Air Quality Division
April 1993 Monthly Report

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MEETINGS AND CONFERENCES

AQD Staff Attend the Forest Service's 25th Annual Air Pollution Workshop: Randy Ferrin, Tonnie Maniero, and Ellen Porter (FWS) attended the Workshop in Estes Park, Colorado, April 20-22. While much of this annual meeting focuses on research investigating the effects of air pollutants on vegetation, other aspects of air pollution research are also discussed. This year's sessions included ecosystem monitoring, nitrogen deposition effects on ecosystems, atmospheric measurements, and mechanisms, modeling, and evaluation of air pollution effects on vegetation. There was also a session on vegetation effects data relevant to the standard-setting process. This session was particularly timely since the EPA will write the criteria document this year which will be used as the basis for maintaining or changing the current ozone standard. A number of researchers working on AQD-sponsored projects attended the Workshop. Dr. Howard Neufeld, Appalachian State University, described the fumigation system he is using in Great Smoky Mountains National Park (NP). Dr. John Skelly and Ms. Elizabeth Hildebrand, Pennsylvania State University, discussed their ozone trend plot work at Shenandoah NP. Also, Dr. Paul Miller, U.S. Forest Service, presented results from the on-going ponderosa pine trend plot work in the Sierra Nevada (Project FOREST), which includes Sequoia/Kings Canyon, Yosemite, and Lassen Volcanic NPs.

OUTREACH ACTIVITIES

Grand Canyon Air Quality Brochures: Carl Bowman (Resource Management Division, Grand Canyon NP) sent two draft air quality brochures to the AQD for review. One brochure was entitled "Where the Earth is the Floor of the Sky!" and is intended for park visitors and other interested parties. The other brochure was entitled "Air Quality on the Colorado Plateau" and is targeted for a technically-oriented audience. Both brochures present information about visibility impairment; air pollution source areas; the transport of air pollution throughout the Southwest; and air quality legislation. The AQD reviewed both brochures and sent comments to Carl Bowman.

Request for Air Quality Videos: The AQD received requests from Badlands NP, Sequoia/Kings Canyon NPs, and Yosemite NP for the video "Looking Through the Atmosphere". A copy of the video was sent to each park. The video is targeted for National Park Service employees and focuses on the mechanics of visibility impairment in NPS units Servicewide. The video is available from the AQD upon request.

PLANNING AND ENVIRONMENTAL REVIEW

Pacific Northwest Region (PNR): At the request of Shirley Clark, Regional Air Quality Coordinator, Erik Hauge attended an interagency meeting in Seattle on April 14 to discuss the development of a Regional Air Quality Management Plan (AQMP) for the Cascade Mountains of Washington and Oregon. Attendees included PNRO staff, and representatives from North Cascades and Mount Rainier National Parks, the University of Washington CPSU, and the Forest Service (FS). After presenting various ideas and

examples of air quality management plans (Hauge presented the Colonial National Historical Park AQMP and the draft Shenandoah National Park AQMP) and discussing their strengths and weaknesses, the group decided on a three-phased approach to developing and implementing an NPS-FS Western Washington AQMP: (1) to prepare a Memorandum of Agreement (MOA) between the NPS and FS to be signed by the Regional Forester and Regional Director; (2) to present the MOA and an outline of the AQMP's purposes and goals as a task directive or work plan at the semi-annual Supervisors Meeting (forest supervisors and park superintendents) at North Cascades National Park in May; and (3) to develop the plan itself.

Western Region (WR): Hauge attended and participated in the Integrated Cultural and Natural Resources Management Workshop at Death Valley National Monument, April 18-23. He briefed the attendees on air quality issues from the Washington Office perspective at Judy Rocchio's (WR Air Quality Coordinator) special session on air quality and, with Ms. Rocchio, introduced and discussed the air quality issue at the fire management session. Rocchio and Hauge also discussed establishment of individual park air quality specialists, as well as ecoregional air quality management plans, citing the example of the Federal Clean Air Partnership (FCAP) in the Sierra Nevada. Rocchio and Hauge met with Superintendent Tom Ritter of Sequoia and Kings Canyon NPs and Jeri Hall of Yosemite NP regarding preparation of AQMPs for each park as well as a regional AQMP to include those parks and the nearby Forest Service Class I wilderness areas.

GASEOUS POLLUTANT MONITORING

Annual Data Summary Reports: Annual gaseous pollutant summary reports have been prepared for Everglades National Park (1989), Great Smoky Mountains National Park--Look Rock Site (1991), Indiana Dunes National Lakeshore (1991), Mammoth Cave National Park (1991) and Olympic National Park (1991). Final ozone, sulfur dioxide and/or meteorological data are included, as well as graphs and summaries of the data. These reports were sent to the parks and the respective Regional Air Quality Coordinators.

Great Smoky Mountains National Park Ozone Data Analysis: Jim Renfro of the Uplands Research Lab at Great Smoky Mountains National Park requested analyses of ozone data collected at the park. Ozone data collected at the Uplands, Cove Mountain and Look Rock sites between 1987 and 1992 were analyzed and daily, monthly, growing season, and annual summary statistics were calculated. The results were sent to Jim and also Dr. Howard Neufeld at Appalachian State University. (David Joseph)

Calibration and Maintenance Visits: Tables 1 and 2 list the semi-annual calibration and maintenance visits conducted during April 1993 and those to be performed May through August 1993. Visits will be scheduled with the site operators by the visitor. Site operators, park Superintendents and Regional Air Quality Coordinators will be given a 2-week written notice of the site visit. (Ron Lawler Heavner)

NAAQS Exceedances: The raw data for April 1993 indicated that all National Park Service areas with monitoring sites were below the ozone and sulfur dioxide National Ambient Air Quality Standards (NAAQS) during the month.

The primary and secondary NAAQS for ozone is 0.12 ppm not to be exceeded more that one time per year. The sulfur dioxide NAAQS has both a primary and secondary standard. There is a annual average primary NAAQS for sulfur dioxide of 0.03 ppm and a 24-hour primary NAAQS for sulfur dioxide of 0.14 ppm. The secondary NAAQS for sulfur dioxide is a 3-hour standard of 0.5 ppm. The 24-hour primary standard and 3-hour secondary standard are not to be exceeded more that one time per year. A primary standard is for the protection of public health. A secondary

standard protects the public welfare from any known or anticipated adverse effects from a pollutant. All national primary and secondary ambient air quality standards can be found in 40 CFR part 50.

The raw data for April 1993 indicates that the maximum 1-hour ozone concentration for the gaseous pollutant monitoring network was 0.110 ppm measured at 1800 hours on April 30, 1993, in Joshua Tree National Monument. The second highest concentration was 0.094 ppm measured at 2100 hours on April 20, 1993, also at Joshua Tree National Monument.

The maximum 1-hour sulfur dioxide concentration was 0.662 ppm measured at 01600 hours on April 17, 1993, in Hawaii Volcanoes National Park. (Bob Carson)

BIOLOGICAL EFFECTS PROGRAM

Hardwood Trend Plot Researchers Visit AQD: On April 19, Dr. Art Chappelka (Auburn University), Dr. John Skelly (Penn State University), Ms. Elisabeth Hildebrand (Penn State), and Mr. Bryan Joyce (Penn State) visited the Air Quality Division (AQD) office. Dr. Chappelka and Ms. Hildebrand summarized the results and conclusions of the research efforts at Great Smoky Mountains (GRSM) and Shenandoah (SHEN) National Parks, respectively. Both research teams have now collected 2 years of data on foliar injury to overstory hardwood trees. The trees are all located within a 5.5-mile radius of an ozone monitor, and efforts are underway to relate the incidence and severity of foliar injury to ozone exposure. Following the two presentations, the Auburn and Penn State representatives met with members of the AQD to amend the existing Trend Plot Survey protocols. The new procedures will provide data necessary to determine the spatial variability of foliar ozone injury on at least one hardwood species. The 1993 study data will also be used to develop survey procedures that can utilize smaller trees as sampling surrogates for tall, overstory trees. (Nash, Harvey)

AQD Funds Additional Work on the ForestHealth Expert Advisory System: The AQD has approved funding for continued work on the ForestHealth Expert Advisory System. This computerized training aid teaches researchers how to estimate correctly the degree of foliar injury on hardwood leaves. Periodic retesting through the field season provides quality assurance information among leaf evaluators. The system was successfully used at Great Smoky Mountains and Shenandoah National Parks in 1992. In addition to these two parks, the system will be used at Acadia National Park and at least one USDA-Forest Service Wilderness Area in 1993. New enhancements for the system will include: conversion of test leaf images to color, production of a dynamic electronic output, addition of a branchlet (multiple leaves) test to the existing single leaf test, addition of an injured (chlorotic mottle) pine needle image library, production of a users' manual, and utilization of digital imagery techniques to produce leaf images. This software is being developed by Dr. Michael Saunders and Mr. Bruce Miller (Penn State University) and Dr. Bruce Nash (AQD).

Pathological Anatomy Project on White Pine at Acadia National Park (ACAD): The AQD has approved funding for a proposal submitted by Dr. William Merrill (Penn State University) entitled: "Pathological Anatomy of Eastern White Pine Needles Injured by Exposure to Known Dosages of Ozone and to Ambient Conditions in Acadia National Park." Dr. Merrill will work in association with Drs. Robert Eckert and Tom Lee (University of New Hampshire), and Robert Kohut (Boyce Thompson Institute), to determine the proportions of white pine "blighting" which are attributed to pathogenic fungi and to ozone. Dr. Merrill will use photographic and histological techniques to document the development of foliar symptoms on white pine seedlings and trees located in fumigation chambers and research plots within ACAD. (Nash)

AQD Funds Project to Investigate Episodic Acidification at Shenandoah National Park (SHEN): AQD staff, SHEN scientists, and MARO science staff have reviewed and approved for funding a 3-year project, "Episodic Acidification of Streams in Shenandoah National Park, Virginia." This proposal, prepared by Dr. Keith Eshleman and Dr. Jennie Moody of the University of Virginia, describes a project to develop a data base and modeling methods that will allow researchers to establish the link between atmospheric deposition and surface water-quality in streams at SHEN using existing data collected as part of both the **Shenandoah Watershed Acidification Study** and the **Fish in Sensitive Habitats** projects. The objective of this project is to develop a conceptual model of how different types of streams respond to rainfall episodes that can rapidly change stream pH, ANC, and aluminum concentrations. These changes are linked to effects on fish and invertebrate populations. (Tonnessen)

AQD Provides Training Materials to the USDA-Forest Service: Scientists from the USDA-Forest Service Forest Health Monitoring and Forest Pest Management Programs requested the production of printed foliar injury standards and the ForestHealth software for use in ozone injury surveys. The AQD provided the requested materials, which will be used to train and standardize several Forest Service field crews this summer. (Nash)

AQD Staff Participate in Synoptic Snow Survey in the Rockies: On April 6-7, AQD staff members Randy Ferrin, John Vimont, and Doug Garnand, obtained snow samples from two sites in Rocky Mountain National Park (ROMO) as part of an interagency, interstate snow chemistry project, led by the U.S. Geological Survey (USGS). AQD staff were responsible for sampling on the west side of the park, west of the Continental Divide. One site was near the Timber Lake Trailhead at an elevation of approximately 9030 feet. The other site was near Lake Irene at an elevation of 10,640 feet. Snow depths ranged from one meter at the lower site to two meters at the higher site. Samples were obtained using the protocol prescribed by the USGS to avoid contamination of the samples and to ensure that the entire snow column was proportionally represented in the sample. At both sites, snow temperature readings were taken at 10-cm intervals from the top of the snowpack to the snow/soil interface. Notes concerning the stratigraphy of the snowpack were also taken. Data from the snow chemistry network will be used to characterize air pollution loading to snowpacks throughout the Rocky Mountains. Sulfur isotope data will be used to help determine the source of sulfur loading. AQD staff were assisted at the high-elevation site by ROMO staff member Jim Richardson. (Ferrin, Vimont, Garnand)

Research Branch Staff Introduced to U.S./Canadian Members of the International Air Quality Advisory Board of the International Joint Commission: Kathy Tonnessen attended meetings of the International Joint Commission (IJC) and the International Air Quality Advisory Board (IAQAB) of the IJC on April 22. This was her first meeting as a member of the IAQAB, a 10-member advisory group that provides information to the six IJC Commissioners on issues concerning U.S./Canadian air quality. During their morning meeting, the IAQAB members reviewed their semi-annual report to the IJC. This report included a number of articles on such subjects as toxic deposition to Lake Superior, the control of Reid Vapor Pressure in gasoline, and the possible environmental and health effects of MTBE. Tonnessen briefed Board and Commission members on the role the NPS-AQD in research and monitoring air quality and its effects in Class I areas. Board members asked her to prepare an article for the next report to the IJC on "remote area" air quality issues. (Tonnessen)

AQD Joins with Water Resources Division (WRD) to Discuss NPS Watershed Projects: On April 13-14, AQD staff travelled to Fort Collins to attend a 2-day meeting of NPS researchers working on watershed studies sponsored by the NPS-WRD, the NPS-Global Change Program, the NPS-Inventory and Monitoring Program, among others. Many of the presenters discussed the effects of deposition on watershed processes and surface-water quality. The WRD "core" watershed studies, begun under the National Acid Precipitation Assessment Program, include work at Sequoia National Park, Olympic National Park, Isle Royale National Park, and Rocky Mountain National Park. Representatives from other agencies involved in watershed research (USFS, BLM) presented information on their programs. Many of these studies are supported by the AQD through funding of the National Acid Deposition Program monitoring sites. These data bases are useful to AQD in assessing the current and future impacts of air pollution and deposition on sensitive resources. (Tonnessen, Ferrin)

Melillo Discusses Nitrate Deposition to Forests in the Northeastern United States: On April 8, Randy Ferrin attended a seminar at Colorado State University presented by Dr. Jerry Melillo of the Ecosystems Center, Marine Biological Laboratory, Woods Hole, Massachusetts. Melillo's talk was titled: "The biogeochemical consequences of chronic nitrogen loading of mid-latitude forest ecosystems." Melillo described the work that he and his colleagues are conducting in the Harvard Forest in Massachusetts. Stands of red pine and hardwoods are being treated with nitrogen fertilizer at various dosages to simulate chronic nitrogen loading. He reported that mineralization and nitrification rates have differed slightly between stands and treatments and that nitrogen output has been nonlinear in response to inputs. Melillo concluded that for both pines and hardwoods, the major fraction of the added nitrogen must be retained in the mineral soil. He suggested one cause of the increase in atmospheric methane and diminishing methane sinks was due to increasing amounts of soil nitrogen. The work is expected to continue for a 20-year period. (Ferrin)

AQD and WRD Staff Confer on Availability of Surface-Water Data at Class 1 Parks: Randy Ferrin met with Gary Rosenlieb and Dean Tucker of the Water Resource Division's Water Operations Branch to discuss acquisition of water quality data for Class I park units. The WRD began a project to assemble and analyze existing water quality data for 30 park units, several of which are Class I parks. The data are currently stored in the Environmental Protection Agency's STORET data base. AQD is interested in using these data to characterize one aspect of the Air Quality Related Values for Class I areas. The information could also be used to identify those units most susceptible to acid deposition and nutrient loading. Compiled data from three test parks will be forwarded to the AQD in the near future for review. (Ferrin)

Lichen Publication Available: The workshop proceedings volume, "Lichens as Bioindicators of Air Quality," has been published by the Rocky Mountain Station of the U.S. Forest Service as General Technical Report RM-224. This volume contains papers contributed at a workshop sponsored by the Air Quality Division, National Park Service and the U.S. Forest Service in April 1991. If you want to receive a copy of this document please call Dale Breitenfeld at (303) 987-6694.

VISIBILITY

Fine Particle and Visibility Data: A report, "Spatial and Temporal Patterns and the Chemical Composition of the Haze in the United States," has been completed and distributed by AQD research associates and contractors. The report provides a description of the IMPROVE (Interagency Monitoring of Protected Visual Environments) monitoring network, monitoring methodologies, parameter

coverage, and recommendations for future research. The report also displays spatial and seasonal distributions of concentrations of atmospheric aerosols, responsible for visibility impairment, and reconstructed light extinction (a measure of visibility impairment). Copies of the report have been sent to all NPS units articipating in the monitoring program, all Regional Air Quality Coordinators, select State agencies, and IMPROVE participants. For further information contact Dr. William Malm at 303-491-8292.

TABLE 1
CALIBRATION AND MAINTENANCE VISITS

SITE LOCATION	VISITED BY	DATE
Mesa Verde NP*	Mike Bagby and Robert Lehman (ARS)	April 12-16
Big Bend NP	Mark Tigges (ARS)	April 14-15
Great Smoky Mtns. NP	John Faust and Mitch Walker (ARS)	April 26-30
Everglades NP	Mitch Walker (ARS)	April 29

* Trends Site Installation

TABLE 2
SCHEDULED CALIBRATION AND MAINTENANCE VISITS

SITE LOCATION	TO BE VISITED BY	DATE
May Site Visits		
Joshua Tree NM and Death Valley NM**	Mark Tigges (ARS)	May 4-6
Yosemite NP	John Faust (ARS)	May 13-17
Denali NP & Pres	Mark Tigges (ARS)	May 17-21
Great Basin NP**	Bobby Carson (AQD-DEN)	May 18-19
Voyageurs NP	Robert Lehman (ARS)	May 19-21
Mammoth Cave NP	Mike Bagby (ARS)	May 24-26
** Trends Site Selection Trip		
June Site Visits		
Craters of the Moon NM	Mike Bagby (ARS)	June 7-9
Saguaro NM	Robert Lehman (ARS)	June 7-9
Yellowstone NP	Mike Bagby (ARS)	June 10-12
Redwood NP	Mark Tigges (ARS)	June 14-16
Grand Canyon NP	John Faust (ARS)	June 21-23
July Site Visits		
Canyonlands NP	Robert Lehman (ARS)	July 7-10
Sequoia NP	Mark Tigges (ARS)	July 12-16
Olympic NP and Mount Rainier NP	John Faust (ARS)	July 12-17
Everglades NP	Mike Bagby (ARS)	July 20-23
August Site Visits		
Haleakala NP and Hawaii Volcanoes NP	Mark Tigges (ARS)	August 2-8
Great Basin NP*	Bob Carson (AQD-DEN) and Robert Lehman (ARS)	August 16-20
* Trends Site Installation		