams/liter data.

Notebooks used to store sample status and equipment maintenance information are recorded in paragraph form. All entries are signed and dated by lab personnel.

Table D-10 Typical Notebook Page for Sample Calculations

Sample	Peak Height	Conclusion

Appendix D-11 Methods for Laboratory Data Collection, Reporting, and Storage

The purpose of this procedure is to define methods for data collection, data reporting, and data storage so that all reported data is correct and accurate. The procedure also provides investigators and outside agencies with a method for data tracking and validation.

Water samples are analyzed for various chemical species including: orthophosphorus, ammonia, nitrate, total kjeldahl nitrogen, soluble total kjeldahl nitrogen, total phosphorus, soluble total phosphorus, total suspended solids, chemical oxygen demand, pH, and conductivity. There are various methods for recording and calculating the results from these tests. After the results have been processed, they are entered on the main report file and then transferred to the HAS SAM data base. This procedure will describe individual methods for collecting and reporting the various forms of data.

A large majority of data is collected on a strip chart recorder. The strip chart consists of a roll of graph paper on which peaks corresponding to samples and standards are recorded. Data for orthophosphorus, ammonia, nitrates, total kjedahl nitrogen, and total phosphorus tests are all recorded using strip charts. Every strip chart used in the lab is assigned a lab number that consists of a lab number with a C prefix (i.e. C21). After the chart has been assigned a lab number, data can be recorded on it. When all the data has been collected from a sample run, the chart is removed from the recorder. The data, test identification, chart lab number, and initials of the analysts are recorded on the end of the chart paper. The strip chart roll is then placed in the "To Be Read File" kept by the lab manager. The chart is now ready to be read. The data from the chart is read, calculated, and recorded in a lab notebook. The strip charts are stored in the "Read File" by the lab manager. The charts are stored by lab number and are kept for a minimum of one year.

The CFA-PC data handling system is also used to collect data from orthophosphorus, ammonia, nitrate, total kjedahl nitrogen, and total phosphorus tests. (See CFA-PC operation manual.) A file is created for each set of samples that is going to be run on the Scientific auto analyzer. Each file is given a lab number that consists of the test abbreviation code and a file number (i.e. TKN53). After the file has been created, data generated by the analyzer for each sample and standard is recorded directly into a CFA-PC file. When the analysis is complete, the raw data is calculated using the CFA-PC system software. A report of the calculated data is created and stored by the lab manager. The report includes the filename, data, analysts initials, and data for each sample and standard. The results are transferred from the CFA-PC report to the main report file by laboratory personnel and verified by the lab manager.

Data for chemical oxygen demand tests are recorded in the COD notebook. Raw data for the samples and standards, the date of the tests, and the analysts initials are recorded for each run. The raw data is calculated and stored in the COD notebook. The calculated data is transferred to the main report file by lab personnel and verified by the lab manager.

pH and Conductivity tests results are recorded in the pH notebook. The date of the tests, and the initials of the analysts are recorded for each set of tests. The results of these tests are entered directly into the HAS SAM data base.

Data from the total suspended solids tests are recorded in the solids notebook. Three values are required for solid measurements: dry pan and filter weight; the dry pan, filter and sample weight, and the volume of filtered sample. The amount of solids for each sample is calculated and recorded in the solids notebook. The calculated solids data is then transferred to the main report file by laboratory personnel and verified by the lab manager.

The main report file is used to store the results obtained from the various tests. The file is used to enter completed data on the HAS SAM system and is also used as a backup to the HAS SAM System. The main report file consists of pages that contain sample identification information and test results for each sample. The pages have areas to record the lab number, site code, group number, field number, and test results for each sample. (See attached sample file page.) After all the sample information and results have been entered for one group of samples; that information is transferred to the HAS SAM system. Once the data has been transferred, it is verified for correctness by lab personnel. Verification is accomplished by having one person read the values from the original lab books while another person compares the spoken values with those written in the

HAS SAM system files. All incorrect entries and sample problems are recorded in the HAS SAM notebook and reported to the lab manager. Corrections are authorized or made by the lab manager and are checked off in the HAS SAM notebook. After all corrections have been made, the samples are flagged as complete and the project engineer is notified. The main report file is stored in the lab by the lab manager.

Appendix D-12 Distilled-Deionized Water/Glassware Cleaning

Scope: This operating procedure will discuss methods for the production of distilled-deionized water and the cleaning of glassware in the Water Quality Lab.

Purpose: The purpose of this procedure is to ensure the proper quality of reagent grade water is produced and that all glassware is cleaned in the correct fashion.

Procedure: Tap water is distilled using an electric still (Corning MP3-A) and a stem still (Barnstead A 1013). Distilled water is collected in two 100 gallon polypropylene containers. The distilled water is then gravity fed through a mixed bed high-resistance cartridge (Barnstead Ultrapure) into a ten gallon storage carboy. Distilled-deionized water is tested every week for conductivity. The conductivity of the water is required to be less than 1 micromho/cm. If the distilled-deionized water has conductivity greater than 1 micromho/cm, the deionization column is replaced and the water re-tested.

Glassware is washed with tap water and a laboratory detergent (Versa-clean). The glassware is then rinsed with tap water. Next the glassware is rinsed in an acid bath. The acid bath is a 15% HCL solution; HCL is used to prevent nitrogen contamination. The glassware is thoroughly rinsed with the acid solution so that all surfaces are coated. The glassware is then rinsed with distilled-deionized water and allowed to air dry so that no dust can fall into the glassware. After the glassware is dry, all openings are covered with parafilm and the glassware is stored.

Appendix D-13 Laboratory Quality Control Procedures for Nutrient Data

This procedure discusses the use and theory of control charts. It also defines the methods used for quality control in the different analysis performed by the laboratory. Definitions and calculations are also provided in this procedure.

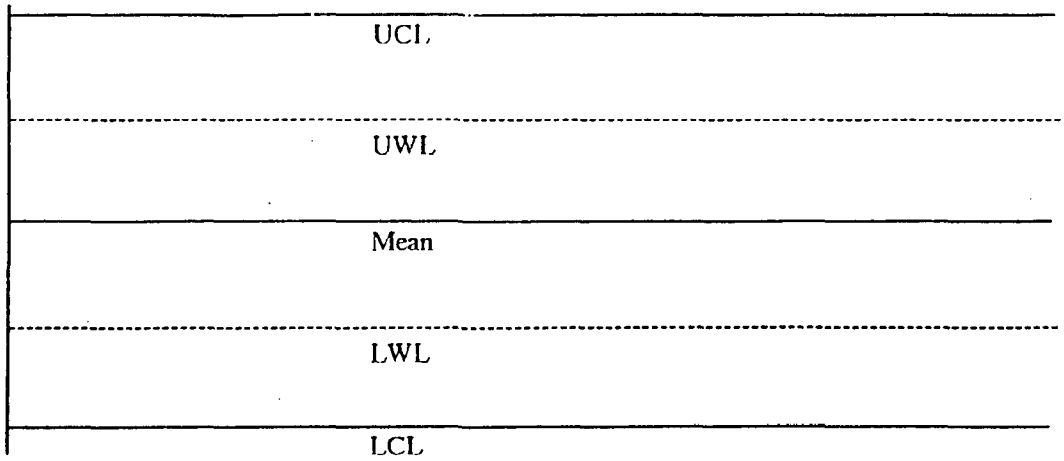
Quality Control Charts:

Quality control charts are used to help determine if a set of data is accurate and precise. One advantage of control charts is that sample sets that are incorrect (out of control) can quickly be detected. Control charts can also visualize trends in sample analysis. Two types of control charts are used; $\overline{X}$-charts and R-charts. $\overline{X}$-charts are used to record statistical data for check standards and spikes. $\overline{R}$ -charts are used to record statistical data for duplicate analysis.

$\overline{X}$ - charts use a calculated mean and the standard deviation to determine whether as set of samples is out of bounds. For check standards, a mean value is calculated and compared to the theoretical value of the check standard. (Check standards are EPA quality control samples; the mean should fall within the 95% intervals provided by the EPA). The standard deviations of the check standards are then calculated; the 95% confidence interval for the standards is equal to Xbar:e.f:f.pm1.965, where X is the mean and S is the standard deviation. The upper and lower control limits are determined by $\overline{X} \pm 2.58S$, this is equivalent to the 99% confidence interval. There is a 5% chance that the calculated data point will fall outside the 95% interval but only $\simeq$ 0.3% chance that the data will fall outside the UCL or the LCL (upper and lower control limits). Any check standard that falls outside the control limits is suspect; the check standard and the set of samples that was analyzed with it should be rerun. The values of the check standards should fall equally above and below the mean value. There is only a 13% chance that 3 consecutive data points will fall on one side of the mean. If more than 5 data points fall on one side of the mean, some action should be taken to correct the analysis so that no samples will go out of control (prepare new reagents, calibrate instruments, etc.).

$\overline{R}$ -charts use the absolute value of the difference between two duplicate samples to determine whether a set of samples is out of bounds. The mean value of the variance is calculated ($\overline{R}$) and plotted on a graph; also lines are plotted for $0.845\,\overline{R}$, $2.456\overline{R}$the 95% confidence limit, and 3.27 $\overline{R}$ the 99% confidence limit. 50% of the calculate variance should fall above the $0.845\overline{R}$ line. Data that falls outside the 99% confidence limit is suspect and the sample group should be reanalyzed. The $\overline{R}$ -chart is interpreted like the X-chart.

1. $\overline{X}$-chart.

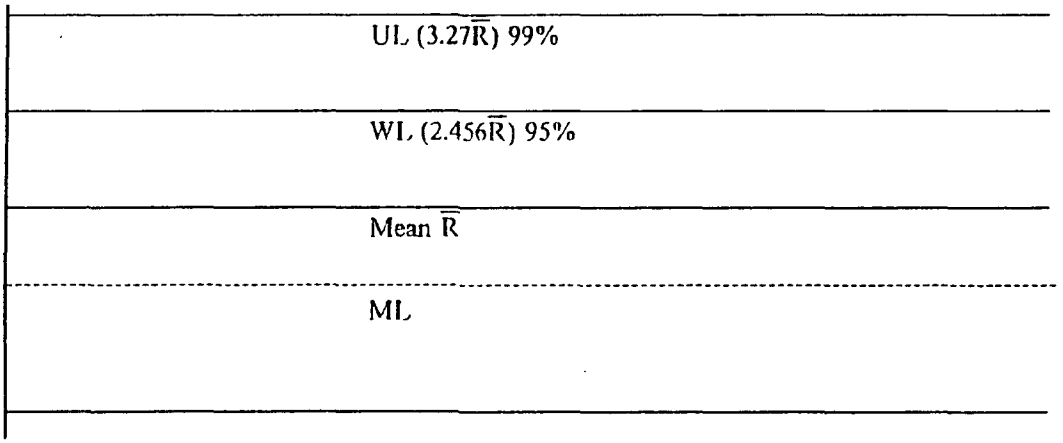


Mean - the average value of the standard being tested

UWL-LWL (Upper and lower warning limits) - they are the 95% confidence interval lines; 95% of all values will fall within this range. $\overline{X} \pm 1.96S$ where S is the standard deviation

UCL-LCL (Upper and lower control limits) - all data should fall within the UCL and the LCL, if data falls outside these limits it is considered out of bounds. $\overline{X} \pm 2.58S$ where S is the standard deviation.

2. $\overline{R}$-Chart



Mean - the average value for the variance of a set of samples

ML (middle line) - 50% of all points should fall above or below this line; used to detect trends of analysis

WL (warning limit) - 95% confidence limit; one out of every 20 points should fall above this limit.

UL (upper limit) - 99% confidence limit; if data falls above this limit it is out of bounds.

Procedures:

A. Quality control methods for ammonia, nitrate, orthophosphate, TKN, and total phosphorus tests.

1. A series of standards are prepared for each set of tests. Standard curves are generated from these standards and are checked for accuracy. The correlation of each curve must be greater than 0.99 and less than or equal to 1.0. If the correlation is not correct; standards that seem to be inaccurate are remade and the curve is regenerated.
2. An EPA quality control sample is run with each set of new standards. The concentration of EPA sample is calculated using the generated standard curve. The value of the EPA sample must all within the 95% confidence interval provided by the EPA. If the sample falls outside the interval, it should be rerun and recalculated. If it is still not within the limits, a new set of standards is made and another EPA quality control sample is analyzed. The EPA sample is sent to another lab to verify its accuracy.
3. Every month a $\overline{X}$-quality control chart is prepared for check standard results; another chart is prepared for spiked sample results. $\overline{R}$-quality control charts are prepared monthly for duplicate result data.
4. Results from check standards and spiked samples are compared to the previous months $\overline{X}$-control charts. The data should fall within the 95% confidence intervals, if it does not, the sample set associated with the standard or spike should be rerun.
5. Results from duplicate samples are compared to the previous months $\overline{R}$ -control chart. The data should fall within the 95% confidence interval, if it does not, the sample set associated with the duplicate should be rerun.

B. Quality control methods for Solids analysis

1. A $\overline{R}$-control chart is prepared monthly for duplicates run during solids testing. The duplicate results are compared to the previous months control chart and the results should fall within the 95% confidence interval. If the data does not fall within the expected range, the set of samples associated with the out of control duplicate must be rerun.
2. An EPA quality control sample is run for every 200 samples. The value of the solids should fall within the provided 95% confidence interval. If the value falls outside the expected results, the procedure and technician techniques should be reviewed.

C. Quality control methods for COD analysis

1. A standard curve is prepared for each set of samples that are analyzed; the correlations of the curve should be between 0.88 and 1.0. If the correlation is low, the standards that seem to be incorrect should dropped out.
2. An $\overline{X}$-control chart is prepared using EPA quality control standards; the control chart is prepared quarterly. The control standards are compared with the $\overline{X}$-control charts, the values should fall within the 95% confidence intervals. If the results fall outside the confidence intervals, the sample set associated with the out of control standard are rerun.

D. General quality control methods

1. Performance evaluation samples are analyzed quarterly and the results are tabulated by an independent testing lab. The results are tabulated by an independent lab. The results from these tests are used to determine the quality of the lab results.
2. Blind samples are run monthly for each test parameter; the results are compared to the control charts for each test. Blind samples are used as a measure of the laboratory's quality.

E. Preparation of spiked samples

1. 3 mL of a water sample to be used as a spike is removed from its autoanalyzer and transferred to a new auto analyzer cup. The sample is transferred in 3 aliquots using a calibrated 1 mL pipet.
2. 1 mL of a mid to high range standard is added to the autoanalyzer cup that contains the 3 mL of sample. The sample is capped and shaken vigorously.
3. The spike sample is run as a normal sample.

Calculations:

1. Standard Curve Calculations (use linear regression techniques)

Standard Values	Peak Height
1.0	46.9
.8	39.1
.6	29.9
.4	20.4
.2	10.7

correlation = 0.9989
slope = 0.9857
value at 0 = -0.0209

2. Duplicate variance

Standard value = 2.0
n = 5

Duplicates	Absolute Variance
0.203	0.003
0.205	0.005
0.198	0.002
0.197	0.003
0.208	0.008
1.011	0.021

mean variance = sum of the absolute variance/n = 0.0042
middle line = 0.845R = 0.0035
95% confidence limit = 2.456R = 0.0103
99% confidence limit = 3.27R = 0.0137

3. Standard deviation

$$\sum x^2 = \sum x^2 - \frac{(\sum x)^2}{n}$$

$$S_x = \frac{\sqrt{|\sum x^2|}}{n} \quad \rightarrow \text{standard deviation}$$

4. Spike and Check Standard Calculations

Mean (X) = average standard value of check standards or average value of percent recovery for spikes

95% confidence interval = $X \pm 1.965$ where S is the standard deviation

99% confidence interval = $X \pm 3.0S$ where S is the standard deviation.

Percent recovery - the actual value obtained from an analyzed spike divided by the theoretical value times 100;

$$\frac{\text{actual}}{\text{theoretical}} \times 100 = \% \text{ recovery}$$

Theoretical value - the calculated value of a spiked sample.

i.e. One sample is run twice and an average of the results is taken. A spiked samples i prepared by adding 1/4 of a known standard to 3/4 of the analyzed sample. A theoretical value can then be obtained.

Average value = 3.0 ppm
Standard = 10.0 ppm 3.0 (.75) + 10.0 (.25) = 4.75 ppm theoretical value.

5. Calculations for COD analysis

   a. convert % T to absorbance using $A = \log (1/T)$

      i.e. $93\%T = \log (1/0.93) = 0.032A$

   b. plot the calculated absorbance values versus the concentrations of the measured standards.
   c. calculate the unknown sample concentrations using the standard curve.

6. Supsended solids

   a.

$$\text{mg total suspended solids/L} = \frac{(A - B) \times 1000}{\text{sample vol. mL}}$$

   where
   A = weight of filter, pan and residue
   B = weight of filter and pan

Table D-13 Reagents and Supplies for the Water Quality Lab

Item	Use	Supplier	Type
Mercuric Oxide	Catalyst, TKN and TP	Fisher Scientific	ACS grade
Potassium Sulfate	Catalyst, reagents TKN and TP	Fisher, Baxter	ACS grade powdered
Sodium Phosphate Dibasic	Reagents	Baxter, Fisher	ACS grade
Sodium Hydroxide	Reagents, pH adjustment	Baxter, Fisher	ACS grade
Sodium Potassium Tartrate	Reagents	Baxter, Fisher	ACS grade
Dichloroisocyanurate	Reagents	Kodak	ACS grade
Sodium Salicylate	Reagents	Fisher	ACS grade
Sodium Nitroferricyanide	Reagents	Baxter	ACS grade
Ammonium Chloride	Reagents, standards	Fisher, Baxter	Primary standard
Ammonium Molybdate	Reagents	Fisher	ACS grade
Antimony Potassium Tartrate	Reagents	Fisher	ACS grade
SLS®	Wetting agent	Scientific Instruments	N/A
Araboascorbic Acid	Reagent	Kodak	ACS grade
Potassium Dihydrogen Phosphate	Standards	Fisher	ACS primary standard
Sulfanilamide	Reagent	Baxter, Fisher	ACS grade
N-1-naphthylenediamine Dihydrochloride	Reagent	Kodak	ACS grade
Brij – 35®	Wetting agent	Fisher	N/A
Cadmimum	Reduction column	Fisher	ACS grade
Chloroform	Preservative	Fisher	ACS reagent
Sodium Hypochlorite	Reagent	Various	Purex
Phenol	Reagent	Fisher	ACS grade
Gelman Type A/E Filters	Suspended solids	Fisher	N/A

Table D-13 (cont.) Reagents and Supplies for the Water Quality Lab

Whatman Type GF-A	Sample filtration	Fisher, Baxter	N/A
Auto Analyzer Cups and Caps	Sample holding	Fisher	4 mL
Dilute – it® Vials	Sample holding	Fisher	30 mL
Sulfuric Acid	Reagents	Fisher, Baxter	ACS reagent
Hydrochloric Acid	Acid bath	Fisher, Baxter	ACS reagent
Phosphoric Acid	Reagents	Fisher, Baxter	ACS reagent
Potassium Chloride 2N	Ammonia extraction for soils	Fisher, Baxter	ACS grade