# National Research Support Project-3
# 2001 ANNUAL REPORT

## NATIONAL ATMOSPHERIC DEPOSITION PROGRAM

A Cooperative Research Support Program of the
State Agricultural Experiment Stations (NRSP-3)
Federal and State Agencies
and Private Research Organizations

## TABLE OF CONTENTS

# ANNUAL REPORT

## National Research Support Project 3, National Atmospheric Deposition Program
## January 1 to December 31, 2001

Title: The National Atmospheric Deposition Program-A Long-term Monitoring Program in Support of Research on Effects of Atmospheric Chemical Deposition

Supported by the Regional Research Fund, Hatch Act, as amended August 11, 1985, and voluntary contributions from many other federal, state, and private research organizations

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| Denali NP | P. Brease |
| Everglades NP | B. Zepp |
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| Joshua Tree NP | C. Holbeck |
| Lassen Volvanic NP | L. Johnson |
| Little Big Horn Battlefield NM | L. Hergenrider |
| Mount Rainier NP | B. Samora |
| Mesa Verde NP | G. San Miguel |
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| Exxon Mobil Corporation | L. T. Johnson |
| Florida Power & Light Co | E. Zillioux |
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# National Research Support Project - 3, National Atmospheric Deposition Program
# Progress of Work and Principal Accomplishments - 2001

The National Atmospheric Deposition Program (NADP) provides quality assured data and information on the exposure of managed and natural ecosystems and cultural resources to acidic compounds, nutrients, base cations, and mercury in precipitation. These data support informed decisions on air quality issues related to precipitation chemistry and are used by scientists, policy-makers, educators, and the public. Data are freely available via the Internet, which enables on-line retrieval of individual data points, seasonal and annual averages, trend plots, concentration and deposition maps, reports, manuals, and other data and information (http://nadp.sws.uiuc.edu).

The NADP operates three precipitation chemistry networks: the National Trends Network (NTN), the Atmospheric Integrated Research Monitoring Network (AIRMoN), and the Mercury Deposition Network (MDN). At the end of December 2001, there were 232 NTN stations collecting one-week precipitation samples in 48 states, Puerto Rico, the Virgin Islands, and Quebec Province, Canada (Appendix 1). The NTN provides the only long-term nationwide record of wet deposition in the United States. Complementing the NTN are the 10-site AIRMoN (Appendix 2) and the 63-site MDN (Appendix 3). Data from daily precipitation samples collected at AIRMoN sites support continued research of atmospheric transport and removal of air pollutants and development of computer simulations of these processes. The MDN offers the only regional measurements of mercury in North American precipitation, and MDN data are used to quantify mercury deposition to water bodies that have fish and wildlife consumption advisories due to this toxic chemical. In 2001, 42 states listed advisories warning people to limit game fish consumption due to high mercury levels. Advisories also were issued for coastal Maine, the Atlantic Coast from the Virginia-North Carolina border to the southern tip of Florida, and the entire U.S. Gulf Coast.

The NADP continued its extensive quality assurance program in 2001. Two NTN sites and one MDN site collected samples in side-by-side wet deposition collectors to obtain network precision measurements. Network precision data are now available for 2 MDN and 43 NTN sites. Ongoing comparisons between the two primary North American networks continued at co-located NTN and Canadian Air and Precipitation Monitoring Network sites in central Pennsylvania and southern Quebec Province. A site systems and performance review team checked equipment, operating procedures, and installations at 100 NTN and 18 MDN sites during the year. In addition, NADP Program Office staff began preparing updated quality assurance documents.

The Network Operations Subcommittee, Budget Advisory Committee, and Executive Committee (Appendix 4) met in Champaign, Illinois, on 27-30 August 2001. A total of 49 Technical Committee members attended one or more of these business meetings (see minutes in Appendix 5). Among the major topics addressed was the status of an initiative to identify a modern precipitation gage and wet deposition collector to replace currently used equipment, a potential partnering arrangement with the National Climate Data Center's new long-term Climate Reference Network, and a new effort to measure hydrogen and oxygen isotopes in archival NADP samples as part of the U.S. Network for Isotopes in Precipitation (http://nadp.sws.uiuc.edu/issues.asp). Unlike previous meetings, a scientific symposium was not held in conjunction with the 2001 Technical Committee meetings. Instead, NADP helped organize sessions on "Atmospheric Deposition of Nitrogen" and "Effects of Atmospheric Deposition of Nitrogen" at *N2001: The Second International Nitrogen Conference* held in Potomac, Maryland, 14-18 October 2001. Nearly 400 scientists, policy-makers, and citizens from 30 nations participated in this interdisciplinary conference organized by long-time NADP Technical Committee members Dr. James Galloway and Dr. Ellis Cowling. Sixty-three papers presented at this meeting (nearly one in five) either used NADP data or were presented by Technical Committee members or presenters in NADP-organized sessions.

Below are highlights of year 2001 research activities in which Technical Committee scientists used NADP data to learn about spatial distributions or temporal trends in atmospheric wet deposition (Objective 1):

**Objective 1.** **Characterize geographic patterns and temporal trends in biologically important chemical deposition.**

- Applying a nonparametric statistical test for trend detection, U.S. Geological Survey investigators reported that from 1981 to 1998 there were statistically significant decreases in sulfate concentrations at more than 67 percent of NTN sites, increases in ammonium concentrations at more than 75 percent of sites (significant at ~20 percent), decreases in calcium concentrations at all sites (significant at ~44 percent), while nitrate concentrations generally did not change.
- In summing up what has been learned from NTN measurements over the last decade, a University of Illinois scientist concluded that nitrate continues to grow in importance as a cause of acidic deposition, while ammonium deposition increases are of growing concern because of the acidifying effects of ammonium in terrestrial ecosystems.
- Scientists at the Institute of Ecosystem Studies and National Oceanic and Atmospheric Administration Air Resources Laboratory coupled back-trajectory analyses with AIRMoN and NTN data to study the regional-scale impact of the

1990 Clean Air Act Amendments on precipitation chemistry, and concluded that precipitation acidity has not abated in the acid-sensitive Southern Appalachian Mountains.

- Reporting on environmental trends and conditions, the Kentucky Environmental Quality Commission, a seven-member citizen board cited NTN pH data to conclude that Kentucky's rain has become less acidic over the last 15 years.
- Researchers at the New York State Department of Environmental Conservation adapted a mathematical tool that filters out short-term and cyclical variations in NTN sulfate and nitrate concentrations so that long-term changes can readily be identified, tracked, and compared with emissions changes occurring in response to acid deposition control programs.
- A team of scientists used NTN data along with extensive snowpack measurements in the northern, central, and southern Rocky Mountains to characterize snowpack acidity and its relationship with sulfates, nitrates, and base cations.
- In its annual report to the citizens of North Carolina, the Air Quality Division of the North Carolina Department of Environment and Natural Resources used NTN data in reporting that statewide annual average ammonium concentrations decreased from 1980 to 1987, increased from 1987 to 1996, and decreased again from 1996 to 1999.
- U.S. Geological Survey and Indiana Department of Environmental Management scientists report that they are using data from their four jointly sponsored MDN sites in Indiana to determine Total Maximum Daily Loads of mercury in watersheds where high mercury levels in gamefish have resulted in fish consumption advisories.

Below is a list of selected year 2001 research activities in which NADP data supported investigations of the effects of atmospheric deposition (Objective 2):

**Objective 2.** **Support research activities related to: (a) the productivity of managed and natural ecosystems; (b) the chemistry of surface and ground waters including estuaries; (c) the health of domestic animals, wildlife, and fish; (d) human health; (e) the effects of atmospheric deposition on visibility and materials; and (f) discerning source-receptor relationships.**

- A Hubbard Brook Research Foundation team reported that sulfur dioxide emissions reductions since 1970 have resulted in statistically significant decreases in sulfate in wet and bulk deposition and in surface waters, but acid-neutralizing capacity in New England surface waters has increased only modestly, and surface waters in the Adirondack and Catskill regions have experienced no significant improvements.
- Scientists working for the Electric Power Research Institute used MDN measurements to evaluate a three-dimensional regional-scale model that simulates the transport, transformation, and deposition of mercury; simulated values correlated highly with measurements and had a gross error of about 21 percent.
- Participants in the Tampa Bay Estuary Program have agreed on new lower nitrogen-loading targets for Tampa Bay, where AIRMoN measurements, air quality measurements, and model estimates have shown that approximately 30 percent of the nitrogen entering the bay is from atmospheric deposition.
- University of Illinois and U.S. Geological Survey researchers studying nitrogen management practices in the Mississippi River basin have adapted previous models into a new model that relates net anthropogenic nitrogen input, including nitrogen deposition from NTN data, to nitrogen in Mississippi River outflow.
- U.S. Department of Agriculture-Forest Service researchers report that total atmospheric (wet and dry) nitrogen deposition in California ecosystems is ecologically significant and highly variable (1-45 kilograms/hectare/year), depending on location and exposure, and that evidence is accumulating on shifts in species composition and other effects due to nitrogen deposition.
- Both NTN nitrate and ammonium data were used to gauge nitrogen inputs to watersheds in Alaska, Colorado, and Michigan, where scientists conducting long-term nitrogen-cycling studies report that hydrological factors, soil types, nitrogen mineralization rates, seasonal weather patterns, vegetation, and forest floor organic litter control the release of nitrogen to headwater streams.
- An investigator studying the effects of snowmelt on Rocky Mountain stream chemistry used NTN and snowpack chemistry measurements to examine the processes affecting the export of acids, nutrients, and base cations from the Fraser Experimental Forest in north-central Colorado.
- While studying nitrogen fluxes in and out of spruce-fir forests in the Great Smoky Mountains National Park, investigators learned that annual nitrogen export in a stream draining a first-order watershed was about half of the atmospheric nitrogen input, although the amount and timing of the export varied seasonally, and with soil temperature and moisture conditions.
- Scientists measured atmospheric nitrogen deposition, complemented by NTN nitrogen-flux data, to address questions about the role of increased nitrogen deposition in enhancing carbon sequestration in an eastern deciduous forest in Indiana.
- A University of Nebraska researcher used deuterium and oxygen-18 measurements in archived samples from the NTN site at Mead, Nebraska, to conclude that the primary moisture source for precipitation at Mead is the Gulf of Mexico,

but important secondary sources are evaporation from open water or irrigation to air masses during travel to the region.

**Usefulness of Findings**

With 23 years of NTN data, 9 years of AIRMoN data, and 5 years of MDN data, the NADP database is an invaluable resource supporting research of atmospheric deposition and its effects on managed and unmanaged ecosystems, i.e., National Research Support Project-3 Objectives 1 and 2.

In 2001, the NADP Internet site (nadp.sws.uiuc.edu) received nearly 43,000 unique visitors, a 7 percent increase over 2000 usage. Site users logged more than 109,000 sessions, and the site received more than one million hits for the first time in its history. Since tracking of Internet site usage began in 1998, usage has increased by 300 to 400 percent. Most frequently accessed data products were color contour maps of pollutant concentrations and depositions. Site users viewed 88,367 maps in 2001 and retrieved 18,535 data files. User statistics show that researchers primarily use NADP data to study atmospheric deposition and watershed processes, as well as environmental phenomena such as the effects of deposition on aquatic and terrestrial ecosystems and on cultural resources. Universities account for 35 percent of NADP Internet site users, followed by federal agencies (21 percent) and public schools (18 percent). Research and educational usage have averaged 60 percent and 40 percent, respectively. College students and secondary and elementary school students use the popular on-line brochures *Inside Rain* and *Nitrogen in the Nation's Rain*, as well as using NADP data for research and class assignments. NADP maps also appear in several new textbooks, such as *Ecosystem Change and Public Health* (Johns Hopkins University Press), *Chemistry in Context* (American Chemical Society), and *Meteorology* (McGraw-Hill). In January 2001, the Institute of Scientific Information (ISI) selected the NADP site for *Current Web Contents*, an on-line listing of scholarly, research-oriented Web sites. Navigation and design, accuracy and currency of content, scope and quality of writing are among the criteria ISI applies in selecting sites.

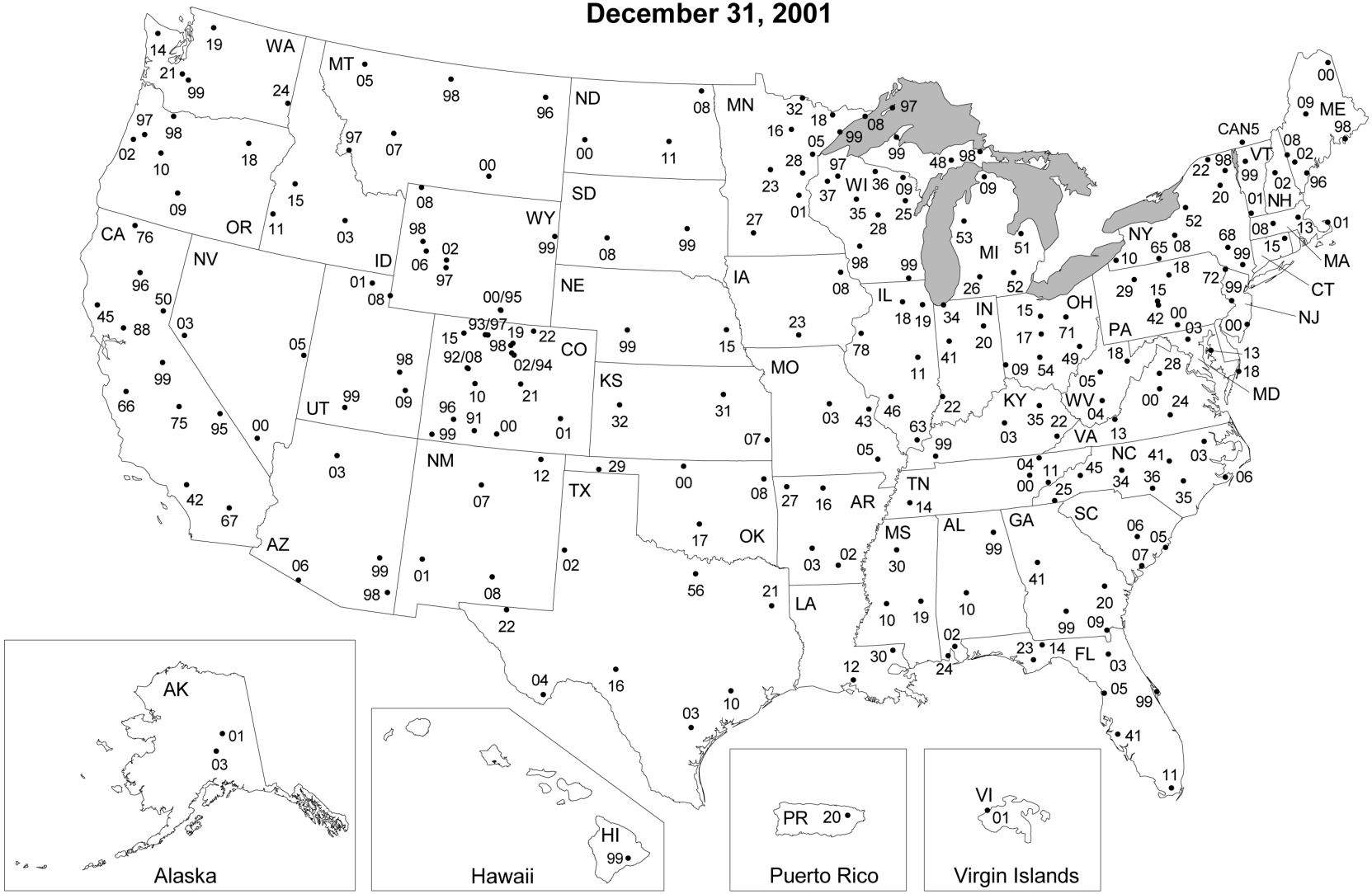
The Southern Appalachian Mountains Initiative (SAMI), a partnership of state and federal environmental agencies, federal land managers, industries, environmental groups, academia, and interested citizens, is using NTN data to assess acidic deposition effects on streams, soils, and forests in nine southeastern states. The SAMI scientists used NTN data to establish a base case for acidic deposition in the study region. After applying available air quality models that link current pollutant emissions to measured acidic deposition, they ran the models to estimate acidic deposition under several future emissions scenarios. They also applied forest nutrient cycling and watershed models to evaluate present and future acidic deposition effects on streams and forests in the SAMI region.

In its report, *Clean Coastal Waters, Understanding and Reducing the Effects of Nutrient Pollution*, a National Academy of Sciences Committee used NADP data to evaluate the role of atmospheric nitrogen deposition as a cause of excess nutrient levels in estuarine systems. The report indicates that from 10 percent to 40 percent of the total nitrogen input to estuaries comes from atmospheric deposition, depending on water surface to watershed area and the degree of nitrogen saturation in tributary watersheds. The Committee also cited NADP data as crucial to the development of airshed and watershed models.

**Publications**

Appendix 6 lists more than 200 citations, including 46 journal articles, of 2001 publications using NADP data or published by NRSP-3 scientists. Seven papers, one communication, and one technical note, based on presentations at the October 2000 Technical Committee meeting in Saratoga Springs, New York, have been accepted for publication in the journal *Atmospheric Environment* and will appear in early 2002. Three NADP reports were published in 2001: *NADP 2001 - NADP Committee Meeting Proceedings* (Appendix 7), *Quality Assurance Report, National Atmospheric Deposition Program, 1999, Laboratory Operations, Central Analytical Laboratory* (Appendix 8), and 2000 map summary (Appendix 9). Finally, the *2002 CALendar* (Appendix 10) featuring 21 sites was published and distributed to site supervisors, operators, and Technical Committee meeting attendees.

# National Atmospheric Deposition Program
## National Trends Network
### December 31, 2001



# National Atmospheric Deposition Program/National Trends Network Sites
# December 31, 2001

| State Site Code | Site Name | County | Sponsoring Agency | Start Date |
|---|---|---|---|---|
| **Alabama** | | | | |
| AL02 | Delta Elementary | Baldwin | EPA/Alabama Dept of Environmental Mgt | 06/01 |
| AL24 | Bay Road | Mobile | EPA/Alabama Dept of Environmental Mgt | 05/01 |
| AL10 | Black Belt Ag Substation | Dallas | US Geological Survey | 08/83 |
| AL99 | Sand Mountain Ag Experiment Station | DeKalb | Tennessee Valley Authority | 10/84 |
| **Alaska** | | | | |
| AK01 | Caribou - Poker Creek | Fairbanks | USDA Forest Service | 12/92 |
| AK03 | Denali NP - Mount McKinley | Denali | National Park Service - Air Resources Div | 06/80 |
| **Arizona** | | | | |
| AZ03 | Grand Canyon NP - Hopi Point | Coconino | National Park Service - Air Resources Div | 08/81 |
| AZ06 | Organ Pipe Cactus NM | Pima | National Park Service - Air Resources Div | 04/80 |
| AZ98 | Chiricahua | Cochise | US Environmental Protection Agency-CAMD | 02/99 |
| AZ99 | Oliver Knoll | Graham | US Geological Survey | 08/81 |
| **Arkansas** | | | | |
| AR02 | Warren 2WSW | Bradley | US Geological Survey | 05/82 |
| AR03 | Caddo Valley | Clark | US Geological Survey | 12/83 |
| AR16 | Buffalo NR - Buffalo Point | Marion | National Park Service - Air Resources Div | 07/82 |
| AR27 | Fayetteville | Washington | US Geological Survey | 04/80 |
| **California** | | | | |
| CA42 | Tanbark Flat | Los Angeles | USDA Forest Service | 01/82 |
| CA45 | Hopland | Mendocino | US Geological Survey | 10/79 |
| CA50 | Sagehen Creek | Nevada | US Geological Survey | 11/01 |
| CA66 | Pinnacles NM - Bear Valley | San Benito | National Park Service - Air Resources Div | 11/99 |
| CA67 | Joshua Tree NP - Black Rock | San Bernardino | National Park Service - Air Resources Div | 09/00 |
| CA75 | Sequoia NP - Giant Forest | Tular | National Park Service - Air Resources Div | 07/80 |
| CA76 | Montague | Siskiyou | US Geological Survey | 06/85 |
| CA88 | Davis | Yolo | US Geological Survey | 09/78 |
| CA95 | Death Valley NP - Cow Creek | Inyo | National Park Service - Air Resources Div | 02/00 |
| CA96 | Lassen Volcanic NP - Manzanita Lake | Shasta | National Park Service - Air Resources Div | 06/00 |
| CA99 | Yosemite NP - Hodgdon Meadow | Tuolumne | National Park Service - Air Resources Div | 12/81 |
| **Colorado** | | | | |
| CO00 | Alamosa - Weather Service Office | Alamosa | US Geological Survey | 04/80 |
| CO01 | Las Animas Fish Hatchery | Bent | US Geological Survey | 10/83 |
| CO02 | Niwot Saddle | Boulder | NSF/INSTAAR-University of Colorado | 06/84 |
| CO08 | Four Mile Park | Garfield | US Environmental Protection Agency-CAMD | 12/87 |
| CO10 | Gothic | Gunnison | US Environmental Protection Agency-CAMD | 02/99 |
| CO15 | Sand Spring | Moffat | Bureau of Land Management | 03/79 |
| CO19 | Rocky Mountain NP - Beaver Meadows | Larimer | National Park Service - Air Resources Div | 05/80 |
| CO21 | Manitou | Teller | USDA Forest Service | 10/78 |
| CO22 | Pawnee | Weld | NSF-LTER/Colorado State University | 05/79 |
| CO91 | Wolf Creek Pass | Mineral | USDA Forest Service | 05/92 |
| CO92 | Sunlight Peak | Garfield | US Environmental Protection Agency-CAMD | 01/88 |
| CO93 | Buffalo Pass - Dry Lake | Routt | USDA Forest Service | 10/86 |
| CO94 | Sugarloaf | Boulder | US Environmental Protection Agency-CAMD | 11/86 |
| CO96 | Molas Pass | San Juan | USDA Forest Service | 07/86 |
| CO97 | Buffalo Pass - Summit Lake | Routt | USDA Forest Service | 02/84 |
| CO98 | Rocky Mountain NP - Loch Vale | Larimer | USGS/Colorado State University | 08/83 |
| CO99 | Mesa Verde NP - Chapin Mesa | Montezuma | US Geological Survey | 04/81 |
| **Connecticut** | | | | |
| CT15 | Abington | Windham | US Environmental Protection Agency-CAMD | 01/99 |
| **Florida** | | | | |
| FL03 | Bradford Forest | Bradford | St. John's River Water Management District | 10/78 |
| FL05 | Chassahowitzka NWR | Citrus | US Fish & Wildlife Serv - Air Quality Branch | 08/96 |
| FL11 | Everglades NP - Research Center | Dade | National Park Service - Air Resources Div | 06/80 |
| FL14 | Quincy | Gadsden | US Geological Survey | 03/84 |
| FL23 | Sumatra | Liberty | US Environmental Protection Agency-CAMD | 01/99 |
| FL41 | Verna Well Field | Sarasota | US Geological Survey | 08/83 |
| FL99 | Kennedy Space Center | Brevard | NASA/Dynamac Corporation | 08/83 |

| State Site Code | Site Name | County | Sponsoring Agency | Start Date |
|---|---|---|---|---|
| **Georgia** | | | | |
| GA09 | Okefenokee NWR | Charlton | US Fish & Wildlife Serv - Air Quality Branch | 06/97 |
| GA20 | Bellville | Bellville | US Environmental Protection Agency-CAMD | 04/83 |
| GA41 | Georgia Station | Pike | SAES-University of Georgia | 10/78 |
| GA99 | Chula | Tift | US Geological Survey | 02/94 |
| **Hawaii** | | | | |
| HI99 | Hawaii Volcanoes NP - Thurston | Hawaii | National Park Service - Air Resources Div | 11/00 |
| **Idaho** | | | | |
| ID03 | Craters of the Moon NM | Butte | National Park Service - Air Resources Div | 08/80 |
| ID11 | Reynolds Creek | Owyhee | US Geological Survey | 11/83 |
| ID15 | Smiths Ferry | Valley | US Geological Survey | 10/84 |
| **Illinois** | | | | |
| IL11 | Bondville | Champaign | SAES-University of Illinois | 02/79 |
| IL18 | Shabbona | DeKalb | SAES-University of Illinois | 05/81 |
| IL19 | Argonne | DuPage | DOE-Argonne National Laboratory | 03/80 |
| IL46 | Alhambra | Madison | US Environmental Protection Agency-CAMD | 01/99 |
| IL63 | Dixon Springs Ag Center | Pope | SAES-University of Illinois | 01/79 |
| IL78 | Monmouth | Warren | US Geological Survey | 01/85 |
| **Indiana** | | | | |
| IN20 | Huntington Reservoir | Huntington | US Geological Survey | 08/83 |
| IN22 | Southwest Purdue Ag Center | Knox | US Geological Survey | 09/84 |
| IN34 | Indiana Dunes NL | Porter | National Park Service - Air Resources Div | 07/80 |
| IN41 | Purdue University Ag Farm | Tippecanoe | SAES-Purdue University | 07/82 |
| **Iowa** | | | | |
| IA08 | Big Springs Fish Hatchery | Clayton | US Geological Survey | 08/84 |
| IA23 | McNay Memorial Research Center | Lucas | US Geological Survey | 09/84 |
| **Kansas** | | | | |
| KS07 | Farlington Fish Hatchery | Crawford | US Geological Survey | 03/84 |
| KS31 | Konza Prairie | Riley | SAES-Kansas State University | 08/82 |
| KS32 | Lake Scott State Park | Scott | US Geological Survey | 03/84 |
| **Kentucky** | | | | |
| KY03 | Mackville | Washington | US Geological Survey | 11/83 |
| KY22 | Lilley Cornett Woods | Letcher | NOAA-Air Resources Lab | 09/83 |
| KY35 | Clark State Fish Hatchery | Rowan | US Geological Survey | 08/83 |
| KY99 | Mulberry Flats | Trigg | TVA/Murray State University | 12/94 |
| **Louisiana** | | | | |
| LA12 | Iberia Research Station | Iberia | US Geological Survey | 11/82 |
| LA30 | Southeast Research Station | Washington | US Geological Survey | 01/83 |
| **Maine** | | | | |
| ME00 | Caribou | Aroostook | NOAA-Air Resources Lab | 04/80 |
| ME02 | Bridgton | Cumberland | EPA/Maine Dept of Environmental Protection | 09/80 |
| ME08 | Gilead | Oxford | US Geological Survey | 09/99 |
| ME09 | Greenville Station | Piscataquis | SAES-University of Maine | 11/79 |
| ME96 | Casco Bay - Wolfe's Neck Farm | Cumberland | EPA/Maine Dept of Environmental Protection | 01/98 |
| ME98 | Acadia NP - McFarland Hill | Hancock | National Park Service - Air Resources Div | 11/81 |
| **Maryland** | | | | |
| MD03 | White Rock Substation | Carroll | Constellation Energy Group | 10/84 |
| MD13 | Wye | Queen Anne | SAES-University of Maryland | 03/83 |
| MD18 | Assateague Island NS - Woodcock | Worchester | Maryland Department of Natural Resources | 09/00 |
| **Massachusetts** | | | | |
| MA01 | North Atlantic Coastal Lab | Barnstable | National Park Service - Air Resources Div | 12/81 |
| MA08 | Quabbin Reservoir | Franklin | NESCAUM | 03/82 |
| MA13 | East | Middlesex | NESCAUM | 02/82 |

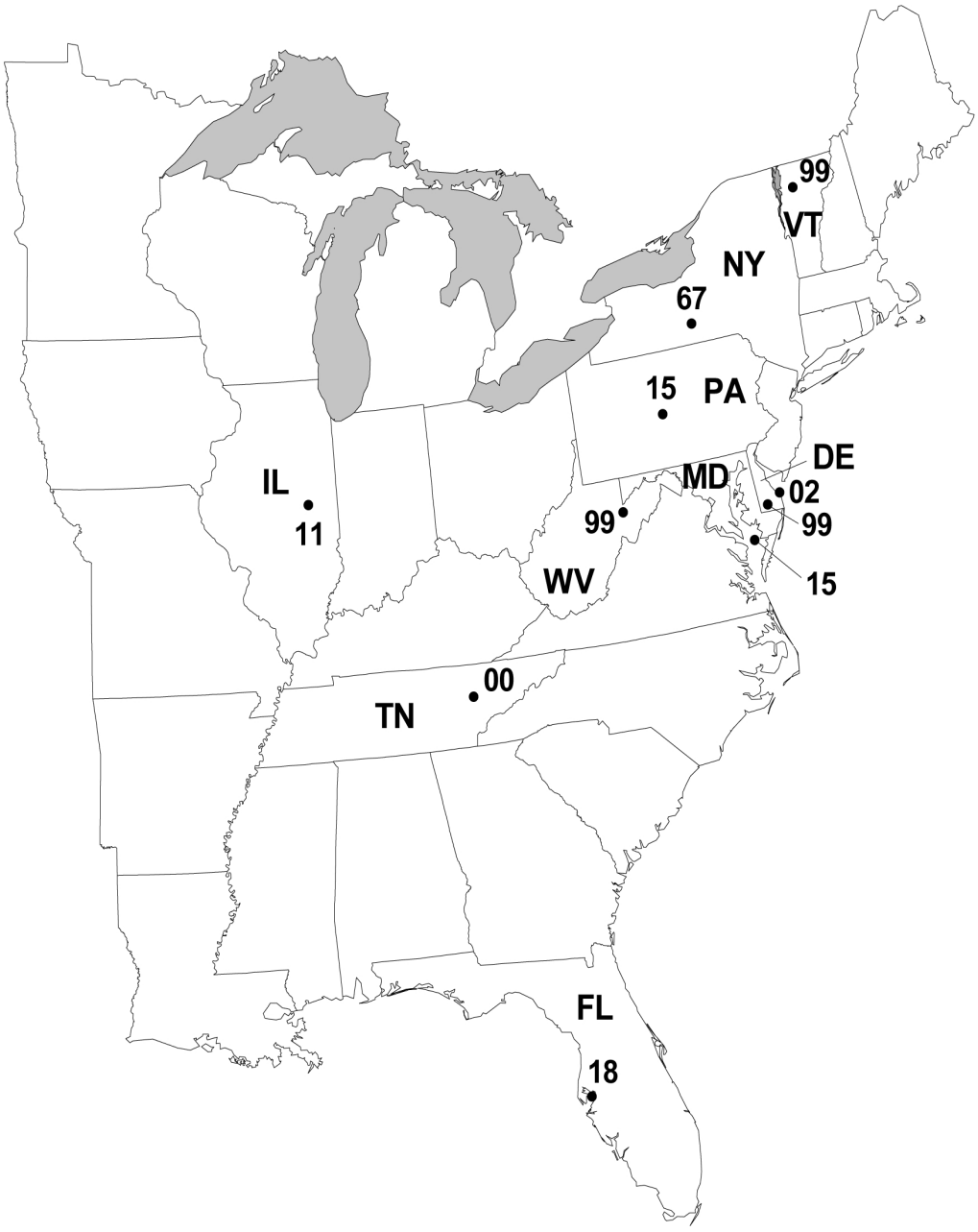
| State Site Code | Site Name | County | Sponsoring Agency | Start Date |
|---|---|---|---|---|
| **Michigan** | | | | |
| MI09 | Douglas Lake- Univ Michigan Biological Station | Cheboygan | USDA/Michigan State University | 07/79 |
| MI26 | Kellogg Biological Station | Kalamazoo | USDA/Michigan State University | 06/79 |
| MI48 | Seney NWR - Headquarters | Schoolcraft | US Fish & Wildlife Serv - Air Quality Branch | 11/00 |
| MI51 | Unionville | Tuscola | US Environmental Protection Agency-CAMD | 01/99 |
| MI52 | Ann Arbor | Washtenaw | US Environmental Protection Agency-CAMD | 01/99 |
| MI53 | Wellston | Wexford | USDA Forest Service | 10/78 |
| MI97 | Isle Royale NP - Wallace Lake | Keneenaw | National Park Service - Air Resources Div | 05/85 |
| MI98 | Raco | Chippewa | US Environmental Protection Agency-CAMD | 05/84 |
| MI99 | Chassell | Houghton | National Park Service - Air Resources Div | 02/83 |
| **Minnesota** | | | | |
| MN01 | Cedar Creek | Anoka | Minnesota Pollution Control Agncy | 12/96 |
| MN05 | Fond du Lac | Carlton | EPA/Fond du Lac Reservation | 11/96 |
| MN08 | Hovland | Cook | Minnesota Pollution Control Agency | 12/96 |
| MN16 | Marcell Experimental Forest | Itasca | USDA Forest Service | 07/78 |
| MN18 | Fernberg | Lake | US Environmental Protection Agency-CAMD | 11/80 |
| MN23 | Camp Ripley | Morrison | US Geological Survey | 10/83 |
| MN27 | Lamberton | Redwood | Minnesota Pollution Control Agency | 01/79 |
| MN28 | Grindstone Lake | Pine | Minnesota Pollution Control Agency | 12/96 |
| MN32 | Voyageurs NP - Sullivan Bay | St. Louis | National Park Service - Air Resources Div | 05/00 |
| MN99 | Wolf Ridge | Lake | Minnesota Pollution Control Agency | 12/96 |
| **Mississippi** | | | | |
| MS10 | Clinton | Hinds | US Geological Survey | 07/84 |
| MS19 | Newton | Newton | NOAA-Air Resources Lab | 11/86 |
| MS30 | Coffeeville | Yalobusha | Tennessee Valley Authority | 07/84 |
| **Missouri** | | | | |
| MO03 | Ashland Wildlife Area | Boone | US Geological Survey | 10/81 |
| MO05 | University Forest | Butler | US Geological Survey | 10/81 |
| MO43 | Tyson Research Center | St. Louis | Washington University | 08/01 |
| **Montana** | | | | |
| MT00 | Little Big Horn Battlefield | Big Horn | US Geological Survey | 07/84 |
| MT05 | Glacier NP - Fire Weather Station | Flathead | National Park Service - Air Resources Div | 06/80 |
| MT07 | Clancy | Jefferson | US Geological Survey | 01/84 |
| MT96 | Poplar River | Roosevelt | EPA/Ft. Peck Tribes | 12/99 |
| MT97 | Lost Trail Pass | Ravalli | USDA Forest Service | 09/90 |
| MT98 | Havre | Hill | US Geological Survey | 07/85 |
| **Nebraska** | | | | |
| NE15 | Mead | Saunders | SAES-University of Nebraska | 07/78 |
| NE99 | North Platte Ag Station | Lincoln | US Geological Survey | 09/85 |
| **Nevada** | | | | |
| NV00 | Red Rock Canyon | Clark | Bureau of Land Management | 01/85 |
| NV03 | Smith Valley | Smith | US Geological Survey | 08/85 |
| NV05 | Great Basin NP - Lehman Caves | White Pine | National Park Service - Air Resources Div | 01/85 |
| **New Hampshire** | | | | |
| NH02 | Hubbard Brook | Grafton | USDA Forest Service | 07/78 |
| **New Jersey** | | | | |
| NJ00 | Edwin B. Forsythe NWR | Atlantic | US Fish & Wildlife Serv - Air Quality Branch | 10/98 |
| NJ99 | Washington Crossing | Mercer | US Environmental Protection Agency-CAMD | 08/81 |
| **New Mexico** | | | | |
| NM01 | Gila Cliff Dwellings NM | Catron | EPA/New Mexico Environment Dept. | 07/85 |
| NM07 | Bandelier NM | Los Alamos | DOE-Los Alamos National Lab | 06/82 |
| NM08 | Mayhill | Otero | US Geological Survey | 01/84 |
| NM12 | Capulin Volcano NM | Union | EPA/New Mexico Environment Dept. | 11/84 |

| State<br>Site Code | Site Name | County | Sponsoring Agency | Start<br>Date |
|---|---|---|---|---|
| **New York** | | | | |
| NY08 | Aurora Research Farm | Cayuga | USDA/Cornell University | 04/79 |
| NY10 | Chautauqua | Chautauqua | US Geological Survey | 06/80 |
| NY20 | Huntington Wildlife | Essex | EPA/State Univ of New York-Syracuse | 10/78 |
| NY22 | St. Regis Mohawk - Fort Covington | Franklin | US Environmental Protection Agency-CAMD | 08/99 |
| NY52 | Bennett Bridge | Oswego | EPA/State Univ of New York-Oswego | 06/80 |
| NY65 | Jasper | Steuben | US Geological Survey | 02/80 |
| NY68 | Biscuit Brook | Ulster | US Geological Survey | 10/83 |
| NY98 | Whiteface Mountain | Essex | US Geological Survey | 07/84 |
| NY99 | West Point | Orange | US Geological Survey | 09/83 |
| **North Carolina** | | | | |
| NC03 | Lewiston | Bertie | North Carolina State University | 10/78 |
| NC06 | Beaufort | Carteret | US Environmental Protection Agency-CAMD | 01/99 |
| NC25 | Coweeta | Macon | USDA Forest Service | 07/78 |
| NC34 | Piedmont Research Station | Rowan | North Carolina State University | 10/78 |
| NC35 | Clinton Crops Research Station | Sampson | North Carolina State University | 10/78 |
| NC36 | Jordan Creek | Scotland | US Geological Survey | 10/83 |
| NC41 | Finley Farms | Wake | North Carolina State University | 10/78 |
| NC45 | Mount Mitchell | Yancey | North Carolina State University | 11/85 |
| **North Dakota** | | | | |
| ND00 | Theodore Roosevelt NP-Painted Canyon | Billings | National Park Service-Air Resources Div | 01/01 |
| ND08 | Icelandic State Park | Pembina | US Geological Survey | 10/83 |
| ND11 | Woodworth | Stutsman | US Geological Survey | 11/83 |
| **Ohio** | | | | |
| OH09 | Oxford | Butler | US Geological Survey | 08/84 |
| OH15 | Lykens | Crawford | US Environmental Protection Agency-CAMD | 01/99 |
| OH17 | Delaware | Delaware | USDA Forest Service | 10/78 |
| OH49 | Caldwell | Noble | US Geological Survey | 09/78 |
| OH54 | Deer Creek State Park | Pickaway | US Environmental Protection Agency-CAMD | 01/99 |
| OH71 | Wooster | Wayne | US Geological Survey | 09/78 |
| **Oklahoma** | | | | |
| OK00 | Salt Plains NWR | Alfalfa | US Geological Survey | 12/83 |
| OK08 | Lake Eucha | Delaware | EPA/Oklahoma Conservation Commission | 02/00 |
| OK17 | Great Plains Apiaries | McClain | NOAA-Air Resources Lab | 03/83 |
| OK29 | Goodwell Research Station | Texas | US Geological Survey | 01/85 |
| **Oregon** | | | | |
| *OR02 | Alsea Guard Ranger Station | Benton | US Environmental Protection Agency-CAMD | 12/79 |
| OR09 | Silver Lake Ranger Station | Lake | US Geological Survey | 08/83 |
| OR10 | H J Andrews Experimental Forest | Lane | USDA Forest Service | 05/80 |
| OR18 | Starkey Experimental Forest | Union | US Geological Survey | 03/84 |
| OR97 | Hyslop Farm | Benton | US Environmental Protection Agency-CAMD | 04/83 |
| OR98 | Bull Run | Clackamas | USGS/Portland Water Bureau, OR | 07/82 |
| **Pennsylvania** | | | | |
| PA00 | Arendtsville | Adams | US Environmental Protection Agency-CAMD | 01/99 |
| PA15 | Penn State | Centre | NOAA-Air Resources Lab | 06/83 |
| PA18 | Young Woman's Creek | Clinton | US Geological Survey | 04/99 |
| PA29 | Kane Experimental Forest | Elk | USDA Forest Service | 07/78 |
| PA42 | Leading Ridge | Huntingdon | SAES-Pennsylvania State University | 04/79 |
| PA72 | Milford | Pike | USDA Forest Service | 12/83 |
| **Puerto Rico** | | | | |
| PR20 | El Verde | Rio Grande | USDA Forest Service | 02/85 |
| **South Carolina** | | | | |
| SC05 | Cape Romain - NWR | Charleston | US Fish & Wildlife Serv - Air Quality Branch | 11/00 |
| SC06 | Santee NWR | Clarendon | US Geological Survey | 07/84 |
| SC07 | Ace Basin NERR | Colleton | US Environmental Protection Agency-CAMD | 12/01 |
| **South Dakota** | | | | |
| SD08 | Cottonwood | Jackson | NOAA-Air Resources Lab | 10/83 |
| SD99 | Huron Well Field | Huron | US Geological Survey | 11/83 |

| State<br>Site Code | Site Name | County | Sponsoring Agency | Start<br>Date |
|---|---|---|---|---|
| **Tennessee** | | | | |
| TN00 | Walker Branch Watershed | Anderson | DOE/Oak Ridge Natl Lab/Lockheed-Martin | 03/80 |
| TN04 | Speedwell | Claiborne | US Environmental Protection Agency-CAMD | 01/99 |
| TN11 | Great Smoky Mountain NP - Elkmont | Sevier | National Park Service - Air Resources Div | 08/80 |
| TN14 | Hatchie NWR | Haywood | Tennessee Valley Authority | 10/84 |
| **Texas** | | | | |
| TX02 | Muleshoe NWR | Bailey | US Geological Survey | 06/85 |
| TX03 | Beeville | Bee | NOAA-Air Resources Lab | 02/84 |
| TX04 | Big Bend NP - K-Bar | Brewster | National Park Service - Air Resources Div | 04/80 |
| TX10 | Attwater Prairie Chicken NWR | Colorado | US Geological Survey | 07/84 |
| TX16 | Sonora | Edwards | US Geological Survey | 06/84 |
| TX21 | Longview | Gregg | Texas Natural Resource Conservation Comm | 06/82 |
| TX22 | Guadalupe Mountains NP-Frijole Ranger Station | Culberson | US Geological Survey | 06/84 |
| TX56 | LBJ National Grasslands | Wise | US Geological Survey | 09/83 |
| **Utah** | | | | |
| UT01 | Logan | Cache | US Geological Survey | 12/83 |
| UT08 | Murphy Ridge | Rich | BP Amoco | 03/86 |
| UT09 | Canyonlands NP - Island in the Sky | San Juan | National Park Service - Air Resources Div | 11/97 |
| UT98 | Green River | Emery | US Geological Survey | 04/85 |
| UT99 | Bryce Canyon NP - Repeater Hill | Garfield | National Park Service - Air Resources Div | 01/85 |
| **Vermont** | | | | |
| VT01 | Bennington | Bennington | US Geological Survey | 04/81 |
| VT99 | Underhill | Chittenden | US Geological Survey | 06/84 |
| **Virgin Islands** | | | | |
| VI01 | Virgin Islands NP - Lind Point | St. John | National Park Service - Air Resources Div | 04/98 |
| **Virginia** | | | | |
| VA00 | Charlottesville | Albemarle | US Geological Survey | 10/84 |
| VA13 | Horton's Station | Giles | Tennessee Valley Authority | 07/78 |
| VA24 | Prince Edward | Prince Edward | US Environmental Protection Agency-CAMD | 01/99 |
| VA28 | Shenandoah NP - Big Meadows | Madison | National Park Service - Air Resources Div | 05/81 |
| **Washington** | | | | |
| WA14 | Olympic NP - Hoh Ranger Station | Jefferson | National Park Service - Air Resources Div | 05/80 |
| WA19 | North Cascades NP-Marblemount Ranger Station | Skagit | US Geological Survey | 02/84 |
| WA21 | La Grande | Pierce | US Environmental Protection Agency-CAMD | 04/84 |
| WA24 | Palouse Conservation Farm | Whitman | US Geological Survey | 08/85 |
| WA99 | Mount Rainier NP - Tahoma Woods | Pierce | National Park Service - Air Resources Div | 10/99 |
| **West Virginia** | | | | |
| WV04 | Babcock State Park | Fayette | US Geological Survey | 09/83 |
| WV05 | Cedar Creek State Park | Gilmer | US Environmental Protection Agency-CAMD | 01/99 |
| WV18 | Parsons | Tucker | USDA Forest Service | 07/78 |
| **Wisconsin** | | | | |
| WI09 | Popple River | Florence | Wisconsin Department of Natural Resources | 12/86 |
| WI25 | Suring | Oconto | Wisconsin Department of Natural Resources | 01/85 |
| WI28 | Lake Dubay | Portage | Wisconsin Department of Natural Resources | 06/82 |
| WI35 | Perkinstown | Taylor | US Environmental Protection Agency-CAMD | 01/99 |
| WI36 | Trout Lake | Vilas | Wisconsin Department of Natural Resources | 01/80 |
| WI37 | Spooner | Washburn | Wisconsin Department of Natural Resources | 06/80 |
| WI97 | Lac Courte Oreilles Reservation | Sawyer | EPA/Lac Courte Oreilles Conservation Dept | 11/01 |
| *WI98 | Wildcat Mountain | Vernon | Wisconsin Department of Natural Resources | 08/89 |
| WI99 | Lake Geneva | Walworth | Wisconsin Department of Natural Resources | 06/84 |
| **Wyoming** | | | | |
| WY00 | Snowy Range - West Glacier Lake | Albany | USDA Forest Service | 04/86 |
| WY02 | Sinks Canyon | Fremont | Bureau of Land Management | 08/84 |
| WY06 | Pinedale | Sublette | Bureau of Land Management | 01/82 |
| WY08 | Yellowstone NP - Tower | Park | National Park Service - Air Resources Div | 06/80 |
| WY95 | Brooklyn Lake | Albany | USDA Forest Service | 09/92 |
| WY97 | South Pass City | Fremont | SF Phosphates Ltd. - Bridger Teton NF | 04/85 |
| WY98 | Gypsum Creek | Sublette | Exxon Mobil Corporation | 12/84 |
| WY99 | Newcastle | Weston | Bureau of Land Management | 08/81 |
| **Canada** | | | | |
| CAN5 | Frelighsburg | | US Geological Survey | 10/01 |

*At these sites the USGS sponsors a second collector for the purpose of measuring network precision.

# National Atmospheric Deposition Program
## Atmospheric Integrated Research Monitoring Network
### December 31, 2001



# NADP/Atmospheric Integrated Research Monitoring Network Sites
# December 31, 2001

| State<br>Site Code | Site Name | County | Sponsoring Agency | Start<br>Date |
|---|---|---|---|---|
| **Delaware** | | | | |
| DE02 | Lewes | Sussex | NOAA-Air Resources Laboratory | 09/92 |
| DE99 | Trap Pawn State Park | Sussex | NOAA-Air Resources Laboratory | 05/01 |
| **Florida** | | | | |
| FL18 | Tampa Bay | Hillsborough | FL-Department of Environmental Protection | 08/96 |
| **Illinois** | | | | |
| IL11 | Bondville | Champaign | NOAA-Air Resources Laboratory | 10/92 |
| **Maryland** | | | | |
| MD15 | Smith Island | Somerset | NOAA-Air Resources Laboratory | 11/95 |
| **New York** | | | | |
| NY67 | Cornell University | Thompkins | NOAA-Air Resources Laboratory | 09/92 |
| **Pennsylvania** | | | | |
| PA15 | Penn State | Centre | NOAA-Air Resources Laboratory | 10/92 |
| **Tennessee** | | | | |
| TN00 | Oak Ridge National Lab | Anderson | NOAA-Air Resources Laboratory | 09/92 |
| **Vermont** | | | | |
| VT99 | Underhill | Chittenden | NOAA-Air Resources Laboratory | 01/93 |
| **West Virginia** | | | | |
| WV99 | Canaan Valley Institute | Tucker | NOAA-Air Resources Laboratory | 06/00 |

# National Atmospheric Deposition Program
# Mercury Deposition Network

**December 31, 2001**

# National Atmospheric Deposition Program/Mercury Deposition Network Sites
## December 31, 2001

| State/Province Site Code | Site Name | County | Sponsoring Agency | Start Date |
|---|---|---|---|---|
| **Alabama** | | | | |
| AL02 | Delta Elementary | Baldwin | EPA/Alabama Department of Environmental Management | 06/01 |
| AL03 | Centreville | Bibb | Southern Company/Atmospheric Research and Analysis, Inc. | 06/00 |
| AL24 | Bay Road | Mobile | EPA/Alabama Department of Environmental Management | 05/01 |
| **California** | | | | |
| CA72 | San Jose | Santa Clara | EPA/San Francisco Estuary Institute | 01/00 |
| **Colorado** | | | | |
| CO97 | Buffalo Pass - Summit Lake | Routt | USDA Forest Service-Rocky Mountain Research Station | 09/98 |
| CO99 | Mesa Verde NP-Chapin Mesa | Montezuma | EPA/Office of Wetlands, Oceans, & Watersheds | 12/01 |
| **Florida** | | | | |
| FL04 | Andytown | Broward | S FL Water Mgt Dist/FL Dept of Environmental Protection | 01/98 |
| FL05 | Chassahowitzka NWR | Citrus | US Fish and Wildlife Service - Air Quality Branch | 07/97 |
| FL11 | Everglades NP - Research Center | Dade | S FL Water Mgt Dist/FL Dept of Environmental Protection | 12/95* |
| FL34 | ENRP | Palm Beach | S FL Water Mgt Dist/FL Dept of Environmental Protection | 07/97 |
| **Georgia** | | | | |
| GA09 | Okefenokee NWR | Charlton | US Fish and Wildlife Service - Air Quality Branch | 07/97 |
| GA40 | Yorkville | Paulding | Southern Company/Atmospheric Research and Analysis, Inc. | 06/00 |
| **Illinois** | | | | |
| **IL11 | Bondville | Champaign | Illinois State Water Survey | 12/95* |
| **Indiana** | | | | |
| IN20 | Huntington Reservoir | Huntington | Indiana Department of Environmental Management/USGS | 10/00 |
| IN21 | Clifty Falls State Park | Jefferson | Indiana Department of Environmental Management/USGS | 01/01 |
| IN28 | Bloomington | Monroe | Indiana Department of Environmental Management/USGS | 12/00 |
| IN34 | Indiana Dunes National Lakeshore | Porter | Indiana Department of Environmental Management/USGS | 10/00 |
| **Louisiana** | | | | |
| LA05 | Lake Charles | Calcasieu | Louisiana Department of Environmental Quality | 10/98 |
| LA10 | Chase | Franklin | Louisiana Department of Environmental Quality | 10/98 |
| LA23 | Alexandria | Rapides | Louisiana Department of Environmental Quality | 02/01 |
| LA28 | Hammond | Tangipahoa | Louisiana Department of Environmental Quality | 10/98 |
| **Maine** | | | | |
| ME02 | Bridgton | Cumberland | Maine Department of Environmental Protection | 06/97 |
| ME09 | Greenville Station | Piscataquis | Maine Department of Environmental Protection | 09/96 |
| ME96 | Casco Bay - Wolfe's Neck Farm | Cumberland | Maine Department of Environmental Protection | 01/98 |
| ME98 | Acadia NP - McFarland Hill | Hancock | NPS-Acadia NP & ME Dept of Environmental Protection | 01/96* |
| **Minnesota** | | | | |
| MN16 | Marcell Experimental Forest | Itasca | USDA Forest Service-North Central Research Station | 12/95* |
| MN18 | Fernberg | Lake | USDA- FS, Superior NF & MN Pollution Control Agency | 01/96* |
| MN23 | Camp Ripley | Morrison | Minnesota Pollution Control Agency | 07/96 |
| MN27 | Lamberton | Redwood | Minnesota Pollution Control Agency | 07/96 |
| **Mississippi** | | | | |
| MS22 | Oak Grove | Perry | Southern Company/Atmospheric Research and Analysis, Inc. | 06/00 |
| **New Hampshire** | | | | |
| NH00 | Laconia | Belknap | New Hampshire Department of Environmental Services | 01/98*** |
| NH05 | New Castle | Rockingham | New Hampshire Department of Environmental Services | 10/97*** |
| **New Mexico** | | | | |
| NM10 | Caballo | Sierra | Bureau of Reclamation/New Mexico State University | 05/97 |

| State/Province<br>Site Code | Site Name | County | Sponsoring Agency | Start<br>Date |
|---|---|---|---|---|
| **North Carolina** | | | | |
| NC08 | Waccamaw State Park | Columbus | North Carolina Dept of Environment & Natural Resources | 12/95* |
| NC42 | Pettigrew State Park | Washington | North Carolina Dept of Environment & Natural Resources | 12/95* |
| **New York** | | | | |
| NY20 | Huntington Wildlife | Essex | EPA/State University of New York - Syracuse | 12/99 |
| **Pennsylvania** | | | | |
| PA00 | Arendtsville | Adams | PA Dept of Environmental Protection/Penn State University | 11/00 |
| PA13 | Allegheny Portage Railroad NHS | Cambria | PA Dept of Environmental Protection/Penn State University | 01/97 |
| PA30 | Erie | Erie | PA Dept of Environmental Protection/Penn State University | 06/00 |
| PA37 | Holbrooke | Greene | US Dept of Energy/National Energy Technology Laboratory | 05/99 |
| PA60 | Valley Forge | Montgomery | PA Dept of Environmental Protection/Penn State University | 11/99 |
| PA72 | Milford | Pike | PA Dept of Environmental Protection/Penn State University | 09/00 |
| PA90 | Hills Creek State Park | Tioga | PA Dept of Environmental Protection/Penn State University | 01/97 |
| **South Carolina** | | | | |
| SC03 | Savannah River | Barnwell | US Dept of Energy/Westinghouse Savannah River Co | 01/01 |
| SC19 | Congaree Swamp State Park | Richland | South Carolina Dept of Health & Environmental Quality | 12/95* |
| **Texas** | | | | |
| TX21 | Longview | Gregg | Texas Natural Resource Conservation Commission | 12/95* |
| TX50 | Fort Worth | Tarrant | EPA/Ft Worth Department of Environmental Management | 08/01 |
| **Washington** | | | | |
| WA18 | Seattle - NOAA | King | Frontier Geosciences, Inc | 03/96 |
| **Wisconsin** | | | | |
| WI08 | Brule River | Douglas | Wisconsin Department of Natural Resources | 12/95* |
| WI09 | Popple River | Florence | Wisconsin Department of Natural Resources | 12/95 |
| WI31 | Devils Lake | Sauk | Wisconsin Department of Natural Resources | 01/01 |
| WI36 | Trout Lake | Vilas | Wisconsin Department of Natural Resources | 12/95* |
| WI99 | Lake Geneva | Walworth | Wisconsin Department of Natural Resources | 01/97 |
| **CANADA** | | | | |
| **British Columbia** | | | | |
| BC06 | Reifel Island | | Environment Canada - Pacific and Yukon Region | 03/00 |
| **New Brunswick** | | | | |
| NB02 | St. Andrews | | Environment Canada - Meteorological Service of Canada | 07/96 |
| **Newfoundland** | | | | |
| NF09 | Newfoundland | | Environment Canada - Meteorological Service of Canada | 05/00 |
| **Nova Scotia** | | | | |
| NS01 | Kejimkujik NP | | Environment Canada - Meteorological Service of Canada | 07/96 |
| **Ontario** | | | | |
| ON07 | Egbert | | Environment Canada - Air Quality Research Branch | 03/00 |
| ON10 | Burnt Island | | Environment Canada - Environmental Conservation Service | 12/01 |
| ON11 | Point Petre | | Environment Canada - Environmental Conservation Service | 12/01 |
| **Quebec** | | | | |
| PQ04 | Saint Anicet | | Environment Canada - Meteo Service of Canada-Quebec Region | 04/98 |
| PQ05 | Mingan | | Environment Canada - Meteo Service of Canada-Quebec Region | 04/98 |
| **Saskatchewan** | | | | |
| SK12 | Regina | | Environment Canada - Prairie and Northern Region | 08/01 |

*These dates mark the official start of NADP/MDN operations. Data for a transition network operating in 1995 are available from the NADP web site at http://nadp.sws.uiuc.edu.
**At this site the NADP Program Office sponsors a second collector for the purpose of measuring network precision.
***Sampling was discontinued at NH00 from 04/00 to 05/01 and at NH05 from 12/99 to 04/01.

# NATIONAL ATMOSPHERIC DEPOSITION PROGRAM (NRSP-3)
# EXECUTIVE COMMITTEE - 2001/2002

## PROGRAM OFFICERS

| | |
|---|---|
| Kathy A. Tonnessen<br>Chair | NPS/RM-CESU<br>School of Forestry<br>University of Montana<br>Missoula, MT 59812 |
| Richard H. Grant<br>Vice Chair | Purdue University<br>Department of Agronomy<br>Life Sciences Building<br>West Lafayette, IN 47907 |
| Gary Lear<br>Secretary | U.S. Environmental Protection Agency<br>Clean Air Markets Division<br>Mail Code 6204N<br>1200 Pennsylvania Avenue NW<br>Washington, DC 20460 |
| Richard S. Artz<br>Past Chair | NOAA-Air Resources Lab<br>R/ARL, SSMC3, Room 3151<br>1315 East West Highway<br>Silver Spring, MD 20910 |

**Committee & Subcommittee Chairs:**

| | |
|---|---|
| Mark Nilles<br>Budget Advisory Committee<br>Co-Chair | U.S. Geological Survey<br>Box 25046, MS 401<br>Denver, CO 80225 |
| Kristi Morris<br>Network Operations Subcommittee<br>Chair | U.S. Fish & Wildlife Service<br>NPS-AIR<br>P.O. Box 25287<br>Denver, CO 80225-0287 |
| Bob Larson<br>Data Management & Analysis Subcommittee<br>Chair | Illinois State Water Survey<br>2204 Griffith drive<br>Champaign, IL 61820 |
| John Sherwell<br>Environmental Effects Subcommittee<br>Co-Chair | MD Dept. of Natural Resources<br>Tawes Building B-3<br>Annapolis, MD 21401 |

## PROGRAM REPRESENTATIVES

**SAES Administrative Advisors**

| | |
|---|---|
| Wayne Banwart<br>North Central Region | University of Illinois<br>ACES Admin.<br>104 Mumford Hall, MC-710<br>1301 West Gregory<br>Urbana, IL 61801 |
| Bruce Wiersma<br>Northeastern Region | Dean<br>College of Natural Sciences, Forestry and Agriculture<br>University of Maine<br>Orono, Maine 04469-0163 |
| G. (Jerry) F. Arkin<br>Southern Region | Associate Director, Resident Director<br>University of Georgia<br>1109 Experiment Street<br>Griffin, GA 30223-1797 |
| Donald LSnyder<br>Western Region | Director<br>Utah State University<br>Agricultural Experiment Station<br>4810 Old Main Hill,, AGSC225<br>Logan, UT 84332-4810 |

**Other Advisors**

| | |
|---|---|
| Daniel D. Jones<br>National Program Leader (USDA/CSREES) | USDA CSREES<br>Room3002, Waterfront Centre<br>1400 Independence Avenue SW<br>Washington, DC 20250-2220 |
| Michael Uhart<br>National Acid Precipitation Assessment Program (NAPAP) | NAPAP/NOAA/PDC<br>1315 East West Highway<br>Room 11419<br>Silver Spring, MD 20910 |
| Mark Nilles<br>NTN (USGS) | U.S. Geological Survey<br>Box 25046, MS 401<br>Denver, CO 80225 |

| | |
|---|---|
| Bruce Rodger<br>MDN (WI DNR) | Wisconsin Dept of Natural Resources<br>Bureau of Air Management<br>101 South Webster Street<br>Madison, Wisconsin 53707 |
| Richard S. Artz<br>AIRMoN (NOAA) | NOAA-Air Resources Lab<br>R/ARL, SSMC3, Room 3151<br>1315 East West Highway<br>Silver Spring, MD 20910 |

**Agency Representatives**

| | |
|---|---|
| Scott F. Archer<br>Bureau of Land Management (BLM) | NARSC (RS-140)<br>Denver Federal Center, Building 50<br>P.O. Box 25047<br>Denver, CO 80225-0047 |
| Gary Lear<br>Clean Air Status and Trends Network (CASTNet) | U.S. Environmental Protection Agency<br>Clean Air Markets Division<br>Mail Code 6204N<br>1200 Pennsylvania Avenue NW<br>Washington, DC 20460 |
| Rona Birnbaum<br>U.S. Environmental Protection Agency (EPA) | U.S. Environmental Protection Agency<br>Clean Air Markets Division<br>Mail Code 6204N<br>1200 Pennsylvania Avenue NW<br>Washington, DC 20460 |
| Ellen Porter<br>U.S. Fish and Wildlife Service (FWS) | U.S. Fish & Wildlife Service<br>NPS - AIR<br>P. O. Box 25287<br>Denver, CO 80225-0287 |
| Kristi Morris<br>National Park Service (NPS) | National Park Service-AIR<br>c/o U.S. Fish & Wildlife Service<br>P. O. Box 25287<br>Denver, CO 80239 |
| William J. Parkhurst<br>Tennessee Valley Authority (TVA) | Tennessee Valley Authority<br>P.O. Box 1010, CEB 2A<br>Muscle Shoals, AL 35660-1010 |
| Richard G. Cline<br>U.S. Department of Agriculture/Forest Service (USDA/FS) | Department of Agriculture<br>Forest Service, WFWAR<br>201 14th St. SW, P. O. Box 96090<br>Washington, DC 20090-6090 |

**Other Representatives**

| | |
|---|---|
| Van C. Bowersox<br>NADP Coordinator | Illinois State Water Survey<br>2204 Griffith Drive<br>Champaign, IL 61820 |
| Clyde W. Sweet<br>Associate NADP Coordinator For Toxics | Illinois State Water Survey<br>2204 Griffith Drive<br>Champaign, IL 61820 |
| Karen Harlin<br>Assistant NADP Coordinator & CAL Director | Illinois State Water Survey<br>2204 Griffith Drive<br>Champaign, IL 61820 |
| Eric M. Prestbo<br>Mercury Analytical Laboratory-Director | Frontier Geosciences<br>414 Pontius North<br>Seattle, WA 98109 |
| Kathy Douglas<br>NADP Recorder | Illinois State Water Survey<br>2204 Griffith Drive<br>Champaign, IL 61820 |

## SUBCOMMITTEE OFFICERS

**Network Operations Subcommittee**

| | |
|---|---|
| Kristi Morris<br>Chair | National Park Service-AIR<br>c/o U.S. Fish & Wildlife Service<br>P. O. Box 25287<br>Denver, CO 80225-0287 |
| Mark Nilles<br>Vice Chair | U.S. Geological Survey<br>Box 25046, MS 401<br>Denver, CO 80225 |
| Natalie Latysh<br>Secretary | U.S. Geological Survey<br>Box 25046, MS 401<br>Denver, CO 80225 |

**Data Management and Analysis Subcommittee**

| | |
|---|---|
| Bob Larson<br>Chair | Illinois State Water Survey<br>2204 Griffith Drive<br>Champaign, IL 61820 |

| | |
|---|---|
| Tom Lavery<br>Vice Chair and Secretary | Harding ESE/CASTNet<br>2315 Beach Boulevard<br>Suite 104<br>Jacksonville Beach, FL 32250 |

**Environmental Effects Subcommittee**

| | |
|---|---|
| John Sherwell<br>Chair | Maryland Department of Natural Resources<br>Tawes Building B-5<br>Annapolis, MD 21401 |

**APPENDIX 5**

**The National Atmospheric Deposition Program (NRSP-3)**
**Technical/Executive Committee Meeting**
August 29-30, 2001, Champaign, Illinois
**Minutes**

**Wednesday, August 29, 2001**
Program Chair, Richard Artz, called the Technical Committee's Executive Committee to order at 3:10 p.m. The agenda was reviewed and Rick invited members to introduce themselves.

**Attendance List —**

| | |
|---|---|
| Richard Artz | NADP Chair<br>NOAA - Air Resources Lab |
| Kathy Tonnessen | NADP Vice Chair<br>National Park Service |
| Richard Grant | NADP Secretary<br>Purdue University |
| James Lynch | NADP Past Chair<br>Penn State University |
| John Shimshock | Chair, Network Operations Subcommittee<br>Advanced Technology Systems, Inc |
| Gary Lear | Chair, Data Management & Analysis Subcommittee<br>U.S. Environmental Protection Agency |
| John Sherwell | Chair, Environmental Effects Subcommittee<br>Maryland Department of Natural Resources |

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| | |
|---|---|
| Dan Jones | National Program Leader,<br>USDA/CSREES |
| Wayne Banwart | Lead Administrative Advisor, SAES - North Central Region<br>University of Illinois |
| Lee Sommers | Advisor, SAES - Western Region<br>Colorado State University |
| Mark Nilles | Advisor, NAPAP - National Trends Network<br>USGS-WRD |

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| | |
|---|---|
| Rona Birnbaum | Representative, USEPA |
| Richard Cline | Representative, USDA-Forest Service |
| Gary Lear | Representative, CASTNet<br>USEPA |
| Kristi Morris | Representative, National Park Service |
| Van Bowersox | NADP Program Coordinator<br>Illinois State Water Survey |
| Karen Harlin | NADP Assistant Program Coordinator<br>Illinois State Water Survey |
| Clyde Sweet | Associate Coordinator for Toxics<br>Illinois State Water Survey |

| | |
|---|---|
| Kathy Douglas | Recorder, NADP Program Office, Illinois State Water Survey |
| Scott Dossett | Guest, Illinois State Water Survey |
| Scott Faller | Guest, USEPA |
| Joel Frisch | Guest, USGS |
| Jeff Welker | Guest presenter, Colorado State University |

**NADP Field Equipment Modernization Initiative —**

**Precipitation Chemistry Collectors**

Scott Dossett, Guest, NADP Program Office, Illinois State Water Survey

- Presented the results of splash, freeze-down, and other tests performed over an eight-month period on N–CON Systems, Inc., ADS 2000, a new wet-only deposition collector purchased ($3,200) by the Program Office.
- Reported on positive test results of the ADS 2000 collector: (1) no freeze-downs occurred during tests in a walk-in freezer and in the field; (2) collector operates satisfactorily under DC power; (3) mechanical and electrical systems generally function well (with the exceptions noted below); and (4) optical sensor discriminates between wet and dry weather and does not trigger in fog.
- Reported on negative test results of the ADS 2000 collector: (1) only two corners of the square lid are driven, and strong winds have been observed to force the free corners out of position, jamming the collector; (2) counter weights designed to keep the free lid corners in position fail to keep the lid positioned properly in high winds.
- Described additional collector tests that are planned.

Rick Artz, Program Chair

- Presented a report on the status of the U.S. Department of Commerce Small Business Innovation Research Initiative award to Yankee Environmental Systems (YES) to design a new wet-only deposition collector.
- Reported that Phase I (design feasibility) had been completed successfully.
- Reported that YES had been notified of a Phase II (develop working prototype) award covering a two-year period at a total cost of $300K. YES promises to have a functioning model in two years and has a mock-up displayed at this meeting.

**Automated Precipitation Gages**

Bruce Baker, Guest by Phone, National Climate Data Center, Climate Reference Network (CRN) and Rick Artz, Program Chair

- Described the CRN, which is a new long-term (50-100 years) NOAA network with 25 stations being installed now and 250 stations planned for the complete network.
- Described key elements of the CRN: (1) yearly site visits to check and maintain equipment, (2) licensing agreements with operators, most of whom are not compensated for CRN work, (3) Geonor precipitation gage, equipped with a Campbell (CR23X) data logger with 1200-baud satellite uplink, (4) all gages with wind shields, (5) avoid forested areas, (6) smart software to help ensure data completeness, (6) ready supply of spare parts, (7) data available on-line, and (8) partner with NADP, if common ground can be found.

- Discussed the following topics & concerns: (1) shielded gages may result in step-function changes in NADP's precipitation record; (2) questioned decision to avoid forested areas (Baker said that these were avoided because of temperature measurement inhomogeneities in forests); and (3) discussed getting field trials of Geonor gages at 2 or 3 NADP sites.
- CRN has an annual budget of several million dollars; CRN's Web page address: http://lwf.ncdc.noaa.gov/oa/climate/research/crn/crn_main.html

Mark Nilles, US Geological Survey
- Presented summary of Ott-Pluvio precipitation gage tests: (1) John Gordon is preparing a report on a 5-gage comparison in which the Ott-Pluvio gage excelled, the Geonor and ETI NOAH-II gages were acceptable, and the Belfort vibrating wire gage was deemed unacceptable.
- Reported that field trials of the Ott-Pluvio gage will be completed by the Spring 2002 NOS meeting and a USGS report will be submitted for Director approval by October 2002.

Van Bowersox, Program Coordinator, Illinois State Water Survey
- Described a new gage being designed and built by ETI, a Fort Collins, CO, company: (1) design uses the Belfort gage case, replacing the mechanical weighing mechanism with a battery-powered load cell, (2) estimated purchase price not to exceed $4000, and (3) Budget Advisory Committee approved the purchase of two of these gages (model: NOAH-III) for testing.

**Funding Equipment Modernization (open discussion)**

- The Executive Committee is committed to replacing the Belfort gage and Aerochem Metrics collector with a new electronic gage and wet-deposition collector. A two-step process for replacing existing equipment was suggested: (1) select acceptable replacement equipment based on scientifically sound tests and (2) develop an infrastructure to handle a new data acquisition system and to repair and replace new equipment. Tests will continue until acceptable replacements are selected. New sites could install approved new equipment, while existing sites could phase in replacement equipment as funds become available.

**Reports —**

**NTN Advisor, Mark Nilles, USGS**

- Outlook for FY02 field site and Program Office support is stable.
- USGS considering new sites at Moss Lake, NY, and Lake Tahoe Watershed.
- FY02 BLM support is level.

**National Park Service/Fish &Wildlife Service, Kristi Morris**

- Stable FY02 funding for FWS with possibly 1 new MDN and 1 new NTN site.
- Stable FY02 funding for NPS with possibly 5 new MDN and 8-10 new NTN sites.

**USDA-Forest Service, Richard Cline**

- Stable FY02 funding for 20 sites is anticipated.

**National Oceanic and Atmospheric Administration, Rick Artz**

- NTN support is stable and AIRMoN will remain at 10 sites, including Smith Island and the new Delaware site, Trap Pond State Park.

**Environmental Protection Agency, Rona Birnbaum**

- Anticipates all three tribal sites will be in operation in the near future.
- Five NERRS sites will be installed and become operational in the near future.

**Program Vice Chair, Kathy Tonnessen**

- Reported that NADP will lead two platform and two poster sessions at the upcoming International N2001 Conference in Potomac, MD. Abstracts for presentations and posters are available in the proceedings of this meeting.

**Program Chair, Rick Artz**

- Appointed the nominating committee (John Sherwell, Kathy Tonnessen, Lee Sommers) for selection of the 2001/02 NADP Secretary.

**Thursday, August 30, 2001**
Program Chair, Richard Artz, called the Executive Committee meeting to order. Minutes of the 17-20 October 2000 Executive Committee Meeting in Saratoga Springs, NY, were approved with minor corrections.

**Special Presentation on Measuring Isotopes in NADP Samples —**

***Isotopic ($\delta^{18}O$ & $\delta D$) characteristics of weekly precipitation collected across the US using the NADP network: Establishment of the US Network for Isotopes in Precipitation (USNIP)***

Jeff Welker, Guest, Colorado State University
- US Network for Isotopes in Precipitation is based on archive samples from 80 NTN sites.
- Proposed that NADP establish an isotope network that would be funded as part of long-term NADP support.
- Discussion: Rick Artz suggested that Welker submit a written proposal to have the USNIP become part of the NADP. He also suggested that the Program Office create a “new issues” area on the NADP home page, where there would be a link to the USNIP. Mark Nilles sees no organizational roadblock to such an application.

**Reports (continued) —**

**National Program Leader, Dan Jones, CSREES**

- Reported on a meeting between CSREES Executive staff and the NRSP-3, held on 15 March 2001. Attending the meeting were NADP Program Chair Rick Artz, Past Chair Jim Lynch, Lead Administrative Advisor Wayne Banwart, and Program Coordinator Van Bowersox, along with CSREES Deputy Administrators. Van presented a seminar describing the history, status, and new directions of National Research Support Project #3 (NADP). After the presentation, meetings were arranged with George Cooper, Deputy Administrator for Partnerships, Ralph Otto, Deputy Administrator for Natural Resources, and Jane Coulter, Deputy Administrator for Science and Education Resource Development.
- Reported that a program review must be completed prior to seeking NRSP-3 renewal. Dan met with George Cooper and Ted Wilson, Deputy Administrator for Plant and Animal Systems, to discuss the review and learned that general criteria for national program reviews will not be available in time to meet the deadline for an NRSP-3 review. He also learned that CSREES would not lead these reviews and that objectivity and independent thinking are important criteria for review team members. Review criteria can be based on previous reviews (e.g., 1998 review) or can be entirely new, if justified. A combination of old and new criteria may work best. The NRSP-3 review must be completed and the reviewers' report finalized before the Spring SAES Directors' meetings.
- Discussed having an on-site review conducted by a panel of 5 or 6 external reviewers. Ideally, the panel would meet in September or October at Program Office facilities at the University of Illinois.

**Administrative Advisors**

Wayne Banwart, Lead Administrative Advisor, North Central Region

- Reiterated support for an on-site program review completed before the Spring 2002 meetings.

Lee Sommers, Administrative Advisor, Western Region

- Reported that NRSP-3 needs to emphasize its interconnectedness with federal, state, and non-governmental programs and its many linkages with other networks and programs. Questions have been raised about the function, role, and longevity of existing national programs.
- Reported that this is his last NRSP-3 meeting as Western Administrative Advisor. With the realignment of responsibilities in the Western Region, other responsibilities are requiring his time and attention. Dr. Donald Snyder of Utah State University will replace him.
- Program Chair, Rick Artz, thanked Lee for serving as our Western Advisor and for his contributions to the NADP.

**Program Office**

Van Bowersox, NADP Coordinator, Illinois State Water Survey

- Reported on status of three NADP networks: NTN has 231 active sites, AIRMoN has 10 active sites, and MDN has 60 active sites.
- Meeting Support: (1) Kathy Douglas prepared and distributed the minutes of the October 2000 Executive Committee meeting in Saratoga Springs, NY; (2) Kathy worked with Rick Artz to coordinate submission of manuscripts from the Saratoga Springs Technical Committee symposium (Manuscripts are under review for publication in a special section of *Atmospheric Environment.)*; (3) Kathy and Pam Bedient prepared the proceedings for this meeting, which included abstracts of papers to be presented in NADP sessions at the upcoming *N2001 - The Second International Nitrogen Conference*, scheduled for the Bolger Conference Center in Potomac, MD; (4) Rick Artz and Kathy Tonnessen will chair sessions on "Atmospheric Deposition of Nitrogen" and "Effects of Atmospheric Deposition of Nitrogen," respectively, at the *N2001 Conference*.
- Archival Samples: Karen Harlin has agreed to chair the ad-hoc committee that evaluates requests for NADP archival samples, pending Executive Committee approval; Karen would replace Van in this capacity.

*Note:* Approval was given for Karen Harlin to replace Van Bowersox as chair of the archive sample ad-hoc committee. This motion was carried when the entire Program Office report is accepted.

- Marketing: (1) Scott Dossett attended the Second Annual National Tribal Forum in New Orleans, LA, on 10-11 April, where he gave a presentation on the NTN and MDN; (2) Clyde Sweet and Eric Prestbo prepared a white paper recommending that NADP add a trace metals option to the existing MDN; (3) An informational brochure about the NADP/MDN, originally drafted by Tamara Saltman of the EPA with input from the Environmental Effects Subcommittee, is now available on-line and hard copies can be obtained from the Program Office; (4) Plans are to send an e-mail announcing publication of the NADP 2000 Annual Summary, as well as other new publications and new features on the NADP Internet site.
- Site Documentation: Information from the on-site systems and performance reviews conducted by ATS are being received and added to NADP files.
- Site Liaison: (1) Procedures for on-site sub-sampling were revised to accommodate lower volume limits for sample removal by site personnel who are engaged in on-site research; (2) ME00, the Caribou site, no longer performs field chemistry measurements, joining CO15, IL18, NM12, PA29 and NY98, which previously had discontinued these measurements; (3) Site moves were listed.
- Site Operator Training: On 1-3 May, 28 people completed the Field Operations Training Course at the Illinois State Water Survey.
- Network Equipment Depot (NED): In 2000/01, modest improvement was realized in the frequency of bulk and undefined samples, which decreased from 3.55% to 3.08% of the total number of samples.
- Equipment Modernization Initiative: (1) The Ott-Pluvio precipitation gage is being field-tested at the Bondville site operated by the Water Survey; (2) The Bondville site will serve as a field test site for Climate Reference Network equipment; (3) A Ft. Collins, CO, company (ETI Systems, Inc.) has developed a proposal for NADP consideration for a new precipitation measurement system that can control and monitor a wet deposition

sampler; (4) Yankee Environmental Systems, Inc., is continuing to seek comment and information on specifications and features for its new wet deposition collector; (5) The Program Office purchased and is evaluating a new wet deposition collector sold by N–Con Systems, Inc., of Crawford, GA.

- Data Base/Web Page: (1) NADP's Internet site is being re-designed to offer a more attractive interface, improved navigation, and increased reliability of large downloads; (2) Back-trajectories for AIRMoN samples can now be displayed;
  (3) Preparation of 50-km topographic maps for sites is complete; (4) Global Positioning System measurements are being recorded for all NADP sites; (5) US census data on streets, roads, and trails are being summarized for posting on site maps; (6) Statistics on Internet site usage:
- Of the 1,251,150 hits on the web page this year, 40% were education- related and 60% were of research-related.
- NTN data to April 2001, AIRMoN data to February 2001 and MDN data through December 2000 are available on the internet site.
- In January 2001, the Institute of Scientific Information (ISI) selected the NADP site for inclusion in the Current Web Contents, an on-line listing of scholarly, research-oriented web sites. Navigation and design, accuracy and currency of content, scope and quality of writing are among the criteria ISI applies in selecting sites.
- Quality Assurance:(1) A job search is open for an NADP Quality Assurance Manager; (2) Greg Dzursin is working 40% time to handle ATS site systems and performance surveys, oversee conversion of the hand-drawn 30-meter site sketches into digital drawings, and oversee a project to obtain GPS readings of all NADP sites; (3) ATS has delivered 164 NTN site systems and performance reviews in 2000/2001; (4) Greg Dzurizin and Scott Dossett sent colored site sketches and accompanying data sheets to the 34 site operators and supervisors at NTN sites with 45-degree violations, and operators were asked to review the sketches for accuracy, mark changes and corrections, and comment on whether the 45-degree violations might be addressed in some way (although no corrective action was required, 9 sites took action to correct violations).
- MDN Analytical Laboratory (HAL) Contract: The contract for MDN laboratory services was re-competed and the current laboratory, Frontier Geosciences Inc., was selected.

*Motion:* Mark Nilles moved to accept the Program Office report. Jim Lynch seconded. *Motion carried.*

A fire alarm sounded and the building was cleared.

**___CAL Report**

Karen Harlin, CAL Director, Illinois State Water Survey

- CAL Internet Site: nadp.sws.uiuc.edu/cal, became active in February 2001
- Site Operations
  - 31st NTN site operators course held at the CAL, May 1-3, 2001.
  - 32nd NTN site operators course is scheduled for April 9-11, 2002.
  - NTN lid seal change was scheduled for June 5, 2001. To date, 200 out of 229 have been returned or 87%.
  - 2002 Calendar is in the registration packets and will be mailed in the October 2001 site mailing.

- Site operator awards include 7 - 5 year awards, 20 - 10 year awards, 16 - 15 year awards and 3 - 20 year awards. The recipients are as follows:

### *5 Year Awards (paper certificate)*

| Site | Name | Wet Start | Agency |
|---|---|---|---|
| KS32 - Lake Scott State Park | Curtis Sauer | 032784 | USGS |
| NM12 - Capulin Volcano NM | Abbie Reaves | 111584 | EPA/NM ED-AQB |
| OK17 - Great Plains Apiary | Kathy McAlister | 032983 | NOAA-ARL |
| PA15 - Penn State | Robert Ziegler | 060783 | NOAA-ARL |
| PR20 - El Verde | John Bithorn | 021285 | USFS |
| TN11 - Great Smokey Mtn NP | Scott Berenyi | 081280 | NPS-ARD |
| WA24 - Palouse Cons Farm | Robert Barry | 082085 | USGS |
| ***10 Year Awards (5 x 7 plaque)*** | | | |
| AL10 - Black Belt Substation | Peggy Seekers | 083183 | USGS |
| CO22 - Pawnee | Mark Lindquist | 052279 | NSF-LTER/CSU |
| CO91 - Wolf Creek Pass | Todd Pitcher | 052692 | USFS |
| CO96 - Molas Pass | Brian Parker | 072986 | USFS |
| IA08 - Big Springs Fish Hatchery | Robert Zach | 081484 | USGS |
| IN22 - SW Purdue Ag Center | Angie Thompson | 092584 | USGS/Purdue Univ |
| MS19 - Newton | Ron Gilstrap | 111186 | NOAA-ARL |
| MT13 - Give Out Morgan & | Linda Connor | 091482 | EPA/Ft Peck Tribes |
| MT96 - Poplar River | | 122199 | EPA/Ft Peck Tribes |
| MT97 - Lost Trail Pass | Chuck Oppegard | 092590 | USFS |
| ND11 - Woodworth | Gayle Cook | 112983 | USGS |
| NY65 - Jasper | Peter Finlay | 021980 | USGS |
| NY98 - Whiterface Mountain | Douglas Wolfe | 070384 | USGS |
| OH49 - Caldwell | Mike Franko | 092678 | USGS |
| PA29 - Kane Exp Forest | Donald Dorn | 071878 | USFS |
| TX16 - Sonora | Robert Moen | 062684 | USGS |
| VA13 - Horton's Station | Stanley Long | 072578 | TVA |
| WI28 - Lake Dubay | Barry Benson | 062982 | Wisconsin DNR |

| | | | |
|---|---|---|---|
| WI98 - Wildcat Mountain | Karen Teed | 080189 | Wisconsin DNR |
| WY06 - Pinedale | Sallie Otteman | 012682 | BLM |
| ***15 Year Awards (8 x 10 plaque)*** | | | |
| CA45 - Hopland | Charles Vaughn | 100379 | USGS |
| FL99 - Kennedy Space Center | Lee Maull | 080283 | Dynamac |
| IL11 - Bondville | Mike Snider | 022779 | SAES- U of Illinois |
| IN20 - Huntington Reservoir | Gary Zeissig | 082283 | USGS |
| MI99 - Chassell | David Toczydlowski | 021583 | NPS-ARD |
| MS30 - Coffeeville | Hilliard Griffin | 071784 | TVA |
| NE15 - Mead | Sheldon Sharp | 072578 | SAES - U of Nebraska |
| NE99 - North Platte Ag Exp Stn | Jim Goeke | 092485 | USGS |
| OH71 - Wooster | Cheryl Capek | 092678 | USGS |
| TX03 - Beeville | Domingo Martinez | 020784 | NOAA-ARL |
| UT08 - Murphy Ridge | Lee Bodine | 032586 | BP/AMOCO |
| UT98 - Green River | Nolan Johnson | 042585 | USGS |
| VT01 - Bennington | Dan Taylor | 042881 | USGS |
| WI09 - Popple River | Cathy McLain | 123086 | Wisconsin DNR |
| WV18 - Parsons | John Pearce | 070578 | USFS |
| WY98 - Gypsum Creek | Terry Pollard | 122684 | Exxon Mobile Oil Corp |
| ***20 Year Awards (lucite trophy)*** | | | |
| IL63 - Dixon Springs Ag Center | Claris Barger | 013079 | SAES - U of Illinois |
| MI09 - Douglas Lake | Robert Vande Kopple | 070379 | SAES-Michigan State |
| NJ99 - Washington Crossing | Kathy McCullough | 080481 | EPA |

- Laboratory Operations: (1) NTN reviewed and validated 212,432 samples as of 8/24/01; (2) AIRMoN reviewed and validated 12,054 samples as of 8/24/01; (3) A new M.S. level chemist is in training for all instrumental procedures; (4) Automated transfer of lab comments, contamination codes, pH and conductivity measurements is in testing and, barring problems, will be implemented for AIRMoN in October 2001 and for NTN in January 2002; (5) A new IC autosampler will allow decreased sample volumes to be used; (6) New instrumentation is under review for major cations; (7) The CAL statement of work is being updated with review from the Program Office; (8) The CAL shipped NTN archival samples from 1994 and 1995 to several researchers.

- Data Management Operations: (1) NTN data through April 2001 was sent to the Program Office; (2) AIRMoN data through May 2001 was sent to the Program Office: (3) CAL reviewer comments have been added to the NTN database in response to auditors suggestions to eliminate data reviewer's notations on the FORFs; (4) The analysis date has been added to the NTN database for FIA, IC and AAS; (5) The AIRMoN database now contains hourly precipitation, beginning January 1, 2001.
- QA/QC: (1) *1999 CAL Quality Assurance Report* has been published; (2) *CAL Quality Assurance Plan* was externally reviewed, comments were incorporated, and the *Plan* is in a second internal review; (3) CAL lab operations were reviewed, July 23-24, 2001, by Mark Peden, Jane Rothert, and Karen Harlin.

*Motion*: John Shimshock moved to accept the report. Kathy Tonnessen seconded. *Motion carried.*

**___NADP Archive Samples**

Karen Harlin, Assistant NADP Coordinator, Illinois State Water Survey

- Archival samples (NTN > 5 years old; AIRMoN > 2 years old):
  - Dr. Emi Ito of the University of Minnesota received 1995 NTN archival samples from 8 sites (IA08, LA12, MT07, NE15, NY52, NC03, WI25 and PR20).
  - Dan Driscoll of the USGS in Rapid City, SD, received NTN archival samples from ND11.
  - Jeff Welker of Colorado State University, received all remaining 1995 NTN archival samples.
- Active archival samples (NTN < 5 years old; AIRMoN < 2 years old)
  - Dr. Ed Harvey of the University of Nebraska-Lincoln received samples from NE15 for 1996-1998 (shipment pending).
  - Dr. Madhav Machavaram of the Lawrence Berkeley National Laboratory is scheduled to receive active archival samples from eight NTN sites (AR03, CA42, KS32, LA30, OK29, TX10, TX56, and UT99). Shipments will begin in September 2001.
  - Dr. Devorah Neher of the University of Toledo will receive composited samples by site and by month with volumes that exceed the 150 ml required for CAL analysis and archival purposes. The sites are IN20, MI26, MI52, and OH15.
- Archival sample requests for Executive Committee approval:
  - Dr. Ed Harvey of the University of Nebraska-Lincoln requests samples from NE15 through 2000 for compositing with previously received samples so that he can make monthly and seasonal tritium measurements.
  - Ty Coplen of the USGS requests NTN and AIRMoN samples collected at collocated sites (OH09, PA15) during 1997 and 1998. Coplen is testing whether $^{18}O/^{2}H$ in weekly samples is physically consistent with $^{18}O/^{2}H$ in daily samples.
  - Jeff Welker of Colorado State University requests NTN subsamples from WI36 for June-August 2001; OR02, OR10, and OR18 from June-September, 1996 and 1997, and for all of 2000 and July-August 2001. Welker is participating in a study involving Wisconsin and Oregon, where investigators are addressing carbon and water cycling in deciduous and evergreen forests. He wants to document the isotopic relationship between oxygen isotopes in precipitation and in the oxygen of CO2.
  - Interest has been expressed from the following but proposals have not been submitted: Simon Poulson or the University of Nevada-Reno, Brian Scott of Environment Canada, and Mark Lyford of the University of Wyoming.

*Motion:* Accept Harvey, Coplen, and Welker requests, made by Mark Nilles. Seconded by John Sherwell.
*Discussion:* Question about the cost of suppling subsamples, which is $2 per bottle or a minimum of $50. Karen was asked to prepare a report summarizing costs for preparing and mailing subsamples to ensure that the CAL is recovering the cost of this activity.
*Motion carried.*

**Budget Advisory Committee**

Mark Nilles, Budget Advisory Committee Co-chair
- Reported that the FY01 cooperative agreement between USDA-CSREES and the University of Illinois was fully funded by the federal agencies that support the agreement.
- Reviewed FY01expenditures and the proposed FY02 budget.
  - Federal agencies expect no substantial changes in their FY02 commitments to support NADP.
  - No change in cost of CAL services in FY02.
  - Likely increase in CAL cost in FY03.
  - Special projects approved for FY02 include Phase II trials of the NOAH III raingage and N–Con sampler.

**Network Operations Subcommittee**

John Shimshock, Network Operations Subcommittee Chair
- Siting Criteria Violations:
  - Proposed forming an ad hoc committee to address current siting criteria violations at NADP sites and recommend how these should be addressed; report is due at Spring 2002 NOS meeting. Chair is Joel Frisch, members are Scott Dossett and Preston Lewis.
  - Proposed forming an ad hoc committee to review NADP siting criteria and report on progress at Spring 2002 NOS meeting. Chair is Gary Stensland, members are Rick Artz, Natalie Latysh, and John Shimshock.
  - 5-meter rule: siting criteria violations for objects within 5 meters of the wet bucket orifice will be given a 0.5 meter “grace” distance for the purpose of initiating administrative follow-up and corrective actions.
  - Collector orientation: the siting criterion that specifies that the collector be oriented with the wet bucket to the west will result in administrative follow-up and corrective actions when the wet bucket orientation is outside of the 225-315 degree azimuth range.
- Proposed acceptance of NTN site, WA98:
  - Recommend that WA98, near Portland, OR, be granted an exception to the criterion addressing “urban area proximity” and accepted into NTN.
- Proposed NTN sites in Virginia:
  - Recommend that the Program Office inform the Virginia Department of Natural Resources that any site considered for inclusion in NTN must meet local siting criteria. Proposed sites at Rock Bridge and NASA Langley could potentially meet these criteria, while the site at Occoquan would require relocation.
- Recommended acceptance of the newly revised NADP/ NTN Site Information Worksheet and Section 3 and Appendix A of the *Site Selection and Installation Manual*.

- Elected Natalie Latysh, USGS, as NOS secretary. NOS officers are Kristi Morris, Chair, Mark Nilles, Vice-chair, and Natalie Latysh, Secretary.
- Proposed forming an ad hoc committee to address ETI corporation questions about system integration and control software for the NOAH-III precipitation measurement system. Chair is Scott Dossett, members are Dennis Lamb, Rick Artz and Mark Nilles.
- Approved release of AIRMoN orthophosphate data on the NADP Internet site.
- Recommend that 30-meter site sketches be made available on-line.

*Motion:* Mark Nilles moved that the NOS report including all action items be approved. Jim Lynch seconded.
*Discussion:* There was discussion about NADP data from "urban" sites on the Internet. Data from all NADP sites meeting the completeness criteria are presented without any indication of the possibility of urban or other influences. It was suggested that urban sites be classified and designated on annual summary maps. This discussion did not lead to any amendments.
*Motion carried.*

**New Business —**

**EPA's QA Program**

Gary Lear, U.S. Environmental Protection Agency
- Described the history of the QA Steering Committee, established in the early 1980s to set QA policies and priorities and discontinued in 1996, because of perceived redundancy with the Executive Committee.
- Described the position of QA Manager, which was funded under a separate agreement between EPA and the Coordination Office from 1985-1995; the position was filled by Dave Bigelow, who compiled summaries of QA activities, conducted research, and reported to EPA and the QA Steering Committee.
- Described the renewed emphasis on quality assurance at EPA; monitoring activities must have up-to-date QA Plans.
- Proposed a new QA program for NADP in which EPA resources would be re-directed toward QA research and coordination; Scott Faller of EPA would coordinate this effort and would be responsible for preparation of updated QA Plans and annual summary reports.

*Motion:* Re-establish NADP QA Committee, which would report to the Executive Committee and establish QA policies and priorities. Members would include the EPA QA Coordinator, USGS representative, Program Office QA Manager, CAL QA Representative, HAL QA Representative. John Sherwell seconded.
*Discussion:* Questions were raised about the budgetary impacts.
*Motion:* Mark Nilles moved to table the motion. John Sherwell seconded.
*Motion to Table Carried.*

**New Executive Committee Secretary**

The nominating committee selected Gary Lear as the new NADP secretary.
*Motion:* Van Bowersox moved that the nominations be closed. Jim Lynch seconded. *Motion carried.*

**___Technical Committee Meeting 2002**

Locations for the 2002 Technical Committee meeting were discussed. Madison, WI, and Seattle, WA, were suggested. There were suggestions that this meeting emphasize mercury deposition. The Program Office will check on facilities and prices in these two cities and work with Rich Grant to select a location and dates for the meeting.

**Reports (continued) —**

**___HAL Report**

Clyde Sweet, Associate Coordinator for Toxics. Illinois State Water Survey

- Total active MDN sites: 61. The Covello site, CA97, is temporarily closed and will be moved. Seven new sites are expected to begin operations by the end of 2001 and 10 other sites have been proposed.
- Reported on new HAL facilities, which include 700 sq ft of new space, two dedicated total and methyl mercury analyzers, a new sample receiving area, a dedicated bottle washing room and lab (expected to move in 11/2001).
- Reported on HAL quality assurance activities:
  - 2000 Annual HAL QA Report awaiting final system blanks; it will be available on the web site.
  - 2001 quarterly lab QA reports will continue to be sent with MDN preliminary quarterly data reports.
  - 2001 HAL interlaboratory comparison studies for July - Dec 2001 to be complete in Feb 2002.
  - Frontier Geosciences has been audited by 7 different agencies, including the NADP.
  - Field comparisons have been conducted at ME98, WA18, and IL11.
  - ATS Sites Systems and Performance reviews to be conducted on a 3-year cycle.
- Reported on MDN Operator Training: 16 site operators trained in 2000 and 17 trained through June 2001.
- MDN site moves: CA97 to move to Englenook, CA, and AB08 moved to SK12
- 2001 meetings attended:
  - West Palm Beach, FL, *Workshop on the Fate Transport and Transformation of Mercury in Aquatic and Terrestrial Environments*, May 8-9, 2001. Sponsored by the US EPA, attended by Clyde Sweet and Eric Prestbo.
  - Minamata, Japan, *Mercury as a Global Pollutant, 6$^{th}$ International Conference*, Eric Prestbo attended.
  - Montreal, Quebec, Canada, *Workshop on Atmospheric Mercury Science and Policy*, Sep 14-16, 2001, sponsored by the Council on Environmental Cooperation, International Joint Commission, Clyde Sweet attended.
  - NESCAUM meeting, Massachusetts, November 8-9, 2001. Attended by Clyde Sweet.

*Motion:* Jim Lynch moved to accept the report. John Sherwell seconded.
*Discussion:* There wasa suggestion to break out the MDN publications in annual reports
*Motion carried.*

## Environmental Effects Subcommittee

John Sherwell, Environmental Effects Subcommittee Chair, Maryland Department of Natural Resources

- Discussed the need to assess the impact of urban areas on regional atmospheric deposition. Three Virginia Acid Precipitation Network sites are being considered for inclusion in NTN to look at this question.
- Reported on a pilot program, initiated in July 2001, to measure total nitrogen in a subset of NTN samples. Mark Castro of the University of Maryland in Frostburg is principle investigator of this project.
- The Chesapeake Bay Program is preparing an RFP to develop a regression model of daily deposition estimates for the Chesapeake Bay watershed.

*Motion:* Kathy Tonnessen moved to accept the report, seconded by Gary Lear.
*Motion carried.*

## Data Management and Analysis Subcommittee

Gary Lear, Data Management and Analysis Subcommittee Chair, US Environmental Protection Agency

- Minutes from the Spring 2001 meeting will be posted by Bob Larson within 30 days of this meeting.
- Subcommittee Officers for 2001/2002: Bob Larson, Chair, Tom Lavery, Vice Chair/Secretary.
- Recommended that methyl mercury data be transferred from the HAL to the Program Office on the same schedule as total Hg data; it was proposed that these data be transferred as Excel spreadsheet files, although the security of these transfers was questioned and the methods for storing and transferring Hg data were deferred to the Spring 2002 meeting.
- Reported on a passive ammonia sampling experiment that Gary Stensland described to the Subcommittee; gaseous ammonia deposition estimates could fill an important gap in total nitrogen deposition calculations.
- Reported on progress in providing on-line open data base connectivity (ODBC) access to NADP database tables. Bob Larson anticipates that ODBC access will be available in 2001 and will send an announcement when it is ready. Potential users should contact him to establish a user ID and password.
- Reported on progress toward an integrated coding system for the three NADP networks. MDN and AIRMoN codes are close to being integrated. The Program Office will present the resolved coding system for MDN and AIRMoN and convert all time data from local time to GMT before the Spring 2002 meeting.

*Motion:* John Sherwell moved to accept the report and Kathy Tonnessen seconded. *Motion carried.*

**New Business (continued) —**

**___CASTNet Dry Deposition**

Gary Lear, US Environmental Protection Agency
- Reported on EPA efforts to expand the CASTNet dry deposition network.
- Described a cooperative agreement between EPA and the Canadian Meteorological Service to work on total and dry deposition issues. Among the joint activities is an effort to improve the characterization of filter packs and improve the methods for combining all North American atmospheric deposition data, using the NATChem system developed by Environment Canada.
- Reported on the work of Peter Finklestein and Monte Fuentes to develop a regional deposition model using Models 3.
- Reported on a study in which EPA has funded the Institute for Ecosystem Studies to compare throughfall measurements with total deposition estimates from collocated NTN and CASTNet sites.

**___Trace Metals in NADP**

Clyde Sweet, Associate Coordinator for Toxics
- Presented a white paper, “Measurement of Trace Metals in NADP, prepared by Clyde Sweet and Eric Prestbo, and asked whether NADP wants to officially include a trace metals option in its toxics program.
- Described current efforts occurring at selected Pennsylvania sites, where a separate trace metals sampling train is installed in the MDN collectors and samples are sent to Frontier Geosciences for analysis.
- Discussion followed to allow a link to be added to the web site to show what is out there but not necessarily endorsed by NADP or connected to NADP. Jim Lynch would be happy to share the Pennsylvania data, if the state agrees.

**___Joint Network Training**

- Discussion about joint training classes and videos across the three networks.
- The Program Office was advised to coordinate training and other activities among the three networks to reduce any duplication of effort.

*Motion:* Rich Grant made a motion to adjourn the meeting, Kathy Tonnessen seconded. *Motion carried.*

NADP Chair, Rick Artz, adjourned the meeting at 1:30 p.m. by presenting the traditional “mallet” to Kathy Tonnessen, the 2001/2002 NADP Technical Committee Chair.

**National Atmospheric Deposition Program**
**August 27-30, 2001 Technical Committee Meeting**
**Participant List**

| | |
|---|---|
| Artz, Richard | NOAA - Air Resources Lab |
| Bachman, Sue | Illinois State Water Survey |
| Banwart, Wayne | University of Illinois |
| Beaubien, Mark | Yankee Environmental Systems, Inc. |

| | |
|---|---|
| Bergerhouse, Thomas | Illinois State Water Survey |
| Birnbaum, Rona | USEPA Clean Air Markets Division |
| Bowersox, Van | Illinois State Water Survey |
| Claybrooke, Roger | Illinois State Water Survey |
| Cline, Richard | USDA Forest Service |
| Cornelius, Wayne | NC Dept of Environment and Natural Resources |
| Demir, Brigita | Illinois State Water Survey |
| Dossett, Scotty | Illinois State Water Survey |
| Douglas, Kathy | Illinois State Water Survey |
| Dzurisin, Greg | Illinois State Water Survey |
| Faller, Scott | USEPA |
| Fringer, Joyce | Illinois State Water Survey |
| Frisch, Joel | U.S. Geological Survey |
| Gordon, John | U.S. Geological Survey |
| Grant, Richard | Purdue University |
| Harlin, Karen | Illinois State Water Survey |
| Islam, Tahmina | North Carolina DENR--Air Quality--Air Monitoring |
| Johnson, Andrew | Maine Department of Environmental Protection |
| Jones, Daniel | USDA/CSREES |
| Larson, Robert | Illinois State Water Survey |
| Latysh, Natalie | U.S. Geological Survey |
| Lear, Gary | USEPA Clean Air Markets Division |
| Lewis, Preston | New York State Dept of Environmental Conservation |
| Lynch, James | Penn State University |
| Lynch, Malcolm | C. C. Lynch & Associates, Inc. |
| Malone, Patrick | New York State Dept of Environmental Conservation |
| Maull, Lee | Dynamac Corp. |
| McCormick, Kathy | Illinois State Water Survey |
| Mesarch, Mark | University of Nebraska - Lincoln |
| Milton, Sarah | Illinois State Water Survey |
| Morris, Kristi | National Parl Service -- AIR |
| Nilles, Mark | U.S. Geological Survey |
| Peden, Mark | Illinois State Water Survey |
| Pribble, Jeff | Illinois State Water Survey |
| Rothert, Jane | Illinois State Water Survey |
| Sherwell, John | Maryland Department of Natural Resources |
| Shimshock, John | Advanced Technology Systems, Inc |
| Smith, Luther | ManTech Environmental Technology |
| Sommers, Lee | Colorado State University, Agricultural Experiment Station |
| Stensland, Gary | Illinois State Water Survey |
| Sweet, Clyde | Illinois State Water Survey |
| Tonnessen, Kathy | National Park Service/RM-CESU |
| Wade, Terry | Texas A&M University |
| Welker, Jeff | Colorado State University, Natural Resource Ecology Lab |
| Wolfe, Rosemary | USEPA Clean Air Markets Division |

**APPENDIX 6**

## National Research Support Project - 3
## Publications by NRSP-3 Scientists - 2001

### NADP Program Office Publications

National Atmospheric Deposition Program. 2001. *NADP 2001 - NADP Committee Meeting Proceedings.* (prepared by Douglas, K.E. and P.S. Bedient) NADP Proceedings 2001-01, August 27-30, 2001, Champaign, IL, and October 14-18, 2001, N2001 - The Second Annual International Nitrogen Conference, Potomac, MD. NADP Program Office, Champaign, IL. 120 pp.

National Atmospheric Deposition Program. 2001. National Atmospheric Deposition Program 2000 Annual Summary. NADP Data Report 2001-01. NADP Program Office, Champaign, IL. 16 pp.

National Atmospheric Deposition Program. 2001. *Quality Assurance Report, National Atmospheric Deposition Program, 1999, Laboratory Operations, Central Analytical Laboratory.* (prepared by J.E. Rothert) NADP QA Report 2001-01, NADP Program Office, Champaign, IL. 127 pp.

National Atmospheric Deposition Program. 2001. 2002 CALendar. NADP Program Office, Champaign, IL. 30 pp.

### Journal Articles

Bischoff, J.M., P. Bukaveckas, K. Ohrui, and M.J. Mitchell. 2001. Nitrogen Storage and Cycling in Vegetation of a Forested Wetland: Implications for Watershed N Processing. *Water, Air, and Soil Pollution.* **128**:97-114.

Boesch, D.F., R.B. Brinsfield, and R.E. Magnien. 2001. Chesapeake Bay Eutrophication: Scientific Understanding, Ecosystem Restoration, and Challenges for Agriculture. *Journal of Environmental Quality.* **30**:303-320.

Bytnerowicz, A., P.E. Padgett, S.D. Parry, M.E. Fenn, and M.J. Arbaugh. 2001. Concentrations, Deposition, and Effects of Nitrogenous Pollutants in Selected California Ecosystems. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World* **1**(S2):304-311.

Butler, T.J., G.E. Likens, and B.J.B. Stunder. 2001. Regional-scale Impacts of Phase I of the Clean Air Act Amendments in the USA: the Relation Between Emissions and Concentrations, Both Wet and Dry. *Atmospheric Environment*. **35**:1015-1028.

Cape, J.N., A. Kirika, A.P. Rowland, D.R. Wilson, T.D. Jickells, and S. Cornell. 2001. Organic Nitrogen in Precipitation: Real Problems or Sampling Artifact? Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd Interna tional Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):230-237.

Coats, R.N. and C.R. Goldman. 2001. Patterns of Nitrogen Transport in Streams of the Lake Tahoe Basin, California-Nevada. *Water Resources Research*. **37**(2):405-415.

Civerolo, K.L., E. Brankov, S. T. Rao, and I. Zurbenko. 2001. Assessing the Impact of the Acid Deposition Control Program. *Atmospheric Environment.* **35**:4135-4148.

Civerolo, K. L., and S. T. Rao. 2001. Space-time Analysis of Precipitation-Weighted Sulfate Concentrations Over the Eastern United States. *Atmospheric Environment*, **35**:5657-5661.

David, M.B., G.F. McIsaac, T.V. Royer, R.G. Darmody, and L.E. Gentry. 2001. Estimated Historical and Current Nitrogen Balances for Illinois. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):597-604.

Driscoll, C.T., G.B. Lawrence, A.J. Bulger, T.J. Butler, C.S. Cronan, C. Eagar, K.F. Lambert, G.E. Likens, J.L. Stoddard, and K.C. Weathers. 2001. Acidic Deposition in the Northeastern United States: Sources and Inputs, Ecosystem Effects, and Management Strategies. *BioScience*. **51**(3):180-198.

Eshleman, K.N., D.A. Fiscus, N.M. Castro, J.R. Webb, and F.A. Deviney, Jr. 2001. Computation and Visualization of Regional-Scale Forest Disturbance and Associated Dissolved Nitrogen Export from Shenandoah National Park, Virginia. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):539-547.

Fenn, M.E. and M.A. Poth. 2001. A Case Study of Nitrogen Saturation in Western U.S. Forests. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):433-439.

Goolsby, D.A. and W.A. Battaglin. 2001. Long-term Changes in Concentrations and Flux of Nitrogen in the Mississippi River Basin, USA. *Hydrological Processes.* **15**:1209-1226.

Goolsby, D.A., W.A. Battaglin, B.T. Aulenbach, and R.P. Hooper. 2001. Nitrogen Input to the Gulf of Mexico. *Journal of Environmental Quality*. **30**:329-336.

Greening, H. and B. D. DeGrove. 2001. Implementing a Voluntary, Nonregulatory Approach to Nitrogen Management in Tampa Bay, FL: A Public/Private Partnership. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):433-439.

Holloway, J.M., R.A. Dahlgren, and W.H. Casey. 2001. Nitrogen Release from Rock and Soil Under Simulated Field Conditions. *Chemical Geology.* **174**:403-414.

Johnson, C.A., M.A. Mast, and C.L. Kester. 2001. Use of $^{17}O/^{16}O$ to Trace Atmospherically-Deposited Sulfate in Surface Waters: A Case Study in Alpine Watersheds in the Rocky Mountains. *Geophysical Research Letters*. **28**:4483-4486.

Harvey, F.E. 2001. Use of NADP Archive Samples to Determine the Isotope Composition of Precipitation: Characterizing the Meteoric Input Function for Use in Ground Water Studies. *Ground Water.* **49**(3):380-390.

Hicks, B.B., T.P. Meyers, R.P. Hosker, Jr., and R.S. Artz. 2001. Climatological Features of Regional Surface Air Quality from the Atmospheric Integrated Research Monitoring Network (AIRMoN) in the USA. *Atmospheric Environment.* **35**:1053-1068.

Krajick, K. 2001. Long-term Data Show Lingering Effects from Acid Rain. *Science*. **292**:195-196.

Likens, G.E., T.J. Butler, and D.C. Buso. 2001. Long- and Short-term Changes in Sulfate Deposition: Effects of the 1990 Clean Air Act Amendments. *Biogeochemistry.* **52**:1-11.

Luria, M., R.E. Imhoff, R.J. Valente, W.J. Parkhurst, and R.L. Tanner. 2001. Rates of Conversion of Sulfur Dioxide to Sulfate in a Scrubbed Power Plant Plume. *Journal of the Air and Waste Management Association.* **51**:1408-1413.

Mast, M.A., J.T. Turk, G.P. Ingersoll, D.W. Clow, and C.L. Kester. 2001. Use of Stable Sulfur Isotopes to Identify Sources of Sulfate in Rocky Mountain Snowpacks. *Atmospheric Environment.* **35:**3303-3313.

McIsaac, G.F., M.B. David, G.Z. Gertner, and D.A. Goolsby. 2001. Nitrate Flux in the Mississippi River. Nature. 414:166-167.

Meixner, T., M. Fenn, and M. Poth. 2001. Nitrate in Polluted Mountainous Catchments with Mediterranean Climates. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):564-571.

Miegroet, H.V., I.F. Creed, N.S. Nicholas, D.G. Tarboton, K.L. Webster, J. Shubzda, B. Robinson, J. Smoot, D.W. Johnson, S.E. Lindberg, G. Lovett, S. Nodvin, and S. Moore. 2001. Is There Synchronicity in Nitrogen Input and Output Fluxes at the Noland Divide Watershed, a Small N-Saturated Forested Catchment in the Great Smoky Mountains National Park. Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):480-492.

Mitchell, M.J., C.T. Driscoll, J. Owen, D. Schaefer, R. Michener, and D.J. Raynal. 2001. Nitrogen Biogeochemistry of Three Northern Hardwood Forest Ecosystems in the Adirondack Mountains. *Biogeochemistry*. **56**:93-133.

Mitchell, M.J., P.J. McHale, S. Inamdar, and D.J. Raynal. 2001. Role of Within Lake Processes and Hydrobiogeochemical Changes over 16 Years in a Watershed in the Adirondack Mountains of New York State, U.S.A. *Hydrological Processes.* **15**:1951-1965.

Napier, T.L. and M. Tucker. 2001. Factors Affecting Nutrient Application Rates within Three Midwestern Watersheds. *Journal of Soil and Water Conservation.* **56**(3):220-228.

Nilles, M.A. and B.E. Conley. 2001. Changes in the Chemistry of Precipitation in the United States, 1981-1998. *Water, Air, and Soil Pollution.* **130**:409-414.

Norton, S.A., B.J. Cosby, I.J. Fernandez, J.S. Kahl, and M.R. Church. 2001. Long-term and Seasonal Variations in CO2: Linkages to Catchment Alkalinity Generation. *Hydrology and Earth System Sciences.* **5**:83-91.

Parker, J.L., I.J. Fernandez, L.E. Rustad, and S.A. Norton. 2001. Effects of Nitrogen Enrichment, Wildfire, and Harvesting on Forest Soil Carbon and Nitrogen. *Soil Science Society of America Journal*. **65**:1248-1255.

Pilgrim, W., P. Eaton, andL. Trip. 2001. The Need for Integrated Linkages and Long-term Monitoring of Mercury in Canada. *Environmental Monitoring and Assessment.* **67**:57-68.

Pryor, S.C., R.J. Barthelmie, M. Carreiro, M.L. Davis, A. Hartley, B. Jensen, A. Oliphant, J.C. Randolph, and J.T. Schoof. 2001. Nitrogen Deposition to and Cycling in a Deciduous Forest. In Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):245-254.

Rabaud, N.E., T.A. James, L.I. Ashbaugh, and R.G. Flocchini. 2001. A Passive Sampler for the Determination of Airborne Ammonia Concentrations near Large-Scale Animal Facilities. *Environmental Science and Technology.* **35**(6):1190-1196.

Reid, N., P.K. Misra, R. Bloxam, D. Yap, S.T. Rao, K. Civerolo, E. Brankov, and R.J. Vet. 2001. Do We Understand Trends in Atmospheric Sulfur Species? *Journal of the Air & Waste Management Association.* **51**:1561-1567.

Seigneur, C., P. Karamchandani, K. Lohman, K. Vijayaraghavan, and R.L. Shia. 2001. Multiscale Modeling of the Atmospheric Fate and Transport of Mercury. *Journal of Geophysical Research*. **106**(D21):27,795-27,809.

Showstack., R. 2001. Further Emissions Cuts Needed for Speedier Acid Rain Recovery. *EOS, Transactions, American Geophysical Union.* **82**:161-162.

St. Louis, V.L. , J.W.M. Rudd, C.A. Kelly, B.D. Hall, K.R. Rolfhus, K. J. Scott, S.E. Lindberg, and W. Dong. 2001. Importance of the Forest Canopy to Fluxes of Methyl Mercury and Total Mercury to Boreal Ecosystems. *Environmental Science and Technology*. **35**:3089-3098.

Staver, K.W. and R.B. Brinsfield. 2001. Agriculture and Water Quality on the Maryland Eastern Shore: Where do we go from here? *BioScience*. **51**(10): 859-868.

Stottlemyer, R. 2001. Ecosystem Processes and Nitrogen Export in Northern U.S. Watersheds. In Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):581-588.

Stottlemyer, R. 2001. Processes Regulating Watershed Chemical Export during Snowmelt, Fraser Experimental Forest, Colorado. *Journal of Hydrology*. **245**:177-195.

Takemoto, B.K., A. Bytnerowiscz, and M.E. Fenn. 2001. Current and Future Effects of Ozone and Atmospheric Nitrogen Deposition on California's Mixed Conifer Forests. *Forest Ecology and Management.* **144**:159-173.

Turk, J.T., H.E. Taylor, G.P. Ingersoll, K.A. Tonnessen, D.W. Clow, M.A. Mast, D.H. Campbell, and J.M. Melack. 2001. Major-ion Chemistry of the Rocky Mountain Snowpack, USA. *Atmospheric Environment.* **35**:3957-3966.

Williams, M.W. and D. Manthorne. 2001. Class I Areas at Risk: Event-Based Nitrogen Deposition to a High-Elevation, Western Site. In Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection: Proceedings of the 2nd International Nitrogen Conference on Science and Policy. *The Scientific World.* **1**(S2):287-293.

Zhang, Q. and C. Anastasio. 2001. Chemistry of fog waters in California's Central Valley - Part 3: Concentrations and Speciation of Organic and Inorganic Nitrogen. *Atmospheric Environment*. **35**:5629-5643.

NADP Proceedings : *NADP 2001 - NADP Committee Meeting Proceedings*. NADP Proceedings 2001-01, August 27-30, 2001, Champaign, IL, and October 14-18, 2001, Potomac, MD. (Note: See the next section for abstracts from N2001: The Second International Nitrogen Conference.)

Demir, B., K. Surratt, and J. Rothert. 2001. Optimization and Preparation of Precipitation Analyses. U.S. Fish and Wildlife Service p. 23.

Dossett, S.R. 2001. NADP Field Equipment Infrastructure Improvements. p. 24.

Dossett, S.R. and P. Bedient. 2001. The NADP History and Networks. p. 25.

Peden, M.E. 2001. Programs of the Illinois State Water Survey. p. 26.

Park, J. T.L. Wade, and S.T. Sweet. 2001 Atmospheric Deposition of PAHs, PCBs, and Organochlorine Pesticides to Corpus Christi Bay, Texas. p. 27.

*N2001: The Second International Nitrogen Conference, Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection. Program and Abstracts.* Bolger Conference Center, Potomac, MD, October 14-18, 2001 (http://esa.sdsc.edu/n2001).

Aber, J., S. Ollinger, R. Freuder, C. Driscoll, G. Likens, R. Holmes, and C. Goodale. 2001. Temporal Changes in Nitrate Loss from Forested Ecosystems in Response to Physical, Chemical, Biotic, and Climatic Perturbations. p. 89.

Allen, E.B., L. Egerton-Warburton, C. Siguenza, and A.G. Sirulnik. 2001. Effects of N Deposition on Plants and Soil Microorganisms on an Urban to Rural Gradient in Southern California. p. 64.

Baker, L.A., D. Hope, J. Edmonds, Y. Xu, and L. Lauver. 2001. Factors Controlling N Cycling in the Central Arizona-Phoenix Ecosystem. p. 82.

Baron, J., H.M. Rueth, A.P. Wolfe, K.R. Nydick, B. Moraska, and M. Pagani. 2001. Ecosystem Responses to Nitrogen Deposition in the Colorado Rocky Mountains. p. 41.

Bobbink, R. 2001. The Impacts of Air-Borne NitrogenPollutants on Diversity: An European Overview. p. 65.

Boggs, J.B., S.G. McNulty, and L.H. Pardo. 2001. Effects of Nitrogen Deposition on High Elevation Spruce-Fir and Deciduous Forests Across the Northeastern US. p. 109.

Boyer, E.W., R.W. Howarth, and C.L. Goodale. 2001. Effects of Anthropogenic Nitrogen Loading on Riverine Nitrogen Export. p. 83.

Boynton, W.R. 2001. Chesapeake Bay Eutrophication: Historical and Recent Patterns of Nutrient Inputs, Effects on Water Quality, Fate of Nutrients, and Likely Responses to Load reductions. p. 77.

Brewer, P.F., T. Sullivan, B.J. Cosby, and R.K. Munson. 2001. Responses of Forests and Streams in Southern Appalachian Mountains to Changes in S, N, and Base Cation Deposition. p. 65.

Bytnerowicz, A., M. Fenn, P. Padgett, M. Arbaugh, and M. Poth. 2001. Deposition and Effects of Nitrogen Deposition in California Ecosystems. p. 65.

Campbell, D.H., M.A. Mast, D.W. Clow, L. Nanus, G. P. Ingersoll, and T. Blett. 2001. Response of Aquatic Ecosystems to Nitrogen Deposition in the Rocky Mountains. p. 66.

Campos, E.C., N. Garcia, M. Colina, G. Colina, N. Fernandez, E. Chacin, L. Sandova, and J. Marin. 2001. Evaluation of the Nitrogen Forms as Macronutrients in Atmospheric Settle-able Particles in Maracaibo Lake Strait. p. 96.

Cape, J.N., A.P. Rowland, and T.D. Jickells. 2001. Organic Nitrogen in Precipitation: Real Problem or Sampling Artifact? p. 49.

Corre, M.D. and F.O. Beese. 2001. Gross Rates of Internal N Cylce in Acid, High N Deposition Forest Soil: Changes under Long-Term N Saturated and Limed Conditions. P. 109-110.

Cuesta-Santos, O., A. Collazo,A. Wallo, R. Labrador, M. Gonzalez, and P. Oritz. 2001. Atmospheric Nitrogen Compounds Deposition in the Humid Tropics - Cuba. p. 96.

David, M.B., G.F. McIsaac, T.V. Royer, J.L. Tank, and L.E. Gentry. 2001. The Nitrogen Mass Balance of an Agricultural and Artificially Drained State: Past and Current. p. 62.

Dennis, R. 2001. Ammonia Deposition and Airsheds and their Relation to Inorganic Nitrogen Deposition. p. 44.

DeWalle, D., M.T. Gockley, M. O'Driscoll, and J. Chorover. 2001. Upland Versus Hyporheic Nitrogen Losses on an Appalachian Forest Watershed. p. 73.

Dixon, L.K., E.D. Estevez, and E.M. Porter. 2001. Water and Vegetation Sampling to Evaluate Nitrogen Enrichment at Chassahowitzka National Wildlife Refuge 1996-Present. p. 110.
Galloway, J. and E. Cowling. 2001. Nitrogen and the World. p. 30.
Gilliland, A.B., R.L. Dennis, S.J. Roselle, and T.E. Pierce. 2001. Inverse Modeling to Estimate the Seasonality of Airborne Ammonia Emissions. p. 45.
Gilliland, A.B., T.J. Butler, and G.E. Likens. 2001. Seasonal and Monthly Bias in Weekly (NADP/NTN) vs Daily (AIRMoN) Ammonium and Nitrogen Precipitation Chemistry in the Eastern U.S.A. p 109.
Goolsby, D.A. and W.A. Battaglin. 2001. Nitrogen Sources and Fate in the Mississippi River Basin. p. 62.
Greening, H.S. and B.D. DeGrove. 2001. Implementing a Nitrogen Management Strategy in Tampa Bay, Florida: A Public/Private Partnership. p. 79.
Howarth, R.W.2001. The North American Nitrogen Story. p. 30.
Indriksone, I., I. Lyulko, and M. Frolova. 2001. Nitrogen Deposition in Latvia. p. 97.
Ito, M., M.J. Mitchell, C.T. Driscoll, W. Kretser, and K. Roy. 2001. Nitrogen Input and Output in the Adirondack Lake-Watershed. p. 114.
Jaworski, N.A. 2001. Nitrogen, Phosphorus, and Potassium Inputs and Outputs for the Potomac Watershed, 1900-2000. p. 108.
Kerchner, M., J. Thomas, A. Weber, and R. Halloran. 2001. The Implications of Ammonia Emissions to Coastal and Estuarine Areas. p. 110.
Lawrence, G.B., Accumulation of Nitrogen in Forest Soils Continues to Cause Episodic Acidification of Streams in Calcium-Depleted Watersheds. p. 66.
Lear, G.G. and D.W. Schmeltz. 2001. Spatial and Temporal Trends in Total Nitrogen Deposition for the U.S. p. 49.
Losleben, M., M.W. Williams, and C. Seibold. 2001. Four NADP Stations along an Elevational Transect in the Colorado Front Range: Atmospheric Sources of N Deposition. p. 97.
Lovett, G.M., K.C. Weathers, and M.A. Arthur. 2001. Factors Controlling Stream Water Nitrate Concentrations in Forested Watersheds of the Catskill Mountains, New York. p. 74.
Lynch, J.A. and V.C. Bowersox. 2001. Annual and Seasonal Trends in Nitrate Concentration in the USA and their Relationship to Emissions. p. 49.
Manthorne, D. and M.W. Williams. 2001. Class I Areas at Risk: Event-Based Nitrogen Deposition to a High-Elevation, Western Site. p. 97.
Mastoi, G.M., and M.Y. Khuhawar. 2001. Effects of Fertilizers on the Human Health of Sindh, Pakistan. p. 110.
McCubbin, D.R., B.J. Apelberg, S. Roe, and F. Divita. 2001. Animal Feeding Operations, Ammonia, and Particulate Health Effects. p.66.
Meixner, T., M.E. Fenn, and M.A. Poth. 2001. Nitrogen Export in Polluted Semi-Arid Mountainous Catchments. p. 115.
Morris, K., and K.A. Tonnessen. 2001. Nitrogen Deposition in Primenet Park Units: A Comparative Analysis. p. 97.
Murdoch, P.S. and D.A. Burns. Effect of Clearcutting on Nitrogen Export from a Watershed in the Catskill Mountains, New York. p. 91.
Nilles, M.A. and B.E. Conley. 2001. Trends in Wet Deposition of Ammonium and Nitrate in the United States, 1985-2000. p. 49.
Paerl, H.W., D.R. Whitall, and R.L. Dennis. 2001. Integrating Atmospheric Deposition of Nitrogen in Estuarine and Coastal Nutrient Cycling and Eutrophication Dynamics. p. 80.
Pan, Y., J. Hom, K. McCullough, and J. Aber. 2001. The Impact of Increasing Atmospheric Nitrogen Deposition on Forest Ecosystems and Watersheds in the Chesapeake Bay Region. p. 66.
Pardo, L.H., S.G. McNulty, and J.L. Boggs. 2001. Effects of N Deposition on High elevation Forests in the Northeastern US: Foliar $^{15}N$ Patterns. p.92.
Peterjohn, W.T., M.J. Christ, J.R. Cumming, and M.B. Adam. 2001. Patterns of Nitrogen Availability in Appalachian Forests Receiving High Inputs of Atmospheric Nitrogen. p. 115.

Pryor, S.C., R.J. Barthelmie, M. Carreiro, M.L. Davis, A. Hartley, B. Jensen, A. Oliphant, J.C. Randolph, and J.T. Schoof. 2001. Nitrogen Deposition to a Mid-Latitude Deciduous Forest and Ecosystem Response. p. 49-50.

Robarge, W.P., J. Walker, G. Murray, J. Chauhan, and T. Manuszak. 2001. Atmospheric Ammonia/um in a Region with Large-Scale Animal Production Facilities. p. 93.

Rodhe, H., J.C.K. Kuylenstierna, W.K. Hicks, H-M. Seip, F. Dentener, and M. Shulz. 2001. Global Distribution of Acidifying Deposition and a Simple Model for Terrestrial Ecosystem Acidification. p. 118.

Russow, R.W.B., F. Bohme, and H.U. Neue. 2001. A New Approach to Determine the Total Airborne N-Input into the Soil-Plant System Using the $^{15}N$ Isotope Dilution(ITNI): Results for Agricultural Used Areas of Central Germany. p. 50.

Salahi, A., S. Geranfar, and S.A. Korori. 2001. Nitrogen Compounds Deposition on Urban Ecosystems. p. 98.

Sherwell, J. 2001. Evaluation of the Calpuff Model using NADP/NTN and CASTNET Data. p.67.

Sherwell, J., and M. Garrison. 2001. A Mitigation Strategy for Deposition from a New Electricity Generating Facility. p. 1100-111.

Sickles, J.E. II. 2001. Deposition of Oxidized Nitrogen in the Eastern United States. p. 50.

Singh, R.K., and M. Agrawal. 2001. Characterization of Wet and Dry Deposition in the Down Wind of Industrial Sources in a Dry Tropical Area. p. 98.

Stensland, G.J. and J. Montgomery. 2001. Month-to-Month Variation in Concentration in Precipitation of Nitrate and Ammonium in Sites in the USA. p. 98-99.

Stensland, G.J., V.C. Bowersox, B. Larson, and R.D. Claybrooke. 2001. Comparison of Ammonium in USA Wet Deposition to Ammonia Emission Estimates. p. 50.

Stottlemyer, R. 2001. Ecosystem Processes and Watershed Nitrogen Export in U.S. National Parks. p. 115.

Sutton, M., S. Tang, D. Fowler, R.I. Smith, N. Fournier, and K.J. Weston. 2001. Spatial Analysis of Ammonia and Ammonium in the UK: Comparison of Model Estimates with Measurement from the National Monitoring Network. p. 51.

Swank, W.T., J.M. Vose, and B.L. Haine. 2001. Long-Term Nitrogen Dynamics of Coweeta Forested Watersheds in the Southeastern USA. p. 116.

Tarney, L.W. and A.W. Gertler. 2001. Nitrogen Deposition in the Lake Tahoe Basin: Scaling from Leaf to Landscape Using G.I.S. p. 51.

Van Miegroet, H. 2001. Spatial Variability in N Saturation in High-Elevation Spruce-Forests of the Southeastern U.S.A. p. 43.

Webster, K.L. I.F. Creed, H. Van Miegroet, and N.S. Nicholas. 2001. Establishing Links Between Deposition, Transformation and Export of Nitrogen in a Forested Catchment in the Southern Appalachians. p. 116.

Weiss, S.B. 2001. Mitigation Strategies for N-Deposition Sources in South San Jose, CA: Checkerspot Butterflies, Power Plants, and the Information Superhighway. p. 67.

Whitall, D.R., C.T. Driscoll, J.D. Aber, C.S. Cronan, M.S. Castro, P.M. Groffman, C. Hopkinson, G.B. Lawrence, and S.V. Ollinger. 2001. Inputs of Nitrogen and Effects on Air, Terrestrial, Aquatic and Coastal Resources of the Northeastern US. p. 119.

Zapletal, M. 2001. Atmospheric Deposition of Nitrogen and Sulphur Compounds in the Czech Republic. p.99.

**Other Publications**

Birnbaum, R. 2001. Perspectives on Additional Reductions: Needs. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 16-17.

Boehlert, S., J. Baron, C. Driscoll, G. Keeler, E. Cowling, C. Schumer,J. Sweeney, and H.R. Clinton. 2001. The Legislative Outlook. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 20-21.

Bolger, A. 2001. Acid Rain Impacts: State of the Science, Freshwater Aquatic Systems. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 10.

Bowersox, V.C. 2001. Acid Rain Impacts: State of the Science, Results from Monitoring Deposition. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 8.

Boyer, E.W., C.L. Goodale, and R.W. Howarth. 2001. Effects of Anthropogenic Nitrogen Loading on Riverine Nitrogen Export in the Northeastern USA (Abstract H42A-18). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Boyer, E.W., C.L. Goodale, R.W. Howarth, and N. VanBreemen. 2001. Where Did All the Nitrogen Go? Use of Watershed-Scale Budgets to Quantify Nitrogen Inputs, Storages, and Losses (Abstract H12H-01). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Brakebill, J.W. and S.D. Preston. 2001. Land-Use Data Used to Relate Nutrient Sources to Water Quality in the Chesapeake Bay Watershed (Abstract B31A-02). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Burns, D.A. and P.S. Murdoch. 2001. The Response of Net Nitrification Rates to a Clearcut in a Deciduous Forest in the Catskill Mountains of New York (Abstract H12H-05). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Campbell, D.H. 2001. Regional Outlooks, Intermountain/West. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 14-15.

Campbell, D.H., M.A. Mast, D.W. Clow, T.F. Blett, J.S. Baron, H.M. Rueth, J. Holloway, and P.D. Brooks. 2001. Effects of Nitrogen Deposition on Rocky Mountain Ecosystems: Beyond the Front Range (Abstract H12H-02). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Center for Environmental Information. 2001. *Acid Rain: Are the Problems Solved?* Conference Executive Summary, May 2-3, 2001, Washington, D.C. 34 pp.

Civerolo, K.L., E. Brankov, S.T. Rao, K. Roy, G.P. Lewis, and P. Galvin. 2001. Analyzing Atmospheric and Lake Acid Deposition Data in the Adirondacks. In Proceedings *Environmental Monitoring, Evaluation, and Protection in New York: Linking Science and Policy*, New York State Energy Research and Development Authority, Albany, NY, September 24-25, 2001.

Cowling, E. 2001. Regional Outlooks, Southeast. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 14.

Daley, B. 2001. Acid Rain Resists '90s Fix, Study Says. In *The Boston Globe.* March 26, 2001.

Dripps, W.R., C.J. Kucharik, J.D. Lenters, M.P. Anderson, and J.A. Foley. 2001. Modeling the Spatial and Temporal Distribution of Groundwater Recharge Across a Forested Watershed in Northern Wisconsin (Abstract H41B-04). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Driscoll, C. 2001. Sources, Impacts, and Recovery: Recovery. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 7.

Driscoll, C.T., G.B. Lawrence, A.J. Bulger, T.J. Butler, C.S. Cronan, C. Eagar, K.F. Lambert, G.E. Likens, J.L. Stoddard, and K.C. Weathers. 2001. *Acid Rain Revisited: Advances in Scientific Understanding Since the Passage of the 1970 and 1990 Clean Air Act Amendments.* Hubbard Brook Research Foundation. Science Links™ Publication. Vol. 1, No. 1. 20 pp.

Driscoll, C.T., G.B. Lawrence, A.J. Bulger, T.J. Butler, C.S. Cronan, C. Eagar, K.F. Lambert, G.E. Likens, J.L. Stoddard, and K.C. Weathers. 2001. Acid Rain Revisited: Advances in Scientific Understanding Since the Passage of the 1970 and 1990 Clean Air Act Amendments. In *Hubbard Brook Research Foundation Acid Rain Update II.* 2 pp.

Ecological Society of America. 2001. *N2001: The Second International Nitrogen Conference, Optimizing Nitrogen Management in Food and Energy Production and Environmental Protection. Program and Abstracts.* October 14-18, 2001, Potomac, MD. Ecological Society of America, Washington, DC. 119 pp.

Environmental Science and Engineering, Inc. 2001. *Clean Air Status and Trends Network (CASTNet) 1999 Annual Report.* U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. 176 pp.

Evans, J., I.J. Fernandez, L.E. Rustad, and S.A. Norton. 2001. *Methods for Evaluating Carbon Fractions in Forest Soils. A Review* (Technical Bulletin 178). University of Maine Agricultural Experiment Station, Orono, ME. 39pp.

Fenech, G. 2001. Regional Outlooks, Canada. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 16.

Galloway, J. 2001. Sources, Impacts, and Recovery: Impacts. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 6-7.

Goodale, C.L., K. Lajtha, K.J. Nadelhoffer, E.A. Boyer, and N.A. Jaworski. 2001. Forest Nitrogen Sinks in Large Eastern U.S. Watersheds: Inventory and Modeled Estimates (Abstract H51C-04). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Hollinger, D.Y., J. Aber, B. Dail, E. Davidson, I. Fernandez, S. Goltz, M. LeClerc, and H. Sievering. 2001. Impact of Canopy Nitrogen Deposition on Forest Carbon Storage: Initial Results from a Manipulative Experiment at the Howland AmeriFlux Site (Abstract B42E-04). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Howarth, R.W. 2001. Acid Rain Impacts: State of the Science, Coastal Ecosystems. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 10.

Hubbard Brook Research Foundation. 2001. *Acid Rain Revisited.* Hubbard Brook Research Foundation, Hanover, NH. 20 pp.

Illinois State Water Survey. 2001. National Atmospheric Deposition Program, Providing Resources Today for Tomorrow's Scientists. In *Illinois State Water Survey Annual Report, 2000-2001.* Illinois State Water Survey. Champaign, IL. pp. 17-20.

Kentucky Environmental Quality Commission. 2001. Air Quality Sulfur Dioxide. In *2000-2001 State of Kentucky's Environment: A Report on Environmental Trends and Conditions*. Kentucky Environmental Quality Commission, Frankfort, KY. pp 51-52.

Knauer, D. 2001. Regional Outlooks, Midwest. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 14.

Larson, R.S. and V.C. Bowersox. 2001. The National Atmospheric Deposition Program's Databases. In *Proceedings 94th Annual Air & Waste Management Association Meeting* (paper #669). Air and Waste Management Association, Sewickley, PA. 13 pp.

Lawrence, G.B. 2001. Acid Rain Impacts: State of the Science, Terrestrial Systems. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 9-10.

Levin, L. and C. Seigneur. 2001. Mass Balance Implications of Background Mercury Emissions in the United States (Abstract B42B-02). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Levy, H., M. Galanter, and T. Holloway. 2001. A Global Analysis of Human Impact on Nitrate Deposition (Abstract H51C-01). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Lloyd, S.A. 2001. Acid Deposition. In *Ecosystem Change and Public Health.* Eds. J.L. Aron and J.A. Patz. Johns Hopkins University Press, Baltimore, MD. p. 209-213.

Lovett, G.M., K.C. Weathers, and M.A. Arthur. 2001. Factors Controlling Stream Water Nitrate Concentrations in Forested Watersheds of the Catskill Mountains, New York (Abstract H21B-01). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Machavaram, M.V., M.E. Conrad, and N.L. Miller. 2001 Stable Isotope Systematics of the Water Cycle of a Regional Watershed in the Southern Great Plains of USA (Abstract H21C-0315). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

McClean, B. 2001. Addressing the Acid Rain Problem - Twenty Years in Retrospect: Federal Legislation and Regulation. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 2

McDowell, N.G., D.G. Bowling, C.K. Lunch, J. Welker, P. Anthoni, B. Law, B.J. Bond, and J.R. Ehleringer. 2001. Oxygen-18 Content of Ecosystem Respiration Across a Climatic Gradient in Oregon (Abstract B11A-06). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Michalski, G.M., M. Holve, J. Feldmeier, H. Bao, M. Reheis, J.G. Bockheim, and M.H. Thiemans. 2001. Tracing the Atmospheric Source of Desert Nitrates Using delta O-17 (Abstract B21A-08). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Middleton, P. 2001. Sources, Impacts, and Recovery: Sources. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 5-6.

Murdoch, P.S. and T.D. Bullen. 2001. Studying Calcium Depletion Using Changes in Stream Chemistry at Contrasting U.S. Hydrologic Benchmark Network Sites (Abstract H31A-10). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Murdoch, P.S., J.B. Shanley, and T.G. Huntington. 2001. Tracking the Effects of Acidic Deposition in Medium-Scale Forested Watersheds of the Eastern U.S.(Abstract H31A-06). In Srping Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

North Carolina Department of Environment and Natural Resources. 2001. Acid Rain and Statewide Trends. In *1999 Ambient Air Quality Report* (Air Monitoring Section Report #2001.01). North Carolina Division of Air Quality, Department of Environment and Natural Resources, Raleigh, NC. pp 58-73.

Norton, S.A., A. Pearce, A. Amirbahman, and R. Bouchard. 2001. Is Al Chemistry the Key to Lake Trophic Status in Acid-Sensitive Geologic Terranes. In Meeting Abstracts of the 36th Annual Meeting of the Northeastern Section of the Geological Society of America (http://gsa.confex.com/gsa/2001NE/finalprogram/session_118.htm).

Norton, S. A., Perry, E. R., Norris, M-J, Hess, C. T., Cangelosi, J., Kahl, J. S., and Courtemanch, D. 2001. *How has the Atmospheric Deposition of Hg Changed Through Time in Maine?* Maine Water Conference 2001, Augusta, ME.

Norton, S. A., Pugh, A., and Reeve, A. S. 2001. *Dynamics of Water Chemistry in Bogs Versus the Rest of Maine.* Maine Water Conference 2001, Augusta, ME.

Pan, Y., J. Hom, K. McCullough, J. Aber, J. Grimm, J. Lynch. 2001. The Impacts of Increasing Atmospheric Nitrogen Deposition on Forest Carbon Accumulation in the U.S. Mid-Atlantic Region (Abstract B51B-0212). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Petrone, K.C., L.D. Hinzman, and J.B. Jones. 2001. Nitrogen and Carbon Budgets for Three Boreal Forest Watersheds (Abstract H32B-0310). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Poirot, R. 2001. Regional Outlooks, Northeast. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 13-14.

Perry, E.R., S.A. Norton, J.A. Cangelosi, C.T. Hess, and M.J. Norris. 2001. Mercury Storage, Release, and Transport in the Watersheds of Seven Maine Lakes. In Meeting Abstracts of the 36th Annual Meeting of the Northeastern Section of the Geological Society of America (http://gsa.confex.com/gsa/2001NE/finalprogram/session_440.htm).

Pryor, S.C., R.J. Barthelmie, M. Carreiro, M.L. Davis, A.E. Hartley, B. Jensen, A. Oliphant, J.C. Randolph, and J.T. Schoof. 2001. Forest Canopy Uptake of Atmospheric Nitrogen at a Midwestern U.S. Mixed Hardwood Site: Implications for Carbon Storage (Abstract B42E-06). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Risch, M. 2001. *Monitoring Program for Mercury in Precipitation in Indiana*. U.S. Geological Survey, Indianapolis, IN. 4 pp.

Rustad, L.E., I.J. Fernandez, J.E. Parker, J.S. Kahl, and S.A. Norton. 2001. The Effects of Experimentally Elevated N Deposition on Soil N Dynamics: Linkages Between Terrestrial and Aquatic Ecosystems (Abstract H21B-08 Invited). In Spring Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Sammons, J.I., D.D. Murray, and J.B. Reid. 2001. The National Aeolian Detritus Project, A Student-controlled, Standards-based Research Opportunity for Middle and High School Students (Abstract ED51A-0222). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Sickman, J.O., J.M. Melack, and D.W. Clow. 2001. Long-term Changes in Lake Nutrient and Trophic Status in the Sierra Nevada: Results from Synoptic Surveys and Intensive Monitoring of Emerald Lake, California (Abstract H11C-0251). In Fall Meeting Supplement, *Eos Transactions American Geophysical Union.* **82**.

Southern Appalachian Mountains Initiative. 2001. Acid Deposition Assessment. In *2001 Interim Report.* Southern Appalachian Mountains Initiative, Asheville, NC. p. 11, 16-17.

Striegel, M. 2001. Acid Rain Impacts: State of the Science, Materials and Cultural Resources. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 12-13.

Takemoto, B. 2001. Regional Outlooks, California. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 15-16.
Uhart, M. 2001. Addressing the Acid Rain Problem - Twenty Years in Retrospect: National Acid Precipitation Assessment Program Analysis. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 4.
U.S. Environmental Protection Agency. 2001. *Clean Air Status and Trends Network (CASTNet): Monitoring the Results of Emission Reductions*. U.S. Environmental Protection Agency, Office of Air and Radiation, Washington, D.C. 2 pp.
U.S. Fish and Wildlife Service. 2001. Clearing the Air: Air Quality in the National Wildlife Refuge System (video). U.S. Fish and Wildlife Service, Denver, CO.
U.S. Geological Survey. 2001. Water Resources Data, Alabama, Water Year 2000, U.S. Geological Survey Water-Data Report AL-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Arkansas, Water Year 2000, U.S. Geological Survey Water-Data Report AR-00-1.
U.S. Geological Survey. 2001. Water Resources Data, California, Water Year 2000, U.S. Geological Survey Water-Data Report CA-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Colorado, Water Year 2000, U.S. Geological Survey Water-Data Report CO-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Florida, Water Year 2000, U.S. Geological Survey Water-Data Report FL-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Georgia, Water Year 2000, U.S. Geological Survey Water-Data Report GA-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Iowa Water Year 2000. U.S. Geological Survey Water-Data Report IA-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Indiana, Water Year 2000, U.S. Geological Survey Water-Data Report IN-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Kansas, Water Year 2000, U.S. Geological Survey Water-Data Report KS-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Kentucky, Water Year 2000, U.S. Geological Survey Water-Data Report KY-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Minnesota, Water Year 2000, U.S. Geological Survey Water-Data Report MN-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Mississippi, Water Year 2000, U.S. Geological Survey Water-Data Report MS-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Montana, Water Year 2000, U.S. Geological Survey Water-Data Report MT-00-1.
U.S. Geological Survey. 2001. Water Resources Data, North Carolina, Water Year 2000, U.S. Geological Survey Water-Data Report NC-00-1.
U.S. Geological Survey. 2001. Water Resources Data, North Dakota, Water Year 2000, U.S. Geological Survey Water-Data Report ND-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Nebraska, Water Year 2000, U.S. Geological Survey Water-Data Report NE-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Nevada, Water Year 2000, U.S. Geological Survey Water-Data Report NV-00-1.
U.S. Geological Survey. 2001. Water Resources Data, New York, Water Year 2000, U.S. Geological Survey Water-Data Report NY-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Ohio, Water Year 2000, U.S. Geological Survey Water-Data Report OH-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Oklahoma, Water Year 2000, U.S. Geological Survey Water-Data Report OK-00-1.

U.S. Geological Survey. 2001. Water Resources Data, Oregon, Water Year 2000, U.S. Geological Survey Water-Data Report OR-00-1.
U.S. Geological Survey. 2001. Water Resources Data, South Carolina, Water Year 2000, U.S. Geological Survey Water-Data Report SC-00-1.
U.S. Geological Survey. 2001. Water Resources Data, South Dakota, Water Year 2000, U.S. Geological Survey Water-Data Report SD-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Tennessee, Water Year 2000, U.S. Geological Survey Water-Data Report TN-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Texas, Water Year 2000, U.S. Geological Survey Water-Data Report TX-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Utah, Water Year 2000, U.S. Geological Survey Water-Data Report UT-00-1.
U.S. Geological Survey. 2001. Water Resources Data, Washington, Water Year 2000, U.S. Geological Survey Water-Data Report WA-00-1.
Valentinetti, R. 2001. Addressing the Acid Rain Problem - Twenty Years in Retrospect: State and Local Legislation and Regulation. In *Acid Rain: Are the Problems Solved?* Center for Environmental Information, Rochester, NY. p. 2-3.

NADP Proceedings 2001-01

# Illinois State Water Survey

# NADP 2001

## NADP Committee Meeting
## August 27-30, 2001
## Champaign, Illinois

Morrow Plots

NATIONAL ATMOSPHERIC DEPOSITION PROGRAM

NCSA


## N2001 - The Second Annual International Nitrogen Conference

## October 14-18, 2001
## Potomac, Maryland

NADP QA Report 2001-01

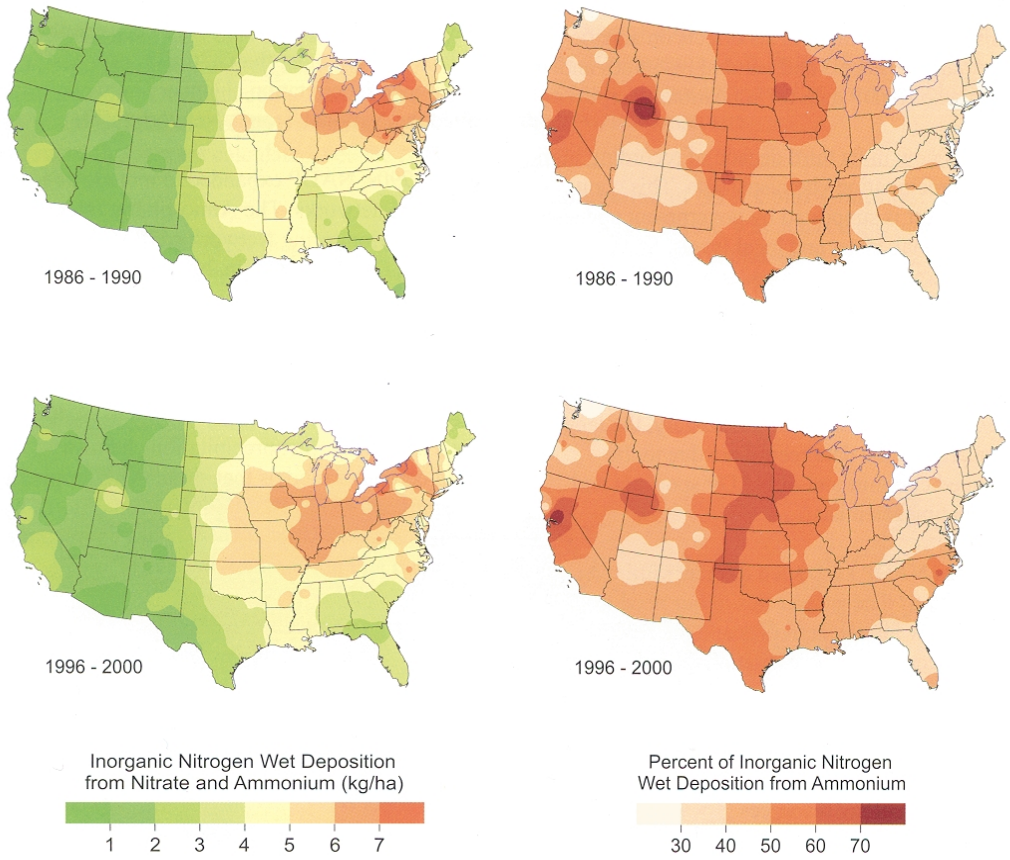
# QUALITY ASSURANCE REPORT
# NATIONAL ATMOSPHERIC DEPOSITION PROGRAM, 1999

Laboratory Operations
Central Analytical Laboratory

## NATIONAL ATMOSPHERIC DEPOSITION PROGRAM

A Cooperative Research Support Program of the
State Agricultural Experiment Stations (NRSP-3)
Federal and State Agencies
and Private Research Organizations

# National Atmospheric Deposition Program 2000 Annual Summary




NATIONAL ATMOSPHERIC DEPOSITION PROGRAM
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State Agricultural Experiment Stations (NRSP-3)
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# 2002 CALendar

NATIONAL ATMOSPHERIC DEPOSITION PROGRAM

**NADP Field Operations Training Course Class of 2001:**

Front Row (left to right): Cheryl Guster, IN34; Kathy Wholaver, PA00; Abbie Reaves, NM12; Niki Juarez-Cummings, IN34. Second Row: Tim Leon, ISWS; Michael Ritsche, IL19; Tracey Dombek, ISWS; Becky Perdaems, ND00; Jose Kemperman, MA13; Angela Benedict-Dunn, NY22; Nicole Kaplan, CO22; Laurel Hartley, CO22. Third Row: Mike O'Connell, MD18; Bobby Kildow, OK00; Ronald Phernetton, GA09; Robert White, IL19; Marie Freeman, AIRMoN DE02; Lynn Dennis, PA72; Amanda Kuhl, KS31; Nick Young, CO01. Back Row: Ralph Perron, NH02; Robert Ziegler, PA15; Nathan Stover, NC25; Brett McConnell, WI97; Jacques De La Sablonniere, CAN4; Alexander Nyhus, WI28/WI99; Edmond Johnson, TX21; Eric Olson, CA76; Clyde Sweet, MDN Coordinator.

*Photo by Linda Hascall*

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The Illinois State Water Survey is an Affiliated Agency of the University of Illinois and a Division of the Illinois Department of Natural Resources