ATMOSPHERIC DEPOSITION: SPATIAL AND TEMPORAL VARIATIONS IN PENNSYLVANIA 2003

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EXECUTIVE SUMMARY

A wet atmospheric deposition monitoring network was established in Pennsylvania in 1981 to determine the magnitude and distribution of toxic and nutrient elements in precipitation, to assess their potential environmental impacts, and to evaluate the effectiveness of current and future legislation designed to reduce acidic and toxic deposition in the Commonwealth. Results from the 22nd full-year of operation of this network are summarized in this report. Included in this summary are data from seven National Atmospheric Deposition Program/National Trends Network (NADP/NTN) sites and 10 sites supported by The Pennsylvania Department of Environmental Protection, Bureau of Air Quality Control. Additional information on atmospheric deposition in Pennsylvania and the United States can be obtained over the Internet at http://www.dep.state.pa.us and http://nadp.sws.uiuc.edu.

The acidity (as pH) of precipitation in Pennsylvania has declined approximately 40% over the last 22 years. The 2003 statewide mean annual pH (4.4) was the highest pH (lowest acidity) measured in Pennsylvania since monitoring began in 1981. The decline in "acid rain" can be attributed to reductions in sulfur dioxide and nitrogen oxides emissions and to a lesser extent increasing base cation and ammonium concentrations in some regions of the state. Despite the decrease in acidity, precipitation in the Commonwealth is still more acidic than nearly all other regions of the United States. Only three sites in the NADP/NTN recorded mean annual pH values in 2003 that were equal to or lower than the mean annual pH in Pennsylvania.
3
Sulfate concentrations have decreased approximately 34% since 1983. The statewide mean annual sulfate concentration in 2003 was 2.002 mg/L, the lowest reported to date. The reduction in sulfate concentrations resulted in an 11.2 kg/ha reduction in wet sulfate deposition across the State. The reported reduction in sulfate deposition can be attributed to reductions in sulfur dioxide emissions in Pennsylvania and in upwind states. Despite the dramatic reductions, sulfate concentrations and wet deposition in the northwestern corner of the Commonwealth continue to be the highest of any region in the United States. The highest mean annual sulfate concentration (2.6 mg/L) at any of the NADP/NTN sites in 2003 was measured at the Kane site in northwestern Pennsylvania. Wet sulfate deposition at the Kane site was 35 kg/ha in 2003, the second highest amount recorded in the United States in 2003. The highest sulfate deposition (37 kg/ha) was measured at a site in southwestern Ohio.

Nitrate concentrations have decreased approximately 22% since 1983. The statewide mean annual nitrate concentration in 2003 was 1.399 mg/L. Reductions in nitrate concentrations resulted in a 4.8 kg/ha reduction in wet nitrate deposition across the state. The measured reductions in nitrate concentrations in precipitation can be attributed to reductions in nitrogen oxides emissions in Pennsylvania and in upwind states. Although nitrate concentrations in Pennsylvania are fairly comparable to those in neighboring states, nitrate deposition in the northwestern corner of the Commonwealth continues to be higher than in any region in the United States, except for a portion of up-state New York. Nitrate deposition at the Kane site was 21 kg/ha in 2003, the second highest amount recorder in the United States in 2003. Nitrate

deposition was even higher at some Pennsylvania Network sites (e.g., Presque Isle) located in northwestern Pennsylvania.

Ammonium concentrations and wet deposition have generally increased across the state since 1983, although the increases are not statistically significant at most sites. The highest ammonium concentrations and wet depositions in 2003 were measured at the Millersville site that is located on a farm in Lancaster County. Ammonium concentrations at this site are similar to many NADP/NTN sites located in agricultural regions of the mid-west, in southeastern United States, and around the Great Lakes. The relatively high concentrations around Lake Erie are also similar to those observed at two up-state New York NADP/NTN sites that are strongly influenced by ammonia emissions from decaying vegetation in these shallow lakes and lake effect precipitation patterns.

Although significant progress has been made in reducing "acid rain" in Pennsylvania and across the Northeast and Mid-Atlantic regions, additional sulfur dioxide and nitrogen oxides emissions reductions will likely be necessary to protect acid sensitive aquatic and terrestrial ecosystems and cultural and material resources in the Commonwealth, particularly in western Pennsylvania. Some of the increase in wet acidic deposition in 2003 over previous years can be attributed to above average precipitation. Since precipitation is an unmanageable parameter of climate, the only way to provide additional protection to the citizens of the Commonwealth and the environment is to reduce further sulfur dioxide and nitrogen oxides emissions in Pennsylvania and in upwind states. The expeditious implementation of a stringent national multi-pollutant strategy would not only reduce emissions but improve visibility. An assessment of source-receptor relationships should be undertaken to identify those sources that will provide the greatest opportunity for further reductions in acidic deposition in Pennsylvania. A detailed evaluation of spatial and temporal variations in precipitation and its influence on deposition patterns in the Commonwealth should also be undertaken. Such an analysis will provide valuable information to determine the level of emissions reductions that will be necessary to achieve adequate protection of the citizens of the Commonwealth and the environment.

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INTRODUCTION

Precipitation plays an important role in biogeochemical cycling by cleansing the atmosphere of many pollutants and delivering dissolved substances to aquatic and terrestrial ecosystems. Atmospheric pollutants are also returned to the Earth's surfaces via dry depositional processes, e.g., solid particulate fallout, aerosol impaction, and gaseous adsorption. Atmospheric pollutants can affect water quality and human health and impact aquatic, terrestrial, cultural, and material resources. Accordingly, the detailed study of the spatial and temporal chemistry of precipitation and dry deposition serves four principle functions: (1) it provides basic data needed for calculations involving specific air pollutants; (2) it provides data needed for evaluating possible impacts of these pollutants on aquatic and terrestrial ecosystems, cultural and material resources, and human health; (3) it provides for comparisons of both beneficial and detrimental substances associated with atmospheric deposition; and (4) it provides quantitative means of evaluating the effectiveness of present and future air pollution control legislation, such as the Clean Air Act Amendments of 1990, aimed at reducing atmospheric deposition in the United States.

Because of the importance of precipitation in providing water and its dissolved substances to the biosphere, an atmospheric deposition monitoring network was established in Pennsylvania in 1981 under a Cooperative Agreement between The Pennsylvania State University and The Pennsylvania Department of Environmental Resources, currently the Pennsylvania Department of Environmental Protection. The objectives of this project were to (1) determine the magnitude and distribution of wet atmospheric deposition and associated toxic and nutrient elements in Pennsylvania and (2) to assess their potential environmental impacts. The project was revised in 1986 and additional objectives added to: (3) determine temporal trends in the chemistry of precipitation in the state; (4) evaluate the influence of local emissions and variations in precipitation amounts on wet deposition patterns; (5) determine the optimum number of sites needed to define spatial variability in atmospheric deposition in Pennsylvania; and (6) evaluate the effectiveness of the Clean Air Act Amendments of 1990, Title IV in reducing acidic deposition to the Commonwealth.

This report represents a summary of precipitation chemistry and wet deposition data collected at 17 atmospheric deposition-monitoring sites in Pennsylvania in 2003. The Pennsylvania Department of Environmental Protection, Bureau of Air Quality Control, supported 11 of the monitoring sites. These sites are located in Mercer, Armstrong, Cambria, Somerset, Tioga, Lycoming, Perry, Luzerne, Erie, Lancaster, and Montgomery counties. The remaining six sites are part of the National Atmospheric Deposition Program/National Trends Network (NADP/NTN, 2003). The NADP/NTN sites are located in Elk County near Kane, in Huntingdon County on the Leading Ridge Experimental Watersheds, in Centre County near Penn State University, in Pike County near Milford, in Adams County near Arendtsville, and in Clinton County near North Bend (Young Women's Creek). The U.S. Forest Service, Northeast Forest Experiment Station, supported the NADP/NTN sites near Kane and Milford. The Pennsylvania Agricultural Experiment Station through the National Research Support Project-3 (NRSP-3) supported the Leading Ridge NADP/NTN site. The National Oceanic and Atmospheric Administration supported the Penn State NADP/NTN site. The U.S. Environmental Protection

Agency and The U.S. Geological Survey supported the Arendtsville and Young Women's Creek sites, respectively. A DEP supported monitoring site near Millersville University (Lancaster County) is also an NADP/NTN site. This site is located on an active farm and was selected to provide additional information on ammonium concentrations and wet deposition close to agricultural ammonia emission sources.

NETWORK DESIGN AND OPERATION

Monitoring Site Locations

Seventeen atmospheric deposition-monitoring sites were in operation in Pennsylvania during 2003. Included in this network were 10 sites supported by The Pennsylvania Department of Environmental Protection (DEP), Bureau of Air Quality Control and seven National Atmospheric Deposition Program/National Trends Network (NADP/NTN, 2003) sites. One of the NADP/NTN sites was supported by DEP. Site locations are plotted in Figure 1. The latitude, longitude, elevation, county, and date sampling was initiated for each site are given in Table 1.

Collection Site Specifications

All sites were equipped with an Aerochem Metrics wet/dry precipitation collector. This instrument consists of a two-container system with a movable lid designed to expose the wet container and cover the dry container during periods of precipitation, and vice versa. A sensor mounted on the instrument reacts electrically to the onset of precipitation causing the lid to move thereby exposing the wet-side container. Heaters mounted below the sensor serve to both melt snow and ice as well as evaporate moisture from the sensing element.

Standard recording and non-recording rain gages were installed at each site. Each recording rain gage was equipped with a timer/chart recorder keyed to the sampling interval of one week. The times of opening and closing of the wet/dry sampler were determined from an event recorder mounted on the recording rain gage. The standard non-recording rain gage was used to determine the total amount of precipitation. All of the monitoring sites in the Pennsylvania Network meet NADP/NTN standards and were instrumented with equipment selected for use in the NADP/NTN Network (Bigelow, 1984).

Protocols for Operation of Monitoring Network

All precipitation samples were collected following procedures established by the Illinois State Water Survey (Peden et al., 1979) and the NADP/NTN (Bigelow and Dossett, 1988). Sampling was conducted according to a specific weekly schedule and the entire collection bucket was shipped by United Parcel Service (UPS) in specially provided containers to a water quality lab at the Penn State Institutes of the Environment at the University Park campus of The Pennsylvania State University. NADP/NTN samples were shipped by UPS to the NADP/NTN Central

Pennsylvania Atmospheric Deposition Monitoring Network

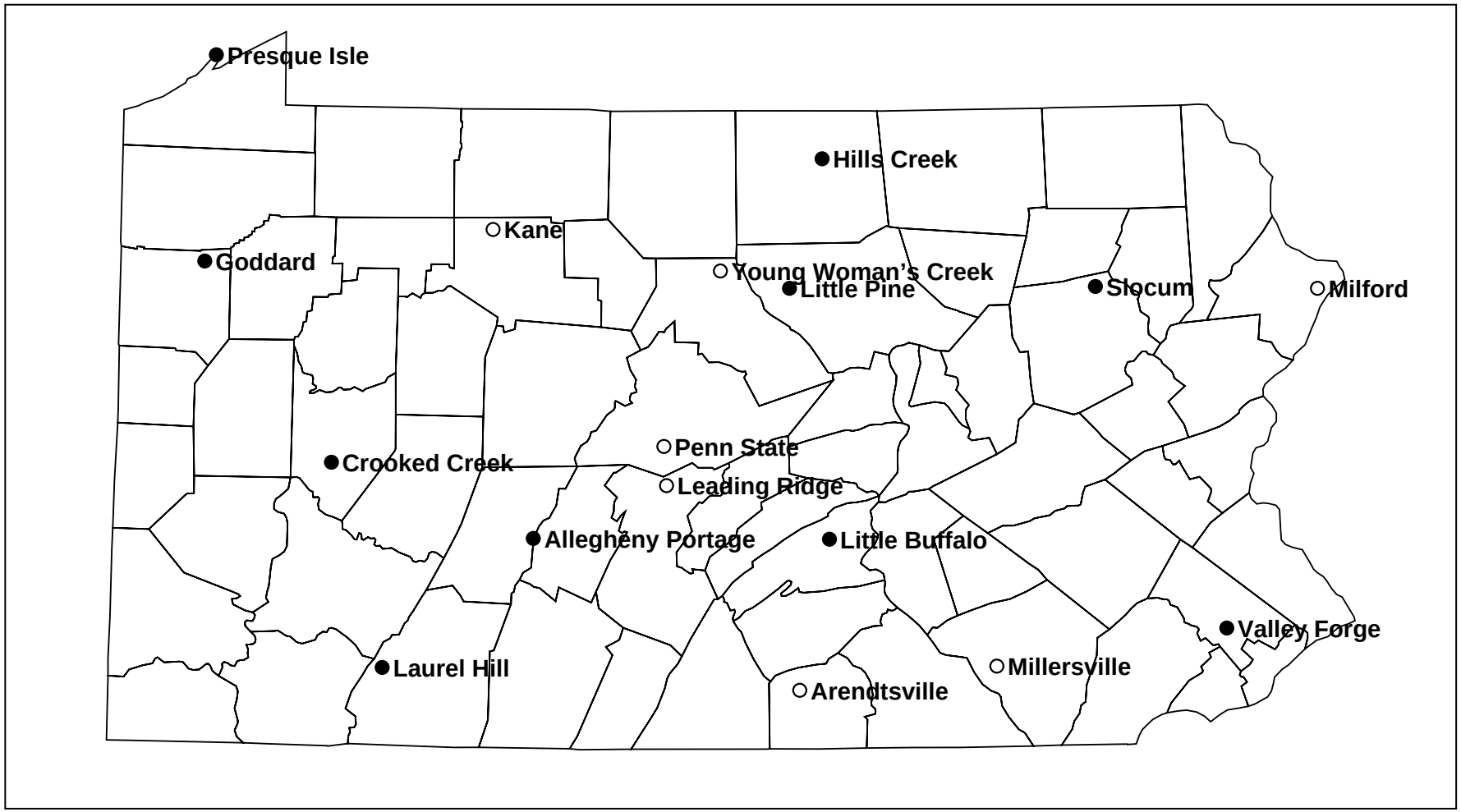


Figure 1. Site locations of the 2003 Pennsylvania Atmospheric Deposition Monitoring Network. Sites marked with an empty circle are part of the National Atmospheric Deposition Program/National Trends Network (NADP/NTN).

Table 1. Location and description of sites in the 2003 Pennsylvania Atmospheric Deposition Monitoring Network.

Site Name	Latitude	Longitude	County	Elevation (Meters)	Sampling Started
Western Pennsylvania					
Presque Isle State Park	42.1558	-80.1133	Erie	177	06/20/2000
M.K. Goddard State Park	41.4167	-80.1417	Mercer	384	11/10/1981
Crooked Creek Lake	40.7167	-79.5167	Armstrong	296	12/08/1981
Laurel Hill State Park	39.9869	-79.2544	Somerset	616	11/03/1981
Kane NADP/NTN	41.5978	-78.7675	Elk	618	07/17/1978
Allegheny Portage NHS	40.4572	-78.5600	Cambria	739	01/07/1997
Central Pennsylvania					
Arendtsville NADP/NTN	39.9231	-77.3078	Adams	269	01/26/1999
Hills Creek State Park	41.8044	-77.1903	Tioga	476	11/01/1981
Little Pine State Park	41.3800	-77.9397	Lycoming	238	01/03/1984
Leading Ridge NADP/NTN	40.6575	-77.9397	Huntingdon	287	04/25/1979
Little Buffalo State Park	40.4500	-77.1667	Perry	122	08/04/1981
Penn State NADP/NTN	40.7883	-77.9458	Centre	393	06/07/1983
Young Women Creek NADP/NTN	41.4133	-77.6939	Clinton	273	04/20/1999
Eastern Pennsylvania					
Milford NADP/NTN	41.3275	-74.8203	Pike	212	11/03/1981
Frances Slocum State Park	41.3333	-75.8833	Luzerne	366	11/03/1981
Valley Forge NHS	40.1167	-75.8917	Montgomery	46	11/03/1981
Millersville NADP/NTN	39.9900	-76.3862	Lancaster	85	11/21/2002

Analytical Laboratory (CAL) at the Illinois State Water Survey in Champaign, Illinois. Prior to shipment of NADP/NTN samples, site operators took "field" pH and conductivity measurements Starting on 3 January 1994 all NADP/NTN precipitation samples were transferred to 1000 mL polyethylene bottles before shipment to the CAL. Prior to that date, all NADP/NTN samples were shipped to the CAL in the collection container.

At the time of collection, a clean collection container provided by the water quality labs was placed in the sampler. The "wet" sample containers were shipped to the laboratory each week regardless of whether precipitation occurred. Sample containers were removed each Tuesday at approximately 9:00 a.m. unless it was raining or snowing, but in no case later than the end of the working day on Tuesday.

Precautions were taken to preclude changes in or contamination of precipitation samples during collection, transport, and storage prior to analysis. Analyses were performed as soon as possible after receipt of the samples. Although ionic concentrations in weekly precipitation samples may be subject to change (Peden and Skowron, 1978; de Pena et al., 1985; Coscio et al., 1982; Ridder et al., 1985), the feasibility of daily or event sampling was unwarranted because of the high cost involved.

Laboratory Analyses

Precipitation samples were analyzed for the following parameters provided a sufficient volume was present: pH (H^+), sulfate (SO_4^{2-}), nitrate (NO_3^-), ammonium (NH_4^+), chloride (CL^-), calcium (Ca^{2+}), magnesium (Mg^{2+}), potassium (K^+), sodium (Na^+), and specific conductance. In the event that insufficient volume was present for complete analysis, the priority on analysis was as listed. Specific analytical techniques and laboratory equipment used in this monitoring program are listed in Table 2.

Sample Handling Procedures

Upon receipt at the water quality lab, samples were assigned a number that is traceable to a specific sampling period and site. Following immediate measurement of volume, pH, and specific conductance (if sufficient volume was present), the samples were filtered. After filtration, nitrate, ammonium, sulfate, and chloride concentrations were measured within 1-3 working days; calcium, magnesium, sodium, and potassium samples were acidified and stored; analyses usually followed within 3-5 weeks. Precipitation samples that were grossly contaminated were discarded. For samples arriving with a twig, leaf, pine needle, beetle, bumblebee, etc., the contaminant was removed by filtration and the sample processed like any other precipitation sample. At the time of sample check-in, comments were placed in the site record to indicate the visual appearance and the presence of odor of each sample.

Table 2. Summary of analytical techniques used to measure ionic concentrations, pH, and specific conductance of precipitation samples collected in The Pennsylvania Atmospheric Deposition Monitoring Network.

Parameter	Methodology (Reference, EPA, 1983)	Equipment
pH	EPA Electrometric (150.1)	Accumet Model 20
Specific Conductance	EPA Specific Conductance	Suntex Model SC-170
Sulfate	EPA Ion Chromatrography (300.0)	Dionex Ion Chromatrography Model DX-500
Chloride	EPA Ion Chromatrography (300.0)	Dionex Ion Chromatrography Model DX-500
Ammonium-Nitrogen	EPA-Phenate Method (350.1)	Bran and Luebbe Autoanalyzer III
Oxidized Nitrogen Reduction	Standard Methods-Cadium (353.3)	Bran and Luebbe Autoanalyzer III
Extractable Metals		Perkin Ekmer Atomic Absorption Model 5100ZL
Calcium	EPA AA Direct Aspiration (215.1)	
Magnesium	EPA AA Direct Aspiration (242.1)	
Potassium	EPA AA Direct Aspiration (258.1)	
Sodium	EPA AA Direct Aspiration (273.1)	

Quality Assurance and Quality Control

The quality control (QC) and quality assurance (QA) policies for atmospheric deposition monitoring that have been followed throughout this project were designed to provide maximum credibility of the data, including documented accuracy, precision, and completeness. Major components of this QA plan include sound QC programs addressing field operations, laboratory analyses, and data management. The QA/QC programs discussed below apply to Pennsylvania network sites supported by The Pennsylvania Department of Environmental Protection. A separate QA/QC program is maintained by the NADP/NTN for all precipitation chemistry data from NADP/NTN sites that are included in this report. This report is available on the Internet at http://nadp.sws.uiuc.edu.

Field Measurements: Precipitation samples were collected following procedures established under the NADP/NTN and discussed in detail in the NADP/NTN Instruction Manual on Site Operations (Bigelow and Dossett, 1988). Recording rain gage calibrations were conducted each fall and spring or whenever discrepancies exist for two consecutive weeks between the recording rain gage and the non-recording gage. Weekly comparison of precipitation volume from the Aerochem Metrics wet/dry collector and the non-recording rain gage were made to assure that the sensor was properly activating the precipitation sampler. Using the event recorder, the opening and closing of the roof on the precipitation sampler was compared each week with the recording rain gage chart to determine if the sample had been exposed to the atmosphere during rain free periods and to determine if the sampler was responding to precipitation. Any contamination in the sample or any field sampling problems noted on the field form by the site operator were reviewed weekly by the Project Assistant and entered into each site's permanent record. Information on site operations is used in screening precipitation chemistry data to eliminate contaminated samples.

Analytical Laboratory and External Audits: Quality assurance for the analytical measurements given in Table 2 is a multi-tiered program that includes bench level quality control, laboratory management quality assurance, and external quality assurance monitoring. The analytical laboratory is expected to achieve at least the detection limits in Table 3 with maximum allowable variance in accuracy of ±100 percent of the detection limit, of ±20 percent at ten times the detection limit, and ±10 percent at 100 times the detection limit. Analytical methodology and specific references are given in Table 2. Instruments are maintained and calibrated according to manufacturer specifications. Standard preparation and instrument calibrations are among the most critical procedures in laboratory quality control. For QA of the preparation of stock standard solutions, the Lab Manager arranges for (1) independent laboratory confirmation of each standard and (2) compares the results of new standard solutions to those obtained with prior standards. In some cases, the lab may also obtain confirmation by an independent analytical procedure within the lab, such as is the case with nitrate standards that are used to calibrate both the automated colorimetric apparatus and the ion chromatograph. Procedure 1 is accomplished by the simultaneous measurement of stock solution standards and U.S. EPA mineral and nutrient standards. All standard solutions are reformulated at or before shelve-life of the solution.

Table 3. Minimum detection limit criteria for Laboratory analyses. Units in mg/L unless otherwise noted.

Ion		Detection Limit
Na^+		0.005
K^+		0.005
Ca^{2+}		0.005
Mg^{2+}		0.005
NH_4^+		0.005
SO_4^{2-}		0.2
NO_3^-		0.005
Cl^-		0.02
	Accuracy	Precision
pH < 5.0	± 0.05	± 0.03
pH > 5.0	± 0.05	± 0.01
Specific Conductance		
10-100 µS/cm	± 5%	± 3%
>100 µS/cm	± 2%	± 1%

Quality control exercised by the analyst is also an essential component of the overall program. Immediately following instrument calibration, one or more reference samples are analyzed to ensure that the system is functioning properly. Subsequently, at a frequency of no less than 1 sample in 10, the analyst inserts a reference material duplicate or single-point standard to verify correct operation. The observed values for these QC samples must not differ from the theoretical value by more than ±5% for all parameters, except nitrate and ammonium that must not differ by more than ±10% of the theoretical value. When an unacceptable value for the calibration QC sample is obtained, the instrument is re-calibrated and all samples that were analyzed after the last acceptable QC sample are re-analyzed. One sample per batch is also prepared and must be within the control limit that is ±5% of the relative standard deviation. An Ion Chromatography Resolution Test is also performed for each analytical run. Records of all QC data are maintained in a bound notebook at each workstation and periodically reviewed by the Lab Manager. Maintenance of current information on the characteristics (precision, bias, detection limit, etc.) of the analytical methods are provided by a continuous quality assurance monitoring program operated by the Lab Manager and Project Supervisor. The program includes "blind" insertion into the normal sample flow of split samples, spiked samples, and standard reference solutions. "Blind audit samples" using simulated rain water provided by the National Atmospheric Deposition Program Coordination Office and the Central Analytical Lab of the Illinois State Water Survey are also periodically submitted to the lab, generally at a rate of one per month.

In addition to the above QC program, cation/anion balance, conductance balance, and percent ion difference are calculated for each sample with complete chemical analyses. Samples with poor cation/anion balance (<0.85 or >1.15) are checked for possible cause and re-analyzed. An approximation of the conductance of each sample is calculated by adding together the equivalent conductance of each measured ion at infinite dilution. The calculated conductance is determined by multiplying the concentration of each ion by the appropriate factor. The percent conductance difference is calculated by dividing the difference between the calculated conductance and the measured conductance by the measured conductance. Samples are screened based on the conductance criterion of +10% or -40%. The larger negative percentage is based on the fact that calculated conductance is always less than measured conductance due to the presence of ions in precipitation that are not measured.

The water quality laboratory participates in an inter-laboratory comparison study sponsored by the National Water Research Institute of Canada. The LRTAP (Long Range Transport of Air Pollution) Inter-laboratory Study for major ions and nutrients is conducted bi-annually.

Data Management: All analytical results and field measurements are entered into a computer database by the Lab Manager or Project Assistant. The data are entered twice and automatically checked to assure correct entry. All of the data are manually verified against the original laboratory and field forms. All of the laboratory data are evaluated based on available QA/QC data using established procedures. The objective of the data verification process is to identify and correct, flag, or delete data of unacceptable quality. All data are rigorously validated to identify outliers and detect possible systematic errors in the measurement and analytical processes. Outliers are identified using uni-variate, bi-variate, and multi-variate analyses.

DATA REDUCTION

Precipitation-Weighted Means

Seasonal and annual precipitation-weighted mean concentrations discussed in this report were calculated according to the formula:

$$C_w = \frac{\sum_{i=1}^{n} C_i P_i}{\sum_{i=1}^{n} P_i}$$

where the precipitation-weighted mean concentration, $\mathbf{C_w}$, for a given ion was calculated from the n valid samples in the season or year under consideration. Individual sample concentrations,

$\mathbf{C_i}$, were weighted by the measured precipitation, $\mathbf{P_i}$, from the standard non-recording rain gage, with values substituted from the recording gage or sample volume for those infrequent cases where the standard non-recording rain gage was out of service or where rain gage measurements were otherwise invalid.

The quantity of precipitation measured by the rain gage is usually greater than that captured in the sample bucket. Non-recording rain gage amounts, rather than the actual sample volumes, were used in the calculation of precipitation-weighted means. This practice is based on the assumption that the chemistry of the sample captured in the bucket represents that which was missed.

Weekly, Seasonal, and Annual Deposition Estimates

Weekly measured wet deposition (kg/ha) of each ion was obtained by multiplying the product of the concentration data (mg/L) and precipitation depth (mm) by 0.01. Ionic concentrations for each weekly sampling period were converted to depositions and then summed over desired periods. Total annual and seasonal depositions were calculated by adding to the measured deposition an estimate of the amount of deposition that occurred during those precipitation events that were not analyzed. The estimate of unmeasured deposition was based on the amount of precipitation measured but not analyzed and the precipitation-weighted average concentration of each ion for their respective summary periods.

Concentration and Deposition Maps

Color-shaded raster maps depict the annual and seasonal precipitation-weighted mean estimates of ion concentrations and wet depositions for precipitation across Pennsylvania in 2002. The concentrations and depositions were estimated from data collected at the ten Pennsylvania Network and six NADP/NTN monitoring sites within Pennsylvania (Figure 1) and 26 NADP/NTN monitoring sites located around the periphery of the state (Table 4). Estimates of concentration and deposition for each pixel in a 1820-column by 1365-row grid superimposed on Pennsylvania were obtained by applying the multi-quadric equation spatial interpolation algorithm (Harding, 1974) to the coordinates and chemistry data from the 42 monitoring sites. The resulting estimated grids were mapped by applying a color gradient to the range of values in each grid and overlaying the state boundaries and monitoring sites on the colorized grids.

Concentration and wet deposition maps included in this report are also available in an electronic version at http://www.dep.state.pa.us. Concentration and wet deposition maps from the National Atmospheric Deposition Program/National Trends Network (NADP/NTN) are available at http://nadp.sws.uiuc.edu.

Concentration and Deposition Trends

Statistical analyses of long-term trends in ion concentration and wet deposition at each monitoring site in Pennsylvania were based on a least squares general linear model which

Table 4. Peripheral NADP/NTN monitoring sites used to estimate spatial distributions of ionic concentrations and wet depositions across Pennsylvania.

State (ID No.)	Location
Connecticut (CT15)	Abington
Maryland (MD03)	White Rock
Maryland (MD13)	Wye
Maryland (MD18)	Assateague Island
New Jersey (NJ00)	E. B. Forsythe
New Jersey (NJ99)	Washington Crossing
New York (NY08)	Aurora
New York (NY10)	Chautaugua
New York (NY20)	Huntingdon
New York (NY 22)	St. Lawrence River Valley
New York (NY52)	Bennett Bridge
New York (NY65)	Jasper
New York (NY68)	Biscuit Brook
New York (NY98)	Whiteface Mountain
New York (NY99)	West Point
Ohio (OH09)	Oxford
Ohio (OH15)	Lykens
Ohio (OH17)	Delaware
Ohio (OH49)	Caldwell
Ohio (OH54)	Deer Creek State Park
Ohio (OH71)	Wooster
Virginia (VA00)	Charlottesville
Virginia (VA28)`	Shenandoah National Park
West Virginia (WV04)	Babcock State Park
West Virginia (WV05)	Cedar Creek State Park
West Virginia (WV28)	Parsons

controlled for the cyclical seasonal variability inherent in precipitation chemistry and volume. The trend model incorporated precipitation chemistry data that was summarized into 6, bi-monthly seasons for each year during the 1983 through 2003 trend analysis period. Concentrations were summarized as precipitation-weighted means. Seasonal deposition values were calculated from the corresponding seasonal precipitation-weighted mean concentration and the total seasonal precipitation volume.

The components of the model are as follows:

$$C_{ys} = b_0 + b_s + y_{by} + e$$

where,
- C_{ys} = estimated concentration or deposition during season, s, and year, y.
- b_0 = estimated intercept of the linear model.
- b_s = estimated shift in concentration or deposition during season, s, relative to the latest season (i.e., Nov-Dec).
- y = date at the mid-point of the season, expressed as decimal years (e.g., the first season of 1994 would be 1994.0833).
- b_y = estimated long-term linear trend in concentration or deposition.

Inferences on the direction and significance of long-term trends in concentration or deposition were based on the estimated value of b_y and on the F-statistic of the linear effect associated with b_y.

Concentration and deposition trend plots for each analyte and for each site with at least 19 years of data are included in the hard copy version of this report; these plots are also included in the electronic version that can be viewed at http://www.dep.state.pa.us.

Units

The standard units used in this report are **mg/L** (milligrams per liter) or **µeq/L** (micro-equivalents per liter) for concentrations and **kg/ha** (kilograms/hectare) for wet deposition amounts. Conversion factors appear in Tables 5 and 6. Table 5 presents factors for converting among various deposition units and for converting ion concentrations to deposition amounts, given precipitation measurements in cm (centimeters). Table 6 presents factors to convert mass per unit volume to micro-moles or micro-equivalents per unit volume for direct elemental comparisons.

Summary Periods

For this report, the annual period started at 9:00 a.m. on 31 December 2002 and ended at 9:00 a.m. on 30 December 2003. The growing season started 29 April 2003 and ended 28 October 2003. The dormant season included precipitation samples collected from 31 December 2002 to 29 April 2003 and from 28 October 2003 to 30 December 2003. The annual and seasonal

Table 5. Conversion factors for concentration and deposition units.

From	To	Multiply by
mg/m2	lb/ac	0.00892
mg/m2	kg/ha	10-2
mg/L	g/m2	10-2 x cm rainfall
mg/L	kg/ha	10-1 x cm rainfall
mg/L	lb/ac	0.0892 x cm rainfall

periods in this report are the same as those used in summarizing the 2003 atmospheric deposition data of the National Atmospheric Deposition Program/National Trends Network.

Appendices

A summary of weekly chemical analyses (mg/L) of all precipitation samples collected throughout Pennsylvania during 2003 appears in Appendix I. Weekly measured wet depositions (kg/ha) for each ion are summarized in Appendix II. Annual and seasonal mean concentration and wet deposition trends from 1982 through 2003 are given in Appendix III. Correlation coefficient matrices are given in Appendix IV. Micro-equivalent concentrations and ionic balances of weekly precipitation chemistry observations are given in Appendix V. Annual and seasonal concentration and wet deposition maps are shown in Appendix VI.

Table 6. Conversion factors from mass to micro-moles or micro-equivalents.

Ion	Ion as	Factor From mg/L to µmoles/L	Factor From mg/L to µeq/L
		Multiply by	Multiply by
Hydrogen	H^+	1000	1000
Calcium	Ca^{2+}	24.950	49.900
Magnesium	Mg^{2+}	41.144	82.287
Potassium	K^+	25.577	25.577
Sodium	Na^+	43.498	43.498
Ammonium	NH_4^+	55.473	55.438
Sulfate	SO_4^{2-}	10.410	20.821
Nitrate	NO_3^-	16.128	16.128
Chloride	Cl^-	28.206	28.216

2003 NETWORK PERFORMANCE

Catch Efficiency

The precipitation catch efficiency of the Aerochem Metrics precipitation sampler and the handling protocols of site operators were very good in 2003. On an annual basis, the amount of precipitation that arrived at the water quality lab (determined from the volume of precipitation in the wet-side bucket) as a ratio of the amount of precipitation measured in the standard non-recording rain gage varied from 0.82 at the Valley Forge and Slocum sites in Montgomery and Luzerne counties to 1.00 at the Leading Ridge and Young Women's Creek NADP/NTN sites in Huntingdon and Clinton counties, respectively (Table 7). A ratio of 1.0 indicates that 100% of the precipitation was collected by the sampler and that no precipitation was lost in transit to the water quality lab. The annual network mean catch efficiency ratio was 0.92, with 12 of 17 sites having a catch efficiency ratio of 0.90 or higher. Considering that the Aerochem Metrics sampler, because of its construction and aerodynamics, is less efficient in catching precipitation than a standard rain gage, the annual ratios are indicative of very good network performance. Studies comparing the sampler to a standard rain gage have shown that the sampler underestimates total annual precipitation by 5% to 10% of the rain gage measurement. Discrepancies between measured precipitation and the sampler's volume are also influenced by equipment failure (especially the sensor) and electrical outages.

The form of precipitation (rain versus snow) and site exposure also influence the catch efficiency of the Aerochem Metrics sampler. This is evident when comparing the ratios of the weekly bucket volumes to the standard non-recording rain gage amounts for the warm and cold periods (Table 7). At all sites, except the Millersville NADP/NTN site in Lancaster County, the sampler was more efficient during the warm period (1 April 2003 through 28 October 2003) when precipitation was dominated by rain than during the cold period (1 January 2003 to 31 March 2003 and 29 October 2003 to 30 December 2003) when precipitation frequently occurred as snow or ice. The network mean ratio during the warm period was 0.94 compared to 0.86 during the cold period. The lower ratios during the cold period reflect the sensor's inability to detect and sample light, dry snow, as well as other problems associated with freezing conditions. The relatively low cold period catch efficiency at the Valley Forge site in Montgomery County was caused by frequent weather related electrical failures at that site in 2003.

Site exposure also affects the collection efficiency of the sampler. Where the Aerochem Metrics sampler is exposed (in an open field or on a ridge), as it is at M. K. Goddard State Park in Mercer County, the Allegheny Portage National Historic Site in Cambria County, and the Valley Forge National Historic Park in Montgomery County, it is subject to higher wind velocities (which lowers catch efficiency) than samplers located at more protected (shielded) sites, such as the Leading Ridge and Young Women's Creek NADP/NTN sites.

Table 7. Precipitation catch efficiency of the Aerochem Metric precipitation sampler during 2003.

Monitoring Site	Ratio of Bucket Volume to Nonrecording Raingage Amount[1]		
	Annual	Warm Period[2]	Cold Period[3]
Western Pennsylvania			
Laurel Hill State Park	0.92	0.99	0.79
M. K. Goddard State Park	0.92	0.94	0.86
Crooked Creek Lake	0.89	0.94	0.78
Allegheny Portage N. R.	0.83	0.87	0.73
Presque Isle State Park	0.90	0.92	0.86
Kane - NADP	0.97	0.99	0.93
Central Pennsylvania			
Little Buffalo State Park	0.92	0.97	0.82
Hills Creek State Park	0.92	0.92	0.91
Little Pine State Park	0.95	0.95	0.95
Young Woman's Creek - NADP	1.00	1.00	0.97
Leading Ridge - NADP	1.00	1.00	0.99
Penn. State Univ. - NADP	0.95	0.97	0.92
Arendtsville - NADP	0.95	0.99	0.88
Eastern Pennsylvania			
Valley Forge National Park	0.82	0.93	0.64
Slocum State Park	0.82	0.84	0.79
Millersville - NADP	0.88	0.87	0.91
Milford - NADP	0.95	0.95	0.93
State Mean	0.92	0.94	0.86

[1] Ratio of volume of precipitation collected in wet bucket of Aerochem Metric Sampler as measured at the water quality lab to the amount of precipitation measured in the nonrecording standard raingage.

[2] Warm Period: 1 April through 28 October 2003 represents the period when precipitation was primarily rain.

[3] Cold Period: 1 January through 31 March 2003 and 29 October through 30 December 2003 represent periods when precipitation was primarily snow and/or ice.

Sampling Frequency

The maximum number of valid precipitation samples that could have been collected by the Pennsylvania Atmospheric Deposition Monitoring Network during 2003 was 884 (Table 8). Since 34 of these sampling periods were without precipitation, the maximum number of potential samples available for complete or partial analysis was 850. Of this number, 758 samples (89%) contained sufficient volume for complete analysis. Of the 66 sampling periods with precipitation but no analyses, 26 samples involved precipitation amounts of 0.05 inch or less. Failure of the Aerochem Metrics sampler to detect and sample low intensity snow or rainfall accounts for many of these missed samples. The Valley Forge site in Montgomery County collected the lowest number of samples (39) with complete analyses. The Young Women's Creek and Kane NADP/NTN sites in Clinton and Elk counties, respectively, collected the second smallest number (41) of samples with complete analyses. The largest number of samples with volumes large enough to permit complete analyses was collected at Crooked Creek Lake in Armstrong County (50); the second largest number of samples (49) was collected at the Leading Ridge NADP/NTN site in Huntingdon County. The number of measurements in 2003 by site and parameter is given in Table 8.

Percentage of Annual Precipitation Analyzed

Another means of evaluating network performance is to compare the percentage of annual precipitation that was analyzed with the total volume of measured precipitation at each site. Such a comparison is given in Table 9 for each precipitation quality parameter. More than 96% of the mean annual precipitation in Pennsylvania was analyzed for pH in 2003. On an individual site basis, the percentage varied from slightly less than 100% at the Penn State and Leading Ridge NADP/NTN sites to approximately 85% at the Kane NADP/NTN site in Elk County. Electrical problems and equipment failure at the Kane site as well as the Little Buffalo State Park site in Perry County resulted in the relatively high amount of missed precipitation at these sites, most of which occurred during the winter months. Approximately 96% of the annual precipitation was also analyzed for sulfate, nitrate, chloride, and ammonium concentrations in 2003. Slightly more that 95% of the annual precipitation was analyzed for base cations (calcium, magnesium, potassium, and sodium) concentrations. The percent of precipitation analyzed at individual sites varied from more than 99.9% at the Penn State and Leading Ridge NADP/NTN sites to approximately 84% at the Kane NADP/NTN site for all 10 analytes (Table 9).

Quality Control/Quality Assurance

The distribution of precipitation samples having "flagged" cation/anion balances (ratios <0.85 or >1.15) among intervals of precipitation volume, specific conductance, and total ionic strength for all valid samples collected at the 17 atmospheric deposition monitoring sites in Pennsylvania in 2003 are shown in Table 10. Approximately 93% of the samples were within the specified cation/anion criterion. Of the 51 samples that were flagged, 14% of them were from low volume storms (<0.3 inch). This group of seven samples represented approximately 0.1% of the total volume of precipitation measured in Pennsylvania in 2003 (Table 10). Twenty-five percent of

Table 8. Number of precipitation quality measurements in Pennsylvania in 2003 by site and quality parameter.

Region/ Site Name	Maximum Number of Samples	Number of Measurements of Each Parameter											No. of Samples with Complete Analyses	No. of Samples with Partial Analyses	No. of Sample Periods with no Analyses	No. of Sample Periods with no Precip.
		pH	Conduct-ance	SO_4	NO_3	Cl	NH_4	Ca	Mg	K	Na	Sum				
Western Pennsylvania																
M. K. Goddard	52	47	47	46	46	46	46	45	45	45	45	458	45	2	5	2
Crooked Creek	52	51	51	50	50	50	50	50	50	50	50	502	50	1	1	0
Laurel Hill	52	49	49	48	48	48	48	48	48	48	48	482	48	1	3	1
Allegheny Portage	52	49	49	48	48	48	48	45	45	45	45	470	45	4	3	1
Presque Isle	52	44	44	44	44	44	44	44	44	44	44	440	44	0	8	2
Kane-NADP	52	41	41	41	41	41	41	41	41	41	41	410	41	0	11	1
Central Pennsylvania																
Little Pine	52	49	49	48	48	48	48	47	47	47	47	478	47	2	3	2
Hills Creek	52	47	47	45	45	45	45	44	44	44	44	450	44	3	5	2
Little Buffalo	52	45	45	44	44	44	44	43	43	43	43	438	43	2	7	3
Penn State-NADP	52	48	48	48	48	48	48	48	48	48	48	480	48	0	4	1
Leading Ridge-NADP	52	49	49	49	49	49	49	49	49	49	49	490	49	0	3	1
Arendtsville-NADP	52	45	45	45	45	45	45	45	45	45	45	450	45	0	7	3
Y. Woman Creek-NADP	52	41	41	41	41	41	41	41	41	41	41	410	41	0	11	2
Eastern Pennsylvania																
Slocum	52	48	48	45	45	45	44	43	43	43	43	447	42	6	4	1
Valley Forge	52	43	43	41	41	41	41	39	39	39	39	406	39	4	9	5
Milford-NADP	52	44	44	44	44	44	44	44	44	44	44	440	44	0	8	4
Millersville-NADP	52	44	44	44	44	43	44	44	44	44	44	439	43	1	8	3
State Sum	884	784	784	771	771	770	770	760	760	760	760	7690	758	26	100	34

Table 9. Annual and seasonal distribution of precipitation in Pennsylvania during 2003 and the percent of annual precipitation not analyzed.

Region and Site Name	Measured Precipitation (Inches)			Percent of Annual Precipitation Not Analyzed									
	Annual	Growing Season	Dormant Season	pH	SO_4	NO_3	NH_4	Cl	Cond	Ca	Mg	Na	K
Western Pennsylvania													
Laurel Hill	61.04	36.37	24.67	1.00	1.03	1.03	1.03	1.03	1.00	1.03	1.03	1.03	1.03
M. K. Goddard	53.95	36.61	17.34	3.76	4.15	4.15	4.15	4.15	3.76	4.54	4.54	4.54	4.54
Crooked Creek	51.18	32.52	18.66	.23	.31	.31	.31	.31	.23	.31	.31	.31	.31
Allegheny Portage	61.25	36.66	24.59	.24	.62	.62	.62	.62	.24	2.56	2.56	2.56	2.56
Presque Isle	42.12	26.21	15.91	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27
Kane-NADP	54.72	32.44	22.28	15.67	15.67	15.67	15.67	15.67	15.67	15.67	15.67	15.67	15.67
Central Pennsylvania													
Little Buffalo	52.94	30.74	22.20	10.11	10.12	10.12	10.12	10.12	10.11	10.26	10.26	10.26	10.26
Hills Creek	45.90	29.29	16.61	.22	.46	.46	.46	.46	.22	.61	.61	.61	.61
Little Pine	45.91	27.52	18.39	.04	.11	.11	.11	.11	.04	.15	.15	.15	.15
Y. Woman's Creek	50.45	31.93	18.52	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05	7.05
Leading Ridge-NADP	53.15	33.02	20.13	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
Penn State-NADP	58.61	36.49	22.12	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
Arendtsville-NADP	48.07	28.02	20.05	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Eastern Pennsylvania													
Valley Forge	58.68	35.07	23.61	2.42	4.33	4.33	4.33	4.33	2.42	4.57	4.57	4.57	4.57
Slocum	55.84	35.43	20.41	3.46	4.64	4.64	6.79	4.64	3.46	10.17	10.17	10.17	10.17
Milford-NADP	59.72	35.25	24.47	7.81	7.81	7.81	7.81	7.81	7.81	7.81	7.81	7.81	7.81
Millersville-NADP	54.59	31.15	23.43	3.21	3.21	3.21	3.21	5.26	3.21	3.21	3.21	3.21	3.21
State Mean	53.42	32.63	20.79	3.66	3.91	3.91	4.04	4.03	3.66	4.41	4.41	4.41	4.41

Table 10. Distribution of precipitation samples having "flagged" cation:anion balances (ratios < 0.85 or > 1.15) among intervals of precipitation volume, specific conductance, and total ionic strength for valid samples collected at 14 sites in Pennsylvania during 2003. Only those observations have complete chemical analyses were included.

Parameter and Interval	# of Obs.	Percent (#) of Obs. with cation:anion ratios < 0.85 or > 1.15	Distribution of precip. vol. by interval (%) ($100.0*v_i/v_t$)	Vol. of flagged precip. by interval as a % of total precip. vol. ($100.0*x_i/v_t$)	Distribution of flagged precip. vol. by interval (%) ($100.0*x_i/x_t$)	Percent of precip. vol. that was flagged by interval (%) ($100.0*x_i/v_i$)
Precip. (Inches)						
0.0 - 0.3	114	6.1 (7)	2.3	0.1	2.2	6.3
0.3 - 0.5	102	9.8 (10)	4.7	0.5	7.5	10.7
0.5 - 1.0	196	6.6 (13)	16.6	1.1	16.2	6.5
1.0 - 1.5	139	4.3 (6)	19.7	0.8	12.4	4.2
1.5 - 2.0	85	7.1 (6)	17.0	1.2	18.2	7.1
2.0 - 2.5	54	7.4 (4)	13.9	1.0	15.2	7.3
2.5+	68	7.4 (5)	25.8	1.9	28.3	7.3
Conductance (µS/cm)						
0 - 16	209	11.0 (23)	36.0	3.3	50.1	9.2
16 - 32	369	5.4 (20)	48.2	2.8	42.5	5.8
32 - 48	132	3.8 (5)	13.1	0.4	5.5	2.8
48 - 64	36	5.6 (2)	2.2	0.1	1.7	5.1
64 - 80	8	0.0 (0)	0.3	0.0	0.0	0.0
80+	4	25.0 (1)	0.1	0.0	0.2	31.8
Total Ionic Strength						
0 - 100	202	12.9 (26)	35.7	4.5	67.3	12.5
100 - 200	343	5.0 (17)	46.8	1.7	24.9	3.5
200 - 300	151	3.3 (5)	14.8	0.4	6.5	2.9
300 - 400	39	2.6 (1)	1.9	0.1	1.0	3.3
400 - 500	17	11.8 (2)	0.5	0.0	0.4	5.0
500+	6	0.0 (0)	0.2	0.0	0.0	0.0

v_i = volume of precipitation samples for the given interval, summed over all sites.
v_t = total volume of precipitation samples for 2003, summed over all intervals and sites.
x_i = volume of flagged precipitation samples for the given interval, summed over all sites.
x_t = total volume of flagged precipitation samples for 2003, summed over all intervals and sites.

the "flagged" samples were from storms ranging in size from 0.5 inch to 1.0 inch. This group of 13 samples represented 1.1% of the total volume of precipitation measured in Pennsylvania in 2003. Overall, the analyses of samples from 93.4% of the precipitation collected in the state met the cation/anion criterion. It should be noted that failure to meet the cation/anion criterion does not in itself mean that the analytical results for these samples are in error. The list of cations and anions that are measured represents the major ions found in precipitation in the state. However, other ions, such as phosphorous, may be present, and if present would affect the ionic strength and subsequently the cation/anion balance. Furthermore, samples with low ionic strength and consequently low specific conductance are more likely to be flagged than higher ionic strength samples.

Inter-Laboratory Comparisons

A summary of analytical results from inter-laboratory comparisons of water samples submitted to the water quality lab at the Penn State Institutes of the Environment in the Spring of 2003 are shown in Tables 11. Overall, the Penn State water lab compared favorably with other labs participating in the inter-laboratory comparisons, although a number of potential problems were detected and corrected as a result of the external audit. The water quality lab did not participate in the inter-laboratory audit that is normally conducted each fall because of a change in lab personnel at the time the audit samples were to be requested from the National Water Research Institute in Ontario, Canada.

The mean difference in pH between reported and expected (the mean of all the labs participating in the comparison minus those with coded or flagged results) values for the spring audit samples was -0.10 units. The results from individual samples varied -0.02 to -0.37 pH unit indicating a potential negative analytical bias for pH measurements. However, the differences between expected and reported pH values for six of the 10 samples were 0.05 unit or less. Although a low analytical bias is possible, approximately half of the mean difference resulted from errors associated with 2 of the 10 samples.

The mean difference in sulfate concentrations between expected and reported values for the spring audit samples was +0.046 mg/L. Results from the analyses of individual samples varied from –0.007 mg/L to +0.197 mg/L indicating no consistent analytical bias. Nearly all of the mean difference between reported and expected values resulted from differences in the expected and reported results for two samples. No analytical bias was indicated.

The mean difference in nitrate and ammonium concentrations between reported and expected values for the spring audit samples were +0.015 mg/L and -0.004 mg/L, respectively. The absolute difference in nitrate concentrations for individual samples ranged from zero to +0.113 mg/L; for ammonium concentrations the range was from +0.001 to -0.017 mg/L. The results from all analyses were within the range of acceptable values. No analytical bias was indicated for either ion.

Table 11. Results of inter-laboratory analyses of water samples submitted to the water quality lab at Penn State's Institutes of the Environment. The expected value is the mean of all of the labs participating in the comparison minus those with coded or flagged results. Samples were submitted in Spring 2003.

Spring Audit Sample	PH[1] Reported-Mean	Sulfate[2] Reported-Mean	Nitrate[3] Reported-Mean	Chloride[4] Reported-Mean	Potassium[5] Reported-Mean
1	4.46-4.83	1.687-1.639	0.241-0.241	0.157-0.166	0.031-0.038
2	4.54-4.59	1.357-1.364	0.263-0.257	0.296-0.316	0.036-0.039
3	6.69-6.87	2.011-1.921	0.457-0.466	0.224-0.224	0.170-0.184
4	4.63-4.66	3.232-3.202	1.315-1.262	0.290-0.334	0.106-0.115
5	4.74-4.77	3.191-3.256	0.142-0.142	4.214-4.195	0.227-0.244
6	5.21-5.25	2.327-2.322	0.027-0.038	4.279-4.605	0.211-0.225
7	6.17-6.31	7.021-6.835	0.624-0.625	0.442-0.495	0.208-0.209
8	6.86-7.02	3.018-3.027	0.072-0.075	1.509-1.584	0.218-0.230
9	5.20-5.23	2.392-2.408	<0.01-<0.01	5.851-5.690	0.227-0.230
10	4.44-4.46	5.795-5.598	2.301-2.188	0.523-0.573	0.177-0.168

[1] Mean difference -0.10 pH units. Possible low analytical bias indicated. Sample #1 flagged as extremely low.
[2] Mean difference +0.046 mg/L. No analytical bias indicated. All sample concentrations within range of expected value.
[3] Mean difference +0.015 mg/L. No analytical bias indicated. All sample concentrations within range of expected value.
[4] Mean difference +0.040 mg/L. No analytical bias indicated. Sample #6 flagged as low.
[5] Mean Difference –0.007 mg/L. No analytical bias indicated. All samples concentrations within range of expected value.

Table 11. Continued….

Spring Audit Sample	Calcium[6] Reported-Mean	Magnesium[7] Reported-Mean	Sodium[8] Reported-Mean	Ammonium[9] Reported-Mean
1	0.212-0.277	0.065-0.067	n/a	0.260-0.225
2	0.031-0.121	0.035-0.037	n/a	0.111-0.118
3	3.320-2.908	0.591-0.583	n/a	<0.01-0.003
4	1.944-1.837	0.805-0.458	n/a	0.071-0.090
5	0.176-0.506	0.469-0.382	n/a	<0.01-0.005
6	0.253-0.759	0.243-0.066	n/a	0.015-0.017
7	2.815-2.869	0.838-0.837	n/a	0.013-0.034
8	1.258-3.393	0.330-0.728	n/a	<0.01-0.006
9	0.355-0.861	0.366-0.461	n/a	0.014-0.019
10	4.051-2.829	1.109-0.983	n/a	0.154-0.177

[6] Mean difference –0.195 mg/L. Samples #2, #5, #6, #8, and #9 flagged extremely low. Samples #3 and #10 flagged very or extremely high. Analytical problems indicated.
[7] Mean difference +0.025 mg/L. Samples #4, #5, and #10 flagged extremely high. Samples #6, #8, and #9 flagged extremely low or very low. Analytical problems indicated.
[8] Analyses for sodium were not performed for the Spring Audit Samples.
[9] Mean difference –0.004 mg/L. Sample #1 flagged high. Samples #4 and #7 flagged low. No analytical problems indicated.

Chloride analyses were generally lower than the expected values (mean difference -0.040 mg/L) for eight of the 10 spring samples. The majority of the mean difference for the spring audit was attributable to one sample (#6) where the reported and expected concentrations differed by-0.326 mg/L. If removed from the data set, the mean difference for the remaining audit samples would be less than -0.01 mg/L. Although the results of two chloride analyses were flagged as unacceptable, no consistent analytical bias was indicated.

Potassium analyses were very good. The mean difference for the inter-comparison samples was –0.007 mg/L. No analytical bias was indicated and all reported concentrations were within the range of the expected concentrations.

Calcium concentrations for the Spring 2003 samples were highly variable. Differences between reported and expected concentrations ranged from –2.135 mg/L to +1.22 mg/L resulting in a mean difference of -0.195 mg/L. The reported concentrations of only three of the 10 samples were acceptable. Magnesium concentration results were similar to the calcium analyses. Although the mean difference was only 0.024 mg/L above the expected concentrations, 6 of the 10 samples were flagged as unacceptable. The poor lab performance for calcium and magnesium analyses resulted from the way background interference was eliminated. As a result of the inter-laboratory comparison, new procedures were implemented in June 2003. Precipitation samples saved from this project were reanalyzed using the new procedures. Where possible, the concentrations from the reanalyzed samples were included in this report.

Although some of the results of the inter-laboratory performance audits were above or below expected values and were flagged as unacceptable and that analytical biases were indicated for some analytes, the poor lab performance of some of the analytes may be the result of inappropriate calibration of the instruments for the range of concentrations found in the audit samples. Most analytical equipment has an optimum range of concentrations for which the instrument is calibrated. When higher or lower than expected concentrations are encountered that lie outside this range, it is standard laboratory procedure to re-calibrate the instrument and repeat the analyses. Since the actual concentrations of blind-audit samples are unknown, re-calibration and re-analysis is not possible. For example, the majority of the audit samples for pH had expected values that were higher than those normally encountered in precipitation in Pennsylvania. The pH of precipitation samples collected in Pennsylvania in 2003 ranged from 3.69 to 5.48; the lowest audit sample pH was 4.44; the highest pH was 7.02. Similarly, the expected magnesium concentrations in the audit samples were 10 to 30 times higher than magnesium concentrations normally found in precipitation in Pennsylvania. Consequently, if poor lab performance in the inter-laboratory comparisons is a result of inappropriate calibration of the instruments for the range of concentrations in the audit samples, then the concentration data for all 2003 precipitation samples are less likely to be biased. In fact, other quality control and quality assurance procedures support this position. The cation and anion balances and the conductive balances do not indicate any consistent problems. Nor do other statistical measures that are used to routinely screen data to detect and eliminate potential bias or questionable results.

2003 SUMMARY
PRECIPITATION CHEMISTRY AND WET DEPOSITION

A wet atmospheric deposition monitoring network was established in Pennsylvania in 1981 to determine the magnitude and distribution of toxic and nutrient elements in precipitation and to assess their potential environmental impacts. Results from the 22nd full-year of operation of this network are summarized in this report. Included in this summary are data from seven National Atmospheric Deposition Program/National Trends Network (NADP/NTN) sites and 10 sites supported by The Pennsylvania Department of Environmental Protection, Bureaus of Air Quality Control. In addition to this data summary, precipitation chemistry data from the NADP/NTN can be obtained over the Internet at http://nadp.sws.uiuc.edu. Additional summaries of precipitation chemistry and wet deposition data from the Pennsylvania Network can also be obtained over the Internet at http://www.dep.state.pa.us.

Samples of weekly precipitation collected during 2003 were analyzed for pH, specific conductance, sulfate, nitrate, ammonium-nitrogen, chloride, sodium, potassium, calcium, and magnesium. Of the 884 possible weekly samples collected in 2003, 758 samples contained sufficient precipitation for complete analyses, while 26 samples received partial analyses. Of the 100 sampling periods that received no analyses, 34 recorded no precipitation during the week (Table 8, page 17). Chemical analyses of the precipitation samples collected in 2003 revealed that measurable quantities of each of the above parameters were present in precipitation during each sampling period.

Hydrogen Ion (as pH) - Precipitation in Pennsylvania can be characterized as a dilute, aqueous solution of sulfuric and nitric acids. The precipitation-weighted mean annual pH at each of the 17 monitoring sites in Pennsylvania in 2003 was from 11 to 23 times more acidic than "uncontaminated" precipitation. The statewide precipitation-weighted mean annual pH in 2003 was 4.40 (Table 12). Although precipitation in some areas of the state was more acidic than other areas, precipitation over the entire state can be characterized as acidic. The precipitation-weighted mean annual pH at the 17 monitoring sites varied from 4.29 at the Crooked Creek Lake and the Kane NADP/NTN sites in Armstrong and Elk counties to 4.61 at the Millersville NADP/NTN site in Lancaster County. As in previous years, regional differences were evident, with the most acidic precipitation falling in western Pennsylvania where the pH averaged 4.32. The average annual pH in central and eastern regions of the state was 4.39 and 4.53, respectively. Intra-regional variability was less evident in 2003 than in previous years of network operations. In western and central Pennsylvania, the mean annual pH varied by 0.09 unit (4.29 to 4.38) and 0.06 unit (4.37 to 4.43), respectively. In the eastern portion of the state, the mean annual pH varied from 4.46 at the Slocum site in Luzerne County to 4.61 in Lancaster County.

Consistent regional patterns were also evident during both the growing and dormant seasons. Statewide, the growing season pH averaged 4.36 in 2003; the dormant season pH averaged 4.49 (Table 12). The lowest growing season mean pH (4.24) was measured at the Crooked Creek

Table 12. Annual and seasonal hydrogen ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean pH			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	4.31	4.27	4.42	0.67	0.50	0.17	51.92	34.71	17.21	2.03	1.90	0.13
CROOKCRK	4.29	4.24	4.40	0.67	0.48	0.19	51.06	32.52	18.54	0.12	0.00	0.12
LAURHILL	4.34	4.30	4.39	0.72	0.46	0.26	60.43	36.33	24.10	0.61	0.04	0.57
ALLEPORT	4.38	4.32	4.50	0.65	0.45	0.20	61.10	36.65	24.45	0.15	0.01	0.14
PRESQISL	4.31	4.27	4.37	0.53	0.36	0.17	40.32	24.93	15.39	1.80	1.28	0.52
KANE	4.29	4.24	4.39	0.71	0.48	0.23	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	4.32	4.28	4.41	0.66	0.45	0.20	51.83	32.44	19.39	2.21	1.03	1.19
Central Pennsylvania												
YOWOCRK	4.41	4.36	4.52	0.50	0.35	0.14	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	4.37	4.36	4.39	0.50	0.31	0.19	45.89	27.52	18.37	0.02	0.00	0.02
HILLSCRK	4.37	4.29	4.55	0.50	0.38	0.12	45.80	29.24	16.56	0.10	0.05	0.05
LITTBUFF	4.37	4.34	4.43	0.57	0.36	0.21	47.59	30.74	16.85	5.35	0.00	5.35
PSUNADP	4.38	4.32	4.48	0.63	0.45	0.19	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	4.43	4.37	4.55	0.50	0.36	0.15	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	4.39	4.34	4.48	0.50	0.33	0.17	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	4.39	4.34	4.49	0.53	0.36	0.17	49.25	30.72	18.53	1.47	0.28	1.19
Eastern Pennsylvania												
SLOCUM	4.46	4.42	4.56	0.49	0.34	0.14	53.91	35.43	18.48	1.93	0.00	1.93
VALLFORG	4.58	4.54	4.65	0.39	0.26	0.14	57.26	34.70	22.56	1.42	0.37	1.05
MILFORD	4.48	4.47	4.52	0.50	0.31	0.19	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	4.61	4.57	4.66	0.35	0.22	0.13	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	4.53	4.50	4.60	0.43	0.28	0.15	54.76	33.84	20.92	2.44	0.38	2.06
State Mean	4.40	4.36	4.49	0.55	0.38	0.18	51.46	32.06	19.39	1.96	0.57	1.39

Lake and the Kane NADP/NTN sites. The lowest dormant season mean pH (4.37) was observed at the Presque Isle State Park site near Erie. The highest growing (4.57) and dormant (4.66) season mean pH values were recorded at the Millersville NADP/NTN site. The lowest pH for any weekly sample (3.69) was measured at the Milford NADP/NTN site in Pike County. Although each site captured at least one weekly precipitation sample with a pH measurement below 4.00, the number of weekly samples with pH values below 4.0 has decreased dramatically over the last nine years following implementation of additional emissions controls to reduce acidic deposition in the United States, particularly in the Northeast and Mid-Atlantic regions.

No record low (high acidity) mean annual pH values were recorded in 2003 at any of the monitoring sites with at least four years of data. However, record high mean annual pH values were measured at nine sites including Laurel Hill State Park (4.34) in Somerset County, Crooked Creek Lake (4.29) in Armstrong County, Allegheny Portage NHS (4.38) in Cambria County, Little Buffalo State Park (4.37) in Perry County, Leading Ridge NADP/NTN (4.43) in Huntingdon County, Little Pine State Park (4.37) in Lycoming County, Valley Forge NHP (4.58) in Montgomery County, Milford NADP/NTN (4.48) in Pike County, and Slocum State Park (4.46) in Luzerne County. The western (4.32), central (4.39), and eastern (4.53) regional mean annual pH values and the statewide mean (4.40) were also the highest recorded to date. All of the other sites recorded mean annual pH values that were slightly more acidic than the past couple of years, but well within the range of values reported since implementation of Title IV of the Clean Air Act Amendments of 1990 (CAAA) on 1 January 1995.

Seasonal pH values were consistent with the annual pattern. No record low growing or dormant season pH means were reported in the state in 2003. However, record high growing season pH means were recorded at seven sites with at least four years of data including Laurel Hill (4.30), Crooked Creek Lake (4.24), Allegheny Portage (4.32), Little Buffalo (4.34), Little Pine (4.36), Valley Forge (4.54), and Slocum (4.42). Record high dormant season pH means were reported at Crooked Creek Lake (4.40), Allegheny Portage (4.50), Presque Isle State Park (4.37), Hills Creek State Park (4.55), Leading Ridge NADP/NTN (4.55), Young Women's Creek NADP/NTN (4.52), Arendtsville NADP/NTN (4.48), Valley Forge (4.65), Milford NADP/NTN (4.52), and Slocum (4.56). All regional and statewide growing and dormant season pH means were the highest reported since monitoring began in 1982.

The relatively high annual and seasonal pH means across the state continued the general decreasing pattern in the acidity of precipitation that has been evident in Pennsylvania since implementation of the CAAA on 1 January 1995. The 2003 mean annual pH of 4.40 was 0.25 pH unit higher than the mean pH value from 1982 through 1994, and 0.11 pH unit higher than the average mean pH since implementation of Title IV of the CAAA. What this indicates is that precipitation in Pennsylvania was much less acidic in 2003 than at any time during the past 22 years for which records are available. Of importance also is the fact that the average decline in acidity (pH) since 1995 (0.13 pH units) has been very consistent across the state, although intra-regional variability is evident. The greatest regional variability occurs in western Pennsylvania where the average increase in pH since 1995 has varied from 0.09 unit at Laurel Hill and Crooked Creek Lake to 0.16 unit at the Kane NADP/NTN site.

The growing and dormant season changes mimic the annual pattern very well indicating that the decrease in acidity has been not only very consistent cross the state but also fairly uniform across seasons. Although on a pH scale these differences appear to be small, they do represent a substantial reduction in hydrogen ion (H^+) concentrations. For example, the reduction of 0.25 pH unit in 2003 relative to the pre-CAAA (1983-1994) average pH (4.15) is equivalent to a 44% reduction in (H^+) concentrations.

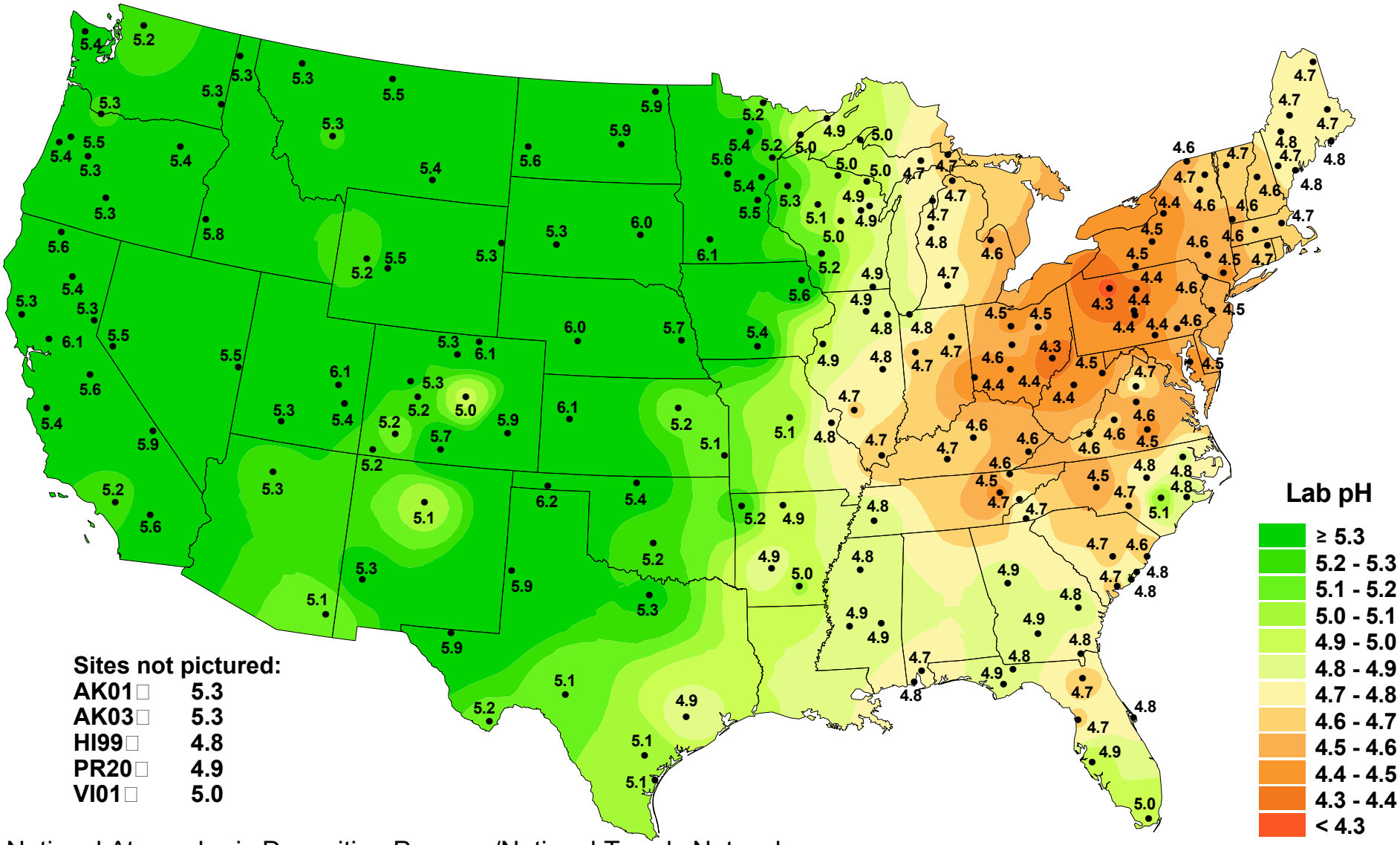
Although there has been a substantial decrease in the acidity of precipitation in Pennsylvania over the past 22 years, precipitation in the Commonwealth continues to be more acidic than nearly all other regions of the United States. This observation is based on a comparison of 2003 mean annual pH values for precipitation samples collected throughout the United States by the National Atmospheric Deposition Program/National Trends Network (NADP/NTN) and shown in Figure 2 (NADP, 2004). This observation is especially true for the western and central portions of the state. Mean annual pH values in these regions in 2003 ranged from 4.3 to 4.4. The only sites in the NADP/NTN that recorded similar pH values in 2003 are located in southern Ohio, central West Virginia, and upstate New York. This comparison suggests that although significant improvement has been achieved in reducing "acid rain" in Pennsylvania and across the Northeast and Mid-Atlantic regions, additional reductions in emissions may be necessary if we are to provide greater protection to acid sensitive aquatic and terrestrial ecosystems and cultural and material resources in the Commonwealth.

The decrease in free acidity in precipitation across the state since 1995 reflects to a large extent the direct results of reduced sulfur dioxide (SO_2) and nitrogen oxides (NO_X) emissions in the United States, primarily along the Ohio River Valley, following implementation of Phase I of the CAAA on 1 January 1995 and Phase II on 1 January 2000. Changes in SO_2 and NO_X emissions since 1995 and the impact on precipitation chemistry will be discussed in detail in a separate report entitled "Effectiveness of the Clean Air Act Amendments of 1990, Title IV" that will be submitted to the Pennsylvania Department of Environmental Protection in October 2004.

Based on pH and precipitation volume measurements, precipitation contributed from 0.35 kg/ha to 0.72 kg/ha of H^+ to aquatic and terrestrial ecosystems in the Commonwealth in 2003 (Table 12). The lowest amount of wet H^+ deposition occurred at the Millersville NADP/NTN site in Lancaster County; the highest deposition was measured at Laurel Hill State Park in Somerset County. At all of the monitoring sites, the growing season received the largest amount of wet H^+ deposition accounting for nearly 69% (range 62.0% to 74.6%) of the annual deposition. The highest (0.50 kg/ha) and lowest (0.22 kg/ha) growing season depositions were measured at M. K. Goddard State Park (Mercer County) and the Millersville NADP/NTN sites, respectively. The highest (0.26 kg/ha) and lowest (0.12 kg/ha) dormant season depositions in the state were measured at Laurel Hill and Hills Creek State Parks, respectively (Table 12). The Hills Creek site is located in Tioga County near Wellsboro.

Statewide, the mean annual wet H^+ deposition in Pennsylvania in 2003 measured 0.55 kg/ha. Although not the lowest amount recorded to date, it was only 0.07 kg/ha higher than the lowest amount recorded in 2001. This slight increase over the past two years resulted from much higher

Hydrogen ion concentration as pH from measurements made at the Central Analytical Laboratory, 2003



Sites not pictured:

AK01	5.3
AK03	5.3
HI99	4.8
PR20	4.9
VI01	5.0

National Atmospheric Deposition Program/National Trends Network
http://nadp.sws.uiuc.edu

precipitation in the Commonwealth in 2003 and 2002 relative to 2001. The statewide average precipitation in 2003 was 53.42 inches (Table 13), about 9 inches above the 2002 average of 44.55 inches and nearly 20 inches higher than 2001. Even though precipitation was much higher in 2003 than 2002 or 2001, higher pH values at two sites (Little Pine State Park in Lycoming County and Valley Forge in Montgomery County) resulted in record low annual H^+ depositions at these sites in 2003. The Valley Forge site also reported a record low dormant season deposition along with the Crooked Creek Lake site in Armstrong County and the Leading Ridge NADP/NTN site in Huntingdon County. No record low growing season depositions were reported, although both the Young Women's Creek NADP/NTN site in Clinton County and the Arendtsville NADP/NTN site in Adams County reported their highest growing season depositions over their relatively short (4-year) period of record. Both of these sites also recorded their highest growing season precipitation totals to date, which significantly influenced the amount of H^+ deposition these sites received in 2003. The only regional wet deposition record recorded in 2003 occurred during the dormant season in eastern Pennsylvania. Very low deposition at the new Millersville NADP/NTN site contributed substantially to the record low wet H^+ deposition in this region.

Trend analyses indicate that from 1983 through 2003, the pH of precipitation increased (became less acidic) across the state (Table 14). Statistically significant ($p<0.05$) decreasing H^+ concentration trends are evident at all sites. The average statewide decline in H^+ concentrations since 1983 is 31.05 μeq/L, a decrease of approximately 41.1%. The greatest decrease (37.95 μeq/L, 45.6%) occurred at M. K. Goddard State Park in Mercer County. The smallest significant ($p<0.05$) decrease (24.09 μeq/L, 35.0%) was measured at Slocum State Park in Luzerne County.

Year to year differences in precipitation volumes can strongly influence the magnitude and statistical significance of trends in wet H^+ deposition (the product of weekly concentration and weekly precipitation volume measurements). Significant ($p<0.05$) decreasing wet H^+ deposition trends are evident at all sites (Table 15). The average statewide decrease in H^+ deposition since 1983 is 0.34 kg/ha, a decrease of 41.3%. The largest decrease (0.50 kg/ha, 46.5%) occurred at the Laurel Hill site in Somerset County. The next largest decrease (0.49 kg/ha, 50.8%) occurred at the Kane NADP/NTN site in Elk County, which is also located in western Pennsylvania. Clearly, wet H^+ deposition has decreased across Pennsylvania the past 22 years. The decline has been more pronounced in western Pennsylvania than in the rest of the state, although differences on a regional basis are fairly small. On a seasonal basis, the decline in wet deposition since 1983 has been nearly twice as large during the growing season than during the dormant season, which would be expected given that precipitation is much more acidic during the growing season than the dormant season. The decline in H^+ deposition is a direct result of a combination of factors that include reductions in the acidity of precipitation, because of lower emissions of sulfur dioxide and to a lesser extent nitrogen oxides, and an increase in some cation concentrations, particularly ammonium, at some sites. Year to year fluctuations and inter- and intra-regional variability in H^+ concentration and wet deposition trends are also associated with fluctuations in precipitation amounts above and/or below the long-term average at individual sites (see Table 13).

Table 13. Mean annual and seasonal precipitation volumes at selected network sites in 2003 and before (1982-1994) and after (1995-2003) implementation of the Clean Air Act Amendments of 1990, Title IV.

Site/Region	Pre-CAAA Precipitation			Post-CAAA Precipitation			2003 Precipitation		
	Annual	Growing	Dormant	Annual	Growing	Dormant	Annual	Growing	Dormant
	----------Inches----------								
Laurel Hill	51.68	24.62	27.06	51.83	26.19	25.64	61.04	36.37	24.67
M.K. Goddard	44.82	24.94	19.89	42.59	23.31	19.28	53.95	36.61	17.34
Crooked Creek Lake	42.16	22.36	19.80	42.01	22.54	19.47	51.18	32.52	18.66
Kane NADP	49.91	25.92	23.99	44.94	23.80	21.14	54.72	32.44	22.28
Eastern Region	47.14	24.46	22.68	45.30	23.90	21.40	54.04	33.47	20.58
Little Buffalo	42.56	22.19	20.37	44.52	23.89	20.63	52.94	30.74	22.20
Hills Creek	36.86	21.19	15.67	36.04	20.41	15.63	45.90	29.29	16.61
Leading Ridge NADP	42.50	21.64	20.86	41.47	23.03	18.44	53.15	33.02	20.13
Little Pine	41.81	22.70	19.10	40.86	21.91	18.89	45.91	27.52	18.39
Penn State NADP	40.00	21.03	18.97	44.52	24.81	19.70	58.61	36.49	22.12
Central Region	40.75	21.75	18.99	41.88	22.97	19.02	50.72	31.00	19.72
Valley Forge	46.44	23.97	22.47	47.77	25.20	22.57	58.68	35.07	23.61
Milford NADP	46.77	24.81	21.96	46.93	24.68	22.25	59.72	35.25	24.47
Slocum	43.37	24.11	19.27	42.24	23.24	19.00	55.84	35.43	20.41
Eastern Region	45.53	24.29	21.23	45.55	24.26	21.29	57.21	34.23	22.98
Statewide	44.07	23.29	20.78	43.92	23.58	20.34	53.42	32.63	20.79

Table 14. Estimated changes in concentrations of individual ions in precipitation from 1983 to 2003.

	Hydrogen Ion		Sulfate		Nitrate		Chloride	
Site	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change
CROOKCRK	-37.119*	-39.100	-23.384*	-30.445	-7.849*	-21.287	-0.095	-1.278
GODDARD	-37.949*	-45.594	-24.012*	-34.626	-7.237*	-20.118	1.351*	28.623
HILLSCRK	-26.826*	-39.350	-18.817*	-33.811	-8.405*	-26.702	-0.306	-6.691
LAURHILL	-33.721*	-41.232	-23.820*	-35.195	-6.885*	-21.388	0.229	4.493
LITTBUFF	-34.122*	-43.609	-18.946*	-30.031	-6.794*	-19.848	0.351	5.466
SLOCUM	-24.086*	-34.995	-14.214*	-25.226	-4.289	-13.855	0.103	1.910
VALLFORG	-27.470*	-42.196	-22.614*	-38.207	-8.635*	-28.257	-3.621*	-30.269
LITTPINE	-33.139*	-40.691	-19.696*	-31.626	-10.784*	-29.286	0.560	11.430
PSUNADP	-31.926*	-42.785	-24.002*	-37.088	-8.856*	-27.180	-1.913*	-36.815
KANE	-30.425*	-40.966	-22.171*	-34.230	-4.337*	-14.305	-1.611*	-35.395
LEADRIDG	-25.044*	-35.905	-18.445*	-30.322	-5.240*	-16.499	-1.775*	-34.148
MILFORD	-30.758*	-46.528	-24.046*	-43.846	-8.323*	-27.452	-2.328*	-32.975
Mean	-31.049	-41.079	-21.181	-33.721	-7.303	-22.181	-0.755	-10.471

* p<0.05

Table 14 (continued).

	Ammonium		Calcium		Magnesium		Potassium		Sodium	
Site	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change	Change (ueq/L)	Percent Change
CROOKCRK	0.593	3.440	-1.694	-19.808	-1.046*	-35.585	0.344*	47.341	0.205	9.988
GODDARD	2.713	14.642	-2.693*	-28.788	-1.038*	-34.743	0.500*	82.086	0.482	22.815
HILLSCRK	1.756	13.280	-1.421*	-25.882	-0.874*	-39.719	0.524*	97.608	0.586*	37.344
LAURHILL	0.385	2.425	-0.873	-13.998	-0.997*	-42.259	0.313	38.721	0.547*	29.424
LITTBUFF	2.756	14.481	-2.857*	-38.391	-1.049*	-37.378	0.700*	104.230	0.341	10.685
SLOCUM	6.202*	45.596	-0.213	-4.430	-0.796*	-34.569	0.348	45.888	-0.411	-12.680
VALLFORG	2.740	17.948	-3.421*	-47.207	-4.163*	-67.104	0.352*	48.700	-4.104*	-44.528
LITTPINE	1.876	12.254	-0.855	-15.881	-0.321	-16.788	0.399*	72.744	0.884*	47.193
PSUNADP	1.990	15.789	-1.601*	-26.320	-0.902*	-46.647	-0.053	-12.347	-1.214*	-44.393
KANE	1.019	7.511	-0.096	-1.783	-0.524*	-30.601	-0.006	-1.357	-0.939*	-40.241
LEADRIDG	1.164	8.220	-1.185	-20.266	-0.795*	-39.962	-0.168	-26.509	-0.931*	-33.877
MILFORD	2.174	22.490	-0.760	-18.344	-0.950*	-43.633	-0.148*	-29.245	-1.311	-26.566
Mean	2.114	14.840	-1.472	-21.758	-1.121	-39.082	0.259	38.988	-0.489	-3.736

* p<0.05

Table 15. Estimated changes in wet deposition of individual ions from 1983 to 2003.

Site	Hydrogen Ion		Sulfate		Nitrate		Chloride	
	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change
CROOKCRK	-0.340*	-34.92	-9.749*	-25.67	-4.113*	-17.78	0.143	5.49
GODDARD	-0.458*	-49.35	-15.337*	-40.48	-6.750*	-27.25	0.357	19.70
HILLSCRK	-0.243*	-39.17	-8.172*	-33.62	-4.212*	-24.96	-0.048	-3.48
LAURHILL	-0.500*	-46.45	-17.392*	-40.72	-7.389*	-28.36	0.005	0.20
LITTBUFF	-0.335*	-41.05	-8.422*	-26.58	-3.401	-15.59	0.175	7.55
SLOCUM	-0.266*	-36.16	-7.755*	-26.57	-3.092	-15.40	0.001	0.04
VALLFORG	-0.339*	-44.95	-13.523*	-41.20	-5.984*	-28.62	-1.543*	-32.99
LITTPINE	-0.272*	-33.97	-7.058*	-23.88	-4.671*	-21.28	0.346	20.81
PSUNADP	-0.244*	-33.87	-7.592*	-25.42	-2.591	-13.69	-0.392*	-23.41
KANE	-0.493*	-50.81	-17.906*	-44.76	-6.684*	-28.04	-0.930*	-45.75
LEADRIDG	-0.298*	-39.70	-10.755*	-34.07	-4.292*	-20.67	-0.719*	-37.84
MILFORD	-0.316*	-44.83	-11.036*	-39.77	-4.938*	-24.72	-0.691*	-27.12
Mean	-0.342	-41.269	-11.225	-33.562	-4.843	-22.197	-0.275	-9.733

* p<0.05

Table 15 (continued).

Site	Ammonium		Calcium		Magnesium		Potassium		Sodium	
	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change	Change (kg/ha)	Percent Change
CROOKCRK	0.336	10.56	-0.250	-14.30	-0.113*	-31.12	0.115	37.01	0.082	17.83
GODDARD	0.087	2.25	-0.569*	-28.51	-0.159*	-39.22	0.185*	70.22	0.066	12.41
HILLSCRK	0.362	16.83	-0.215	-22.43	-0.094*	-39.54	0.181*	98.96	0.113	37.31
LAURHILL	-0.245	-6.50	-0.356	-21.64	-0.157*	-42.82	0.102	24.97	0.075	13.21
LITTBUFF	0.571	15.47	-0.582*	-37.15	-0.128*	-36.10	0.298*	108.37	0.094	12.82
SLOCUM	1.136*	43.02	-0.062	-6.10	-0.106*	-35.75	0.157	49.30	-0.100	-13.50
VALLFORG	0.388	12.21	-0.760*	-47.57	-0.565*	-68.09	0.150	48.14	-1.022*	-44.79
LITTPINE	0.679	25.00	-0.067	-6.35	-0.017	-7.47	0.193*	93.98	0.279*	70.45
PSUNADP	0.686*	30.20	-0.174	-14.86	-0.086*	-38.26	-0.019	-10.65	-0.205*	-35.85
KANE	-0.307	-9.70	-0.243	-17.51	-0.112*	-41.70	-0.032	-15.76	-0.366*	-52.78
LEADRIDG	0.103	3.72	-0.296*	-23.56	-0.105*	-41.41	-0.089	-32.41	-0.257*	-39.19
MILFORD	0.346	17.37	-0.104	-11.92	-0.120*	-41.87	-0.044	-20.79	-0.303	-25.10
Mean	0.345	13.369	-0.306	-20.992	-0.147	-38.613	0.100	37.612	-0.129	-3.932

* p<0.05

Sulfate - Sulfate and nitrate were the most important acid anions in precipitation in 2003, both of which were positively correlated (r = 0.75 and r = 0.69, respectively) with H^+ concentrations (pH). Precipitation volume-weighted mean annual sulfate concentrations in 2003 ranged from 2.621 mg/L at the Presque Isle State Park site near Erie to 1.244 mg/L at the Milford NADP/NTN site in eastern Pennsylvania. This west (higher concentrations) to east (lower concentrations) pattern is also evident when comparing regional means (Table 16), although the magnitude of this spatial pattern is not as great as it was prior to implementation of the CAAA in 1995. Inter- and intra-regional variability, which has been fairly pronounced in past years, was not nearly as pronounced in 2003, indicating that although regional variability is evident, concentrations within regions tended to be more uniform in 2003 than in previous years.

The statewide mean annual sulfate concentration in 2003 was 2.006 mg/L (Table 16). This was the lowest mean annual sulfate concentration recorded in Pennsylvania since monitoring began in 1982. The 2003 statewide mean was 1.016 mg/L lower than the pre-CAAA 13-year (1983-1994) mean and 0.105 mg/L lower than the post-CAAA (1995-2002) mean annual concentration. Record low mean annual sulfate concentrations were also recorded at Laurel Hill and Crooked Creek Lake in western Pennsylvania, at Little Pine and Arendtsville in central Pennsylvania, and at all three of the long-term monitoring sites in eastern Pennsylvania. In addition, the central and eastern regional mean annual sulfate concentrations were the lowest reported to date.

Mean growing season sulfate concentrations in 2003 ranged from 1.401 mg/L at the Milford NADP/NTN site to 3.005 mg/L at Presque Isle (Table 16). Six sites (Laurel Hill, M. K. Goddard, Little Buffalo, Little Pine, Milford and Slocum) reported record low growing season means in 2003. The central regional mean was also the lowest reported to date and 1.016 mg/L below the pre-CAAA mean of 2.979 mg/L. Sulfate concentrations during the growing season tend to be higher in western Pennsylvania than in central or eastern portions of the state. However, inter- and intra-regional variability is evident.

Sulfate concentrations were generally lower during the dormant season than during the growing season (Table 16). Nevertheless, the west (higher concentrations) to east (lower concentrations) spatial pattern was similar to the annual and growing season patterns. Dormant season mean sulfate concentrations in 2003 ranged from 0.971 mg/L in Pike County (Milford NADP/NTN) to 1.998 mg/L at the Presque Isle State Park site near Erie. This was the first time that the lowest mean dormant season concentration was below 1.0 mg/L. Record low dormant season concentrations were also reported at M.K. Goddard State Park and Allegheny Portage NHS in western Pennsylvania; at Hills Creek, Penn State NADP/NTN, Young Women's Creek NADP/NTN, and Arendtsville NADP/NTN in central Pennsylvania; and at all three long-term monitoring sites in eastern Pennsylvania. In addition, the central and eastern region means were the lowest reported to date. The statewide mean dormant season concentration was also the lowest observed to date, 0.623 mg/L lower than the pre-CAAA mean of 2.039 mg/L.

Precipitation contributed from 18.58 kg/ha to 34.76 kg/ha of sulfate to surfaces of the Commonwealth during 2003 (Table 16). The highest wet sulfate deposition occurred in Elk County at the Kane NADP/NTN site; the lowest annual deposition fell in Pike County at the

Table 16. Annual and seasonal sulfate ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	2.512	2.822	1.878	34.51	26.24	8.27	51.71	34.71	17.00	2.24	1.90	0.34
CROOKCRK	2.437	2.948	1.540	31.65	24.35	7.30	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	2.099	2.484	1.519	32.47	22.95	9.52	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	2.048	2.466	1.415	31.80	22.96	8.84	60.87	36.65	24.22	0.38	0.01	0.37
PRESQISL	2.621	3.005	1.998	28.08	20.01	8.08	40.32	24.93	15.39	1.80	1.28	0.52
KANE	2.550	2.929	1.878	34.76	24.13	10.63	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	2.378	2.776	1.705	32.21	23.44	8.77	51.75	32.44	19.31	2.30	1.03	1.27
Central Pennsylvania												
YOWOCRK	1.895	2.338	1.073	24.01	18.97	5.05	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	1.821	1.978	1.587	21.24	13.82	7.41	45.86	27.52	18.34	0.05	0.00	0.05
HILLSCRK	1.931	2.426	1.051	22.49	18.05	4.43	45.69	29.24	16.45	0.21	0.05	0.16
LITTBUFF	2.172	2.447	1.672	28.53	19.10	9.43	47.58	30.73	16.85	5.36	0.01	5.35
PSUNADP	1.907	2.295	1.268	28.39	21.27	7.12	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	1.998	2.359	1.405	26.97	19.78	7.18	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	2.019	2.436	1.422	24.58	17.34	7.24	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	1.963	2.326	1.354	25.17	18.33	6.84	49.22	30.72	18.51	1.50	0.29	1.21
Eastern Pennsylvania												
SLOCUM	1.589	1.820	1.150	22.34	16.38	5.96	53.25	34.88	18.37	2.59	0.55	2.04
VALLFORG	1.385	1.584	1.064	20.49	14.11	6.38	56.14	34.70	21.44	2.54	0.37	2.17
MILFORD	1.244	1.401	0.971	18.58	12.55	6.03	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	1.880	2.394	1.187	26.01	18.95	7.07	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	1.524	1.800	1.093	21.85	15.49	6.36	54.32	33.71	20.61	2.89	0.52	2.37
State Mean	2.006	2.361	1.416	26.88	19.47	7.41	51.31	32.03	19.29	2.11	0.60	1.50

Milford NADP/NTN site. The majority of the annual sulfate deposition fell during the growing season. Growing season sulfate deposition ranged from 12.55 kg/ha at Milford to 26.24 kg/ha at M.K. Goddard State Park in Mercer County. Dormant season sulfate deposition ranged from 4.43 kg/ha at Hills Creek State Park in Tioga County to 10.63 kg/ha at the Kane NADP/NTN site. Regardless of the summary period, mean annual and seasonal sulfate depositions were greatest in western Pennsylvania and decreased to their lowest levels in eastern Pennsylvania with the greatest decrease occurring between western and central Pennsylvania. However, generalizations regarding regional deposition patterns across the state are not always consistent for annual and seasonal depositions at individual sites. It is not unusual for some eastern sites, e.g., Millersville NADP/NTN, to receive more deposition than sites located in central Pennsylvania (Table 16), although the number of sites where this occurs has decreased since implementation of the CAAA in 1995.

Annual and growing season wet sulfate deposition was generally higher at many sites in 2003 when compared to the past eight years. In fact, most of the sites with relatively short records (Arendtsville, Allegheny Portage, Presque Isle, and Young Women's Creek) reported their highest annual and growing season sulfate depositions to date. The western, central, and statewide annual and growing season means were the second highest reported since 1995. Above average precipitation (Table 13) is the reason for the relatively high annual and growing season depositions in 2003. Annual and growing season precipitation volumes were the highest since 1996, and one of the highest on record over the past 25 years. Above average precipitation not only contributes to lower concentrations due to dilution, it can increase deposition levels even where concentrations remain low or continue to decline due to reductions in emissions. In contrast, 2003 dormant season precipitation was nearly identical to the long-term average throughout the Commonwealth (Table 13). As a result, wet dormant season sulfate deposition was fairly low across the state with the Laurel Hill and Crooked Creek Lake sites reporting their lowest deposition levels to date. Deposition levels at the other sites were generally lower than in 2002 as well, due to declining concentrations, but well within the levels recorded over the past eight years.

Like H^+, sulfate concentrations from 1983 through 2003 exhibit a decreasing pattern throughout the state with statistically significant trends ($p<0.05$) at all sites (Table 14). The overall decline in sulfate concentrations in Pennsylvania since 1983 is estimated to be 21.18 μeq/L (33.7%) based on linear trend statistics of log-transformed concentrations. The largest decrease (24.05 μeq/L, 43.8%) was measured at the Milford NADP/NTN site in Pike County (Table 14). The smallest decrease (14.21 μeq/L, 25.2%) was observed at Slocum State Park in Luzerne County. Wet sulfate deposition has also decreased across the state since 1983 (Table 15). The overall decline in sulfate deposition in Pennsylvania is estimated to be 11.23 kg/ha (33.6%). The largest decrease (17.91 kg/ha, 44.8%) was measured at the Kane NADP/NTN site; the smallest decrease (7.06 kg/ha, 25.4%) was observed at the Little Pine site. All regions of the state have experienced statistically significant reductions in sulfate concentrations and depositions over the past 22 years, with the majority of the reductions occurring since 1995.

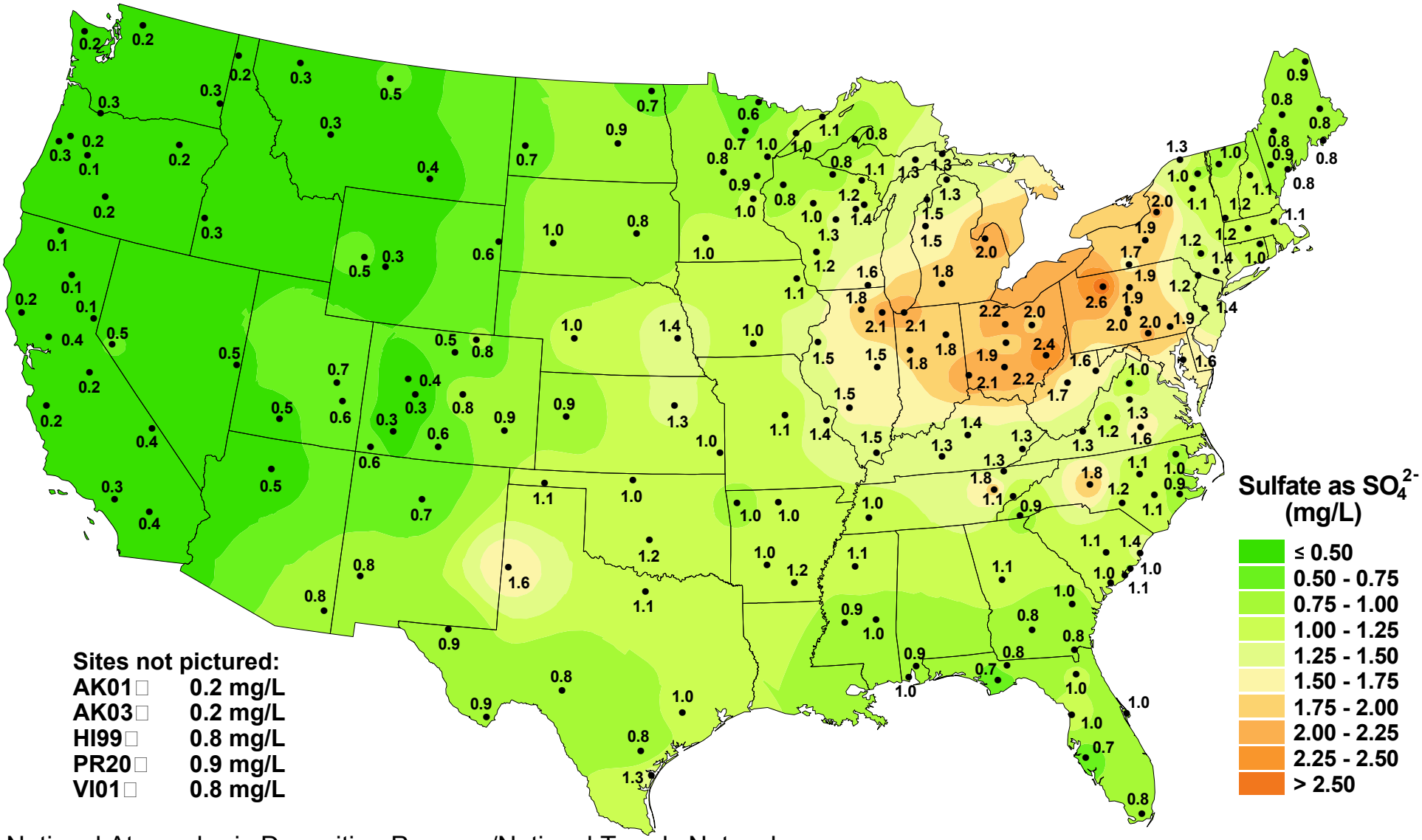
Despite the substantial decrease in sulfate concentrations in Pennsylvania over the past 22 years and the nearly 34% reduction in wet sulfate deposition, sulfate concentrations and wet deposition in the northwestern corner of the Commonwealth continue to be the highest of any region in the United States. A comparison of mean annual sulfate concentrations (Figure 3) and wet depositions (Figure 4) in Pennsylvania with other sites participating in the NADP/NTN in 2003 (NADP, 2004) supports this conclusion. The highest mean annual concentration (2.6 mg/L) at any of the NADP/NTN sites in 2003 was measured at the Kane site in the northwestern portion of Pennsylvania. Mean annual sulfate concentrations at Pennsylvania Network sites (Table 16) located in this region (Presque Isle State Park near Erie (2.6 mg/L), M.K. Goddard State Park in Mercer County (2.5 mg/L), and the Crooked Creek Lake site in Armstrong County (2.4 mg/L)) indicate the extent of the high sulfate concentrations across this region. Only one NADP/NTN site, located in southeastern Ohio, recorded sulfate concentrations in 2003 that were similar to those found in northwestern Pennsylvania (Figure 3).

Annual sulfate deposition at the Kane NADP/NTN site (35 kg/ha) in 2003 was the second highest amount recorder in the United State in 2003; the highest sulfate deposition (37 kg/ha) was measured at a site in southwestern Ohio (Figure 4). Sulfate depositions in excess of 30 kg/ha were also measured at other western Pennsylvania Network sites (Table 16). In fact, sulfate deposition in western Pennsylvania averaged more than 32 kg/ha in 2003. Some of the increase in wet sulfate deposition in 2003 can be attributed to above average precipitation at these sites (Table 13). However, since precipitation is an unmanageable parameter of climate, the only way to provide additional protection to acid sensitive aquatic and terrestrial ecosystems and cultural and material resources in the region, as well as other areas of the state, is to reduce further sulfur dioxide emissions in western Pennsylvania and in upwind states.

Nitrate - The statewide mean annual nitrate concentration in Pennsylvania in 2003 was 1.399 mg/L (Table 17). The highest mean annual nitrate concentration (2.208 mg/L) was recorded at Presque Isle State Park near Erie; the lowest mean (1.00 mg/L) was measured at the Valley Forge site in Montgomery County. The Presque Isle site also recorded the highest growing (2.022 mg/L) and dormant (2.510 mg/L) season mean nitrate concentrations in 2003. The lowest growing (1.029 mg/L) and dormant (0.868 mg/L) season means were measured at the Valley Forge and the Millersville NADP/NTN sites, respectively. Nitrate concentrations were generally higher at western Pennsylvania sites in 2003 and decreased across the state to their lowest levels in eastern Pennsylvania (Table 17). This spatial pattern is similar to previous years of observations.

Mean annual nitrate concentrations in 2003 were the lowest reported to date at 10 of the16 sites with at least four years of data. At four of the six remaining sites, the mean annual concentrations were the second lowest values to date. The largest reductions occurred in the central and eastern portions of the state. In these regions the only sites not to report record low nitrate concentrations were Little Buffalo and Little Pine. The mean annual nitrate concentration in 2003 was 0.156 mg/L lower than in 2002, 0.343 mg/L lower than the post-CAAA mean (1995-2002), and 0.554 mg/L lower than the mean annual concentration from 1983 through 1994. Although all areas of the state have experienced lower nitrate concentrations since 1995, the

Sulfate ion concentration, 2003

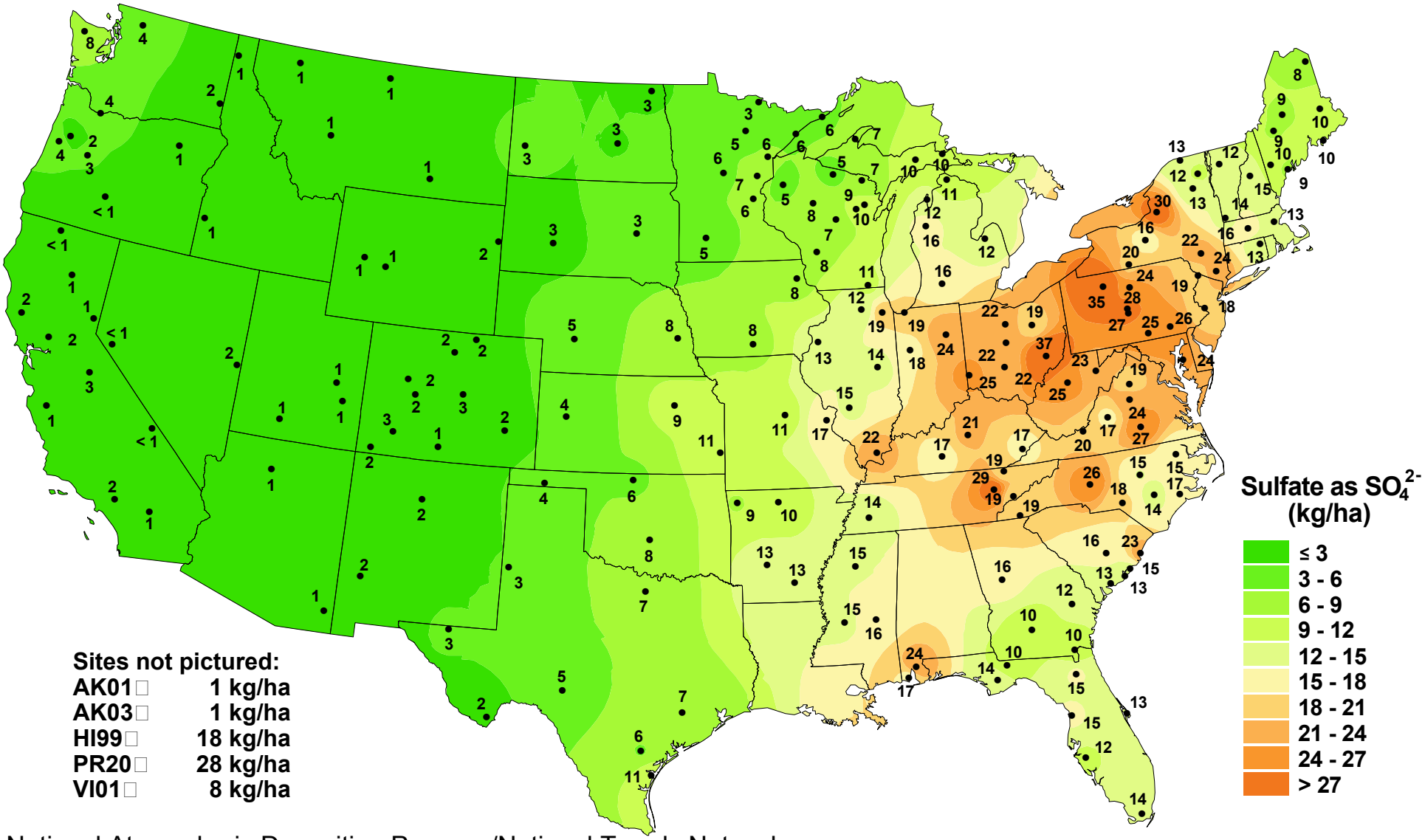


Sites not pictured:

AK01	0.2 mg/L
AK03	0.2 mg/L
HI99	0.8 mg/L
PR20	0.9 mg/L
VI01	0.8 mg/L

National Atmospheric Deposition Program/National Trends Network
http://nadp.sws.uiuc.edu

Sulfate ion wet deposition, 2003



Sites not pictured:

AK01	1 kg/ha
AK03	1 kg/ha
HI99	18 kg/ha
PR20	28 kg/ha
VI01	8 kg/ha

National Atmospheric Deposition Program/National Trends Network
http://nadp.sws.uiuc.edu

Table 17. Annual and seasonal nitrate ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	1.627	1.574	1.736	22.28	14.64	7.65	51.71	34.71	17.00	2.24	1.90	0.34
CROOKCRK	1.465	1.523	1.362	19.04	12.58	6.46	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	1.498	1.376	1.683	23.26	12.71	10.55	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	1.434	1.467	1.382	22.30	13.66	8.63	60.87	36.65	24.22	0.38	0.01	0.37
PRESQISL	2.208	2.022	2.510	23.60	13.46	10.14	40.32	24.93	15.39	1.80	1.28	0.52
KANE	1.542	1.419	1.761	21.66	11.69	9.97	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	1.629	1.564	1.739	22.02	13.12	8.90	51.75	32.44	19.31	2.30	1.03	1.27
Central Pennsylvania												
YOWOCRK	1.292	1.286	1.305	16.56	10.43	6.14	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	1.511	1.385	1.700	17.62	9.68	7.94	45.86	27.52	18.34	0.05	0.00	0.05
HILLSCRK	1.256	1.278	1.217	14.64	9.51	5.13	45.69	29.24	16.45	0.21	0.05	0.16
LITTBUFF	1.661	1.703	1.585	22.23	13.30	8.94	47.58	30.73	16.85	5.36	0.01	5.35
PSUNADP	1.228	1.275	1.151	18.29	11.82	6.47	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	1.346	1.342	1.353	18.17	11.25	6.92	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	1.317	1.442	1.137	16.06	10.26	5.79	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	1.373	1.387	1.350	17.65	10.89	6.76	49.22	30.72	18.51	1.50	0.29	1.21
Eastern Pennsylvania												
SLOCUM	1.200	1.276	1.055	16.95	11.48	5.47	53.25	34.88	18.37	2.59	0.55	2.04
VALLFORG	1.000	1.029	0.954	14.89	9.17	5.72	56.14	34.70	21.44	2.54	0.37	2.17
MILFORD	1.047	1.077	0.996	15.83	9.64	6.19	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	1.149	1.358	0.868	15.91	10.74	5.17	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	1.099	1.185	0.968	15.89	10.26	5.64	54.32	33.71	20.61	2.89	0.52	2.37
State Mean	1.399	1.402	1.397	18.78	11.53	7.25	51.31	32.03	19.29	2.11	0.60	1.50

largest average reduction was recorded in eastern Pennsylvania (0.452 mg/L); the smallest decrease (0.162 mg/L) was observed in western Pennsylvania. Reductions in nitrate concentrations were also much greater during the growing season than during the dormant season months.

Twelve of 16 Network sites recorded their lowest growing season nitrate concentrations in 2003 (Table 17). The statewide mean growing season nitrate concentration was 1.402 mg/L, which was also the lowest concentration since monitoring began in 1982, 0.732 mg/L lower than the 13-year pre-CAAA mean and 0.408 mg/L lower than the previous 8-year post-CAAA mean. The largest reductions in nitrate occurred in the central (0.425 mg/L) and eastern (0.421 mg/L) regions of the state, although all sites have recorded much lower nitrate concentrations since 1995. All regions of the state also recorded their lowest mean growing season concentrations to date. The largest average decrease in growing season nitrate concentrations (0.565 mg/L) during the 9-year post-CAAA period was measured at the Milford NADP/NTN site in Pike County.

Dormant season concentrations have also been lower since 1995, although the reductions have not been as large as those observed during the growing season (Table 17). The average dormant season nitrate concentration in Pennsylvania in 2003 was 1.397 mg/L, the lowest value reported to date and 0.403 mg/L lower than the pre-CAAA 13-year mean. The eastern region mean (0.968 mg/L) was also the lowest reported to date and the first time a dormant season region mean was below 1.00 mg/L. Although each region of the state has experienced lower dormant season nitrate concentrations since 1995, the largest reductions occurred in eastern Pennsylvania; the smallest decreases have been observed in the western portion of the state. Sites recording their lowest dormant season mean concentrations in 2003 were Crooked Creek Lake and Presque Isle State Park in western Pennsylvania; Leading Ridge, Penn State, Young Women's Creek and Arendtsville in central Pennsylvania; and all three long-term monitoring sites in the eastern portion of the state.

It should be noted that nitrate concentrations exhibit less seasonal variability than is generally evident for sulfate concentrations. Historically, growing season nitrate concentrations tended to be higher than dormant season concentrations. However, the 2003 dormant season means where somewhat higher than the growing seasons means at some sites, especially those located in western Pennsylvania. The reason for this is not entirely clear; however, emissions trading programs designed to reduce summer ozone levels by encouraging emitters to reduce NO_X emissions during the growing season months and allowing them to increase emissions during the dormant season months may be a contributing factor. This factor may also explain the much larger reductions in nitrate concentrations during the growing season.

Clearly, nitrate concentrations have decreased throughout the Commonwealth since 1995, particularly during the last couple of years. The decrease appears to be consistent with reported reductions in NO_X emissions in Pennsylvania and in states to the south and west. Reductions in NO_X emissions will be discussed in detail in a separate report entitled "Effectiveness of the Clean Air Act Amendments of 1990, Title IV" that will be submitted to the Pennsylvania Department of Environmental Protection in October 2004.

Annual wet nitrate deposition in 2003 ranged from 14.64 kg/ha in Tioga County (Hills Creek State Park) to 23.60 kg/ha at Presque Isle State Park near Erie (Table 17). The highest growing and dormant season depositions were recorded at M.K. Goddard (14.64 kg/ha) and Laurel Hill (10.55 kg/ha) State Parks, respectively. The lowest growing (9.17 kg/ha) and dormant (5.13 kg/ha) season depositions were reported at Valley Forge and Hills Creek, respectively. For all summary periods, nitrate deposition was lowest in eastern Pennsylvania and highest in the western third of the state. However, regional differences, particularly during the growing season, were quite small despite considerable intra-regional variability.

On an annual basis, wet nitrate deposition in 2003 was well within the range of values reported the past 22 years. Despite the record low nitrate concentrations in 2003, none of the sites recorded record low wet deposition. In fact, two sites, Allegheny Portage and Young Women's Creek reported their highest nitrate deposition to date. Both of these sites have been in operation a relatively short period of time and were strongly influenced by above average precipitation at both sites in 2003. Above average precipitation during the growing season also accounted for the record high nitrate deposition at Allegheny Portage, Presque Isle, and Young Women's Creek and explains why none of the other sites recorded record low depositions despite record low growing season nitrate concentrations. In contrast, record low dormant season nitrate depositions were recorded at Crooked Creek Lake, Valley Forge, and Milford in 2003. All three sites reported record low dormant season concentrations as well. Although other sites, particularly in central Pennsylvania, also reported record low concentrations during the dormant season, dormant season precipitation in this region as well as across much of Pennsylvania in 2003 was near or slightly below the long-term average (Table 13). As a result, the statewide mean dormant season deposition in 2003 (7.25 kg/ha) was the lowest value recorded to date.

Nitrate concentrations have decreased across the state since 1983 (Table 14). The average decrease at all sites is 7.30 μeq/L (22.2%). The decreasing patterns at all but the Slocum State Park site in Luzerne County are statistically significant ($p<0.05$). The largest decrease at any site is 10.78 μeq/L (29.3%); the smallest statistically significant decrease is 4.34 μeq/L (14.3%) at the Kane NADP/NTN site in Elk County.

Wet nitrate deposition has also decreased at all sites since 1983 (Table 15). Statistically significant ($p<0.05$) decreasing deposition trends are evident at Crooked Creek Lake, M.K. Goddard, Hills Creek, Laurel Hill, Valley Forge, Little Pine, and the Kane, Milford, and Leading Ridge NADP/NTN sites. Nitrate deposition at all sites has decreased an average 4.84 kg/ha, a decrease of nearly 22.2% (Table 15). The average decrease in nitrate deposition at those sites with statistically significant trends is estimated to be 5.45 kg/ha, a decrease of approximately 25%. The influence that precipitation volume exerts on wet deposition trends is very evident in the nitrate concentration/wet deposition trends at the Penn State NADP/NTN site. Despite a significant decreasing nitrate concentration trend of 8.86 μeq/L (Table 14), wet deposition at this site has decreased only 2.59 kg/ha (Table 15), a non-significant ($p<0.05$) decrease of 13.7% over the past 22 years.

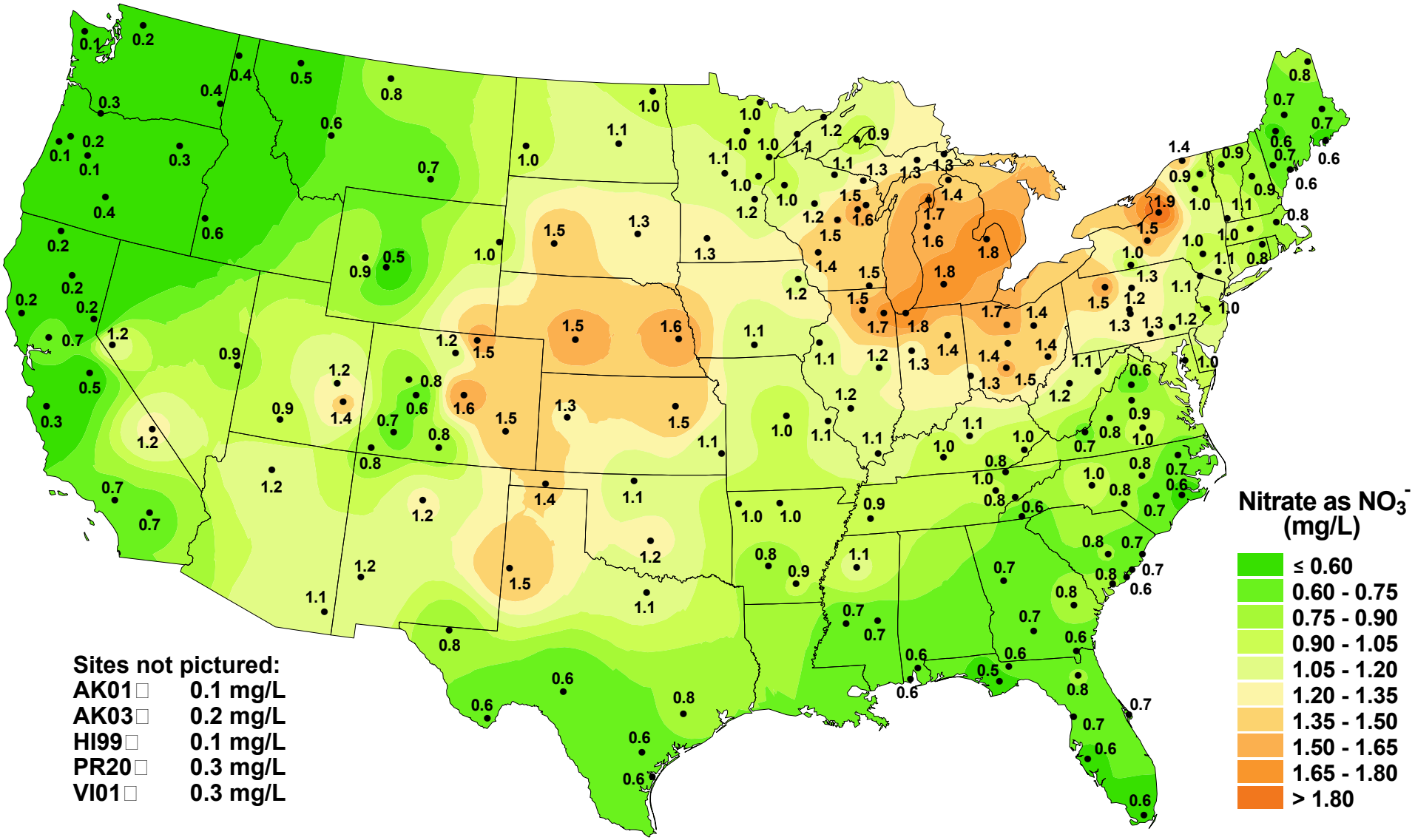
Compared to mean annual nitrate concentrations (Figure 5) at NADP/NTN sites throughout the United States, nitrate concentrations in Pennsylvania in 2003 were similar to those in neighboring states. The mean annual nitrate concentration at the Kane NADP/NTN site in northwestern Pennsylvania was 1.5 mg/L, which was lower than many sites located around the Great Lakes and in the Ohio River Valley, but considerably above sites located in portions of the Mid-Atlantic and Northeast regions of the United States. However, nitrate concentrations at the Kane site were lower than those measured at other Pennsylvania Network sites in western Pennsylvania (Table 17). The highest concentrations occur in the extreme portion of northwest Pennsylvania around Mercer and Erie counties. The Presque Isle site recorded a mean annual concentration of 2.2 mg/L, which makes it the highest mean annual nitrate concentration in the United States in 2003.

Because of the influence that precipitation has on the amount of deposition a site receives, wet nitrate deposition levels in Pennsylvania (Table 17) were generally higher than any other region of the United States (Figure 6). The highest wet nitrate deposition in the United States in 2003 was measured at an up-state New Your site (28 kg/ha); the next highest deposition (21 kg/ha) was recorded at the Kane site in Pennsylvania. However, wet deposition at some Pennsylvania Network sites located in this region of Pennsylvania (Table 17) was higher. The highest deposition was measured at the Presque Isle site near Erie (24 kg/ha). Since nitrate has a two-fold impact on the environment, acidification and eutrophication, further reductions in nitrogen oxides emissions may be necessary if additional protection to acid sensitive aquatic and terrestrial ecosystems and cultural and material resources in Pennsylvania, particularly northwestern Pennsylvania, is warranted.

Ammonium - Mean annual and seasonal ammonium concentrations and wet depositions for 2003 are given in Table 18. Ammonium concentrations and wet depositions are of particular interest because of their potential contribution to nutrient enrichment and/or acidification of surface waters. Ammonium concentrations in precipitation are a by-product of agricultural activity, so their concentrations are generally higher near and downwind of large-scale agricultural operations, such as hog and poultry farms and animal feedlots. Another major source of ammonium is from automobile exhaust, so ammonium concentrations are also likely to be higher near urban areas. Biological decomposition of plant materials in shallow surface waters, such as Lake Erie, can also contribute to local spatial patterns.

Mean annual ammonium concentrations in precipitation in 2003 ranged from 0.186 mg/L at the Milford NADP/NTN site in Pike County to 0.483 mg/L at the Millersville NADP/NTN site in Lancaster County (Table 18). The statewide mean annual concentration was 0.311 mg/L. Ammonium concentrations were highest during the growing season (statewide mean was 0.351 mg/L) than during the dormant season (statewide mean was 0.248 mg/L) at all sites except the Presque Isle State Park site near Erie. The highest (0.447 mg/L) and lowest (0.133 mg/L) mean dormant season ammonium concentrations were measured at Presque Isle State Park and at the Milford and Young Women's Creek NADP/NTN sites, respectively. Growing season ammonium concentrations were highest at Millersville (0.577 mg/L) in southeast Pennsylvania and lowest at Milford (0.217 mg/L). On a regional basis, ammonium concentrations were highest in western

Nitrate ion concentration, 2003



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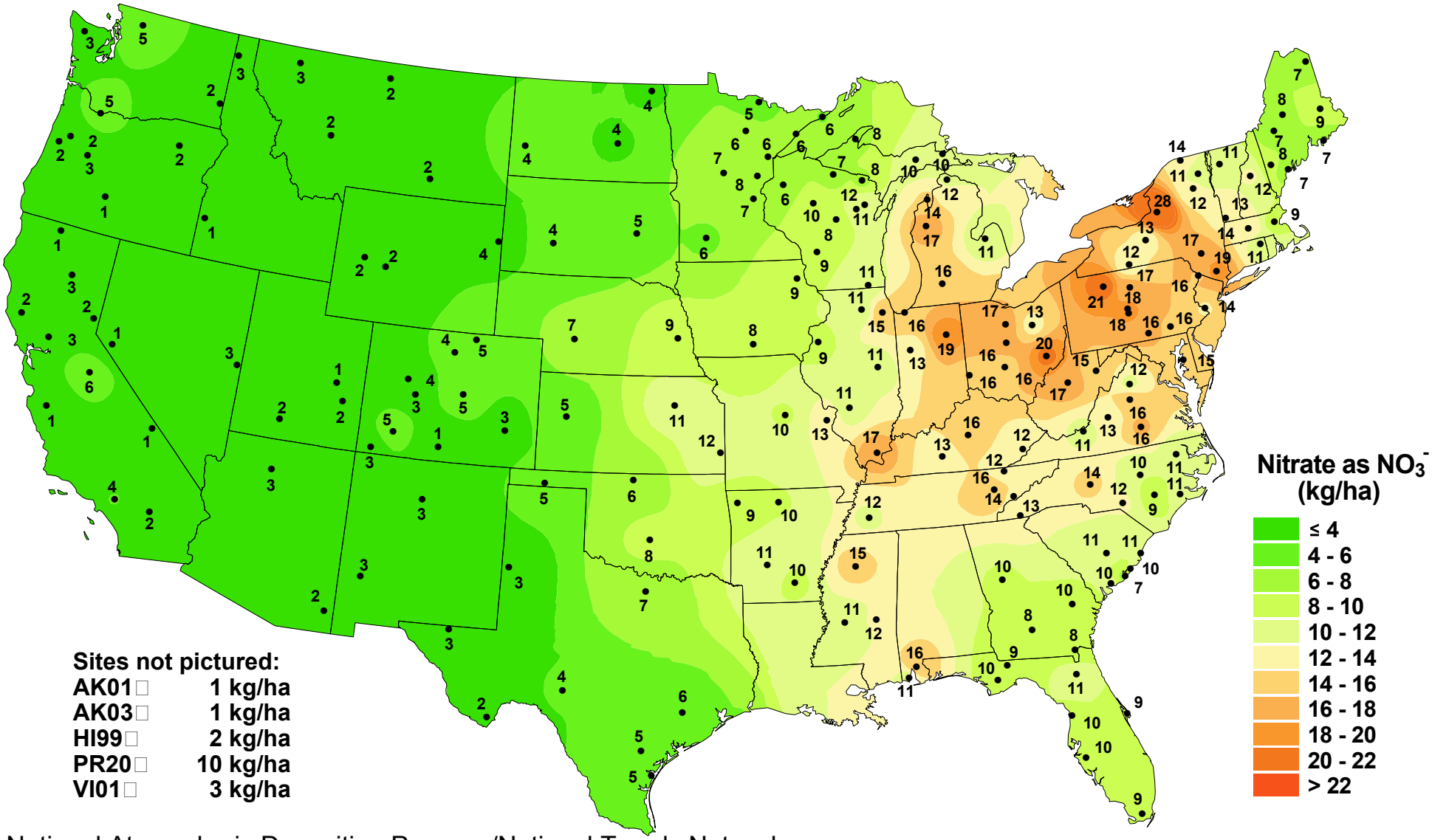
Nitrate ion wet deposition, 2003



Sites not pictured:

AK01	1 kg/ha
AK03	1 kg/ha
HI99	2 kg/ha
PR20	10 kg/ha
VI01	3 kg/ha

National Atmospheric Deposition Program/National Trends Network
http://nadp.sws.uiuc.edu

Table 18. Annual and seasonal ammonium ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	0.365	0.370	0.353	5.00	3.44	1.56	51.71	34.71	17.00	2.24	1.90	0.34
CROOKCRK	0.261	0.315	0.167	3.39	2.60	0.79	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	0.331	0.370	0.274	5.13	3.41	1.72	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	0.293	0.333	0.232	4.55	3.10	1.45	60.87	36.65	24.22	0.38	0.01	0.37
PRESQISL	0.441	0.438	0.447	4.72	2.91	1.81	40.32	24.93	15.39	1.80	1.28	0.52
KANE	0.297	0.303	0.288	4.12	2.49	1.63	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	0.331	0.355	0.293	4.49	2.99	1.49	51.75	32.44	19.31	2.30	1.03	1.27
Central Pennsylvania												
YOWOCRK	0.230	0.282	0.133	2.92	2.29	0.63	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	0.305	0.331	0.266	3.55	2.31	1.24	45.86	27.52	18.34	0.05	0.00	0.05
HILLSCRK	0.273	0.327	0.177	3.18	2.43	0.75	45.69	29.24	16.45	0.21	0.05	0.16
LITTBUFF	0.430	0.469	0.361	5.69	3.66	2.03	47.58	30.73	16.85	5.36	0.01	5.35
PSUNADP	0.235	0.268	0.180	3.50	2.49	1.01	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	0.275	0.320	0.201	3.71	2.69	1.03	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	0.364	0.455	0.235	4.43	3.24	1.20	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	0.302	0.350	0.222	3.86	2.73	1.13	49.22	30.72	18.51	1.50	0.29	1.21
Eastern Pennsylvania												
SLOCUM	0.261	0.292	0.197	3.65	2.63	1.02	52.05	34.88	17.17	3.79	0.55	3.24
VALLFORG	0.262	0.294	0.208	3.87	2.62	1.25	56.14	34.70	21.44	2.54	0.37	2.17
MILFORD	0.186	0.217	0.133	2.77	1.94	0.83	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	0.483	0.577	0.356	6.69	4.57	2.12	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	0.298	0.345	0.224	4.24	2.94	1.30	54.02	33.71	20.31	3.19	0.52	2.67
State Mean	0.311	0.351	0.248	4.17	2.87	1.30	51.24	32.03	19.21	2.18	0.60	1.57

Pennsylvania and decreased to their lowest levels in the eastern portion of the state. This regional pattern was evident during the growing and dormant seasons (Table 18), although the differences between the central and eastern regions were very small. As indicated earlier, the highest ammonium concentrations are generally associated with agricultural activities and indeed this was the case at the Millersville site that is located on a farm in a heavily agricultural portion of Lancaster County. However, high concentrations were also evident at the Presque Isle site near Lake Erie. The source of the ammonium at his site is likely the result of biological decomposition of aquatic plants in the lake and the release of ammonia gas to the atmosphere. However, emissions from local sources may also be a contributing factor, especially with respect to the high ammonium concentrations at the site during the dormant season.

Spatial and temporal patterns in wet ammonium deposition in 2003 deviated from the ammonium concentration pattern. These deviations were largely attributable to seasonal and spatial patterns in precipitation during the year. On a statewide basis, annual wet ammonium deposition averaged 4.17 kg/ha in 2003 (Table 18). About 69% of the mean annual ammonium deposition fell during the growing season. The highest annual (6.69 kg/ha), growing (4.57 kg/ha), and dormant (2.12 kg/ha) season ammonium depositions were measured at the Millersville NADP/NTN site; the lowest annual (2.77 kg/ha) and growing season (1.94 kg/ha) depositions were reported at the Milford NADP/NTN site in Pike County (Table 18). Dormant season depositions varied from 0.63 kg/ha at Young Women's Creek to 2.12 kg/ha at Millersville. The statewide mean growing season deposition was 2.87 kg/ha; the dormant season mean was 1.30 kg/ha. On a regional basis, the greatest annual ammonium deposition fell in western Pennsylvania; the lowest deposition in general fell within the centre region. The same pattern was also true during the growing and dormant seasons, although differences in deposition (Table 18) between eastern and central Pennsylvania were somewhat smaller.

Mean annual ammonium concentrations and wet depositions in 2003 were generally within the range of values reported since monitoring began in 1982. Record low annual concentration means were reported at Crooked Creek Lake in Armstrong County and at the Young Women's Creek site in Clinton County. In contrast, three sites (Allegheny Portage, Young Women's Creek and Arendtsville) reported their highest ammonium deposition to date. All three sites have relatively short (4 to 7 years) records and as such were strongly influenced by the above average precipitation that fell in 2003 relative to previous years of operation at these sites, this was especially evident at the Young Women's Creek site.

The amount and distribution of precipitation during the growing and dormant seasons also had considerable influence on seasonal wet ammonium deposition throughout the state. Despite the fact that growing season ammonium concentrations at all sites were within the range of values reported since monitoring began in 1982, five sites (Laurel Hill, Allegheny Portage, Leading Ridge, Young Women's Creek, and Arendtsville) and the central and eastern regional mean depositions were the highest ever, as was the 2003 statewide mean ammonium deposition of 2.87 kg/ha. Above average precipitation during the growing season (Table 13) was the primary reason for the high ammonium deposition at these sites. Dormant season wet deposition and concentrations means in 2003 were generally within the range of values reported to date.

However, record low dormant season concentrations at Crooked Creek Lake, Young Women's Creek and Arendtsville combined with near or below average precipitation resulted in these sites reporting their lowest dormant season depositions to date. No regional or statewide seasonal mean ammonium concentrations or deposition records were reported in 2003.

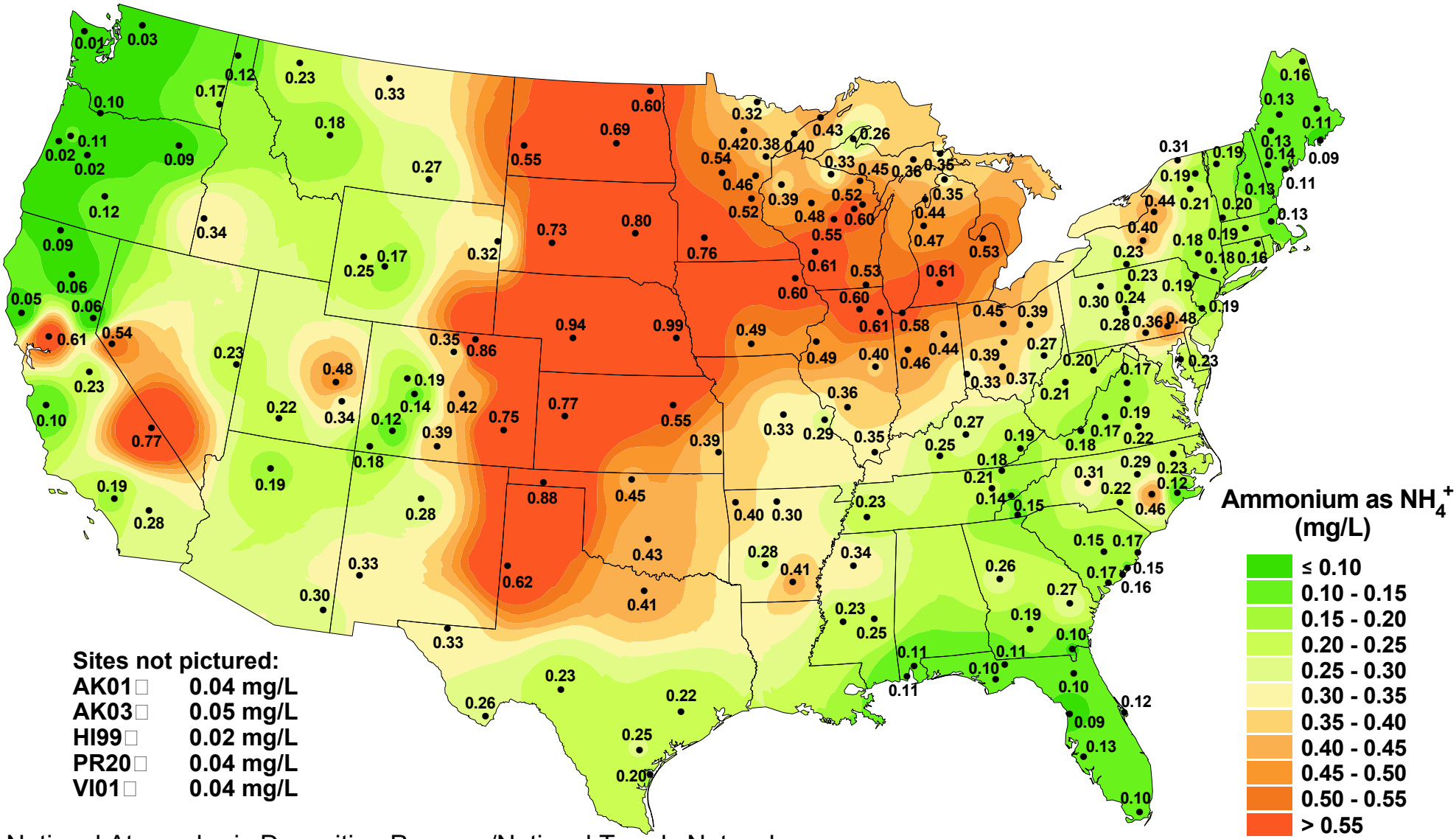
Ammonium concentrations have increased across the state since 1983; however, the increasing patterns are statistically significant ($p<0.05$) at only Slocum State Park in Luzerne County (Table 14). On a statewide basis, ammonium concentrations have increased an average 2.11 μeq/L since 1983, an increase of 14.8%. The largest increase is evident at the Slocum State Park site (6.20 μeq/L, 45.6%). Wet ammonium deposition trends (Table 15) are also positive at all but two sites (Laurel Hill State Park and the Kane NADP/NTN site). However, none of the decreasing trends and only two of the sites (Slocum and Penn State NADP/NTN) with increasing trends are statistically significant ($p<0.05$). The average increase across the network is 0.32 kg/ha, an increase of approximately 13.3% since 1983 (Table 15). The influence that precipitation has on deposition trends is very evident with respect to ammonium concentration and deposition trends. At the Laurel Hill and Kane NADP/NTN sites, ammonium concentrations have increased where as wet deposition trends at these sites indicate a decreasing pattern, all of which are not statistically significant ($p<0.05$). Despite some large percentage changes, few sites exhibit statistical significant ammonium concentration and deposition trends because of the magnitude of year-to-year fluctuations in ammonium concentrations and annual and seasonal depositions. The greater the variability of individual parameters the more difficult it becomes to establish statistical significance.

Ammonium concentrations in Pennsylvania are fairly comparable to measurements at NADP/NTN sites located in neighboring states (Figure 6). The highest concentration in southeastern Pennsylvania (Millersville) is similar to many NADP/NTN sites located in agricultural regions of the mid-west and around the Great Lakes. The relatively high concentration at the Presque Isle site (Table 18) is almost identical to two up-state New York NADP/NTN sites, both of which are located to the east of Lake Ontario. The Presque Isle site is similarly located with respect to Lake Erie.

Calcium and Magnesium - Calcium (Table 19) and magnesium (Table 20) ions were found in precipitation in 2003 at very low concentrations averaging annually 0.114 mg/L and 0.024 mg/L, respectively. Based on annual regional means, calcium concentrations were higher in the western portion of the state (0.163 mg/L) and decreased to the east (0.075 mg/L). In contrast, magnesium concentrations tended to be lowest in the centre region (0.018 mg/L) and increased to the west (0.032 mg/L) and east (0.021 mg/L) with the highest concentrations generally occurring in the western third of the state. Seasonal concentrations followed similar spatial patterns for both ions. Both calcium and magnesium concentrations tend to be higher during the dormant season than during the growing season, although the differences are quite small.

Annual calcium concentrations in Pennsylvania ranged from 0.264 mg/L at Presque Isle State Park to 0.056 mg/L at the Milford NADP/NTN site in Pike County (Table 19). Growing season calcium concentrations were also highest (0.243 mg/L) at the Erie site and lowest (0.051 mg/L)

Ammonium ion concentration, 2003



Sites not pictured:

AK01	0.04 mg/L
AK03	0.05 mg/L
HI99	0.02 mg/L
PR20	0.04 mg/L
VI01	0.04 mg/L

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Table 19. Annual and seasonal calcium ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	0.162	0.143	0.201	2.21	1.33	0.89	51.50	34.71	16.79	2.45	1.90	0.55
CROOKCRK	0.152	0.160	0.137	1.97	1.32	0.65	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	0.140	0.135	0.146	2.17	1.25	0.92	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	0.149	0.152	0.144	2.31	1.41	0.90	59.68	36.65	23.03	1.57	0.01	1.56
PRESQISL	0.264	0.243	0.299	2.82	1.62	1.21	40.32	24.93	15.39	1.80	1.28	0.52
KANE	0.113	0.098	0.140	1.59	0.80	0.79	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	0.163	0.155	0.178	2.18	1.29	0.89	51.51	32.44	19.07	2.53	1.03	1.50
Central Pennsylvania												
YOWOCRK	0.076	0.085	0.058	0.96	0.69	0.27	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	0.102	0.093	0.116	1.19	0.65	0.54	45.84	27.50	18.34	0.07	0.02	0.05
HILLSCRK	0.085	0.086	0.082	0.99	0.64	0.35	45.62	29.24	16.38	0.28	0.05	0.23
LITTBUFF	0.131	0.134	0.126	1.75	1.04	0.71	47.51	30.73	16.78	5.43	0.01	5.42
PSUNADP	0.084	0.088	0.078	1.25	0.82	0.44	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	0.085	0.085	0.086	1.15	0.72	0.44	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	0.097	0.101	0.091	1.19	0.72	0.47	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	0.094	0.096	0.091	1.21	0.75	0.46	49.20	30.71	18.49	1.52	0.29	1.23
Eastern Pennsylvania												
SLOCUM	0.070	0.062	0.084	0.99	0.56	0.43	50.16	31.79	18.37	5.68	3.64	2.04
VALLFORG	0.080	0.089	0.066	1.19	0.79	0.40	56.00	34.56	21.44	2.68	0.51	2.17
MILFORD	0.056	0.051	0.064	0.86	0.46	0.40	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	0.094	0.120	0.058	1.30	0.95	0.35	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	0.075	0.081	0.068	1.08	0.69	0.39	53.51	32.90	20.61	3.69	1.33	2.37
State Mean	0.114	0.113	0.116	1.52	0.93	0.60	51.03	31.84	19.19	2.39	0.79	1.59

Table 20. Annual and seasonal magnesium ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	0.027	0.025	0.030	0.36	0.23	0.13	51.50	34.71	16.79	2.45	1.90	0.55
CROOKCRK	0.029	0.034	0.021	0.38	0.28	0.10	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	0.023	0.025	0.021	0.36	0.23	0.13	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	0.032	0.033	0.030	0.50	0.31	0.19	59.68	36.65	23.03	1.57	0.01	1.56
PRESQISL	0.066	0.072	0.056	0.71	0.48	0.23	40.32	24.93	15.39	1.80	1.28	0.52
KANE	0.016	0.015	0.018	0.23	0.12	0.10	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	0.032	0.034	0.029	0.42	0.28	0.15	51.51	32.44	19.07	2.53	1.03	1.50
Central Pennsylvania												
YOWOCRK	0.012	0.014	0.007	0.15	0.11	0.03	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	0.025	0.024	0.025	0.29	0.17	0.12	45.84	27.50	18.34	0.07	0.02	0.05
HILLSCRK	0.017	0.018	0.016	0.20	0.13	0.07	45.62	29.24	16.38	0.28	0.05	0.23
LITTBUFF	0.030	0.034	0.024	0.40	0.26	0.13	47.51	30.73	16.78	5.43	0.01	5.42
PSUNADP	0.013	0.014	0.011	0.19	0.13	0.06	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	0.014	0.014	0.013	0.18	0.12	0.07	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	0.018	0.018	0.017	0.21	0.13	0.09	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	0.018	0.019	0.016	0.23	0.15	0.08	49.20	30.71	18.49	1.52	0.29	1.23
Eastern Pennsylvania												
SLOCUM	0.015	0.014	0.017	0.22	0.13	0.09	50.16	31.79	18.37	5.68	3.64	2.04
VALLFORG	0.032	0.033	0.031	0.48	0.29	0.18	56.00	34.56	21.44	2.68	0.51	2.17
MILFORD	0.017	0.017	0.016	0.26	0.16	0.10	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	0.019	0.024	0.012	0.26	0.19	0.07	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	0.021	0.022	0.019	0.30	0.19	0.11	53.51	32.90	20.61	3.69	1.33	2.37
State Mean	0.024	0.025	0.021	0.32	0.20	0.11	51.03	31.84	19.19	2.39	0.79	1.59

at the Milford site. Dormant season concentrations varied from 0.299 mg/L at Presque Isle to 0.058 mg/L at the Millersville and Young Women's Creek NADP/NTN sites. The relatively high concentrations at Presque Isle State Park may be related to windblown sand at the site. This situation would be similar to windblown soil in the mid-west that results in much higher calcium and magnesium concentrations in precipitation collected at NADP/NTN sites in this region (NADP, 2004) than are generally reported for the Northeast or Mid-Atlantic regions.

Magnesium concentrations exhibited much less spatial and temporal variability than calcium concentrations. The highest annual (0.066 mg/L), growing (0.072 mg/L), and dormant (0.056 mg/L) season mean concentrations in 2003 were measured at the Presque Isle site. The lowest annual and dormant season mean magnesium concentrations were reported at Young Women's Creek (0.012 mg/L and 0.007 mg/L, respectively). Four sites (Young Women's Creek, Penn State, Leading Ridge, and Slocum) recorded the lowest growing season mean concentration of 0.014 mg/L. The relatively high magnesium concentrations at the Presque Isle site are likely influenced by windblown sand as discussed above. The very low concentrations at the Young Women's Creek, Milford, and Leading Ridge sites reflect the fact that these sites are located in grassy openings in wooded terrain were windblown soil particles would be minimal.

For the most part, the 2003 annual and seasonal calcium concentrations were within the range of values reported the past 22 years, although several records were reported. Record low annual concentration means were observed at Milford, Slocum and the Young Women's Creek site. In contrast, two sites (Allegheny Portage and Presque Isle) reported their highest annual calcium concentrations to date. Both of these sites have been in operation a relatively short period of time (7 and 3 years, respectively). A record low growing season concentration was observed at Slocum. A record low dormant season calcium concentration mean was observed at Young Women's Creek, while a record high concentration was reported at Presque Isle. All regional and statewide annual and seasonal calcium concentration means were within the range of values reported the past 22 years of network operation.

Magnesium concentrations in 2003 were also generally within the range of values report since monitoring began. Two sites, Presque Isle and Arendtsville, reported record high annual means in 2003 due largely to record high concentrations at these sites during the growing season. Record low magnesium concentrations were recorded at Young Women's Creek (annual) and Leading Ridge (growing season). A record low dormant season concentration was also observed for the eastern region primarily because of the addition of the Millersville site in that region which reported a magnesium concentration of only 0.012 mg/L.

Wet calcium (Table 19) and magnesium (Table 20) depositions in 2003 were also generally within the range of values reported since monitoring began in 1982. Annual calcium wet deposition in Pennsylvania ranged from 2.82 kg/ha at Presque Isle to 0.86 kg/ha at Milford. Growing and dormant season calcium depositions were also highest (1.62 kg/ha and 1.21 kg/ha, respectively) at Presque Isle. The lowest growing season deposition (0.46 kg/ha) was recorded at Milford while the Millersville site reported the lowest dormant season deposition (0.35 kg/ha). Annual and seasonal calcium depositions were generally highest in western Pennsylvania and

decreased across the state to their lowest levels in eastern Pennsylvania. However, regional differences between central and eastern Pennsylvania were quite small (Table 19). The highest annual (0.71 kg/ha), growing (0.48 kg/ha) and dormant (0.23 kg/ha) season magnesium depositions in 2003 were all measured at Presque Isle State Park; the lowest annual (0.15 kg/ha), growing (0.11 kg/ha) and dormant (0.03 kg/ha) season magnesium depositions were measured at the Young Women's Creek NADP/NTN site in Clinton County. Magnesium deposition was also generally the highest in western Pennsylvania and decreased to the east. High deposition at Valley Forge in eastern Pennsylvania was an exception to this general pattern (Table 20).

A number of sites reported record high annual (Laurel Hill, Allegheny Portage, Presque Isle, and Arendtsville), growing (Allegheny Portage, Presque Isle, Young Women's Creek, and Arendtsville), and dormant (Allegheny Portage) season calcium depositions in 2003. With the exception of the Laurel Hill site, all of these sites have been in operation a relatively short (3 to 7 years) time and are thus sensitive to annual and seasonal fluctuations in precipitation that influences strongly the amount of deposition a site receives. Nearly all of these sites reported their highest precipitation to date. At Laurel Hill, 61.04 inches of precipitation fell in 2003, the highest volume to date and nearly 10 inches above the long-term average (Table 13). The same situation was true for the Allegheny Portage site. And even though a record growing season deposition was not recorded at Laurel Hill in 2003, growing season precipitation was the second highest on record, exceeded only by 1990 when the highest calcium deposition was recorded.

Although annual and seasonal magnesium depositions in 2003 were generally within the range of values reported since 1982, a number of sites did report record high depositions. Record high annual and seasonal magnesium depositions were recorded at the Arendtsville site in Adams County. The high deposition levels at this site resulted from a combination of higher concentrations and high precipitation. Record high annual and growing season depositions were also observed at Presque Isle, while the Young Women's Creek site reported record high growing season deposition. High annual and growing season concentrations were primarily responsible for the record depositions at the Erie site while growing season precipitation was the driving factor at Young Women's Creek.

Statistically significant ($p<0.05$) decreasing calcium concentration trends are evident at five sites (M.K. Goddard, Hills Creek, Little Buffalo, Valley Forge, and the Penn State NADP/NTN site); non-significant decreasing calcium concentration trends are evident at the remaining sites (Table 14). Statistically significant ($p<0.05$) decreasing magnesium concentration trends are evident at all sites except Little Pine State Park in Lycoming County (Table 14). Since 1983, calcium and magnesium concentrations have decreased an average of 1.47 μeq/L (21.6%) and 1.12 μeq/L (39.1%), respectively. The largest decline in calcium concentrations (3.42 μeq/L, 47.2%) occurred at Valley Forge in Montgomery County; the largest decline in magnesium concentrations (4.16 μeq/L, 67.1%) was also measured at the Valley Forge site.

Calcium and magnesium wet deposition also exhibit-decreasing trends throughout the state with significant ($p<0.05$) trends at four sites for calcium (M.K. Goddard, Little Buffalo, Valley Forge, and Leading Ridge NADP/NTN) and at all sites for magnesium deposition except Little Pine

State Park (Table 15). The average decrease in calcium and magnesium deposition since 1983 is 0.31 kg/ha (21.0%) and 0.15 kg/ha (38.6%), respectively. The largest decline in calcium deposition occurred at Little Buffalo State Park (0.76 kg/ha, 47.6%); the largest decline in magnesium deposition occurred at Valley Forge (0.56 kg/ha, 68.1%).

Potassium - Potassium occurs in precipitation in Pennsylvania at very low concentrations (Table 21). Statewide, potassium concentrations averaged 0.044 mg/L in 2003 and ranged from 0.015 mg/L at the Arendtsville NADP/NTN site in Adams County to 0.088 mg/L at Little Buffalo State Park in Perry County. The Little Buffalo site also recorded the highest growing season mean concentration (0.108 mg/L). The lowest mean growing season concentration (0.015 mg/L) was measured at Millersville. Dormant season concentrations were highest at Presque Isle State Park (0.062 mg/L) and lowest (0.010 mg/L) at the Leading Ridge, Milford, and Arendtsville NADP/NTN sites. On average, dormant season potassium concentrations were lower than growing season concentrations, except at the Millersville and M.K. Goddard State Park sites. Potassium concentrations also tend to be higher in the western portion of the state and decrease to the east except during the dormant season where the lowest concentrations were measured in the centre region.

None of the long-term monitoring sites reported record low or high annual or seasonal mean potassium concentrations in 2003. However, record high mean annual concentrations were observed at Presque Isle and Arendtsville. Both of these sites also reported a record high growing season concentration, as did the Allegheny Portage site. Presque Isle was the only site to report record high dormant season concentrations. In contract, the Young Women's Creek site in Clinton County reported its lowest annual and seasonal concentrations to date. None of the record concentrations at any of these relatively short-term (3 to 7 years) monitoring sites are unusual and all are within the range of values observed at other locations within the State.

Annual potassium depositions ranged from 0.18 kg/ha at Arendtsville NADP/NTN to 1.13 kg/ha at Little Buffalo (Table 21). Growing season depositions ranged from 0.12 kg/ha at Millersville to 0.84 kg/ha at Little Buffalo. Dormant season depositions ranged from 0.04 kg/ha to 0.29 kg/ha; the lowest deposition was measured in Clinton County (Young Women's Creek); the highest deposition was reported at Little Buffalo. Potassium deposition was generally lowest in central Pennsylvania and increased to the east and west. Although the highest deposition fell in western Pennsylvania, the differences between eastern and central deposition levels was 0.05 kg/ha or less.

Potassium deposition in 2003 at all long-term monitoring sites was within the range of values reported since 1982. However, as was the case with potassium concentrations, record high annual and growing season depositions were reported at three of the four sites with 3 to 7 years of data (Presque Isle, Young Women's Creek, and Arendtsville). The record high deposition levels at these sites were attributed to higher concentrations and record or near record precipitation, especially during the growing season. As a result, the western region of Pennsylvania recorded it highest annual and growing season mean depositions to date, as did the eastern region during the growing season. Above average rainfall was also responsible for the

Table 21. Annual and seasonal potassium ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	0.050	0.049	0.050	0.68	0.46	0.22	51.50	34.71	16.79	2.45	1.90	0.55
CROOKCRK	0.058	0.058	0.058	0.75	0.48	0.28	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	0.058	0.069	0.041	0.89	0.64	0.25	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	0.063	0.083	0.031	0.96	0.77	0.19	59.68	36.65	23.03	1.57	0.01	1.56
PRESQISL	0.084	0.098	0.062	0.90	0.65	0.25	40.32	24.93	15.39	1.80	1.28	0.52
KANE	0.020	0.022	0.017	0.28	0.18	0.10	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	0.055	0.063	0.043	0.74	0.53	0.21	51.51	32.44	19.07	2.53	1.03	1.50
Central Pennsylvania												
YOWOCRK	0.018	0.024	0.008	0.23	0.19	0.04	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	0.056	0.068	0.038	0.65	0.48	0.18	45.84	27.50	18.34	0.07	0.02	0.05
HILLSCRK	0.055	0.065	0.037	0.64	0.49	0.15	45.62	29.24	16.38	0.28	0.05	0.23
LITTBUFF	0.088	0.108	0.051	1.13	0.84	0.29	47.51	30.73	16.78	5.43	0.01	5.42
PSUNADP	0.030	0.043	0.009	0.45	0.40	0.05	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	0.018	0.023	0.010	0.25	0.19	0.05	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	0.015	0.018	0.010	0.18	0.13	0.05	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	0.040	0.050	0.023	0.50	0.39	0.12	49.20	30.71	18.49	1.52	0.29	1.23
Eastern Pennsylvania												
SLOCUM	0.048	0.053	0.040	0.68	0.47	0.21	50.16	31.79	18.37	5.68	3.64	2.04
VALLFORG	0.058	0.066	0.045	0.86	0.59	0.27	56.00	34.56	21.44	2.68	0.51	2.17
MILFORD	0.019	0.024	0.010	0.28	0.22	0.06	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	0.018	0.015	0.021	0.25	0.12	0.12	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	0.036	0.040	0.029	0.52	0.35	0.17	53.51	32.90	20.61	3.69	1.33	2.37
State Mean	0.044	0.052	0.032	0.59	0.43	0.16	51.03	31.84	19.19	2.39	0.79	1.59

record high statewide potassium deposition in 2003. The influence of precipitation on wet potassium deposition is very evident when comparing seasonal depositions in 2003. As indicated above, record high growing season depositions were reported at a number of sites. In contrast, not one of the 16 sites with two or more years of data recorded record dormant season deposition. As shown in Table 13, dormant season precipitation was near the long-term average throughout the state in 2003. The influence that an individual site has on regional deposition levels is also illustrated nicely by the 2003 potassium deposition data. Without the addition of the Presque Isle, Allegheny Portage, and Arendtsville sites, record deposition would not have been reported in 2003 for the eastern and western regions of the state.

No consistent temporal pattern in potassium concentrations exists across the state (Table 14). The four NADP/NTN sites exhibit decreasing trends, of which only the Milford trend is significant ($p<0.05$), while eight sites exhibit increasing patterns six of which are statistically significant ($p<0.05$) (Crooked Creek Lake, Hills Creek, M.K. Goddard, Little Buffalo, Valley Forge and Little Pine). Wet potassium deposition trends are likewise mixed with eight sites exhibiting increasing trends and four sites exhibiting decreasing trends (Table 15). The increasing trend at M. K. Goddard, Hills Creek, and Little Buffalo state parks are statistically significant ($p<0.05$). None of the decreasing trends are significant ($p<0.05$).

Chloride and Sodium – Chloride (Table 22) and sodium (Table 23) concentrations generally exhibit fairly definable spatial and temporal patterns that can be associated with the origin and direction of storms and the presence of sea salt (sodium chloride) from coastal influences. Chloride may also be present in precipitation as a result of the release of hydrochloric acid (HCL) to the atmosphere during the combustion of coal. Both sources strongly influence spatial patterns of chloride concentrations in the Commonwealth (Table 22). Another potential contributing influence is from the application of salts used in deicing road surfaces. Generally, sodium chloride (NaCl) or calcium chloride (CaCl) salts are used, depending on air temperature. Both can be entrained in road mist that in turn could influence precipitation chemistry at nearby sites.

The highest mean annual chloride concentrations have traditionally been found in eastern Pennsylvania (Valley Forge) because of the region's relatively close proximity to the Atlantic Ocean and the presence of sea salts. This is especially during the dormant season when coastal storms frequently occur. As would be expected, sodium concentrations in this region are also traditionally the highest in the Network. The next highest chloride concentrations have consistently been measured at sites located in western Pennsylvania (Laurel Hill and Allegheny Portage). Chloride released during the combustion of coal is responsible for the high concentrations in this region where a number of large coal-fired electric generation plants are located. As would be expected, sodium concentrations in this region do not mimic chloride concentrations as well and are well below the concentrations found in eastern Pennsylvania. Deicing chemicals at some sites, such as Allegheny Portage that is located on top of Cresson Mountain near Route 22 in Cambria County, may also be a contributing factor to the high concentrations found at this site, and potentially at other sites in the Network.

Table 22. Annual and seasonal chloride ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	0.141	0.099	0.227	1.92	0.92	1.00	51.71	34.71	17.00	2.24	1.90	0.34
CROOKCRK	0.183	0.155	0.233	2.38	1.28	1.10	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	0.247	0.250	0.243	3.83	2.31	1.52	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	0.212	0.123	0.347	3.31	1.15	2.17	60.87	36.65	24.22	0.38	0.01	0.37
PRESQISL	0.196	0.128	0.305	2.08	0.85	1.23	40.32	24.93	15.39	1.80	1.28	0.52
KANE	0.110	0.091	0.143	1.56	0.75	0.81	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	0.181	0.141	0.250	2.51	1.21	1.31	51.75	32.44	19.31	2.30	1.03	1.27
Central Pennsylvania												
YOWOCRK	0.096	0.098	0.090	1.22	0.80	0.43	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	0.208	0.230	0.174	2.42	1.61	0.81	45.86	27.52	18.34	0.05	0.00	0.05
HILLSCRK	0.136	0.129	0.148	1.58	0.96	0.63	45.69	29.24	16.45	0.21	0.05	0.16
LITTBUFF	0.232	0.222	0.251	3.15	1.73	1.41	47.58	30.73	16.85	5.36	0.01	5.35
PSUNADP	0.107	0.097	0.124	1.60	0.90	0.70	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	0.104	0.092	0.123	1.40	0.77	0.63	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	0.189	0.156	0.236	2.31	1.11	1.20	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	0.153	0.146	0.164	1.96	1.13	0.83	49.22	30.72	18.51	1.50	0.29	1.21
Eastern Pennsylvania												
SLOCUM	0.157	0.138	0.193	2.24	1.24	1.00	53.25	34.88	18.37	2.59	0.55	2.04
VALLFORG	0.339	0.314	0.380	5.07	2.80	2.28	56.14	34.70	21.44	2.54	0.37	2.17
MILFORD	0.176	0.144	0.234	2.74	1.29	1.45	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	0.211	0.222	0.195	2.92	1.76	1.16	51.72	30.30	21.41	2.87	0.85	2.02
Region Mean	0.221	0.204	0.250	3.24	1.77	1.47	54.04	33.71	20.33	3.17	0.52	2.65
State Mean	0.179	0.158	0.214	2.46	1.31	1.15	51.25	32.03	19.22	2.17	0.60	1.57

Table 23. Annual and seasonal sodium ion analyses of precipitation collected at sites throughout Pennsylvania during 2003.

	Volume Weighted Mean Concentrations (mg/L)			Total Wet Depositions (kg/ha)			Precipitation Analyzed (Inches)			Precipitation Not Analyzed (Inches)		
Region/Site	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.	Annual	Grow.	Dorm.
Western Pennsylvania												
GODDARD	0.065	0.044	0.109	0.89	0.41	0.48	51.50	34.71	16.79	2.45	1.90	0.55
CROOKCRK	0.059	0.044	0.086	0.77	0.37	0.41	51.02	32.52	18.50	0.16	0.00	0.16
LAURHILL	0.072	0.056	0.097	1.12	0.51	0.61	60.41	36.31	24.10	0.63	0.06	0.57
ALLEPORT	0.094	0.060	0.149	1.49	0.56	0.93	59.68	36.65	23.03	1.57	0.01	1.56
PRESQISL	0.086	0.057	0.134	0.92	0.38	0.54	40.32	24.93	15.39	1.80	1.28	0.52
KANE	0.028	0.016	0.051	0.41	0.13	0.29	46.14	29.51	16.63	8.58	2.93	5.65
Region Mean	0.068	0.046	0.104	0.93	0.39	0.54	51.51	32.44	19.07	2.53	1.03	1.50
Central Pennsylvania												
YOWOCRK	0.032	0.030	0.035	0.40	0.24	0.16	46.89	30.47	16.42	3.56	1.46	2.10
LITTPINE	0.078	0.074	0.083	0.90	0.52	0.39	45.84	27.50	18.34	0.07	0.02	0.05
HILLSCRK	0.057	0.050	0.071	0.67	0.37	0.30	45.62	29.24	16.38	0.28	0.05	0.23
LITTBUFF	0.112	0.106	0.123	1.52	0.82	0.69	47.51	30.73	16.78	5.43	0.01	5.42
PSUNADP	0.033	0.025	0.046	0.49	0.23	0.26	58.58	36.49	22.09	0.03	0.00	0.02
LEADRIDG	0.034	0.023	0.052	0.46	0.19	0.27	53.12	33.01	20.11	0.03	0.01	0.02
ARENDTSV	0.081	0.065	0.105	0.99	0.46	0.53	46.84	27.55	19.29	1.23	0.47	0.76
Region Mean	0.061	0.053	0.073	0.78	0.41	0.37	49.20	30.71	18.49	1.52	0.29	1.23
Eastern Pennsylvania												
SLOCUM	0.069	0.051	0.099	0.97	0.46	0.51	50.16	31.79	18.37	5.68	3.64	2.04
VALLFORG	0.181	0.156	0.220	2.71	1.39	1.32	56.00	34.56	21.44	2.68	0.51	2.17
MILFORD	0.089	0.068	0.125	1.38	0.61	0.78	55.05	34.94	20.11	4.67	0.31	4.36
MILLERSV	0.088	0.094	0.080	1.22	0.74	0.48	52.84	30.30	22.53	1.75	0.85	0.90
Region Mean	0.106	0.092	0.131	1.57	0.80	0.77	53.51	32.90	20.61	3.69	1.33	2.37
State Mean	0.074	0.060	0.098	1.02	0.49	0.53	51.03	31.84	19.19	2.39	0.79	1.59

The 2003 spatial pattern of chloride concentrations across Pennsylvania followed the historical patterns discussed above. The highest mean annual (0.339 mg/L), growing (0.314 mg/L) and dormant (0.380 mg/L) season concentrations were reported at the Valley Forge site in eastern Pennsylvania (Table 22). The second highest mean chloride concentrations were reported at sites located in western Pennsylvania. The lowest annual and seasonal chloride concentrations have been consistently found at the more remote sites located in forest settings, well away from road surface contamination, coastal influences, and utility emissions. This was the situation in 2003 as well with the Leading Ridge and Young Women's Creek NADP/NTN sites accounting for the lowest annual and seasonal mean concentrations (Table 22). The Young Women's Creek site recorded the lowest dormant sodium concentration (Table 23), while Kane had the lowest annual and growing season sodium concentration means. The highest mean annual and seasonal sodium concentrations were measured at Valley Forge (Table 23).

Chloride concentrations in 2003 relative to previous years of observations showed mixed patterns with some sites reporting their lowest concentrations to date while some recorded their highest levels ever. The spatial and temporal patterns observed in 2003 were strongly influenced by precipitation volume and its seasonal distribution, as well as the length of observation at a given site. Record low annual concentration means were reported at Allegheny Portage and Leading Ridge; record low growing season concentrations were observed at M.K. Goddard, Crooked Creek Lake, Allegheny Portage, Presque Isle, and Leading Ridge, while Young Women's Creek reported a record low dormant season mean chloride concentration in 2003. In all cases, these sites received above average annual and/or seasonal precipitation that essentially diluted the available chloride in the atmosphere and thus lowered its concentration. For example, the low concentrations at M.K. Goddard, Leading Ridge, and Crooked Creek Lake, three sites with a minimum of 22 years of measurements, coincided with precipitation volumes that were 10 to 13 inches above the long-term means at these sites. This was also true for some of the sites with relatively short records (e.g., Young Women's Creek during the dormant season, Presque Isle during the growing season). In contrast, the record high annual and seasonal chloride concentrations at Arendtsville and at Presque Isle during the dormant season are exceptions to this general pattern. At both of these sites, precipitation was near or slightly above seasonal and annual means. However, both sites have relatively short records that make it more difficult to assess the influence precipitation has on concentrations at these sites.

Sodium concentrations were less variable than chloride concentrations and were for the most part within the range of previously observed values at most sites. Record high mean annual and/or seasonal sodium concentrations were reported at Presque Isle (annual and dormant season) and Arendtsville and Allegheny Portage (dormant season). Record low annual concentrations were reported at Leading Ridge and Penn State while record low growing season concentrations were observed at Kane and Leading Ridge. In all cases, the low concentration records coincided with above average precipitation volumes on either a growing season or annual basis.

Statewide, mean annual chloride and sodium deposition in 2003 were 2.46 kg/ha and 1.02 kg/ha, respectively (Tables 22 and 23). Chloride and sodium wet depositions were lowest in central Pennsylvania and increased to the east and west, with the highest deposition generally occurring

in western Pennsylvania. The lowest growing and dormant season chloride depositions were measured at the Young Women's Creek site in Clinton County and at the Kane site in Elk County, respectively. The highest annual and dormant and growing season chloride depositions were measured at Valley Forge (Table 22). Annual and seasonal sodium depositions were also lowest at the Kane and Young Women's Creek sites; the highest annual and seasonal sodium depositions were consistently measured at the Valley Forge site (Table 22).

On annual and seasonal bases, chloride deposition across the state was generally within the range of values reported since monitoring began in 1982 despite the fact that a number of sites reported record low annual and growing season chloride concentration means in 2003. The low concentrations resulted from above average precipitation and its dilution effect on chloride concentrations. Above average precipitation was also the primary reason for the record high chloride depositions recorded at a number of the short-term (3-7 years) monitoring sites (e.g., Young Women's Creek, Arendtsville, and Presque Isle).

Sodium deposition in 2003 was also generally within the range of values reported the past 22 years. Annual and growing season wet deposition records were measured at a number of western and central Pennsylvania site mainly due to above average precipitation. In contract record high dormant season deposition at three of the short-term monitoring sites coincided with record high concentrations at these sites in 2003.

Chloride concentration trends are quite variable across the state (Table 14). Decreasing chloride patterns are evident at seven sites, while five sites exhibit increasing trends. The decreasing trends at the Penn State, Leading Ridge, Milford and Kane NADP/NTN sites are statistically significant ($p<0.05$) as is the decreasing trend at Valley Forge. The only significant increasing trend was evident at the M. K. Goddard site. Sodium concentration trends are also variable with six sites exhibiting decreasing trends and six sites displaying increasing patternss (Table 14). The decreasing trends at the Valley Forge site and the Kane, Leading Ridge, and Penn State NADP/NTN sites are significant ($p<0.05$). The increasing trends at Hills Creek, Laurel Hill, and Little Pine are also statistically significant.

Chloride deposition trends are also quite variable across the state (Table 15). Decreasing patterns are evident at six sites, five of which (Kane, Penn State, Milford, Leading Ridge and Valley Forge) are significant ($p<0.05$). None of the increasing patterns are significant. Six network sites exhibit decreasing sodium deposition trends with four sites (Valley Forge, Penn State, Kane, and Leading Ridge) exhibiting significant ($p<0.05$) trends. The only increasing sodium deposition pattern that is statistically significant (Table 15) occurred at Little Pine State Park in Lycoming County.

Correlation Analysis

Correlation analyses indicate that a strong, positive association existed between hydrogen ion (H^+) concentrations and sulfate ($r=0.75$) and nitrate ($r=0.69$) concentrations in precipitation in 2003 (Appendix IV). Weaker relationships existed between the other ions and H^+

concentrations. These results support the position that sulfur dioxide and nitrogen oxides emissions continue to be the most important atmospheric pollutants in 2003 contributing to the acidification of precipitation in Pennsylvania. Although sulfate and nitrate anions dominate the acidification process, ammonium and to a lesser extent some of the base cations, also influenced precipitation acidity by neutralizing some of the acidity caused by the acid anions.

Although sulfur in the form of sulfate has been the dominate anion contributing to the acidity in precipitation at most sites, nitrogen, in the form of nitrate, appears to be playing a much more important role as indicated by the correlation coefficients. This appears to be the result of reductions in sulfur dioxide emissions (the primary source of sulfate in precipitation) following the implementation of Title IV of the CAAA in 1995 and the increasing importance of nitrogen oxides emissions (the primary sources of nitrate in precipitation) in the acidification process. Although NO_X emissions have also decreased the past eight years, the reductions have been much smaller than the reductions in sulfur dioxide emissions. Consequently, the relative strength of the relationship between H^+ and sulfate concentrations appears to be less than it was when monitoring began in the early 1980s. Such assessments are difficult, however, because of inter- and intra-site variability and the close association of free acidity (as pH) in precipitation with some cations, especially ammonium, calcium, and magnesium. Also influencing such an assessment would be highly variable precipitation patterns across the state as well as between annual and seasonal periods.

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APPENDICES

2003 PRECIPITATION QUALITY SUMMARIES

APPENDIX I

2003 PRECIPITATION QUALITY SUMMARY

CHEMICAL ANALYSES OF WEEKLY

PRECIPITATION SAMPLES

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Allegheny Portage NHS

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.13	0.024	0.001	0.216	0.134	1.05	0.416	1.11	4.49	12.8	2.91
030114	----	-----	-----	-----	-----	----	-----	----	4.32	47.4	0.23
030121	----	-----	-----	-----	0.542	3.59	1.177	0.87	4.10	25.5	0.45
030128	----	-----	-----	-----	-----	----	-----	----	----	----	0.14
030204	0.05	0.024	0.001	0.132	0.237	1.19	0.351	1.35	4.39	18.0	0.89
030211	0.23	0.086	0.046	0.903	0.227	3.24	1.705	1.00	4.25	28.4	0.55
030218	0.10	0.029	0.017	0.131	0.046	0.84	0.284	0.32	4.91	6.6	1.61
030225	0.03	0.026	0.003	0.021	0.018	0.90	0.131	0.94	4.57	12.3	1.48
030304	----	-----	-----	-----	0.480	5.92	0.848	5.54	4.58	37.8	0.27
030311	0.73	0.227	0.035	0.265	0.337	2.65	0.432	2.70	4.52	22.7	0.72
030318	0.28	0.050	0.012	0.086	1.122	4.21	0.267	5.41	3.97	55.3	0.35
030325	0.60	0.060	0.063	0.119	0.259	1.32	0.197	1.88	4.72	14.7	1.36
030401	0.26	0.044	0.159	0.101	0.386	1.63	0.246	1.49	4.64	15.1	0.85
030408	0.15	0.040	0.072	0.165	0.663	1.93	0.276	2.63	4.41	24.7	1.70
030415	0.06	0.022	0.105	0.056	0.122	0.98	0.060	0.85	4.69	10.7	0.61
030422	0.19	0.037	0.111	0.070	0.645	2.12	0.223	3.12	4.23	29.6	0.36
030429	0.15	0.024	0.059	0.040	0.431	1.80	0.099	2.19	4.35	25.2	0.24
030506	0.33	0.072	0.301	0.087	0.138	1.23	0.185	1.41	4.74	13.3	0.48
030513	0.26	0.044	0.098	0.106	0.363	1.72	0.316	3.26	4.12	33.3	2.20
030520	0.11	0.020	0.019	0.034	0.509	1.63	0.063	2.01	4.46	17.9	1.72
030527	0.17	0.019	0.111	0.042	0.314	1.36	0.049	1.85	4.42	19.9	1.67
030603	0.10	0.018	0.085	0.012	0.232	0.90	0.019	1.41	4.65	13.6	1.80
030610	0.09	0.032	0.078	0.127	0.281	0.88	0.132	1.37	4.69	13.0	2.52
030617	0.12	0.040	0.157	0.086	0.446	1.99	0.173	2.85	4.17	26.8	0.46
030624	0.03	0.024	0.039	0.052	0.453	2.47	0.104	2.85	4.16	32.7	2.16
030701	----	-----	-----	-----	-----	----	-----	----	----	----	0.01
030708	0.15	0.025	0.046	0.024	0.492	1.74	0.099	3.93	4.17	23.8	1.10
030715	0.09	0.023	0.075	0.046	0.283	1.66	0.065	2.11	4.34	17.5	1.55
030722	0.05	0.018	0.069	0.016	0.278	1.44	0.052	2.74	4.25	24.1	1.96
030729	1.89	0.544	0.194	0.549	0.596	3.38	1.194	7.45	4.99	36.1	0.31
030805	0.10	0.018	0.043	0.063	0.386	1.83	0.063	3.12	4.18	32.0	2.78
030812	0.07	0.015	0.034	0.029	0.274	1.64	0.058	2.66	4.22	23.2	0.82
030819	0.28	0.049	0.119	0.049	1.846	2.96	0.257	7.66	4.11	51.8	0.19
030826	0.32	0.049	0.134	0.040	0.622	2.26	0.135	4.12	4.14	34.9	2.39
030902	0.13	0.016	0.002	0.032	0.285	1.24	0.096	2.68	4.23	24.0	3.13
030909	0.12	0.010	0.063	0.043	0.216	2.00	0.193	3.74	4.05	37.2	0.50
030916	0.04	0.018	0.030	0.096	0.321	1.10	0.273	2.41	4.36	19.5	0.61
030923	0.07	0.019	0.075	0.080	0.109	0.42	0.088	0.82	4.86	8.0	2.75
030930	0.06	0.015	0.027	0.042	0.268	0.87	0.096	1.94	4.43	18.6	2.60
031007	0.29	0.050	0.121	0.042	0.434	2.88	0.251	2.17	4.31	31.7	0.62
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.41	0.128	0.479	0.042	0.084	1.31	0.219	2.04	4.65	17.2	1.39
031028	0.12	0.024	0.028	0.114	0.215	1.04	0.084	2.02	4.38	23.1	0.94
031104	0.18	0.021	0.113	0.173	0.626	2.05	0.678	3.08	4.31	25.4	0.08
031111	0.10	0.011	0.004	0.060	0.219	1.72	0.235	2.31	4.15	31.4	1.21
031118	0.14	0.019	0.113	0.105	0.430	2.10	0.202	2.48	4.25	28.6	0.26
031125	0.01	0.006	0.001	0.050	0.139	0.50	0.115	1.01	4.66	8.7	3.15
031202	----	-----	-----	-----	0.321	1.43	1.473	1.30	5.09	17.6	0.47
031209	0.04	0.001	0.018	0.077	0.001	0.81	0.087	0.38	4.80	5.4	1.19
031216	0.02	0.001	0.030	0.071	0.106	0.71	0.146	0.70	4.66	10.5	2.43
031223	0.40	0.080	0.034	1.202	0.421	4.11	2.254	1.76	4.36	36.2	0.41
031230	0.09	0.002	0.007	0.151	0.176	1.01	0.323	1.31	4.51	18.6	0.67

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Crooked Creek Lake

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.05	0.011	0.051	0.122	0.077	0.91	0.140	0.97	4.52	12.8	2.04
030114	----	-----	-----	-----	-----	----	-----	----	4.24	76.9	0.04
030121	0.31	0.064	0.055	0.606	0.381	3.99	1.295	0.65	4.29	28.8	0.26
030128	0.26	0.045	0.001	0.317	0.559	3.18	0.865	1.12	4.43	27.7	0.30
030204	0.13	0.019	0.001	0.058	0.232	1.62	0.160	1.90	4.28	25.5	0.84
030211	0.25	0.064	0.103	0.279	0.301	4.21	0.869	1.21	4.19	36.1	0.42
030218	0.01	0.019	0.145	0.034	0.010	0.53	0.140	0.22	5.03	4.7	0.93
030225	0.05	0.020	0.015	0.049	0.009	1.15	0.182	1.26	4.37	23.2	1.08
030304	----	-----	-----	-----	-----	----	-----	----	----	----	0.12
030311	0.28	0.050	0.142	0.079	0.255	2.78	0.316	1.86	4.23	28.6	0.64
030318	0.23	0.041	0.097	0.106	0.559	2.77	0.282	3.10	4.13	38.9	0.45
030325	1.81	0.092	0.123	0.206	0.290	1.41	0.493	4.70	5.03	21.2	0.34
030401	0.41	0.059	0.154	0.077	0.583	2.56	0.198	3.12	4.24	35.9	0.39
030408	0.18	0.044	0.149	0.128	0.299	1.51	0.302	2.69	4.20	25.5	1.25
030415	0.08	0.016	0.081	0.017	0.089	0.67	0.052	0.45	4.93	6.1	0.41
030422	0.18	0.024	0.044	0.057	0.259	1.31	0.149	2.55	4.22	28.2	0.51
030429	0.34	0.148	0.335	0.027	0.515	3.29	0.196	3.35	4.16	39.6	0.15
030506	0.08	0.019	0.009	0.030	0.144	0.51	0.076	1.02	4.69	11.1	0.65
030513	0.30	0.050	0.002	0.111	0.466	2.12	0.212	3.31	4.24	32.4	2.48
030520	0.07	0.021	0.079	0.030	0.158	1.18	0.167	2.44	4.25	22.7	1.30
030527	0.42	0.429	0.454	0.070	0.171	2.07	0.183	5.84	4.10	26.5	0.70
030603	0.10	0.019	0.003	0.013	0.327	1.89	0.419	3.86	4.02	43.4	1.09
030610	0.07	0.015	0.066	0.054	0.204	0.98	0.067	2.29	4.26	22.1	1.57
030617	0.01	0.017	0.058	0.049	0.133	1.34	0.115	2.77	4.14	28.0	1.02
030624	0.19	0.077	0.066	0.078	0.304	1.68	0.235	1.70	4.74	15.4	0.18
030701	0.22	0.047	0.001	0.049	0.902	2.64	0.180	4.91	4.17	32.5	0.15
030708	0.16	0.033	0.037	0.040	0.571	1.93	0.106	4.25	4.15	32.5	1.38
030715	0.05	0.017	0.080	0.038	0.268	1.51	0.087	2.99	4.22	20.4	0.95
030722	0.09	0.016	0.091	0.012	0.278	1.39	0.063	2.78	4.24	25.2	2.79
030729	0.12	0.025	0.001	0.029	0.285	1.25	0.115	2.21	4.31	22.6	1.00
030805	0.07	0.012	0.058	0.036	0.173	1.23	0.081	2.85	4.21	29.4	2.13
030812	0.06	0.008	0.006	0.033	0.268	2.34	0.465	5.62	3.86	57.8	1.33
030819	0.73	0.116	0.189	0.352	1.412	5.20	0.523	5.89	4.17	47.3	0.04
030826	0.46	0.063	0.093	0.036	0.918	2.57	0.132	4.73	4.34	35.5	2.54
030902	0.12	0.008	0.072	0.031	0.185	1.06	0.142	2.16	4.33	17.4	4.76
030909	0.37	0.052	0.006	0.053	0.869	3.53	0.272	4.70	4.04	41.0	0.25
030916	0.08	0.006	0.021	0.036	0.207	0.86	0.131	3.05	4.19	26.6	1.16
030923	0.07	0.028	0.004	0.040	0.036	0.30	0.215	0.70	4.71	10.4	1.19
030930	0.38	0.052	0.013	0.049	0.497	2.41	0.180	2.98	4.22	27.3	0.92
031007	0.36	0.084	0.098	0.066	0.554	2.78	0.317	2.78	4.32	30.7	0.42
031014	0.10	0.014	0.027	0.025	0.126	0.85	0.074	1.31	4.58	13.4	1.21
031021	0.23	0.036	0.076	0.066	0.471	2.01	0.109	2.29	4.47	22.2	0.19
031028	0.15	0.021	0.039	0.125	0.125	1.38	0.125	1.66	4.36	21.1	1.12
031104	0.11	0.022	0.057	0.138	0.215	1.42	0.287	2.75	4.30	24.4	0.62
031111	0.19	0.025	0.003	0.030	0.265	2.06	0.192	2.53	4.17	31.8	0.57
031118	0.02	0.001	0.035	0.022	0.071	0.52	0.078	1.29	4.50	15.4	2.29
031125	0.22	0.035	0.086	0.131	0.254	1.06	0.259	2.05	4.48	15.2	0.40
031202	0.06	0.016	0.001	0.054	0.189	1.07	0.289	1.46	4.47	18.6	0.77
031209	0.03	0.001	0.041	0.041	0.001	1.02	0.206	0.90	4.47	16.1	1.95
031216	0.07	0.001	0.001	0.029	0.117	0.91	0.169	0.49	4.70	10.0	0.87
031223	0.04	0.001	0.001	0.083	0.192	1.63	0.186	1.58	4.36	22.9	0.56
031230	0.06	0.001	0.001	0.090	0.111	1.03	0.168	1.09	4.50	19.0	0.46

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
M. K. Goddard State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.03	0.012	0.040	0.106	0.134	0.90	0.144	1.23	4.47	14.9	1.36
030114	----	-----	-----	-----	-----	----	-----	----	----	----	0.09
030121	----	-----	-----	-----	-----	----	-----	----	4.20	22.7	0.21
030128	----	-----	-----	-----	0.319	3.40	0.521	0.54	4.41	16.6	0.21
030204	0.23	0.028	0.043	0.105	0.529	1.93	0.218	2.50	4.43	32.7	0.92
030211	0.27	0.072	0.145	0.349	0.451	4.10	0.693	1.08	4.28	31.7	0.28
030218	0.06	0.022	0.128	0.081	0.013	0.63	0.120	0.15	5.16	4.1	0.51
030225	0.19	0.025	0.001	0.074	0.050	1.66	0.155	1.46	4.38	21.2	0.94
030304	0.30	0.031	0.001	0.127	0.568	6.06	0.368	4.62	3.88	58.0	0.13
030311	0.29	0.061	0.022	0.086	0.398	2.51	0.248	2.20	4.32	23.0	0.61
030318	0.62	0.047	0.151	0.043	0.714	3.27	0.148	2.36	4.38	28.3	0.36
030325	0.57	0.052	0.003	0.072	0.629	2.28	0.204	2.99	4.31	29.1	0.44
030401	0.10	0.034	0.104	0.097	0.498	1.79	0.170	2.18	4.41	25.0	0.99
030408	0.33	0.065	0.130	0.164	0.725	1.86	0.306	2.54	4.60	17.5	2.17
030415	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030422	0.16	0.033	0.077	0.069	0.603	2.21	0.158	3.32	4.20	35.6	0.71
030429	----	-----	-----	-----	-----	----	-----	----	----	----	0.04
030506	0.11	0.030	0.001	0.041	0.254	1.11	0.207	2.33	4.35	23.6	0.63
030513	0.31	0.046	0.028	0.064	0.385	1.44	0.196	1.93	4.50	19.2	1.68
030520	0.40	0.234	0.179	0.098	0.663	3.15	0.277	7.46	3.87	44.6	0.14
030527	0.15	0.022	0.009	0.043	0.236	1.43	0.101	3.18	4.13	32.4	1.90
030603	0.12	0.038	0.103	0.036	0.312	1.21	0.052	2.26	4.42	20.3	1.85
030610	0.11	0.029	0.198	0.068	0.747	2.52	0.065	4.18	4.20	38.5	0.75
030617	0.07	0.021	0.143	0.049	0.331	1.83	0.113	3.33	4.16	31.9	1.32
030624	0.07	0.032	0.001	0.041	0.443	1.76	0.154	3.74	4.14	35.9	0.45
030701	0.44	0.051	0.048	0.026	0.739	2.16	0.118	4.90	4.19	35.6	0.57
030708	0.36	0.050	0.042	0.054	1.015	3.07	0.139	5.13	4.08	37.4	0.97
030715	0.03	0.010	0.056	0.034	0.166	1.13	0.054	1.92	4.36	19.5	1.48
030722	0.11	0.019	0.001	0.044	0.464	1.64	0.036	3.41	4.22	27.3	6.48
030729	----	-----	-----	-----	-----	----	-----	----	----	----	1.90
030805	0.08	0.019	0.114	0.039	0.194	1.96	0.134	3.35	4.14	36.5	0.81
030812	0.04	0.006	0.061	0.017	0.260	1.20	0.046	2.80	4.23	21.2	3.63
030819	0.38	0.049	0.178	0.045	1.046	2.53	0.083	3.32	4.49	20.0	0.17
030826	0.78	0.130	0.113	0.075	1.103	3.86	0.075	3.63	4.45	29.2	0.61
030902	0.21	0.023	0.018	0.051	0.384	1.59	0.206	3.09	4.20	26.9	2.49
030909	0.74	0.094	0.094	0.272	0.922	5.32	0.539	5.22	4.01	54.1	0.13
030916	0.04	0.010	0.111	0.037	0.276	1.72	0.234	3.68	4.03	36.4	0.62
030923	0.06	0.012	0.074	0.060	0.130	0.37	0.113	0.97	4.77	9.5	2.57
030930	0.16	0.029	0.078	0.053	0.395	2.03	0.104	3.35	4.19	32.2	1.68
031007	0.22	0.038	0.025	0.031	0.353	2.52	0.120	1.56	4.48	21.1	0.91
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.06	0.008	0.031	0.030	0.182	0.92	0.081	1.43	4.47	14.0	1.58
031028	0.12	0.014	0.007	0.030	0.204	1.51	0.073	1.52	4.45	19.3	1.29
031104	0.19	0.024	0.030	0.141	0.474	3.99	0.427	3.91	3.97	48.9	0.40
031111	0.29	0.070	0.201	0.882	0.448	3.14	1.255	3.36	4.10	42.0	0.17
031118	0.09	0.011	0.007	0.025	0.359	1.97	0.095	1.79	4.39	18.6	0.91
031125	0.08	0.009	0.003	0.041	0.108	0.76	0.096	1.16	4.59	11.0	1.10
031202	0.04	0.011	0.001	0.037	0.146	0.71	0.108	1.49	4.41	17.4	1.33
031209	0.29	0.035	0.051	0.138	0.040	0.97	0.184	0.57	5.22	6.4	0.45
031216	0.06	0.002	0.035	0.026	0.001	0.77	0.097	0.64	4.68	10.9	1.00
031223	0.93	0.067	0.024	0.261	0.999	3.07	0.548	3.80	4.35	33.2	0.64
031230	0.07	0.007	0.001	0.134	0.131	1.48	0.302	1.19	4.40	21.9	1.37

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Hills Creek State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.04	0.018	0.001	0.085	0.146	1.26	0.093	0.71	4.60	11.4	2.10
030114	----	-----	-----	-----	-----	----	-----	----	4.40	23.4	0.07
030121	----	-----	-----	-----	-----	----	-----	----	4.97	20.5	0.04
030128	0.21	0.058	0.006	0.314	0.429	3.96	0.704	0.74	4.25	29.0	0.15
030204	0.22	0.020	0.001	0.078	0.198	1.54	0.194	2.00	4.28	26.4	0.56
030211	0.15	0.037	0.053	0.089	0.160	3.27	0.319	0.83	4.27	27.3	0.27
030218	0.01	0.019	0.012	0.043	0.012	0.43	0.161	0.19	5.03	3.3	0.93
030225	0.10	0.018	0.004	0.044	0.004	1.05	0.092	1.33	4.42	16.1	0.68
030304	----	-----	-----	-----	-----	----	-----	----	----	----	0.05
030311	0.21	0.026	0.062	0.075	0.079	1.81	0.140	0.76	4.49	16.6	0.38
030318	0.21	0.026	0.099	0.029	0.676	3.14	0.131	2.11	4.30	29.6	0.20
030325	0.23	0.022	0.049	0.065	0.086	0.98	0.126	0.85	4.70	10.6	1.08
030401	0.05	0.023	0.142	0.042	0.296	1.25	0.113	0.96	4.67	14.9	0.87
030408	0.11	0.031	0.119	0.067	0.599	1.76	0.188	2.13	4.45	23.9	1.63
030415	----	-----	-----	-----	0.116	0.50	1.800	1.17	5.16	6.9	0.07
030422	0.12	0.045	0.098	0.292	1.221	4.91	0.650	4.90	3.94	60.9	0.22
030429	0.20	0.028	0.058	0.084	0.319	1.37	0.144	1.39	4.57	15.9	0.15
030506	0.26	0.035	0.001	0.076	0.453	2.55	0.230	4.39	4.03	44.8	0.21
030513	0.31	0.057	0.143	0.163	0.670	1.88	0.316	2.56	4.42	23.1	0.82
030520	0.16	0.041	0.054	0.062	0.237	1.95	0.193	1.53	4.34	20.3	0.57
030527	0.14	0.020	0.101	0.042	0.475	1.71	0.106	2.88	4.24	27.8	1.22
030603	0.05	0.019	0.069	0.023	0.289	1.29	0.075	1.70	4.40	17.8	1.41
030610	0.06	0.019	0.047	0.043	0.291	1.30	0.072	1.87	4.37	19.6	0.90
030617	0.03	0.018	0.101	0.029	0.464	1.82	0.107	3.47	4.17	33.1	0.75
030624	0.02	0.021	0.003	0.031	0.160	0.83	0.060	0.68	4.72	8.4	2.19
030701	----	-----	-----	-----	-----	----	-----	----	----	----	0.01
030708	0.13	0.025	0.099	0.057	0.439	1.56	0.247	4.24	4.14	34.5	0.18
030715	0.10	0.028	0.075	0.104	0.402	2.10	0.211	3.05	4.17	29.3	0.79
030722	0.17	0.029	0.135	0.025	0.440	1.72	0.071	2.99	4.27	26.0	3.07
030729	0.05	0.010	0.039	0.023	0.720	1.24	0.668	1.32	4.51	15.0	1.05
030805	0.05	0.012	0.177	0.041	0.209	1.15	0.035	1.96	4.38	19.8	1.48
030812	0.05	0.006	0.016	0.031	0.450	1.38	0.079	5.11	3.95	46.7	4.85
030819	----	-----	-----	-----	-----	----	-----	----	----	----	0.04
030826	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030902	0.09	0.008	0.017	0.016	0.147	0.78	0.056	1.67	4.51	15.5	2.74
030909	0.20	0.034	0.014	0.057	0.353	1.95	0.124	2.47	4.33	22.1	0.65
030916	0.04	0.013	0.005	0.087	0.140	0.82	0.213	1.20	4.55	12.0	0.72
030923	0.06	0.046	0.104	0.331	0.202	0.64	0.565	1.29	4.65	13.4	0.59
030930	0.07	0.012	0.080	0.056	0.173	0.80	0.080	1.32	4.56	14.6	2.33
031007	0.23	0.040	0.134	0.188	0.259	1.50	0.197	1.11	4.76	15.5	0.38
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.03	0.011	0.153	0.035	0.138	0.94	0.105	0.92	4.58	11.5	0.77
031028	0.06	0.009	0.047	0.054	0.240	0.94	0.128	1.26	4.57	14.4	1.57
031104	0.05	0.001	0.056	0.065	0.013	1.26	0.109	1.29	4.40	19.1	0.41
031111	0.03	0.004	0.052	0.068	0.091	0.79	0.235	1.28	4.41	18.0	0.36
031118	0.12	0.017	0.037	0.044	0.419	1.91	0.103	1.39	4.51	18.2	0.19
031125	0.04	0.007	0.033	0.063	0.129	0.60	0.121	0.86	4.71	8.7	1.95
031202	0.07	0.019	0.006	0.058	0.039	0.82	0.032	0.92	4.69	9.3	0.56
031209	0.13	0.005	0.008	0.221	0.037	1.32	0.416	0.23	4.81	9.2	0.32
031216	0.03	0.002	0.002	0.061	0.001	1.01	0.106	0.65	4.60	12.0	2.19
031223	0.18	0.001	0.001	0.069	0.215	1.28	0.144	0.98	4.65	14.6	0.27
031230	0.03	0.001	0.001	0.034	0.106	0.55	0.016	0.80	4.73	10.8	0.91

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Laurel Hill State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.12	0.023	0.081	0.139	0.202	2.06	0.211	1.61	4.27	24.1	2.43
030114	0.34	0.046	0.001	0.161	0.468	3.00	0.412	1.13	4.56	16.2	0.38
030121	0.44	0.079	0.090	0.286	0.663	4.88	0.699	1.05	4.25	31.3	0.53
030128	0.28	0.092	0.005	0.468	0.515	4.00	1.061	1.13	4.28	29.9	0.40
030204	0.11	0.016	0.033	0.044	0.500	2.55	0.300	2.33	4.17	35.1	0.88
030211	----	-----	-----	-----	-----	----	-----	----	----	----	0.57
030218	0.05	0.018	0.011	0.063	0.024	0.47	0.102	0.24	5.03	4.3	2.35
030225	0.06	0.020	0.001	0.038	0.036	0.80	0.156	1.00	4.57	11.3	1.54
030304	0.15	0.032	0.205	0.233	0.287	3.47	0.425	2.06	4.19	32.0	0.33
030311	0.25	0.035	0.001	0.055	0.417	2.31	0.157	2.82	4.18	32.5	0.78
030318	0.43	0.042	0.072	0.086	0.916	3.81	0.352	4.76	4.03	50.3	0.18
030325	0.64	0.038	0.060	0.085	0.169	1.14	0.193	1.28	5.08	10.1	0.74
030401	0.31	0.035	0.047	0.070	0.404	2.13	0.269	2.00	4.36	28.3	0.66
030408	0.26	0.038	0.081	0.125	0.622	2.15	0.353	2.95	4.20	31.9	2.36
030415	0.18	0.032	0.056	0.056	0.140	1.50	0.223	1.79	4.34	22.4	0.23
030422	0.11	0.023	0.130	0.048	0.362	1.58	0.145	2.62	4.23	28.1	0.29
030429	0.25	0.049	0.290	0.272	0.683	4.05	0.547	4.19	3.96	54.1	0.13
030506	0.05	0.033	0.003	0.036	0.388	1.11	0.119	1.55	4.64	14.2	1.47
030513	0.25	0.038	0.105	0.092	0.349	1.40	0.250	2.87	4.27	28.5	5.24
030520	0.07	0.022	0.027	0.001	0.229	1.02	0.083	0.85	4.68	11.0	0.59
030527	0.14	0.025	0.008	0.035	0.222	1.68	0.076	1.97	4.33	23.2	1.98
030603	0.18	0.042	0.059	0.034	0.281	1.00	0.073	2.06	4.47	15.4	1.87
030610	0.02	0.011	0.037	0.031	0.193	0.65	0.026	1.18	4.58	12.4	3.22
030617	0.03	0.024	0.025	0.098	0.227	1.04	0.134	1.29	4.55	14.3	1.01
030624	0.13	0.020	0.001	0.056	0.407	1.64	0.117	2.21	4.35	21.5	2.11
030701	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030708	0.18	0.040	0.001	0.095	0.407	1.41	0.144	3.16	4.23	26.8	2.03
030715	0.09	0.019	0.075	0.033	0.241	1.19	0.076	2.48	4.28	22.1	1.47
030722	0.28	0.028	0.162	0.066	0.344	2.42	0.320	2.90	4.21	29.7	0.36
030729	0.15	0.024	0.098	0.085	2.230	2.42	4.366	5.16	3.90	46.1	1.05
030805	0.09	0.015	0.104	0.049	0.489	1.63	0.050	3.68	4.16	34.2	2.05
030812	0.21	0.011	0.021	0.036	0.374	3.58	0.247	7.87	3.72	76.4	0.46
030819	----	-----	-----	-----	-----	----	-----	----	4.06	59.2	0.02
030826	0.41	0.073	0.102	0.038	0.972	3.13	0.158	5.71	3.99	47.8	0.54
030902	0.20	0.017	0.090	0.046	0.439	1.83	0.144	4.16	4.13	37.2	2.66
030909	0.16	0.018	0.042	0.034	0.501	1.80	0.136	3.09	4.17	27.9	0.40
030916	0.01	0.006	0.047	0.058	0.086	0.22	0.111	0.65	4.87	5.8	2.00
030923	0.07	0.008	0.087	0.062	0.109	0.47	0.166	1.16	4.60	13.2	0.93
030930	0.14	0.027	0.065	0.063	0.314	1.43	0.132	3.02	4.23	30.2	1.12
031007	0.23	0.030	0.004	0.030	0.346	2.11	0.127	1.86	4.44	21.8	0.68
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.04
031021	0.11	0.024	0.276	0.044	0.180	1.49	0.098	1.48	4.50	16.7	1.98
031028	0.09	0.013	0.049	0.053	0.256	1.33	0.127	1.68	4.38	20.7	1.09
031104	0.12	0.008	0.054	0.092	0.188	2.07	0.202	2.41	4.18	30.2	0.33
031111	0.06	0.005	0.004	0.044	0.188	1.43	0.142	1.64	4.32	21.9	2.15
031118	0.39	0.040	0.081	0.052	0.650	2.32	0.213	2.06	4.57	19.4	0.45
031125	0.01	0.002	0.031	0.021	0.121	0.40	0.097	0.61	4.93	5.4	2.62
031202	0.08	0.017	0.003	0.055	0.361	1.80	0.396	1.62	4.30	22.0	0.73
031209	0.12	0.001	0.050	0.326	0.001	1.07	0.509	0.37	4.67	10.2	0.68
031216	0.10	0.005	0.027	0.073	0.167	1.87	0.187	1.57	4.31	25.1	1.73
031223	0.13	0.001	0.030	0.193	1.055	3.84	0.587	1.45	4.33	29.5	0.39
031230	0.04	0.001	0.003	0.097	0.135	0.97	0.120	1.08	4.48	15.0	0.81

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Little Buffalo State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.14	0.024	0.011	0.084	0.286	1.60	0.248	1.27	4.44	17.3	1.13
030114	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030121	0.50	0.088	0.031	0.263	0.576	3.77	0.386	0.87	4.58	19.6	0.09
030128	----	-----	-----	-----	1.164	6.58	0.983	1.39	4.10	47.2	0.07
030204	0.19	0.028	0.001	0.101	0.556	2.23	0.278	2.54	4.21	33.0	0.59
030211	0.20	0.028	0.024	0.064	0.334	2.37	0.237	1.17	4.37	22.3	0.40
030218	----	-----	-----	-----	-----	----	-----	----	----	----	2.65
030225	0.08	0.020	0.006	0.063	0.090	1.06	0.244	1.56	4.39	17.8	1.13
030304	0.28	0.080	0.151	0.295	0.547	5.09	0.602	2.91	4.04	45.2	0.20
030311	0.19	0.019	0.101	0.071	0.178	1.52	0.115	1.65	4.36	21.1	0.41
030318	0.27	0.041	0.001	0.090	0.980	4.48	0.274	5.01	3.96	59.8	0.42
030325	0.11	0.023	0.001	0.116	0.241	0.53	0.321	0.78	4.89	8.1	1.83
030401	0.19	0.023	0.117	0.067	0.464	1.34	0.168	2.10	4.49	18.6	0.85
030408	0.25	0.038	0.132	0.139	0.858	2.58	0.308	2.82	4.30	33.2	0.97
030415	0.14	0.022	0.073	0.071	0.202	1.32	0.119	1.67	4.46	18.1	0.75
030422	0.29	0.089	0.121	0.452	0.707	3.28	0.750	3.59	4.10	43.9	1.11
030429	----	-----	-----	-----	-----	----	-----	----	----	----	0.20
030506	0.54	0.077	0.108	0.084	1.247	3.41	0.215	4.64	4.28	36.4	0.51
030513	0.25	0.045	0.008	0.078	0.679	2.22	0.204	2.93	4.26	28.7	1.30
030520	0.27	0.072	0.014	0.246	0.603	2.42	0.403	2.15	4.44	21.5	1.13
030527	0.11	0.016	0.112	0.042	0.332	1.21	0.086	1.42	4.55	15.1	2.08
030603	0.18	0.038	0.001	0.114	0.643	2.49	0.113	3.41	4.19	31.3	0.66
030610	0.03	0.016	0.046	0.058	0.357	1.19	0.041	1.72	4.42	18.8	2.75
030617	0.53	0.090	0.022	0.180	1.494	5.33	0.436	5.35	4.12	50.8	0.08
030624	0.05	0.018	0.017	0.047	0.355	1.57	0.100	2.43	4.30	23.7	1.95
030701	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030708	0.25	0.071	0.215	0.350	0.242	2.46	0.245	3.36	4.20	33.0	0.08
030715	0.03	0.013	0.098	0.039	0.717	2.60	0.178	4.57	4.03	39.4	1.12
030722	0.36	0.044	0.081	0.027	0.900	2.67	0.069	4.91	4.12	38.7	0.70
030729	0.19	0.019	0.065	0.049	1.251	2.44	0.567	2.82	4.36	24.8	1.37
030805	0.09	0.016	0.135	0.063	0.344	1.57	0.108	2.04	4.38	20.7	0.73
030812	0.11	0.018	0.045	0.021	0.681	2.33	0.049	3.21	4.18	31.5	2.22
030819	0.14	0.023	0.197	0.026	0.820	1.81	0.025	3.45	4.32	24.4	1.31
030826	----	-----	-----	-----	-----	----	-----	----	4.51	38.5	0.01
030902	0.29	0.133	0.341	0.143	0.272	1.61	0.285	3.33	4.40	24.9	1.60
030909	0.06	0.008	0.042	0.031	0.371	2.24	0.194	2.92	4.11	33.2	1.83
030916	0.06	0.031	0.078	0.207	0.357	1.23	0.425	1.41	4.63	13.7	1.03
030923	0.08	0.051	0.201	0.293	0.072	0.62	0.478	1.24	4.59	13.8	3.30
030930	0.11	0.023	0.082	0.093	0.349	1.70	0.183	2.82	4.23	29.2	0.82
031007	0.28	0.053	0.216	0.035	0.448	2.56	0.177	1.92	4.50	21.3	0.46
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.09	0.020	0.057	0.041	0.340	1.79	0.120	2.30	4.32	23.1	1.78
031028	0.16	0.023	0.246	0.249	0.247	0.69	0.443	1.11	5.01	9.7	1.92
031104	----	-----	-----	-----	-----	----	-----	----	----	----	0.45
031111	0.04	0.038	0.508	0.063	0.978	1.86	0.270	1.99	5.11	18.7	0.56
031118	0.19	0.033	0.068	0.070	0.404	2.14	0.121	2.65	4.23	29.1	0.38
031125	----	-----	-----	-----	-----	----	-----	----	----	----	2.05
031202	0.07	0.019	0.014	0.148	0.442	1.17	0.135	1.84	4.53	17.6	0.85
031209	0.07	0.003	0.002	0.054	0.072	0.99	0.105	0.55	4.79	7.4	0.98
031216	0.02	0.002	0.002	0.114	0.137	0.81	0.167	0.66	4.72	10.4	3.04
031223	0.07	0.001	0.024	0.088	0.185	1.44	0.151	1.46	4.36	22.3	0.18
031230	0.05	0.001	0.001	0.104	0.291	1.47	0.139	1.98	4.27	23.7	0.91

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Little Pine State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.08	0.017	0.011	0.068	0.170	2.13	0.095	1.34	4.30	22.4	1.70
030114	0.31	0.126	0.067	0.204	0.578	4.02	0.346	1.24	4.42	20.1	0.09
030121	----	-----	-----	-----	-----	----	-----	----	----	----	0.02
030128	----	-----	-----	-----	-----	----	-----	----	3.90	93.0	0.03
030204	0.11	0.025	0.007	0.068	0.335	2.06	0.169	1.89	4.23	29.5	0.84
030211	0.17	0.033	0.009	0.063	0.334	3.20	0.271	1.19	4.27	27.8	0.21
030218	0.03	0.019	0.001	0.060	0.017	0.50	0.148	0.26	4.98	4.8	1.00
030225	0.51	0.127	0.107	0.127	0.019	1.79	0.337	1.40	4.49	16.7	0.75
030304	0.20	0.034	0.104	0.126	0.483	7.75	0.536	6.03	3.70	90.5	0.13
030311	0.19	0.045	0.088	0.074	0.249	3.43	0.183	1.62	4.18	31.5	0.23
030318	0.10	0.024	0.084	0.039	0.627	3.98	0.169	2.33	4.09	39.3	0.34
030325	0.16	0.023	0.034	0.109	0.118	0.71	0.159	1.15	4.71	10.6	1.25
030401	0.12	0.025	0.101	0.082	0.402	1.57	0.170	2.05	4.46	17.5	0.76
030408	0.26	0.054	0.062	0.099	0.831	2.76	0.228	3.10	4.30	27.1	1.46
030415	0.06	0.022	0.091	0.031	0.155	0.77	0.084	0.62	4.85	8.5	0.29
030422	0.54	0.108	0.193	0.171	1.604	6.08	0.371	6.39	3.91	59.1	0.60
030429	0.15	0.029	0.035	0.042	0.228	1.28	0.100	1.66	4.40	19.1	0.15
030506	0.22	0.051	0.001	0.042	0.316	1.77	0.128	1.46	4.53	17.6	0.19
030513	0.17	0.055	0.012	0.094	0.475	2.22	0.553	2.51	4.21	28.6	0.83
030520	0.30	0.105	0.001	0.208	0.241	3.55	0.485	4.76	3.86	50.3	0.65
030527	0.14	0.020	0.106	0.029	0.192	1.37	0.086	2.05	4.33	20.0	1.12
030603	0.05	0.031	0.161	0.017	0.394	1.27	0.121	2.21	4.43	18.4	1.52
030610	0.06	0.015	0.102	0.065	0.277	1.17	0.045	1.86	4.37	19.9	1.14
030617	0.02	0.019	0.127	0.067	0.353	2.04	0.116	3.62	4.03	38.3	0.97
030624	0.03	0.009	0.003	0.050	0.108	0.89	0.039	0.50	4.72	7.8	2.23
030701	----	-----	-----	-----	1.041	1.91	0.855	2.20	4.14	35.2	0.02
030708	0.08	0.013	0.023	0.010	0.178	1.04	0.064	2.90	4.16	31.3	0.24
030715	0.02	0.023	0.055	0.037	0.363	1.87	0.067	2.28	4.27	20.1	0.93
030722	0.13	0.027	0.103	0.028	0.404	1.67	0.026	2.21	4.38	20.6	1.76
030729	0.13	0.033	0.051	0.046	0.827	1.12	0.877	2.58	4.31	21.7	2.90
030805	0.10	0.013	0.154	0.050	0.082	1.25	0.011	1.11	4.55	14.1	1.39
030812	0.05	0.011	0.005	0.023	0.301	2.53	0.080	2.98	4.03	37.6	0.30
030819	0.27	0.038	0.108	0.028	0.900	2.01	0.112	3.82	4.28	29.5	0.43
030826	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030902	0.11	0.010	0.024	0.028	0.202	1.39	0.112	2.48	4.26	23.6	1.91
030909	0.08	0.005	0.029	0.028	0.187	1.23	0.105	1.97	4.32	19.5	1.55
030916	0.04	0.007	0.108	0.054	0.201	0.75	0.081	1.10	4.65	10.2	1.75
030923	0.06	0.083	0.117	0.640	0.146	0.47	1.133	0.94	4.79	12.3	1.28
030930	0.19	0.028	0.056	0.087	0.357	1.83	0.144	2.04	4.33	21.6	0.81
031007	0.28	0.044	0.093	0.033	0.374	2.63	0.077	1.76	4.45	22.2	0.50
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.02	0.011	0.025	0.031	0.440	1.64	0.063	1.89	4.48	22.9	1.78
031028	0.06	0.007	0.034	0.034	0.156	0.85	0.001	1.09	4.57	13.4	1.32
031104	0.10	0.004	0.084	0.062	0.013	1.24	0.099	1.69	4.29	21.2	0.37
031111	0.04	0.009	0.006	0.106	0.126	1.33	0.287	1.67	4.33	21.4	0.74
031118	0.11	0.013	0.021	0.033	0.459	3.17	0.138	2.39	4.16	35.5	0.27
031125	0.02	0.010	0.012	0.094	0.176	0.69	0.178	1.30	4.54	14.6	2.30
031202	0.02	0.012	0.025	0.059	0.307	1.10	0.090	1.39	4.47	16.9	0.85
031209	0.09	0.003	0.001	0.079	0.080	1.49	0.147	0.33	4.72	9.6	0.49
031216	0.02	0.001	0.023	0.066	0.017	1.11	0.130	0.77	4.54	15.0	2.42
031223	0.18	0.021	0.041	0.303	0.265	4.52	0.554	2.48	4.04	49.4	0.20
031230	0.02	0.001	0.007	0.019	0.097	0.56	0.039	0.71	4.69	10.8	0.90

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Presque Isle State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.12	0.022	0.027	0.040	0.299	1.65	0.133	1.18	4.52	16.4	1.07
030114	0.90	0.200	0.001	0.470	0.446	6.07	0.769	1.09	4.51	24.4	0.38
030121	0.73	0.209	0.036	0.458	0.630	6.98	0.814	1.31	4.34	33.8	0.26
030128	0.76	0.138	0.001	0.791	0.362	3.37	1.273	0.70	4.84	19.4	0.30
030204	0.65	0.058	0.001	0.265	0.495	3.41	0.387	2.70	4.24	35.7	0.41
030211	0.52	0.142	0.076	0.385	0.715	5.62	0.741	1.56	4.30	31.8	0.25
030218	0.32	0.076	0.001	0.316	0.075	1.61	0.738	0.61	4.78	12.9	0.54
030225	0.09	0.023	0.001	0.054	0.116	2.54	0.201	1.53	4.22	26.3	0.98
030304	0.19	0.038	0.043	0.120	0.577	4.99	0.304	3.09	4.01	46.3	0.13
030311	0.22	0.029	0.003	0.072	0.685	3.77	0.212	2.92	4.10	40.5	0.65
030318	0.21	0.030	0.006	0.058	0.831	4.01	0.182	1.91	4.37	26.8	0.25
030325	0.32	0.034	0.126	0.071	0.533	1.71	0.174	2.14	4.51	21.3	0.67
030401	0.24	0.040	0.095	0.084	0.613	2.07	0.188	2.47	4.37	27.6	1.58
030408	0.30	0.049	0.092	0.084	0.506	1.61	0.186	1.80	4.64	18.4	1.32
030415	----	-----	-----	-----	-----	----	-----	----	----	----	0.49
030422	0.60	0.139	0.439	0.141	0.886	2.92	0.234	4.43	4.29	35.6	0.66
030429	----	-----	-----	-----	-----	----	-----	----	----	----	0.01
030506	0.26	0.048	0.008	0.071	0.692	2.55	0.157	2.83	4.32	27.7	1.37
030513	0.37	0.069	0.154	0.138	0.656	2.88	0.289	3.14	4.26	30.5	0.79
030520	0.32	0.051	0.032	0.036	0.523	2.28	0.194	4.41	4.07	40.3	0.36
030527	0.49	0.565	0.663	0.112	0.361	2.13	0.153	8.06	4.14	31.9	1.49
030603	0.11	0.013	0.027	0.115	0.404	1.24	0.061	2.75	4.28	23.5	1.10
030610	0.15	0.050	0.069	0.042	0.859	5.17	0.152	7.34	3.81	75.6	0.46
030617	0.03	0.019	0.056	0.061	0.147	1.91	0.224	2.95	4.08	36.1	1.15
030624	0.11	0.028	0.051	0.027	0.260	1.42	0.079	1.22	4.62	13.6	0.65
030701	----	-----	-----	-----	-----	----	-----	----	----	----	0.13
030708	----	-----	-----	-----	-----	----	-----	----	----	----	0.94
030715	0.14	0.034	0.101	0.048	0.516	3.11	0.134	4.08	4.06	34.9	0.68
030722	0.19	0.042	0.024	0.031	0.367	2.01	0.065	2.22	4.34	22.7	1.42
030729	0.78	0.098	0.125	0.067	0.992	2.74	0.193	2.86	4.85	19.1	1.19
030805	0.17	0.020	0.101	0.041	0.392	2.06	0.092	4.89	3.99	48.4	2.13
030812	0.13	0.024	0.130	0.032	0.747	3.89	0.212	5.73	3.87	59.7	0.71
030819	----	-----	-----	-----	-----	----	-----	----	----	----	0.21
030826	0.64	0.069	0.134	0.071	0.808	2.96	0.097	3.00	4.45	25.1	0.22
030902	0.11	0.012	0.109	0.035	0.182	0.86	0.075	1.50	4.52	15.1	1.64
030909	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030916	0.09	0.015	0.058	0.044	0.245	1.18	0.111	2.02	4.36	18.8	0.72
030923	0.08	0.026	0.009	0.086	0.251	0.97	0.161	1.32	4.60	14.7	1.86
030930	0.12	0.020	0.004	0.031	0.357	1.50	0.093	1.86	4.41	19.6	2.87
031007	0.77	0.170	0.142	0.057	0.668	3.05	0.135	1.95	5.21	13.4	1.46
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.19	0.033	0.052	0.035	0.187	0.96	0.090	1.29	4.62	13.2	1.48
031028	0.20	0.033	0.019	0.041	0.618	3.01	0.109	2.93	4.11	39.0	1.18
031104	0.41	0.058	0.085	0.151	1.101	6.62	0.307	3.76	4.03	57.3	0.30
031111	0.22	0.045	0.046	0.151	0.182	3.36	0.402	3.02	4.10	45.7	0.11
031118	0.85	0.207	0.180	0.099	1.050	3.29	0.256	3.24	5.04	18.6	0.49
031125	0.31	0.159	0.011	0.183	0.285	1.15	0.969	1.76	4.56	14.7	0.67
031202	0.10	0.005	0.025	0.035	0.200	1.06	0.124	1.61	4.39	19.2	1.68
031209	----	-----	-----	-----	-----	----	-----	----	----	----	0.02
031216	0.16	0.002	0.071	0.091	0.358	2.72	0.216	2.12	4.22	31.5	0.75
031223	0.73	0.056	0.025	0.235	0.549	3.02	0.448	2.96	4.41	31.0	0.43
031230	0.07	0.001	0.001	0.087	0.250	2.08	0.140	1.32	4.33	20.9	1.51

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Slocum State Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.09	0.021	0.001	0.082	0.098	0.65	0.113	0.52	4.89	6.5	2.40
030114	----	-----	-----	-----	-----	----	-----	----	4.73	11.5	0.08
030121	----	-----	-----	-----	-----	----	-----	----	4.37	24.7	0.03
030128	----	-----	-----	-----	-----	----	-----	----	----	----	0.02
030204	0.16	0.022	0.003	0.058	0.161	1.68	0.164	1.95	4.23	29.0	0.78
030211	0.08	0.022	0.077	0.036	0.072	1.63	0.225	1.30	4.40	16.4	0.50
030218	----	-----	-----	-----	-----	----	-----	----	----	----	1.36
030225	0.13	0.027	0.004	0.078	0.037	0.92	0.156	1.29	4.58	13.1	0.79
030304	0.22	0.023	0.107	0.084	0.277	2.85	0.211	3.80	3.98	45.7	0.18
030311	0.10	0.016	0.001	0.037	0.008	0.90	0.083	0.56	4.63	11.0	0.33
030318	0.12	0.023	0.001	0.179	0.018	0.78	0.321	1.04	4.57	38.9	0.25
030325	0.11	0.014	0.052	0.089	0.133	0.71	0.211	0.59	4.83	7.8	1.14
030401	0.11	0.023	0.089	0.103	0.341	1.08	0.238	1.67	4.46	19.3	0.79
030408	0.09	0.030	0.087	0.088	0.546	1.99	0.206	1.86	4.45	23.4	1.11
030415	0.02	0.008	0.015	0.010	0.102	0.49	0.116	0.27	4.96	6.1	0.73
030422	0.60	0.097	0.058	0.191	1.598	5.12	0.502	7.37	3.96	63.6	0.52
030429	0.01	0.012	0.025	0.021	0.219	0.51	0.083	0.47	5.07	5.5	1.03
030506	0.62	0.117	0.341	0.112	1.562	5.03	0.438	7.63	3.97	64.1	0.16
030513	0.14	0.041	0.098	0.120	0.769	2.57	0.222	2.57	4.35	25.9	0.73
030520	0.17	0.045	0.058	0.222	0.240	1.74	0.200	1.46	4.56	16.3	0.25
030527	0.10	0.031	0.103	0.137	0.129	0.85	0.257	0.63	4.81	9.1	1.25
030603	----	-----	-----	-----	0.416	0.94	0.365	1.87	5.03	9.6	3.06
030610	0.03	0.017	0.039	0.006	0.201	1.18	0.034	1.17	4.50	15.1	1.25
030617	0.09	0.031	0.154	0.074	0.505	2.66	0.287	4.47	4.02	45.7	0.38
030624	0.04	0.007	0.041	0.034	0.269	0.62	0.047	0.67	5.06	7.4	4.00
030701	----	-----	-----	-----	1.323	3.86	0.607	5.42	4.37	36.0	0.03
030708	0.47	0.091	0.205	0.128	0.752	4.27	0.460	9.08	3.78	81.9	0.04
030715	0.02	0.014	0.033	0.044	0.403	2.32	0.051	3.37	4.12	30.9	0.93
030722	0.09	0.018	0.001	0.013	0.413	1.45	0.022	2.02	4.42	18.8	2.25
030729	0.08	0.021	0.001	0.032	0.535	1.58	0.224	2.46	4.28	23.8	1.08
030805	0.08	0.021	0.092	0.068	0.236	1.43	0.068	1.44	4.48	16.8	0.87
030812	0.05	0.006	0.002	0.033	0.355	1.91	0.086	2.77	4.12	28.1	4.92
030819	----	-----	-----	-----	-----	----	-----	----	4.18	38.9	0.55
030826	0.15	0.017	0.009	0.024	0.666	1.27	0.013	2.90	4.43	21.3	0.30
030902	0.05	0.006	0.064	0.029	0.137	0.97	0.081	1.64	4.46	17.5	3.59
030909	0.04	0.006	0.040	0.053	0.300	1.97	0.156	3.83	4.05	37.7	1.15
030916	0.03	0.011	0.134	0.076	0.080	0.82	0.140	0.65	4.76	7.8	1.33
030923	0.04	0.014	0.131	0.109	0.099	0.39	0.230	0.79	4.80	9.1	2.60
030930	0.14	0.026	0.086	0.122	0.381	1.85	0.241	2.83	4.22	30.7	0.55
031007	0.19	0.029	0.154	0.045	0.510	3.28	0.185	2.70	4.25	34.8	0.56
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031021	0.05	0.016	0.032	0.042	0.183	1.23	0.047	1.61	4.44	17.6	1.35
031028	0.05	0.010	0.010	0.038	0.140	0.77	0.143	1.16	4.60	13.4	2.25
031104	0.06	0.003	0.025	0.047	-----	0.73	0.120	1.01	4.59	11.6	1.20
031111	----	-----	-----	-----	-----	----	-----	----	----	----	0.55
031118	0.14	0.025	0.093	0.103	0.679	2.76	0.254	2.29	4.40	26.2	0.09
031125	0.04	0.017	0.051	0.138	0.129	0.55	0.208	0.90	4.73	9.2	1.52
031202	0.05	0.018	0.057	0.107	0.113	1.32	0.135	1.30	4.39	18.4	0.95
031209	0.03	0.002	0.068	0.051	0.001	0.55	0.086	0.26	5.04	4.5	0.62
031216	0.03	0.003	0.075	0.195	0.067	0.51	0.339	0.52	4.84	8.3	2.20
031223	0.05	0.011	0.004	0.265	0.276	2.36	0.431	1.67	4.26	31.4	0.50
031230	0.03	0.001	0.001	0.051	0.130	0.97	0.072	1.12	4.45	15.5	0.74

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Valley Forge National Park

Date Off	Concentrations (mg/L) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	pH	Spec. Cond. (umhos/cm)	Ppt. (Inches)
030107	0.01	0.059	0.049	0.421	0.183	0.78	0.656	1.27	4.51	16.6	1.83
030114	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030121	----	-----	-----	-----	-----	----	-----	----	----	----	0.05
030128	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030204	0.20	0.051	0.023	1.055	0.714	3.95	1.701	2.31	4.16	43.2	0.33
030211	0.17	0.064	0.327	0.524	0.238	1.23	0.889	1.11	4.78	14.8	0.20
030218	0.09	0.021	0.071	0.131	0.050	0.51	0.285	0.35	4.98	6.0	3.20
030225	0.09	0.022	0.001	0.048	0.019	0.42	0.109	0.68	4.86	6.8	2.30
030304	0.16	0.029	0.081	0.061	0.829	3.98	0.218	2.06	4.30	12.7	0.69
030311	----	-----	-----	-----	-----	----	-----	----	5.07	6.3	1.02
030318	----	-----	-----	-----	-----	----	-----	----	4.16	60.5	0.10
030325	0.11	0.104	0.092	0.731	0.174	0.52	1.240	1.00	4.95	12.1	1.50
030401	0.11	0.039	0.099	0.193	0.717	1.70	0.314	2.02	4.53	20.9	1.15
030408	0.18	0.041	0.031	0.663	0.370	1.01	0.969	0.93	5.01	13.6	0.58
030415	0.05	0.038	0.017	0.137	0.242	1.18	0.219	1.23	4.61	14.3	1.07
030422	0.13	0.053	0.090	0.258	0.777	3.51	0.498	4.78	3.95	56.8	0.22
030429	0.21	0.045	0.003	0.163	0.379	1.24	0.227	1.10	4.95	10.4	0.35
030506	----	-----	-----	-----	0.529	2.50	0.678	2.75	4.72	20.4	0.10
030513	0.27	0.062	0.153	0.067	2.145	3.77	0.216	5.46	4.32	38.2	0.72
030520	0.31	0.081	0.092	0.395	0.265	1.29	0.718	1.31	4.68	15.1	0.42
030527	0.06	0.017	0.046	0.078	0.161	0.69	0.078	0.86	4.76	9.9	2.60
030603	0.09	0.011	0.049	0.087	0.301	0.97	0.019	1.19	4.70	10.6	1.34
030610	0.03	0.019	0.074	0.052	0.254	1.04	0.047	1.23	4.56	14.7	2.67
030617	0.06	0.036	0.112	0.054	0.913	2.21	0.129	3.82	4.14	36.7	1.86
030624	0.11	0.017	0.078	0.037	0.307	1.21	0.084	1.88	4.47	18.0	3.34
030701	----	-----	-----	-----	2.338	5.99	1.034	13.61	3.80	96.1	0.04
030708	0.14	0.037	0.001	0.058	0.350	1.09	0.180	1.65	4.67	13.4	0.35
030715	0.12	0.059	0.085	0.194	0.429	2.70	0.347	3.40	4.21	28.5	0.24
030722	----	-----	-----	-----	-----	----	-----	----	----	----	0.36
030729	0.12	0.026	0.119	0.057	0.402	2.39	0.365	3.09	4.13	31.9	0.26
030805	0.06	0.022	0.085	0.072	0.237	0.95	0.086	1.96	4.45	18.3	2.50
030812	0.10	0.012	0.001	0.052	0.185	0.79	0.099	1.24	4.57	12.3	4.79
030819	0.35	0.038	0.162	0.146	0.371	4.48	0.255	3.40	3.96	43.6	0.12
030826	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
030902	0.09	0.021	0.044	0.039	0.604	1.66	0.105	2.70	4.32	22.6	1.53
030909	0.04	0.006	0.027	0.040	0.192	1.77	0.129	1.75	4.30	21.2	0.87
030916	0.05	0.042	0.056	0.320	0.103	0.63	0.622	0.62	4.88	7.9	2.69
030923	0.20	0.166	0.239	0.975	0.130	0.20	2.166	1.17	5.23	13.7	2.60
030930	0.06	0.027	0.014	0.144	0.166	0.65	0.308	1.38	4.61	14.7	0.72
031007	0.20	0.045	0.153	0.179	0.380	1.80	0.410	2.15	4.46	22.7	0.14
031014	----	-----	-----	-----	-----	----	-----	----	----	----	0.01
031021	0.10	0.013	0.049	0.065	0.113	0.78	0.068	0.93	4.66	10.4	1.90
031028	0.03	0.013	0.006	0.080	0.085	0.38	0.175	0.79	4.73	9.4	2.90
031104	0.01	0.003	0.031	0.027	0.091	0.27	0.012	0.42	5.13	3.7	1.74
031111	0.01	0.010	0.047	0.077	0.224	1.49	0.157	1.51	4.35	21.1	1.80
031118	0.09	0.014	0.067	0.121	0.279	2.47	0.211	1.65	4.26	27.7	0.53
031125	0.02	0.021	0.020	0.172	0.130	0.56	0.333	0.86	4.75	9.9	1.98
031202	----	-----	-----	-----	-----	----	-----	----	----	----	1.00
031209	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031216	----	-----	-----	-----	-----	----	-----	----	----	----	0.00
031223	0.04	0.015	0.001	0.270	0.146	0.53	0.480	1.66	4.53	18.8	1.03
031230	0.03	0.001	0.001	0.098	0.097	0.26	0.118	0.57	5.08	5.7	0.94

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Kane Experimental Forest - NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.89
030114	0.28	0.043	0.018	0.171	0.470	2.79	0.360	1.05	4.68	4.68	17.4	17.4	0.22
030121	0.18	0.028	0.012	0.231	0.100	3.83	0.600	0.46	4.26	4.26	28.5	28.5	0.10
030128	0.09	0.014	0.009	0.060	0.110	3.20	0.370	0.48	4.29	4.29	25.9	25.9	0.24
030204	0.11	0.011	0.011	0.046	0.280	1.81	0.130	2.39	4.29	4.29	28.3	28.3	1.33
030211	0.08	0.014	0.008	0.041	0.260	3.59	0.310	1.06	4.26	4.26	29.8	29.8	0.34
030218	0.04	0.009	0.002	0.034	0.030	1.46	0.120	0.17	4.66	4.66	11.0	11.0	0.86
030225	0.10	0.007	0.008	0.030	0.120	1.54	0.080	1.80	4.33	4.33	23.9	23.9	1.10
030304	0.14	0.017	0.018	0.067	0.600	5.24	0.340	3.91	3.96	3.96	59.4	59.4	0.29
030311	0.19	0.023	0.048	0.046	0.460	3.24	0.210	2.67	4.20	4.20	38.1	38.1	0.62
030318	0.29	0.026	0.014	0.046	0.700	3.77	0.140	2.82	4.27	4.27	36.5	36.5	0.26
030325	0.26	0.017	0.037	0.053	0.200	1.36	0.170	1.95	4.42	4.42	21.6	21.6	1.40
030401	0.25	0.030	0.020	0.049	0.480	2.35	0.140	2.27	4.43	4.43	26.4	26.4	0.59
030408	0.30	0.042	0.023	0.090	0.540	1.88	0.180	2.71	4.42	4.42	24.2	24.2	2.13
030415	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030422	0.12	0.019	0.022	0.069	0.280	1.72	0.150	2.99	4.25	4.25	32.5	32.5	0.40
030429	0.08	0.011	0.009	0.012	0.350	1.11	0.050	1.37	4.68	4.68	14.7	14.7	0.10
030506	0.18	0.028	0.038	0.032	0.470	2.23	0.160	3.57	4.18	4.18	38.8	38.8	1.19
030513	0.12	0.023	0.081	0.062	0.280	1.26	0.120	1.64	4.51	4.51	18.3	18.3	1.55
030520	0.10	0.015	0.012	0.021	0.410	1.92	0.090	2.38	4.29	4.29	28.1	28.1	0.47
030527	0.07	0.010	0.007	0.020	0.160	1.14	0.080	2.02	4.32	4.32	24.7	24.7	1.47
030603	0.08	0.016	0.016	0.005	0.570	1.79	0.080	3.26	4.21	4.21	33.5	33.5	1.77
030610	0.04	0.007	0.011	0.005	0.230	1.11	0.040	2.62	4.28	4.28	27.9	27.9	1.29
030617	0.06	0.008	0.010	0.032	0.260	1.74	0.140	2.94	4.15	4.15	34.9	34.9	0.93
030624	0.07	0.009	0.002	0.005	0.390	2.55	0.100	2.45	4.20	4.20	33.9	33.9	0.84
030701	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.07
030708	0.43	0.056	0.045	0.038	1.040	5.11	0.230	7.49	3.85	3.85	78.5	78.5	0.10
030715	0.11	0.018	0.014	0.023	0.450	2.25	0.140	4.82	4.00	4.00	50.2	50.2	0.52
030722	0.12	0.020	0.058	0.009	0.370	1.61	0.100	3.94	4.15	4.15	39.6	39.6	4.20
030729	0.11	0.013	0.010	0.008	0.260	0.89	0.040	2.15	4.41	4.41	21.3	21.3	3.17
030805	0.08	0.012	0.011	0.008	0.280	1.48	0.170	5.72	3.94	3.94	57.6	57.6	2.67
030812	0.05	0.007	0.005	0.003	0.240	1.50	0.090	3.48	4.13	4.13	38.3	38.3	1.56
030819	0.06	0.010	0.007	0.005	0.480	1.07	0.040	2.41	4.44	4.44	20.6	20.6	0.40
030826	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.18
030902	0.05	0.007	0.006	0.004	0.180	0.86	0.040	1.83	4.42	4.42	19.6	19.6	2.18
030909	0.12	0.027	0.013	0.020	0.330	1.74	0.050	2.12	4.38	4.38	23.7	23.7	0.71
030916	0.04	0.007	0.005	0.022	0.170	1.05	0.120	3.10	4.19	4.19	33.2	33.2	0.27
030923	0.02	0.005	0.009	0.039	0.080	0.48	0.080	1.02	4.69	4.69	12.4	12.4	2.10
030930	0.22	0.025	0.021	0.011	0.360	1.66	0.070	2.86	4.32	4.32	29.0	29.0	1.09
031007	0.26	0.042	0.017	0.006	0.360	2.07	0.080	1.69	4.52	4.52	19.8	19.8	1.03
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.03
031021	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.85
031028	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.80
031104	0.20	0.036	0.033	0.156	0.820	5.05	0.430	5.57	3.89	3.89	70.6	70.6	0.42
031111	0.07	0.016	0.025	0.086	0.250	1.52	0.200	2.55	4.21	4.21	30.7	30.7	0.75
031118	0.10	0.012	0.018	0.016	0.330	1.71	0.070	1.89	4.36	4.36	23.8	23.8	1.30
031125	0.03	0.006	0.006	0.023	0.120	0.56	0.050	0.80	4.76	4.76	10.1	10.1	2.78
031202	0.08	0.014	0.009	0.021	0.170	0.93	0.060	1.10	4.61	4.61	13.7	13.7	1.40
031209	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.32
031216	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.52
031223	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.72
031230	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.20

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Leading Ridge - NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	0.01	0.003	0.004	0.011	0.060	0.90	0.060	1.11	4.51	4.72	16.0	16.6	2.12
030114	0.25	0.043	0.015	0.091	0.340	2.50	0.500	0.90	4.59	4.59	18.6	18.6	0.07
030121	0.61	0.099	0.015	0.308	0.210	4.42	0.440	0.64	4.58	4.73	23.6	28.6	0.13
030128	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.02
030204	0.09	0.008	0.007	0.037	0.290	1.82	0.110	2.18	4.28	4.48	27.1	28.7	0.88
030211	0.13	0.020	0.007	0.045	0.280	2.81	0.170	1.15	4.39	4.45	23.0	25.9	0.39
030218	0.04	0.005	0.002	0.022	0.010	0.76	0.070	0.24	4.81	4.93	7.5	8.4	1.76
030225	0.02	0.004	0.004	0.015	0.090	1.42	0.060	1.34	4.37	4.56	20.8	20.4	1.04
030304	0.30	0.032	0.012	0.152	0.750	9.18	0.560	5.11	3.73	3.83	97.0	103.4	0.14
030311	0.16	0.014	0.002	0.030	0.160	2.28	0.090	1.65	4.34	4.45	26.6	28.5	0.42
030318	0.30	0.030	0.018	0.057	0.880	4.18	0.170	4.82	4.04	4.10	54.8	58.7	0.22
030325	0.25	0.019	0.026	0.123	0.110	0.69	0.220	1.03	4.87	4.99	10.1	11.4	1.11
030401	0.14	0.018	0.014	0.033	0.260	1.09	0.100	1.57	4.57	4.56	17.3	19.0	0.87
030408	0.16	0.024	0.016	0.080	0.550	2.12	0.150	2.56	4.35	4.44	27.4	29.4	1.68
030415	0.03	0.006	0.004	0.016	0.060	0.57	0.050	0.91	4.65	4.75	11.8	12.4	0.44
030422	0.20	0.049	0.024	0.212	0.980	3.60	0.290	3.55	4.26	4.32	37.7	42.3	0.31
030429	0.20	0.038	0.024	0.016	0.230	1.53	0.070	1.76	4.48	4.43	20.5	24.0	0.48
030506	0.17	0.032	0.106	0.032	0.470	1.46	0.100	2.67	4.41	4.38	24.8	26.0	0.58
030513	0.23	0.040	0.086	0.076	0.410	2.16	0.200	3.27	4.21	4.26	36.0	35.7	1.76
030520	0.15	0.035	0.022	0.081	0.550	1.87	0.180	2.35	4.42	4.47	24.7	25.1	0.94
030527	0.11	0.015	0.028	0.019	0.350	1.83	0.080	2.17	4.32	4.33	26.3	28.7	1.13
030603	0.16	0.025	0.028	0.005	0.570	2.30	0.120	3.16	4.23	4.21	35.1	36.3	1.15
030610	0.03	0.007	0.020	0.002	0.170	0.94	0.040	1.28	4.52	4.57	16.2	16.2	2.27
030617	0.19	0.027	0.030	0.090	0.650	3.94	0.340	5.18	3.91	3.95	60.8	61.0	0.14
030624	0.05	0.007	0.011	0.005	0.220	1.36	0.050	1.68	4.35	4.36	21.9	17.8	1.20
030701	0.13	0.022	0.030	0.017	0.630	2.01	0.080	1.75	4.53	4.50	19.5	23.6	0.06
030708	0.13	0.015	0.023	0.011	0.670	2.03	0.150	5.81	3.99	4.02	55.6	54.3	1.42
030715	0.04	0.005	0.007	0.011	0.280	1.43	0.060	1.92	4.34	4.38	21.7	23.3	2.00
030722	0.15	0.022	0.025	0.016	0.420	1.24	0.070	2.69	4.37	4.42	25.0	24.8	1.10
030729	0.15	0.018	0.025	0.007	0.340	1.78	0.100	3.83	4.12	4.14	39.8	54.0	0.73
030805	0.03	0.005	0.006	0.005	0.240	0.93	0.050	1.64	4.48	4.57	17.9	17.9	4.06
030812	0.03	0.005	0.010	0.005	0.390	1.12	0.060	2.49	4.35	4.40	24.9	25.1	1.08
030819	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.01
030826	0.40	0.064	0.050	0.033	0.640	2.90	0.160	4.82	4.10	4.10	45.3	49.7	0.16
030902	0.06	0.010	0.011	0.010	0.270	1.11	0.070	2.67	4.30	4.30	27.8	28.3	4.50
030909	0.05	0.009	0.011	0.006	0.280	1.26	0.100	2.66	4.28	4.33	29.1	28.8	1.16
030916	0.05	0.010	0.013	0.051	0.520	1.08	0.120	2.80	4.37	4.42	24.7	25.7	0.75
030923	0.05	0.012	0.014	0.091	0.080	0.52	0.180	1.02	4.66	4.72	12.4	12.7	2.45
030930	0.09	0.009	0.009	0.027	0.360	0.88	0.060	1.57	4.61	4.64	15.0	15.4	1.21
031007	0.20	0.031	0.019	0.007	0.410	2.08	0.070	2.12	4.36	4.45	24.7	25.1	0.54
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
031021	0.10	0.020	0.081	0.007	0.280	1.78	0.090	2.27	4.30	4.33	27.3	26.6	1.47
031028	0.08	0.009	0.019	0.025	0.280	1.33	0.050	2.14	4.35	4.44	23.5	24.2	1.15
031104	0.15	0.031	0.018	0.128	0.190	2.94	0.330	3.34	4.05	4.02	43.5	44.0	0.12
031111	0.05	0.015	0.009	0.074	0.340	2.08	0.170	2.07	4.27	4.31	27.8	28.8	0.74
031118	0.10	0.018	0.046	0.021	0.270	2.58	0.120	3.21	4.10	4.14	40.2	42.0	0.27
031125	0.05	0.015	0.013	0.095	0.210	0.78	0.180	1.30	4.63	4.60	14.7	15.4	2.35
031202	0.04	0.007	0.012	0.032	0.330	1.03	0.090	1.95	4.44	4.41	21.4	21.6	0.74
031209	0.08	0.010	0.003	0.024	0.050	1.15	0.130	0.29	4.72	4.88	9.9	10.7	0.62
031216	0.02	0.003	0.002	0.024	0.040	0.67	0.060	0.57	4.68	4.71	10.1	10.3	2.24
031223	0.09	0.014	0.025	0.104	0.120	2.18	0.230	1.13	4.35	4.28	23.8	26.7	0.18
031230	0.04	0.007	0.009	0.046	0.100	0.90	0.100	1.25	4.53	4.47	17.0	18.6	0.79

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Milford - Forest Service - NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	0.02	0.005	0.003	0.039	0.050	0.70	0.090	0.41	4.81	4.76	10.5	9.9	2.38
030114	0.19	0.026	0.016	0.157	0.580	5.10	0.410	1.98	4.17	4.10	40.4	40.4	0.13
030121	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.05
030128	0.15	0.014	0.024	0.359	0.350	3.34	0.700	0.75	4.46	4.46	21.5	21.5	0.05
030204	0.33	0.046	0.022	0.389	0.560	4.13	0.660	4.04	4.08	4.01	49.8	54.4	0.19
030211	0.03	0.006	0.003	0.046	0.150	1.64	0.160	0.86	4.49	4.47	17.4	17.7	0.48
030218	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.36
030225	0.18	0.013	0.017	0.047	0.080	0.81	0.090	1.29	4.63	4.60	13.3	15.0	1.26
030304	0.04	0.005	0.002	0.025	0.160	1.16	0.090	1.25	4.48	4.41	17.5	18.3	0.45
030311	0.03	0.007	0.002	0.041	0.080	0.83	0.080	0.90	4.60	4.53	12.6	13.7	0.58
030318	0.35	0.038	0.012	0.176	0.980	5.92	0.380	2.85	4.10	4.08	48.2	46.2	0.31
030325	0.08	0.029	0.015	0.258	0.070	0.77	0.450	0.78	4.75	4.62	12.1	12.2	1.45
030401	0.13	0.071	0.029	0.536	0.290	1.26	0.970	1.71	4.53	4.47	21.3	22.2	1.19
030408	0.16	0.022	0.012	0.079	0.350	1.75	0.180	1.54	4.52	4.44	19.3	19.6	0.80
030415	0.03	0.017	0.011	0.128	0.050	0.41	0.230	0.63	4.79	4.65	8.9	12.2	0.47
030422	0.30	0.087	0.031	0.400	0.600	4.32	0.670	4.10	4.02	3.92	53.0	63.7	0.11
030429	0.13	0.017	0.008	0.072	0.350	2.22	0.170	2.49	4.24	4.17	32.6	32.4	0.19
030506	0.34	0.067	0.071	0.096	0.450	3.49	0.230	3.02	4.21	4.16	38.4	35.9	0.12
030513	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.31
030520	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030527	0.06	0.051	0.087	0.027	0.280	0.55	0.050	0.58	5.75	5.37	6.0	5.2	3.08
030603	0.07	0.012	0.030	0.012	0.460	1.34	0.070	2.06	4.45	4.47	21.1	22.7	2.58
030610	0.03	0.005	0.020	0.004	0.230	1.05	0.030	1.27	4.53	4.47	16.4	16.8	1.92
030617	0.06	0.010	0.040	0.022	0.460	3.14	0.100	2.87	4.10	4.06	40.6	40.4	0.89
030624	0.03	0.005	0.016	0.012	0.240	1.18	0.040	1.44	4.44	4.40	18.0	18.1	4.00
030701	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030708	0.28	0.028	0.051	0.008	0.160	1.76	0.070	2.27	4.33	4.18	26.0	29.1	0.10
030715	0.12	0.021	0.033	0.050	0.740	2.69	0.180	3.96	4.13	4.10	39.9	43.2	0.24
030722	0.15	0.030	0.090	0.013	0.360	1.72	0.110	3.28	4.20	4.17	33.9	34.1	1.66
030729	0.16	0.016	0.018	0.010	0.300	1.64	0.070	2.22	4.30	4.26	26.1	25.8	0.72
030805	0.03	0.007	0.008	0.035	0.180	1.39	0.100	1.88	4.32	4.27	24.1	23.8	1.94
030812	0.04	0.008	0.006	0.024	0.190	1.59	0.080	1.42	4.42	4.32	20.7	20.4	2.76
030819	0.07	0.008	0.023	0.007	0.230	0.42	0.020	0.60	4.99	4.94	7.0	7.3	0.29
030826	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030902	0.02	0.002	0.005	0.013	0.120	0.92	0.050	1.58	4.40	4.40	19.6	20.6	2.50
030909	0.02	0.004	0.006	0.019	0.230	2.40	0.100	2.78	4.14	4.08	38.8	39.5	0.37
030916	0.06	0.062	0.028	0.525	0.090	0.90	0.940	0.83	4.68	4.59	15.1	14.9	1.25
030923	0.03	0.029	0.014	0.228	0.120	0.39	0.400	0.89	4.86	4.84	10.2	10.8	4.02
030930	0.07	0.022	0.011	0.150	0.170	0.99	0.260	1.05	4.62	4.58	14.4	15.7	1.18
031007	0.08	0.014	0.013	0.037	0.280	1.52	0.090	2.27	4.34	4.32	25.1	26.0	0.34
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
031021	0.05	0.010	0.006	0.029	0.120	0.96	0.060	0.62	4.71	4.65	10.5	10.4	1.72
031028	0.03	0.005	0.005	0.041	0.070	0.38	0.080	0.65	4.85	4.74	8.0	8.2	3.26
031104	0.01	0.002	0.004	0.004	0.020	0.22	0.020	0.29	5.12	5.00	4.6	4.5	1.89
031111	0.08	0.014	0.009	0.058	0.170	1.77	0.140	2.38	4.26	4.13	30.0	32.3	0.64
031118	0.16	0.035	0.052	0.094	0.900	5.61	0.290	3.55	4.01	3.69	54.3	54.0	0.09
031125	0.03	0.020	0.013	0.203	0.070	0.66	0.350	0.80	4.69	4.58	11.8	11.8	2.70
031202	0.03	0.007	0.011	0.072	0.180	0.90	0.130	1.05	4.67	4.47	14.0	10.5	1.70
031209	0.05	0.006	0.005	0.098	0.030	0.84	0.160	0.09	4.91	4.80	6.7	7.3	0.45
031216	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	2.95
031223	0.02	0.006	0.004	0.064	0.080	0.61	0.130	0.99	4.59	4.36	13.4	14.0	0.83
031230	0.02	0.006	0.004	0.073	0.040	0.42	0.120	0.37	4.95	4.72	6.7	6.6	1.77

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Pennsylvania State University - NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	0.04	0.004	0.004	0.013	0.070	0.94	0.090	0.90	4.56	4.50	14.3	13.9	2.05
030114	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.01
030121	0.29	0.041	0.012	0.163	0.250	4.53	0.430	0.68	4.31	4.27	31.8	30.8	0.10
030128	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.02
030204	0.07	0.006	0.007	0.034	0.230	1.60	0.110	1.96	4.33	4.33	24.7	22.8	0.80
030211	0.10	0.011	0.006	0.025	0.190	3.03	0.150	0.75	4.40	4.33	23.5	23.8	0.33
030218	0.04	0.004	0.002	0.016	0.010	0.62	0.080	0.15	5.00	5.01	5.7	5.6	1.38
030225	0.01	0.002	0.003	0.009	0.060	0.97	0.080	1.47	4.38	4.36	19.3	18.1	0.98
030304	0.22	0.022	0.019	0.095	0.630	5.94	0.260	4.02	3.93	3.88	65.1	66.1	0.22
030311	0.12	0.010	0.008	0.025	0.130	1.68	0.080	0.90	4.50	4.44	16.9	17.1	0.42
030318	0.18	0.020	0.012	0.041	0.560	2.88	0.130	3.25	4.19	4.11	39.2	39.4	0.41
030325	0.20	0.021	0.022	0.106	0.110	0.67	0.200	1.20	4.72	4.62	12.5	13.1	1.40
030401	0.14	0.013	0.015	0.033	0.220	1.15	0.100	1.48	4.51	4.62	16.8	19.2	0.90
030408	0.14	0.021	0.016	0.074	0.380	1.62	0.200	2.02	4.45	4.38	21.7	23.4	1.62
030415	0.05	0.006	0.007	0.020	0.050	0.46	0.040	0.86	4.69	4.62	10.2	11.6	0.73
030422	0.50	0.083	0.039	0.247	0.970	4.32	0.400	4.43	4.16	4.12	43.3	52.4	0.14
030429	0.24	0.036	0.010	0.014	0.580	2.10	0.090	3.11	4.33	4.24	30.9	33.4	0.52
030506	0.09	0.015	0.034	0.022	0.320	0.94	0.060	1.66	4.55	4.46	16.2	18.1	0.54
030513	0.26	0.041	0.060	0.070	0.340	2.16	0.170	3.08	4.21	4.25	34.2	34.0	1.16
030520	0.17	0.037	0.023	0.090	0.510	1.97	0.210	2.49	4.32	4.33	27.6	27.2	1.05
030527	0.10	0.014	0.015	0.014	0.410	1.70	0.090	2.35	4.33	4.27	26.7	27.0	1.02
030603	0.18	0.025	0.037	0.006	0.420	1.92	0.120	2.62	4.26	4.27	29.8	29.5	1.58
030610	0.04	0.005	0.012	0.004	0.220	0.95	0.070	1.68	4.45	4.41	18.9	19.5	2.45
030617	0.10	0.017	0.023	0.040	0.330	2.75	0.220	4.96	3.92	3.97	57.2	57.8	0.45
030624	0.03	0.004	0.006	0.003	0.160	1.27	0.050	1.62	4.37	4.35	22.1	21.3	1.93
030701	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.01
030708	0.10	0.025	0.016	0.009	0.580	1.85	0.140	4.33	4.08	4.08	42.3	41.5	0.79
030715	0.02	0.002	0.003	0.007	0.260	1.24	0.030	1.60	4.41	4.44	20.1	19.5	1.58
030722	0.17	0.023	0.020	0.008	0.280	1.64	0.120	3.27	4.20	4.16	34.4	33.6	1.74
030729	0.11	0.011	0.016	0.008	0.260	1.76	0.110	3.72	4.10	4.11	39.6	40.4	0.81
030805	0.07	0.008	0.008	0.006	0.270	1.12	0.060	1.64	4.48	4.40	18.6	18.5	3.75
030812	0.11	0.010	0.008	0.003	0.370	1.63	0.090	4.66	4.04	4.07	45.7	45.4	1.28
030819	0.12	0.015	0.010	0.006	0.540	0.80	0.070	3.29	4.34	4.38	26.1	24.8	0.89
030826	0.31	0.045	0.016	0.013	0.280	2.23	0.070	2.34	4.31	4.11	28.5	41.4	0.22
030902	0.06	0.008	0.006	0.005	0.200	1.03	0.070	2.56	4.28	4.24	27.1	27.3	5.04
030909	0.08	0.015	0.012	0.015	0.420	1.88	0.100	3.47	4.14	4.14	37.4	37.5	0.76
030916	0.03	0.008	0.006	0.039	0.270	0.65	0.080	1.54	4.60	4.55	14.6	15.7	1.50
030923	0.06	0.013	0.059	0.138	0.010	0.62	0.240	1.20	4.79	4.70	12.5	12.5	2.99
030930	0.07	0.028	0.052	0.020	0.300	0.76	0.060	1.52	4.70	4.70	13.7	14.0	1.63
031007	0.18	0.026	0.021	0.017	0.390	2.41	0.100	2.23	4.32	4.28	27.8	27.8	0.54
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
031021	0.10	0.025	0.645	0.007	0.180	1.41	0.070	2.05	4.49	4.45	20.2	21.1	1.36
031028	0.06	0.006	0.009	0.017	0.210	1.10	0.040	1.76	4.44	4.34	20.0	22.1	1.43
031104	0.15	0.019	0.014	0.059	0.280	2.63	0.220	2.46	4.23	4.21	34.4	35.5	0.13
031111	0.06	0.017	0.011	0.082	0.250	1.60	0.160	1.92	4.33	4.31	24.6	25.6	0.76
031118	0.12	0.022	0.020	0.022	0.410	2.38	0.160	3.29	4.16	4.08	38.3	39.0	0.26
031125	0.04	0.010	0.007	0.072	0.230	0.70	0.140	1.20	4.68	4.65	13.1	14.0	3.38
031202	0.03	0.006	0.008	0.017	0.250	0.83	0.070	1.52	4.47	4.45	17.6	17.4	0.89
031209	0.09	0.009	0.026	0.076	0.060	1.09	0.190	0.29	4.80	4.72	9.7	10.4	0.67
031216	0.02	0.002	0.002	0.017	0.030	0.60	0.080	0.47	4.71	4.68	9.2	9.0	2.62
031223	0.08	0.012	0.018	0.079	0.100	1.79	0.160	0.85	4.47	4.47	18.5	18.4	0.26
031230	0.03	0.005	0.007	0.045	0.140	0.97	0.100	1.07	4.50	4.48	16.6	16.2	1.12

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Arendtsville - NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	0.04	0.012	0.004	0.061	0.240	1.34	0.230	1.65	4.41	4.40	21.2	18.2	1.98
030114	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030121	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.01
030128	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.01
030204	0.06	0.006	0.005	0.036	0.530	1.82	0.200	2.68	4.33	4.27	29.1	30.2	0.56
030211	0.04	0.004	0.002	0.012	0.050	1.34	0.060	0.30	4.67	4.62	11.3	11.9	0.27
030218	0.06	0.007	0.006	0.023	0.040	0.65	0.100	0.21	5.03	4.95	5.9	5.0	2.09
030225	0.01	0.002	0.002	0.008	0.140	0.60	0.060	1.10	4.63	4.58	12.8	12.0	1.24
030304	0.06	0.008	0.004	0.052	0.120	1.45	0.170	1.55	4.38	4.35	22.7	22.8	0.38
030311	0.86	0.053	0.037	0.078	0.410	2.99	0.140	3.44	4.35	4.01	31.4	34.8	0.62
030318	0.24	0.025	0.013	0.052	0.780	3.36	0.190	4.47	4.08	4.02	49.3	45.2	0.10
030325	0.13	0.044	0.020	0.365	0.140	0.43	0.650	0.98	4.96	4.96	10.2	10.4	1.70
030401	0.16	0.018	0.013	0.050	0.440	1.58	0.110	2.16	4.44	4.34	22.2	22.5	0.75
030408	0.09	0.020	0.016	0.079	0.540	1.88	0.150	2.02	4.45	4.40	21.5	24.3	0.87
030415	0.03	0.006	0.002	0.030	0.300	1.39	0.080	1.72	4.38	4.40	21.4	21.1	0.69
030422	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.75
030429	0.08	0.012	0.014	0.015	0.900	1.61	0.090	2.57	4.57	4.50	20.8	23.5	0.35
030506	0.09	0.015	0.014	0.029	0.400	1.19	0.080	2.40	4.41	4.32	23.3	25.9	0.67
030513	0.32	0.045	0.074	0.077	0.730	2.56	0.170	3.64	4.24	4.24	35.0	34.4	0.95
030520	0.08	0.025	0.019	0.133	0.650	1.64	0.240	2.24	4.50	4.40	21.9	23.3	2.95
030527	0.04	0.007	0.009	0.026	0.420	1.12	0.060	1.26	4.70	4.71	13.3	13.0	1.61
030603	0.26	0.023	0.041	0.012	0.780	2.16	0.100	3.16	4.36	4.33	28.7	29.6	1.30
030610	0.04	0.006	0.015	0.008	0.450	1.19	0.070	2.02	4.43	4.41	20.7	21.0	4.28
030617	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.47
030624	0.05	0.009	0.025	0.014	0.360	1.36	0.090	2.78	4.23	4.24	29.0	29.7	2.07
030701	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030708	0.11	0.011	0.022	0.008	0.560	1.31	0.080	3.50	4.26	4.21	30.7	31.3	0.60
030715	0.16	0.023	0.016	0.034	0.710	2.46	0.140	4.51	4.06	4.11	44.9	45.0	0.40
030722	0.28	0.032	0.009	0.014	0.550	1.74	0.110	3.98	4.19	4.19	36.3	36.6	0.35
030729	0.20	0.020	0.010	0.005	0.510	2.72	0.100	2.92	4.21	3.99	34.8	39.0	0.25
030805	0.11	0.019	0.012	0.059	0.650	2.06	0.220	4.73	4.07	4.07	46.2	46.4	0.47
030812	0.22	0.016	0.016	0.012	0.640	2.44	0.090	3.59	4.23	4.18	35.8	37.2	1.00
030819	0.20	0.029	0.012	0.007	0.780	1.94	0.100	4.99	4.11	4.10	43.4	43.9	0.56
030826	0.32	0.039	0.019	0.009	0.470	2.26	0.080	4.04	4.14	4.05	39.9	47.8	0.18
030902	0.09	0.009	0.007	0.009	0.300	1.04	0.060	2.45	4.33	4.38	24.5	25.6	1.50
030909	0.10	0.018	0.011	0.035	0.540	2.87	0.150	3.59	4.10	4.09	42.2	42.4	0.61
030916	0.07	0.017	0.011	0.117	0.460	1.11	0.260	2.44	4.44	4.40	23.0	23.4	1.03
030923	0.09	0.037	0.019	0.277	0.170	0.64	0.480	1.20	4.69	4.65	13.5	13.2	3.04
030930	0.11	0.020	0.017	0.078	0.420	1.59	0.160	3.60	4.21	4.17	34.7	35.8	0.76
031007	0.06	0.009	0.008	0.010	0.180	1.24	0.040	1.58	4.46	4.43	20.0	19.7	0.42
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
031021	0.07	0.011	0.012	0.018	0.350	1.60	0.080	1.92	4.43	4.30	22.3	22.5	1.48
031028	0.04	0.007	0.005	0.021	0.180	0.64	0.060	1.19	4.64	4.50	12.5	12.8	1.07
031104	0.02	0.002	0.003	0.003	0.030	0.41	0.010	0.42	4.88	4.68	7.3	7.0	0.48
031111	0.04	0.012	0.008	0.060	0.410	2.14	0.180	2.39	4.23	4.20	30.0	29.6	0.45
031118	0.15	0.018	0.021	0.017	0.230	1.68	0.040	1.99	4.36	4.23	23.5	22.7	0.55
031125	0.07	0.036	0.017	0.293	0.240	0.98	0.520	1.42	4.56	4.56	16.3	16.9	1.50
031202	0.10	0.017	0.014	0.053	0.410	1.51	0.120	2.29	4.37	4.28	25.3	26.1	0.55
031209	0.07	0.008	0.009	0.019	0.200	0.84	0.170	0.63	4.83	4.81	10.2	10.0	0.82
031216	0.03	0.014	0.007	0.141	0.130	0.74	0.310	1.01	4.60	4.58	14.2	14.2	2.85
031223	0.08	0.012	0.009	0.053	0.130	1.19	0.160	2.23	4.33	4.29	25.0	24.1	0.14
031230	0.08	0.025	0.018	0.175	0.280	1.83	0.340	2.92	4.22	4.14	35.8	37.4	0.35

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Millersville - NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	0.04	0.011	0.008	0.079	0.450	1.25	0.180	1.74	4.58	4.56	17.3	17.7	1.47
030114	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030121	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.04
030128	0.16	0.018	0.021	0.161	1.320	4.22	0.520	1.78	4.68	4.59	24.6	25.1	0.10
030204	0.06	0.011	0.010	0.094	0.970	1.85	0.220	2.56	4.69	4.48	20.4	22.0	0.42
030211	0.02	0.003	0.002	0.010	0.180	1.04	0.070	0.35	4.90	4.29	7.4	8.7	0.48
030218	0.04	0.007	0.003	0.036	0.170	0.68	0.080	0.40	5.08	4.83	6.2	5.7	2.23
030225	0.02	0.002	0.002	0.017	0.150	0.52	0.080	0.99	4.69	4.74	11.4	11.3	1.58
030304	0.07	0.015	0.005	0.135	0.610	1.32	0.280	2.04	4.58	4.80	19.0	14.2	0.41
030311	0.65	0.043	0.029	0.104	0.760	2.64	0.170	3.64	4.45	3.76	30.1	30.7	0.55
030318	0.44	0.080	0.022	0.386	3.020	4.91	0.730	5.48	5.41	5.28	33.6	33.6	0.14
030325	0.06	0.021	0.015	0.172	0.300	0.58	0.320	0.84	5.11	4.88	8.2	8.1	1.60
030401	0.12	0.019	0.279	0.085	0.920	1.36	0.460	2.50	4.74	4.65	19.1	22.6	1.10
030408	0.16	0.031	0.016	0.113	0.480	1.16	0.170	1.67	4.80	4.76	14.0	15.6	0.47
030415	0.05	0.010	0.008	0.057	0.280	0.86	0.100	1.08	4.72	4.66	12.4	13.5	1.09
030422	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.37
030429	0.02	0.005	0.004	0.009	0.420	0.50	0.040	0.71	5.43	5.32	6.0	5.5	0.79
030506	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.06
030513	0.28	0.042	0.053	0.070	2.100	2.92	0.210	4.12	5.51	5.48	22.7	19.6	0.98
030520	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.79
030527	0.04	0.012	0.008	0.059	0.520	0.90	0.120	1.21	4.99	5.08	10.3	10.3	2.03
030603	0.43	0.054	0.048	0.012	0.870	2.38	0.330	2.10	4.75	4.83	18.9	19.9	0.36
030610	0.04	0.007	0.006	0.016	0.430	1.14	0.080	1.66	4.52	4.74	18.6	17.7	2.88
030617	0.09	0.016	0.020	0.023	0.340	2.37	0.130	1.42	4.34	4.43	23.3	23.8	0.22
030624	0.03	0.005	0.004	0.008	0.510	0.86	0.030	1.25	4.92	5.00	10.4	16.2	2.32
030701	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030708	0.22	0.028	0.031	0.011	1.150	1.33	0.080	3.57	4.66	4.79	21.5	20.1	1.29
030715	0.20	0.036	0.022	0.052	1.570	4.87	0.160	6.54	3.95	4.01	67.8	65.4	0.16
030722	0.30	0.034	0.044	0.042	1.160	1.94	0.130	2.64	5.14	5.14	16.2	16.2	0.08
030729	0.06	0.008	0.013	0.009	0.440	1.23	0.080	2.20	4.42	4.68	22.0	21.5	2.31
030805	0.07	0.017	0.014	0.071	0.800	2.49	0.220	2.60	4.34	4.42	28.6	30.9	0.30
030812	0.07	0.012	0.017	0.025	0.510	1.89	0.160	3.17	4.25	4.28	32.6	33.9	1.19
030819	0.06	0.010	0.006	0.007	0.420	1.93	0.140	4.20	4.06	4.19	44.1	43.5	1.75
030826	0.43	0.052	0.029	0.023	1.190	3.15	0.230	8.44	3.92	3.94	72.2	74.9	1.00
030902	0.37	0.047	0.015	0.018	0.940	2.40	0.090	4.44	4.30	4.34	36.5	35.5	3.35
030909	0.03	0.006	0.005	0.008	0.300	1.49	0.080	1.87	4.38	4.33	23.2	23.6	1.03
030916	0.07	0.083	0.032	0.695	0.500	0.72	1.210	1.00	5.63	5.48	10.8	10.5	1.05
030923	0.06	0.039	0.021	0.341	0.150	0.29	0.620	0.83	4.99	4.91	9.0	8.4	4.54
030930	0.19	0.026	0.021	0.028	1.150	4.13	0.240	4.84	4.06	4.06	51.8	52.9	0.31
031007	0.07	0.014	0.005	0.010	0.360	0.91	0.040	1.17	4.87	4.82	10.7	12.9	0.22
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
031021	0.05	0.008	0.006	0.009	0.340	0.68	0.030	0.89	4.98	5.14	8.2	7.4	1.67
031028	0.02	0.007	0.005	0.056	0.230	0.41	0.140	0.92	4.85	4.75	9.1	9.3	1.26
031104	0.01	0.002	0.003	0.002	0.180	0.28	-----	0.40	5.34	5.35	4.1	3.4	1.12
031111	0.03	0.007	0.006	0.028	0.370	0.92	0.080	1.30	4.66	4.68	13.2	13.6	1.50
031118	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.49
031125	0.02	0.019	0.012	0.162	0.270	0.68	0.290	0.86	4.88	4.84	10.1	9.2	1.91
031202	0.04	0.008	0.008	0.055	0.260	0.92	0.200	1.62	4.43	4.51	19.2	15.8	1.07
031209	0.04	0.005	0.004	0.034	0.280	0.76	0.100	0.47	5.19	5.14	6.2	7.0	0.78
031216	0.03	0.016	0.007	0.137	0.220	0.52	0.250	0.80	4.91	4.93	8.9	9.0	2.28
031223	0.02	0.014	0.007	0.115	0.330	0.93	0.390	2.14	4.36	4.53	24.3	19.9	0.66
031230	0.02	0.006	0.004	0.056	0.230	0.44	0.120	0.92	4.86	4.83	9.3	8.6	0.79

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Concentration Data for
Young Woman's Creek – NADP/NTN

Date	Concentrations (mg/L)								pH		Spec. Cond.		Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	Lab.	Field	Lab.	Field	(Inches)
030107	0.02	0.003	0.004	0.009	0.070	1.61	0.050	0.85	4.44	4.55	18.0	19.5	2.05
030114	0.26	0.039	0.028	0.067	0.500	3.29	0.180	1.39	4.50	4.50	20.5	20.5	0.07
030121	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.05
030128	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.04
030204	0.13	0.011	0.010	0.054	0.280	1.91	0.120	1.81	4.42	4.47	23.9	28.0	0.72
030211	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.35
030218	0.01	0.004	0.002	0.014	0.010	0.76	0.060	0.20	4.85	4.86	7.4	8.1	0.79
030225	0.02	0.004	0.004	0.022	0.080	1.77	0.060	1.53	4.29	4.29	25.9	27.7	0.84
030304	0.27	0.035	0.028	0.178	1.510	10.69	0.430	6.97	3.68	3.76	114.5	122.0	0.13
030311	0.14	0.016	0.008	0.036	0.160	1.97	0.080	1.22	4.45	4.62	21.2	22.7	0.42
030318	0.11	0.009	0.005	0.019	0.620	4.30	0.160	2.70	4.10	4.12	45.7	49.2	0.32
030325	0.17	0.021	0.022	0.089	0.160	1.11	0.170	1.19	4.67	4.69	14.2	16.0	1.09
030401	0.09	0.009	0.004	0.020	0.170	1.09	0.060	0.91	4.64	4.60	13.1	15.5	0.83
030408	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.16
030415	0.06	0.008	0.002	0.021	0.080	0.53	0.050	0.45	4.99	4.93	7.1	9.1	0.22
030422	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.50
030429	0.34	0.058	0.004	0.015	0.260	2.00	0.080	1.88	4.45	4.45	19.8	19.8	0.06
030506	0.22	0.035	0.089	0.039	0.440	2.06	0.140	3.35	4.24	4.26	33.2	34.8	0.47
030513	0.19	0.040	0.159	0.113	0.450	1.76	0.200	2.64	4.33	4.40	27.1	27.4	1.40
030520	0.18	0.046	0.019	0.183	0.270	2.60	0.390	3.10	4.06	4.21	41.5	62.2	0.87
030527	0.11	0.017	0.036	0.012	0.640	1.85	0.080	3.06	4.30	4.34	30.5	34.7	1.90
030603	0.09	0.016	0.038	0.005	0.410	1.60	0.080	2.45	4.31	4.25	26.9	28.4	1.60
030610	0.04	0.006	0.008	0.002	0.280	1.15	0.050	2.03	4.38	4.42	23.0	23.5	1.35
030617	0.05	0.008	0.017	0.017	0.220	1.77	0.130	3.15	4.10	4.14	36.4	37.1	0.85
030624	0.02	0.002	0.012	0.002	0.060	0.65	0.020	0.32	4.93	4.92	6.7	7.6	1.46
030701	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.03
030708	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.24
030715	0.07	0.009	0.008	0.012	0.210	1.60	0.080	2.21	4.26	4.41	27.4	28.1	1.38
030722	0.15	0.020	0.018	0.009	0.380	1.48	0.090	3.30	4.21	4.22	33.2	33.3	3.23
030729	0.10	0.011	0.016	0.008	0.340	0.90	0.070	2.79	4.30	4.35	25.8	26.8	2.92
030805	0.04	0.004	0.003	0.006	0.130	1.03	0.040	1.43	4.44	4.44	18.9	22.1	1.90
030812	0.04	0.006	0.012	0.004	0.340	2.00	0.110	4.92	4.00	4.02	52.7	52.1	1.48
030819	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.01
030826	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
030902	0.06	0.010	0.023	0.014	0.200	1.05	0.060	2.48	4.29	4.32	26.2	27.3	1.90
030909	0.04	0.004	0.013	0.004	0.140	1.39	0.050	2.36	4.27	4.31	30.2	29.3	0.96
030916	0.02	0.006	0.011	0.054	0.190	0.60	0.110	1.26	4.62	4.66	13.9	14.3	1.26
030923	0.04	0.018	0.014	0.158	0.080	0.52	0.270	0.97	4.70	4.75	12.2	12.5	1.81
030930	0.06	0.008	0.008	0.015	0.230	0.75	0.040	1.33	4.63	4.69	13.7	14.3	2.05
031007	0.28	0.044	0.017	0.004	0.360	2.04	0.100	2.02	4.46	4.51	22.8	24.0	0.47
031014	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	0.00
031021	----	-----	-----	-----	-----	----	-----	----	----	----	----	----	1.18
031028	0.06	0.006	0.009	0.013	0.170	1.11	0.050	1.50	4.46	4.55	17.9	18.9	1.21
031104	0.10	0.013	0.014	0.054	0.230	2.37	0.200	2.43	4.18	4.24	33.3	34.0	0.34
031111	0.06	0.021	0.017	0.123	0.230	1.75	0.270	2.65	4.24	4.13	32.4	34.9	0.66
031118	0.10	0.012	0.045	0.042	0.220	2.10	0.120	1.98	4.29	4.29	27.8	30.7	0.30
031125	0.02	0.003	0.007	0.029	0.120	0.53	0.070	0.82	4.75	4.72	9.8	11.5	2.51
031202	0.05	0.008	0.008	0.011	0.120	0.71	0.040	1.12	4.60	4.63	13.7	14.2	0.59
031209	0.05	0.005	0.007	0.045	0.060	1.00	0.070	0.11	4.94	5.01	7.6	7.2	0.55
031216	0.02	0.002	0.002	0.023	0.030	0.70	0.060	0.44	4.71	4.71	9.5	9.5	2.58
031222	0.06	0.008	0.008	0.040	0.130	1.87	0.120	0.78	4.44	4.52	18.5	21.9	0.29
031230	0.07	0.004	0.007	0.029	0.100	1.18	0.080	1.11	4.51	4.45	17.5	17.8	1.06

APPENDIX II

2003 PRECIPITATION QUALITY SUMMARY

MEASURED WEEKLY WET DEPOSITION

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Allegheny Portage NHS

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.098	0.018	0.001	0.160	0.099	0.776	0.307	0.819	0.024	2.91
030114	-----	-----	-----	-----	-----	-----	-----	-----	0.003	0.23
030121	-----	-----	-----	-----	0.062	0.410	0.135	0.100	0.009	0.45
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.14
030204	0.010	0.005	0.001	0.030	0.054	0.269	0.079	0.305	0.009	0.89
030211	0.032	0.012	0.006	0.126	0.032	0.453	0.238	0.140	0.008	0.55
030218	0.040	0.012	0.007	0.054	0.019	0.342	0.116	0.132	0.005	1.61
030225	0.012	0.010	0.001	0.008	0.007	0.338	0.049	0.352	0.010	1.48
030304	-----	-----	-----	-----	0.033	0.406	0.058	0.380	0.002	0.27
030311	0.133	0.042	0.006	0.048	0.062	0.485	0.079	0.493	0.006	0.72
030318	0.025	0.004	0.001	0.008	0.100	0.374	0.024	0.481	0.010	0.35
030325	0.208	0.021	0.022	0.041	0.089	0.455	0.068	0.648	0.007	1.36
030401	0.055	0.009	0.034	0.022	0.083	0.351	0.053	0.321	0.005	0.85
030408	0.066	0.017	0.031	0.071	0.286	0.834	0.119	1.136	0.017	1.70
030415	0.009	0.003	0.016	0.009	0.019	0.151	0.009	0.132	0.003	0.61
030422	0.017	0.003	0.010	0.006	0.059	0.194	0.020	0.285	0.005	0.36
030429	0.009	0.001	0.004	0.002	0.026	0.110	0.006	0.134	0.003	0.24
030506	0.040	0.009	0.037	0.011	0.017	0.150	0.023	0.172	0.002	0.48
030513	0.147	0.025	0.055	0.059	0.203	0.961	0.177	1.819	0.043	2.20
030520	0.049	0.009	0.008	0.015	0.222	0.710	0.028	0.880	0.015	1.72
030527	0.074	0.008	0.047	0.018	0.133	0.577	0.021	0.786	0.016	1.67
030603	0.045	0.008	0.039	0.005	0.106	0.411	0.009	0.642	0.010	1.80
030610	0.060	0.020	0.050	0.081	0.180	0.565	0.084	0.874	0.013	2.52
030617	0.014	0.005	0.018	0.010	0.052	0.233	0.020	0.333	0.008	0.46
030624	0.015	0.013	0.021	0.029	0.249	1.356	0.057	1.564	0.038	2.16
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030708	0.041	0.007	0.013	0.007	0.137	0.485	0.028	1.098	0.019	1.10
030715	0.034	0.009	0.030	0.018	0.111	0.654	0.026	0.830	0.018	1.55
030722	0.025	0.009	0.034	0.008	0.138	0.715	0.026	1.364	0.028	1.96
030729	0.149	0.043	0.015	0.043	0.047	0.266	0.094	0.587	0.001	0.31
030805	0.067	0.013	0.030	0.044	0.273	1.289	0.044	2.206	0.047	2.78
030812	0.014	0.003	0.007	0.006	0.057	0.342	0.012	0.554	0.013	0.82
030819	0.014	0.002	0.006	0.002	0.089	0.143	0.012	0.370	0.004	0.19
030826	0.193	0.030	0.081	0.024	0.378	1.369	0.082	2.501	0.044	2.39
030902	0.107	0.013	0.002	0.025	0.227	0.983	0.076	2.131	0.047	3.13
030909	0.015	0.001	0.008	0.005	0.027	0.254	0.025	0.475	0.011	0.50
030916	0.006	0.003	0.005	0.015	0.050	0.171	0.042	0.373	0.007	0.61
030923	0.047	0.013	0.052	0.056	0.076	0.291	0.061	0.573	0.010	2.75
030930	0.038	0.010	0.018	0.028	0.177	0.573	0.063	1.281	0.025	2.60
031007	0.045	0.008	0.019	0.007	0.068	0.453	0.040	0.341	0.008	0.62
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.144	0.045	0.169	0.015	0.030	0.461	0.077	0.718	0.008	1.39
031028	0.028	0.006	0.007	0.027	0.051	0.249	0.020	0.482	0.010	0.94
031104	0.004	0.001	0.002	0.004	0.013	0.042	0.014	0.063	0.001	0.08
031111	0.030	0.003	0.001	0.018	0.067	0.528	0.072	0.711	0.022	1.21
031118	0.009	0.001	0.007	0.007	0.028	0.138	0.013	0.164	0.004	0.26
031125	0.008	0.005	0.001	0.040	0.111	0.397	0.092	0.806	0.018	3.15
031202	-----	-----	-----	-----	0.038	0.171	0.176	0.156	0.001	0.47
031209	0.012	0.001	0.005	0.023	0.001	0.244	0.026	0.116	0.005	1.19
031216	0.014	0.001	0.019	0.044	0.065	0.435	0.090	0.430	0.014	2.43
031223	0.041	0.008	0.004	0.125	0.044	0.428	0.235	0.183	0.005	0.41
031230	0.016	0.001	0.001	0.026	0.030	0.172	0.055	0.223	0.005	0.67

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Crooked Creek Lake

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.027	0.006	0.026	0.063	0.040	0.473	0.073	0.503	0.016	2.04
030114	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.04
030121	0.021	0.004	0.004	0.040	0.025	0.264	0.086	0.043	0.003	0.26
030128	0.020	0.003	0.001	0.024	0.043	0.242	0.066	0.085	0.003	0.30
030204	0.028	0.004	0.001	0.012	0.049	0.345	0.034	0.405	0.011	0.84
030211	0.027	0.007	0.011	0.030	0.032	0.449	0.093	0.129	0.007	0.42
030218	0.002	0.004	0.034	0.008	0.002	0.126	0.033	0.052	0.002	0.93
030225	0.015	0.005	0.004	0.013	0.002	0.316	0.050	0.345	0.012	1.08
030304	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.12
030311	0.046	0.008	0.023	0.013	0.041	0.452	0.051	0.302	0.010	0.64
030318	0.026	0.005	0.011	0.012	0.064	0.316	0.032	0.354	0.009	0.45
030325	0.157	0.008	0.011	0.018	0.025	0.122	0.043	0.406	0.001	0.34
030401	0.040	0.006	0.015	0.008	0.058	0.253	0.020	0.309	0.006	0.39
030408	0.058	0.014	0.047	0.041	0.095	0.480	0.096	0.854	0.020	1.25
030415	0.008	0.002	0.008	0.002	0.009	0.069	0.005	0.047	0.001	0.41
030422	0.023	0.003	0.006	0.007	0.034	0.169	0.019	0.330	0.008	0.51
030429	0.013	0.006	0.013	0.001	0.020	0.125	0.007	0.128	0.003	0.15
030506	0.013	0.003	0.001	0.005	0.024	0.084	0.013	0.168	0.003	0.65
030513	0.186	0.031	0.001	0.070	0.294	1.334	0.134	2.084	0.037	2.48
030520	0.021	0.007	0.026	0.010	0.052	0.389	0.055	0.804	0.019	1.30
030527	0.075	0.076	0.081	0.012	0.030	0.368	0.033	1.039	0.014	0.70
030603	0.029	0.005	0.001	0.004	0.091	0.523	0.116	1.069	0.027	1.09
030610	0.028	0.006	0.026	0.022	0.081	0.390	0.027	0.912	0.022	1.57
030617	0.003	0.004	0.015	0.013	0.034	0.347	0.030	0.716	0.019	1.02
030624	0.009	0.004	0.003	0.004	0.014	0.077	0.011	0.078	0.001	0.18
030701	0.008	0.002	0.001	0.002	0.034	0.100	0.007	0.187	0.003	0.15
030708	0.057	0.012	0.013	0.014	0.200	0.675	0.037	1.489	0.025	1.38
030715	0.012	0.004	0.019	0.009	0.065	0.365	0.021	0.721	0.015	0.95
030722	0.064	0.011	0.064	0.009	0.197	0.986	0.045	1.972	0.041	2.79
030729	0.031	0.006	0.001	0.007	0.072	0.319	0.029	0.561	0.013	1.00
030805	0.037	0.006	0.031	0.019	0.094	0.664	0.044	1.540	0.034	2.13
030812	0.021	0.003	0.002	0.011	0.091	0.789	0.157	1.899	0.047	1.33
030819	0.007	0.001	0.002	0.004	0.014	0.053	0.005	0.060	0.001	0.04
030826	0.298	0.041	0.060	0.023	0.592	1.655	0.085	3.052	0.030	2.54
030902	0.146	0.010	0.087	0.037	0.224	1.285	0.172	2.612	0.057	4.76
030909	0.023	0.003	0.001	0.003	0.055	0.224	0.017	0.298	0.006	0.25
030916	0.024	0.002	0.006	0.011	0.061	0.252	0.039	0.897	0.019	1.16
030923	0.021	0.008	0.001	0.012	0.011	0.091	0.065	0.211	0.006	1.19
030930	0.088	0.012	0.003	0.011	0.116	0.563	0.042	0.697	0.014	0.92
031007	0.039	0.009	0.010	0.007	0.059	0.297	0.034	0.296	0.005	0.42
031014	0.030	0.004	0.008	0.008	0.039	0.260	0.023	0.401	0.008	1.21
031021	0.011	0.002	0.004	0.003	0.023	0.097	0.005	0.110	0.002	0.19
031028	0.042	0.006	0.011	0.036	0.036	0.393	0.036	0.473	0.013	1.12
031104	0.017	0.003	0.009	0.022	0.034	0.223	0.045	0.433	0.008	0.62
031111	0.028	0.004	0.001	0.004	0.038	0.298	0.028	0.366	0.010	0.57
031118	0.014	0.001	0.020	0.013	0.041	0.301	0.045	0.752	0.019	2.29
031125	0.022	0.004	0.009	0.013	0.026	0.108	0.026	0.209	0.003	0.40
031202	0.012	0.003	0.001	0.011	0.037	0.210	0.057	0.285	0.007	0.77
031209	0.016	0.001	0.020	0.020	0.001	0.507	0.102	0.444	0.017	1.95
031216	0.016	0.001	0.001	0.006	0.026	0.201	0.037	0.109	0.004	0.87
031223	0.006	0.001	0.001	0.012	0.027	0.231	0.026	0.225	0.006	0.56
031230	0.006	0.001	0.001	0.011	0.013	0.121	0.020	0.127	0.004	0.46

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
M. K. Goddard State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.010	0.004	0.014	0.037	0.046	0.311	0.050	0.426	0.012	1.36
030114	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.09
030121	-----	-----	-----	-----	-----	-----	-----	-----	0.003	0.21
030128	-----	-----	-----	-----	0.017	0.181	0.028	0.029	0.002	0.21
030204	0.053	0.007	0.010	0.025	0.124	0.451	0.051	0.585	0.009	0.92
030211	0.019	0.005	0.010	0.025	0.032	0.292	0.049	0.077	0.004	0.28
030218	0.008	0.003	0.017	0.010	0.002	0.082	0.016	0.020	0.001	0.51
030225	0.046	0.006	0.001	0.018	0.012	0.397	0.037	0.348	0.010	0.94
030304	0.010	0.001	0.001	0.004	0.019	0.200	0.012	0.153	0.004	0.13
030311	0.046	0.009	0.003	0.013	0.062	0.389	0.038	0.341	0.007	0.61
030318	0.057	0.004	0.014	0.004	0.065	0.299	0.014	0.216	0.004	0.36
030325	0.063	0.006	0.001	0.008	0.070	0.255	0.023	0.334	0.006	0.44
030401	0.024	0.009	0.026	0.024	0.125	0.449	0.043	0.547	0.010	0.99
030408	0.183	0.036	0.072	0.090	0.400	1.024	0.169	1.398	0.014	2.17
030415	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030422	0.029	0.006	0.014	0.012	0.109	0.398	0.028	0.598	0.011	0.71
030429	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.04
030506	0.017	0.005	0.001	0.007	0.041	0.177	0.033	0.373	0.007	0.63
030513	0.131	0.020	0.012	0.027	0.164	0.614	0.084	0.823	0.014	1.68
030520	0.014	0.008	0.006	0.003	0.024	0.112	0.010	0.265	0.005	0.14
030527	0.072	0.011	0.004	0.021	0.114	0.691	0.049	1.535	0.036	1.90
030603	0.058	0.018	0.048	0.017	0.147	0.569	0.024	1.062	0.018	1.85
030610	0.021	0.006	0.038	0.013	0.142	0.479	0.012	0.795	0.012	0.75
030617	0.022	0.007	0.048	0.016	0.111	0.612	0.038	1.116	0.023	1.32
030624	0.008	0.004	0.001	0.005	0.051	0.201	0.018	0.427	0.008	0.45
030701	0.064	0.007	0.007	0.004	0.107	0.312	0.017	0.710	0.009	0.57
030708	0.088	0.012	0.010	0.013	0.250	0.755	0.034	1.265	0.021	0.97
030715	0.012	0.004	0.021	0.013	0.062	0.426	0.020	0.723	0.017	1.48
030722	0.176	0.031	0.002	0.072	0.764	2.706	0.059	5.608	0.100	6.48
030729	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.90
030805	0.017	0.004	0.023	0.008	0.040	0.404	0.028	0.688	0.015	0.81
030812	0.032	0.006	0.056	0.016	0.240	1.107	0.042	2.583	0.055	3.63
030819	0.016	0.002	0.008	0.002	0.045	0.109	0.004	0.143	0.001	0.17
030826	0.121	0.020	0.018	0.012	0.171	0.598	0.012	0.563	0.006	0.61
030902	0.135	0.015	0.011	0.032	0.243	1.006	0.130	1.954	0.040	2.49
030909	0.025	0.003	0.003	0.009	0.030	0.176	0.018	0.172	0.003	0.13
030916	0.006	0.002	0.017	0.006	0.043	0.271	0.037	0.580	0.015	0.62
030923	0.039	0.008	0.048	0.039	0.085	0.243	0.074	0.633	0.011	2.57
030930	0.068	0.012	0.033	0.023	0.169	0.864	0.044	1.429	0.028	1.68
031007	0.051	0.009	0.006	0.007	0.082	0.583	0.028	0.361	0.008	0.91
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.024	0.003	0.012	0.012	0.073	0.368	0.033	0.572	0.014	1.58
031028	0.039	0.005	0.002	0.010	0.067	0.495	0.024	0.498	0.012	1.29
031104	0.020	0.002	0.003	0.014	0.048	0.405	0.043	0.397	0.011	0.40
031111	0.013	0.003	0.009	0.038	0.019	0.136	0.054	0.145	0.003	0.17
031118	0.020	0.003	0.002	0.006	0.083	0.455	0.022	0.413	0.009	0.91
031125	0.023	0.003	0.001	0.011	0.030	0.212	0.027	0.324	0.007	1.10
031202	0.014	0.004	0.001	0.012	0.049	0.238	0.036	0.502	0.013	1.33
031209	0.033	0.004	0.006	0.016	0.005	0.110	0.021	0.065	0.001	0.45
031216	0.014	0.001	0.009	0.007	0.001	0.196	0.025	0.161	0.005	1.00
031223	0.151	0.011	0.004	0.042	0.162	0.499	0.089	0.618	0.007	0.64
031230	0.024	0.002	0.001	0.047	0.046	0.516	0.105	0.414	0.014	1.37

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Hills Creek State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.021	0.010	0.001	0.045	0.078	0.674	0.050	0.381	0.014	2.10
030114	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.07
030121	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.04
030128	0.008	0.002	0.001	0.012	0.016	0.151	0.027	0.028	0.002	0.15
030204	0.031	0.003	0.001	0.011	0.028	0.219	0.028	0.284	0.008	0.56
030211	0.010	0.003	0.004	0.006	0.011	0.224	0.022	0.057	0.004	0.27
030218	0.002	0.004	0.003	0.010	0.003	0.102	0.038	0.044	0.002	0.93
030225	0.016	0.003	0.001	0.008	0.001	0.181	0.016	0.229	0.007	0.68
030304	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.05
030311	0.020	0.003	0.006	0.007	0.008	0.175	0.014	0.073	0.003	0.38
030318	0.011	0.001	0.005	0.001	0.034	0.159	0.007	0.107	0.003	0.20
030325	0.062	0.006	0.013	0.018	0.024	0.267	0.035	0.233	0.006	1.08
030401	0.012	0.005	0.031	0.009	0.065	0.275	0.025	0.213	0.005	0.87
030408	0.047	0.013	0.049	0.028	0.248	0.730	0.078	0.884	0.015	1.63
030415	-----	-----	-----	-----	0.002	0.009	0.032	0.021	0.001	0.07
030422	0.006	0.003	0.005	0.016	0.068	0.274	0.036	0.274	0.006	0.22
030429	0.008	0.001	0.002	0.003	0.012	0.052	0.005	0.053	0.001	0.15
030506	0.014	0.002	0.001	0.004	0.024	0.136	0.012	0.234	0.005	0.21
030513	0.065	0.012	0.030	0.034	0.140	0.392	0.066	0.533	0.008	0.82
030520	0.024	0.006	0.008	0.009	0.034	0.282	0.028	0.221	0.007	0.57
030527	0.043	0.006	0.031	0.013	0.147	0.530	0.033	0.892	0.018	1.22
030603	0.019	0.007	0.025	0.008	0.104	0.463	0.027	0.610	0.014	1.41
030610	0.015	0.004	0.011	0.010	0.067	0.298	0.016	0.428	0.010	0.90
030617	0.005	0.003	0.019	0.006	0.088	0.347	0.020	0.661	0.013	0.75
030624	0.009	0.012	0.002	0.017	0.089	0.461	0.033	0.378	0.011	2.19
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030708	0.006	0.001	0.005	0.003	0.020	0.072	0.011	0.194	0.003	0.18
030715	0.020	0.006	0.015	0.021	0.081	0.421	0.042	0.612	0.014	0.79
030722	0.130	0.023	0.105	0.019	0.343	1.337	0.055	2.328	0.042	3.07
030729	0.014	0.003	0.010	0.006	0.192	0.330	0.178	0.353	0.008	1.05
030805	0.020	0.005	0.067	0.015	0.079	0.432	0.013	0.738	0.016	1.48
030812	0.057	0.007	0.020	0.038	0.554	1.702	0.097	6.290	0.139	4.85
030819	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.04
030826	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030902	0.064	0.006	0.012	0.011	0.102	0.543	0.039	1.162	0.022	2.74
030909	0.033	0.006	0.002	0.009	0.058	0.322	0.020	0.408	0.008	0.65
030916	0.007	0.002	0.001	0.016	0.026	0.149	0.039	0.219	0.005	0.72
030923	0.009	0.007	0.016	0.050	0.030	0.096	0.085	0.193	0.003	0.59
030930	0.041	0.007	0.047	0.033	0.102	0.475	0.047	0.779	0.016	2.33
031007	0.022	0.004	0.013	0.018	0.025	0.145	0.019	0.107	0.002	0.38
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.006	0.002	0.030	0.007	0.027	0.184	0.021	0.180	0.005	0.77
031028	0.022	0.004	0.019	0.022	0.096	0.373	0.051	0.502	0.011	1.57
031104	0.005	0.001	0.006	0.007	0.001	0.132	0.011	0.134	0.004	0.41
031111	0.003	0.001	0.005	0.006	0.008	0.072	0.021	0.117	0.004	0.36
031118	0.006	0.001	0.002	0.002	0.020	0.092	0.005	0.067	0.002	0.19
031125	0.021	0.003	0.016	0.031	0.064	0.299	0.060	0.427	0.010	1.95
031202	0.009	0.003	0.001	0.008	0.006	0.116	0.005	0.131	0.003	0.56
031209	0.010	0.001	0.001	0.018	0.003	0.107	0.034	0.019	0.001	0.32
031216	0.016	0.001	0.001	0.034	0.001	0.560	0.059	0.363	0.014	2.19
031223	0.012	0.001	0.001	0.005	0.015	0.088	0.010	0.067	0.002	0.27
031230	0.007	0.001	0.001	0.008	0.025	0.127	0.004	0.185	0.004	0.91

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Laurel Hill State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.073	0.014	0.050	0.086	0.125	1.269	0.130	0.993	0.033	2.43
030114	0.032	0.004	0.001	0.016	0.045	0.289	0.040	0.109	0.003	0.38
030121	0.060	0.011	0.012	0.039	0.089	0.657	0.094	0.142	0.008	0.53
030128	0.028	0.009	0.001	0.048	0.052	0.407	0.108	0.115	0.005	0.40
030204	0.025	0.004	0.007	0.010	0.112	0.570	0.067	0.521	0.015	0.88
030211	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.57
030218	0.028	0.011	0.007	0.038	0.014	0.283	0.061	0.140	0.006	2.35
030225	0.022	0.008	0.001	0.015	0.014	0.312	0.061	0.390	0.011	1.54
030304	0.013	0.003	0.017	0.020	0.024	0.291	0.036	0.172	0.005	0.33
030311	0.050	0.007	0.001	0.011	0.083	0.457	0.031	0.559	0.013	0.78
030318	0.020	0.002	0.003	0.004	0.042	0.174	0.016	0.218	0.004	0.18
030325	0.120	0.007	0.011	0.016	0.032	0.214	0.036	0.241	0.002	0.74
030401	0.052	0.006	0.008	0.012	0.068	0.357	0.045	0.335	0.007	0.66
030408	0.158	0.023	0.049	0.075	0.373	1.286	0.212	1.766	0.038	2.36
030415	0.010	0.002	0.003	0.003	0.008	0.088	0.013	0.104	0.003	0.23
030422	0.008	0.002	0.010	0.004	0.027	0.117	0.011	0.193	0.004	0.29
030429	0.008	0.002	0.010	0.009	0.023	0.134	0.018	0.138	0.004	0.13
030506	0.018	0.012	0.001	0.013	0.145	0.414	0.044	0.578	0.009	1.47
030513	0.329	0.051	0.140	0.122	0.465	1.858	0.333	3.817	0.072	5.24
030520	0.011	0.003	0.004	0.001	0.034	0.152	0.012	0.127	0.003	0.59
030527	0.068	0.013	0.004	0.018	0.112	0.847	0.038	0.991	0.024	1.98
030603	0.084	0.020	0.028	0.016	0.133	0.474	0.035	0.979	0.016	1.87
030610	0.016	0.009	0.030	0.025	0.158	0.529	0.021	0.968	0.022	3.22
030617	0.007	0.006	0.006	0.025	0.058	0.267	0.034	0.330	0.007	1.01
030624	0.068	0.011	0.001	0.030	0.218	0.876	0.063	1.184	0.024	2.11
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030708	0.094	0.021	0.001	0.049	0.210	0.729	0.074	1.627	0.031	2.03
030715	0.035	0.007	0.028	0.012	0.090	0.444	0.028	0.927	0.020	1.47
030722	0.026	0.003	0.015	0.006	0.031	0.222	0.029	0.265	0.006	0.36
030729	0.041	0.006	0.026	0.023	0.595	0.644	1.164	1.377	0.034	1.05
030805	0.048	0.008	0.054	0.026	0.255	0.849	0.026	1.918	0.036	2.05
030812	0.024	0.001	0.002	0.004	0.044	0.418	0.029	0.919	0.022	0.46
030819	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.02
030826	0.057	0.010	0.014	0.005	0.133	0.429	0.022	0.784	0.014	0.54
030902	0.132	0.011	0.061	0.031	0.297	1.239	0.097	2.811	0.050	2.66
030909	0.017	0.002	0.004	0.003	0.051	0.183	0.014	0.314	0.007	0.40
030916	0.005	0.003	0.024	0.029	0.044	0.113	0.056	0.332	0.007	2.00
030923	0.017	0.002	0.021	0.015	0.026	0.110	0.039	0.274	0.006	0.93
030930	0.040	0.008	0.018	0.018	0.089	0.407	0.038	0.859	0.017	1.12
031007	0.040	0.005	0.001	0.005	0.060	0.364	0.022	0.322	0.006	0.68
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.04
031021	0.053	0.012	0.139	0.022	0.091	0.751	0.049	0.745	0.016	1.98
031028	0.024	0.004	0.014	0.015	0.071	0.368	0.035	0.464	0.012	1.09
031104	0.010	0.001	0.005	0.008	0.016	0.173	0.017	0.202	0.006	0.33
031111	0.032	0.003	0.002	0.024	0.103	0.779	0.078	0.898	0.026	2.15
031118	0.044	0.005	0.009	0.006	0.074	0.265	0.024	0.235	0.003	0.45
031125	0.007	0.001	0.021	0.014	0.081	0.266	0.065	0.408	0.008	2.62
031202	0.015	0.003	0.001	0.010	0.067	0.334	0.073	0.300	0.009	0.73
031209	0.020	0.001	0.009	0.056	0.001	0.185	0.088	0.064	0.004	0.68
031216	0.044	0.002	0.012	0.032	0.073	0.820	0.082	0.689	0.022	1.73
031223	0.013	0.001	0.003	0.019	0.105	0.381	0.058	0.144	0.005	0.39
031230	0.008	0.001	0.001	0.020	0.028	0.199	0.025	0.222	0.007	0.81

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Little Buffalo State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.040	0.007	0.003	0.024	0.082	0.460	0.071	0.365	0.011	1.13
030114	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030121	0.011	0.002	0.001	0.006	0.013	0.086	0.009	0.020	0.001	0.09
030128	-----	-----	-----	-----	0.021	0.117	0.017	0.025	0.001	0.07
030204	0.029	0.004	0.001	0.015	0.083	0.334	0.042	0.381	0.009	0.59
030211	0.021	0.003	0.002	0.007	0.034	0.240	0.024	0.119	0.004	0.40
030218	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.65
030225	0.023	0.006	0.002	0.018	0.026	0.303	0.070	0.447	0.012	1.13
030304	0.014	0.004	0.008	0.015	0.028	0.259	0.031	0.148	0.005	0.20
030311	0.020	0.002	0.011	0.007	0.019	0.158	0.012	0.171	0.005	0.41
030318	0.028	0.004	0.001	0.010	0.105	0.478	0.029	0.535	0.012	0.42
030325	0.050	0.011	0.001	0.054	0.112	0.247	0.149	0.361	0.006	1.83
030401	0.040	0.005	0.025	0.014	0.100	0.289	0.036	0.452	0.007	0.85
030408	0.061	0.009	0.033	0.034	0.211	0.635	0.076	0.694	0.012	0.97
030415	0.027	0.004	0.014	0.014	0.038	0.251	0.023	0.319	0.007	0.75
030422	0.082	0.025	0.034	0.127	0.199	0.924	0.211	1.011	0.023	1.11
030429	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.20
030506	0.070	0.010	0.014	0.011	0.162	0.442	0.028	0.601	0.007	0.51
030513	0.081	0.015	0.003	0.026	0.224	0.732	0.067	0.968	0.018	1.30
030520	0.077	0.021	0.004	0.071	0.173	0.694	0.116	0.618	0.011	1.13
030527	0.058	0.008	0.059	0.022	0.175	0.641	0.045	0.752	0.015	2.08
030603	0.030	0.006	0.001	0.019	0.108	0.417	0.019	0.572	0.011	0.66
030610	0.022	0.011	0.032	0.041	0.249	0.830	0.029	1.204	0.027	2.75
030617	0.011	0.002	0.001	0.004	0.030	0.108	0.009	0.109	0.002	0.08
030624	0.026	0.009	0.008	0.023	0.176	0.777	0.050	1.204	0.025	1.95
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030708	0.005	0.001	0.004	0.007	0.005	0.050	0.005	0.068	0.001	0.08
030715	0.009	0.004	0.028	0.011	0.204	0.739	0.051	1.301	0.027	1.12
030722	0.065	0.008	0.014	0.005	0.160	0.475	0.012	0.873	0.014	0.70
030729	0.066	0.007	0.023	0.017	0.435	0.848	0.197	0.982	0.015	1.37
030805	0.017	0.003	0.025	0.012	0.064	0.292	0.020	0.378	0.008	0.73
030812	0.061	0.010	0.025	0.012	0.384	1.314	0.028	1.808	0.038	2.22
030819	0.046	0.008	0.066	0.009	0.273	0.602	0.008	1.148	0.016	1.31
030826	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.01
030902	0.119	0.054	0.139	0.058	0.111	0.656	0.116	1.353	0.016	1.60
030909	0.028	0.004	0.020	0.014	0.172	1.040	0.090	1.357	0.036	1.83
030916	0.016	0.008	0.020	0.054	0.093	0.322	0.111	0.369	0.006	1.03
030923	0.068	0.043	0.168	0.246	0.060	0.516	0.401	1.039	0.022	3.30
030930	0.022	0.005	0.017	0.019	0.073	0.353	0.038	0.588	0.012	0.82
031007	0.032	0.006	0.025	0.004	0.052	0.299	0.021	0.224	0.004	0.46
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.039	0.009	0.026	0.019	0.154	0.807	0.054	1.042	0.022	1.78
031028	0.076	0.011	0.120	0.121	0.120	0.337	0.216	0.539	0.005	1.92
031104	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.45
031111	0.005	0.005	0.072	0.009	0.139	0.264	0.038	0.282	0.001	0.56
031118	0.018	0.003	0.007	0.007	0.039	0.207	0.012	0.255	0.006	0.38
031125	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.05
031202	0.015	0.004	0.003	0.032	0.095	0.253	0.029	0.398	0.006	0.85
031209	0.017	0.001	0.001	0.013	0.018	0.246	0.026	0.136	0.004	0.98
031216	0.018	0.002	0.002	0.088	0.106	0.626	0.129	0.511	0.015	3.04
031223	0.003	0.001	0.001	0.004	0.008	0.066	0.007	0.067	0.002	0.18
031230	0.012	0.001	0.001	0.024	0.067	0.340	0.032	0.459	0.013	0.91

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Little Pine State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.035	0.007	0.005	0.029	0.073	0.918	0.041	0.579	0.022	1.70
030114	0.007	0.003	0.002	0.005	0.013	0.092	0.008	0.028	0.001	0.09
030121	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.02
030128	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.03
030204	0.023	0.005	0.001	0.015	0.071	0.440	0.036	0.403	0.013	0.84
030211	0.009	0.002	0.001	0.003	0.018	0.171	0.014	0.063	0.003	0.21
030218	0.008	0.005	0.001	0.015	0.004	0.127	0.038	0.066	0.003	1.00
030225	0.096	0.024	0.020	0.024	0.004	0.340	0.064	0.267	0.006	0.75
030304	0.006	0.001	0.003	0.004	0.016	0.256	0.018	0.199	0.007	0.13
030311	0.011	0.003	0.005	0.004	0.015	0.201	0.011	0.095	0.004	0.23
030318	0.008	0.002	0.007	0.003	0.054	0.343	0.015	0.201	0.007	0.34
030325	0.049	0.007	0.011	0.035	0.037	0.225	0.050	0.365	0.006	1.25
030401	0.024	0.005	0.019	0.016	0.078	0.304	0.033	0.397	0.007	0.76
030408	0.097	0.020	0.023	0.037	0.308	1.022	0.085	1.150	0.019	1.46
030415	0.005	0.002	0.007	0.002	0.011	0.056	0.006	0.045	0.001	0.29
030422	0.082	0.016	0.029	0.026	0.244	0.926	0.057	0.973	0.019	0.60
030429	0.006	0.001	0.001	0.002	0.009	0.049	0.004	0.063	0.002	0.15
030506	0.011	0.002	0.001	0.002	0.015	0.086	0.006	0.070	0.001	0.19
030513	0.035	0.012	0.003	0.020	0.100	0.467	0.117	0.529	0.013	0.83
030520	0.050	0.017	0.001	0.034	0.040	0.586	0.080	0.785	0.023	0.65
030527	0.040	0.006	0.030	0.008	0.055	0.391	0.024	0.583	0.013	1.12
030603	0.017	0.012	0.062	0.007	0.152	0.489	0.047	0.855	0.014	1.52
030610	0.018	0.004	0.030	0.019	0.080	0.340	0.013	0.539	0.012	1.14
030617	0.006	0.005	0.031	0.017	0.087	0.502	0.029	0.891	0.023	0.97
030624	0.015	0.005	0.002	0.028	0.061	0.502	0.022	0.283	0.011	2.23
030701	-----	-----	-----	-----	0.005	0.010	0.004	0.011	0.001	0.02
030708	0.005	0.001	0.001	0.001	0.011	0.063	0.004	0.177	0.004	0.24
030715	0.004	0.005	0.013	0.009	0.086	0.443	0.016	0.538	0.013	0.93
030722	0.059	0.012	0.046	0.013	0.181	0.745	0.012	0.989	0.019	1.76
030729	0.096	0.024	0.038	0.034	0.609	0.826	0.646	1.899	0.036	2.90
030805	0.034	0.005	0.054	0.018	0.029	0.441	0.004	0.391	0.010	1.39
030812	0.004	0.001	0.001	0.002	0.023	0.193	0.006	0.227	0.007	0.30
030819	0.030	0.004	0.012	0.003	0.098	0.220	0.012	0.418	0.006	0.43
030826	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030902	0.054	0.005	0.012	0.014	0.098	0.673	0.054	1.203	0.027	1.91
030909	0.031	0.002	0.011	0.011	0.074	0.483	0.041	0.776	0.019	1.55
030916	0.018	0.003	0.048	0.024	0.089	0.333	0.036	0.489	0.010	1.75
030923	0.021	0.027	0.038	0.208	0.047	0.153	0.368	0.305	0.005	1.28
030930	0.039	0.006	0.012	0.018	0.073	0.377	0.030	0.420	0.010	0.81
031007	0.035	0.006	0.012	0.004	0.047	0.334	0.010	0.224	0.005	0.50
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.009	0.005	0.011	0.014	0.199	0.743	0.028	0.856	0.015	1.78
031028	0.018	0.002	0.011	0.011	0.052	0.284	0.001	0.365	0.009	1.32
031104	0.010	0.001	0.008	0.006	0.001	0.116	0.009	0.159	0.005	0.37
031111	0.007	0.002	0.001	0.020	0.024	0.250	0.054	0.314	0.009	0.74
031118	0.007	0.001	0.001	0.002	0.031	0.218	0.009	0.164	0.005	0.27
031125	0.011	0.006	0.007	0.055	0.103	0.404	0.104	0.757	0.017	2.30
031202	0.004	0.003	0.005	0.013	0.066	0.237	0.019	0.299	0.007	0.85
031209	0.011	0.001	0.001	0.010	0.010	0.185	0.018	0.040	0.002	0.49
031216	0.010	0.001	0.014	0.041	0.010	0.681	0.080	0.476	0.018	2.42
031223	0.009	0.001	0.002	0.015	0.013	0.230	0.028	0.126	0.005	0.20
031230	0.004	0.001	0.002	0.004	0.022	0.129	0.009	0.162	0.005	0.90

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Presque Isle State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.031	0.006	0.007	0.011	0.081	0.448	0.036	0.321	0.008	1.07
030114	0.087	0.019	0.001	0.045	0.043	0.586	0.074	0.105	0.003	0.38
030121	0.048	0.014	0.002	0.030	0.042	0.461	0.054	0.087	0.003	0.26
030128	0.058	0.011	0.001	0.060	0.028	0.257	0.097	0.053	0.001	0.30
030204	0.068	0.006	0.001	0.028	0.052	0.355	0.040	0.281	0.006	0.41
030211	0.033	0.009	0.005	0.024	0.045	0.357	0.047	0.099	0.003	0.25
030218	0.043	0.010	0.001	0.043	0.010	0.221	0.101	0.084	0.002	0.54
030225	0.021	0.006	0.001	0.013	0.029	0.631	0.050	0.382	0.015	0.98
030304	0.006	0.001	0.001	0.004	0.019	0.165	0.010	0.102	0.003	0.13
030311	0.036	0.005	0.001	0.012	0.113	0.623	0.035	0.483	0.013	0.65
030318	0.013	0.002	0.001	0.004	0.053	0.254	0.012	0.121	0.003	0.25
030325	0.055	0.006	0.021	0.012	0.091	0.291	0.030	0.363	0.005	0.67
030401	0.095	0.016	0.038	0.034	0.246	0.832	0.075	0.991	0.017	1.58
030408	0.099	0.016	0.031	0.028	0.170	0.539	0.062	0.604	0.008	1.32
030415	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.49
030422	0.101	0.023	0.074	0.024	0.149	0.489	0.039	0.743	0.009	0.66
030429	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030506	0.091	0.017	0.003	0.025	0.241	0.887	0.055	0.985	0.017	1.37
030513	0.074	0.014	0.031	0.028	0.132	0.578	0.058	0.630	0.011	0.79
030520	0.029	0.005	0.003	0.003	0.048	0.208	0.018	0.403	0.008	0.36
030527	0.184	0.214	0.251	0.042	0.137	0.805	0.058	3.050	0.028	1.49
030603	0.030	0.004	0.008	0.032	0.113	0.347	0.017	0.768	0.015	1.10
030610	0.017	0.006	0.008	0.005	0.100	0.604	0.018	0.858	0.018	0.46
030617	0.010	0.006	0.016	0.018	0.043	0.556	0.065	0.862	0.024	1.15
030624	0.018	0.005	0.008	0.004	0.043	0.234	0.013	0.201	0.004	0.65
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.13
030708	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.94
030715	0.024	0.006	0.017	0.008	0.089	0.536	0.023	0.704	0.015	0.68
030722	0.069	0.015	0.009	0.011	0.132	0.726	0.023	0.801	0.017	1.42
030729	0.237	0.030	0.038	0.020	0.300	0.828	0.058	0.863	0.004	1.19
030805	0.094	0.011	0.055	0.022	0.212	1.112	0.050	2.645	0.056	2.13
030812	0.024	0.004	0.023	0.006	0.135	0.702	0.038	1.034	0.025	0.71
030819	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.21
030826	0.036	0.004	0.007	0.004	0.045	0.165	0.005	0.168	0.002	0.22
030902	0.046	0.005	0.045	0.015	0.076	0.358	0.031	0.625	0.013	1.64
030909	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030916	0.016	0.003	0.011	0.008	0.045	0.216	0.020	0.369	0.008	0.72
030923	0.036	0.012	0.004	0.041	0.119	0.456	0.076	0.623	0.012	1.86
030930	0.086	0.015	0.003	0.023	0.260	1.092	0.068	1.353	0.029	2.87
031007	0.287	0.063	0.053	0.021	0.248	1.131	0.050	0.723	0.002	1.46
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.073	0.012	0.020	0.013	0.070	0.362	0.034	0.486	0.009	1.48
031028	0.059	0.010	0.006	0.012	0.185	0.902	0.033	0.879	0.023	1.18
031104	0.031	0.004	0.006	0.012	0.084	0.505	0.023	0.287	0.007	0.30
031111	0.006	0.001	0.001	0.004	0.005	0.094	0.011	0.084	0.002	0.11
031118	0.106	0.026	0.022	0.012	0.131	0.409	0.032	0.403	0.001	0.49
031125	0.053	0.027	0.002	0.031	0.049	0.196	0.165	0.300	0.005	0.67
031202	0.043	0.002	0.011	0.015	0.085	0.452	0.053	0.687	0.018	1.68
031209	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.02
031216	0.030	0.001	0.014	0.017	0.068	0.518	0.041	0.403	0.012	0.75
031223	0.079	0.006	0.003	0.026	0.060	0.330	0.049	0.323	0.004	0.43
031230	0.025	0.001	0.001	0.033	0.096	0.797	0.054	0.505	0.018	1.51

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Slocum State Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.055	0.013	0.001	0.050	0.060	0.397	0.069	0.317	0.008	2.40
030114	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.08
030121	-----	-----	-----	-----	-----	-----	-----	-----	0.001	0.03
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.02
030204	0.031	0.004	0.001	0.011	0.032	0.334	0.032	0.387	0.012	0.78
030211	0.010	0.003	0.010	0.005	0.009	0.207	0.029	0.164	0.005	0.50
030218	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.36
030225	0.025	0.005	0.001	0.016	0.007	0.184	0.031	0.258	0.005	0.79
030304	0.010	0.001	0.005	0.004	0.013	0.130	0.010	0.174	0.005	0.18
030311	0.009	0.001	0.001	0.003	0.001	0.075	0.007	0.047	0.002	0.33
030318	0.007	0.001	0.001	0.011	0.001	0.050	0.020	0.066	0.002	0.25
030325	0.031	0.004	0.015	0.026	0.039	0.205	0.061	0.169	0.004	1.14
030401	0.022	0.005	0.018	0.021	0.068	0.216	0.048	0.336	0.007	0.79
030408	0.025	0.008	0.025	0.025	0.154	0.562	0.058	0.524	0.010	1.11
030415	0.004	0.001	0.003	0.002	0.019	0.090	0.022	0.050	0.002	0.73
030422	0.079	0.013	0.008	0.025	0.211	0.676	0.066	0.973	0.015	0.52
030429	0.003	0.003	0.007	0.005	0.057	0.132	0.022	0.123	0.002	1.03
030506	0.025	0.005	0.014	0.005	0.063	0.204	0.018	0.310	0.004	0.16
030513	0.025	0.008	0.018	0.022	0.143	0.477	0.041	0.477	0.008	0.73
030520	0.011	0.003	0.004	0.014	0.015	0.110	0.013	0.093	0.002	0.25
030527	0.031	0.010	0.033	0.043	0.041	0.269	0.082	0.200	0.005	1.25
030603	-----	-----	-----	-----	0.323	0.730	0.284	1.455	0.007	3.06
030610	0.008	0.005	0.012	0.002	0.064	0.376	0.011	0.372	0.010	1.25
030617	0.008	0.003	0.015	0.007	0.049	0.257	0.028	0.431	0.009	0.38
030624	0.042	0.007	0.042	0.035	0.273	0.626	0.048	0.682	0.009	4.00
030701	-----	-----	-----	-----	0.010	0.029	0.005	0.041	0.001	0.03
030708	0.005	0.001	0.002	0.001	0.008	0.043	0.005	0.092	0.002	0.04
030715	0.004	0.003	0.008	0.010	0.095	0.547	0.012	0.797	0.018	0.93
030722	0.053	0.010	0.001	0.007	0.236	0.830	0.013	1.156	0.022	2.25
030729	0.022	0.006	0.001	0.009	0.147	0.434	0.061	0.675	0.015	1.08
030805	0.018	0.005	0.020	0.015	0.052	0.315	0.015	0.317	0.007	0.87
030812	0.059	0.007	0.002	0.041	0.444	2.381	0.107	3.455	0.096	4.92
030819	-----	-----	-----	-----	-----	-----	-----	-----	0.009	0.55
030826	0.011	0.001	0.001	0.002	0.051	0.097	0.001	0.221	0.003	0.30
030902	0.042	0.005	0.058	0.026	0.125	0.881	0.074	1.495	0.032	3.59
030909	0.011	0.002	0.012	0.015	0.088	0.576	0.046	1.119	0.026	1.15
030916	0.009	0.004	0.045	0.026	0.027	0.277	0.047	0.220	0.006	1.33
030923	0.029	0.009	0.087	0.072	0.065	0.258	0.152	0.521	0.011	2.60
030930	0.020	0.004	0.012	0.017	0.053	0.258	0.034	0.395	0.008	0.55
031007	0.027	0.004	0.022	0.006	0.073	0.466	0.026	0.384	0.008	0.56
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.017	0.005	0.011	0.014	0.063	0.422	0.016	0.553	0.013	1.35
031028	0.026	0.006	0.006	0.022	0.080	0.438	0.082	0.661	0.014	2.25
031104	0.019	0.001	0.008	0.014	-----	0.223	0.037	0.309	0.008	1.20
031111	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.55
031118	0.003	0.001	0.002	0.002	0.016	0.063	0.006	0.052	0.001	0.09
031125	0.015	0.007	0.020	0.053	0.050	0.212	0.080	0.346	0.007	1.52
031202	0.012	0.004	0.014	0.026	0.027	0.319	0.033	0.314	0.010	0.95
031209	0.005	0.001	0.011	0.008	0.001	0.086	0.014	0.041	0.001	0.62
031216	0.015	0.002	0.042	0.109	0.037	0.282	0.189	0.290	0.008	2.20
031223	0.006	0.001	0.001	0.034	0.035	0.299	0.055	0.212	0.007	0.50
031230	0.005	0.001	0.001	0.010	0.024	0.182	0.014	0.211	0.007	0.74

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Valley Forge National Park

Date Off	Depositions(kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H	Precip. (Inches)
030107	0.005	0.027	0.023	0.196	0.085	0.360	0.305	0.591	0.014	1.83
030114	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030121	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.05
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030204	0.017	0.004	0.002	0.088	0.060	0.331	0.143	0.193	0.006	0.33
030211	0.008	0.003	0.017	0.027	0.012	0.062	0.045	0.056	0.001	0.20
030218	0.070	0.017	0.058	0.106	0.041	0.410	0.232	0.284	0.009	3.20
030225	0.050	0.013	0.001	0.028	0.011	0.244	0.064	0.400	0.008	2.30
030304	0.028	0.005	0.014	0.011	0.145	0.697	0.038	0.361	0.009	0.69
030311	-----	-----	-----	-----	-----	-----	-----	-----	0.002	1.02
030318	-----	-----	-----	-----	-----	-----	-----	-----	0.002	0.10
030325	0.043	0.040	0.035	0.279	0.066	0.199	0.472	0.383	0.004	1.50
030401	0.032	0.011	0.029	0.056	0.209	0.497	0.092	0.590	0.009	1.15
030408	0.026	0.006	0.005	0.098	0.055	0.148	0.143	0.137	0.001	0.58
030415	0.013	0.010	0.005	0.037	0.066	0.320	0.060	0.335	0.007	1.07
030422	0.007	0.003	0.005	0.014	0.043	0.196	0.028	0.267	0.006	0.22
030429	0.019	0.004	0.001	0.014	0.034	0.110	0.020	0.098	0.001	0.35
030506	-----	-----	-----	-----	0.013	0.064	0.017	0.070	0.001	0.10
030513	0.050	0.011	0.028	0.012	0.392	0.689	0.040	0.999	0.009	0.72
030520	0.033	0.009	0.010	0.042	0.028	0.137	0.077	0.139	0.002	0.42
030527	0.037	0.011	0.030	0.052	0.106	0.454	0.052	0.569	0.012	2.60
030603	0.030	0.004	0.017	0.030	0.102	0.329	0.006	0.405	0.007	1.34
030610	0.019	0.013	0.050	0.035	0.172	0.703	0.032	0.833	0.019	2.67
030617	0.030	0.017	0.053	0.026	0.431	1.045	0.061	1.803	0.034	1.86
030624	0.089	0.014	0.066	0.031	0.260	1.022	0.071	1.595	0.029	3.34
030701	-----	-----	-----	-----	0.024	0.061	0.011	0.138	0.002	0.04
030708	0.012	0.003	0.001	0.005	0.031	0.097	0.016	0.147	0.002	0.35
030715	0.007	0.004	0.005	0.012	0.026	0.164	0.021	0.207	0.004	0.24
030722	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.36
030729	0.008	0.002	0.008	0.004	0.027	0.158	0.024	0.204	0.005	0.26
030805	0.039	0.014	0.054	0.046	0.150	0.605	0.055	1.243	0.023	2.50
030812	0.117	0.015	0.001	0.063	0.225	0.965	0.120	1.512	0.033	4.79
030819	0.011	0.001	0.005	0.004	0.011	0.136	0.008	0.104	0.003	0.12
030826	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030902	0.035	0.008	0.017	0.015	0.235	0.644	0.041	1.049	0.019	1.53
030909	0.009	0.001	0.006	0.009	0.042	0.391	0.029	0.387	0.011	0.87
030916	0.036	0.029	0.038	0.219	0.070	0.433	0.425	0.425	0.009	2.69
030923	0.133	0.110	0.158	0.644	0.086	0.135	1.430	0.775	0.004	2.60
030930	0.011	0.005	0.003	0.026	0.030	0.119	0.056	0.253	0.005	0.72
031007	0.007	0.002	0.005	0.006	0.014	0.064	0.015	0.076	0.001	0.14
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
031021	0.046	0.006	0.024	0.031	0.055	0.378	0.033	0.450	0.011	1.90
031028	0.023	0.010	0.004	0.059	0.063	0.278	0.129	0.578	0.014	2.90
031104	0.004	0.001	0.014	0.012	0.040	0.119	0.005	0.187	0.003	1.74
031111	0.005	0.005	0.021	0.035	0.102	0.681	0.072	0.689	0.021	1.80
031118	0.012	0.002	0.009	0.016	0.038	0.332	0.028	0.222	0.007	0.53
031125	0.008	0.011	0.010	0.087	0.065	0.283	0.167	0.431	0.009	1.98
031202	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.00
031209	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031216	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031223	0.009	0.004	0.001	0.071	0.038	0.139	0.126	0.435	0.008	1.03
031230	0.008	0.001	0.001	0.023	0.023	0.062	0.028	0.137	0.002	0.94

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Kane Experimental Forest - NADP/NTN

Date Off	Depositions (kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	Precip. (Inches)
030107	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.89
030114	0.016	0.002	0.001	0.010	0.027	0.158	0.020	0.059	0.001	0.001	0.22
030121	0.005	0.001	0.001	0.006	0.003	0.097	0.015	0.012	0.001	0.001	0.10
030128	0.005	0.001	0.001	0.004	0.007	0.195	0.023	0.029	0.003	0.003	0.24
030204	0.037	0.004	0.004	0.016	0.095	0.611	0.044	0.807	0.017	0.017	1.33
030211	0.007	0.001	0.001	0.004	0.022	0.310	0.027	0.092	0.005	0.005	0.34
030218	0.009	0.002	0.001	0.007	0.007	0.319	0.026	0.037	0.005	0.005	0.86
030225	0.028	0.002	0.002	0.008	0.034	0.430	0.022	0.503	0.013	0.013	1.10
030304	0.010	0.001	0.001	0.005	0.044	0.386	0.025	0.288	0.008	0.008	0.29
030311	0.030	0.004	0.008	0.007	0.072	0.510	0.033	0.420	0.010	0.010	0.62
030318	0.019	0.002	0.001	0.003	0.046	0.249	0.009	0.186	0.004	0.004	0.26
030325	0.092	0.006	0.013	0.019	0.071	0.484	0.060	0.693	0.014	0.014	1.40
030401	0.037	0.004	0.003	0.007	0.072	0.352	0.021	0.340	0.006	0.006	0.59
030408	0.162	0.023	0.012	0.049	0.292	1.017	0.097	1.466	0.021	0.021	2.13
030415	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030422	0.012	0.002	0.002	0.007	0.028	0.175	0.015	0.304	0.006	0.006	0.40
030429	0.002	0.001	0.001	0.001	0.009	0.028	0.001	0.035	0.001	0.001	0.10
030506	0.054	0.008	0.011	0.010	0.142	0.674	0.048	1.079	0.020	0.020	1.19
030513	0.047	0.009	0.032	0.024	0.110	0.496	0.047	0.646	0.012	0.012	1.55
030520	0.012	0.002	0.001	0.003	0.049	0.229	0.011	0.284	0.006	0.006	0.47
030527	0.026	0.004	0.003	0.007	0.060	0.426	0.030	0.754	0.018	0.018	1.47
030603	0.036	0.007	0.007	0.002	0.256	0.805	0.036	1.466	0.028	0.028	1.77
030610	0.013	0.002	0.004	0.002	0.075	0.364	0.013	0.858	0.017	0.017	1.29
030617	0.014	0.002	0.002	0.008	0.061	0.411	0.033	0.694	0.017	0.017	0.93
030624	0.015	0.002	0.001	0.001	0.083	0.544	0.021	0.523	0.014	0.014	0.84
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.07
030708	0.011	0.001	0.001	0.001	0.026	0.130	0.006	0.190	0.004	0.004	0.10
030715	0.015	0.002	0.002	0.003	0.059	0.297	0.018	0.637	0.013	0.013	0.52
030722	0.128	0.021	0.062	0.010	0.395	1.718	0.107	4.203	0.076	0.076	4.20
030729	0.089	0.010	0.008	0.006	0.209	0.717	0.032	1.731	0.032	0.032	3.17
030805	0.054	0.008	0.007	0.005	0.190	1.004	0.115	3.879	0.078	0.078	2.67
030812	0.020	0.003	0.002	0.001	0.095	0.594	0.036	1.379	0.030	0.030	1.56
030819	0.006	0.001	0.001	0.001	0.049	0.109	0.004	0.245	0.004	0.004	0.40
030826	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.18
030902	0.028	0.004	0.003	0.002	0.100	0.476	0.022	1.013	0.021	0.021	2.18
030909	0.022	0.005	0.002	0.004	0.060	0.314	0.009	0.382	0.008	0.008	0.71
030916	0.003	0.001	0.001	0.002	0.012	0.072	0.008	0.213	0.004	0.004	0.27
030923	0.011	0.003	0.005	0.021	0.043	0.256	0.043	0.544	0.011	0.011	2.10
030930	0.061	0.007	0.006	0.003	0.100	0.460	0.019	0.792	0.013	0.013	1.09
031007	0.068	0.011	0.004	0.002	0.094	0.542	0.021	0.442	0.008	0.008	1.03
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.03
031021	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.85
031028	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.80
031104	0.021	0.004	0.004	0.017	0.087	0.539	0.046	0.594	0.014	0.014	0.42
031111	0.013	0.003	0.005	0.016	0.048	0.290	0.038	0.486	0.012	0.012	0.75
031118	0.033	0.004	0.006	0.005	0.109	0.565	0.023	0.624	0.015	0.015	1.30
031125	0.021	0.004	0.004	0.016	0.085	0.395	0.035	0.565	0.012	0.012	2.78
031202	0.028	0.005	0.003	0.007	0.060	0.331	0.021	0.391	0.009	0.009	1.40
031209	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.32
031216	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.52
031223	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.72
031230	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.20

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Leading Ridge - NADP/NTN

Date	Depositions (kg/ha)										Precip.
Off	Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	(Inches)
030107	0.005	0.002	0.002	0.006	0.032	0.485	0.032	0.598	0.017	0.010	2.12
030114	0.004	0.001	0.001	0.002	0.006	0.044	0.009	0.016	0.001	0.001	0.07
030121	0.020	0.003	0.001	0.010	0.007	0.146	0.015	0.021	0.001	0.001	0.13
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.02
030204	0.020	0.002	0.002	0.008	0.065	0.407	0.025	0.487	0.012	0.007	0.88
030211	0.013	0.002	0.001	0.004	0.028	0.278	0.017	0.114	0.004	0.004	0.39
030218	0.018	0.002	0.001	0.010	0.004	0.340	0.031	0.107	0.007	0.005	1.76
030225	0.005	0.001	0.001	0.004	0.024	0.375	0.016	0.354	0.011	0.007	1.04
030304	0.011	0.001	0.001	0.005	0.027	0.326	0.020	0.182	0.007	0.005	0.14
030311	0.017	0.001	0.001	0.003	0.017	0.243	0.010	0.176	0.005	0.004	0.42
030318	0.017	0.002	0.001	0.003	0.049	0.234	0.009	0.269	0.005	0.004	0.22
030325	0.070	0.005	0.007	0.035	0.031	0.195	0.062	0.290	0.004	0.003	1.11
030401	0.031	0.004	0.003	0.007	0.057	0.241	0.022	0.347	0.006	0.006	0.87
030408	0.068	0.010	0.007	0.034	0.235	0.906	0.064	1.094	0.019	0.016	1.68
030415	0.003	0.001	0.001	0.002	0.007	0.064	0.006	0.102	0.003	0.002	0.44
030422	0.016	0.004	0.002	0.017	0.077	0.283	0.023	0.280	0.004	0.004	0.31
030429	0.024	0.005	0.003	0.002	0.028	0.187	0.009	0.215	0.004	0.005	0.48
030506	0.025	0.005	0.016	0.005	0.069	0.215	0.015	0.393	0.006	0.006	0.58
030513	0.103	0.018	0.038	0.034	0.183	0.966	0.089	1.462	0.028	0.025	1.76
030520	0.036	0.008	0.005	0.019	0.131	0.446	0.043	0.561	0.009	0.008	0.94
030527	0.032	0.004	0.008	0.005	0.100	0.525	0.023	0.623	0.014	0.014	1.13
030603	0.047	0.007	0.008	0.001	0.166	0.672	0.035	0.923	0.017	0.018	1.15
030610	0.017	0.004	0.012	0.001	0.098	0.542	0.023	0.738	0.018	0.016	2.27
030617	0.007	0.001	0.001	0.003	0.023	0.140	0.012	0.184	0.004	0.004	0.14
030624	0.015	0.002	0.003	0.002	0.067	0.415	0.015	0.512	0.014	0.013	1.20
030701	0.002	0.001	0.001	0.001	0.010	0.031	0.001	0.027	0.001	0.001	0.06
030708	0.047	0.005	0.008	0.004	0.242	0.732	0.054	2.096	0.037	0.035	1.42
030715	0.020	0.003	0.004	0.006	0.142	0.726	0.030	0.975	0.023	0.021	2.00
030722	0.042	0.006	0.007	0.004	0.117	0.346	0.020	0.752	0.012	0.011	1.10
030729	0.028	0.003	0.005	0.001	0.063	0.330	0.019	0.710	0.014	0.014	0.73
030805	0.031	0.005	0.006	0.005	0.247	0.959	0.052	1.691	0.034	0.028	4.06
030812	0.008	0.001	0.003	0.001	0.107	0.307	0.016	0.683	0.012	0.011	1.08
030819	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030826	0.016	0.003	0.002	0.001	0.026	0.118	0.007	0.196	0.003	0.003	0.16
030902	0.069	0.011	0.013	0.011	0.309	1.269	0.080	3.052	0.058	0.058	4.50
030909	0.015	0.003	0.003	0.002	0.082	0.371	0.029	0.784	0.016	0.014	1.16
030916	0.010	0.002	0.002	0.010	0.099	0.206	0.023	0.533	0.008	0.007	0.75
030923	0.031	0.007	0.009	0.057	0.050	0.324	0.112	0.635	0.014	0.012	2.45
030930	0.028	0.003	0.003	0.008	0.111	0.270	0.018	0.483	0.008	0.007	1.21
031007	0.027	0.004	0.003	0.001	0.056	0.285	0.010	0.291	0.006	0.005	0.54
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.037	0.007	0.030	0.003	0.105	0.665	0.034	0.848	0.019	0.018	1.47
031028	0.023	0.003	0.006	0.007	0.082	0.388	0.015	0.625	0.013	0.011	1.15
031104	0.005	0.001	0.001	0.004	0.006	0.090	0.010	0.102	0.003	0.003	0.12
031111	0.009	0.003	0.002	0.014	0.064	0.391	0.032	0.389	0.010	0.009	0.74
031118	0.007	0.001	0.003	0.001	0.019	0.177	0.008	0.220	0.005	0.005	0.27
031125	0.030	0.009	0.008	0.057	0.125	0.466	0.107	0.776	0.014	0.015	2.35
031202	0.008	0.001	0.002	0.006	0.062	0.194	0.017	0.367	0.007	0.007	0.74
031209	0.013	0.002	0.001	0.004	0.008	0.181	0.020	0.046	0.003	0.002	0.62
031216	0.011	0.002	0.001	0.014	0.023	0.381	0.034	0.324	0.012	0.011	2.24
031223	0.004	0.001	0.001	0.005	0.005	0.100	0.011	0.052	0.002	0.002	0.18
031230	0.008	0.001	0.002	0.009	0.020	0.181	0.020	0.251	0.006	0.007	0.79

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Milford - Forest Service - NADP/NTN

Date Off	Depositions (kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	Precip. (Inches)
030107	0.012	0.003	0.002	0.024	0.030	0.423	0.054	0.248	0.009	0.011	2.38
030114	0.006	0.001	0.001	0.005	0.019	0.168	0.014	0.065	0.002	0.003	0.13
030121	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.05
030128	0.002	0.001	0.001	0.005	0.004	0.042	0.009	0.010	0.001	0.001	0.05
030204	0.016	0.002	0.001	0.019	0.027	0.199	0.032	0.195	0.004	0.005	0.19
030211	0.004	0.001	0.001	0.006	0.018	0.200	0.020	0.105	0.004	0.004	0.48
030218	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.36
030225	0.058	0.004	0.005	0.015	0.026	0.259	0.029	0.413	0.008	0.008	1.26
030304	0.005	0.001	0.001	0.003	0.018	0.133	0.010	0.143	0.004	0.004	0.45
030311	0.004	0.001	0.001	0.006	0.012	0.122	0.012	0.133	0.004	0.004	0.58
030318	0.028	0.003	0.001	0.014	0.077	0.466	0.030	0.224	0.006	0.007	0.31
030325	0.029	0.011	0.006	0.095	0.026	0.284	0.166	0.287	0.007	0.009	1.45
030401	0.039	0.021	0.009	0.162	0.087	0.380	0.292	0.516	0.009	0.010	1.19
030408	0.033	0.004	0.002	0.016	0.071	0.357	0.037	0.314	0.006	0.007	0.80
030415	0.004	0.002	0.001	0.015	0.006	0.049	0.027	0.075	0.002	0.003	0.47
030422	0.008	0.002	0.001	0.011	0.017	0.121	0.019	0.115	0.003	0.003	0.11
030429	0.006	0.001	0.001	0.004	0.017	0.108	0.008	0.121	0.003	0.003	0.19
030506	0.010	0.002	0.002	0.003	0.014	0.106	0.007	0.092	0.002	0.002	0.12
030513	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.31
030520	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030527	0.047	0.040	0.068	0.021	0.219	0.430	0.039	0.454	0.001	0.003	3.08
030603	0.046	0.008	0.020	0.008	0.301	0.878	0.046	1.350	0.023	0.022	2.58
030610	0.015	0.002	0.010	0.002	0.112	0.512	0.015	0.619	0.015	0.017	1.92
030617	0.014	0.002	0.009	0.005	0.104	0.710	0.023	0.649	0.018	0.020	0.89
030624	0.030	0.005	0.016	0.012	0.244	1.199	0.041	1.463	0.037	0.041	4.00
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030708	0.007	0.001	0.001	0.001	0.004	0.045	0.002	0.058	0.001	0.002	0.10
030715	0.007	0.001	0.002	0.003	0.045	0.165	0.011	0.243	0.005	0.005	0.24
030722	0.063	0.013	0.038	0.005	0.152	0.724	0.046	1.380	0.027	0.029	1.66
030729	0.029	0.003	0.003	0.002	0.055	0.300	0.013	0.405	0.009	0.010	0.72
030805	0.015	0.003	0.004	0.017	0.089	0.685	0.049	0.926	0.024	0.027	1.94
030812	0.028	0.006	0.004	0.017	0.133	1.115	0.056	0.995	0.027	0.034	2.76
030819	0.005	0.001	0.002	0.001	0.017	0.031	0.001	0.045	0.001	0.001	0.29
030826	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030902	0.013	0.001	0.003	0.008	0.076	0.584	0.032	1.003	0.025	0.025	2.50
030909	0.002	0.001	0.001	0.002	0.022	0.225	0.009	0.261	0.007	0.008	0.37
030916	0.019	0.020	0.009	0.167	0.029	0.286	0.298	0.264	0.007	0.008	1.25
030923	0.031	0.030	0.014	0.233	0.123	0.398	0.408	0.909	0.014	0.015	4.02
030930	0.021	0.007	0.003	0.045	0.051	0.297	0.078	0.315	0.007	0.008	1.18
031007	0.007	0.001	0.001	0.003	0.024	0.131	0.008	0.196	0.004	0.004	0.34
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.022	0.004	0.003	0.013	0.052	0.419	0.026	0.271	0.009	0.010	1.72
031028	0.025	0.004	0.004	0.034	0.058	0.315	0.066	0.538	0.012	0.015	3.26
031104	0.005	0.001	0.002	0.002	0.010	0.106	0.010	0.139	0.004	0.005	1.89
031111	0.013	0.002	0.001	0.009	0.028	0.288	0.023	0.387	0.009	0.012	0.64
031118	0.004	0.001	0.001	0.002	0.021	0.128	0.007	0.081	0.002	0.005	0.09
031125	0.021	0.014	0.009	0.139	0.048	0.453	0.240	0.549	0.014	0.018	2.70
031202	0.013	0.003	0.005	0.031	0.078	0.389	0.056	0.453	0.009	0.015	1.70
031209	0.006	0.001	0.001	0.011	0.003	0.096	0.018	0.010	0.001	0.002	0.45
031216	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2.95
031223	0.004	0.001	0.001	0.013	0.017	0.129	0.027	0.209	0.005	0.009	0.83
031230	0.009	0.003	0.002	0.033	0.018	0.189	0.054	0.166	0.005	0.009	1.77

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Pennsylvania State University - NADP/NTN

Date Off	Depositions (kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	Precip. (Inches)
030107	0.021	0.002	0.002	0.007	0.036	0.489	0.047	0.469	0.014	0.017	2.05
030114	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030121	0.007	0.001	0.001	0.004	0.006	0.115	0.011	0.017	0.001	0.001	0.10
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.02
030204	0.014	0.001	0.001	0.007	0.047	0.325	0.022	0.398	0.010	0.010	0.80
030211	0.008	0.001	0.001	0.002	0.016	0.254	0.013	0.063	0.003	0.004	0.33
030218	0.014	0.001	0.001	0.006	0.004	0.218	0.028	0.053	0.004	0.003	1.38
030225	0.002	0.001	0.001	0.002	0.015	0.241	0.020	0.366	0.010	0.011	0.98
030304	0.012	0.001	0.001	0.005	0.035	0.332	0.015	0.225	0.007	0.007	0.22
030311	0.013	0.001	0.001	0.003	0.014	0.179	0.009	0.096	0.003	0.004	0.42
030318	0.019	0.002	0.001	0.004	0.058	0.300	0.014	0.338	0.007	0.008	0.41
030325	0.071	0.007	0.008	0.038	0.039	0.238	0.071	0.427	0.007	0.009	1.40
030401	0.032	0.003	0.003	0.008	0.050	0.263	0.023	0.338	0.007	0.006	0.90
030408	0.058	0.009	0.007	0.030	0.156	0.667	0.082	0.831	0.015	0.017	1.62
030415	0.009	0.001	0.001	0.004	0.009	0.085	0.007	0.159	0.004	0.004	0.73
030422	0.018	0.003	0.001	0.009	0.034	0.154	0.014	0.158	0.002	0.003	0.14
030429	0.032	0.005	0.001	0.002	0.077	0.277	0.012	0.411	0.006	0.008	0.52
030506	0.012	0.002	0.005	0.003	0.044	0.129	0.008	0.228	0.004	0.005	0.54
030513	0.077	0.012	0.018	0.021	0.100	0.636	0.050	0.907	0.018	0.017	1.16
030520	0.045	0.010	0.006	0.024	0.136	0.525	0.056	0.664	0.013	0.013	1.05
030527	0.026	0.004	0.004	0.004	0.106	0.440	0.023	0.609	0.012	0.014	1.02
030603	0.072	0.010	0.015	0.002	0.169	0.771	0.048	1.051	0.022	0.022	1.58
030610	0.025	0.003	0.007	0.002	0.137	0.591	0.044	1.045	0.022	0.024	2.45
030617	0.011	0.002	0.003	0.005	0.038	0.314	0.025	0.567	0.014	0.012	0.45
030624	0.015	0.002	0.003	0.001	0.078	0.623	0.025	0.794	0.021	0.022	1.93
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030708	0.020	0.005	0.003	0.002	0.116	0.371	0.028	0.869	0.017	0.017	0.79
030715	0.008	0.001	0.001	0.003	0.104	0.498	0.012	0.642	0.016	0.015	1.58
030722	0.075	0.010	0.009	0.004	0.124	0.725	0.053	1.445	0.028	0.031	1.74
030729	0.023	0.002	0.003	0.002	0.053	0.362	0.023	0.765	0.016	0.016	0.81
030805	0.067	0.008	0.008	0.006	0.257	1.067	0.057	1.562	0.032	0.038	3.75
030812	0.036	0.003	0.003	0.001	0.120	0.530	0.029	1.515	0.030	0.028	1.28
030819	0.027	0.003	0.002	0.001	0.122	0.181	0.016	0.744	0.010	0.009	0.89
030826	0.017	0.003	0.001	0.001	0.016	0.125	0.004	0.131	0.003	0.004	0.22
030902	0.077	0.010	0.008	0.006	0.256	1.319	0.090	3.277	0.068	0.074	5.04
030909	0.015	0.003	0.002	0.003	0.081	0.363	0.019	0.670	0.014	0.014	0.76
030916	0.011	0.003	0.002	0.015	0.103	0.248	0.030	0.587	0.010	0.011	1.50
030923	0.046	0.010	0.045	0.105	0.008	0.471	0.182	0.911	0.012	0.015	2.99
030930	0.029	0.012	0.022	0.008	0.124	0.315	0.025	0.629	0.008	0.008	1.63
031007	0.025	0.004	0.003	0.002	0.053	0.331	0.014	0.306	0.007	0.007	0.54
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.035	0.009	0.223	0.002	0.062	0.487	0.024	0.708	0.011	0.012	1.36
031028	0.022	0.002	0.003	0.006	0.076	0.400	0.015	0.639	0.013	0.017	1.43
031104	0.005	0.001	0.001	0.002	0.009	0.087	0.007	0.081	0.002	0.002	0.13
031111	0.012	0.003	0.002	0.016	0.048	0.309	0.031	0.371	0.009	0.010	0.76
031118	0.008	0.001	0.001	0.001	0.027	0.157	0.011	0.217	0.005	0.006	0.26
031125	0.034	0.009	0.006	0.062	0.197	0.601	0.120	1.030	0.018	0.019	3.38
031202	0.007	0.001	0.002	0.004	0.057	0.188	0.016	0.344	0.008	0.008	0.89
031209	0.015	0.002	0.004	0.013	0.010	0.185	0.032	0.049	0.003	0.003	0.67
031216	0.013	0.001	0.001	0.011	0.020	0.399	0.053	0.313	0.013	0.014	2.62
031223	0.005	0.001	0.001	0.005	0.007	0.118	0.011	0.056	0.002	0.002	0.26
031230	0.009	0.001	0.002	0.013	0.040	0.276	0.028	0.304	0.009	0.009	1.12

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Arendtsville - NADP/NTN

Date Off	Depositions (kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	Precip. (Inches)
030107	0.020	0.006	0.002	0.031	0.121	0.674	0.116	0.830	0.020	0.020	1.98
030114	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030121	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030204	0.008	0.001	0.001	0.005	0.075	0.257	0.028	0.378	0.007	0.008	0.56
030211	0.003	0.001	0.001	0.001	0.003	0.092	0.004	0.021	0.001	0.002	0.27
030218	0.032	0.004	0.003	0.012	0.021	0.345	0.053	0.111	0.005	0.006	2.09
030225	0.003	0.001	0.001	0.003	0.044	0.189	0.019	0.346	0.007	0.008	1.24
030304	0.006	0.001	0.001	0.005	0.012	0.140	0.016	0.150	0.004	0.004	0.38
030311	0.135	0.008	0.006	0.012	0.065	0.471	0.022	0.542	0.007	0.016	0.62
030318	0.006	0.001	0.001	0.001	0.020	0.085	0.005	0.114	0.002	0.002	0.10
030325	0.056	0.019	0.009	0.158	0.060	0.186	0.281	0.423	0.005	0.005	1.70
030401	0.031	0.003	0.002	0.010	0.084	0.303	0.021	0.414	0.007	0.009	0.75
030408	0.020	0.004	0.004	0.017	0.119	0.415	0.033	0.446	0.008	0.009	0.87
030415	0.005	0.001	0.001	0.005	0.053	0.244	0.014	0.301	0.007	0.007	0.69
030422	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.75
030429	0.007	0.001	0.001	0.001	0.080	0.143	0.008	0.228	0.002	0.003	0.35
030506	0.015	0.003	0.002	0.005	0.068	0.203	0.014	0.408	0.007	0.008	0.67
030513	0.077	0.011	0.018	0.019	0.176	0.618	0.041	0.878	0.014	0.014	0.95
030520	0.060	0.019	0.014	0.100	0.487	1.229	0.180	1.678	0.024	0.030	2.95
030527	0.016	0.003	0.004	0.011	0.172	0.458	0.025	0.515	0.008	0.008	1.61
030603	0.086	0.008	0.014	0.004	0.258	0.713	0.033	1.043	0.015	0.016	1.30
030610	0.043	0.007	0.016	0.009	0.489	1.294	0.076	2.196	0.041	0.043	4.28
030617	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.47
030624	0.026	0.005	0.013	0.007	0.189	0.715	0.047	1.462	0.031	0.030	2.07
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030708	0.017	0.002	0.003	0.001	0.085	0.200	0.012	0.533	0.008	0.009	0.60
030715	0.016	0.002	0.002	0.003	0.072	0.250	0.014	0.458	0.009	0.008	0.40
030722	0.025	0.003	0.001	0.001	0.049	0.155	0.010	0.354	0.006	0.006	0.35
030729	0.013	0.001	0.001	0.001	0.032	0.173	0.006	0.185	0.004	0.007	0.25
030805	0.013	0.002	0.001	0.007	0.078	0.246	0.026	0.565	0.010	0.010	0.47
030812	0.056	0.004	0.004	0.003	0.163	0.620	0.023	0.912	0.015	0.017	1.00
030819	0.029	0.004	0.002	0.001	0.111	0.277	0.014	0.712	0.011	0.011	0.56
030826	0.015	0.002	0.001	0.001	0.021	0.103	0.004	0.185	0.003	0.004	0.18
030902	0.034	0.003	0.003	0.003	0.114	0.396	0.023	0.933	0.018	0.016	1.50
030909	0.015	0.003	0.002	0.005	0.084	0.445	0.023	0.556	0.012	0.013	0.61
030916	0.018	0.004	0.003	0.031	0.120	0.290	0.068	0.638	0.010	0.010	1.03
030923	0.069	0.029	0.015	0.214	0.131	0.494	0.371	0.927	0.016	0.017	3.04
030930	0.021	0.004	0.003	0.015	0.081	0.307	0.031	0.695	0.012	0.013	0.76
031007	0.006	0.001	0.001	0.001	0.019	0.132	0.004	0.169	0.004	0.004	0.42
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.026	0.004	0.005	0.007	0.132	0.601	0.030	0.722	0.014	0.019	1.48
031028	0.011	0.002	0.001	0.006	0.049	0.174	0.016	0.323	0.006	0.009	1.07
031104	0.002	0.001	0.001	0.001	0.004	0.050	0.001	0.051	0.002	0.003	0.48
031111	0.005	0.001	0.001	0.007	0.047	0.245	0.021	0.273	0.007	0.007	0.45
031118	0.021	0.003	0.003	0.002	0.032	0.235	0.006	0.278	0.006	0.008	0.55
031125	0.027	0.014	0.006	0.112	0.091	0.373	0.198	0.541	0.011	0.011	1.50
031202	0.014	0.002	0.002	0.007	0.057	0.211	0.017	0.320	0.006	0.007	0.55
031209	0.015	0.002	0.002	0.004	0.042	0.175	0.035	0.131	0.003	0.003	0.82
031216	0.022	0.010	0.005	0.102	0.094	0.536	0.224	0.731	0.018	0.019	2.85
031223	0.003	0.001	0.001	0.002	0.005	0.042	0.006	0.079	0.002	0.002	0.14
031230	0.007	0.002	0.002	0.016	0.025	0.163	0.030	0.260	0.005	0.006	0.35

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Millersville - NADP/NTN

Date Off	Depositions (kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	Precip. (Inches)
030107	0.015	0.004	0.003	0.029	0.168	0.466	0.067	0.649	0.010	0.010	1.47
030114	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030121	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.04
030128	0.004	0.001	0.001	0.004	0.034	0.107	0.013	0.045	0.001	0.001	0.10
030204	0.006	0.001	0.001	0.010	0.103	0.197	0.023	0.273	0.002	0.004	0.42
030211	0.002	0.001	0.001	0.001	0.022	0.127	0.009	0.043	0.002	0.006	0.48
030218	0.023	0.004	0.002	0.020	0.096	0.385	0.045	0.227	0.005	0.008	2.23
030225	0.008	0.001	0.001	0.007	0.060	0.209	0.032	0.397	0.008	0.007	1.58
030304	0.007	0.002	0.001	0.014	0.064	0.137	0.029	0.212	0.003	0.002	0.41
030311	0.091	0.006	0.004	0.015	0.106	0.369	0.024	0.509	0.005	0.024	0.55
030318	0.016	0.003	0.001	0.014	0.107	0.175	0.026	0.195	0.001	0.001	0.14
030325	0.024	0.009	0.006	0.070	0.122	0.235	0.130	0.341	0.003	0.005	1.60
030401	0.034	0.005	0.078	0.024	0.257	0.380	0.129	0.699	0.005	0.006	1.10
030408	0.019	0.004	0.002	0.013	0.057	0.138	0.020	0.199	0.002	0.002	0.47
030415	0.014	0.003	0.002	0.016	0.078	0.238	0.028	0.299	0.005	0.006	1.09
030422	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.37
030429	0.004	0.001	0.001	0.002	0.084	0.100	0.008	0.142	0.001	0.001	0.79
030506	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.06
030513	0.070	0.010	0.013	0.017	0.523	0.727	0.052	1.026	0.001	0.001	0.98
030520	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.79
030527	0.021	0.006	0.004	0.030	0.268	0.464	0.062	0.624	0.005	0.004	2.03
030603	0.039	0.005	0.004	0.001	0.080	0.218	0.030	0.192	0.002	0.001	0.36
030610	0.029	0.005	0.004	0.012	0.315	0.834	0.059	1.214	0.022	0.013	2.88
030617	0.005	0.001	0.001	0.001	0.019	0.133	0.007	0.080	0.003	0.002	0.22
030624	0.018	0.003	0.002	0.005	0.301	0.507	0.018	0.737	0.007	0.006	2.32
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030708	0.072	0.009	0.010	0.004	0.377	0.436	0.026	1.170	0.007	0.005	1.29
030715	0.008	0.001	0.001	0.002	0.064	0.198	0.007	0.266	0.005	0.004	0.16
030722	0.006	0.001	0.001	0.001	0.024	0.039	0.003	0.054	0.001	0.001	0.08
030729	0.035	0.005	0.008	0.005	0.258	0.722	0.047	1.292	0.023	0.012	2.31
030805	0.005	0.001	0.001	0.005	0.061	0.190	0.017	0.198	0.004	0.003	0.30
030812	0.021	0.004	0.005	0.008	0.154	0.571	0.048	0.958	0.017	0.016	1.19
030819	0.027	0.004	0.003	0.003	0.187	0.858	0.062	1.867	0.039	0.029	1.75
030826	0.109	0.013	0.007	0.006	0.302	0.800	0.058	2.144	0.031	0.029	1.00
030902	0.315	0.040	0.013	0.015	0.800	2.042	0.077	3.778	0.043	0.039	3.35
030909	0.008	0.002	0.001	0.002	0.078	0.390	0.021	0.489	0.011	0.012	1.03
030916	0.019	0.022	0.009	0.185	0.133	0.192	0.323	0.267	0.001	0.001	1.05
030923	0.069	0.045	0.024	0.393	0.173	0.334	0.715	0.957	0.012	0.014	4.54
030930	0.015	0.002	0.002	0.002	0.091	0.325	0.019	0.381	0.007	0.007	0.31
031007	0.004	0.001	0.001	0.001	0.020	0.051	0.002	0.065	0.001	0.001	0.22
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	0.021	0.003	0.003	0.004	0.144	0.288	0.013	0.378	0.004	0.003	1.67
031028	0.006	0.002	0.002	0.018	0.074	0.131	0.045	0.294	0.005	0.006	1.26
031104	0.003	0.001	0.001	0.001	0.051	0.080	-----	0.114	0.001	0.001	1.12
031111	0.011	0.003	0.002	0.011	0.141	0.351	0.030	0.495	0.008	0.008	1.50
031118	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.49
031125	0.010	0.009	0.006	0.078	0.131	0.329	0.140	0.416	0.006	0.007	1.91
031202	0.011	0.002	0.002	0.015	0.071	0.250	0.054	0.440	0.010	0.008	1.07
031209	0.008	0.001	0.001	0.007	0.055	0.151	0.020	0.093	0.001	0.001	0.78
031216	0.017	0.009	0.004	0.079	0.127	0.301	0.145	0.463	0.007	0.007	2.28
031223	0.003	0.002	0.001	0.019	0.055	0.156	0.065	0.359	0.007	0.005	0.66
031230	0.004	0.001	0.001	0.011	0.046	0.088	0.024	0.185	0.003	0.003	0.79

Pennsylvania Atmospheric Deposition Monitoring Network
2003 Weekly Measured Wet Depositions for
Young Woman's Creek

Date Off	Depositions (kg/ha) Ca	Mg	K	Na	NH_4	NO_3	Cl	SO_4	H(Lab)	H(Field)	Precip. (Inches)
030107	0.010	0.002	0.002	0.005	0.036	0.838	0.026	0.443	0.019	0.015	2.05
030114	0.005	0.001	0.001	0.001	0.009	0.058	0.003	0.025	0.001	0.001	0.07
030121	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.05
030128	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.04
030204	0.024	0.002	0.002	0.010	0.051	0.349	0.022	0.331	0.007	0.006	0.72
030211	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.35
030218	0.002	0.001	0.001	0.003	0.002	0.153	0.012	0.040	0.003	0.003	0.79
030225	0.004	0.001	0.001	0.005	0.017	0.378	0.013	0.326	0.011	0.011	0.84
030304	0.009	0.001	0.001	0.006	0.050	0.353	0.014	0.230	0.007	0.006	0.13
030311	0.015	0.002	0.001	0.004	0.017	0.210	0.009	0.130	0.004	0.003	0.42
030318	0.009	0.001	0.001	0.002	0.050	0.350	0.013	0.219	0.007	0.006	0.32
030325	0.047	0.006	0.006	0.025	0.044	0.307	0.047	0.329	0.006	0.006	1.09
030401	0.019	0.002	0.001	0.004	0.036	0.230	0.013	0.192	0.005	0.005	0.83
030408	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.16
030415	0.003	0.001	0.001	0.001	0.004	0.030	0.003	0.025	0.001	0.001	0.22
030422	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.50
030429	0.005	0.001	0.001	0.001	0.004	0.030	0.001	0.029	0.001	0.001	0.06
030506	0.026	0.004	0.011	0.005	0.053	0.246	0.017	0.400	0.007	0.007	0.47
030513	0.068	0.014	0.057	0.040	0.160	0.626	0.071	0.939	0.017	0.014	1.40
030520	0.040	0.010	0.004	0.040	0.060	0.575	0.086	0.685	0.019	0.014	0.87
030527	0.053	0.008	0.017	0.006	0.309	0.893	0.039	1.477	0.024	0.022	1.90
030603	0.037	0.007	0.015	0.002	0.167	0.650	0.033	0.996	0.020	0.023	1.60
030610	0.014	0.002	0.003	0.001	0.096	0.394	0.017	0.696	0.014	0.013	1.35
030617	0.011	0.002	0.004	0.004	0.047	0.382	0.028	0.680	0.017	0.016	0.85
030624	0.007	0.001	0.004	0.001	0.022	0.241	0.007	0.119	0.004	0.004	1.46
030701	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.03
030708	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.24
030715	0.025	0.003	0.003	0.004	0.074	0.561	0.028	0.775	0.019	0.014	1.38
030722	0.123	0.016	0.015	0.007	0.312	1.214	0.074	2.707	0.051	0.050	3.23
030729	0.074	0.008	0.012	0.006	0.252	0.668	0.052	2.069	0.037	0.033	2.92
030805	0.019	0.002	0.001	0.003	0.063	0.497	0.019	0.690	0.018	0.018	1.90
030812	0.015	0.002	0.005	0.002	0.128	0.752	0.041	1.850	0.038	0.036	1.48
030819	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.01
030826	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
030902	0.029	0.005	0.011	0.007	0.097	0.507	0.029	1.197	0.025	0.023	1.90
030909	0.010	0.001	0.003	0.001	0.034	0.339	0.012	0.575	0.013	0.012	0.96
030916	0.006	0.002	0.004	0.017	0.061	0.192	0.035	0.403	0.008	0.007	1.26
030923	0.018	0.008	0.006	0.073	0.037	0.239	0.124	0.446	0.009	0.008	1.81
030930	0.031	0.004	0.004	0.008	0.120	0.391	0.021	0.693	0.012	0.011	2.05
031007	0.033	0.005	0.002	0.001	0.043	0.244	0.012	0.242	0.004	0.004	0.47
031014	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0.00
031021	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.18
031028	0.018	0.002	0.003	0.004	0.052	0.341	0.015	0.461	0.011	0.009	1.21
031104	0.009	0.001	0.001	0.005	0.020	0.205	0.017	0.210	0.006	0.005	0.34
031111	0.010	0.004	0.003	0.021	0.039	0.293	0.045	0.444	0.010	0.013	0.66
031118	0.008	0.001	0.003	0.003	0.017	0.160	0.009	0.151	0.004	0.004	0.30
031125	0.013	0.002	0.004	0.018	0.077	0.338	0.045	0.523	0.011	0.012	2.51
031202	0.007	0.001	0.001	0.002	0.018	0.106	0.006	0.168	0.004	0.004	0.59
031209	0.007	0.001	0.001	0.006	0.008	0.140	0.010	0.015	0.002	0.001	0.55
031216	0.013	0.001	0.001	0.015	0.020	0.459	0.039	0.288	0.013	0.013	2.58
031222	0.004	0.001	0.001	0.003	0.010	0.138	0.009	0.057	0.003	0.002	0.29
031230	0.019	0.001	0.002	0.008	0.027	0.318	0.022	0.299	0.008	0.010	1.06

APPENDIX III

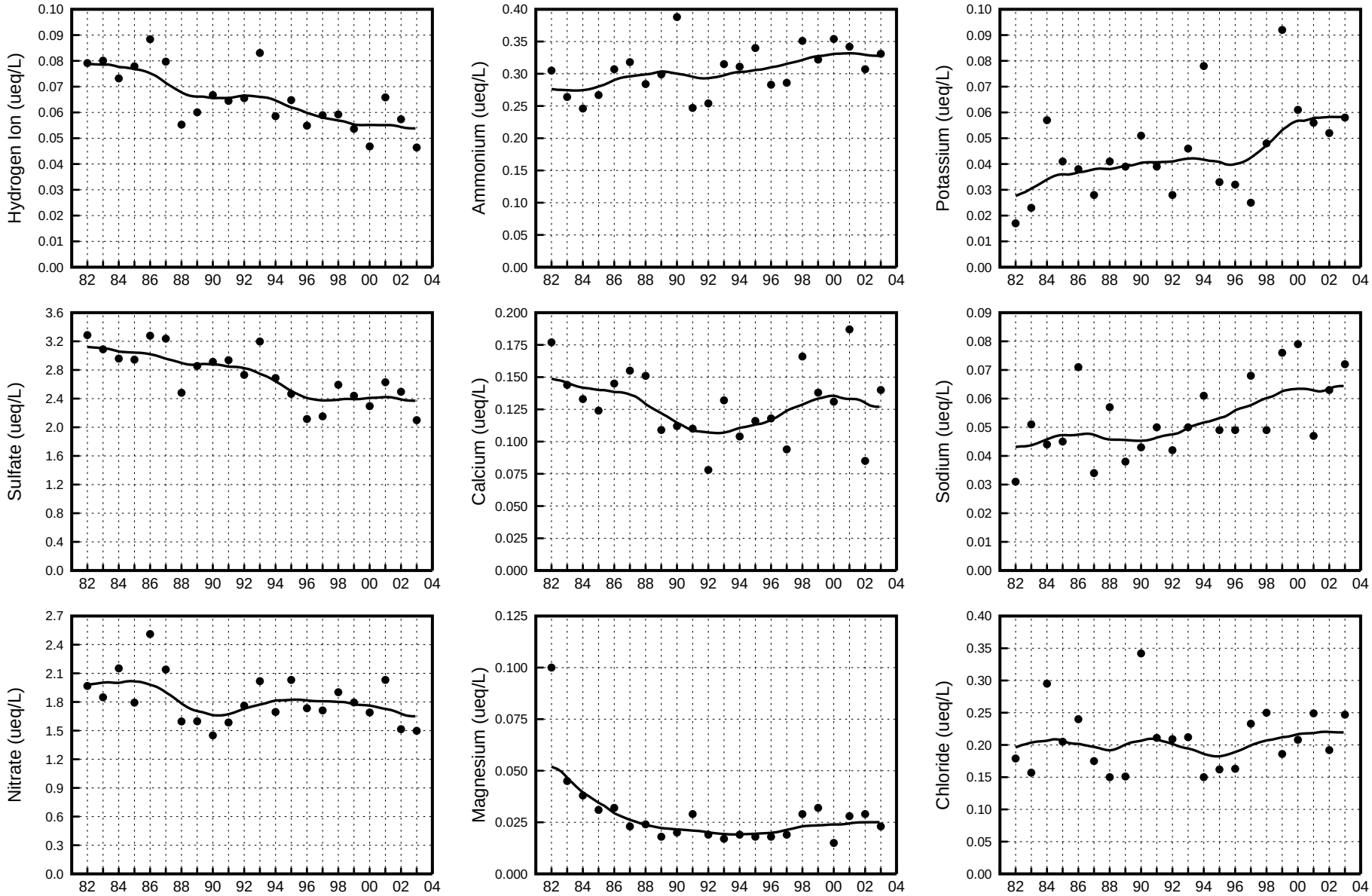
2003 PRECIPITATION QUALITY SUMMARY

ANNUAL AND SEASONAL MEAN

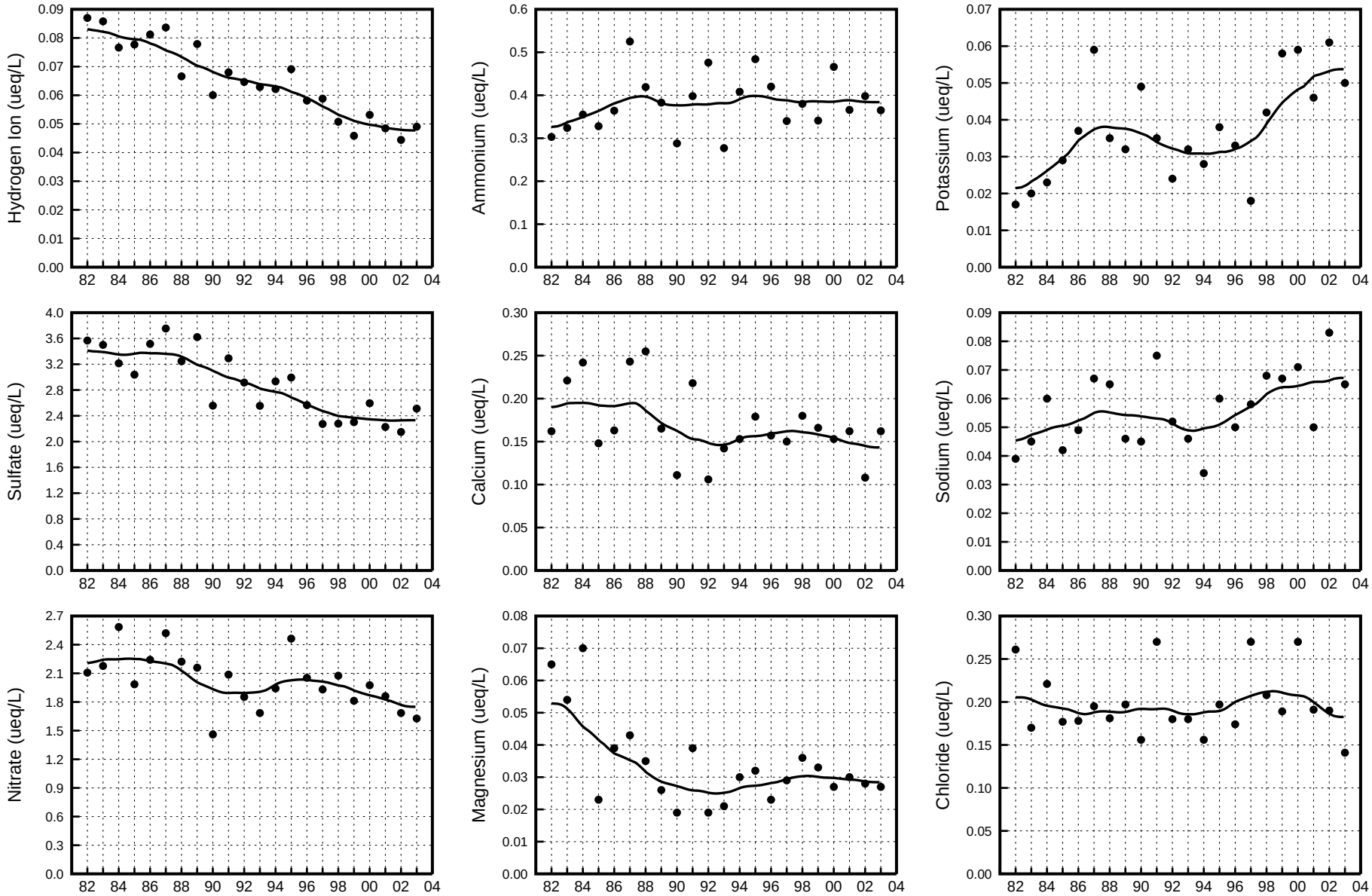
CONCENTRATION AND DEPOSITION

TRENDS FROM 1982 THROUGH 2003

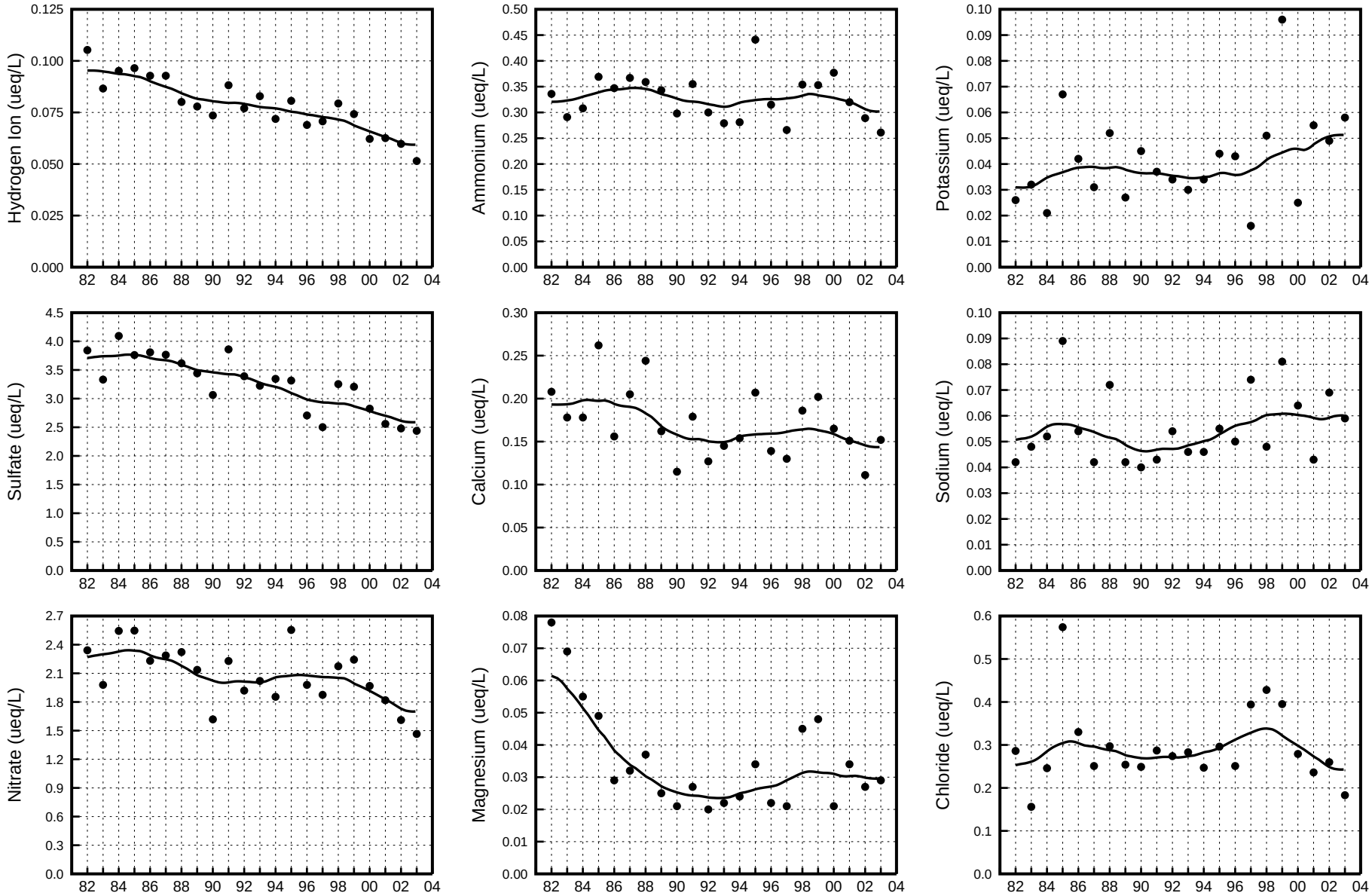
Laurel Hill State Park: 2003 Annual Concentrations



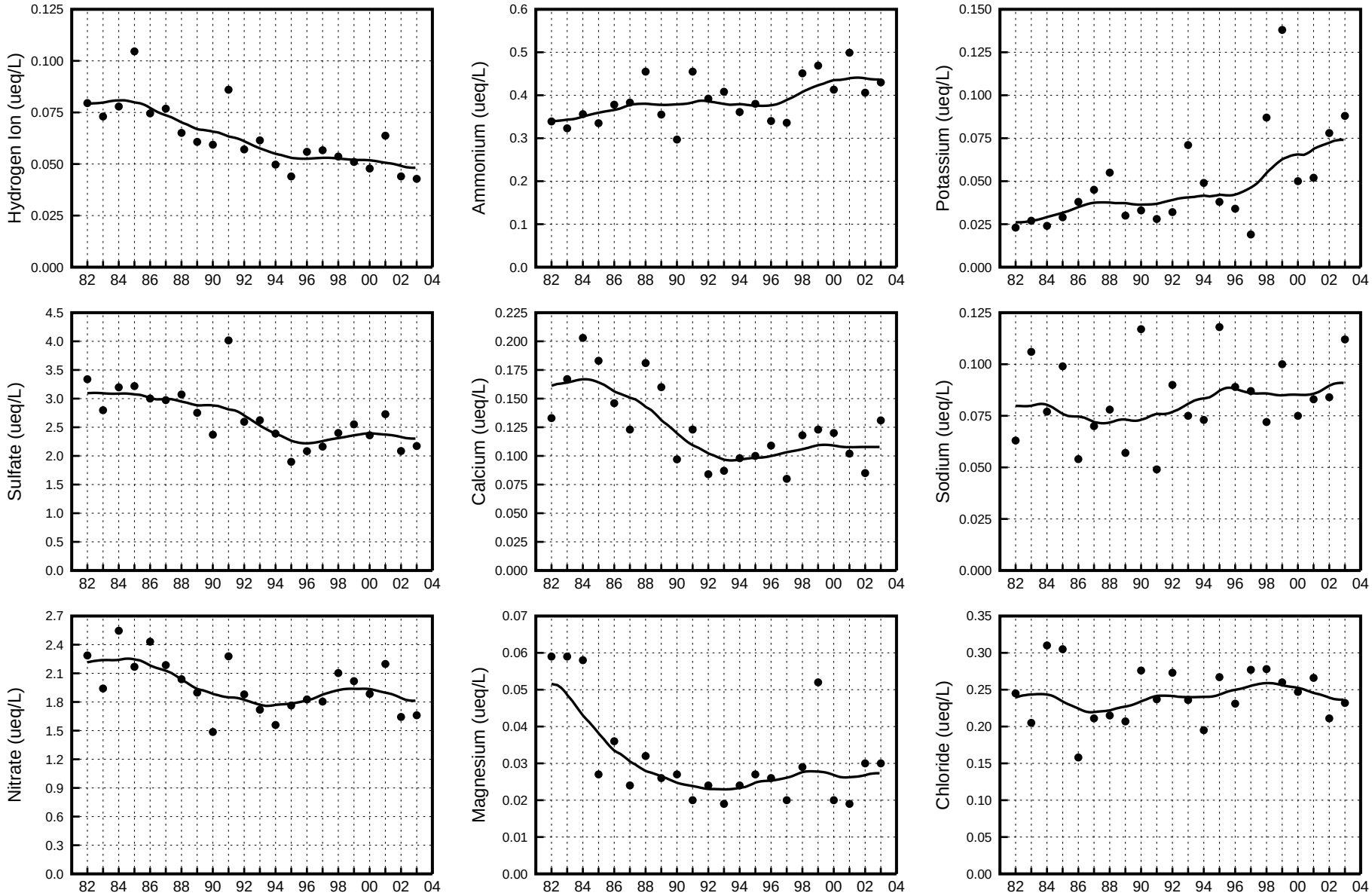
M. K. Goddard State Park: 2003 Annual Concentrations



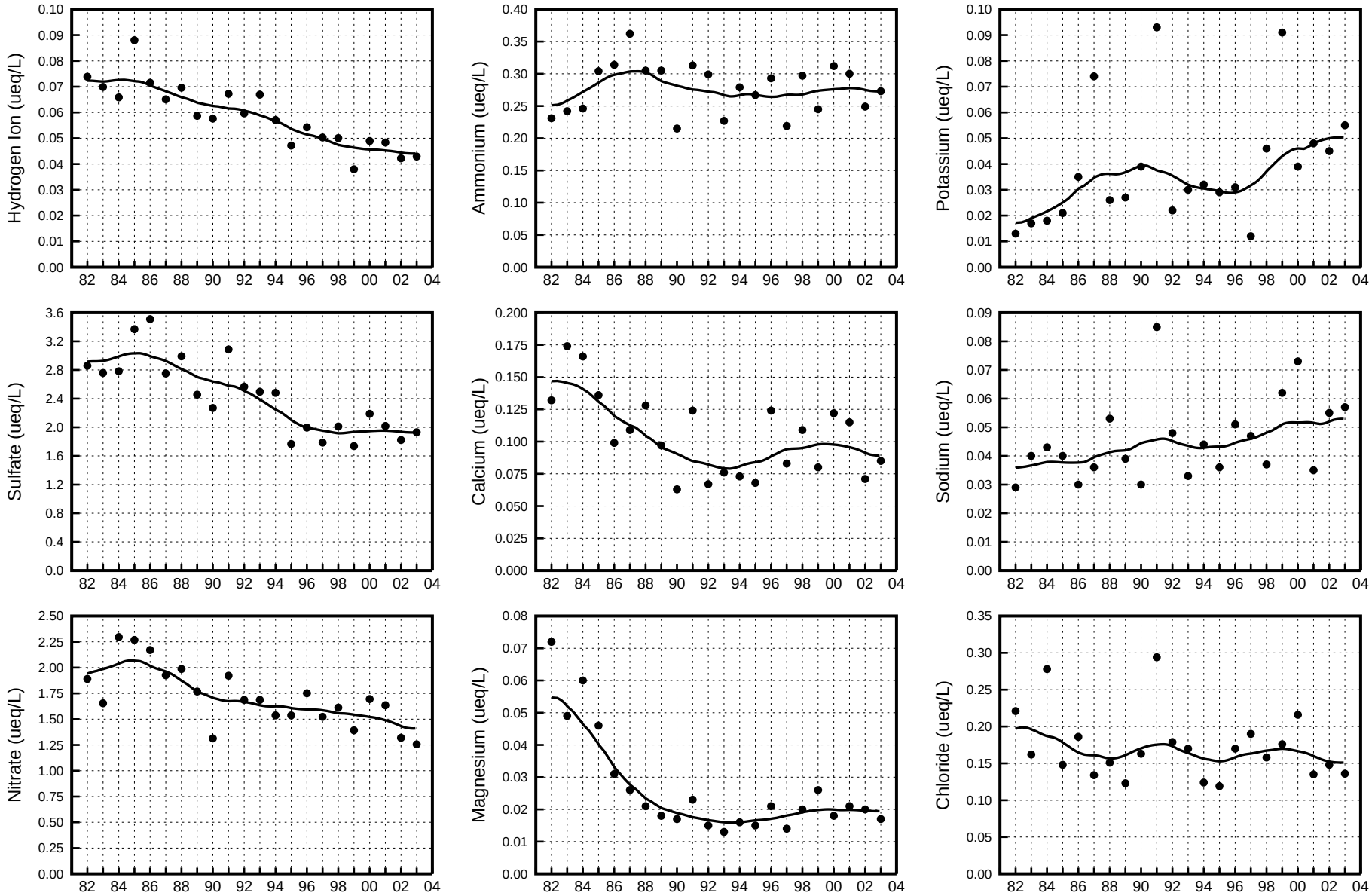
Crooked Creek Lake: 2003 Annual Concentrations



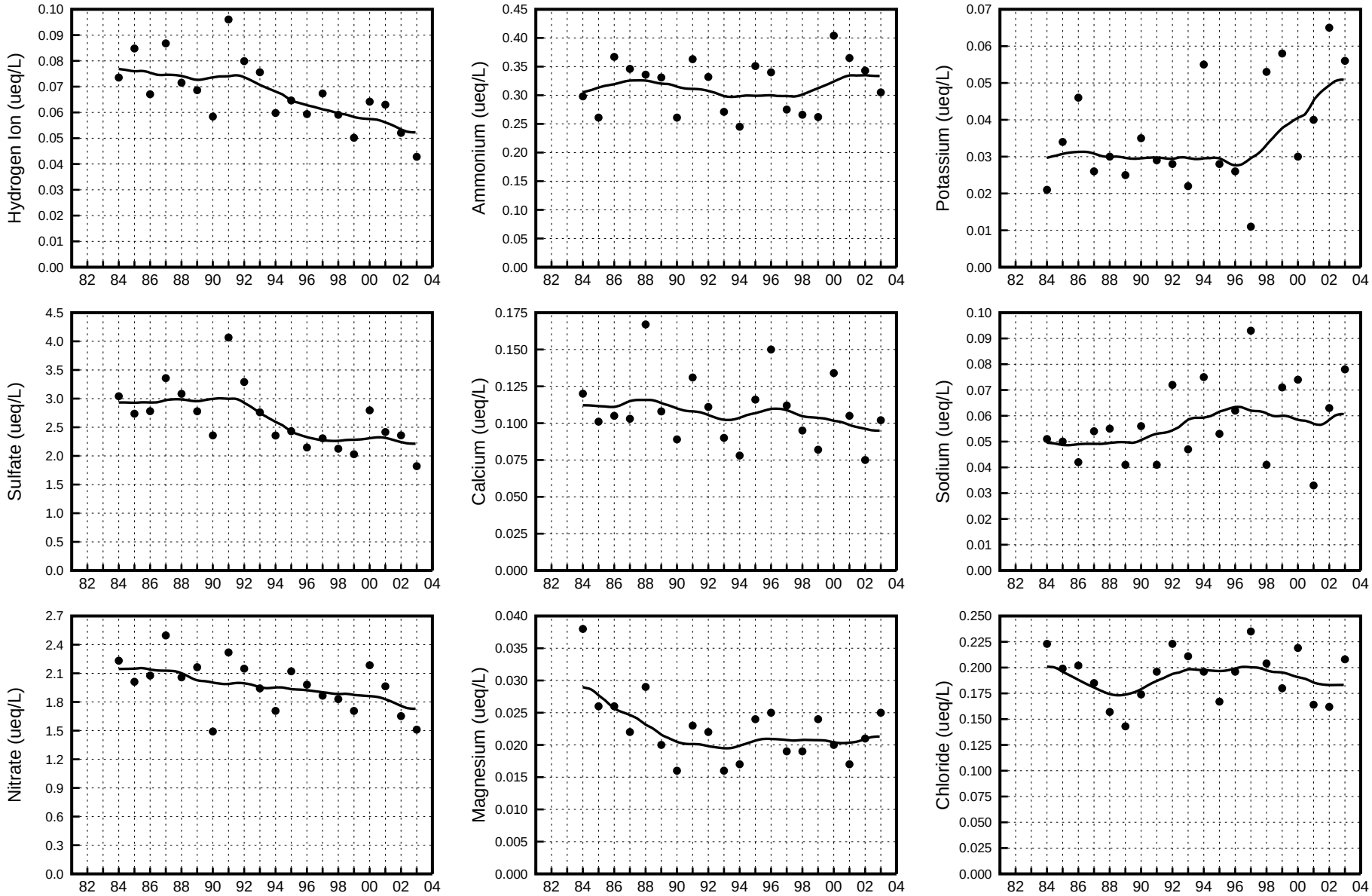
Little Buffalo State Park: 2003 Annual Concentrations



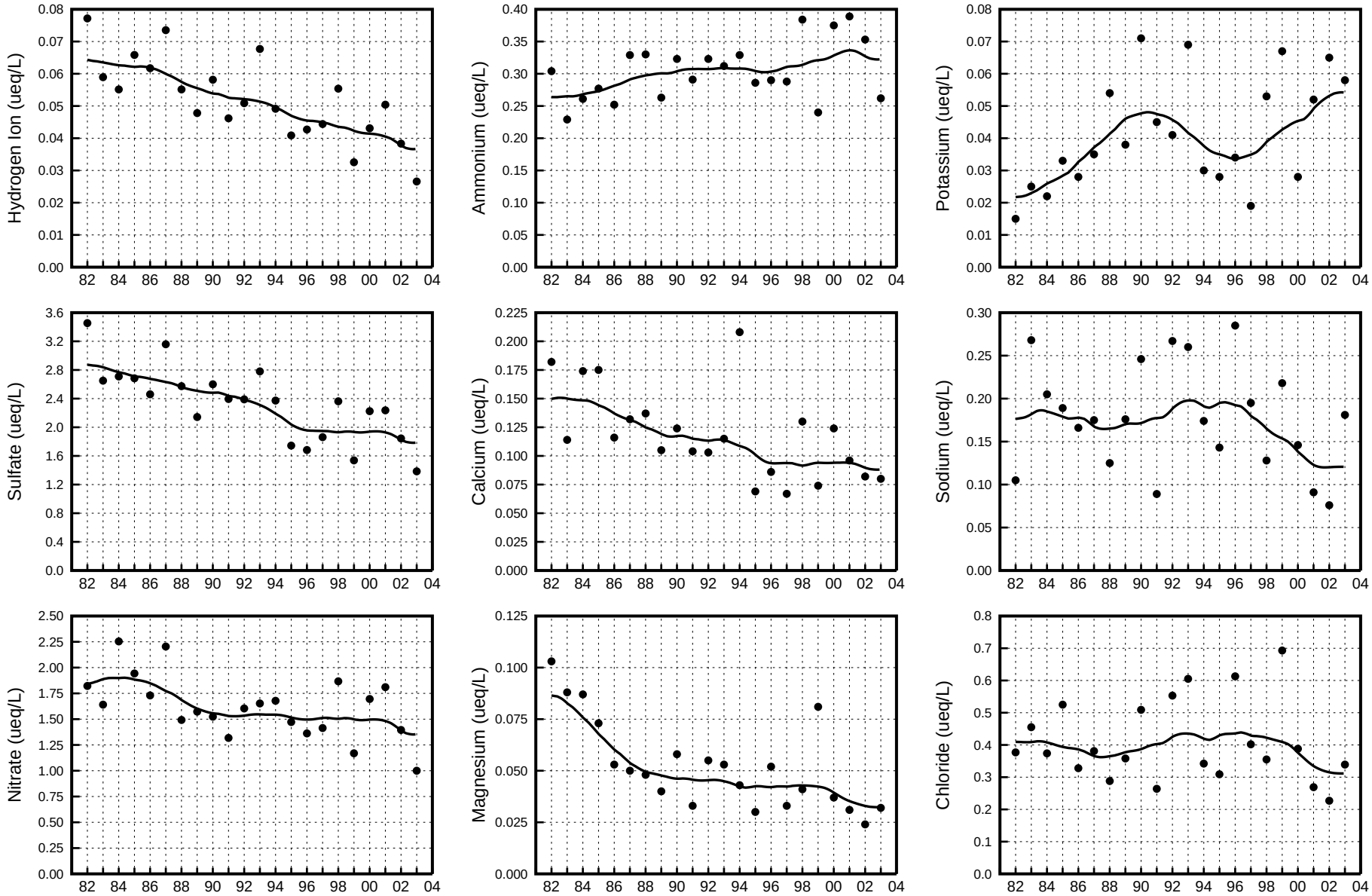
Hills Creek State Park: 2003 Annual Concentrations



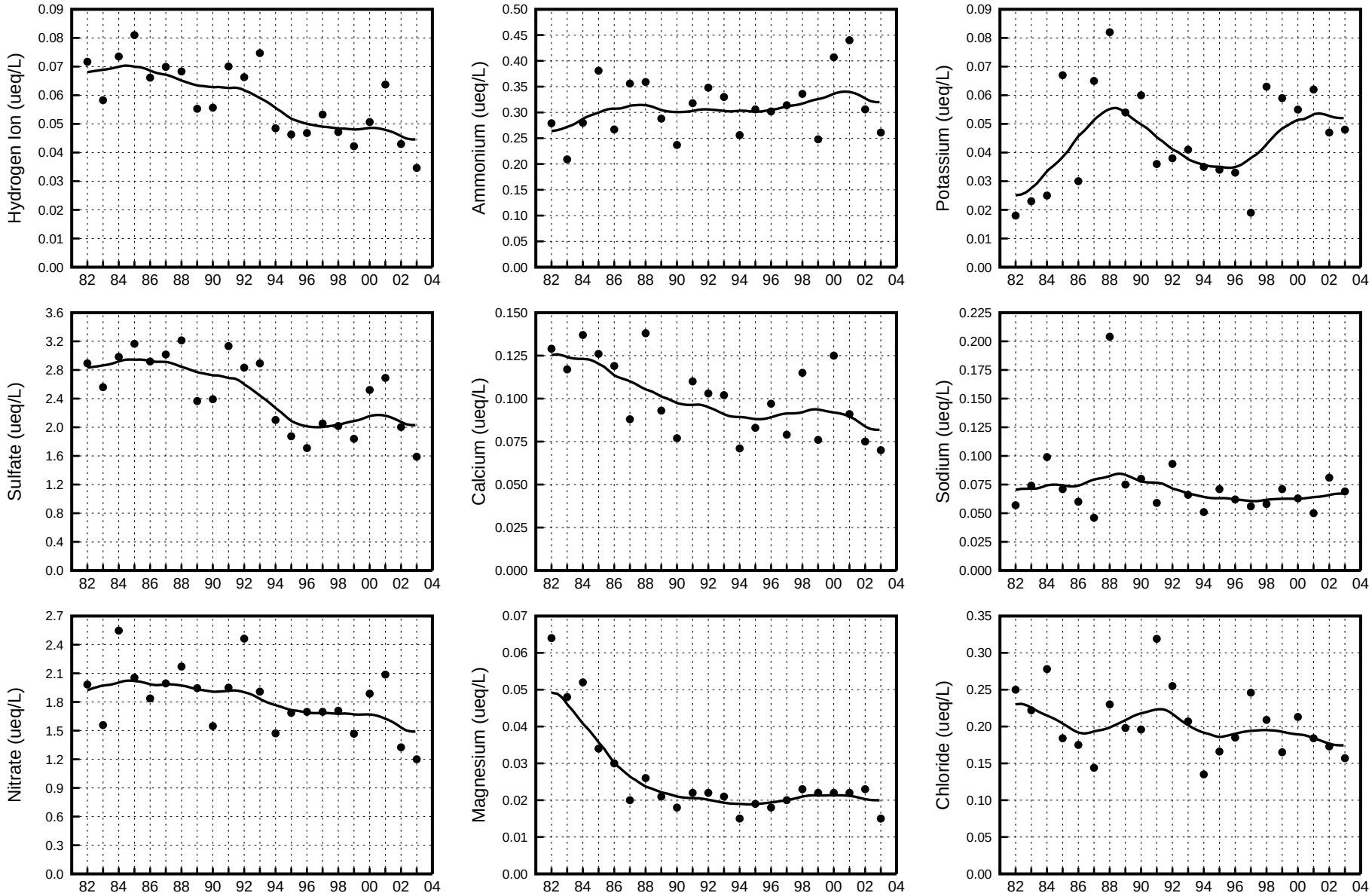
Little Pine State Park: 2003 Annual Concentrations



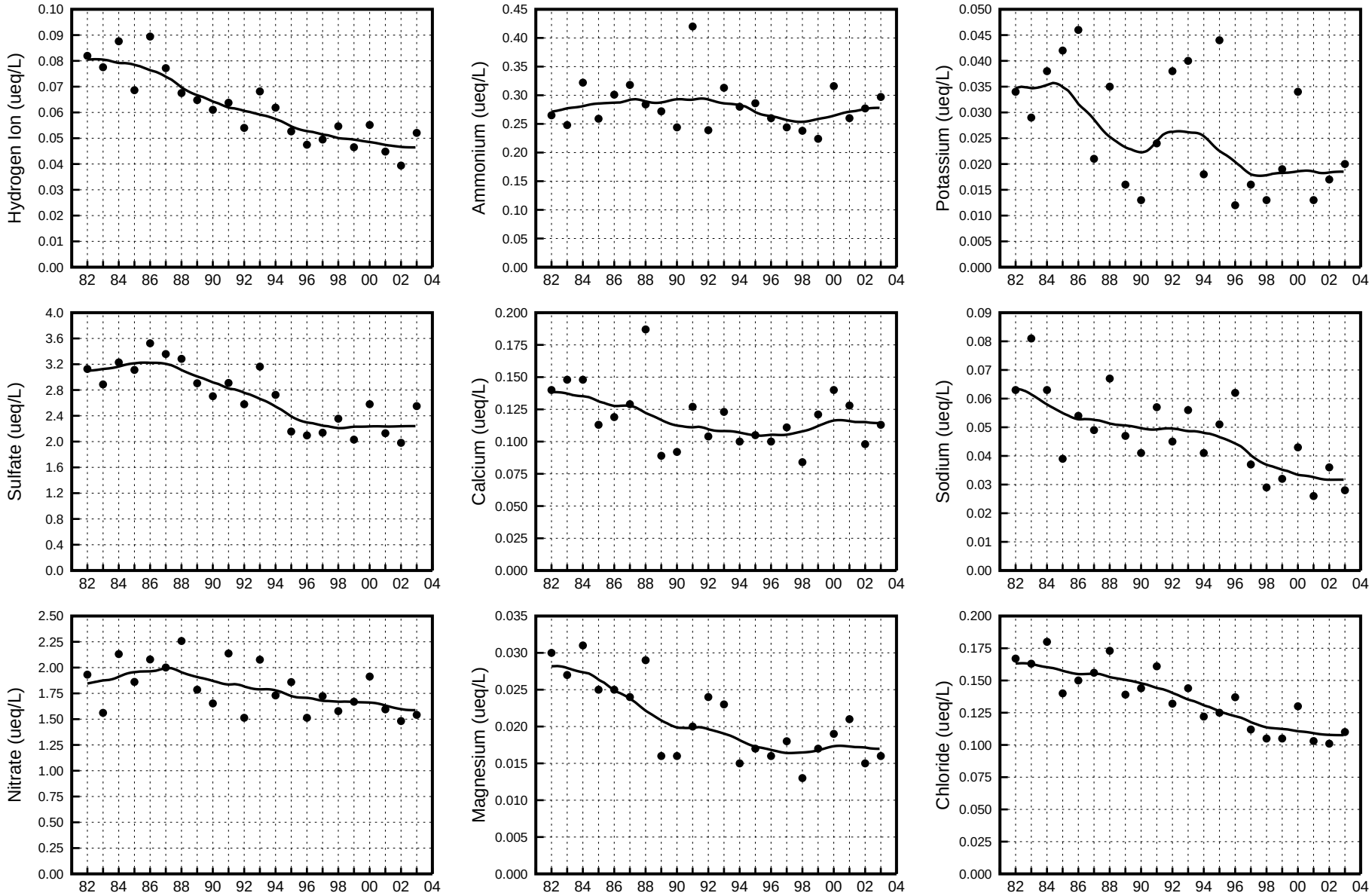
Valley Forge National Park: 2003 Annual Concentrations



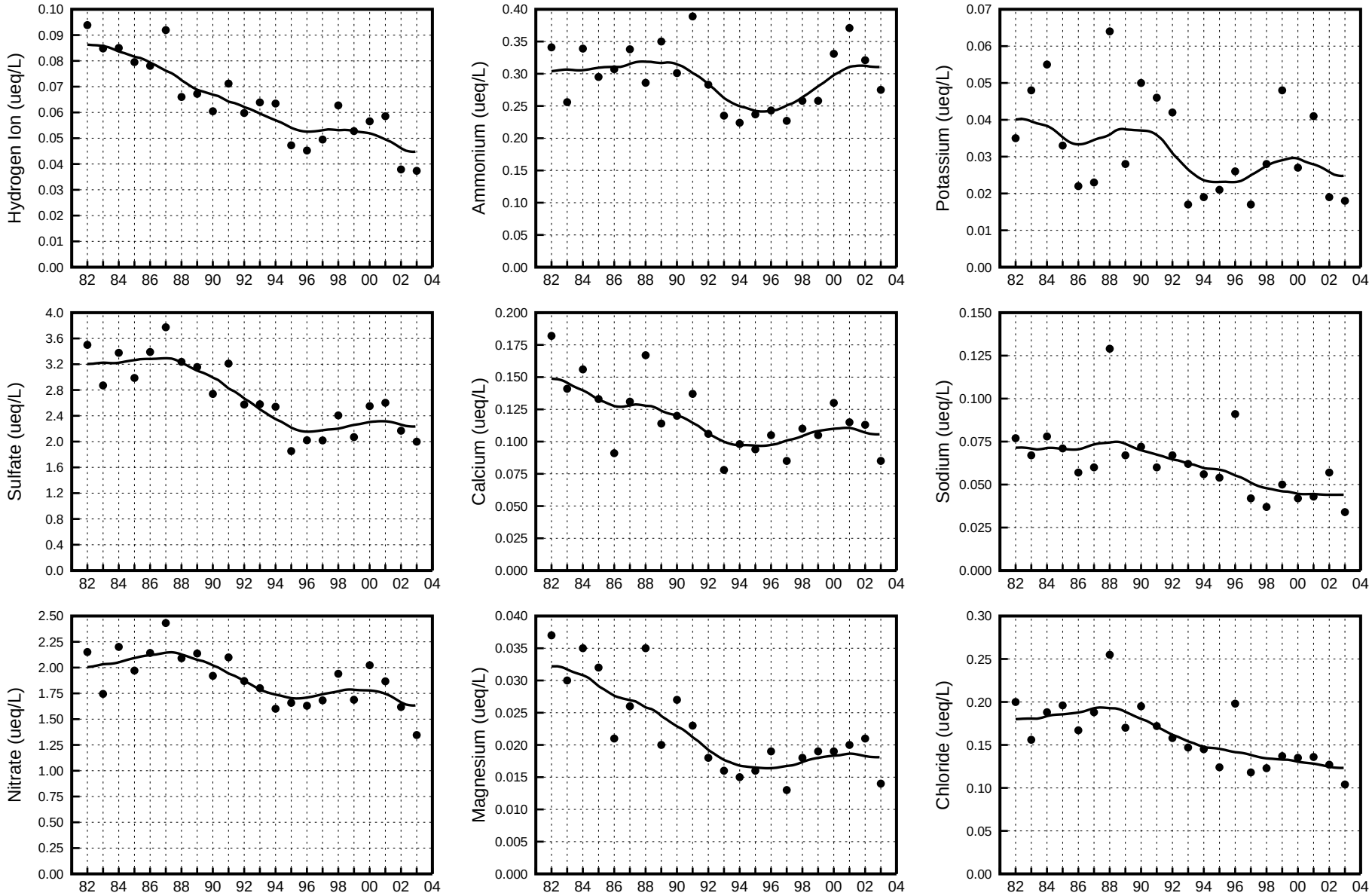
Slocum State Park: 2003 Annual Concentrations



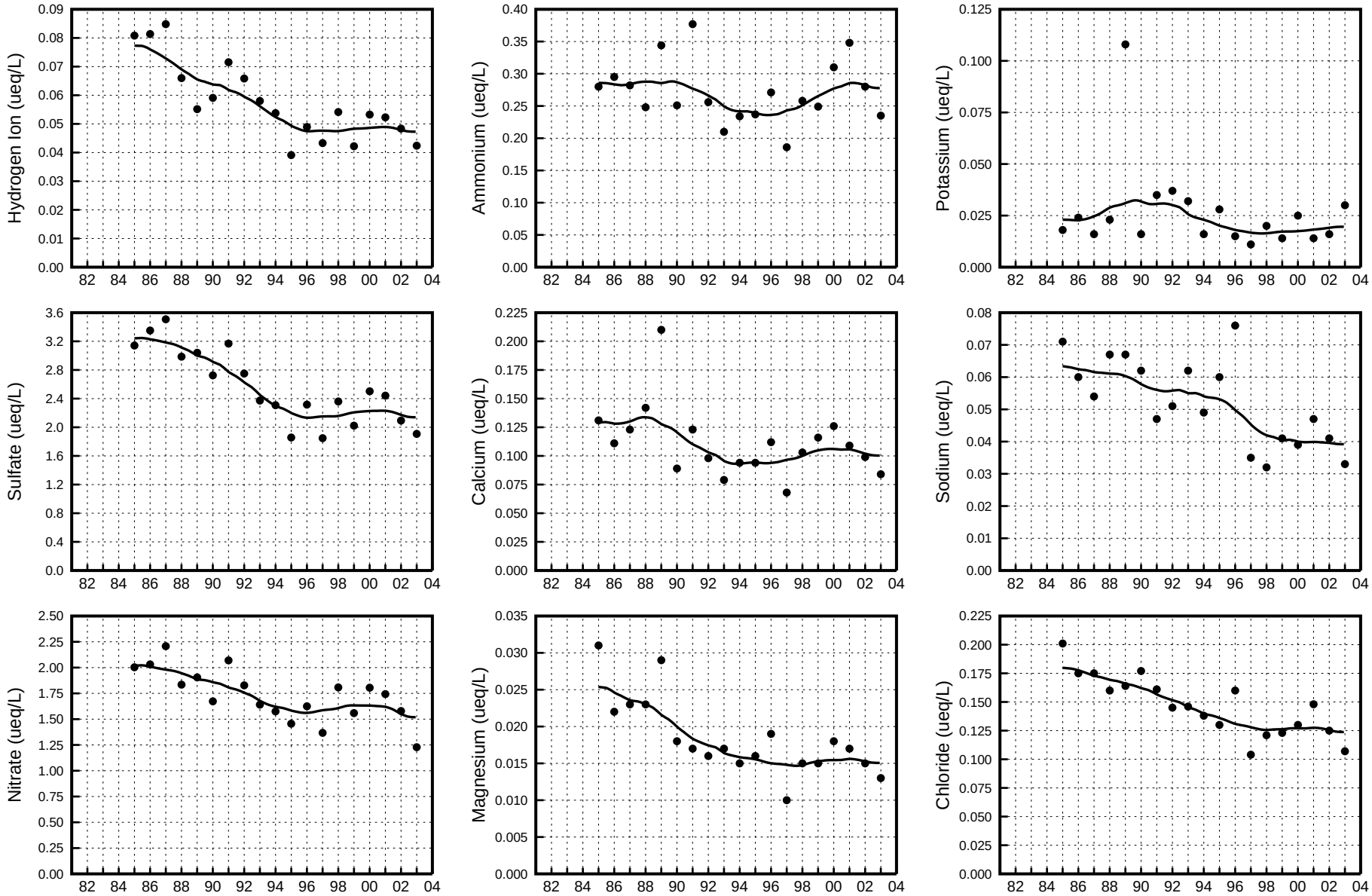
Kane Experimental Forest - NADP/NTN: 2003 Annual Concentrations



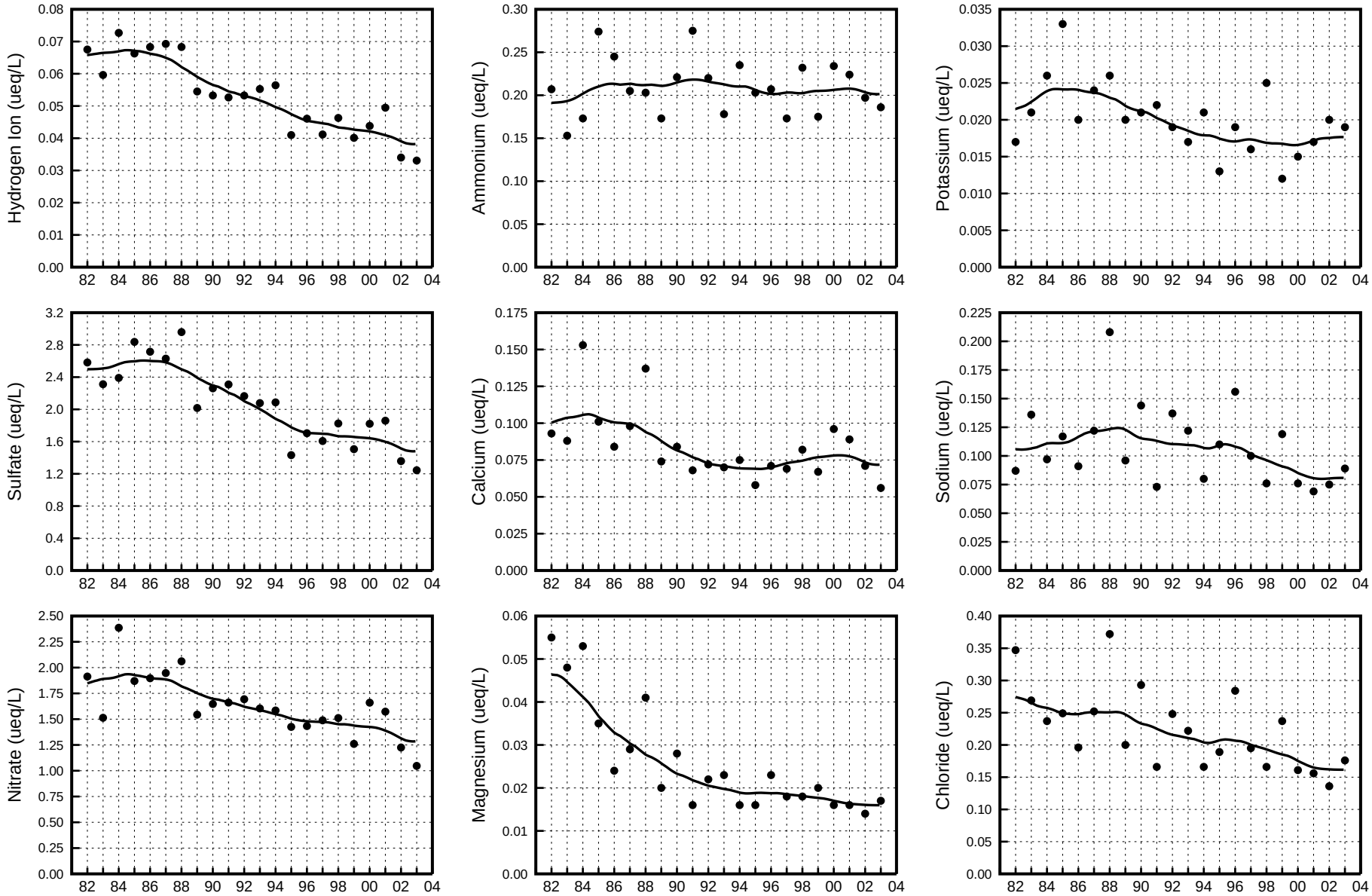
Leading Ridge - NADP/NTN: 2003 Annual Concentrations



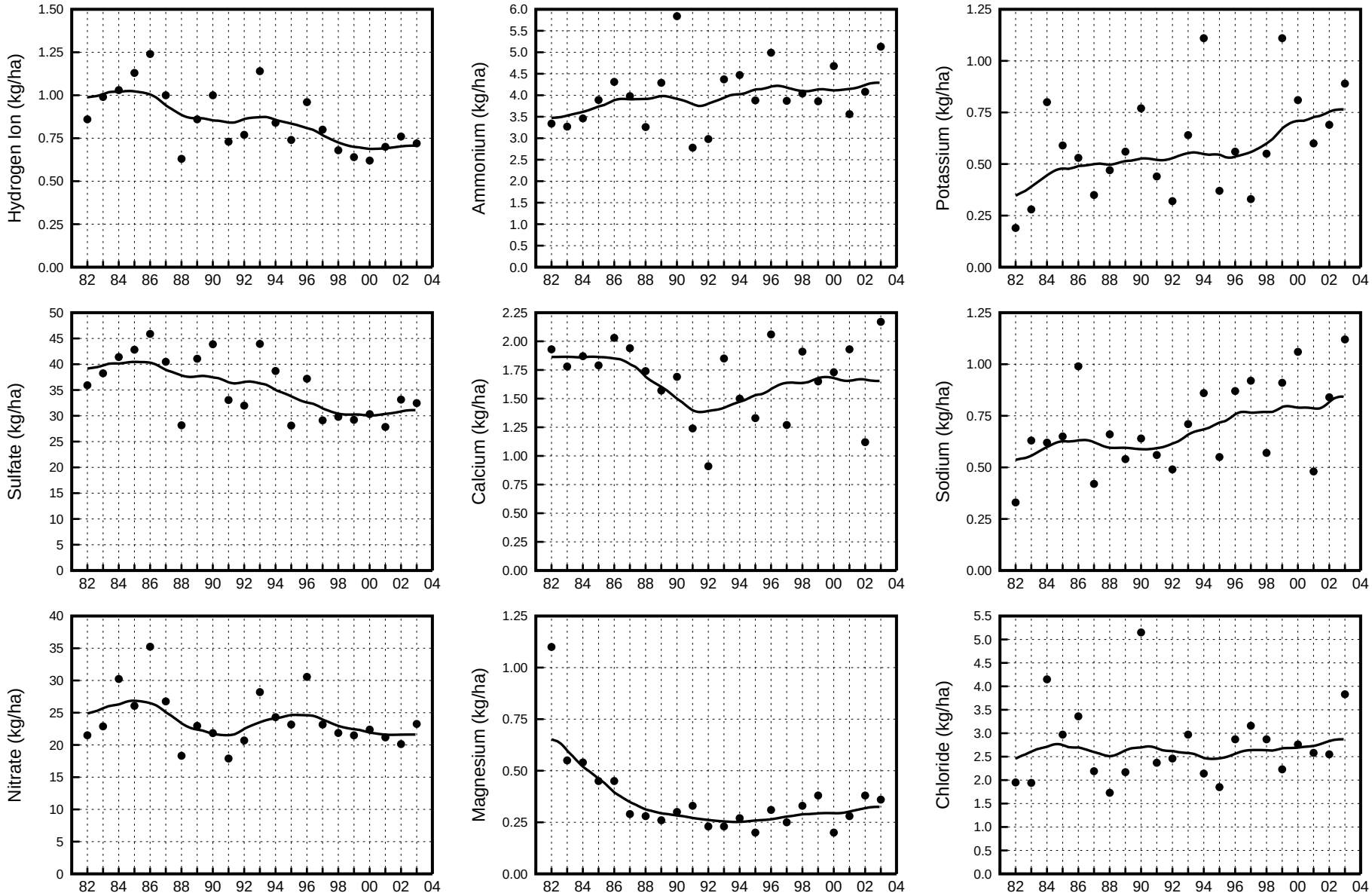
Pennsylvania State University - NADP/NTN: 2003 Annual Concentrations



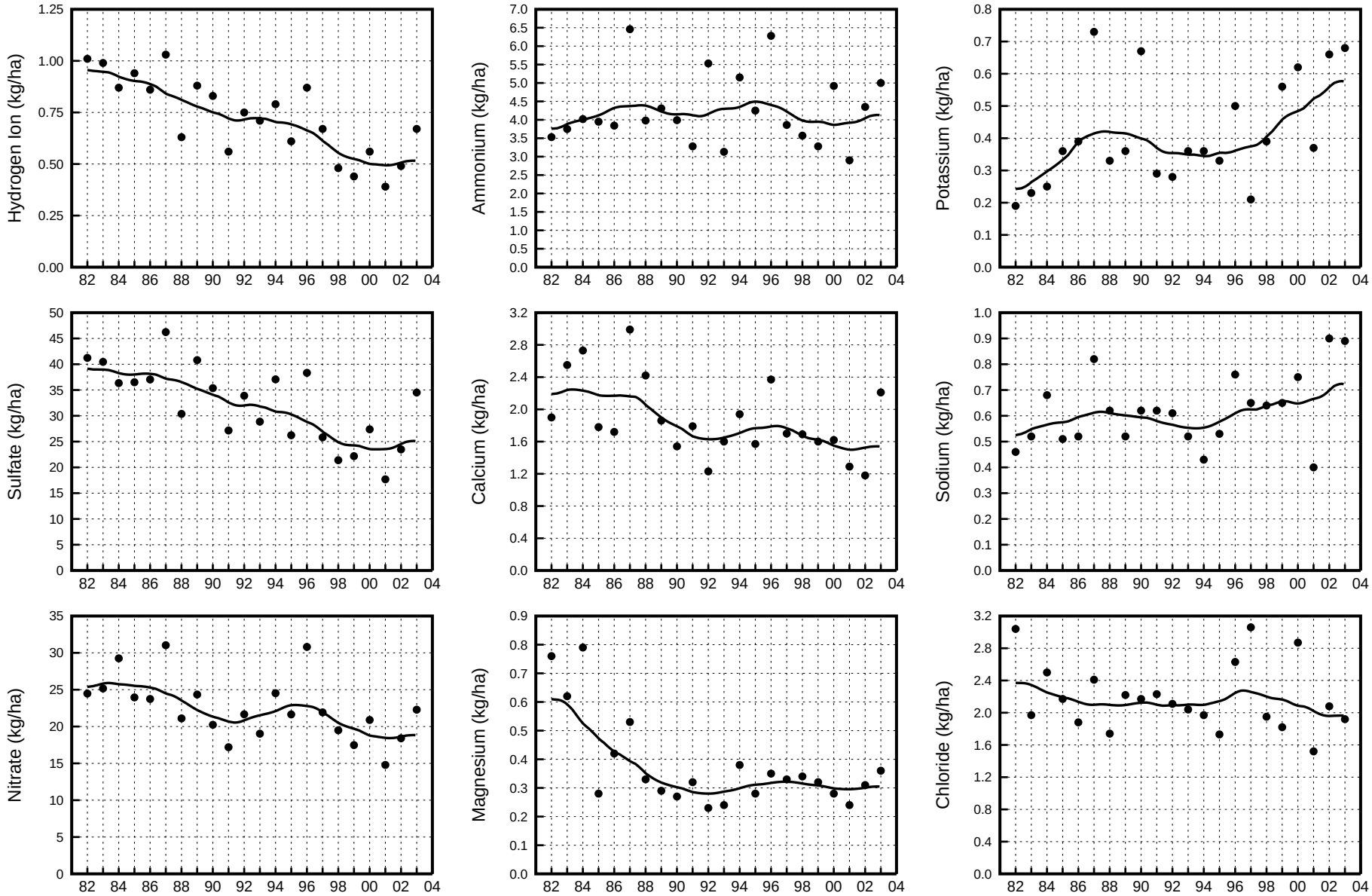
Milford - Forest Service - NADP/NTN: 2003 Annual Concentrations



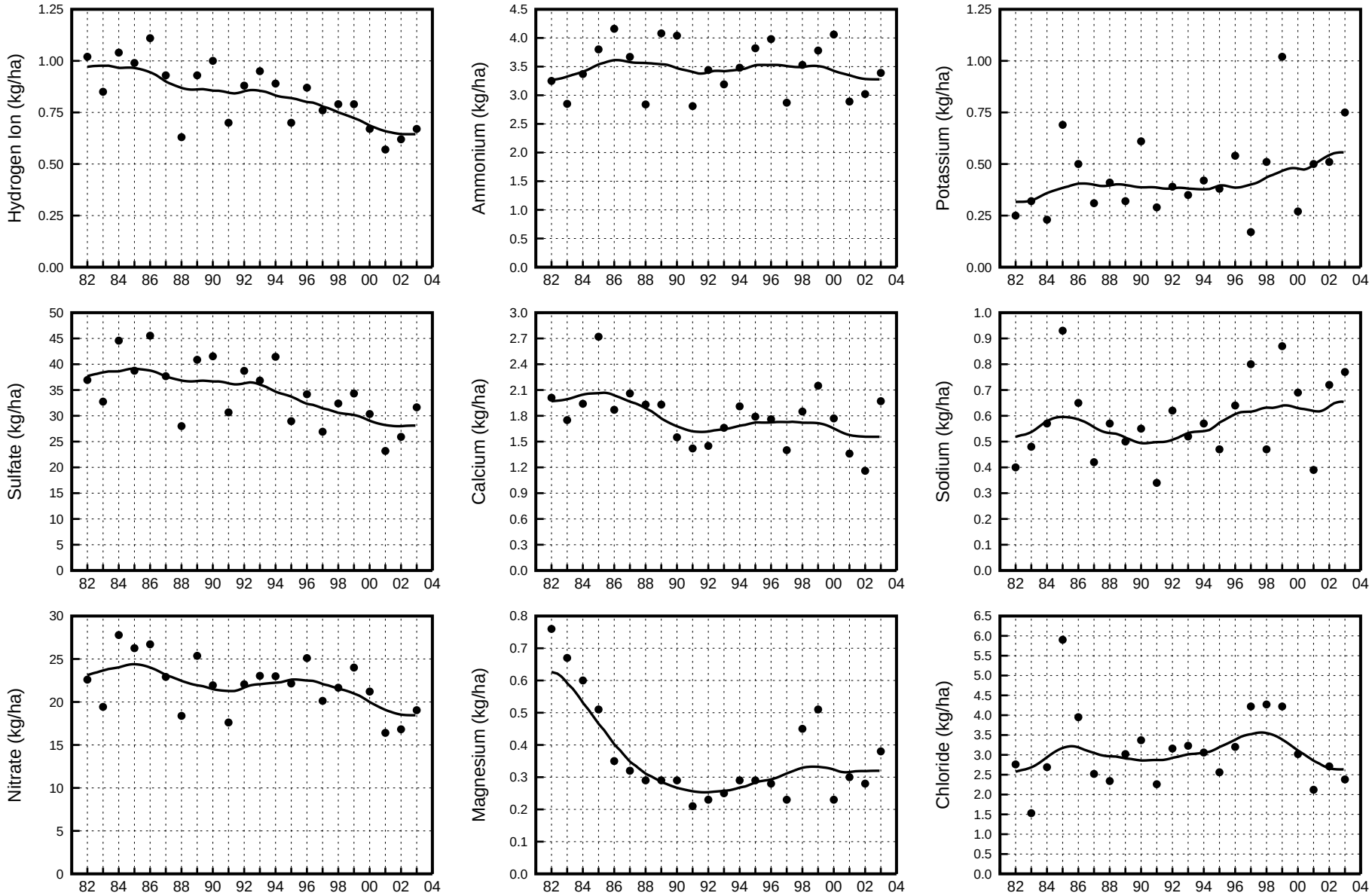
Laurel Hill State Park: 2003 Annual Wet Depositions



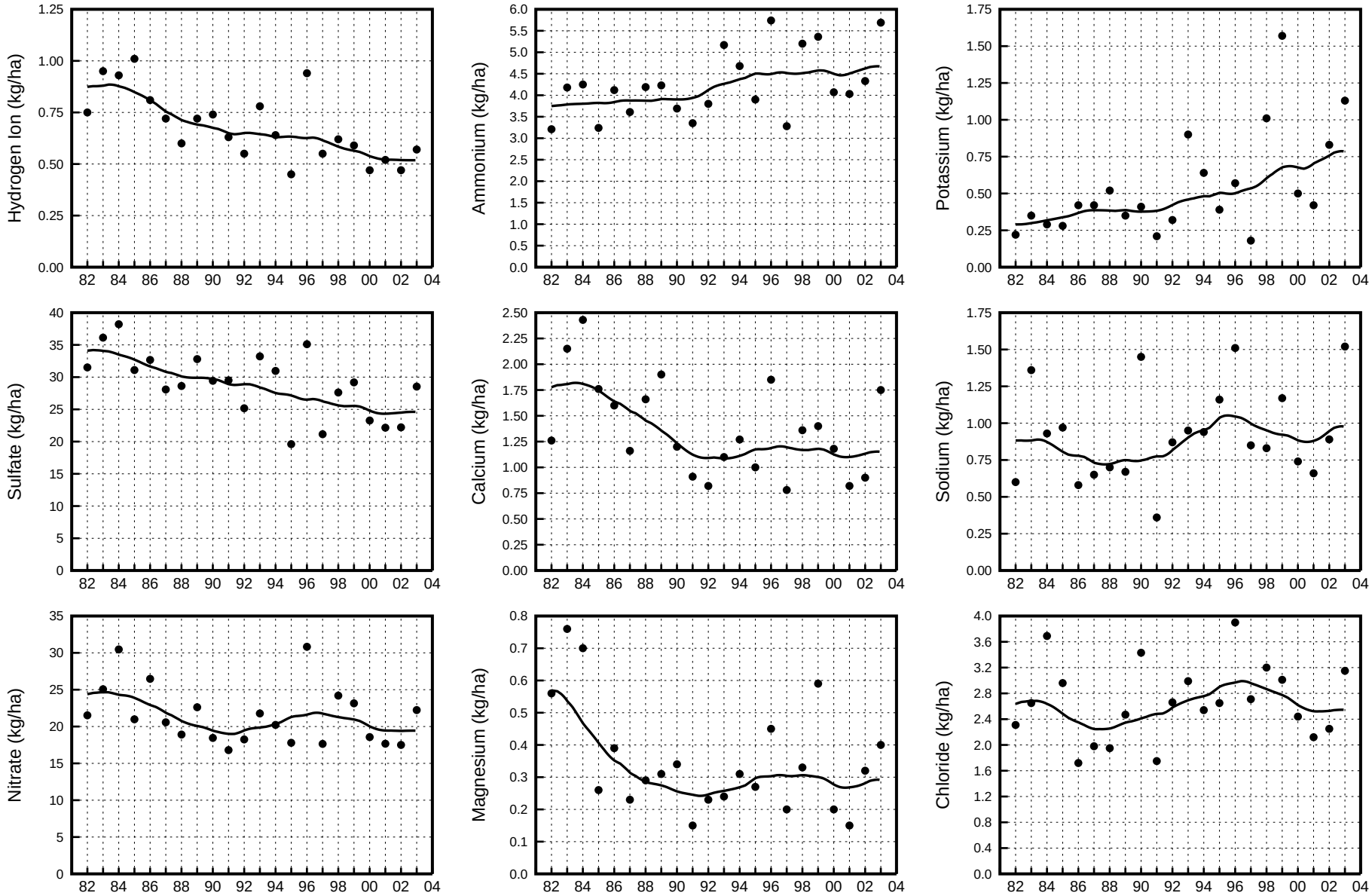
M. K. Goddard State Park: 2003 Annual Wet Depositions



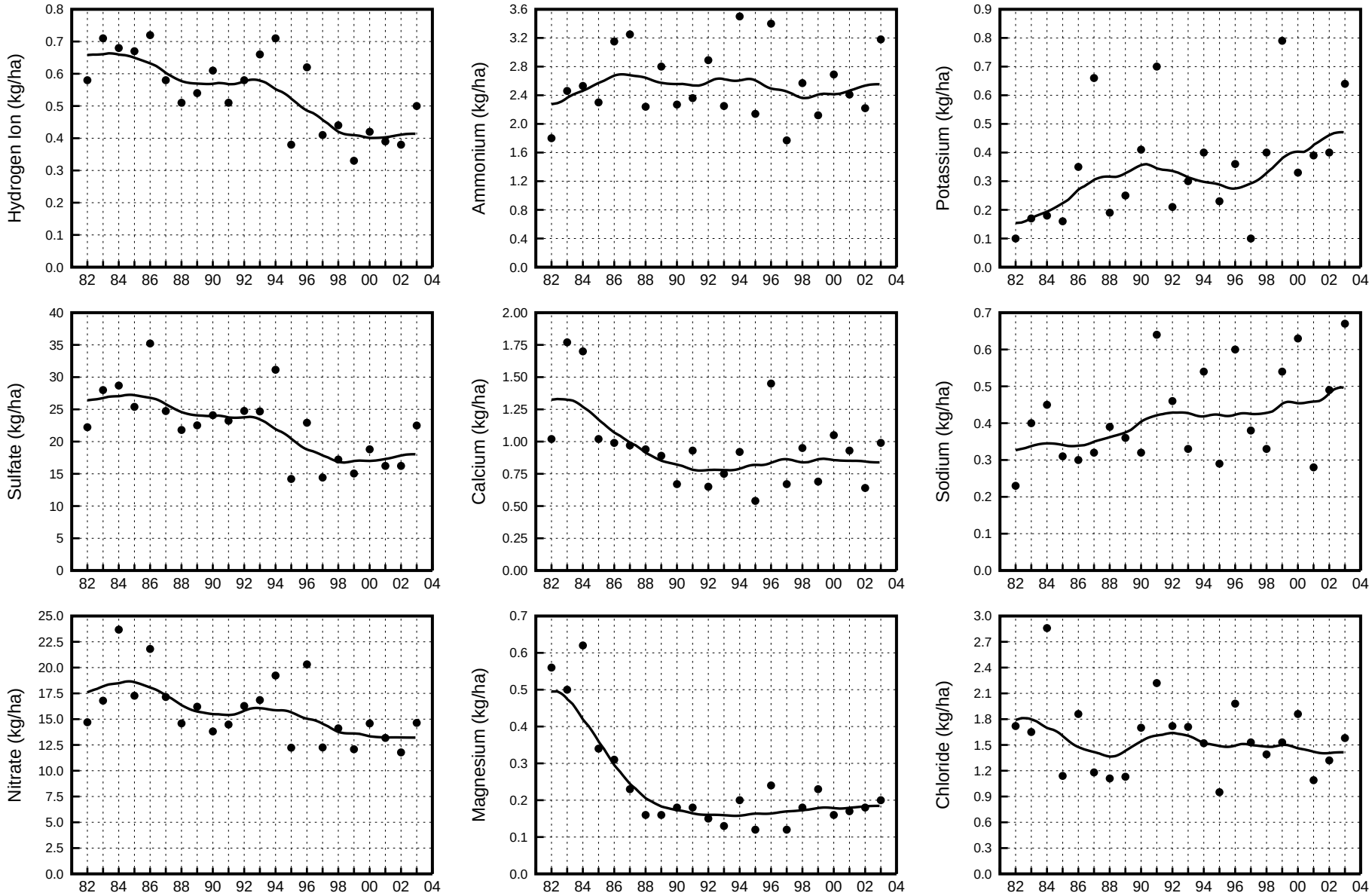
Crooked Creek Lake: 2003 Annual Wet Depositions



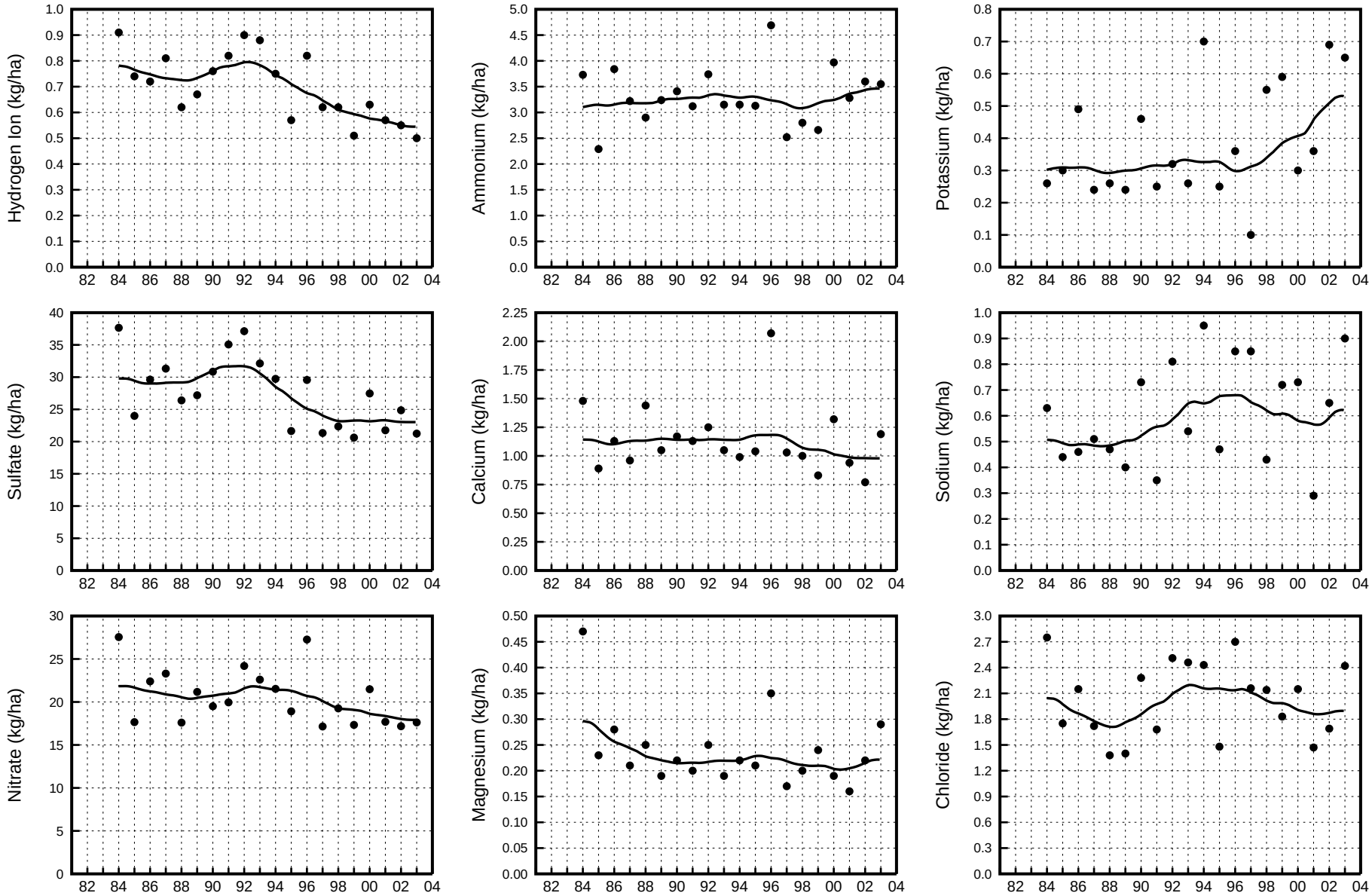
Little Buffalo State Park: 2003 Annual Wet Depositions



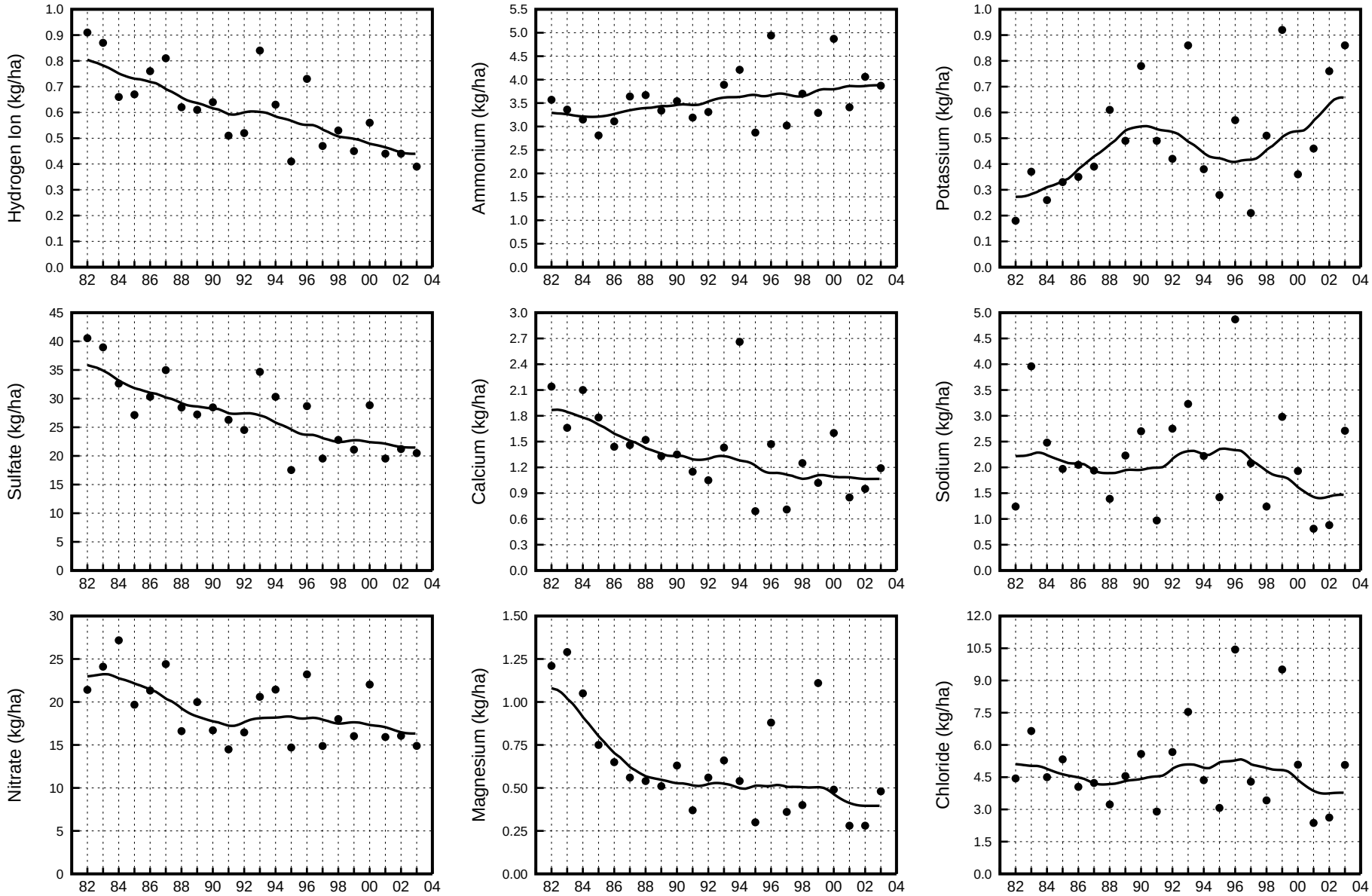
Hills Creek State Park: 2003 Annual Wet Depositions



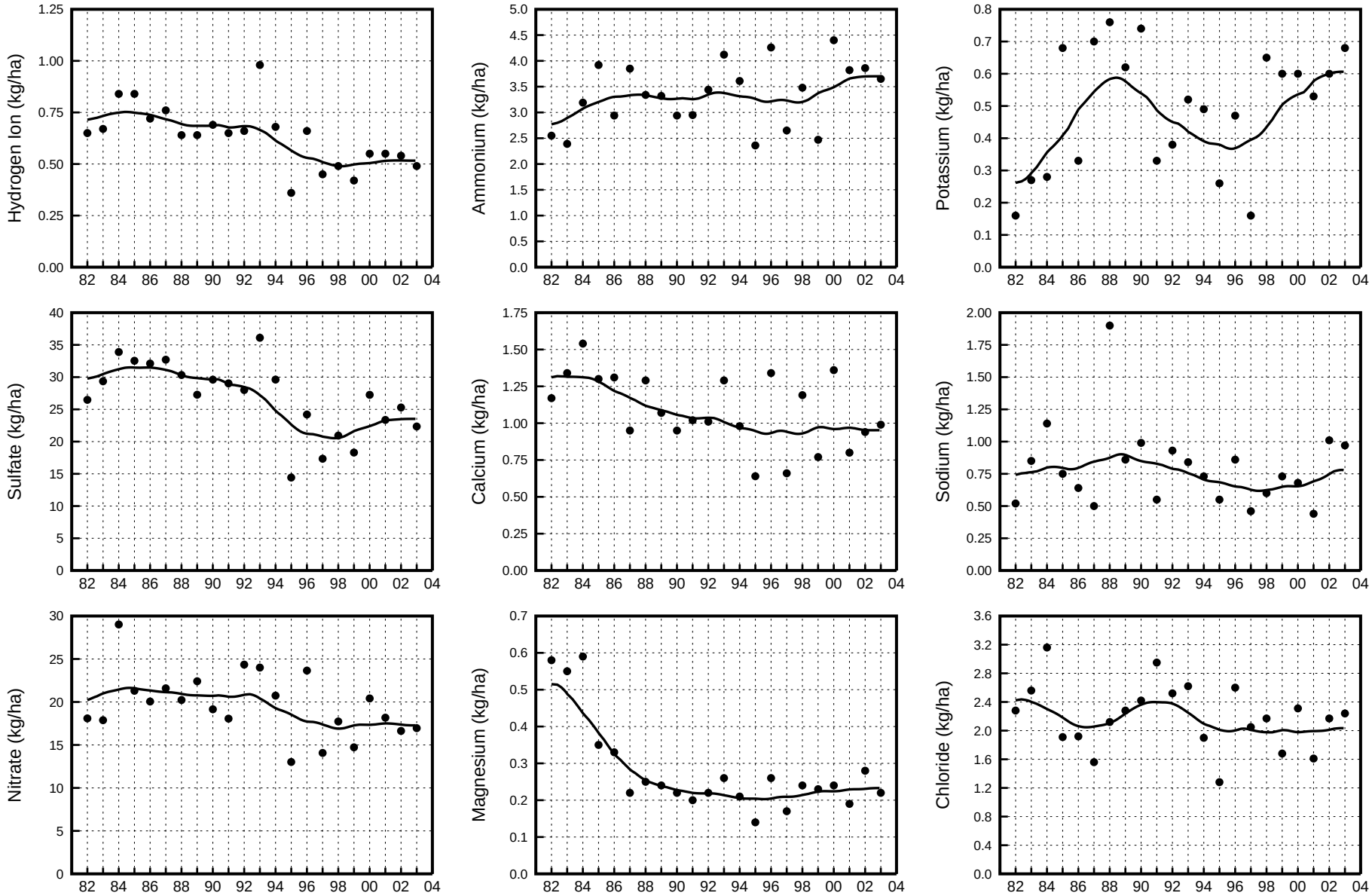
Little Pine State Park: 2003 Annual Wet Depositions



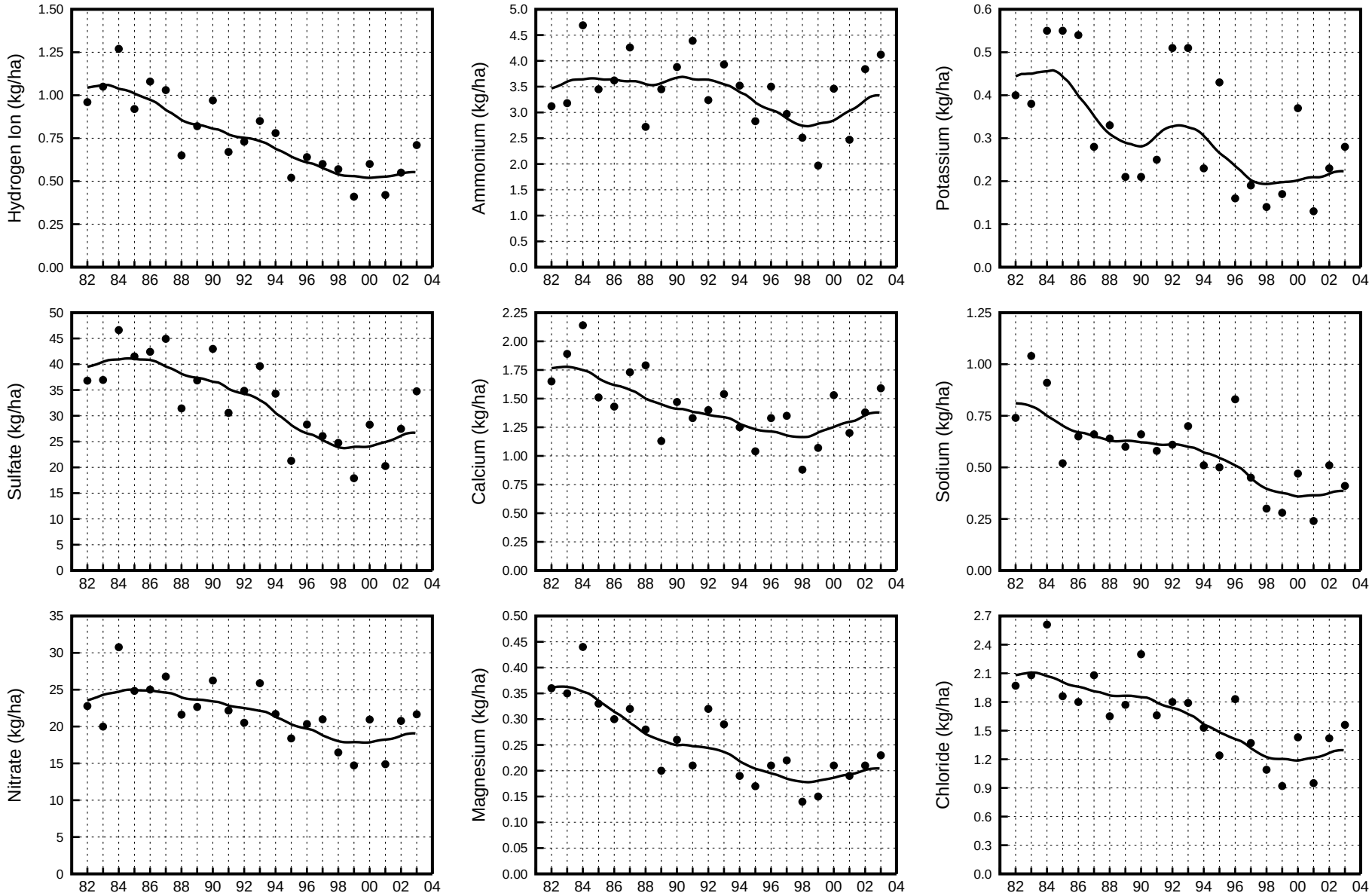
Valley Forge National Park: 2003 Annual Wet Depositions



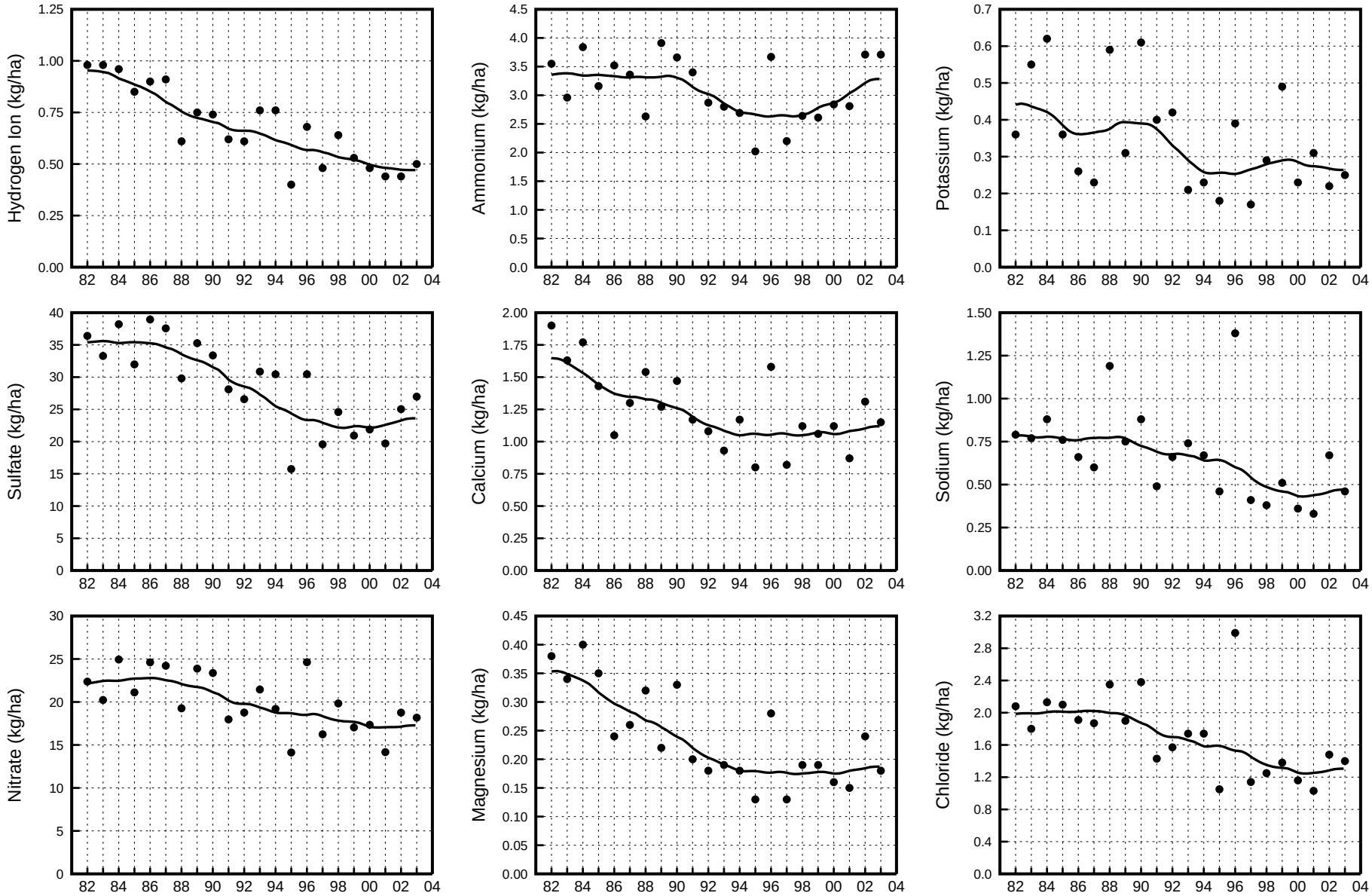
Slocum State Park: 2003 Annual Wet Depositions



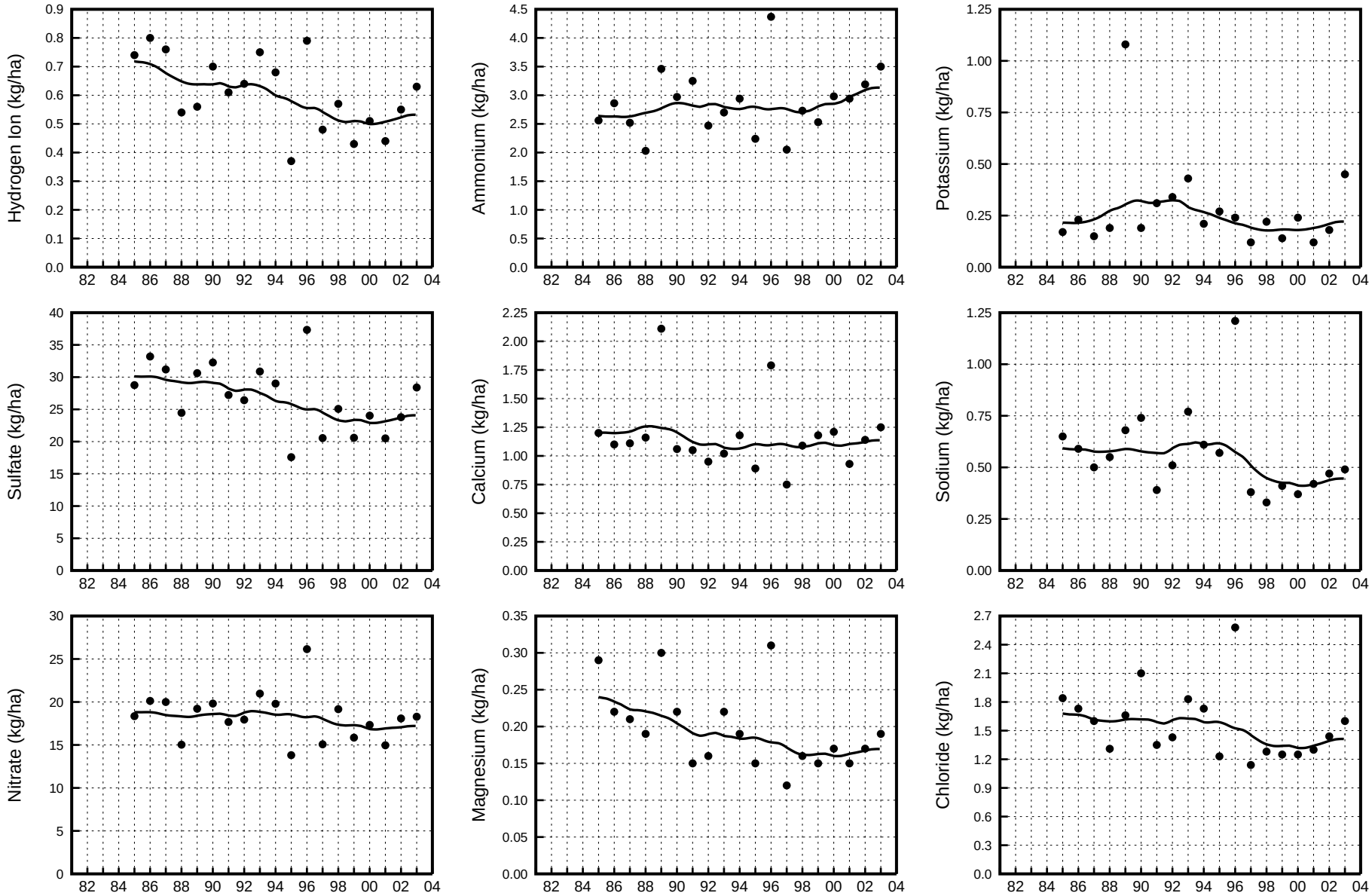
Kane Experimental Forest - NADP/NTN: 2003 Annual Wet Depositions



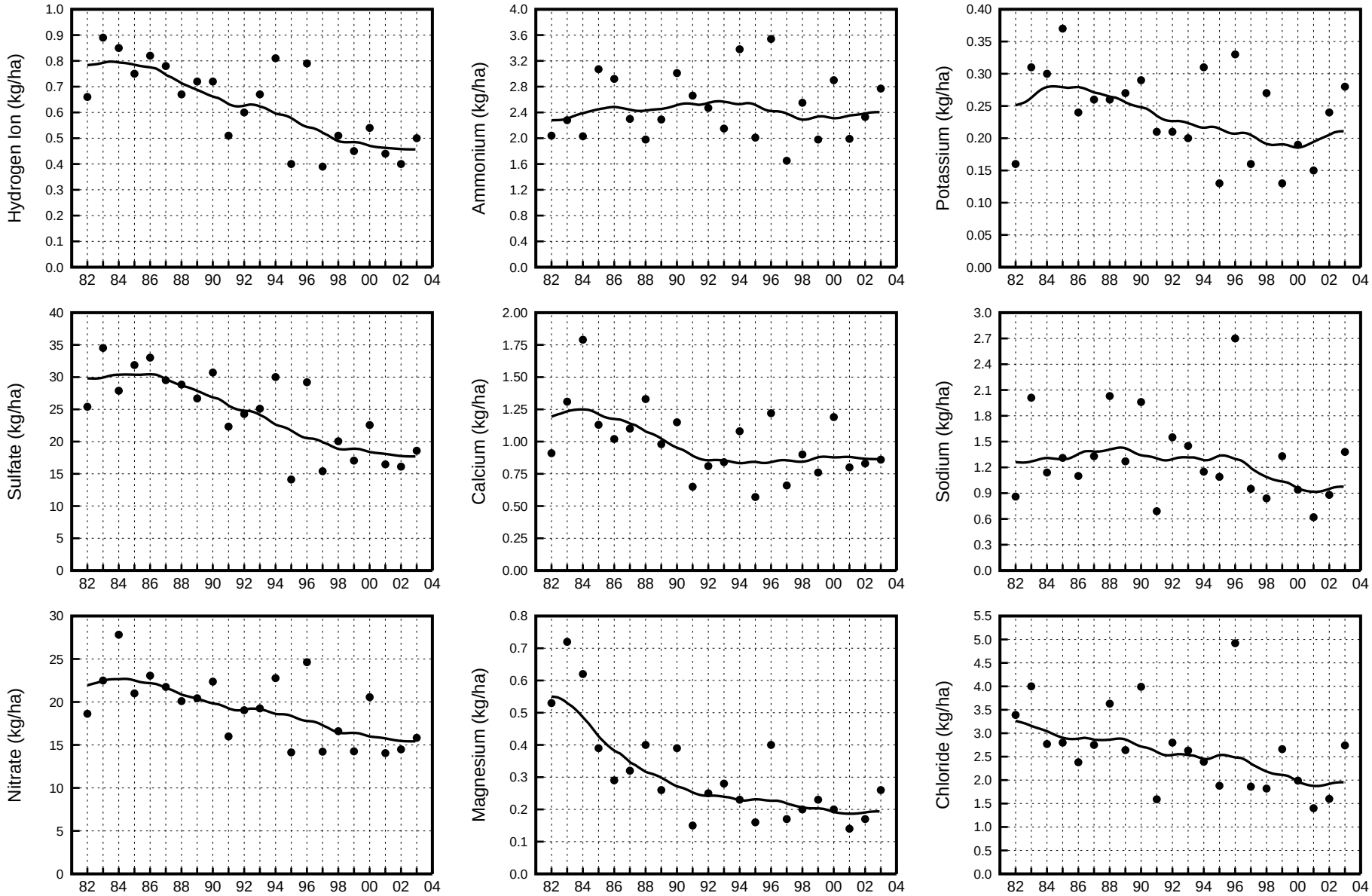
Leading Ridge - NADP/NTN: 2003 Annual Wet Depositions



Pennsylvania State University - NADP/NTN: 2003 Annual Wet Depositions



Milford - Forest Service - NADP/NTN: 2003 Annual Wet Depositions



APPENDIX IV

2003 PRECIPITATION QUALITY SUMMARYCORRELATION COEFFICIENT MATRICES

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Micro-equivalent Correlations for 2003 Precipitation Chemistry Data

All Sites

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / Number of Observations

	PRECIP	HYD	COND	CL	SO4	NO3	NH4	CA	MG	NA	K
PRECIP	1.00000	-0.21701	-0.31799	-0.29931	-0.14606	-0.48037	-0.19295	-0.36344	-0.26092	-0.20919	-0.08020
Precipitation	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0232
	902	825	825	811	812	812	811	801	801	801	801
HYD	-0.21701	1.00000	0.79917	0.15256	0.74797	0.69459	0.45160	0.33932	0.22170	-0.01251	0.15081
Hydrogen	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.7237	0.0001
	825	825	825	811	812	812	811	801	801	801	801
COND	-0.31799	0.79917	1.00000	0.31795	0.76779	0.77192	0.55217	0.45905	0.35056	0.09286	0.19047
Conductivity	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0085	0.0001
	825	825	825	811	812	812	811	801	801	801	801
CL	-0.29931	0.15256	0.31795	1.00000	0.17764	0.40423	0.24544	0.43543	0.52409	0.76151	0.19312
Chloride	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	811	811	811	811	811	811	810	800	800	800	800
SO4	-0.14606	0.74797	0.76779	0.17764	1.00000	0.63700	0.72167	0.51083	0.44181	0.00376	0.33270
Sulfate	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.9154	0.0001
	812	812	812	811	812	812	811	801	801	801	801
NO3	-0.48037	0.69459	0.77192	0.40423	0.63700	1.00000	0.62435	0.66936	0.51222	0.23203	0.24278
Nitrate	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
	812	812	812	811	812	846	811	801	801	801	801
NH4	-0.19295	0.45160	0.55217	0.24544	0.72167	0.62435	1.00000	0.51414	0.51201	0.09298	0.28408
Ammonium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0085	0.0001
	811	811	811	810	811	811	811	800	800	800	800
CA	-0.36344	0.33932	0.45905	0.43543	0.51083	0.66936	0.51414	1.00000	0.73277	0.35479	0.33153
Calcium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
	801	801	801	800	801	801	800	801	801	801	801
MG	-0.26092	0.22170	0.35056	0.52409	0.44181	0.51222	0.51201	0.73277	1.00000	0.47540	0.45131
Magnesium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001
	801	801	801	800	801	801	800	801	801	801	801
NA	-0.20919	-0.01251	0.09286	0.76151	0.00376	0.23203	0.09298	0.35479	0.47540	1.00000	0.22888
Sodium	0.0001	0.7237	0.0085	0.0001	0.9154	0.0001	0.0085	0.0001	0.0001	0.0000	0.0001
	801	801	801	800	801	801	800	801	801	801	801
K	-0.08020	0.15081	0.19047	0.19312	0.33270	0.24278	0.28408	0.33153	0.45131	0.22888	1.00000
Potassium	0.0232	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0
	801	801	801	800	801	801	800	801	801	801	801

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Micro-equivalent Correlations for 2003 Precipitation Chemistry Data

All PSU/PDER Sites

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / Number of Observations

	PRECIP	HYD	COND	CL	SO4	NO3	NH4	CA	MG	NA	K
PRECIP	1.00000	-0.18271	-0.31192	-0.34150	-0.13559	-0.46097	-0.16794	-0.35350	-0.26111	-0.23581	-0.08256
Precipitation	0.0000	0.0001	0.0001	0.0001	0.0024	0.0001	0.0002	0.0001	0.0001	0.0001	0.0682
	567	513	513	500	500	500	499	489	489	489	489
HYD	-0.18271	1.00000	0.80573	0.13990	0.77932	0.70094	0.49180	0.29650	0.19301	-0.01213	0.10334
Hydrogen	0.0001	0.0000	0.0001	0.0017	0.0001	0.0001	0.0001	0.0001	0.0001	0.7890	0.0223
	513	513	513	500	500	500	499	489	489	489	489
COND	-0.31192	0.80573	1.00000	0.32790	0.77539	0.76789	0.54896	0.42834	0.33267	0.14077	0.15879
Conductivity	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0018	0.0004
	513	513	513	500	500	500	499	489	489	489	489
CL	-0.34150	0.13990	0.32790	1.00000	0.16269	0.39051	0.23813	0.42218	0.45364	0.73218	0.09834
Chloride	0.0001	0.0017	0.0001	0.0000	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001	0.0297
	500	500	500	500	500	500	499	489	489	489	489
SO4	-0.13559	0.77932	0.77539	0.16269	1.00000	0.64817	0.70061	0.49834	0.43310	0.01784	0.28510
Sulfate	0.0024	0.0001	0.0001	0.0003	0.0000	0.0001	0.0001	0.0001	0.0001	0.6939	0.0001
	500	500	500	500	500	500	499	489	489	489	489
NO3	-0.46097	0.70094	0.76789	0.39051	0.64817	1.00000	0.63156	0.65045	0.49533	0.25049	0.18513
Nitrate	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
	500	500	500	500	500	505	499	489	489	489	489
NH4	-0.16794	0.49180	0.54896	0.23813	0.70061	0.63156	1.00000	0.49266	0.51093	0.12281	0.24327
Ammonium	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0066	0.0001
	499	499	499	499	499	499	499	488	488	488	488
CA	-0.35350	0.29650	0.42834	0.42218	0.49834	0.65045	0.49266	1.00000	0.67535	0.37280	0.21022
Calcium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
	489	489	489	489	489	489	488	489	489	489	489
MG	-0.26111	0.19301	0.33267	0.45364	0.43310	0.49533	0.51093	0.67535	1.00000	0.41693	0.34583
Magnesium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001
	489	489	489	489	489	489	488	489	489	489	489
NA	-0.23581	-0.01213	0.14077	0.73218	0.01784	0.25049	0.12281	0.37280	0.41693	1.00000	0.13581
Sodium	0.0001	0.7890	0.0018	0.0001	0.6939	0.0001	0.0066	0.0001	0.0001	0.0000	0.0026
	489	489	489	489	489	489	488	489	489	489	489
K	-0.08256	0.10334	0.15879	0.09834	0.28510	0.18513	0.24327	0.21022	0.34583	0.13581	1.00000
Potassium	0.0682	0.0223	0.0004	0.0297	0.0001	0.0001	0.0001	0.0001	0.0001	0.0026	0.0
	489	489	489	489	489	489	488	489	489	489	489

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Micro-equivalent Correlations for 2003 Precipitation Chemistry Data

All NADP Sites

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / Number of Observations

	PRECIP	HYD	LHYD	COND	CL	SO4	NO3	NH4	CA	MG	NA	K
PRECIP Precipitation	1.00000 0.0000 335	-0.26644 0.0001 312	-0.24390 0.0001 312	-0.33009 0.0001 312	-0.23117 0.0001 311	-0.16014 0.0046 312	-0.51139 0.0001 312	-0.24642 0.0001 312	-0.39275 0.0001 312	-0.27980 0.0001 312	-0.20105 0.0004 312	-0.08581 0.1304 312
HYD Hydrogen	-0.26644 0.0001 312	1.00000 0.0000 312	0.94908 0.0001 312	0.79453 0.0001 312	0.16877 0.0028 311	0.70286 0.0001 312	0.68520 0.0001 312	0.39119 0.0001 312	0.41095 0.0001 312	0.27267 0.0001 312	-0.04667 0.4113 312	0.27076 0.0001 312
LHYD Lab. pH	-0.24390 0.0001 312	0.94908 0.0001 312	1.00000 0.0000 312	0.81271 0.0001 312	0.14939 0.0083 311	0.72519 0.0001 312	0.69668 0.0001 312	0.39237 0.0001 312	0.39407 0.0001 312	0.24517 0.0001 312	-0.08726 0.1240 312	0.24843 0.0001 312
COND Conductivity	-0.33009 0.0001 312	0.79453 0.0001 312	0.81271 0.0001 312	1.00000 0.0000 312	0.34935 0.0001 311	0.76426 0.0001 312	0.79533 0.0001 312	0.57521 0.0001 312	0.55414 0.0001 312	0.45214 0.0001 312	0.08934 0.1153 312	0.37134 0.0001 312
CL Chloride	-0.23117 0.0001 311	0.16877 0.0028 311	0.14939 0.0083 311	0.34935 0.0001 311	1.00000 0.0000 311	0.19904 0.0004 311	0.41909 0.0001 311	0.28805 0.0001 311	0.41747 0.0001 311	0.63604 0.0001 311	0.82955 0.0001 311	0.34820 0.0001 311
SO4 Sulfate	-0.16014 0.0046 312	0.70286 0.0001 312	0.72519 0.0001 312	0.76426 0.0001 312	0.19904 0.0004 311	1.00000 0.0000 312	0.61949 0.0001 312	0.78366 0.0001 312	0.54201 0.0001 312	0.48156 0.0001 312	-0.03938 0.4882 312	0.51012 0.0001 312
NO3 Nitrate	-0.51139 0.0001 312	0.68520 0.0001 312	0.69668 0.0001 312	0.79533 0.0001 312	0.41909 0.0001 311	0.61949 0.0001 312	1.00000 0.0000 341	0.62849 0.0001 312	0.70569 0.0001 312	0.55256 0.0001 312	0.19150 0.0007 312	0.39168 0.0001 312
NH4 Ammonium	-0.24642 0.0001 312	0.39119 0.0001 312	0.39237 0.0001 312	0.57521 0.0001 312	0.28805 0.0001 311	0.78366 0.0001 312	0.62849 0.0001 312	1.00000 0.0000 312	0.59553 0.0001 312	0.57474 0.0001 312	0.08899 0.1167 312	0.50851 0.0001 312
CA Calcium	-0.39275 0.0001 312	0.41095 0.0001 312	0.39407 0.0001 312	0.55414 0.0001 312	0.41747 0.0001 311	0.54201 0.0001 312	0.70569 0.0001 312	0.59553 0.0001 312	1.00000 0.0000 312	0.84529 0.0001 312	0.27348 0.0001 312	0.62608 0.0001 312
MG Magnesium	-0.27980 0.0001 312	0.27267 0.0001 312	0.24517 0.0001 312	0.45214 0.0001 312	0.63604 0.0001 311	0.48156 0.0001 312	0.55256 0.0001 312	0.57474 0.0001 312	0.84529 0.0001 312	1.00000 0.0000 312	0.50813 0.0001 312	0.69372 0.0001 312
NA Sodium	-0.20105 0.0004 312	-0.04667 0.4113 312	-0.08726 0.1240 312	0.08934 0.1153 312	0.82955 0.0001 311	-0.03938 0.4882 312	0.19150 0.0007 312	0.08899 0.1167 312	0.27348 0.0001 312	0.50813 0.0001 312	1.00000 0.0000 312	0.22715 0.0001 312
K Potassium	-0.08581 0.1304 312	0.27076 0.0001 312	0.24843 0.0001 312	0.37134 0.0001 312	0.34820 0.0001 311	0.51012 0.0001 312	0.39168 0.0001 312	0.50851 0.0001 312	0.62608 0.0001 312	0.69372 0.0001 312	0.22715 0.0001 312	1.00000 0.0 312

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Micro-equivalent Correlations for 2003 Precipitation Chemistry Data

All Sites

Warm Season: 1 April through 3 November 2003

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / Number of Observations

	PRECIP	HYD	COND	CL	SO4	NO3	NH4	CA	MG	NA	K
PRECIP	1.00000	-0.19069	-0.29683	-0.23829	-0.21053	-0.40648	-0.22624	-0.31023	-0.28310	-0.13857	-0.12389
Precipitation	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0023	0.0066
	535	489	489	485	486	486	485	480	480	480	480
HYD	-0.19069	1.00000	0.82011	0.18114	0.81365	0.71423	0.40777	0.33020	0.17704	-0.00226	0.09762
Hydrogen	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.9606	0.0325
	489	489	489	485	486	486	485	480	480	480	480
COND	-0.29683	0.82011	1.00000	0.36434	0.85716	0.78591	0.57389	0.45967	0.32438	0.08367	0.12729
Conductivity	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0670	0.0052
	489	489	489	485	486	486	485	480	480	480	480
CL	-0.23829	0.18114	0.36434	1.00000	0.33654	0.34463	0.31584	0.43012	0.58624	0.67552	0.27483
Chloride	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	485	485	485	485	485	485	484	479	479	479	479
SO4	-0.21053	0.81365	0.85716	0.33654	1.00000	0.82190	0.71162	0.58069	0.44144	0.10159	0.21940
Sulfate	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0260	0.0001
	486	486	486	485	486	486	485	480	480	480	480
NO3	-0.40648	0.71423	0.78591	0.34463	0.82190	1.00000	0.73615	0.66335	0.52260	0.17351	0.24698
Nitrate	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
	486	486	486	485	486	509	485	480	480	480	480
NH4	-0.22624	0.40777	0.57389	0.31584	0.71162	0.73615	1.00000	0.56620	0.51347	0.13529	0.18472
Ammonium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0030	0.0001
	485	485	485	484	485	485	485	479	479	479	479
CA	-0.31023	0.33020	0.45967	0.43012	0.58069	0.66335	0.56620	1.00000	0.78126	0.33922	0.33835
Calcium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
	480	480	480	479	480	480	479	480	480	480	480
MG	-0.28310	0.17704	0.32438	0.58624	0.44144	0.52260	0.51347	0.78126	1.00000	0.57995	0.45133
Magnesium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001
	480	480	480	479	480	480	479	480	480	480	480
NA	-0.13857	-0.00226	0.08367	0.67552	0.10159	0.17351	0.13529	0.33922	0.57995	1.00000	0.38133
Sodium	0.0023	0.9606	0.0670	0.0001	0.0260	0.0001	0.0030	0.0001	0.0001	0.0000	0.0001
	480	480	480	479	480	480	479	480	480	480	480
K	-0.12389	0.09762	0.12729	0.27483	0.21940	0.24698	0.18472	0.33835	0.45133	0.38133	1.00000
Potassium	0.0066	0.0325	0.0052	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	480	480	480	479	480	480	479	480	480	480	480

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Micro-equivalent Correlations for 2003 Precipitation Chemistry Data

All Sites

Cold Season: 31 December 2002 through 31 March 2004 and 4 November 2003 through 30 December 2003

Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / Number of Observations

	PRECIP	HYD	COND	CL	SO4	NO3	NH4	CA	MG	NA	K
PRECIP	1.00000	-0.40980	-0.48109	-0.31958	-0.33938	-0.66500	-0.38079	-0.54502	-0.37543	-0.20587	-0.20885
Precipitation	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002
	367	336	336	326	326	326	326	321	321	321	321
HYD	-0.40980	1.00000	0.76981	0.23537	0.69372	0.70964	0.47964	0.34558	0.23258	0.11466	0.12815
Hydrogen	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0401	0.0216
	336	336	336	326	326	326	326	321	321	321	321
COND	-0.48109	0.76981	1.00000	0.37221	0.70709	0.78260	0.54045	0.45401	0.35128	0.24036	0.19943
Conductivity	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003
	336	336	336	326	326	326	326	321	321	321	321
CL	-0.31958	0.23537	0.37221	1.00000	0.28044	0.50575	0.40147	0.52511	0.62706	0.88059	0.31796
Chloride	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	326	326	326	326	326	326	326	321	321	321	321
SO4	-0.33938	0.69372	0.70709	0.28044	1.00000	0.58720	0.69205	0.48319	0.39513	0.19701	0.28403
Sulfate	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0004	0.0001
	326	326	326	326	326	326	326	321	321	321	321
NO3	-0.66500	0.70964	0.78260	0.50575	0.58720	1.00000	0.62463	0.68064	0.52509	0.34290	0.27803
Nitrate	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001
	326	326	326	326	326	337	326	321	321	321	321
NH4	-0.38079	0.47964	0.54045	0.40147	0.69205	0.62463	1.00000	0.50440	0.48528	0.29911	0.25163
Ammonium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
	326	326	326	326	326	326	326	321	321	321	321
CA	-0.54502	0.34558	0.45401	0.52511	0.48319	0.68064	0.50440	1.00000	0.69275	0.48860	0.32318
Calcium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
	321	321	321	321	321	321	321	321	321	321	321
MG	-0.37543	0.23258	0.35128	0.62706	0.39513	0.52509	0.48528	0.69275	1.00000	0.56802	0.40784
Magnesium	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001
	321	321	321	321	321	321	321	321	321	321	321
NA	-0.20587	0.11466	0.24036	0.88059	0.19701	0.34290	0.29911	0.48860	0.56802	1.00000	0.30841
Sodium	0.0002	0.0401	0.0001	0.0001	0.0004	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001
	321	321	321	321	321	321	321	321	321	321	321
K	-0.20885	0.12815	0.19943	0.31796	0.28403	0.27803	0.25163	0.32318	0.40784	0.30841	1.00000
Potassium	0.0002	0.0216	0.0003	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000
	321	321	321	321	321	321	321	321	321	321	321

APPENDIX V

2003 PRECIPITATION QUALITY SUMMARY

MICRO-EQUIVALENT CONCENTRATIONS AND IONIC BALANCES

OF WEEKLY PRECIPITATION CHEMISTRY OBSERVATIONS

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030107	ALLEPORT	2.91	12.8	6.64	1.97	0.03	9.40	7.43	32.36	16.94	11.74	23.08	110	1.117	5.54	29.8
20030107	ARENDTSV	1.98	18.2	2.00	0.99	0.10	2.65	13.31	39.81	21.61	6.49	34.37	121	0.942	-2.98	8.9
20030107	CROOKCRK	2.04	12.8	2.59	0.90	1.30	5.31	4.27	30.20	14.73	3.95	20.21	83	1.147	6.83	11.7
20030107	GODDARD	1.36	14.9	1.45	0.99	1.02	4.61	7.43	33.88	14.50	4.06	25.68	94	1.116	5.48	8.1
20030107	HILLSCRK	2.10	11.4	1.95	1.48	0.03	3.70	8.09	25.12	20.37	2.62	14.87	78	1.066	3.19	9.9
20030107	KANE	1.89	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030107	LAURHILL	2.43	24.1	5.89	1.89	2.07	6.05	11.20	53.70	33.16	5.95	33.52	153	1.112	5.32	7.1
20030107	LEADRIDG	2.12	16.6	0.50	0.25	0.10	0.48	3.33	19.05	14.52	1.69	23.12	63	0.603	-24.78	-40.5
20030107	LITTBUFF	1.13	17.3	6.89	1.97	0.28	3.65	15.86	36.31	25.87	7.00	26.47	124	1.095	4.52	9.3
20030107	LITTPINE	1.70	22.4	3.99	1.40	0.28	2.96	9.42	50.12	34.31	2.68	27.91	133	1.050	2.46	4.7
20030107	MILFORD	2.38	9.9	1.00	0.41	0.08	1.70	2.77	17.38	11.29	2.54	8.54	46	1.043	2.11	-18.2
20030107	MILLERSV	1.47	17.7	2.00	0.90	0.20	3.44	24.95	27.54	20.16	5.08	36.24	121	0.960	-2.03	-7.6
20030107	PRESQISL	1.07	16.4	5.74	1.81	0.69	1.74	16.58	30.20	26.58	3.75	24.62	112	1.033	1.61	-0.3
20030107	PSUNADP	2.05	13.9	2.00	0.33	0.10	0.57	3.88	31.62	15.16	2.54	18.75	75	1.056	2.73	2.2
20030107	SLOCUM	2.40	6.5	4.54	1.73	0.03	3.57	5.43	12.88	10.50	3.19	10.83	53	1.149	6.94	11.3
20030107	VALLFORG	1.83	16.6	0.45	4.85	1.25	18.31	10.15	30.90	12.50	18.51	26.50	123	1.146	6.82	3.0
20030107	YOWOCRK	2.05	19.5	1.00	0.25	0.10	0.39	3.88	28.18	25.97	1.41	17.71	79	0.750	-14.30	-30.6
20030114	ALLEPORT	0.23	47.4	----	----	----	----	----	47.86	-----	-----	-----	---	-----	-----	-----
20030114	ARENDTSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030114	CROOKCRK	0.04	76.9	----	----	----	----	----	57.54	-----	-----	-----	---	-----	-----	-----
20030114	GODDARD	0.09	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030114	HILLSCRK	0.07	23.4	----	----	----	----	----	39.81	-----	-----	-----	---	-----	-----	-----
20030114	KANE	0.22	17.4	13.97	3.54	0.46	7.44	26.06	20.89	45.00	10.16	21.87	149	0.939	-3.13	-7.1
20030114	LAURHILL	0.38	16.2	16.72	3.78	0.03	7.00	25.95	27.54	48.31	11.62	23.50	164	0.971	-1.47	17.6
20030114	LEADRIDG	0.07	18.6	12.48	3.54	0.38	3.96	18.85	25.70	40.32	14.10	18.75	138	0.887	-5.99	-9.7
20030114	LITTBUFF	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030114	LITTPINE	0.09	20.1	15.22	10.36	1.71	8.87	32.04	38.02	64.89	9.76	25.91	207	1.056	2.74	23.6
20030114	MILFORD	0.13	40.4	9.48	2.14	0.41	6.83	32.16	79.43	82.26	11.57	41.24	266	0.966	-1.74	1.5
20030114	MILLERSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030114	PRESQISL	0.38	24.4	44.91	16.45	0.03	20.44	24.73	30.90	97.91	21.69	22.66	280	0.966	-1.72	11.1
20030114	PSUNADP	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030114	SLOCUM	0.08	11.5	----	----	----	----	----	18.62	-----	-----	-----	---	-----	-----	-----
20030114	VALLFORG	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030114	YOWOCRK	0.07	20.5	12.97	3.21	0.72	2.91	27.72	31.62	53.07	5.08	28.95	166	0.909	-4.78	-0.0

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030121	ALLEPORT	0.45	25.5	----	----	----	----	30.05	79.43	57.83	33.20	18.16	---	-----	-----	-----
20030121	ARENDTSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030121	CROOKCRK	0.26	28.8	15.52	5.26	1.41	26.36	21.12	51.29	64.39	36.53	13.60	235	1.056	2.73	5.5
20030121	GODDARD	0.21	22.7	----	----	----	----	----	63.10	-----	-----	-----	---	-----	-----	-----
20030121	HILLSCRK	0.04	20.5	----	----	----	----	----	10.72	-----	-----	-----	---	-----	-----	-----
20030121	KANE	0.10	28.5	8.98	2.30	0.31	10.05	5.54	54.95	61.78	16.93	9.58	170	0.930	-3.61	-4.6
20030121	LAURHILL	0.53	31.3	22.06	6.50	2.30	12.44	36.76	56.23	78.70	19.72	21.95	257	1.132	6.20	6.8
20030121	LEADRIDG	0.13	28.6	30.44	8.14	0.38	13.40	11.64	18.62	71.29	12.41	13.33	180	0.851	-8.02	-40.3
20030121	LITTBUFF	0.09	19.6	25.05	7.24	0.79	11.44	31.93	26.30	60.83	10.89	18.18	193	1.143	6.67	4.0
20030121	LITTPINE	0.02	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030121	MILFORD	0.05	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030121	MILLERSV	0.04	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030121	PRESQISL	0.26	33.8	36.63	17.19	0.92	19.92	34.93	45.71	112.64	22.96	27.35	318	0.953	-2.40	1.2
20030121	PSUNADP	0.10	30.8	14.47	3.37	0.31	7.09	13.86	53.70	73.07	12.13	14.16	192	0.934	-3.41	-8.0
20030121	SLOCUM	0.03	24.7	----	----	----	----	----	42.66	-----	-----	-----	---	-----	-----	-----
20030121	VALLFORG	0.05	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030121	YOWOCRK	0.05	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	ALLEPORT	0.14	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	ARENDTSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	CROOKCRK	0.30	27.7	13.02	3.70	0.03	13.79	30.99	37.15	51.31	24.40	23.27	198	0.997	-0.15	-13.0
20030128	GODDARD	0.21	16.6	----	----	----	----	17.69	38.90	54.83	14.70	11.29	---	-----	-----	-----
20030128	HILLSCRK	0.15	29.0	10.48	4.77	0.15	13.66	23.78	56.23	63.89	19.86	15.50	208	1.099	4.72	4.0
20030128	KANE	0.24	25.9	4.49	1.15	0.23	2.61	6.10	51.29	51.62	10.44	10.00	138	0.914	-4.48	-7.0
20030128	LAURHILL	0.40	29.9	13.82	7.57	0.13	20.36	28.55	52.48	64.54	29.93	23.52	241	1.042	2.04	4.5
20030128	LEADRIDG	0.02	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	LITTBUFF	0.07	47.2	----	----	----	----	64.53	79.43	106.07	27.73	29.02	---	-----	-----	-----
20030128	LITTPINE	0.03	93.0	----	----	----	----	----	125.89	-----	-----	-----	---	-----	-----	-----
20030128	MILFORD	0.05	21.5	7.49	1.15	0.61	15.62	19.40	34.67	53.87	19.75	15.62	168	0.885	-6.12	-0.6
20030128	MILLERSV	0.10	25.1	7.98	1.48	0.54	7.00	73.18	25.70	68.07	14.67	37.08	236	0.967	-1.67	-4.2
20030128	PRESQISL	0.30	19.4	37.67	11.35	0.03	34.41	20.07	14.45	54.33	35.91	14.58	223	1.126	5.91	-5.0
20030128	PSUNADP	0.02	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	SLOCUM	0.02	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	VALLFORG	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030128	YOWOCRK	0.04	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030204	ALLEPORT	0.89	18.0	2.25	1.97	0.03	5.74	13.14	40.74	19.23	9.90	28.10	121	1.116	5.48	10.9
20030204	ARENDTSV	0.56	30.2	2.99	0.49	0.13	1.57	29.38	53.70	29.36	5.64	55.82	179	0.972	-1.43	-7.4
20030204	CROOKCRK	0.84	25.5	6.49	1.56	0.03	2.52	12.86	52.48	26.08	4.51	39.54	146	1.083	3.98	-1.8
20030204	GODDARD	0.92	32.7	11.33	2.30	1.10	4.57	29.33	37.15	31.16	6.15	52.14	175	0.959	-2.10	-30.4
20030204	HILLSCRK	0.56	26.4	10.78	1.65	0.03	3.39	10.98	52.48	24.81	5.47	41.56	151	1.104	4.94	-4.2
20030204	KANE	1.33	28.3	5.49	0.90	0.28	2.00	15.52	51.29	29.20	3.67	49.78	158	0.913	-4.53	-9.4
20030204	LAURHILL	0.88	35.1	5.54	1.32	0.84	1.91	27.72	67.61	41.16	8.46	48.53	203	1.069	3.34	-4.7
20030204	LEADRIDG	0.88	28.7	4.49	0.66	0.18	1.61	16.08	33.11	29.36	3.10	45.41	134	0.721	-16.22	-34.3
20030204	LITTBUFF	0.59	33.0	9.58	2.30	0.03	4.39	30.82	61.66	35.95	7.84	52.95	206	1.124	5.86	-3.5
20030204	LITTPINE	0.84	29.5	5.49	2.06	0.18	2.96	18.57	58.88	33.23	4.77	39.37	166	1.139	6.51	-4.3
20030204	MILFORD	0.19	54.4	16.47	3.78	0.56	16.92	31.05	97.72	66.62	18.62	84.15	336	0.983	-0.86	-6.4
20030204	MILLERSV	0.42	22.0	2.99	0.90	0.26	4.09	53.78	33.11	29.84	6.21	53.32	185	1.064	3.12	2.7
20030204	PRESQISL	0.41	35.7	32.39	4.77	0.03	11.53	27.44	57.54	55.04	10.92	56.28	256	1.094	4.48	-5.8
20030204	PSUNADP	0.80	22.8	3.49	0.49	0.18	1.48	12.75	46.77	25.81	3.10	40.83	135	0.934	-3.39	-0.2
20030204	SLOCUM	0.78	29.0	7.88	1.81	0.08	2.52	8.93	58.88	27.16	4.63	40.68	153	1.105	5.00	-6.0
20030204	VALLFORG	0.33	43.2	9.98	4.20	0.59	45.89	39.58	69.18	63.75	47.99	48.01	329	1.061	2.94	-2.8
20030204	YOWOCRK	0.72	28.0	6.49	0.90	0.26	2.35	15.52	33.88	30.81	3.39	37.70	131	0.826	-9.51	-32.8
20030211	ALLEPORT	0.55	28.4	11.33	7.07	1.18	39.28	12.58	56.23	52.31	48.10	20.89	249	1.053	2.56	14.5
20030211	ARENDTSV	0.27	11.9	2.00	0.33	0.04	0.52	2.77	23.99	21.61	1.69	6.25	59	1.003	0.15	-8.4
20030211	CROOKCRK	0.42	36.1	12.67	5.26	2.63	12.14	16.69	64.57	67.89	24.51	25.16	232	0.969	-1.56	-5.4
20030211	GODDARD	0.28	31.7	13.27	5.92	3.71	15.18	25.00	52.48	66.18	19.55	22.54	224	1.067	3.26	-5.0
20030211	HILLSCRK	0.27	27.3	7.34	3.04	1.36	3.87	8.87	53.70	52.68	9.00	17.25	157	0.991	-0.48	-4.6
20030211	KANE	0.34	29.8	3.99	1.15	0.20	1.78	14.41	54.95	57.91	8.75	22.08	165	0.862	-7.40	-8.9
20030211	LAURHILL	0.57	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030211	LEADRIDG	0.39	25.9	6.49	1.65	0.18	1.96	15.52	35.48	45.33	4.80	23.95	135	0.827	-9.46	-24.7
20030211	LITTBUFF	0.40	22.3	10.08	2.30	0.61	2.78	18.52	42.66	38.16	6.69	24.37	146	1.112	5.29	-0.5
20030211	LITTPINE	0.21	27.8	8.58	2.71	0.23	2.74	18.52	53.70	51.60	7.64	24.70	170	1.030	1.49	-2.7
20030211	MILFORD	0.48	17.7	1.50	0.49	0.08	2.00	8.32	33.88	26.45	4.51	17.91	95	0.947	-2.75	-8.1
20030211	MILLERSV	0.48	8.7	1.00	0.25	0.04	0.44	9.98	51.29	16.78	1.97	7.29	89	2.419	41.50	138.1
20030211	PRESQISL	0.25	31.8	25.75	11.68	1.94	16.75	39.64	50.12	90.63	20.90	32.43	290	1.013	0.66	6.4
20030211	PSUNADP	0.33	23.8	4.99	0.90	0.15	1.09	10.53	46.77	48.87	4.23	15.62	133	0.938	-3.22	-5.3
20030211	SLOCUM	0.50	16.4	3.94	1.81	1.97	1.57	3.99	39.81	26.23	6.35	26.97	113	0.892	-5.74	16.6
20030211	VALLFORG	0.20	14.8	8.23	5.26	8.36	22.79	13.19	16.60	19.79	25.08	23.16	142	1.094	4.50	-3.9
20030211	YOWOCRK	0.35	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030218	ALLEPORT	1.61	6.6	4.89	2.39	0.43	5.70	2.55	12.30	13.50	8.01	6.71	56	1.001	0.07	9.4
20030218	ARENDTSV	2.09	5.0	2.99	0.58	0.15	1.00	2.22	11.22	10.48	2.82	4.37	36	1.027	1.34	12.6
20030218	CROOKCRK	0.93	4.7	0.05	1.56	3.71	1.48	0.55	9.33	8.58	3.95	4.56	34	0.976	-1.20	6.6
20030218	GODDARD	0.51	4.1	2.99	1.81	3.27	3.52	0.72	6.92	10.23	3.39	3.17	36	1.147	6.83	6.6
20030218	HILLSCRK	0.93	3.3	0.25	1.56	0.31	1.87	0.67	9.33	6.94	4.54	3.92	29	0.909	-4.79	40.2
20030218	KANE	0.86	11.0	2.00	0.74	0.04	1.48	1.66	21.88	23.55	3.39	3.54	58	0.912	-4.60	-7.1
20030218	LAURHILL	2.35	4.3	2.35	1.48	0.28	2.74	1.33	9.33	7.65	2.88	4.90	33	1.136	6.36	12.7
20030218	LEADRIDG	1.76	8.4	2.00	0.41	0.04	0.96	0.55	11.75	12.26	1.97	5.00	35	0.817	-10.09	-31.8
20030218	LITTBUFF	2.65	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030218	LITTPINE	1.00	4.8	1.55	1.56	0.03	2.61	0.94	10.47	8.08	4.18	5.37	35	0.973	-1.35	11.0
20030218	MILFORD	1.36	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030218	MILLERSV	2.23	5.7	2.00	0.58	0.08	1.57	9.42	14.79	10.97	2.26	8.33	50	1.319	13.75	34.7
20030218	PRESQISL	0.54	12.9	15.77	6.25	0.03	13.75	4.16	16.60	26.02	20.82	12.79	116	0.948	-2.65	-4.6
20030218	PSUNADP	1.38	5.6	2.00	0.33	0.04	0.70	0.55	9.77	10.00	2.26	3.12	29	0.870	-6.94	-15.3
20030218	SLOCUM	1.36	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030218	VALLFORG	3.20	6.0	4.29	1.73	1.82	5.70	2.77	10.47	8.15	8.04	7.27	50	1.142	6.61	5.9
20030218	YOWOCRK	0.79	8.1	0.50	0.33	0.04	0.61	0.55	13.80	12.26	1.69	4.17	34	0.874	-6.73	-22.6
20030225	ALLEPORT	1.48	12.3	1.55	2.14	0.08	0.91	1.00	26.92	14.50	3.70	19.52	70	0.864	-7.29	1.7
20030225	ARENDTSV	1.24	12.0	0.50	0.12	0.04	0.35	7.76	26.30	9.68	1.69	22.91	69	1.023	1.14	3.1
20030225	CROOKCRK	1.08	23.2	2.64	1.65	0.38	2.13	0.50	42.66	18.58	5.13	26.22	100	1.000	0.02	-18.1
20030225	GODDARD	0.94	21.2	9.53	2.06	0.03	3.22	2.77	41.69	26.81	4.37	30.37	121	0.963	-1.87	-5.3
20030225	HILLSCRK	0.68	16.1	4.74	1.48	0.10	1.91	0.22	38.02	16.94	2.60	27.64	94	0.985	-0.74	7.0
20030225	KANE	1.10	23.9	4.99	0.58	0.20	1.30	6.65	46.77	24.84	2.26	37.49	125	0.937	-3.27	-8.0
20030225	LAURHILL	1.54	11.3	2.74	1.65	0.03	1.65	2.00	26.92	12.87	4.40	20.79	73	0.919	-4.22	12.3
20030225	LEADRIDG	1.04	20.4	1.00	0.33	0.10	0.65	4.99	27.54	22.90	1.69	27.91	87	0.659	-20.54	-31.5
20030225	LITTBUFF	1.13	17.8	4.04	1.65	0.15	2.74	4.99	40.74	17.02	6.88	32.47	111	0.963	-1.87	8.1
20030225	LITTPINE	0.75	16.7	25.25	10.45	2.74	5.52	1.05	32.36	28.81	9.51	29.22	145	1.146	6.78	11.6
20030225	MILFORD	1.26	15.0	8.98	1.07	0.43	2.04	4.44	25.12	13.07	2.54	26.87	85	0.991	-0.46	-14.0
20030225	MILLERSV	1.58	11.3	1.00	0.12	0.04	0.74	8.32	18.20	8.39	2.26	20.62	60	0.909	-4.78	-16.8
20030225	PRESQISL	0.98	26.3	4.24	1.89	0.03	2.35	6.43	60.26	40.89	5.67	31.95	154	0.958	-2.16	5.6
20030225	PSUNADP	0.98	18.1	0.50	0.12	0.08	0.39	3.33	43.65	15.65	2.26	30.62	97	0.991	-0.47	5.9
20030225	SLOCUM	0.79	13.1	6.24	2.22	0.10	3.39	2.05	26.30	14.79	4.40	26.81	86	0.876	-6.60	2.0
20030225	VALLFORG	2.30	6.8	4.24	1.81	0.03	2.09	1.05	13.80	6.73	3.07	14.25	47	0.957	-2.18	4.2
20030225	YOWOCRK	0.84	27.7	1.00	0.33	0.10	0.96	4.44	51.29	28.55	1.69	31.87	120	0.936	-3.33	-17.1

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030304	ALLEPORT	0.27	37.8	----	----	----	----	26.61	26.30	95.49	23.92	115.36	---	-----	-----	-----
20030304	ARENDTSV	0.38	22.8	2.99	0.66	0.10	2.26	6.65	44.67	23.39	4.80	32.29	118	0.948	-2.66	-8.3
20030304	CROOKCRK	0.12	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030304	GODDARD	0.13	58.0	14.77	2.55	0.03	5.52	31.49	131.83	97.70	10.38	96.23	391	0.911	-4.64	11.5
20030304	HILLSCRK	0.05	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030304	KANE	0.29	59.4	6.99	1.40	0.46	2.91	33.26	109.65	84.52	9.59	81.45	330	0.881	-6.32	-8.5
20030304	LAURHILL	0.33	32.0	7.53	2.63	5.24	10.14	15.91	64.57	56.04	11.99	42.81	217	0.957	-2.22	4.1
20030304	LEADRIDG	0.14	103.4	14.97	2.63	0.31	6.61	41.58	147.91	148.07	15.80	106.44	484	0.792	-11.62	-26.6
20030304	LITTBUFF	0.20	45.2	14.12	6.58	3.86	12.83	30.33	91.20	82.12	16.98	60.53	319	0.996	-0.22	5.8
20030304	LITTPINE	0.13	90.5	9.73	2.80	2.66	5.48	26.78	199.53	125.07	15.12	125.50	513	0.930	-3.65	2.2
20030304	MILFORD	0.45	18.3	2.00	0.41	0.04	1.09	8.87	38.90	18.71	2.54	26.04	99	1.085	4.08	-1.9
20030304	MILLERSV	0.41	14.2	3.49	1.23	0.13	5.87	33.82	15.85	21.29	7.90	42.49	132	0.843	-8.55	-2.3
20030304	PRESQISL	0.13	46.3	9.38	3.13	1.10	5.22	31.99	97.72	80.55	8.58	64.26	302	0.968	-1.61	5.4
20030304	PSUNADP	0.22	66.1	10.98	1.81	0.49	4.13	34.93	131.83	95.81	7.33	83.74	371	0.985	-0.73	-4.2
20030304	SLOCUM	0.18	45.7	10.83	1.89	2.74	3.65	15.36	104.71	45.89	5.95	79.20	270	1.062	3.01	6.1
20030304	VALLFORG	0.69	12.7	8.08	2.39	2.07	2.65	45.96	50.12	64.18	6.15	42.95	225	0.982	-0.90	136.6
20030304	YOWOCRK	0.13	122.0	13.47	2.88	0.72	7.74	83.71	173.78	172.43	12.13	145.19	612	0.856	-7.75	-24.2
20030311	ALLEPORT	0.72	22.7	36.28	18.67	0.89	11.53	18.68	30.20	42.81	12.19	56.20	227	1.046	2.22	3.6
20030311	ARENDTSV	0.62	34.8	42.91	4.36	0.95	3.39	22.73	97.72	48.23	3.95	71.66	296	1.390	16.30	37.1
20030311	CROOKCRK	0.64	28.6	14.07	4.11	3.63	3.44	14.14	58.88	44.81	8.91	38.66	191	1.064	3.09	4.2
20030311	GODDARD	0.61	23.0	14.67	5.02	0.56	3.74	22.07	47.86	40.52	7.00	45.85	187	1.006	0.30	15.1
20030311	HILLSCRK	0.38	16.6	10.48	2.14	1.59	3.26	4.38	32.36	29.16	3.95	15.73	103	1.110	5.21	-2.7
20030311	KANE	0.62	38.1	9.48	1.89	1.23	2.00	25.50	63.10	52.26	5.92	55.62	217	0.907	-4.89	-13.1
20030311	LAURHILL	0.78	32.5	12.52	2.88	0.03	2.39	23.12	66.07	37.24	4.43	58.74	207	1.066	3.18	2.0
20030311	LEADRIDG	0.42	28.5	7.98	1.15	0.04	1.30	8.87	35.48	36.78	2.54	34.37	129	0.744	-14.67	-33.3
20030311	LITTBUFF	0.41	21.1	9.38	1.56	2.58	3.09	9.87	43.65	24.44	3.24	34.29	132	1.132	6.18	1.8
20030311	LITTPINE	0.23	31.5	9.33	3.70	2.25	3.22	13.80	66.07	55.39	5.16	33.83	193	1.042	2.07	1.7
20030311	MILFORD	0.58	13.7	1.50	0.58	0.04	1.78	4.44	29.51	13.39	2.26	18.75	72	1.100	4.78	-2.2
20030311	MILLERSV	0.55	30.7	32.44	3.54	0.74	4.52	42.13	173.78	42.58	4.80	75.82	380	2.087	35.22	145.2
20030311	PRESQISL	0.65	40.5	10.88	2.39	0.08	3.13	37.98	79.43	60.83	5.98	60.91	262	1.048	2.36	0.8
20030311	PSUNADP	0.42	17.1	5.99	0.82	0.20	1.09	7.21	36.31	27.10	2.26	18.75	100	1.073	3.53	0.5
20030311	SLOCUM	0.33	11.0	5.09	1.32	0.03	1.61	0.44	23.44	14.44	2.34	11.73	60	1.120	5.66	-2.3
20030311	VALLFORG	1.02	6.3	----	----	----	----	----	8.51	-----	-----	-----	---	-----	-----	-----
20030311	YOWOCRK	0.42	22.7	6.99	1.32	0.20	1.57	8.87	23.99	31.78	2.26	25.41	102	0.722	-16.13	-38.7

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030318	ALLEPORT	0.35	55.3	14.17	4.11	0.31	3.74	62.20	107.15	67.83	7.53	112.63	380	1.020	0.97	3.3
20030318	ARENDTSV	0.10	45.2	11.98	2.06	0.33	2.26	43.24	95.50	54.20	5.36	93.11	308	1.018	0.88	7.9
20030318	CROOKCRK	0.45	38.9	11.28	3.37	2.48	4.61	30.99	74.13	44.60	7.96	64.49	244	1.084	4.03	-2.2
20030318	GODDARD	0.36	28.3	30.99	3.87	3.86	1.87	39.58	41.69	52.75	4.18	49.18	228	1.149	6.91	-3.0
20030318	HILLSCRK	0.20	29.6	10.38	2.14	2.53	1.26	37.48	50.12	50.60	3.70	43.87	202	1.059	2.84	-4.1
20030318	KANE	0.26	36.5	14.47	2.14	0.36	2.00	38.81	53.70	60.81	3.95	58.74	235	0.903	-5.12	-13.2
20030318	LAURHILL	0.18	50.3	21.36	3.45	1.84	3.74	50.78	93.33	61.39	9.93	99.13	345	1.024	1.17	0.6
20030318	LEADRIDG	0.22	58.7	14.97	2.47	0.46	2.48	48.79	79.43	67.42	4.80	100.40	321	0.861	-7.48	-23.1
20030318	LITTBUFF	0.42	59.8	13.22	3.37	0.03	3.92	54.33	109.65	72.26	7.73	104.42	369	1.001	0.03	-4.6
20030318	LITTPINE	0.34	39.3	4.89	1.97	2.15	1.70	34.76	81.28	64.12	4.77	48.53	244	1.079	3.82	2.4
20030318	MILFORD	0.31	46.2	17.47	3.13	0.31	7.66	54.33	83.18	95.49	10.72	59.37	332	1.003	0.15	1.1
20030318	MILLERSV	0.14	33.6	21.96	6.58	0.56	16.79	167.43	5.25	79.20	20.59	114.15	433	1.022	1.07	-3.9
20030318	PRESQISL	0.25	26.8	10.43	2.47	0.15	2.52	46.07	42.66	64.62	5.13	39.83	214	0.952	-2.47	1.3
20030318	PSUNADP	0.41	39.4	8.98	1.65	0.31	1.78	31.05	77.62	46.45	3.67	67.70	239	1.030	1.49	-1.5
20030318	SLOCUM	0.25	38.9	5.79	1.89	0.03	7.79	1.00	26.92	12.58	9.06	21.56	87	1.005	0.24	-65.4
20030318	VALLFORG	0.10	60.5	----	----	----	----	----	69.18	-----	-----	-----	---	-----	-----	-----
20030318	YOWOCRK	0.32	49.2	5.49	0.74	0.13	0.83	34.37	75.86	69.36	4.51	56.24	248	0.902	-5.13	-20.7
20030325	ALLEPORT	1.36	14.7	30.04	4.94	1.61	5.18	14.36	19.05	21.23	5.56	39.10	141	1.141	6.59	0.3
20030325	ARENDTSV	1.70	10.4	6.49	3.62	0.51	15.88	7.76	10.96	6.94	18.34	20.41	91	0.990	-0.51	-12.1
20030325	CROOKCRK	0.34	21.2	90.47	7.57	3.15	8.96	16.08	9.33	22.79	13.91	97.86	270	1.007	0.37	-5.1
20030325	GODDARD	0.44	29.1	28.34	4.28	0.08	3.13	34.87	48.98	36.81	5.75	62.24	224	1.142	6.63	0.6
20030325	HILLSCRK	1.08	10.6	11.33	1.81	1.25	2.83	4.77	19.95	15.73	3.55	17.66	79	1.135	6.33	3.4
20030325	KANE	1.40	21.6	12.97	1.40	0.95	2.31	11.09	38.02	21.94	4.80	40.62	134	0.991	-0.46	-7.3
20030325	LAURHILL	0.74	10.1	31.74	3.13	1.53	3.70	9.37	8.32	18.37	5.44	26.72	108	1.143	6.68	-6.9
20030325	LEADRIDG	1.11	11.4	12.48	1.56	0.66	5.35	6.10	10.23	11.13	6.21	21.45	75	0.938	-3.20	-30.4
20030325	LITTBUFF	1.83	8.1	5.34	1.89	0.03	5.05	13.36	12.88	8.58	9.06	16.16	72	1.140	6.56	6.9
20030325	LITTPINE	1.25	10.6	7.73	1.89	0.87	4.74	6.54	19.50	11.44	4.49	23.98	81	1.035	1.70	4.2
20030325	MILFORD	1.45	12.2	3.99	2.39	0.38	11.22	3.88	23.99	12.42	12.69	16.25	87	1.109	5.15	3.7
20030325	MILLERSV	1.60	8.1	2.99	1.73	0.38	7.48	16.63	13.18	9.36	9.03	17.50	78	1.182	8.33	12.9
20030325	PRESQISL	0.67	21.3	16.02	2.80	3.22	3.09	29.55	30.90	27.58	4.91	44.47	163	1.112	5.30	-6.0
20030325	PSUNADP	1.40	13.1	9.98	1.73	0.56	4.61	6.10	23.99	10.81	5.64	25.00	88	1.133	6.25	-2.4
20030325	SLOCUM	1.14	7.8	5.29	1.15	1.33	3.87	7.37	14.79	11.44	5.95	12.19	63	1.143	6.68	9.3
20030325	VALLFORG	1.50	12.1	5.64	8.56	2.35	31.80	9.65	11.22	8.44	34.98	20.91	134	1.076	3.66	-1.9
20030325	YOWOCRK	1.09	16.0	8.48	1.73	0.56	3.87	8.87	20.42	17.90	4.80	24.79	91	0.925	-3.89	-24.7

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030401	ALLEPORT	0.85	15.1	12.82	3.62	4.07	4.39	21.40	22.91	26.23	6.94	31.00	133	1.079	3.79	3.8
20030401	ARENDTSV	0.75	22.5	7.98	1.48	0.33	2.17	24.39	45.71	25.49	3.10	44.99	156	1.115	5.46	6.0
20030401	CROOKCRK	0.39	35.9	20.26	4.85	3.94	3.35	32.32	57.54	41.24	5.59	64.97	234	1.094	4.47	-9.5
20030401	GODDARD	0.99	25.0	4.84	2.80	2.66	4.22	27.61	38.90	28.81	4.80	45.33	160	1.027	1.31	-11.0
20030401	HILLSCRK	0.87	14.9	2.64	1.89	3.63	1.83	16.41	21.38	20.08	3.19	20.06	91	1.103	4.89	-16.4
20030401	KANE	0.59	26.4	12.48	2.47	0.51	2.13	26.61	37.15	37.91	3.95	47.28	170	0.913	-4.57	-15.0
20030401	LAURHILL	0.66	28.3	15.37	2.88	1.20	3.05	22.40	43.65	34.31	7.59	41.66	172	1.060	2.90	-14.3
20030401	LEADRIDG	0.87	19.0	6.99	1.48	0.36	1.44	14.41	27.54	17.58	2.82	32.70	105	0.983	-0.84	-20.2
20030401	LITTBUFF	0.85	18.6	9.33	1.89	2.99	2.91	25.72	32.36	21.58	4.74	43.64	145	1.075	3.62	3.9
20030401	LITTPINE	0.76	17.5	6.14	2.06	2.58	3.57	22.29	34.67	25.37	4.80	42.78	144	0.977	-1.14	14.0
20030401	MILFORD	1.19	22.2	6.49	5.84	0.74	23.32	16.08	33.88	20.32	27.36	35.62	170	1.036	1.79	-5.2
20030401	MILLERSV	1.10	22.6	5.99	1.56	7.13	3.70	51.00	22.39	21.94	12.98	52.08	179	1.055	2.68	-15.3
20030401	PRESQISL	1.58	27.6	11.78	3.29	2.43	3.65	33.98	42.66	33.45	5.30	51.43	188	1.084	4.05	-8.6
20030401	PSUNADP	0.90	19.2	6.99	1.07	0.38	1.44	12.20	23.99	18.55	2.82	30.83	98	0.882	-6.25	-28.9
20030401	SLOCUM	0.79	19.3	5.44	1.89	2.28	4.48	18.91	34.67	17.37	6.71	34.85	127	1.148	6.90	-3.3
20030401	VALLFORG	1.15	20.9	5.54	3.21	2.53	8.40	39.75	29.51	27.45	8.86	42.08	167	1.135	6.30	-3.9
20030401	YOWOCRK	0.83	15.5	4.49	0.74	0.10	0.87	9.42	25.12	17.58	1.69	18.96	79	1.066	3.19	-18.6
20030408	ALLEPORT	1.70	24.7	7.58	3.29	1.84	7.18	36.76	38.90	31.16	7.79	54.78	189	1.019	0.96	-1.7
20030408	ARENDTSV	0.87	24.3	4.49	1.65	0.41	3.44	29.94	39.81	30.32	4.23	42.08	156	1.040	1.98	-8.2
20030408	CROOKCRK	1.25	25.5	9.08	3.62	3.81	5.57	16.58	63.10	24.37	8.52	56.01	191	1.145	6.74	21.9
20030408	GODDARD	2.17	17.5	16.57	5.35	3.32	7.13	40.19	25.12	29.95	8.63	52.82	189	1.069	3.32	15.5
20030408	HILLSCRK	1.63	23.9	5.64	2.55	3.04	2.91	33.21	35.48	28.45	5.30	44.45	161	1.059	2.87	-10.4
20030408	KANE	2.13	24.2	14.97	3.45	0.59	3.92	29.94	38.02	30.32	5.08	56.45	183	0.989	-0.53	-3.0
20030408	LAURHILL	2.36	31.9	13.12	3.13	2.07	5.44	34.48	63.10	34.60	9.96	61.37	227	1.146	6.78	5.7
20030408	LEADRIDG	1.68	29.4	7.98	1.97	0.41	3.48	30.49	36.31	34.20	4.23	53.32	172	0.879	-6.44	-23.7
20030408	LITTBUFF	0.97	33.2	12.38	3.13	3.38	6.05	47.57	50.12	41.60	8.69	58.68	232	1.125	5.89	-8.4
20030408	LITTPINE	1.46	27.1	13.07	4.44	1.59	4.31	46.07	50.12	44.45	6.43	64.61	235	1.035	1.74	13.2
20030408	MILFORD	0.80	19.6	7.98	1.81	0.31	3.44	19.40	36.31	28.23	5.08	32.08	135	1.059	2.87	0.3
20030408	MILLERSV	0.47	15.6	7.98	2.55	0.41	4.92	26.61	17.38	18.71	4.80	34.79	118	1.027	1.32	-15.7
20030408	PRESQISL	1.32	18.4	14.77	4.03	2.35	3.65	28.05	22.91	25.94	5.25	37.54	144	1.103	4.88	-10.6
20030408	PSUNADP	1.62	23.4	6.99	1.73	0.41	3.22	21.07	41.69	26.13	5.64	42.08	149	1.017	0.84	-5.0
20030408	SLOCUM	1.11	23.4	4.44	2.47	2.22	3.83	30.27	35.48	32.16	5.81	38.70	155	1.027	1.31	-10.3
20030408	VALLFORG	0.58	13.6	8.78	3.37	0.79	28.84	20.51	9.77	16.23	27.34	19.37	135	1.145	6.77	-13.9
20030408	YOWOCRK	1.16	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030415	ALLEPORT	0.61	10.7	2.89	1.81	2.68	2.44	6.76	20.42	15.73	1.69	17.71	72	1.054	2.61	0.7
20030415	ARENDTSV	0.69	21.1	1.50	0.49	0.04	1.30	16.63	39.81	22.42	2.26	35.83	120	0.988	-0.61	-6.2
20030415	CROOKCRK	0.41	6.1	3.89	1.32	2.07	0.74	4.93	11.75	10.73	1.47	9.35	46	1.146	6.82	7.4
20030415	GODDARD	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030415	HILLSCRK	0.07	6.9	----	----	----	----	6.43	6.92	8.00	50.78	24.27	---	-----	-----	-----
20030415	KANE	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030415	LAURHILL	0.23	22.4	8.73	2.63	1.43	2.44	7.76	45.71	24.23	6.29	37.18	136	1.015	0.74	-0.1
20030415	LEADRIDG	0.44	12.4	1.50	0.49	0.10	0.70	3.33	17.78	9.19	1.41	18.96	53	0.808	-10.59	-29.1
20030415	LITTBUFF	0.75	18.1	7.19	1.81	1.87	3.09	11.20	34.67	21.29	3.36	34.83	119	1.006	0.29	-0.0
20030415	LITTPINE	0.29	8.4	3.19	1.81	2.33	1.35	8.59	14.13	12.37	2.37	12.85	59	1.138	6.45	-4.2
20030415	MILFORD	0.47	12.2	1.50	1.40	0.28	5.57	2.77	22.39	6.61	6.49	13.12	60	1.293	12.77	-14.5
20030415	MILLERSV	1.09	13.5	2.50	0.82	0.20	2.48	15.52	21.88	13.87	2.82	22.50	83	1.108	5.10	-11.1
20030415	PRESQISL	0.49	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030415	PSUNADP	0.73	11.6	2.50	0.49	0.18	0.87	2.77	23.99	7.42	1.13	17.91	57	1.164	7.57	-7.1
20030415	SLOCUM	0.73	6.1	0.95	0.66	0.38	0.44	5.65	10.96	7.86	3.27	5.67	36	1.134	6.28	-7.3
20030415	VALLFORG	1.07	14.3	2.45	3.13	0.43	5.96	13.42	24.55	19.02	6.18	25.64	101	0.982	-0.90	-2.6
20030415	YOWOCRK	0.22	9.1	2.99	0.66	0.04	0.91	4.44	11.75	8.55	1.41	9.37	40	1.075	3.63	-33.0
20030422	ALLEPORT	0.36	29.6	9.53	3.04	2.84	3.05	35.76	58.88	34.16	6.29	64.91	218	1.073	3.54	8.2
20030422	ARENDTSV	0.75	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030422	CROOKCRK	0.51	28.2	8.78	1.97	1.13	2.48	14.36	60.26	21.08	4.20	53.10	167	1.135	6.33	1.8
20030422	GODDARD	0.71	35.6	7.93	2.71	1.97	3.00	33.43	63.10	35.60	4.46	69.11	221	1.027	1.34	-6.0
20030422	HILLSCRK	0.22	60.9	5.74	3.70	2.51	12.70	67.69	114.82	79.20	18.34	102.11	407	1.038	1.85	0.5
20030422	KANE	0.40	32.5	5.99	1.56	0.56	3.00	15.52	56.23	27.74	4.23	62.28	177	0.879	-6.43	-12.7
20030422	LAURHILL	0.29	28.1	5.34	1.89	3.32	2.09	20.07	58.88	25.52	4.09	54.49	176	1.089	4.27	3.3
20030422	LEADRIDG	0.31	42.3	9.98	4.03	0.61	9.22	54.33	47.86	58.07	8.18	73.95	266	0.899	-5.32	-23.7
20030422	LITTBUFF	1.11	43.9	14.57	7.32	3.09	19.66	39.20	79.43	52.89	21.16	74.68	312	1.098	4.66	0.2
20030422	LITTPINE	0.60	59.1	26.70	8.88	4.94	7.44	88.93	123.03	98.05	10.47	133.02	501	1.076	3.66	18.4
20030422	MILFORD	0.11	63.7	14.97	7.16	0.79	17.40	33.26	120.23	69.68	18.90	85.40	368	1.114	5.39	-6.7
20030422	MILLERSV	0.37	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030422	PRESQISL	0.66	35.6	30.04	11.43	11.23	6.13	49.12	51.29	47.04	6.60	92.30	305	1.091	4.36	-0.2
20030422	PSUNADP	0.14	52.4	24.95	6.83	1.00	10.74	53.78	75.86	69.68	11.28	92.28	346	0.999	-0.03	-13.2
20030422	SLOCUM	0.52	63.6	29.94	7.98	1.48	8.31	88.59	109.65	82.55	14.16	153.48	496	0.983	-0.85	3.5
20030422	VALLFORG	0.22	56.8	6.59	4.36	2.30	11.22	43.08	112.20	56.68	14.05	99.55	350	1.056	2.71	-0.8
20030422	YOWOCRK	0.50	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030429	ALLEPORT	0.24	25.2	7.34	1.97	1.51	1.74	23.89	44.67	29.02	2.79	45.64	159	1.047	2.32	-5.6
20030429	ARENDTSV	0.35	23.5	3.99	0.99	0.36	0.65	49.90	31.62	25.97	2.54	53.53	170	1.067	3.22	-10.1
20030429	CROOKCRK	0.15	39.6	16.77	12.17	8.57	1.17	28.55	69.18	53.10	5.53	69.78	265	1.062	3.02	-4.3
20030429	GODDARD	0.04	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030429	HILLSCRK	0.15	15.9	10.08	2.30	1.48	3.65	17.69	26.92	22.02	4.06	29.02	117	1.128	5.99	-1.2
20030429	KANE	0.10	14.7	3.99	0.90	0.23	0.52	19.40	20.89	17.90	1.41	28.54	94	0.960	-2.03	-14.5
20030429	LAURHILL	0.13	54.1	12.38	4.03	7.42	11.83	37.87	109.65	65.26	15.43	87.22	351	1.091	4.35	2.6
20030429	LEADRIDG	0.48	24.0	9.98	3.13	0.61	0.70	12.75	37.15	24.68	1.97	36.66	128	1.016	0.79	-19.4
20030429	LITTBUFF	0.20	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030429	LITTPINE	0.15	19.1	7.34	2.39	0.89	1.83	12.64	39.81	20.58	2.82	34.56	123	1.120	5.64	3.7
20030429	MILFORD	0.19	32.4	6.49	1.40	0.20	3.13	19.40	67.61	35.81	4.80	51.87	191	1.062	3.02	0.3
20030429	MILLERSV	0.79	5.5	1.00	0.41	0.10	0.39	23.28	4.79	8.06	1.13	14.79	54	1.250	11.10	-4.3
20030429	PRESQISL	0.01	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030429	PSUNADP	0.52	33.4	11.98	2.96	0.26	0.61	32.16	57.54	33.87	2.54	64.78	207	1.043	2.08	-7.8
20030429	SLOCUM	1.03	5.5	0.05	0.99	0.64	0.91	12.14	8.51	8.15	2.34	9.83	44	1.144	6.71	-0.4
20030429	VALLFORG	0.35	10.4	10.53	3.70	0.08	7.09	21.01	11.22	20.02	6.40	22.89	103	1.088	4.19	-2.1
20030429	YOWOCRK	0.06	19.8	16.97	4.77	0.10	0.65	14.41	35.48	32.26	2.26	39.16	146	0.982	-0.88	1.2
20030506	ALLEPORT	0.48	13.3	16.42	5.92	7.70	3.78	7.65	18.20	19.79	5.22	29.43	114	1.096	4.58	-3.7
20030506	ARENDTSV	0.67	25.9	4.49	1.23	0.36	1.26	22.18	47.86	19.19	2.26	49.99	149	1.083	3.99	-7.1
20030506	CROOKCRK	0.65	11.1	3.89	1.56	0.23	1.30	7.98	20.42	8.23	2.14	21.14	67	1.123	5.80	-6.0
20030506	GODDARD	0.63	23.6	5.34	2.47	0.03	1.78	14.08	44.67	17.87	5.84	48.51	141	0.947	-2.74	-4.6
20030506	HILLSCRK	0.21	44.8	12.77	2.88	0.03	3.31	25.11	93.33	41.10	6.49	91.44	276	0.988	-0.58	2.2
20030506	KANE	1.19	38.8	8.98	2.30	0.97	1.39	26.06	66.07	35.97	4.51	74.36	221	0.921	-4.11	-11.7
20030506	LAURHILL	1.47	14.2	2.40	2.71	0.08	1.57	21.51	22.91	17.87	3.36	32.22	105	0.957	-2.18	-2.2
20030506	LEADRIDG	0.58	26.0	8.48	2.63	2.71	1.39	26.06	41.69	23.55	2.82	55.62	165	1.012	0.59	-10.0
20030506	LITTBUFF	0.51	36.4	27.10	6.33	2.76	3.65	69.13	52.48	55.04	6.07	96.61	319	1.024	1.17	2.1
20030506	LITTPINE	0.19	17.6	10.93	4.20	0.03	1.83	17.52	29.51	28.58	3.61	30.31	127	1.024	1.19	-3.0
20030506	MILFORD	0.12	35.9	16.97	5.51	1.82	4.18	24.95	69.18	56.29	6.49	62.91	248	0.975	-1.24	2.4
20030506	MILLERSV	0.06	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030506	PRESQISL	1.37	27.7	13.07	3.95	0.20	3.09	38.36	47.86	41.10	4.43	58.99	211	1.019	0.96	2.2
20030506	PSUNADP	0.54	18.1	4.49	1.23	0.87	0.96	17.74	34.67	15.16	1.69	34.58	111	1.166	7.66	-2.4
20030506	SLOCUM	0.16	64.1	30.89	9.62	8.72	4.87	86.60	107.15	81.12	12.36	159.02	500	0.982	-0.93	2.1
20030506	VALLFORG	0.10	20.4	----	----	----	----	29.33	19.05	40.39	19.13	57.26	---	-----	-----	-----
20030506	YOWOCRK	0.47	34.8	10.98	2.88	2.28	1.70	24.39	54.95	33.23	3.95	69.78	204	0.909	-4.79	-14.1

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030513	ALLEPORT	2.20	33.3	13.12	3.62	2.51	4.61	20.12	75.86	27.73	8.91	67.82	224	1.147	6.86	11.3
20030513	ARENDTSV	0.95	34.4	15.97	3.70	1.89	3.35	40.47	57.54	41.29	4.80	75.82	245	1.008	0.42	-2.8
20030513	CROOKCRK	2.48	32.4	14.72	4.11	0.05	4.83	25.84	57.54	34.16	5.98	68.93	216	0.982	-0.92	-3.4
20030513	GODDARD	1.68	19.2	15.27	3.78	0.72	2.78	21.34	31.62	23.23	5.53	40.18	144	1.095	4.56	-1.6
20030513	HILLSCRK	0.82	23.1	15.52	4.69	3.66	7.09	37.14	38.02	30.37	8.91	53.30	199	1.146	6.81	6.2
20030513	KANE	1.55	18.3	5.99	1.89	2.07	2.70	15.52	30.90	20.32	3.39	34.16	117	1.021	1.03	-7.6
20030513	LAURHILL	5.24	28.5	12.33	3.13	2.68	4.00	19.35	53.70	22.52	7.05	59.74	185	1.066	3.19	-1.7
20030513	LEADRIDG	1.76	35.7	11.48	3.29	2.20	3.31	22.73	54.95	34.84	5.64	68.11	207	0.902	-5.15	-16.0
20030513	LITTBUFF	1.30	28.7	12.28	3.70	0.20	3.39	37.64	54.95	35.74	5.75	61.07	215	1.094	4.47	6.6
20030513	LITTPINE	0.83	28.6	8.38	4.52	0.31	4.09	26.33	61.66	35.74	15.60	52.30	209	1.016	0.79	12.1
20030513	MILFORD	0.31	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030513	MILLERSV	0.98	19.6	13.97	3.45	1.36	3.05	116.42	3.31	47.10	5.92	85.82	280	1.020	0.97	7.8
20030513	PRESQISL	0.79	30.5	18.31	5.68	3.94	6.00	36.37	54.95	46.45	8.15	65.36	245	1.044	2.15	6.7
20030513	PSUNADP	1.16	34.0	12.97	3.37	1.53	3.05	18.85	56.23	34.84	4.80	64.16	200	0.925	-3.90	-12.3
20030513	SLOCUM	0.73	25.9	6.84	3.37	2.51	5.22	42.63	44.67	41.45	6.26	53.55	207	1.039	1.92	5.0
20030513	VALLFORG	0.72	38.2	13.57	5.10	3.91	2.91	118.92	47.86	60.75	6.09	113.77	373	1.065	3.13	5.3
20030513	YOWOCRK	1.40	27.4	9.48	3.29	4.07	4.92	24.95	39.81	28.39	5.64	54.99	176	0.972	-1.43	-14.1
20030520	ALLEPORT	1.72	17.9	5.59	1.65	0.49	1.48	28.22	34.67	26.23	1.78	41.95	142	1.031	1.50	10.9
20030520	ARENDTSV	2.95	23.3	3.99	2.06	0.49	5.79	36.04	39.81	26.45	6.77	46.66	168	1.104	4.93	-0.7
20030520	CROOKCRK	1.30	22.7	3.24	1.73	2.02	1.30	8.76	56.23	19.02	4.71	50.74	148	0.984	-0.80	15.9
20030520	GODDARD	0.14	44.6	20.01	19.25	4.58	4.26	36.76	134.90	50.74	7.81	155.35	434	1.027	1.35	53.0
20030520	HILLSCRK	0.57	20.3	8.13	3.37	1.38	2.70	13.14	45.71	31.45	5.44	31.81	143	1.083	4.00	12.5
20030520	KANE	0.47	28.1	4.99	1.23	0.31	0.91	22.73	51.29	30.97	2.54	49.58	165	0.980	-0.99	-7.0
20030520	LAURHILL	0.59	11.0	3.59	1.81	0.69	0.04	12.70	20.89	16.37	2.34	17.66	76	1.092	4.40	2.3
20030520	LEADRIDG	0.94	25.1	7.49	2.88	0.56	3.52	30.49	33.88	30.16	5.08	48.95	163	0.936	-3.29	-16.1
20030520	LITTBUFF	1.13	21.5	13.42	5.92	0.36	10.70	33.43	36.31	39.02	11.37	44.87	195	1.051	2.50	10.3
20030520	LITTPINE	0.65	50.3	15.17	8.64	0.03	9.05	13.36	138.04	57.25	13.68	99.07	354	1.084	4.03	26.3
20030520	MILFORD	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030520	MILLERSV	0.79	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030520	PRESQISL	0.36	40.3	16.07	4.20	0.82	1.57	29.00	85.11	36.74	5.47	91.90	271	1.020	0.97	6.8
20030520	PSUNADP	1.05	27.2	8.48	3.04	0.59	3.92	28.27	46.77	31.78	5.92	51.87	181	1.017	0.84	-4.8
20030520	SLOCUM	0.25	16.3	8.63	3.70	1.48	9.66	13.31	27.54	28.02	5.64	30.43	128	1.004	0.18	1.4
20030520	VALLFORG	0.42	15.1	15.52	6.66	2.35	17.18	14.69	20.89	20.73	20.25	27.20	145	1.134	6.27	3.2
20030520	YOWOCRK	0.87	62.2	8.98	3.78	0.49	7.96	14.97	61.66	41.94	11.00	64.57	215	0.833	-9.13	-47.9

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030527	ALLEPORT	1.67	19.9	8.68	1.56	2.84	1.83	17.41	38.02	21.94	1.38	38.62	132	1.136	6.35	0.4
20030527	ARENDTSV	1.61	13.0	2.00	0.58	0.23	1.13	23.28	19.50	18.07	1.69	26.25	93	1.015	0.77	-6.6
20030527	CROOKCRK	0.70	26.5	21.06	35.29	11.61	3.05	9.48	79.43	33.37	5.16	121.69	320	0.998	-0.10	66.3
20030527	GODDARD	1.90	32.4	7.44	1.81	0.23	1.87	13.08	74.13	23.08	2.85	66.26	191	1.069	3.34	6.0
20030527	HILLSCRK	1.22	27.8	6.99	1.65	2.58	1.83	26.33	57.54	27.58	2.99	59.97	187	1.070	3.40	6.1
20030527	KANE	1.47	24.7	3.49	0.82	0.18	0.87	8.87	47.86	18.39	2.26	42.08	125	0.990	-0.50	-9.6
20030527	LAURHILL	1.98	23.2	6.74	2.06	0.20	1.52	12.31	46.77	27.16	2.14	41.06	140	0.989	-0.54	-0.8
20030527	LEADRIDG	1.13	28.7	5.49	1.23	0.72	0.83	19.40	46.77	29.52	2.26	45.20	151	0.967	-1.67	-16.7
20030527	LITTBUFF	2.08	15.1	5.44	1.32	2.86	1.83	18.41	28.18	19.58	2.43	29.64	110	1.124	5.82	3.8
20030527	LITTPINE	1.12	20.0	6.94	1.65	2.71	1.26	10.64	46.77	22.16	2.43	42.70	137	1.040	1.95	14.1
20030527	MILFORD	3.08	5.2	2.99	4.20	2.22	1.17	15.52	4.27	8.87	1.41	12.08	53	1.358	15.19	-6.6
20030527	MILLERSV	2.03	10.3	2.00	0.99	0.20	2.57	28.83	8.32	14.52	3.39	25.20	86	0.995	-0.24	-17.4
20030527	PRESQISL	1.49	31.9	24.30	46.48	16.95	4.87	20.01	72.44	34.31	4.32	167.87	392	0.896	-5.47	47.3
20030527	PSUNADP	1.02	27.0	4.99	1.15	0.38	0.61	22.73	53.70	27.42	2.54	48.95	162	1.059	2.87	-1.2
20030527	SLOCUM	1.25	9.1	4.84	2.55	2.63	5.96	7.15	15.49	13.65	7.25	13.12	73	1.135	6.34	2.0
20030527	VALLFORG	2.60	9.9	2.79	1.40	1.18	3.39	8.93	17.38	11.08	2.20	17.93	66	1.123	5.81	-3.8
20030527	YOWOCRK	1.90	34.7	5.49	1.40	0.92	0.52	35.48	45.71	29.84	2.26	63.74	185	0.934	-3.41	-24.7
20030603	ALLEPORT	1.80	13.6	4.94	1.48	2.17	0.52	12.86	22.39	14.50	0.54	29.27	89	1.001	0.07	-7.6
20030603	ARENDTSV	1.30	29.6	12.97	1.89	1.05	0.52	43.24	46.77	34.84	2.82	65.82	210	1.029	1.41	-5.2
20030603	CROOKCRK	1.09	43.4	5.19	1.56	0.08	0.57	18.13	95.50	30.45	11.82	80.40	244	0.987	-0.68	2.0
20030603	GODDARD	1.85	20.3	6.14	3.13	2.63	1.57	17.30	38.02	19.52	1.47	47.08	137	1.011	0.53	0.2
20030603	HILLSCRK	1.41	17.8	2.64	1.56	1.76	1.00	16.02	39.81	20.87	2.12	35.45	121	1.075	3.60	11.4
20030603	KANE	1.77	33.5	3.99	1.32	0.41	0.22	31.60	61.66	28.87	2.26	67.91	198	1.002	0.08	-5.8
20030603	LAURHILL	1.87	15.4	8.78	3.45	1.51	1.48	15.58	33.88	16.08	2.06	42.95	126	1.059	2.86	19.0
20030603	LEADRIDG	1.15	36.3	7.98	2.06	0.72	0.22	31.60	61.66	37.10	3.39	65.82	211	0.981	-0.98	-10.9
20030603	LITTBUFF	0.66	31.3	8.88	3.13	0.03	4.96	35.65	64.57	40.16	3.19	71.09	232	1.024	1.19	10.3
20030603	LITTPINE	1.52	18.4	2.25	2.55	4.12	0.74	21.84	37.15	20.44	3.41	46.12	139	0.981	-0.95	10.7
20030603	MILFORD	2.58	22.7	3.49	0.99	0.77	0.52	25.50	33.88	21.61	1.97	42.91	132	0.980	-1.02	-16.5
20030603	MILLERSV	0.36	19.9	21.46	4.44	1.23	0.52	48.23	14.79	38.39	9.31	43.74	182	0.992	-0.42	-15.1
20030603	PRESQISL	1.10	23.5	5.39	1.07	0.69	5.00	22.40	52.48	20.02	1.72	57.26	166	1.102	4.84	12.8
20030603	PSUNADP	1.58	29.5	8.98	2.06	0.95	0.26	23.28	53.70	30.97	3.39	54.57	178	1.003	0.17	-6.0
20030603	SLOCUM	3.06	9.6	----	----	----	----	23.06	9.33	15.15	10.30	38.99	---	-----	-----	-----
20030603	VALLFORG	1.34	10.6	4.34	0.90	1.25	3.78	16.69	19.95	15.58	0.54	24.77	88	1.148	6.88	11.1
20030603	YOWOCRK	1.60	28.4	4.49	1.32	0.97	0.22	22.73	56.23	25.81	2.26	51.03	165	1.087	4.16	-2.8

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030610	ALLEPORT	2.52	13.0	4.69	2.63	1.99	5.52	15.58	20.42	14.23	3.72	28.45	97	1.096	4.56	-3.8
20030610	ARENDTSV	4.28	21.0	2.00	0.49	0.38	0.35	24.95	38.90	19.19	1.97	42.08	130	1.061	2.94	-3.3
20030610	CROOKCRK	1.57	22.1	3.54	1.23	1.69	2.35	11.31	54.95	15.79	1.89	47.66	140	1.149	6.93	14.9
20030610	GODDARD	0.75	38.5	5.39	2.39	5.06	2.96	41.41	63.10	40.60	1.83	86.97	250	0.930	-3.64	-7.5
20030610	HILLSCRK	0.90	19.6	3.19	1.56	1.20	1.87	16.13	42.66	21.02	2.03	38.99	129	1.074	3.56	7.8
20030610	KANE	1.29	27.9	2.00	0.58	0.28	0.22	12.75	52.48	17.90	1.13	54.57	142	0.928	-3.74	-10.6
20030610	LAURHILL	3.22	12.4	0.95	0.90	0.95	1.35	10.70	26.30	10.44	0.73	24.64	77	1.149	6.94	3.8
20030610	LEADRIDG	2.27	16.2	1.50	0.58	0.51	0.07	9.42	26.92	15.16	1.13	26.66	82	0.908	-4.84	-17.1
20030610	LITTBUFF	2.75	18.8	1.55	1.32	1.18	2.52	19.79	38.02	19.16	1.16	35.89	121	1.145	6.77	2.5
20030610	LITTPINE	1.14	19.9	3.04	1.23	2.61	2.83	15.36	42.66	18.94	1.27	38.79	127	1.148	6.89	5.4
20030610	MILFORD	1.92	16.8	1.50	0.41	0.51	0.17	12.75	33.88	16.94	0.85	26.45	93	1.113	5.34	-3.5
20030610	MILLERSV	2.88	17.7	2.00	0.58	0.15	0.70	23.84	18.20	18.39	2.26	34.58	101	0.823	-9.70	-30.1
20030610	PRESQISL	0.46	75.6	7.39	4.11	1.76	1.83	47.62	154.88	83.41	4.29	152.98	458	0.904	-5.04	0.9
20030610	PSUNADP	2.45	19.5	2.00	0.41	0.31	0.17	12.20	38.90	15.32	1.97	34.99	106	1.032	1.60	-4.9
20030610	SLOCUM	1.25	15.1	1.25	1.40	1.00	0.26	11.14	31.62	19.08	0.96	24.41	91	1.050	2.43	1.9
20030610	VALLFORG	2.67	14.7	1.40	1.56	1.89	2.26	14.08	27.54	16.73	1.33	25.58	92	1.117	5.53	-2.8
20030610	YOWOCRK	1.35	23.5	2.00	0.49	0.20	0.07	15.52	38.02	18.55	1.41	42.28	119	0.905	-5.01	-18.3
20030617	ALLEPORT	0.46	26.8	6.14	3.29	4.01	3.74	24.73	67.61	32.16	4.88	59.34	206	1.136	6.38	25.3
20030617	ARENDTSV	0.47	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030617	CROOKCRK	1.02	28.0	0.55	1.40	1.48	2.13	7.37	72.44	21.58	3.24	57.59	168	1.036	1.76	15.4
20030617	GODDARD	1.32	31.9	3.34	1.73	3.66	2.13	18.35	69.18	29.45	3.19	69.36	200	0.965	-1.80	5.8
20030617	HILLSCRK	0.75	33.1	1.35	1.48	2.58	1.26	25.72	67.61	29.37	3.02	72.24	205	0.956	-2.26	1.8
20030617	KANE	0.93	34.9	2.99	0.66	0.26	1.39	14.41	70.79	28.07	3.95	61.24	184	0.971	-1.49	-5.4
20030617	LAURHILL	1.01	14.3	1.30	1.97	0.64	4.26	12.58	28.18	16.79	3.78	26.77	96	1.034	1.67	2.8
20030617	LEADRIDG	0.14	61.0	9.48	2.22	0.77	3.92	36.04	112.20	63.55	9.59	107.90	346	0.909	-4.75	-8.0
20030617	LITTBUFF	0.08	50.8	26.20	7.40	0.56	7.83	82.83	75.86	85.97	12.30	111.48	410	0.957	-2.21	-1.1
20030617	LITTPINE	0.97	38.3	1.20	1.56	3.25	2.91	19.57	93.33	32.87	3.27	75.34	233	1.093	4.43	12.0
20030617	MILFORD	0.89	40.4	2.99	0.82	1.02	0.96	25.50	87.10	50.65	2.82	59.78	232	1.045	2.22	1.6
20030617	MILLERSV	0.22	23.8	4.49	1.32	0.51	1.00	18.85	37.15	38.23	3.67	29.58	135	0.886	-6.05	-15.9
20030617	PRESQISL	1.15	36.1	1.70	1.56	1.43	2.65	8.15	83.18	30.73	6.32	61.49	197	1.001	0.07	3.6
20030617	PSUNADP	0.45	57.8	4.99	1.40	0.59	1.74	18.30	107.15	44.36	6.21	103.32	288	0.872	-6.85	-12.3
20030617	SLOCUM	0.38	45.7	4.39	2.55	3.94	3.22	28.00	95.50	42.89	8.10	93.01	282	0.956	-2.27	2.7
20030617	VALLFORG	1.86	36.7	3.19	2.96	2.86	2.35	50.62	72.44	35.66	3.64	79.51	253	1.131	6.17	5.0
20030617	YOWOCRK	0.85	37.1	2.50	0.66	0.43	0.74	12.20	72.44	28.55	3.67	65.61	187	0.909	-4.75	-9.1

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions					Ion	Cond.
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Diff.	Balance
20030624	ALLEPORT	2.16	32.7	1.40	1.97	1.00	2.26	25.11	69.18	39.87	2.93	59.37	203	0.988	-0.61	3.8
20030624	ARENDTSV	2.07	29.7	2.50	0.74	0.64	0.61	19.96	57.54	21.94	2.54	57.91	164	0.995	-0.24	-5.8
20030624	CROOKCRK	0.18	15.4	9.63	6.33	1.69	3.39	16.85	18.20	27.02	6.63	35.41	125	0.812	-10.36	-10.6
20030624	GODDARD	0.45	35.9	3.64	2.63	0.03	1.78	24.56	72.44	28.37	4.34	77.90	216	0.950	-2.57	-0.4
20030624	HILLSCRK	2.19	8.4	0.80	1.73	0.08	1.35	8.87	19.05	13.37	1.69	14.16	61	1.091	4.33	15.1
20030624	KANE	0.84	33.9	3.49	0.74	0.04	0.22	21.62	63.10	41.13	2.82	51.03	184	0.939	-3.14	-8.8
20030624	LAURHILL	2.11	21.5	6.34	1.65	0.03	2.44	22.56	44.67	26.37	3.30	46.03	153	1.026	1.28	8.9
20030624	LEADRIDG	1.20	17.8	2.50	0.58	0.28	0.22	12.20	43.65	21.94	1.41	34.99	118	1.018	0.91	16.2
20030624	LITTBUFF	1.95	23.7	2.64	1.48	0.43	2.04	19.68	50.12	25.31	2.82	50.62	155	0.970	-1.51	6.1
20030624	LITTPINE	2.23	7.8	1.30	0.74	0.08	2.17	5.99	19.05	14.29	1.10	10.41	55	1.137	6.39	18.4
20030624	MILFORD	4.00	18.1	1.50	0.41	0.41	0.52	13.31	39.81	19.03	1.13	30.00	106	1.116	5.46	3.7
20030624	MILLERSV	2.32	16.2	1.50	0.41	0.10	0.35	28.27	10.00	13.87	0.85	26.04	81	0.997	-0.15	-46.2
20030624	PRESQISL	0.65	13.6	5.49	2.30	1.30	1.17	14.41	23.99	22.87	2.23	25.41	99	0.964	-1.86	0.9
20030624	PSUNADP	1.93	21.3	1.50	0.33	0.15	0.13	8.87	44.67	20.49	1.41	33.74	111	1.000	0.01	-3.7
20030624	SLOCUM	4.00	7.4	2.05	0.58	1.05	1.48	14.91	8.71	9.94	1.33	13.98	54	1.140	6.54	-15.4
20030624	VALLFORG	3.34	18.0	5.24	1.40	1.99	1.61	17.02	33.88	19.44	2.37	39.16	122	1.003	0.15	0.8
20030624	YOWOCRK	1.46	7.6	1.00	0.12	0.31	0.07	3.33	12.02	10.48	0.56	6.67	35	0.951	-2.52	-23.2
20030701	ALLEPORT	0.01	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	ARENDTSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	CROOKCRK	0.15	32.5	10.73	3.87	0.03	2.13	50.01	67.61	42.52	5.08	102.17	284	0.897	-5.42	20.8
20030701	GODDARD	0.57	35.6	21.96	4.20	1.23	1.13	40.97	64.57	34.81	3.33	102.09	274	0.956	-2.25	5.3
20030701	HILLSCRK	0.01	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	KANE	0.07	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	LAURHILL	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	LEADRIDG	0.06	23.6	6.49	1.81	0.77	0.74	34.93	31.62	32.42	2.26	36.45	147	1.073	3.54	-17.8
20030701	LITTBUFF	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	LITTPINE	0.02	35.2	----	----	----	----	57.71	72.44	30.87	24.12	45.83	---	-----	-----	-----
20030701	MILFORD	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	MILLERSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	PRESQISL	0.13	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	PSUNADP	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030701	SLOCUM	0.03	36.0	----	----	----	----	73.35	42.66	62.18	17.12	112.84	---	-----	-----	-----
20030701	VALLFORG	0.04	96.1	----	----	----	----	129.62	158.49	96.55	29.17	283.43	---	-----	-----	-----
20030701	YOWOCRK	0.03	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030708	ALLEPORT	1.10	23.8	7.34	2.06	1.18	1.04	27.28	67.61	28.02	2.79	81.84	219	0.945	-2.81	45.5
20030708	ARENDTSV	0.60	31.3	5.49	0.90	0.56	0.35	31.05	61.66	21.13	2.26	72.90	196	1.039	1.89	0.3
20030708	CROOKCRK	1.38	32.5	8.13	2.71	0.95	1.74	31.66	70.79	31.08	2.99	88.47	239	0.947	-2.75	13.5
20030708	GODDARD	0.97	37.4	17.81	4.11	1.07	2.35	56.27	83.18	49.45	3.92	106.94	325	1.028	1.38	24.1
20030708	HILLSCRK	0.18	34.5	6.59	2.06	2.53	2.48	24.34	72.44	25.23	6.97	88.36	231	0.916	-4.38	6.8
20030708	KANE	0.10	78.5	21.46	4.61	1.15	1.65	57.66	141.25	82.42	6.49	156.02	473	0.930	-3.63	-6.7
20030708	LAURHILL	2.03	26.8	9.08	3.29	0.03	4.13	22.56	58.88	22.79	4.06	65.72	191	1.058	2.84	11.8
20030708	LEADRIDG	1.42	54.3	6.49	1.23	0.59	0.48	37.14	95.50	32.74	4.23	121.02	299	0.895	-5.53	-11.0
20030708	LITTBUFF	0.08	33.0	12.23	5.84	5.50	15.22	13.42	63.10	39.60	6.91	69.88	232	0.991	-0.47	2.2
20030708	LITTPINE	0.24	31.3	3.74	1.07	0.59	0.44	9.87	69.18	16.79	1.81	60.49	164	1.073	3.54	-0.5
20030708	MILFORD	0.10	29.1	13.97	2.30	1.30	0.35	8.87	66.07	28.39	1.97	47.28	171	1.196	8.93	4.7
20030708	MILLERSV	1.29	20.1	10.98	2.30	0.79	0.48	63.76	16.22	21.45	2.26	74.36	193	0.964	-1.84	-8.5
20030708	PRESQISL	0.94	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030708	PSUNADP	0.79	41.5	4.99	2.06	0.41	0.39	32.16	83.18	29.84	3.95	90.19	247	0.994	-0.33	-1.0
20030708	SLOCUM	0.04	81.9	23.60	7.49	5.24	5.57	41.69	165.96	68.83	12.98	189.09	520	0.921	-4.10	1.9
20030708	VALLFORG	0.35	13.4	6.79	3.04	0.03	2.52	19.40	21.38	17.52	5.08	34.45	110	0.932	-3.53	2.6
20030708	YOWOCRK	0.24	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030715	ALLEPORT	1.55	17.5	4.34	1.89	1.92	2.00	15.69	45.71	26.81	1.83	43.93	144	0.986	-0.71	31.8
20030715	ARENDTSV	0.40	45.0	7.98	1.89	0.41	1.48	39.36	77.62	39.68	3.95	93.94	266	0.936	-3.31	-9.2
20030715	CROOKCRK	0.95	20.4	2.40	1.40	2.05	1.65	14.86	60.26	24.37	2.45	62.26	172	0.927	-3.78	43.1
20030715	GODDARD	1.48	19.5	1.60	0.82	1.43	1.48	9.20	43.65	18.29	1.52	40.06	118	0.972	-1.43	6.1
20030715	HILLSCRK	0.79	29.3	4.94	2.30	1.92	4.52	22.29	67.61	33.87	5.95	63.49	207	1.003	0.13	14.9
20030715	KANE	0.52	50.2	5.49	1.48	0.36	1.00	24.95	100.00	36.29	3.95	100.40	274	0.948	-2.69	-5.0
20030715	LAURHILL	1.47	22.1	4.69	1.56	1.92	1.44	13.36	52.48	19.16	2.14	51.74	148	1.033	1.62	14.5
20030715	LEADRIDG	2.00	23.3	2.00	0.41	0.18	0.48	15.52	41.69	23.07	1.69	39.99	125	0.931	-3.58	-11.3
20030715	LITTBUFF	1.12	39.4	1.65	1.07	2.51	1.70	39.75	93.33	41.89	5.02	95.28	282	0.985	-0.78	18.1
20030715	LITTPINE	0.93	20.1	0.80	1.89	1.41	1.61	20.12	53.70	30.23	1.89	47.45	159	1.000	-0.02	31.7
20030715	MILFORD	0.24	43.2	5.99	1.73	0.84	2.17	41.03	79.43	43.39	5.08	82.49	262	1.002	0.09	-4.9
20030715	MILLERSV	0.16	65.4	9.98	2.96	0.56	2.26	87.04	97.72	78.55	4.51	136.23	420	0.914	-4.47	-11.9
20030715	PRESQISL	0.68	34.9	6.94	2.80	2.58	2.09	28.61	87.10	50.10	3.78	84.92	269	0.937	-3.23	25.0
20030715	PSUNADP	1.58	19.5	1.00	0.12	0.08	0.30	14.41	36.31	20.00	0.85	33.33	106	0.964	-1.83	-8.5
20030715	SLOCUM	0.93	30.9	0.90	1.15	0.84	1.91	22.34	75.86	37.37	1.44	70.24	212	0.945	-2.85	18.2
20030715	VALLFORG	0.24	28.5	5.79	4.85	2.17	8.44	23.78	61.66	43.52	9.79	70.82	231	0.860	-7.55	17.9
20030715	YOWOCRK	1.38	28.1	3.49	0.74	0.20	0.52	11.64	38.90	25.81	2.26	46.03	130	0.749	-14.35	-28.1

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030722	ALLEPORT	1.96	24.1	2.54	1.48	1.76	0.70	15.41	56.23	23.16	1.47	57.05	160	0.957	-2.22	13.0
20030722	ARENDTSV	0.35	36.6	13.97	2.63	0.23	0.61	30.49	64.57	28.07	3.10	82.90	227	0.986	-0.69	-6.6
20030722	CROOKCRK	2.79	25.2	4.49	1.32	2.33	0.52	15.41	57.54	22.44	1.78	57.97	164	0.993	-0.35	10.5
20030722	GODDARD	6.48	27.3	5.34	1.56	0.03	1.91	25.72	60.26	26.52	1.02	70.97	193	0.963	-1.90	12.6
20030722	HILLSCRK	3.07	26.0	8.33	2.39	3.45	1.09	24.39	53.70	27.66	2.00	62.20	185	1.016	0.80	8.6
20030722	KANE	4.20	39.6	5.99	1.65	1.48	0.39	20.51	70.79	25.97	2.82	82.07	212	0.909	-4.75	-11.6
20030722	LAURHILL	0.36	29.7	14.02	2.30	4.14	2.87	19.07	61.66	39.10	9.03	60.39	213	0.959	-2.09	8.7
20030722	LEADRIDG	1.10	24.8	7.49	1.81	0.64	0.70	23.28	38.02	20.00	1.97	56.03	150	0.922	-4.05	-13.9
20030722	LITTBUFF	0.70	38.7	18.16	3.62	2.07	1.17	49.90	75.86	43.10	1.95	102.23	298	1.024	1.18	9.7
20030722	LITTPINE	1.76	20.6	6.54	2.22	2.63	1.22	22.40	41.69	26.87	0.73	46.10	150	1.041	1.99	8.6
20030722	MILFORD	1.66	34.1	7.49	2.47	2.30	0.57	19.96	67.61	27.74	3.10	68.32	200	1.012	0.61	-2.7
20030722	MILLERSV	0.08	16.2	14.97	2.80	1.13	1.83	64.31	7.24	31.29	3.67	54.99	182	1.026	1.27	-7.5
20030722	PRESQISL	1.42	22.7	9.53	3.45	0.61	1.35	20.35	45.71	32.45	1.83	46.24	162	1.006	0.29	6.6
20030722	PSUNADP	1.74	33.6	8.48	1.89	0.51	0.35	15.52	69.18	26.45	3.39	68.11	194	0.979	-1.04	-1.2
20030722	SLOCUM	2.25	18.8	4.64	1.48	0.03	0.57	22.90	38.02	23.44	0.62	42.12	134	1.022	1.09	7.6
20030722	VALLFORG	0.36	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030722	YOWOCRK	3.23	33.3	7.49	1.65	0.46	0.39	21.07	60.26	23.87	2.54	68.74	186	0.960	-2.06	-9.3
20030729	ALLEPORT	0.31	36.1	94.21	44.75	4.96	23.88	33.04	10.23	54.45	33.68	155.27	454	0.867	-7.11	-10.0
20030729	ARENDTSV	0.25	39.0	9.98	1.65	0.26	0.22	28.27	102.33	43.87	2.82	60.82	250	1.327	14.06	19.2
20030729	CROOKCRK	1.00	22.6	6.14	2.06	0.03	1.26	15.80	48.98	20.23	3.24	46.03	144	1.068	3.31	5.9
20030729	GODDARD	1.90	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030729	HILLSCRK	1.05	15.0	2.54	0.82	1.00	1.00	39.92	30.90	19.94	18.84	27.54	143	1.149	6.92	26.7
20030729	KANE	3.17	21.3	5.49	1.07	0.26	0.35	14.41	38.90	14.36	1.13	44.78	121	1.004	0.18	-8.4
20030729	LAURHILL	1.05	46.1	7.63	1.97	2.51	3.70	123.63	125.89	38.95	123.16	107.57	535	0.984	-0.81	61.2
20030729	LEADRIDG	0.73	54.0	7.49	1.48	0.64	0.30	18.85	72.44	28.71	2.82	79.78	213	0.909	-4.76	-34.2
20030729	LITTBUFF	1.37	24.8	9.53	1.56	1.66	2.13	69.36	43.65	39.31	16.00	58.80	242	1.121	5.70	19.5
20030729	LITTPINE	2.90	21.7	6.54	2.71	1.30	2.00	45.85	48.98	18.08	24.74	53.70	204	1.113	5.33	30.9
20030729	MILFORD	0.72	25.8	7.98	1.32	0.46	0.44	16.63	54.95	26.45	1.97	46.24	156	1.095	4.55	2.8
20030729	MILLERSV	2.31	21.5	2.99	0.66	0.33	0.39	24.39	20.89	19.84	2.26	45.83	118	0.731	-15.53	-33.2
20030729	PRESQISL	1.19	19.1	39.07	8.06	3.20	2.91	55.00	14.13	44.16	5.44	59.49	231	1.122	5.73	3.7
20030729	PSUNADP	0.81	40.4	5.49	0.90	0.41	0.35	14.41	77.62	28.39	3.10	77.49	208	0.910	-4.70	-9.2
20030729	SLOCUM	1.08	23.8	4.04	1.73	0.03	1.39	29.66	52.48	25.52	6.32	51.26	172	1.075	3.61	13.8
20030729	VALLFORG	0.26	31.9	5.99	2.14	3.04	2.48	22.29	74.13	38.52	10.30	64.41	223	0.972	-1.41	15.1
20030729	YOWOCRK	2.92	26.8	4.99	0.90	0.41	0.35	18.85	44.67	14.52	1.97	58.12	145	0.941	-3.07	-14.5

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030805	ALLEPORT	2.78	32.0	4.74	1.48	1.10	2.74	21.40	66.07	29.45	1.78	65.07	194	1.013	0.63	1.1
20030805	ARENDTSV	0.47	46.4	5.49	1.56	0.31	2.57	36.04	85.11	33.23	6.21	98.53	269	0.950	-2.56	-6.9
20030805	CROOKCRK	2.13	29.4	3.44	0.99	1.48	1.57	9.59	61.66	19.79	2.29	59.30	160	0.967	-1.65	-2.3
20030805	GODDARD	0.81	36.5	4.19	1.56	2.91	1.70	10.76	72.44	31.66	3.78	69.70	199	0.890	-5.83	-5.5
20030805	HILLSCRK	1.48	19.8	2.64	0.99	4.53	1.78	11.59	41.69	18.52	0.99	40.87	124	1.047	2.30	3.6
20030805	KANE	2.67	57.6	3.99	0.99	0.28	0.35	15.52	114.82	23.87	4.80	119.15	284	0.920	-4.18	-8.6
20030805	LAURHILL	2.05	34.2	4.59	1.23	2.66	2.13	27.11	69.18	26.31	1.41	76.72	211	1.024	1.17	1.0
20030805	LEADRIDG	4.06	17.9	1.50	0.41	0.15	0.22	13.31	26.92	15.00	1.41	34.16	93	0.840	-8.67	-20.3
20030805	LITTBUFF	0.73	20.7	4.44	1.32	3.45	2.74	19.07	41.69	25.37	3.05	42.51	144	1.025	1.24	5.9
20030805	LITTPINE	1.39	14.1	4.74	1.07	3.94	2.17	4.55	28.18	20.16	0.31	23.06	88	1.026	1.27	-0.1
20030805	MILFORD	1.94	23.8	1.50	0.58	0.20	1.52	9.98	53.70	22.42	2.82	39.16	132	1.048	2.34	2.9
20030805	MILLERSV	0.30	30.9	3.49	1.40	0.36	3.09	44.35	38.02	40.16	6.21	54.16	191	0.902	-5.13	-21.0
20030805	PRESQISL	2.13	48.4	8.63	1.65	2.58	1.78	21.73	102.33	33.16	2.60	101.82	276	1.008	0.41	0.1
20030805	PSUNADP	3.75	18.5	3.49	0.66	0.20	0.26	14.97	39.81	18.07	1.69	34.16	113	1.102	4.83	4.2
20030805	SLOCUM	0.87	16.8	3.99	1.73	2.35	2.96	13.08	33.11	23.02	1.92	29.91	112	1.043	2.12	2.4
20030805	VALLFORG	2.50	18.3	3.09	1.81	2.17	3.13	13.14	35.48	15.37	2.43	40.79	117	1.004	0.21	-0.1
20030805	YOWOCRK	1.90	22.1	2.00	0.33	0.08	0.26	7.21	36.31	16.61	1.13	29.79	94	0.972	-1.44	-23.6
20030812	ALLEPORT	0.82	23.2	3.34	1.23	0.87	1.26	15.19	60.26	26.52	1.64	55.39	166	0.983	-0.84	23.9
20030812	ARENDTSV	1.00	37.2	10.98	1.32	0.41	0.52	35.48	66.07	39.36	2.54	74.78	231	0.984	-0.82	-5.8
20030812	CROOKCRK	1.33	57.8	3.04	0.66	0.15	1.44	14.86	138.04	37.66	13.12	117.11	326	0.942	-2.97	7.6
20030812	GODDARD	3.63	21.2	1.75	0.49	1.56	0.74	14.41	58.88	19.37	1.30	58.34	157	0.985	-0.75	31.1
20030812	HILLSCRK	4.85	46.7	2.30	0.49	0.41	1.35	24.95	112.20	22.29	2.23	106.36	273	1.083	3.97	9.4
20030812	KANE	1.56	38.3	2.50	0.58	0.13	0.13	13.31	74.13	24.19	2.54	72.49	190	0.915	-4.45	-10.0
20030812	LAURHILL	0.46	76.4	10.33	0.90	0.54	1.57	20.73	190.55	57.75	6.97	163.91	453	0.982	-0.88	12.4
20030812	LEADRIDG	1.08	25.1	1.50	0.41	0.26	0.22	21.62	39.81	18.07	1.69	51.87	135	0.891	-5.77	-16.5
20030812	LITTBUFF	2.22	31.5	5.44	1.48	1.15	0.91	37.75	66.07	37.60	1.38	66.78	219	1.067	3.22	8.6
20030812	LITTPINE	0.30	37.6	2.54	0.90	0.13	1.00	16.69	93.33	40.81	2.26	62.14	220	1.089	4.27	11.5
20030812	MILFORD	2.76	20.4	2.00	0.66	0.15	1.04	10.53	47.86	25.65	2.26	29.58	120	1.083	3.98	7.7
20030812	MILLERSV	1.19	33.9	3.49	0.99	0.43	1.09	28.27	52.48	30.49	4.51	66.03	188	0.859	-7.60	-16.7
20030812	PRESQISL	0.71	59.7	6.54	1.97	3.32	1.39	41.41	134.90	62.75	5.98	119.38	378	1.008	0.38	8.8
20030812	PSUNADP	1.28	45.4	5.49	0.82	0.20	0.13	20.51	85.11	26.29	2.54	97.07	238	0.892	-5.72	-9.7
20030812	SLOCUM	4.92	28.1	2.35	0.49	0.05	1.44	19.68	75.86	30.73	2.43	57.59	191	1.100	4.78	24.4
20030812	VALLFORG	4.79	12.3	4.79	0.99	0.03	2.26	10.26	26.92	12.79	2.79	25.89	87	1.091	4.34	11.0
20030812	YOWOCRK	1.48	52.1	2.00	0.49	0.31	0.17	18.85	95.50	32.26	3.10	102.48	255	0.851	-8.04	-13.3

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030819	ALLEPORT	0.19	51.8	14.07	4.03	3.04	2.13	102.34	77.62	47.81	7.25	159.58	418	0.947	-2.73	0.1
20030819	ARENDTSV	0.56	43.9	9.98	2.39	0.31	0.30	43.24	79.43	31.29	2.82	103.94	274	0.983	-0.88	-4.6
20030819	CROOKCRK	0.04	47.3	36.43	9.54	4.83	15.31	78.28	67.61	83.91	14.75	122.61	433	0.958	-2.14	3.9
20030819	GODDARD	0.17	20.0	18.71	4.03	4.55	1.96	57.99	32.36	40.81	2.34	69.09	232	1.066	3.17	27.3
20030819	HILLSCRK	0.04	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030819	KANE	0.40	20.6	2.99	0.82	0.18	0.22	26.61	36.31	17.26	1.13	50.20	136	0.979	-1.07	-3.1
20030819	LAURHILL	0.02	59.2	----	----	----	----	----	87.10	-----	-----	-----	---	-----	-----	-----
20030819	LEADRIDG	0.01	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030819	LITTBUFF	1.31	24.4	6.94	1.89	5.04	1.13	45.46	47.86	29.16	0.71	71.86	210	1.065	3.14	16.8
20030819	LITTPINE	0.43	29.5	13.67	3.13	2.76	1.22	49.90	52.48	32.45	3.16	79.63	238	1.069	3.32	7.4
20030819	MILFORD	0.29	7.3	3.49	0.66	0.59	0.30	12.75	11.48	6.77	0.56	12.50	49	1.476	19.22	-8.2
20030819	MILLERSV	1.75	43.5	2.99	0.82	0.15	0.30	23.28	64.57	31.13	3.95	87.49	215	0.752	-14.18	-22.7
20030819	PRESQISL	0.21	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030819	PSUNADP	0.89	24.8	5.99	1.23	0.26	0.26	29.94	41.69	12.90	1.97	68.53	163	0.951	-2.49	-5.6
20030819	SLOCUM	0.55	38.9	----	----	----	----	----	66.07	-----	-----	-----	---	-----	-----	-----
20030819	VALLFORG	0.12	43.6	17.27	3.13	4.14	6.35	20.57	109.65	72.18	7.19	70.78	311	1.073	3.52	20.6
20030819	YOWOCRK	0.01	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030826	ALLEPORT	2.39	34.9	15.87	4.03	3.43	1.74	34.48	72.44	36.37	3.81	85.82	258	1.048	2.32	10.5
20030826	ARENDTSV	0.18	47.8	15.97	3.21	0.49	0.39	26.06	89.13	36.45	2.26	84.15	258	1.101	4.79	-9.5
20030826	CROOKCRK	2.54	35.5	23.05	5.18	2.38	1.57	50.89	45.71	41.39	3.72	98.53	272	0.897	-5.45	-9.7
20030826	GODDARD	0.61	29.2	39.02	10.69	2.89	3.26	61.15	35.48	62.25	2.12	75.63	292	1.089	4.27	3.1
20030826	HILLSCRK	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030826	KANE	0.18	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030826	LAURHILL	0.54	47.8	20.56	6.00	2.61	1.65	53.89	102.33	50.45	4.46	119.02	361	1.075	3.63	13.6
20030826	LEADRIDG	0.16	49.7	19.96	5.26	1.28	1.44	35.48	79.43	46.78	4.51	100.40	295	0.942	-3.00	-13.3
20030826	LITTBUFF	0.01	38.5	----	----	----	----	----	30.90	-----	-----	-----	---	-----	-----	-----
20030826	LITTPINE	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030826	MILFORD	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030826	MILLERSV	1.00	74.9	21.46	4.28	0.74	1.00	65.97	114.82	50.81	6.49	175.81	441	0.893	-5.63	-14.9
20030826	PRESQISL	0.22	25.1	32.09	5.68	3.43	3.09	44.80	35.48	47.66	2.74	62.47	237	1.104	4.92	5.0
20030826	PSUNADP	0.22	41.4	15.47	3.70	0.41	0.57	15.52	77.62	35.97	1.97	48.74	200	1.307	13.30	-13.6
20030826	SLOCUM	0.30	21.3	7.24	1.40	0.23	1.04	36.92	37.15	20.52	0.37	60.34	165	1.034	1.67	4.5
20030826	VALLFORG	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030826	YOWOCRK	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions					Ion	Cond.
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Diff.	Balance
20030902	ALLEPORT	3.13	24.0	6.69	1.32	0.05	1.39	15.80	58.88	19.94	2.71	55.82	163	1.072	3.48	17.0
20030902	ARENDTSV	1.50	25.6	4.49	0.74	0.18	0.39	16.63	41.69	16.78	1.69	51.03	134	0.923	-4.03	-16.9
20030902	CROOKCRK	4.76	17.4	6.04	0.66	1.84	1.35	10.26	46.77	17.15	4.01	44.99	133	1.012	0.58	29.8
20030902	GODDARD	2.49	26.9	10.68	1.89	0.46	2.22	21.29	63.10	25.66	5.81	64.36	195	1.040	1.94	17.3
20030902	HILLSCRK	2.74	15.5	4.59	0.66	0.43	0.70	8.15	30.90	12.58	1.58	34.79	94	0.928	-3.72	-0.8
20030902	KANE	2.18	19.6	2.50	0.58	0.15	0.17	9.98	38.02	13.87	1.13	38.12	105	0.968	-1.65	-7.4
20030902	LAURHILL	2.66	37.2	9.78	1.40	2.30	2.00	24.34	74.13	29.58	4.06	86.65	234	0.947	-2.71	0.8
20030902	LEADRIDG	4.50	28.3	2.99	0.82	0.28	0.44	14.97	50.12	17.90	1.97	55.62	145	0.922	-4.05	-13.5
20030902	LITTBUFF	1.60	24.9	14.67	10.94	8.72	6.22	15.08	39.81	26.02	8.04	69.36	199	0.923	-4.01	-0.0
20030902	LITTPINE	1.91	23.6	5.54	0.82	0.61	1.22	11.20	54.95	22.37	3.16	51.66	152	0.963	-1.88	11.0
20030902	MILFORD	2.50	20.6	1.00	0.12	0.13	0.57	6.65	39.81	14.84	1.41	32.91	97	0.982	-0.91	-11.8
20030902	MILLERSV	3.35	35.5	18.46	3.87	0.38	0.78	52.11	45.71	38.71	2.54	92.49	255	0.907	-4.87	-12.9
20030902	PRESQISL	1.64	15.1	5.49	0.99	2.79	1.52	10.09	30.20	13.87	2.12	31.24	98	1.081	3.91	2.1
20030902	PSUNADP	5.04	27.3	2.99	0.66	0.15	0.22	11.09	57.54	16.61	1.97	53.32	145	1.010	0.51	-2.9
20030902	SLOCUM	3.59	17.5	2.30	0.49	1.64	1.26	7.60	34.67	15.58	2.29	34.16	100	0.922	-4.07	-3.6
20030902	VALLFORG	1.53	22.6	4.54	1.73	1.13	1.70	33.49	47.86	26.73	2.96	56.24	176	1.052	2.56	15.3
20030902	YOWOCRK	1.90	27.3	2.99	0.82	0.59	0.61	11.09	47.86	16.94	1.69	51.66	134	0.910	-4.71	-15.6
20030909	ALLEPORT	0.50	37.2	6.04	0.82	1.61	1.87	11.98	89.13	32.23	5.44	77.90	227	0.964	-1.82	10.8
20030909	ARENDTSV	0.61	42.4	4.99	1.48	0.28	1.52	29.94	81.28	46.29	4.23	74.78	245	0.954	-2.37	-4.9
20030909	CROOKCRK	0.25	41.0	18.26	4.28	0.15	2.31	48.18	91.20	56.97	7.67	97.90	327	1.011	0.56	18.9
20030909	GODDARD	0.13	54.1	37.03	7.73	2.40	11.83	51.12	97.72	85.76	15.21	108.73	418	0.991	-0.45	4.4
20030909	HILLSCRK	0.65	22.1	9.93	2.80	0.36	2.48	19.57	46.77	31.45	3.50	51.45	168	0.948	-2.67	13.0
20030909	KANE	0.71	23.7	5.99	2.22	0.33	0.87	18.30	41.69	28.07	1.41	44.16	143	0.942	-2.97	-7.8
20030909	LAURHILL	0.40	27.9	8.18	1.48	1.07	1.48	27.78	67.61	29.02	3.84	64.36	205	1.107	5.07	20.3
20030909	LEADRIDG	1.16	28.8	2.50	0.74	0.28	0.26	15.52	46.77	20.32	2.82	55.41	145	0.841	-8.63	-18.3
20030909	LITTBUFF	1.83	33.2	2.99	0.66	1.07	1.35	20.57	77.62	36.10	5.47	60.82	207	1.018	0.91	10.2
20030909	LITTPINE	1.55	19.5	3.99	0.41	0.74	1.22	10.37	47.86	19.79	2.96	41.04	128	1.013	0.63	15.8
20030909	MILFORD	0.37	39.5	1.00	0.33	0.15	0.83	12.75	83.18	38.71	2.82	57.91	198	0.988	-0.61	-5.0
20030909	MILLERSV	1.03	23.6	1.50	0.49	0.13	0.35	16.63	46.77	24.03	2.26	38.95	131	1.010	0.48	-4.5
20030909	PRESQISL	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20030909	PSUNADP	0.76	37.5	3.99	1.23	0.31	0.65	23.28	72.44	30.32	2.82	72.28	207	0.967	-1.69	-6.1
20030909	SLOCUM	1.15	37.7	1.90	0.49	1.02	2.31	16.63	89.13	31.81	4.40	79.78	227	0.961	-1.98	9.6
20030909	VALLFORG	0.87	21.2	2.10	0.49	0.69	1.74	10.64	50.12	28.52	3.64	36.45	134	0.959	-2.10	11.6
20030909	YOWOCRK	0.96	29.3	2.00	0.33	0.33	0.17	7.76	48.98	22.42	1.41	49.16	133	0.816	-10.12	-20.6

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030916	ALLEPORT	0.61	19.5	2.00	1.48	0.77	4.18	17.80	43.65	17.79	7.70	50.16	146	0.924	-3.97	16.1
20030916	ARENDTSV	1.03	23.4	3.49	1.40	0.28	5.09	25.50	39.81	17.90	7.33	50.83	152	0.994	-0.32	-6.1
20030916	CROOKCRK	1.16	26.6	4.04	0.49	0.54	1.57	11.48	64.57	13.79	3.70	63.43	164	1.022	1.08	12.1
20030916	GODDARD	0.62	36.4	1.95	0.82	2.84	1.61	15.30	93.33	27.81	6.60	76.65	227	1.043	2.11	16.7
20030916	HILLSCRK	0.72	12.0	1.80	1.07	0.13	3.78	7.76	28.18	13.15	6.01	25.00	87	0.968	-1.64	17.1
20030916	KANE	0.27	33.2	2.00	0.58	0.13	0.96	9.42	64.57	16.94	3.39	64.57	163	0.915	-4.46	-10.3
20030916	LAURHILL	2.00	5.8	0.25	0.49	1.20	2.52	4.77	13.49	3.58	3.13	13.60	43	1.119	5.60	18.2
20030916	LEADRIDG	0.75	25.7	2.50	0.82	0.33	2.22	28.83	38.02	17.42	3.39	58.32	152	0.919	-4.22	-15.9
20030916	LITTBUFF	1.03	13.7	2.99	2.55	1.99	9.00	19.79	23.44	19.87	11.99	29.37	121	0.976	-1.20	9.9
20030916	LITTPINE	1.75	10.2	2.00	0.58	2.76	2.35	11.14	22.39	12.08	2.29	22.91	78	1.106	5.01	16.3
20030916	MILFORD	1.25	14.9	2.99	5.10	0.72	22.84	4.99	25.70	14.52	26.52	17.29	121	1.069	3.33	2.6
20030916	MILLERSV	1.05	10.5	3.49	6.83	0.82	30.23	27.72	3.31	11.61	34.13	20.83	139	1.087	4.19	-2.6
20030916	PRESQISL	0.72	18.8	4.24	1.23	1.48	1.91	13.58	43.65	19.02	3.13	42.08	130	1.029	1.44	14.4
20030916	PSUNADP	1.50	15.7	1.50	0.66	0.15	1.70	14.97	28.18	10.48	2.26	32.08	92	1.052	2.54	-7.6
20030916	SLOCUM	1.33	7.8	1.30	0.90	3.43	3.31	4.44	17.38	13.23	3.95	13.54	61	1.001	0.05	18.5
20030916	VALLFORG	2.69	7.9	2.64	3.45	1.43	13.92	5.71	13.18	10.23	17.55	12.96	81	0.991	-0.47	15.4
20030916	YOWOCRK	1.26	14.3	1.00	0.49	0.28	2.35	10.53	21.88	9.68	3.10	26.25	76	0.936	-3.30	-19.3
20030923	ALLEPORT	2.75	8.0	3.34	1.56	1.92	3.48	6.04	13.80	6.73	2.48	17.10	56	1.146	6.80	-3.2
20030923	ARENDTSV	3.04	13.2	4.49	3.04	0.49	12.05	9.42	22.39	10.32	13.54	25.00	101	1.062	3.00	-0.2
20030923	CROOKCRK	1.19	10.4	3.49	2.30	0.10	1.74	2.00	19.50	4.86	6.07	14.54	55	1.144	6.73	-11.0
20030923	GODDARD	2.57	9.5	2.94	0.99	1.89	2.61	7.21	16.98	6.00	3.19	20.18	62	1.111	5.24	-4.0
20030923	HILLSCRK	0.59	13.4	2.89	3.78	2.66	14.40	11.20	22.39	10.36	15.94	26.77	110	1.080	3.86	3.3
20030923	KANE	2.10	12.4	1.00	0.41	0.23	1.70	4.44	20.42	7.74	2.26	21.25	59	0.902	-5.14	-19.7
20030923	LAURHILL	0.93	13.2	3.49	0.66	2.22	2.70	6.04	25.12	7.50	4.68	24.18	77	1.106	5.05	-5.7
20030923	LEADRIDG	2.45	12.7	2.50	0.99	0.36	3.96	4.44	19.05	8.39	5.08	21.25	66	0.901	-5.19	-21.5
20030923	LITTBUFF	3.30	13.8	4.04	4.20	5.14	12.75	3.99	25.70	9.94	13.48	25.83	105	1.133	6.25	4.1
20030923	LITTPINE	1.28	12.3	3.19	6.83	2.99	27.84	8.09	16.22	7.58	31.96	19.56	124	1.103	4.88	3.8
20030923	MILFORD	4.02	10.8	1.50	2.39	0.36	9.92	6.65	14.45	6.29	11.28	18.54	71	0.977	-1.19	-17.2
20030923	MILLERSV	4.54	8.4	2.99	3.21	0.54	14.83	8.32	12.30	4.68	17.49	17.29	82	1.069	3.35	6.5
20030923	PRESQISL	1.86	14.7	3.84	2.14	0.23	3.74	13.92	25.12	15.58	4.54	27.47	97	1.029	1.44	-5.9
20030923	PSUNADP	2.99	12.5	2.99	1.07	1.51	6.00	0.55	19.95	10.00	6.77	25.00	74	0.768	-13.11	-14.2
20030923	SLOCUM	2.60	9.1	2.20	1.15	3.35	4.74	5.49	15.85	6.29	6.49	16.43	62	1.122	5.75	-3.5
20030923	VALLFORG	2.60	13.7	10.03	13.66	6.11	42.41	7.21	5.89	3.29	61.10	24.45	174	0.960	-2.03	-5.4
20030923	YOWOCRK	1.81	12.5	2.00	1.48	0.36	6.87	4.44	17.78	8.39	7.62	20.21	69	0.909	-4.75	-21.8

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20030930	ALLEPORT	2.60	18.6	2.84	1.23	0.69	1.83	14.86	37.15	14.00	2.71	40.41	116	1.026	1.29	0.5
20030930	ARENDTSV	0.76	35.8	5.49	1.65	0.43	3.39	23.28	67.61	25.65	4.51	74.99	207	0.969	-1.59	-5.8
20030930	CROOKCRK	0.92	27.3	18.71	4.28	0.33	2.13	27.55	60.26	38.87	5.08	62.09	219	1.068	3.29	18.1
20030930	GODDARD	1.68	32.2	7.98	2.39	1.99	2.31	21.90	64.57	32.66	2.93	69.74	206	0.960	-2.04	1.8
20030930	HILLSCRK	2.33	14.6	3.44	0.99	2.05	2.44	9.59	27.54	12.94	2.26	27.43	89	1.080	3.86	-4.3
20030930	KANE	1.09	29.0	10.98	2.06	0.54	0.48	19.96	47.86	26.78	1.97	59.57	170	0.927	-3.79	-12.1
20030930	LAURHILL	1.12	30.2	6.94	2.22	1.66	2.74	17.41	58.88	23.08	3.72	62.91	180	1.002	0.08	-3.1
20030930	LEADRIDG	1.21	15.4	4.49	0.74	0.23	1.17	19.96	22.91	14.19	1.69	32.70	98	1.019	0.93	-12.8
20030930	LITTBUFF	0.82	29.2	5.34	1.89	2.10	4.05	19.35	58.88	27.37	5.16	58.76	183	1.003	0.17	1.1
20030930	LITTPINE	0.81	21.6	9.43	2.30	1.43	3.78	19.79	46.77	29.58	4.06	42.47	160	1.097	4.64	12.7
20030930	MILFORD	1.18	15.7	3.49	1.81	0.28	6.53	9.42	26.30	15.97	7.33	21.87	93	1.059	2.86	-11.8
20030930	MILLERSV	0.31	52.9	9.48	2.14	0.54	1.22	63.76	87.10	66.62	6.77	100.82	338	0.943	-2.95	-7.9
20030930	PRESQISL	2.87	19.6	5.89	1.65	0.10	1.35	19.79	38.90	24.16	2.62	38.66	133	1.034	1.68	3.9
20030930	PSUNADP	1.63	14.0	3.49	2.30	1.33	0.87	16.63	19.95	12.26	1.69	31.66	90	0.977	-1.14	-14.2
20030930	SLOCUM	0.55	30.7	7.04	2.14	2.20	5.31	21.12	60.26	29.81	6.80	58.91	194	1.027	1.31	-0.3
20030930	VALLFORG	0.72	14.7	2.94	2.22	0.36	6.26	9.20	24.55	10.50	8.69	28.81	94	0.949	-2.63	-8.8
20030930	YOWOCRK	2.05	14.3	2.99	0.66	0.20	0.65	12.75	20.42	12.10	1.13	27.70	79	0.921	-4.14	-20.7
20031007	ALLEPORT	0.62	31.7	14.32	4.11	3.09	1.83	24.06	48.98	46.39	7.08	45.10	195	0.978	-1.11	-13.5
20031007	ARENDTSV	0.42	19.7	2.99	0.74	0.20	0.44	9.98	37.15	20.00	1.13	32.91	106	0.953	-2.40	-8.9
20031007	CROOKCRK	0.42	30.7	18.16	6.91	2.51	2.87	30.71	47.86	44.89	8.94	57.84	221	0.976	-1.20	-6.1
20031007	GODDARD	0.91	21.1	11.03	3.13	0.64	1.35	19.57	33.11	40.66	3.39	32.49	145	0.899	-5.31	-7.7
20031007	HILLSCRK	0.38	15.5	11.48	3.29	3.43	8.18	14.36	17.38	24.23	5.56	23.02	111	1.101	4.78	-19.9
20031007	KANE	1.03	19.8	12.97	3.45	0.43	0.26	19.96	30.20	33.39	2.26	35.20	138	0.950	-2.58	-8.5
20031007	LAURHILL	0.68	21.8	11.58	2.47	0.10	1.30	19.18	36.31	34.02	3.58	38.83	147	0.928	-3.72	-5.8
20031007	LEADRIDG	0.54	25.1	9.98	2.55	0.49	0.30	22.73	35.48	33.55	1.97	44.16	151	0.898	-5.39	-17.8
20031007	LITTBUFF	0.46	21.3	13.77	4.36	5.52	1.52	24.84	31.62	41.24	4.99	40.01	168	0.947	-2.75	-3.2
20031007	LITTPINE	0.50	22.2	13.92	3.62	2.38	1.44	20.73	35.48	42.39	2.17	36.72	159	0.954	-2.34	-5.2
20031007	MILFORD	0.34	26.0	3.99	1.15	0.33	1.61	15.52	47.86	24.52	2.54	47.28	145	0.948	-2.67	-8.6
20031007	MILLERSV	0.22	12.9	3.49	1.15	0.13	0.44	19.96	15.14	14.68	1.13	24.37	80	1.003	0.15	-22.5
20031007	PRESQISL	1.46	13.4	38.57	13.98	3.63	2.48	37.03	6.17	49.18	3.81	40.60	195	1.088	4.24	10.2
20031007	PSUNADP	0.54	27.8	8.98	2.14	0.54	0.74	21.62	52.48	38.87	2.82	46.45	175	0.981	-0.94	-2.5
20031007	SLOCUM	0.56	34.8	9.43	2.39	3.94	1.96	28.27	56.23	52.83	5.22	56.20	216	0.895	-5.55	-10.5
20031007	VALLFORG	0.14	22.7	10.13	3.70	3.91	7.79	21.07	34.67	29.08	11.57	44.70	167	0.952	-2.45	-5.9
20031007	YOWOCRK	0.47	24.0	13.97	3.62	0.43	0.17	19.96	30.90	32.91	2.82	42.08	147	0.888	-5.95	-21.1

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions					Ion	Cond.
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Diff.	Balance
20031014	ALLEPORT	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	ARENDTSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	CROOKCRK	1.21	13.4	4.84	1.15	0.69	1.09	6.99	26.30	13.65	2.09	27.20	84	0.956	-2.24	-0.7
20031014	GODDARD	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	HILLSCRK	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	KANE	0.03	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	LAURHILL	0.04	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	LEADRIDG	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	LITTBUFF	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	LITTPINE	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	MILFORD	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	MILLERSV	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	PRESQISL	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	PSUNADP	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	SLOCUM	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	VALLFORG	0.01	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031014	YOWOCRK	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031021	ALLEPORT	1.39	17.2	20.31	10.53	12.25	1.83	4.66	22.39	21.08	6.18	42.39	142	1.033	1.63	-8.0
20031021	ARENDTSV	1.48	22.5	3.49	0.90	0.31	0.78	19.40	50.12	25.81	2.26	39.99	143	1.102	4.86	8.0
20031021	CROOKCRK	0.19	22.2	11.58	2.96	1.94	2.87	26.11	33.88	32.45	3.07	47.62	162	0.954	-2.34	-5.7
20031021	GODDARD	1.58	14.0	2.99	0.66	0.79	1.30	10.09	33.88	14.79	2.29	29.70	97	1.063	3.05	17.0
20031021	HILLSCRK	0.77	11.5	1.50	0.90	3.91	1.52	7.65	26.30	15.15	2.96	19.14	79	1.122	5.74	13.0
20031021	KANE	1.85	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031021	LAURHILL	1.98	16.7	5.29	1.97	7.06	1.91	9.98	31.62	24.08	2.76	30.85	116	1.002	0.12	1.9
20031021	LEADRIDG	1.47	26.6	4.99	1.65	2.07	0.30	15.52	46.77	28.71	2.54	47.28	150	0.908	-4.82	-10.5
20031021	LITTBUFF	1.78	23.1	4.29	1.65	1.46	1.78	18.85	47.86	28.81	3.39	47.99	156	0.946	-2.75	6.3
20031021	LITTPINE	1.78	22.9	1.05	0.90	0.64	1.35	24.39	33.11	26.52	1.78	39.43	129	0.907	-4.86	-18.8
20031021	MILFORD	1.72	10.4	2.50	0.82	0.15	1.26	6.65	22.39	15.48	1.69	12.91	64	1.122	5.76	3.7
20031021	MILLERSV	1.67	7.4	2.50	0.66	0.15	0.39	18.85	7.24	10.97	0.85	18.54	60	0.982	-0.93	-14.1
20031021	PRESQISL	1.48	13.2	9.63	2.71	1.33	1.52	10.37	23.99	15.52	2.54	26.95	95	1.101	4.80	0.6
20031021	PSUNADP	1.36	21.1	4.99	2.06	16.49	0.30	9.98	35.48	22.74	1.97	42.70	137	1.028	1.38	-6.7
20031021	SLOCUM	1.35	17.6	2.45	1.32	0.82	1.83	10.15	36.31	19.87	1.33	33.62	108	0.964	-1.82	1.4
20031021	VALLFORG	1.90	10.4	4.74	1.07	1.25	2.83	6.26	21.88	12.65	1.92	19.43	72	1.119	5.60	7.3
20031021	YOWOCRK	1.18	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20031028	ALLEPORT	0.94	23.1	5.94	1.97	0.72	4.96	11.92	41.69	16.79	2.37	42.08	128	1.097	4.64	-10.4
20031028	ARENDTSV	1.07	12.8	2.00	0.58	0.13	0.91	9.98	31.62	10.32	1.69	24.79	82	1.229	10.26	15.0
20031028	CROOKCRK	1.12	21.1	7.29	1.73	1.00	5.44	6.93	43.65	22.29	3.53	34.66	127	1.092	4.39	-0.2
20031028	GODDARD	1.29	19.3	5.89	1.15	0.18	1.30	11.31	35.48	24.37	2.06	31.68	113	0.952	-2.47	-7.0
20031028	HILLSCRK	1.57	14.4	2.74	0.74	1.20	2.35	13.31	26.92	15.08	3.61	26.22	92	1.052	2.54	-2.0
20031028	KANE	0.80	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031028	LAURHILL	1.09	20.7	4.24	1.07	1.25	2.31	14.19	41.69	21.44	3.58	34.93	125	1.080	3.85	-0.7
20031028	LEADRIDG	1.15	24.2	3.99	0.74	0.49	1.09	15.52	36.31	21.45	1.41	44.58	126	0.862	-7.41	-20.8
20031028	LITTBUFF	1.92	9.6	7.73	1.89	6.29	10.83	13.69	9.77	11.15	12.50	23.04	97	1.076	3.65	-2.9
20031028	LITTPINE	1.32	13.4	2.74	0.58	0.87	1.48	8.65	26.92	13.65	0.03	22.66	78	1.135	6.31	-2.9
20031028	MILFORD	3.26	8.2	1.50	0.41	0.13	1.78	3.88	18.20	6.13	2.26	13.54	48	1.181	8.31	3.4
20031028	MILLERSV	1.26	9.3	1.00	0.58	0.13	2.44	12.75	17.78	6.61	3.95	19.16	64	1.166	7.68	3.1
20031028	PRESQISL	1.18	39.0	9.88	2.71	0.49	1.78	34.26	77.62	48.54	3.07	61.09	239	1.125	5.87	-0.6
20031028	PSUNADP	1.43	22.1	2.99	0.49	0.23	0.74	11.64	45.71	17.74	1.13	36.66	117	1.113	5.35	-4.1
20031028	SLOCUM	2.25	13.4	2.25	0.82	0.26	1.65	7.76	25.12	12.37	4.03	24.08	78	0.935	-3.35	-6.1
20031028	VALLFORG	2.90	9.4	1.55	1.07	0.15	3.48	4.71	18.62	6.08	4.94	16.35	57	1.081	3.89	-1.5
20031028	YOWOCRK	1.21	18.9	2.99	0.49	0.23	0.57	9.42	28.18	17.90	1.41	31.24	92	0.829	-9.38	-23.2
20031104	ALLEPORT	0.08	25.4	9.03	1.73	2.89	7.53	34.71	48.98	33.10	19.13	64.11	221	0.901	-5.19	16.0
20031104	ARENDTSV	0.48	7.0	1.00	0.12	0.08	0.13	1.66	20.89	6.61	0.28	8.75	40	1.527	20.85	23.8
20031104	CROOKCRK	0.62	24.4	5.24	1.81	1.46	6.00	11.92	50.12	22.87	8.10	57.26	165	0.868	-7.09	5.4
20031104	GODDARD	0.40	48.9	9.68	1.97	0.77	6.13	26.28	107.15	64.33	12.05	81.45	310	0.963	-1.88	6.4
20031104	HILLSCRK	0.41	19.1	2.50	0.08	1.43	2.83	0.72	39.81	20.37	3.07	26.83	98	0.942	-2.98	-5.5
20031104	KANE	0.42	70.6	9.98	2.96	0.84	6.79	45.46	128.82	81.46	12.13	116.02	404	0.930	-3.65	-8.0
20031104	LAURHILL	0.33	30.2	5.89	0.66	1.38	4.00	10.42	66.07	33.37	5.70	50.12	178	0.991	-0.43	3.0
20031104	LEADRIDG	0.12	44.0	7.49	2.55	0.46	5.57	10.53	95.50	47.42	9.31	69.57	248	0.967	-1.69	0.8
20031104	LITTBUFF	0.45	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031104	LITTPINE	0.37	21.2	5.19	0.33	2.15	2.70	0.72	51.29	19.94	2.79	35.29	120	1.075	3.62	7.9
20031104	MILFORD	1.89	4.5	0.50	0.12	0.10	0.17	1.11	10.00	3.55	0.56	6.04	22	1.183	8.37	-2.6
20031104	MILLERSV	1.12	3.4	0.50	0.12	0.08	0.07	9.98	4.47	4.52	-----	8.33	---	-----	-----	-----
20031104	PRESQISL	0.30	57.3	20.41	4.77	2.17	6.57	61.04	93.33	106.85	8.66	78.38	382	0.971	-1.47	-7.3
20031104	PSUNADP	0.13	35.5	7.49	1.56	0.36	2.57	15.52	61.66	42.42	6.21	51.24	189	0.893	-5.67	-13.5
20031104	SLOCUM	1.20	11.6	3.14	0.25	0.64	2.04	----	25.70	11.79	3.39	21.12	---	-----	-----	-----
20031104	VALLFORG	1.74	3.7	0.45	0.25	0.79	1.17	5.05	7.41	4.36	0.34	8.81	29	1.120	5.65	12.7
20031104	YOWOCRK	0.34	34.0	4.99	1.07	0.36	2.35	12.75	57.54	38.23	5.64	50.62	174	0.837	-8.89	-16.2

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20031111	ALLEPORT	1.21	31.4	4.79	0.90	0.10	2.61	12.14	70.79	27.73	6.63	48.16	174	1.107	5.08	2.6
20031111	ARENDTSV	0.45	29.6	2.00	0.99	0.20	2.61	22.73	63.10	34.52	5.08	49.78	181	1.025	1.24	3.6
20031111	CROOKCRK	0.57	31.8	9.58	2.06	0.08	1.30	14.69	67.61	33.16	5.42	52.64	187	1.045	2.20	1.1
20031111	GODDARD	0.17	42.0	14.52	5.76	5.14	38.37	24.84	79.43	50.68	35.40	70.05	324	1.076	3.68	5.9
20031111	HILLSCRK	0.36	18.0	1.70	0.33	1.33	2.96	5.05	38.90	12.73	6.63	26.72	96	1.091	4.34	-1.3
20031111	KANE	0.75	30.7	3.49	1.32	0.64	3.74	13.86	61.66	24.52	5.64	53.12	168	1.017	0.85	-4.7
20031111	LAURHILL	2.15	21.9	2.94	0.41	0.10	1.91	10.42	47.86	23.02	4.01	34.24	125	1.039	1.91	1.9
20031111	LEADRIDG	0.74	28.8	2.50	1.23	0.23	3.22	18.85	48.98	33.55	4.80	43.12	156	0.921	-4.13	-13.5
20031111	LITTBUFF	0.56	18.7	1.90	3.13	12.99	2.74	54.22	7.76	29.95	7.62	41.37	162	1.048	2.35	-25.9
20031111	LITTPINE	0.74	21.4	1.75	0.74	0.15	4.61	6.99	46.77	21.44	8.10	34.83	125	0.948	-2.67	2.9
20031111	MILFORD	0.64	32.3	3.99	1.15	0.23	2.52	9.42	74.13	28.55	3.95	49.58	174	1.114	5.40	2.6
20031111	MILLERSV	1.50	13.6	1.50	0.58	0.15	1.22	20.51	20.89	14.84	2.26	27.08	89	1.015	0.76	-9.8
20031111	PRESQISL	0.11	45.7	10.93	3.70	1.18	6.57	10.09	79.43	54.18	11.34	62.97	240	0.871	-6.90	-14.3
20031111	PSUNADP	0.76	25.6	2.99	1.40	0.28	3.57	13.86	48.98	25.81	4.51	39.99	141	1.011	0.54	-7.1
20031111	SLOCUM	0.55	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031111	VALLFORG	1.80	21.1	0.25	0.82	1.20	3.35	12.42	44.67	24.02	4.43	31.37	123	1.048	2.36	0.8
20031111	YOWOCRK	0.66	34.9	2.99	1.73	0.43	5.35	12.75	74.13	28.23	7.62	55.20	188	1.070	3.37	-2.1
20031118	ALLEPORT	0.26	28.6	6.99	1.56	2.89	4.57	23.84	56.23	33.81	5.70	51.70	187	1.053	2.60	1.6
20031118	ARENDTSV	0.55	22.7	7.49	1.48	0.54	0.74	12.75	58.88	27.10	1.13	41.45	152	1.175	8.05	20.0
20031118	CROOKCRK	2.29	15.4	1.20	0.08	0.89	0.96	3.94	31.62	8.36	2.20	26.91	76	1.033	1.61	-7.0
20031118	GODDARD	0.91	18.6	4.24	0.90	0.18	1.09	19.90	40.74	31.73	2.68	37.20	139	0.936	-3.29	14.7
20031118	HILLSCRK	0.19	18.2	6.09	1.40	0.95	1.91	23.23	30.90	30.73	2.91	29.04	127	1.029	1.42	-2.9
20031118	KANE	1.30	23.8	4.99	0.99	0.46	0.70	18.30	43.65	27.58	1.97	39.37	138	1.002	0.11	-7.2
20031118	LAURHILL	0.45	19.4	19.36	3.29	2.07	2.26	36.04	26.92	37.37	6.01	42.81	176	1.043	2.13	2.3
20031118	LEADRIDG	0.27	42.0	4.99	1.48	1.18	0.91	14.97	72.44	41.62	3.39	66.86	208	0.858	-7.65	-16.3
20031118	LITTBUFF	0.38	29.1	9.23	2.71	1.74	3.05	22.40	58.88	34.52	3.41	55.14	191	1.053	2.59	3.1
20031118	LITTPINE	0.27	35.5	5.34	1.07	0.54	1.44	25.45	69.18	51.18	3.89	49.76	208	0.983	-0.88	-3.6
20031118	MILFORD	0.09	54.0	7.98	2.88	1.33	4.09	49.90	204.17	90.49	8.18	73.95	443	1.566	22.06	64.4
20031118	MILLERSV	0.49	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031118	PRESQISL	0.49	18.6	42.37	17.03	4.60	4.31	58.21	9.12	53.04	7.22	67.51	263	1.062	2.99	9.7
20031118	PSUNADP	0.26	39.0	5.99	1.81	0.51	0.96	22.73	83.18	38.39	4.51	68.53	227	1.034	1.65	1.3
20031118	SLOCUM	0.09	26.2	7.04	2.06	2.38	4.48	37.64	39.81	44.53	7.17	47.70	193	0.940	-3.11	-5.1
20031118	VALLFORG	0.53	27.7	4.29	1.15	1.71	5.26	15.47	54.95	39.81	5.95	34.29	163	1.035	1.72	-2.8
20031118	YOWOCRK	0.30	30.7	4.99	0.99	1.15	1.83	12.20	51.29	33.87	3.39	41.24	151	0.923	-4.02	-18.2

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20031125	ALLEPORT	3.15	8.6	0.25	0.49	0.03	2.17	7.71	21.88	8.00	3.24	20.98	65	1.010	0.47	24.4
20031125	ARENDTSV	1.50	16.9	3.49	2.96	0.43	12.75	13.31	27.54	15.81	14.67	29.58	121	1.007	0.35	-5.0
20031125	CROOKCRK	0.40	15.2	10.93	2.88	2.20	5.70	14.08	33.11	17.08	7.31	42.76	136	1.026	1.28	23.0
20031125	GODDARD	1.10	11.0	4.14	0.74	0.08	1.78	5.99	25.70	12.23	2.71	24.12	77	0.984	-0.80	14.9
20031125	HILLSCRK	1.95	8.7	2.10	0.58	0.84	2.74	7.15	19.50	9.73	3.41	17.96	64	1.058	2.83	15.2
20031125	KANE	2.78	10.1	1.50	0.49	0.15	1.00	6.65	17.38	9.03	1.41	16.66	54	1.003	0.13	-13.5
20031125	LAURHILL	2.62	5.4	0.30	0.16	0.79	0.91	6.71	11.75	6.44	2.74	12.77	43	0.940	-3.09	18.2
20031125	LEADRIDG	2.35	15.4	2.50	1.23	0.33	4.13	11.64	25.12	12.58	5.08	27.08	90	1.005	0.24	-13.1
20031125	LITTBUFF	2.05	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031125	LITTPINE	2.30	14.6	0.90	0.82	0.31	4.09	9.76	28.84	11.15	5.02	27.00	88	1.036	1.77	-1.8
20031125	MILFORD	2.70	11.8	1.50	1.65	0.33	8.83	3.88	26.30	10.65	9.87	16.66	80	1.143	6.66	9.1
20031125	MILLERSV	1.91	9.2	1.00	1.56	0.31	7.05	14.97	14.45	10.97	8.18	17.91	76	1.061	2.98	2.3
20031125	PRESQISL	0.67	14.7	15.47	13.08	0.28	7.96	15.80	27.54	18.58	27.34	36.70	163	0.970	-1.53	27.8
20031125	PSUNADP	3.38	14.0	2.00	0.82	0.18	3.13	12.75	22.39	11.29	3.95	25.00	82	1.026	1.27	-13.8
20031125	SLOCUM	1.52	9.2	2.00	1.40	1.30	6.00	7.15	18.62	8.86	5.87	18.64	70	1.093	4.45	9.6
20031125	VALLFORG	1.98	9.9	0.80	1.73	0.51	7.48	7.21	17.78	9.08	9.39	17.85	72	0.978	-1.14	0.4
20031125	YOWOCRK	2.51	11.5	1.00	0.25	0.18	1.26	6.65	19.05	8.55	1.97	17.08	56	1.029	1.41	-18.7
20031202	ALLEPORT	0.47	17.6	----	----	----	----	17.80	8.13	23.08	41.55	27.14	---	-----	-----	-----
20031202	ARENDTSV	0.55	26.1	4.99	1.40	0.36	2.31	22.73	52.48	24.36	3.39	47.70	160	1.117	5.52	0.0
20031202	CROOKCRK	0.77	18.6	2.99	1.32	0.03	2.35	10.48	33.88	17.29	8.15	30.37	107	0.915	-4.46	-8.2
20031202	GODDARD	1.33	17.4	2.10	0.90	0.03	1.61	8.09	38.90	11.37	3.05	30.93	97	1.139	6.48	2.2
20031202	HILLSCRK	0.56	9.3	3.24	1.56	0.15	2.52	2.16	20.42	13.15	0.90	19.16	63	0.905	-4.98	8.8
20031202	KANE	1.40	13.7	3.99	1.15	0.23	0.91	9.42	24.55	15.00	1.69	22.91	80	1.016	0.82	-8.5
20031202	LAURHILL	0.73	22.0	4.14	1.40	0.08	2.39	20.01	50.12	29.08	11.17	33.72	152	1.056	2.74	13.2
20031202	LEADRIDG	0.74	21.6	2.00	0.58	0.31	1.39	18.30	38.90	16.61	2.54	40.62	121	1.028	1.40	-9.2
20031202	LITTBUFF	0.85	17.6	3.39	1.56	0.36	6.44	24.50	29.51	18.87	3.81	38.37	127	1.077	3.72	-1.8
20031202	LITTPINE	0.85	16.9	0.85	0.99	0.64	2.57	17.02	33.88	17.73	2.54	28.87	105	1.139	6.48	1.0
20031202	MILFORD	1.70	10.5	1.50	0.58	0.28	3.13	9.98	33.88	14.52	3.67	21.87	89	1.232	10.40	50.9
20031202	MILLERSV	1.07	15.8	2.00	0.66	0.20	2.39	14.41	30.90	14.84	5.64	33.74	105	0.933	-3.49	2.3
20031202	PRESQISL	1.68	19.2	4.99	0.41	0.64	1.52	11.09	40.74	17.08	3.50	33.52	113	1.098	4.66	1.5
20031202	PSUNADP	0.89	17.4	1.50	0.49	0.20	0.74	13.86	35.48	13.39	1.97	31.66	99	1.112	5.29	-1.8
20031202	SLOCUM	0.95	18.4	2.54	1.48	1.46	4.65	6.26	40.74	21.29	3.81	27.14	109	1.094	4.48	4.2
20031202	VALLFORG	1.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031202	YOWOCRK	0.59	14.2	2.50	0.66	0.20	0.48	6.65	23.44	11.45	1.13	23.33	70	0.945	-2.83	-18.7

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20031209	ALLEPORT	1.19	5.4	1.95	0.08	0.46	3.35	0.06	15.85	13.00	2.45	7.98	45	0.928	-3.74	40.5
20031209	ARENDTSV	0.82	10.0	3.49	0.66	0.23	0.83	11.09	15.49	13.55	4.80	13.12	63	1.010	0.50	-11.7
20031209	CROOKCRK	1.95	16.1	1.60	0.08	1.05	1.78	0.06	33.88	16.52	5.81	18.68	79	0.938	-3.22	-5.7
20031209	GODDARD	0.45	6.4	14.27	2.88	1.30	6.00	2.22	6.03	15.58	5.19	11.83	65	1.003	0.15	-7.7
20031209	HILLSCRK	0.32	9.2	6.34	0.41	0.20	9.61	2.05	15.49	21.29	11.74	4.81	72	0.901	-5.19	-0.2
20031209	KANE	0.32	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031209	LAURHILL	0.68	10.2	5.74	0.08	1.28	14.18	0.06	21.38	17.29	14.36	7.71	82	1.085	4.09	12.8
20031209	LEADRIDG	0.62	10.7	3.99	0.82	0.08	1.04	2.77	13.18	18.55	3.67	6.04	50	0.775	-12.70	-32.9
20031209	LITTBUFF	0.98	7.4	3.44	0.25	0.05	2.35	3.99	16.22	15.94	2.96	11.35	57	0.869	-6.99	14.7
20031209	LITTPINE	0.49	9.6	4.44	0.25	0.03	3.44	4.44	19.05	24.02	4.15	6.77	67	0.906	-4.95	3.4
20031209	MILFORD	0.45	7.3	2.50	0.49	0.13	4.26	1.66	15.85	13.55	4.51	1.87	45	1.248	11.05	2.8
20031209	MILLERSV	0.78	7.0	2.00	0.41	0.10	1.48	15.52	7.24	12.26	2.82	9.79	52	1.076	3.65	-18.4
20031209	PRESQISL	0.02	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031209	PSUNADP	0.67	10.4	4.49	0.74	0.66	3.31	3.33	19.05	17.58	5.36	6.04	61	1.090	4.29	-8.5
20031209	SLOCUM	0.62	4.5	1.45	0.16	1.74	2.22	0.06	9.12	8.86	2.43	5.46	31	0.881	-6.33	6.1
20031209	VALLFORG	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031209	YOWOCRK	0.55	7.2	2.50	0.41	0.18	1.96	3.33	9.77	16.13	1.97	2.29	39	0.889	-5.85	-24.9
20031216	ALLEPORT	2.43	10.5	1.15	0.08	0.77	3.09	5.88	21.88	11.37	4.12	14.52	63	1.094	4.50	0.4
20031216	ARENDTSV	2.85	14.2	1.50	1.15	0.18	6.13	7.21	26.30	11.94	8.75	21.04	84	1.018	0.89	-6.5
20031216	CROOKCRK	0.87	10.0	3.64	0.08	0.03	1.26	6.49	19.95	14.65	4.77	10.23	61	1.061	2.96	-0.5
20031216	GODDARD	1.00	10.9	2.79	0.16	0.89	1.13	0.06	20.89	12.44	2.74	13.23	54	0.913	-4.54	-11.3
20031216	HILLSCRK	2.19	12.0	1.45	0.16	0.05	2.65	0.06	25.12	16.23	2.99	13.60	62	0.899	-5.34	-4.5
20031216	KANE	1.52	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031216	LAURHILL	1.73	25.1	4.99	0.41	0.69	3.18	9.26	48.98	30.08	5.28	32.68	136	0.992	-0.40	-7.1
20031216	LEADRIDG	2.24	10.3	1.00	0.25	0.04	1.04	2.22	19.50	10.81	1.69	11.87	48	0.986	-0.68	-13.6
20031216	LITTBUFF	3.04	10.4	1.15	0.16	0.05	4.96	7.60	19.05	13.08	4.71	13.79	65	1.044	2.15	-5.4
20031216	LITTPINE	2.42	15.0	0.85	0.08	0.59	2.87	0.94	28.84	17.87	3.67	16.12	72	0.907	-4.86	-12.3
20031216	MILFORD	2.95	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031216	MILLERSV	2.28	9.0	1.50	1.32	0.18	5.96	12.20	11.75	8.39	7.05	16.66	65	1.025	1.22	-12.9
20031216	PRESQISL	0.75	31.5	7.98	0.16	1.82	3.96	19.85	60.26	43.89	6.09	44.10	188	0.999	-0.03	-4.0
20031216	PSUNADP	2.62	9.0	1.00	0.12	0.04	0.74	1.66	20.89	9.68	2.26	9.79	46	1.126	5.91	1.5
20031216	SLOCUM	2.20	8.3	1.35	0.25	1.92	8.48	3.71	14.45	8.15	9.56	10.81	59	1.058	2.80	-2.0
20031216	VALLFORG	0.00	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031216	YOWOCRK	2.58	9.5	1.00	0.12	0.04	1.00	1.66	19.50	11.29	1.69	9.17	45	1.053	2.58	-8.5

Weekly Precipitation Chemistry Observations: Micro-equivalent Concentrations and Balances

				Cations						Anions						
Date	Site	Precip	Cond	Ca	Mg	K	Na	NH_4	H	NO_3	Cl	SO_4	TIS	+/-	Ion Diff.	Cond. Balance
20031223	ALLEPORT	0.41	36.2	19.71	6.58	0.87	52.29	23.34	43.65	66.33	63.59	36.66	313	0.879	-6.43	-8.1
20031223	ARENDTSV	0.14	24.1	3.99	0.99	0.23	2.31	7.21	51.29	19.19	4.51	46.45	136	0.941	-3.05	-0.1
20031223	CROOKCRK	0.56	22.9	2.20	0.08	0.03	3.61	10.64	43.65	26.23	5.25	32.89	125	0.935	-3.34	-7.8
20031223	GODDARD	0.64	33.2	46.46	5.51	0.61	11.35	55.38	44.67	49.54	15.46	79.13	308	1.138	6.45	1.3
20031223	HILLSCRK	0.27	14.6	8.98	0.08	0.03	3.00	11.92	22.39	20.58	4.06	20.43	91	1.029	1.44	-13.1
20031223	KANE	0.72	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031223	LAURHILL	0.39	29.5	6.39	0.08	0.77	8.40	58.49	46.77	61.97	16.56	30.29	230	1.111	5.26	-0.0
20031223	LEADRIDG	0.18	26.7	4.49	1.15	0.64	4.52	6.65	52.48	35.16	6.49	23.54	135	1.073	3.52	-9.3
20031223	LITTBUFF	0.18	22.3	3.44	0.08	0.61	3.83	10.26	43.65	23.23	4.26	30.47	120	1.068	3.27	-7.0
20031223	LITTPINE	0.20	49.4	8.93	1.73	1.05	13.18	14.69	91.20	72.97	15.63	51.70	271	0.932	-3.51	-9.8
20031223	MILFORD	0.83	14.0	1.00	0.49	0.10	2.78	4.44	43.65	9.84	3.67	20.62	87	1.537	21.18	31.2
20031223	MILLERSV	0.66	19.9	1.00	1.15	0.18	5.00	18.30	29.51	15.00	11.00	44.58	126	0.781	-12.28	-13.1
20031223	PRESQISL	0.43	31.0	36.18	4.61	0.64	10.22	30.44	38.90	48.68	12.64	61.59	244	0.984	-0.79	-11.1
20031223	PSUNADP	0.26	18.4	3.99	0.99	0.46	3.44	5.54	33.88	28.87	4.51	17.71	99	0.945	-2.80	-10.5
20031223	SLOCUM	0.50	31.4	2.50	0.90	0.10	11.53	15.30	54.95	38.02	12.16	34.79	170	1.004	0.19	-12.8
20031223	VALLFORG	1.03	18.8	1.75	1.23	0.03	11.75	8.09	29.51	8.58	13.54	34.64	109	0.922	-4.04	-15.4
20031223	YOWOCRK	0.29	21.9	2.99	0.66	0.20	1.74	7.21	30.20	30.16	3.39	16.25	93	0.864	-7.32	-31.4
20031230	ALLEPORT	0.67	18.6	4.64	0.16	0.18	6.57	9.76	30.90	16.29	9.11	27.33	105	0.990	-0.49	-13.7
20031230	ARENDTSV	0.35	37.4	3.99	2.06	0.46	7.61	15.52	72.44	29.52	9.59	60.82	202	1.022	1.07	-7.4
20031230	CROOKCRK	0.46	19.0	2.74	0.08	0.03	3.92	6.15	31.62	16.65	4.74	22.64	89	1.012	0.58	-20.4
20031230	GODDARD	1.37	21.9	3.44	0.58	0.03	5.83	7.26	39.81	23.94	8.52	24.77	114	0.995	-0.24	-12.4
20031230	HILLSCRK	0.91	10.8	1.50	0.08	0.03	1.48	5.88	18.62	8.86	0.45	16.71	54	1.060	2.93	-16.0
20031230	KANE	1.20	----	----	----	----	----	----	-----	-----	-----	-----	---	-----	-----	-----
20031230	LAURHILL	0.81	14.9	2.05	0.08	0.08	4.22	7.48	33.11	15.58	3.39	22.43	88	1.136	6.36	3.9
20031230	LEADRIDG	0.79	18.6	2.00	0.58	0.23	2.00	5.54	33.88	14.52	2.82	26.04	88	1.020	0.98	-15.5
20031230	LITTBUFF	0.91	23.7	2.64	0.08	0.03	4.52	16.13	53.70	23.73	3.92	41.33	146	1.118	5.57	7.4
20031230	LITTPINE	0.90	10.8	0.95	0.08	0.18	0.83	5.38	20.42	9.08	1.10	14.77	53	1.115	5.46	-12.2
20031230	MILFORD	1.77	6.6	1.00	0.49	0.10	3.18	2.22	19.05	6.77	3.39	7.71	44	1.458	18.62	27.3
20031230	MILLERSV	0.79	8.6	1.00	0.49	0.10	2.44	12.75	14.79	7.10	3.39	19.16	61	1.065	3.15	-0.9
20031230	PRESQISL	1.51	20.9	3.24	0.08	0.03	3.78	13.86	46.77	33.52	3.95	27.41	133	1.045	2.18	7.8
20031230	PSUNADP	1.12	16.2	1.50	0.41	0.18	1.96	7.76	33.11	15.65	2.82	22.29	86	1.102	4.86	-5.0
20031230	SLOCUM	0.74	15.5	1.45	0.08	0.03	2.22	7.21	35.48	15.58	2.03	23.37	87	1.134	6.26	4.6
20031230	VALLFORG	0.94	5.7	1.60	0.08	0.03	4.26	5.38	8.32	4.21	3.33	11.91	39	1.011	0.54	-11.8
20031230	YOWOCRK	1.06	17.8	3.49	0.33	0.18	1.26	5.54	35.48	19.03	2.26	23.12	91	1.042	2.07	-8.0

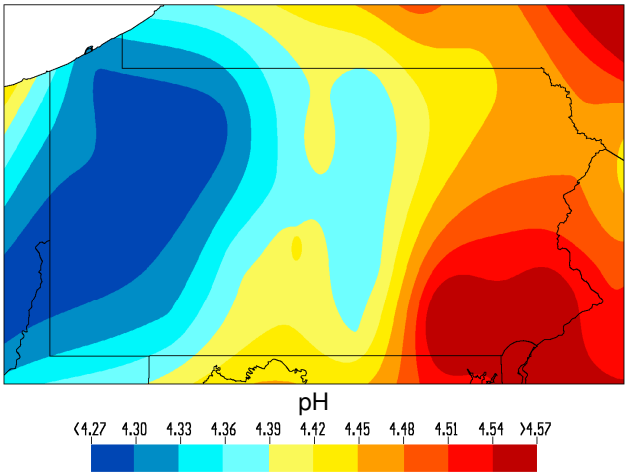
APPENDIX VI

2003 PRECIPITATION QUALITY SUMMARY

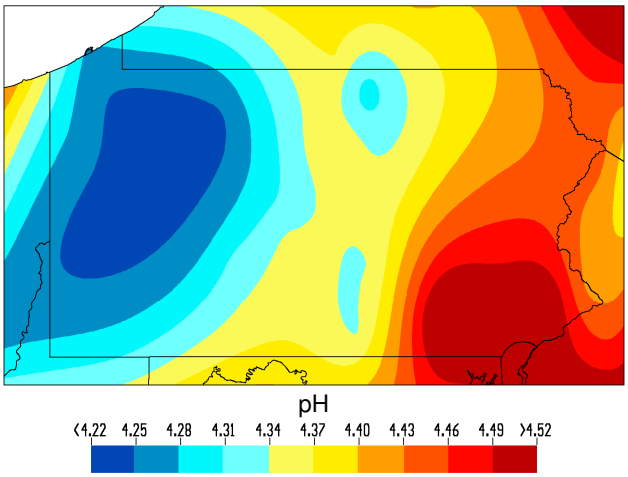
ANNUAL AND SEASONAL CONCENTRATIONS

AND WET DEPOSITION MAPS

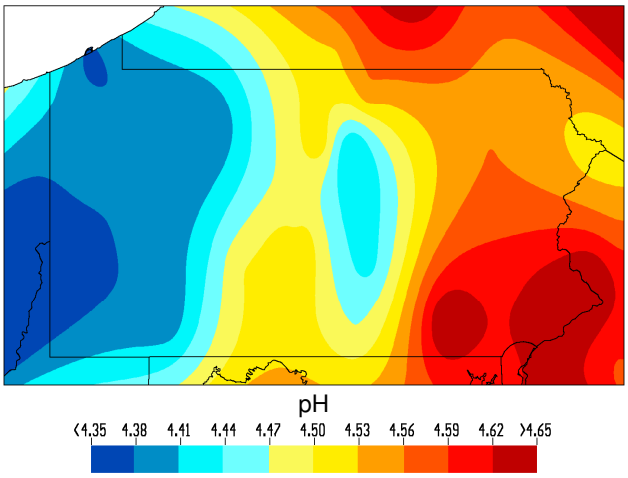
Annual pH: 2003



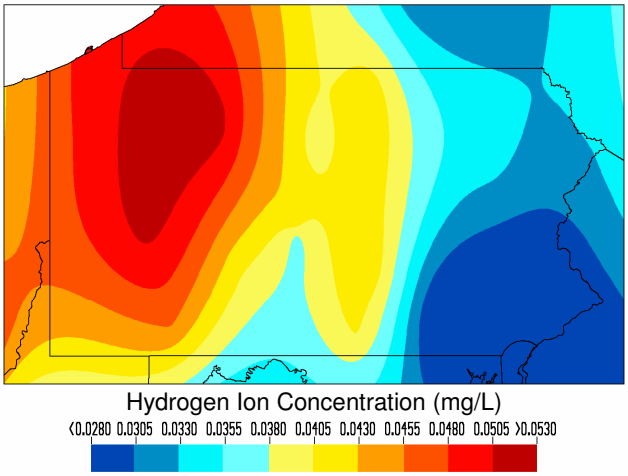
Growing Season pH: 2003



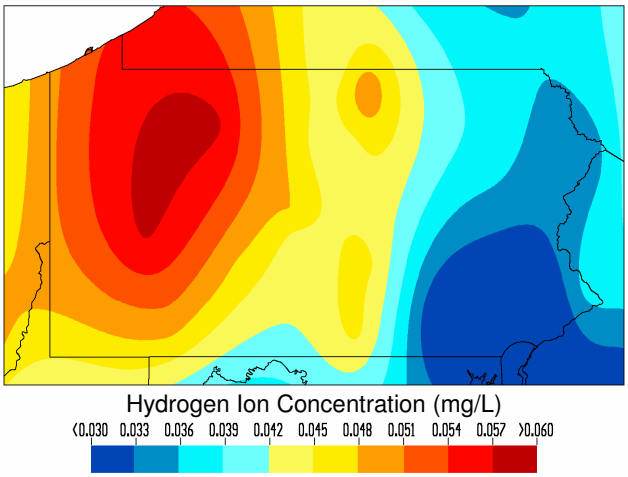
Dormant Season pH: 2003



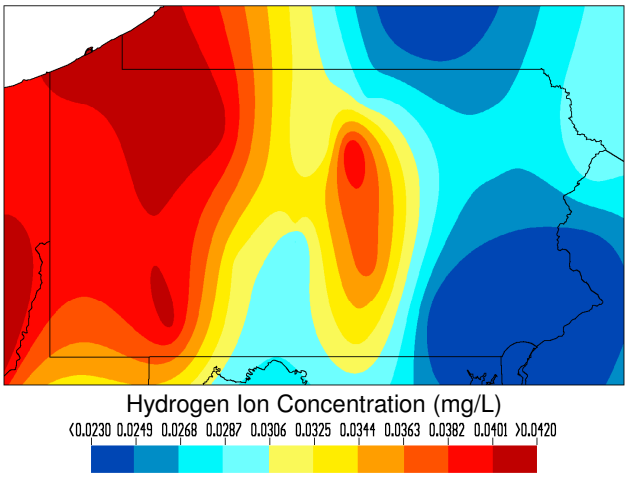
Annual Hydrogen Ion Wet Concentration: 2003



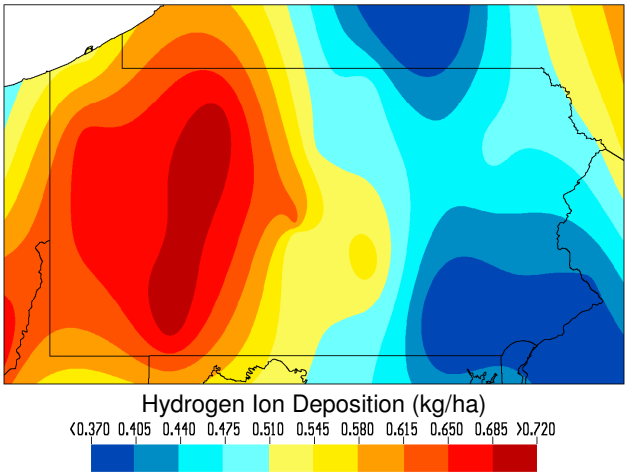
Growing Season Hydrogen Ion Wet Concentration: 2003



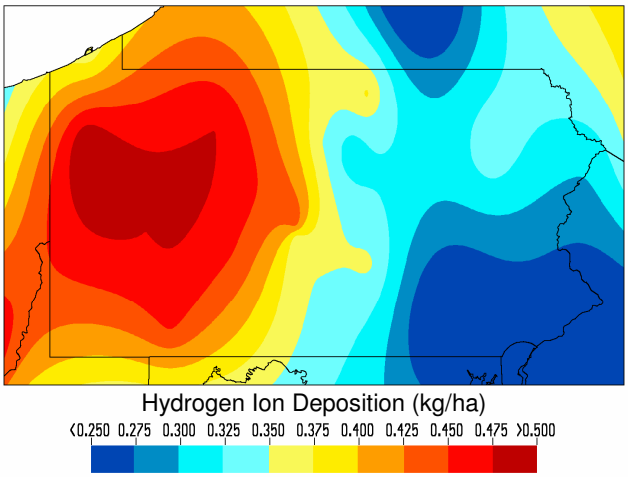
Dormant Season Hydrogen Ion Wet Concentration: 2003



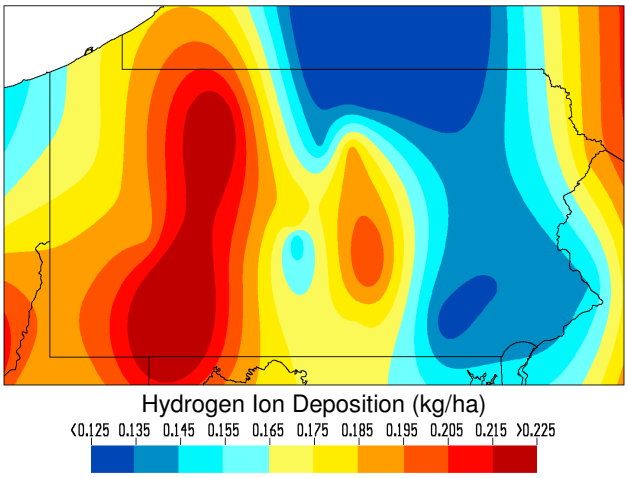
Annual Hydrogen Ion Wet Deposition: 2003



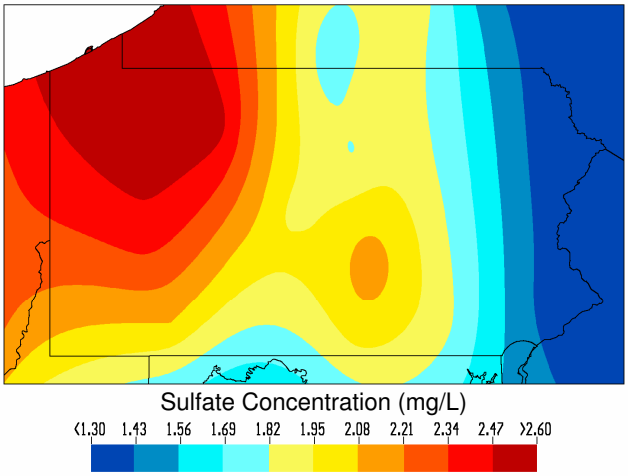
Growing Season Hydrogen Ion Wet Deposition: 2003



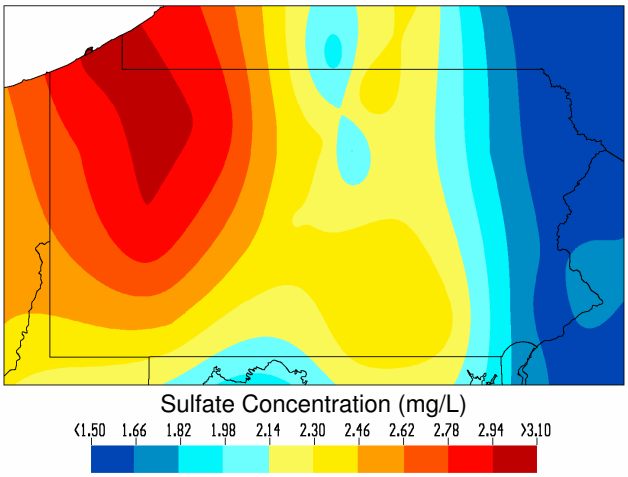
Dormant Season Hydrogen Ion Wet Deposition: 2003



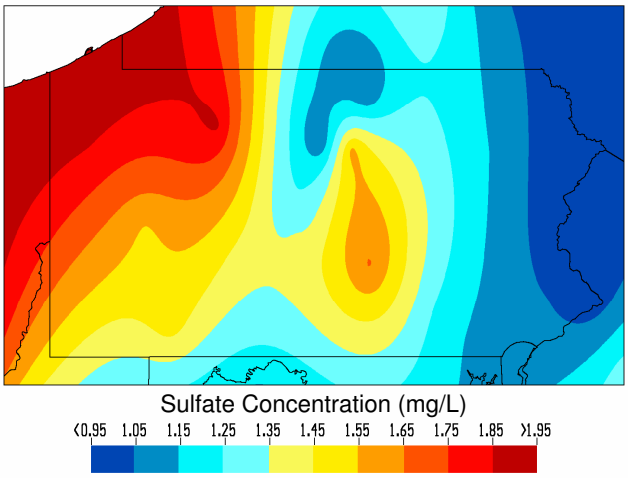
Annual Sulfate Ion Wet Concentration: 2003



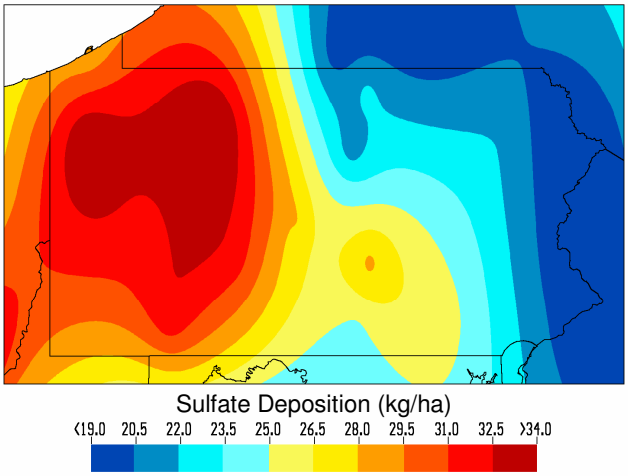
Growing Season Sulfate Ion Wet Concentration: 2003



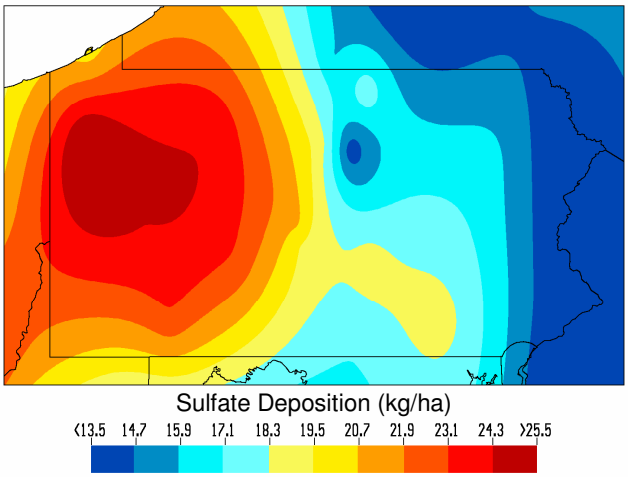
Dormant Season Sulfate Ion Wet Concentration: 2003



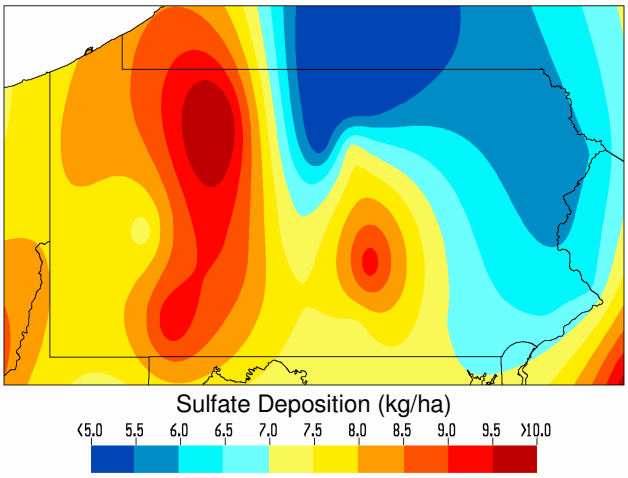
Annual Sulfate Ion Wet Deposition: 2003



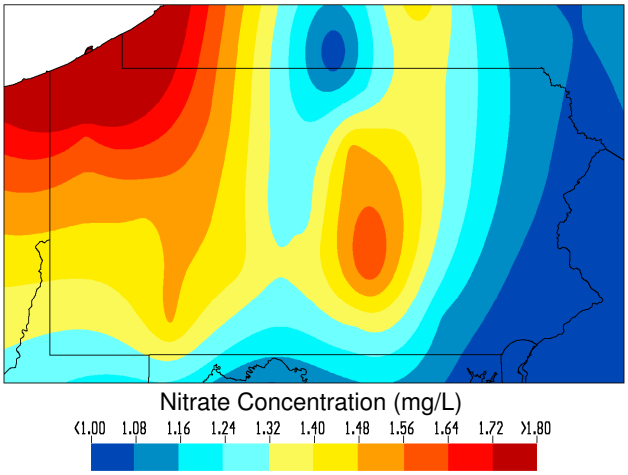
Growing Season Sulfate Ion Wet Deposition: 2003



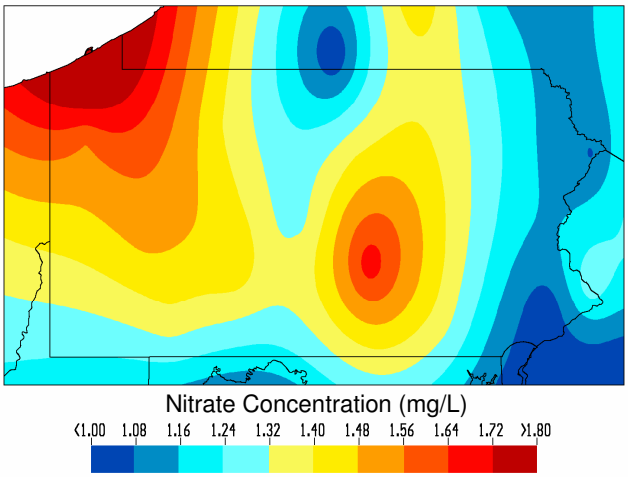
Dormant Season Sulfate Ion Wet Deposition: 2003



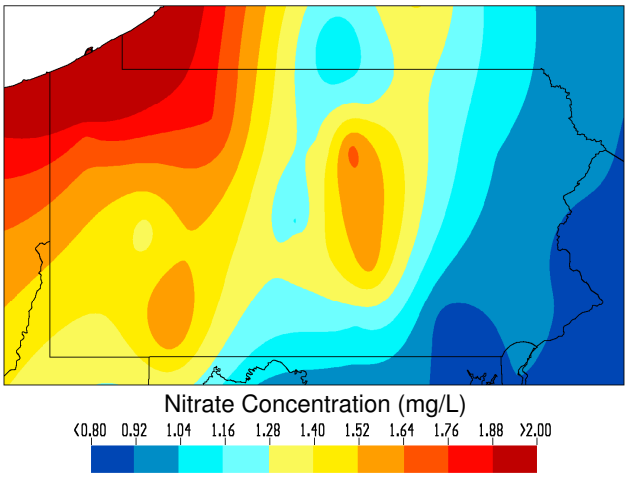
Annual Nitrate Ion Wet Concentration: 2003



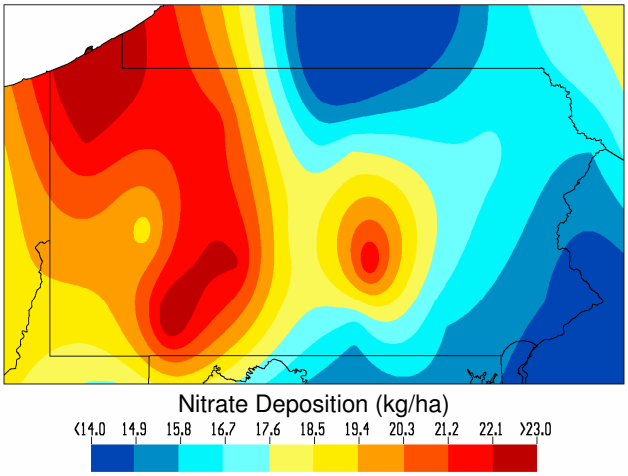
Growing Season Nitrate Ion Wet Concentration: 2003



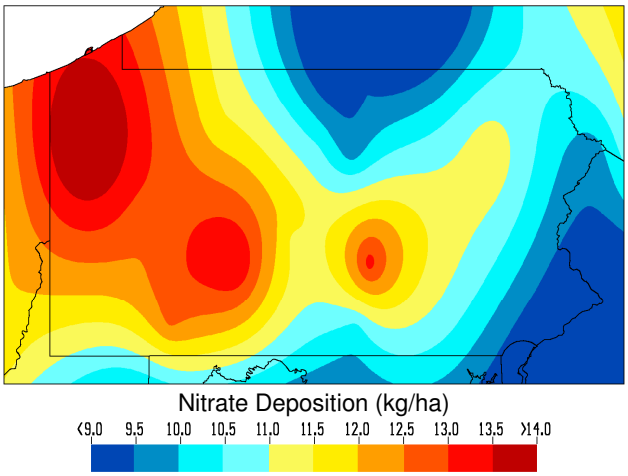
Dormant Season Nitrate Ion Wet Concentration: 2003



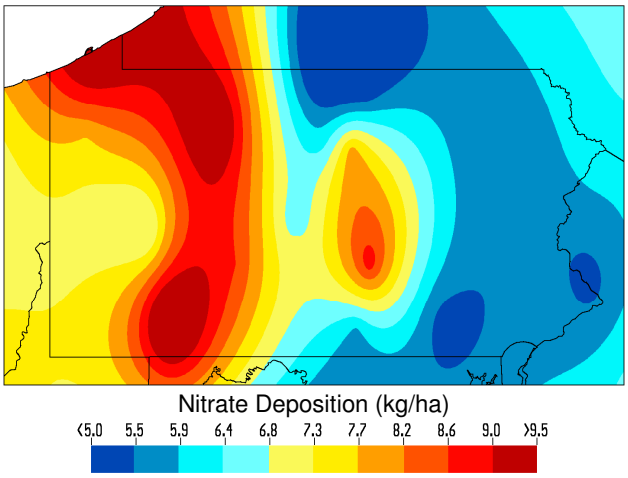
Annual Nitrate Ion Wet Deposition: 2003



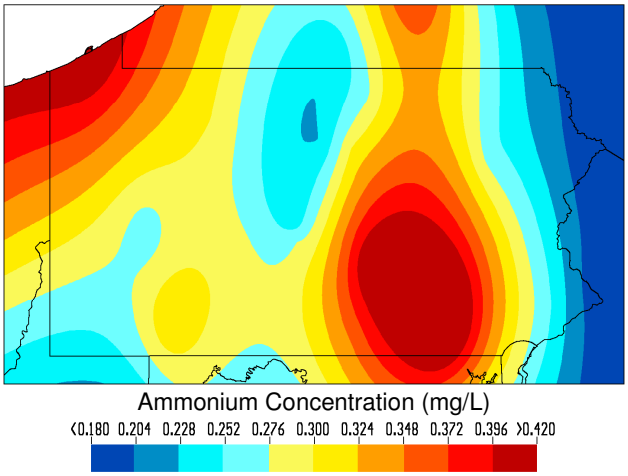
Growing Season Nitrate Ion Wet Deposition: 2003



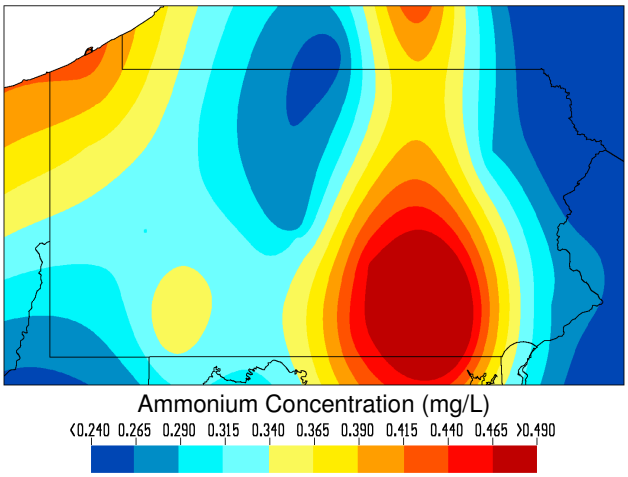
Dormant Season Nitrate Ion Wet Deposition: 2003



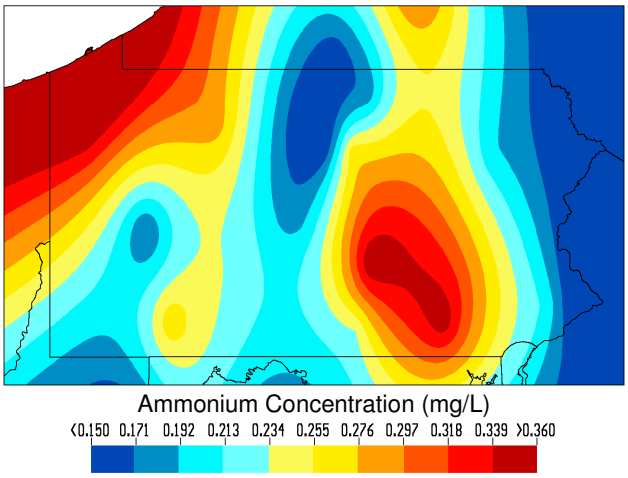
Annual Ammonium Ion Wet Concentration: 2003



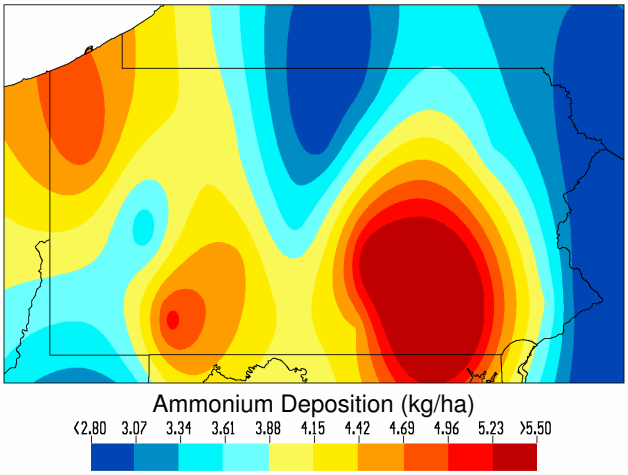
Growing Season Ammonium Ion Wet Concentration: 2003



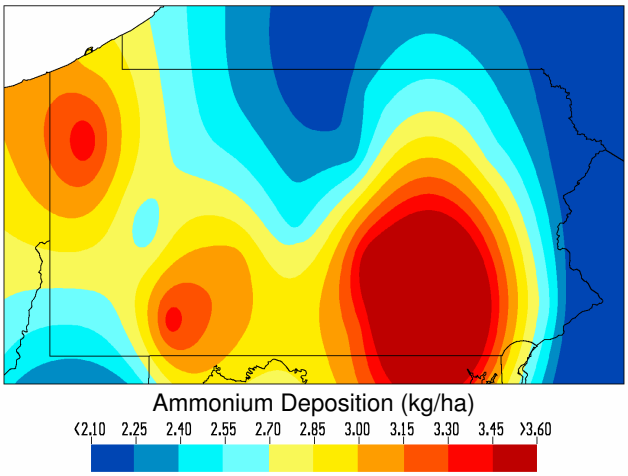
Dormant Season Ammonium Ion Wet Concentration: 2003



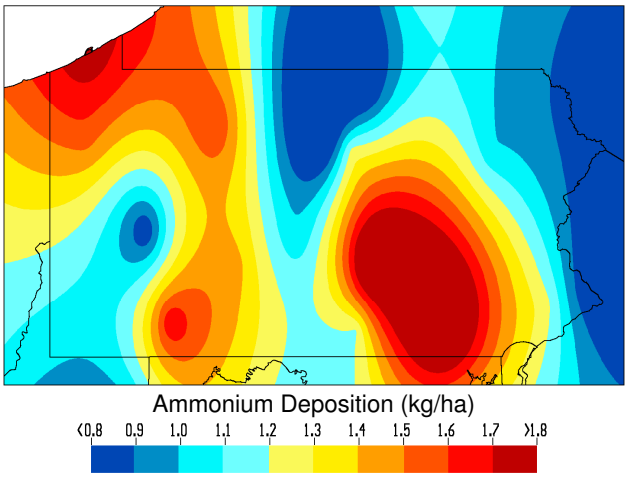
Annual Ammonium Ion Wet Deposition: 2003



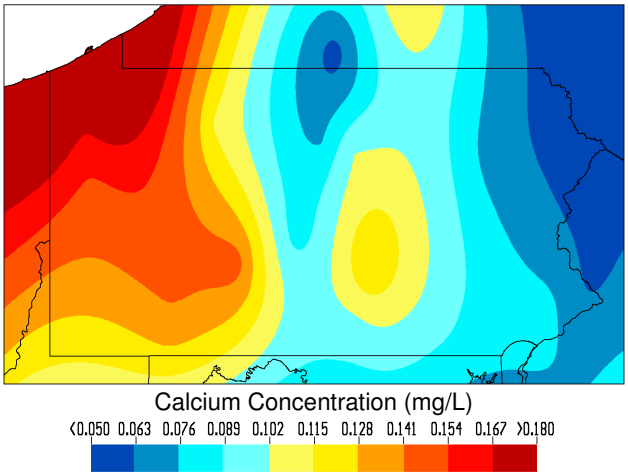
Growing Season Ammonium Ion Wet Deposition: 2003



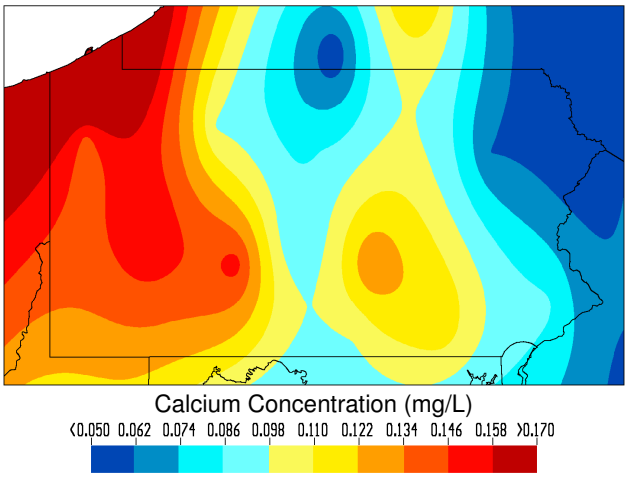
Dormant Season Ammonium Ion Wet Deposition: 2003



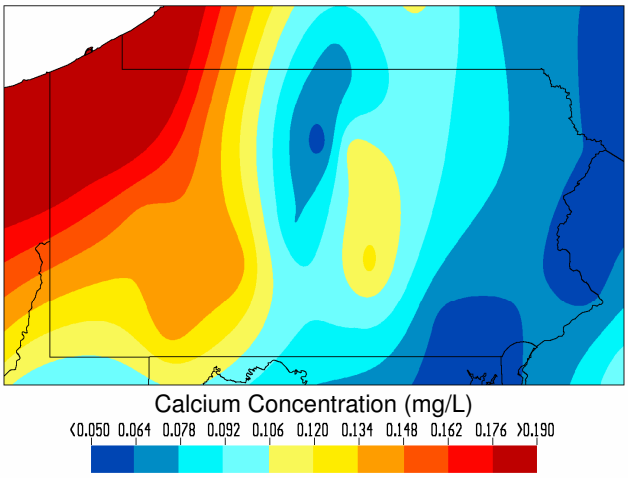
Annual Calcium Ion Wet Concentration: 2003



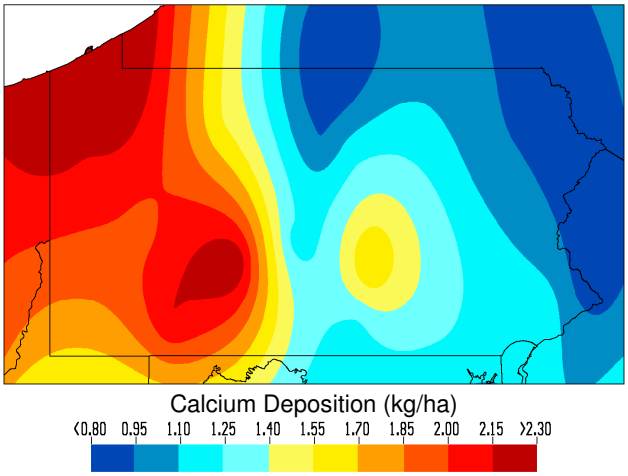
Growing Season Calcium Ion Wet Concentration: 2003



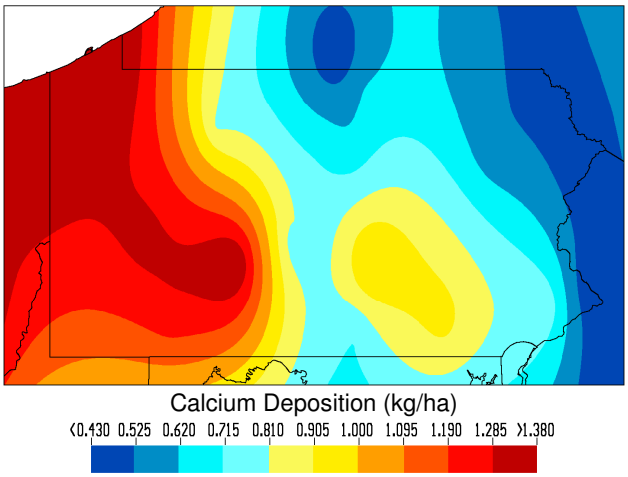
Dormant Season Calcium Ion Wet Concentration: 2003



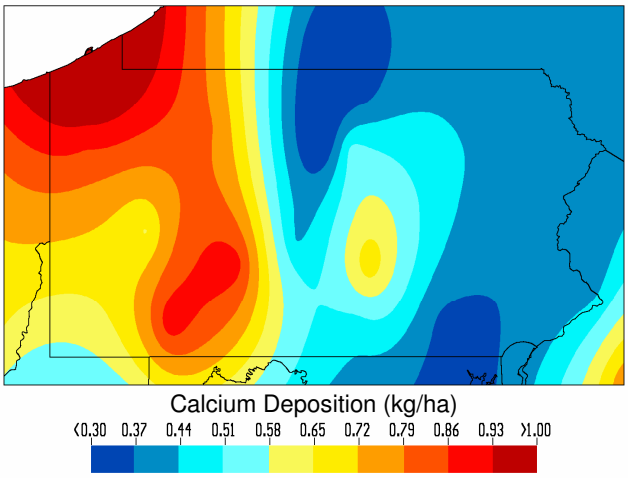
Annual Calcium Ion Wet Deposition: 2003



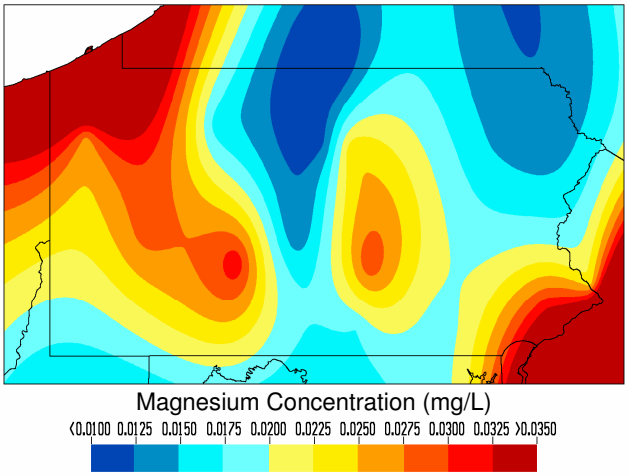
Growing Season Calcium Ion Wet Deposition: 2003



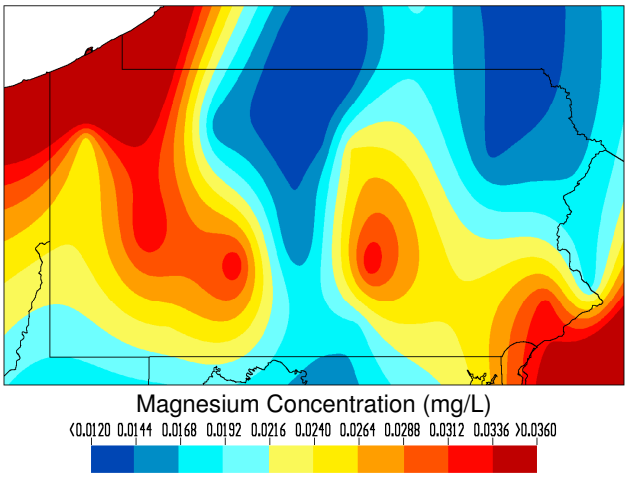
Dormant Season Calcium Ion Wet Deposition: 2003



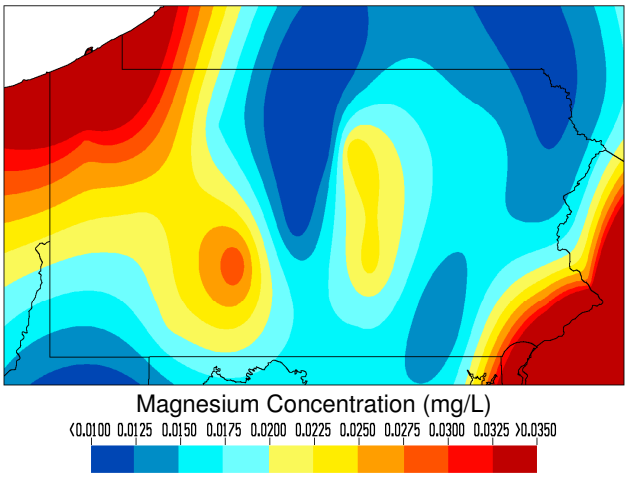
Annual Magnesium Ion Wet Concentration: 2003



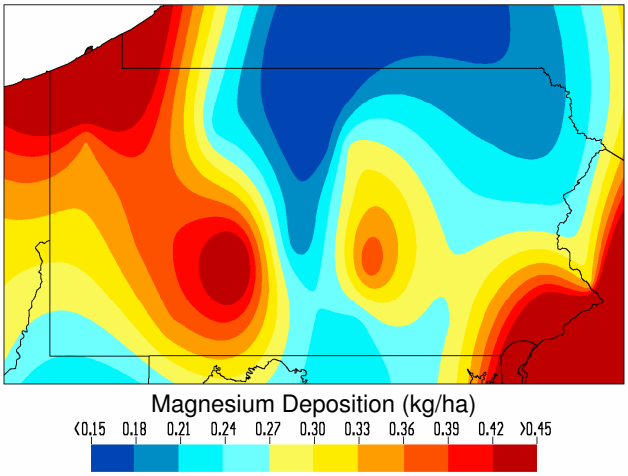
Growing Season Magnesium Ion Wet Concentration: 2003



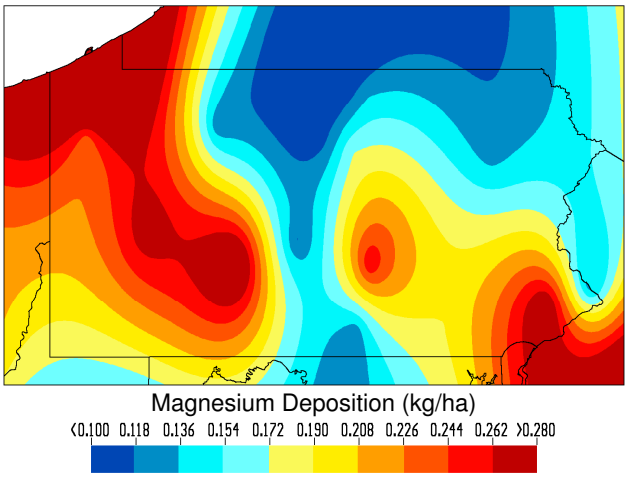
Dormant Season Magnesium Ion Wet Concentration: 2003



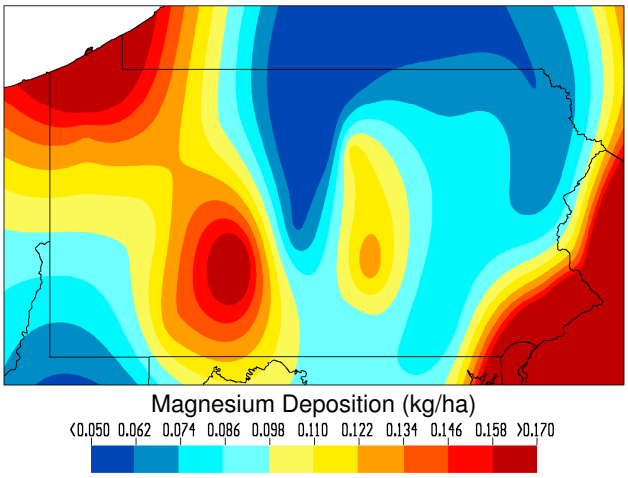
Annual Magnesium Ion Wet Deposition: 2003



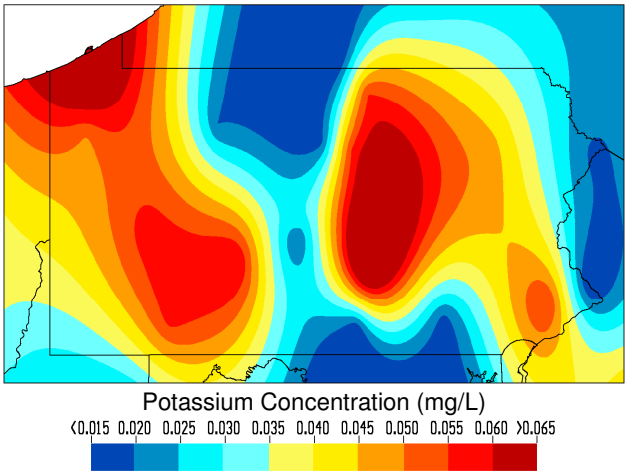
Growing Season Magnesium Ion Wet Deposition: 2003



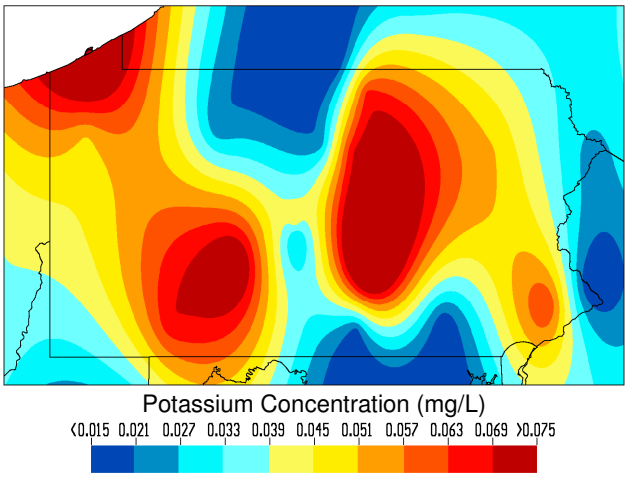
Dormant Season Magnesium Ion Wet Deposition: 2003



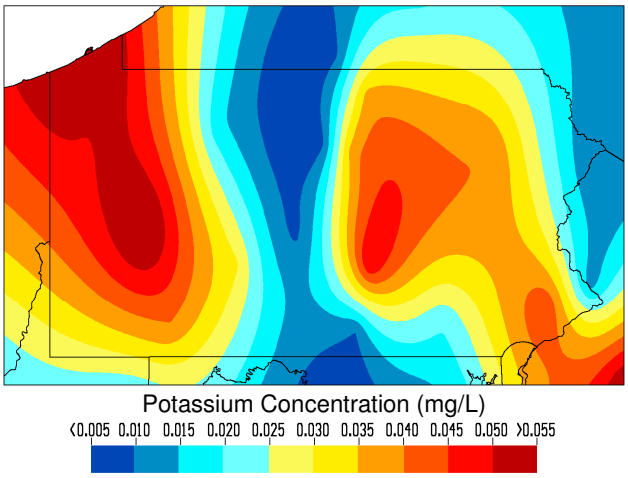
Annual Potassium Ion Wet Concentration: 2003



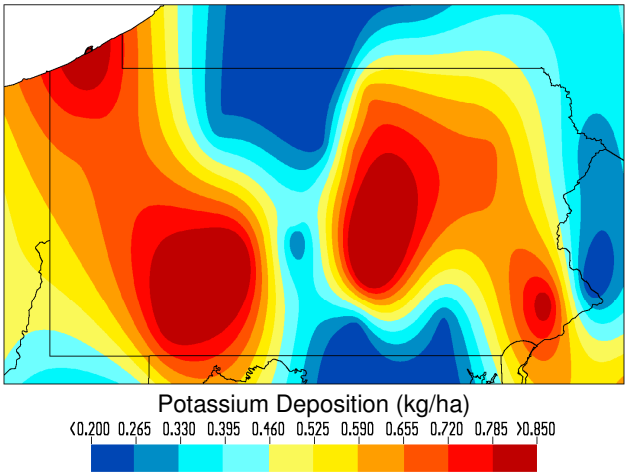
Growing Season Potassium Ion Wet Concentration: 2003



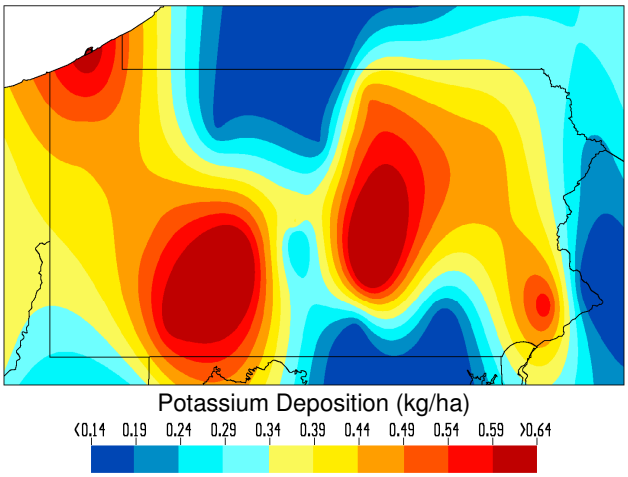
Dormant Season Potassium Ion Wet Concentration: 2003



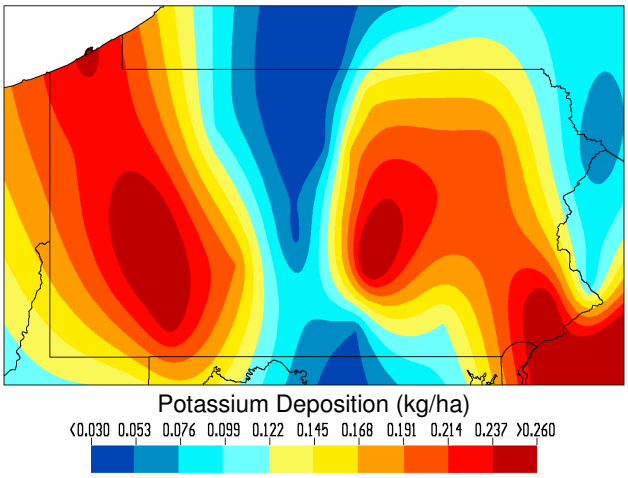
Annual Potassium Ion Wet Deposition: 2003



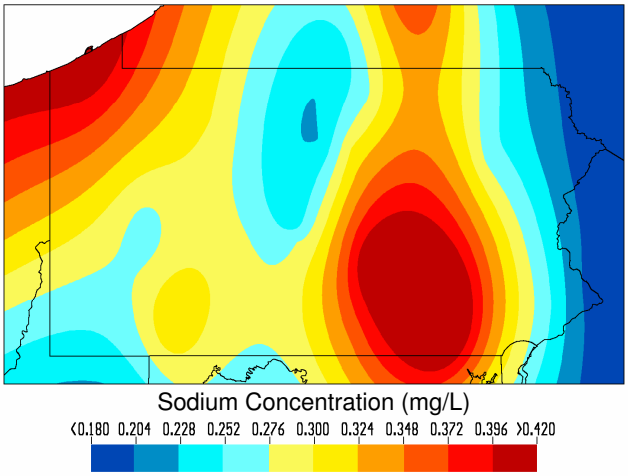
Growing Season Potassium Ion Wet Deposition: 2003



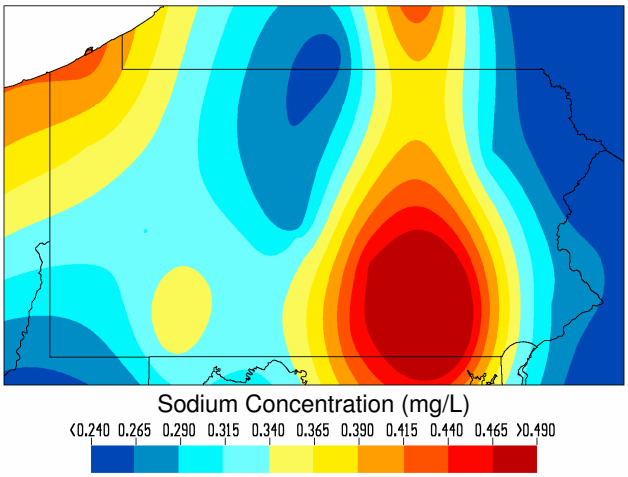
Dormant Season Potassium Ion Wet Deposition: 2003



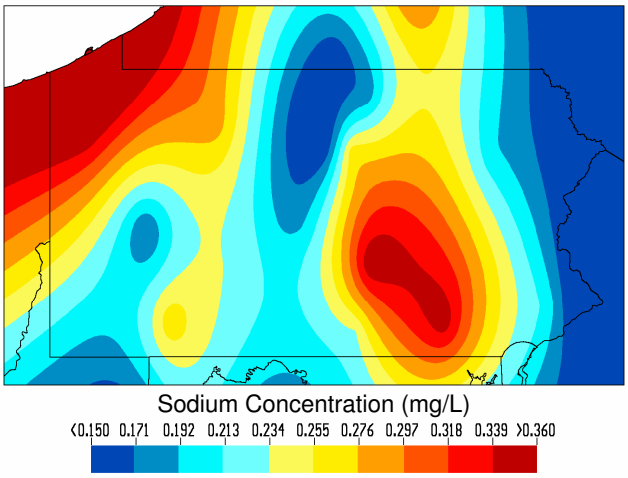
Annual Sodium Ion Wet Concentration: 2003



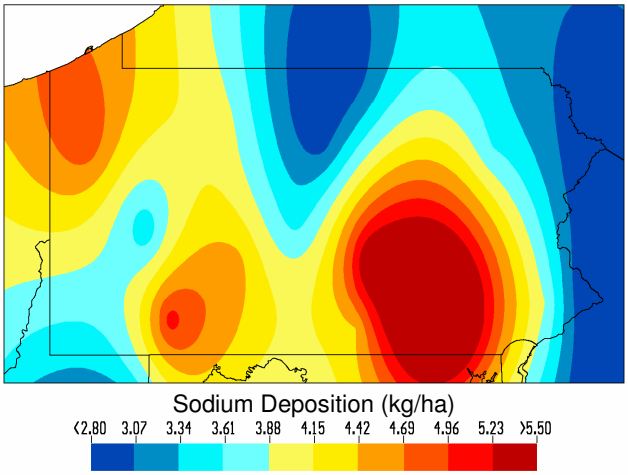
Growing Season Sodium Ion Wet Concentration: 2003



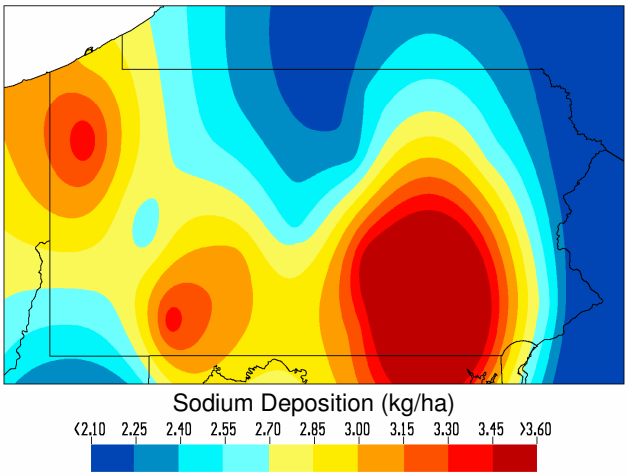
Dormant Season Sodium Ion Wet Concentration: 2003



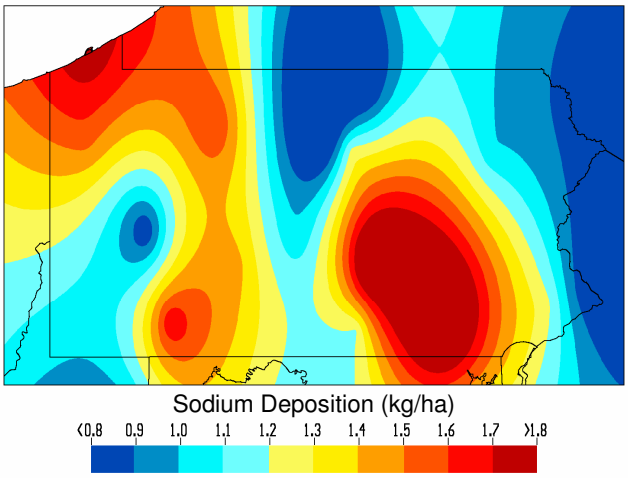
Annual Sodium Ion Wet Deposition: 2003



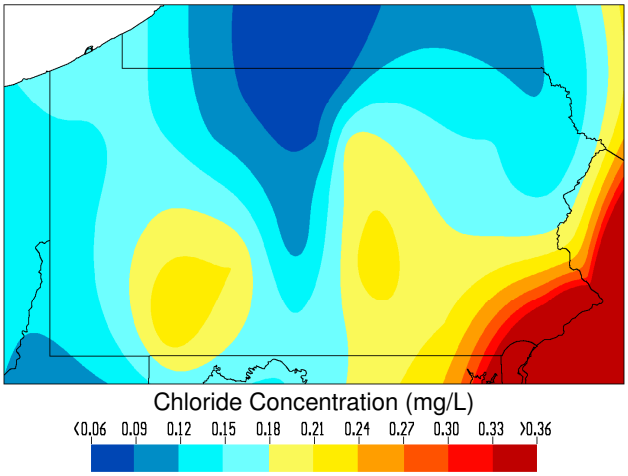
Growing Season Sodium Ion Wet Deposition: 2003



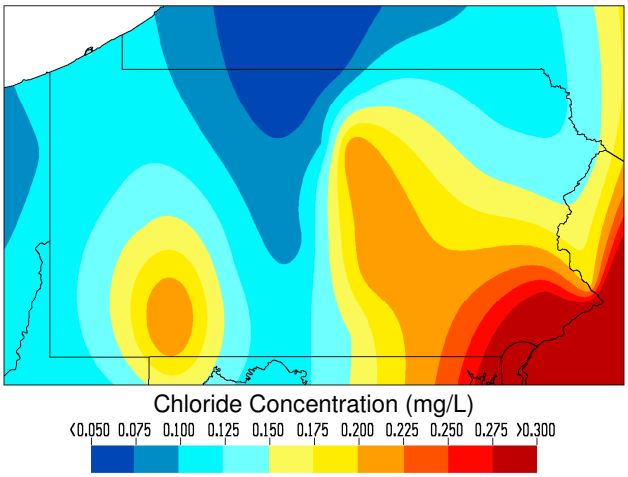
Dormant Season Sodium Ion Wet Deposition: 2003



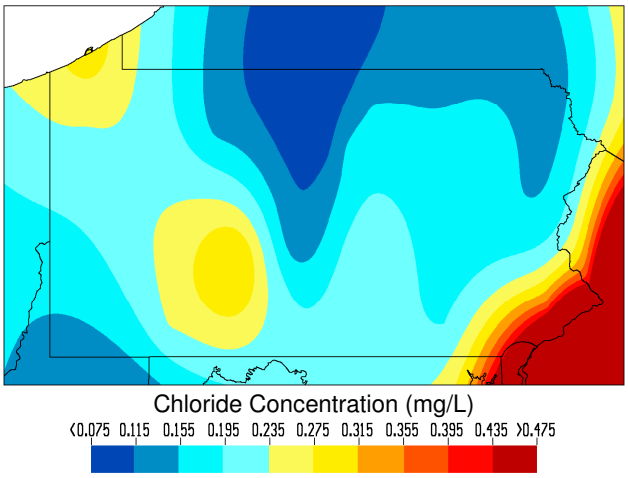
Annual Chloride Ion Wet Concentration: 2003



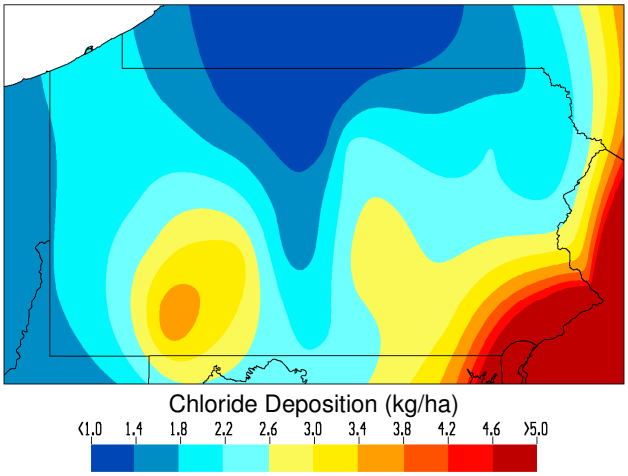
Growing Season Chloride Ion Wet Concentration: 2003



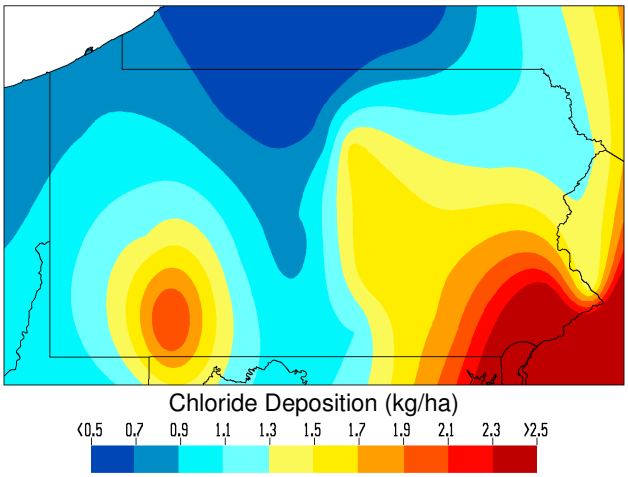
Dormant Season Chloride Ion Wet Concentration: 2003



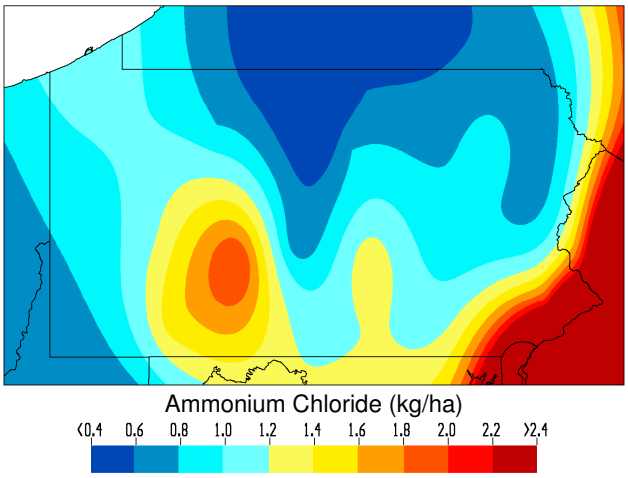
Annual Chloride Ion Wet Deposition: 2003



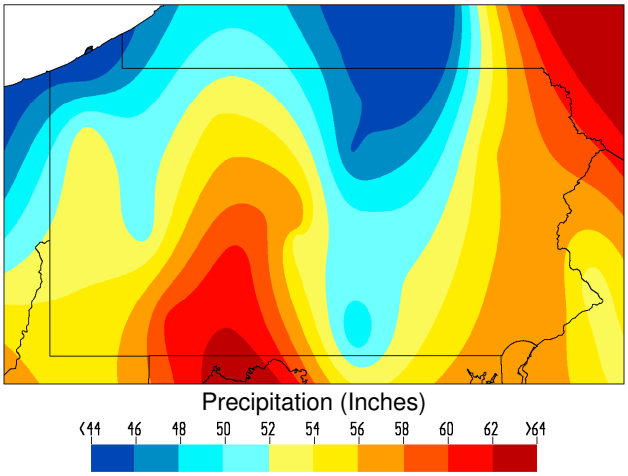
Growing Season Chloride Ion Wet Deposition: 2003



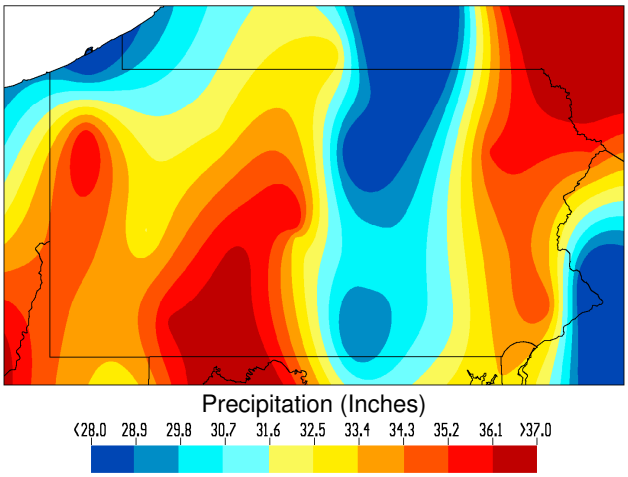
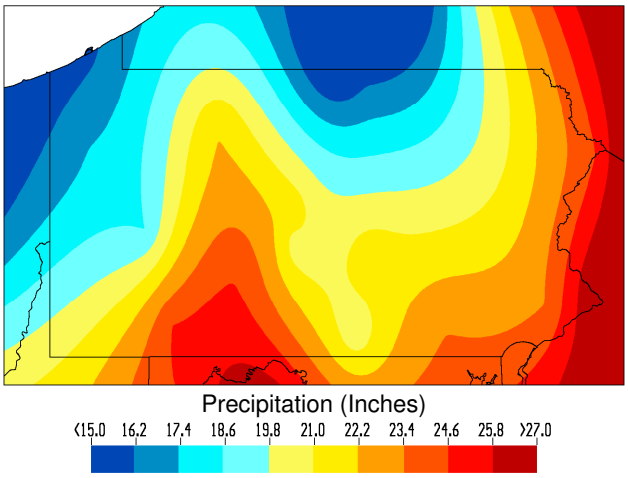
Dormant Season Chloride Ion Wet Deposition: 2003



Annual Precipitation: 2003



Growing Season Precipitation: 2003



Dormant Season Precipitation: 2003