National Park Service
Gaseous Pollutant Monitoring Program

The
Monitor

For National Park Service
Air Quality Station Operators

SPRING 2002

NETWORK NEWS

Network expands air quality monitoring

The following new monitoring stations and equipment will be added to the National Park Service air monitoring network during the Summer 2002 season:

- Yosemite Valley, CA
  will receive an ozone, NOx, and meteorological monitoring station. Monitoring will be conducted in cooperation with a university research project.

- Isle Royale National Park, MI
  will receive a CASTNet-style filter pack sampler and a 2B Tech ozone analyzer to complement their existing solar-powered meteorological station.

- A Western Arctic park, AK
  will receive a meteorological monitoring station with NADP, mercury sampling, and IMPROVE aerosol monitoring.

- Petrified Forest National Park, AZ, and Zion National Park, UT
  will receive traditional ozone air quality monitoring stations, including CASTNet filter pack sampling.

- Mammoth Cave National Park, KY
  will receive an NADP and mercury sampler, expanded meteorological measurements, and a CASTNet filter pack sampler.

- Wind Cave National Park, SD
  will receive an NADP sampler.

Plans are being made to accommodate these changes and we look forward to working with new park staff.

TEOM monitor installed at Great Smokies

A continuous ambient particulate monitor, funded by the U.S. Environmental Protection Agency was installed at the Look Rock station in Great Smoky Mountains National Park. The Rupprecht & Patashnick Series 1440a TEOM is an EPA-approved continuous particle monitor, and will operate with a sample inlet to monitor the particles less than 2.5 microns.

TEOMs use a unique *tapered element oscillating microbalance* to measure real-time particle concentrations. Hourly averages of the particle data will be collected by the Tennessee Division of Air Pollution Control and will be displayed on the Look Rock Web page (*http://www2.nature.nps.gov/ard/parks/grsm/grsmcam/grsmcam.htm*).

TEOMs have been used previously at other park locations including Sequoia, Yosemite, and Yellowstone National Parks, for special or short-term monitoring programs. Theodore Roosevelt National Park (South Unit) will also receive a TEOM later this summer.

What's inside:

Air quality plans under the Natural Resource Challenge

The multiyear Natural Resources Challenge (NRC) is a National Park Service plan to provide new funding for the purpose of expanding and enhancing NPS resource protection. The NRC calls for expanding the air quality monitoring network to provide improved geographical representation, with emphasis on parks most threatened by air pollution or most vulnerable to degradation caused by air pollution. Complementary activities related to data management, reporting, and interpretation will also be augmented. Funding will be provided to parks to support the increased monitoring efforts. This increased funding will enable the NPS to fill data gaps in the monitoring network and enhance our understanding of air pollution transport, concentrations, and effects. Information on the Natural Resource Challenge can be found on the Internet at *http://www.nature.nps.gov/challenge/nrc.htm.*

Parks slated to receive new monitoring were selected based upon NPS Air Resources Division assessments and input from regional air quality coordinators. Agencies other than the NPS also monitor air quality in park units; the NPS ARD assessed whether monitoring being conducted by these other agencies can be used to characterize park air quality. Specifically, the University of Denver is developing GIS-based maps that use data from all federal, state, and locally operated air quality monitors throughout the United States, to interpolate or estimate air quality data for each NPS unit. The interpolations are performed for 32 specific regions of the country as designated by ecotype. These are known as Inventory & Monitoring (I&M) networks.

Areas to receive new monitoring were also prioritized based on several factors. The highest priority for new monitoring is to ensure that appropriate and reasonably representative air quality monitoring ultimately occurs in each of the 32 I & M networks. Furthermore, adequate data should be available to characterize critical air quality parameters in all Class I areas. Some existing park air monitoring stations have recently lost funding from states, EPA, or private companies. Some of these stations will continue monitoring with NRC funds.

A portion of the NRC budget increase is reserved for non-routine air quality monitoring such as biological/ ecological effects monitoring, monitoring of concentrations and effects of toxics, characterization of pollution concentration gradients in topographically complex or large NPS units, and enhanced monitoring in pollution "hotspots." Plans for the new monitoring have been posted on the NPS IntraNet at *http://www2.nrintra.nps.gov/ard/bas/NRC_AQ_mon1.htm.*

NPS ARD will use the NRC funds to support park monitoring efforts including salary support and Full-Time Equivalents (FTEs) for monitoring technicians. Thus, parks with monitoring will see an increase in support funds from the Air Resources Division for each of the monitoring networks. For the first time this year, wet deposition monitoring under NADP will be supported by ARD funds to supplement park contributions. ARD and some regional offices will add new air quality staff.

Western Airborne Contaminants Assessment Project

The National Park Service has initiated the Western Airborne Contaminants Assessment Project (WACAP), to determine the risk to ecosystems and food webs in western national parks, from airborne contaminants. The 5-year project will inventory airborne contaminants in these ecosystems, using a network of sites in western U.S. parks. The monitoring will provide spatially extensive, site-specific, and temporally resolved information regarding the exposure, accumulation, and impacts of airborne toxic compounds such as persistent organic pollutants (POPs) including DDT, PCBs, dioxin, etc. and heavy metals (mercury, cadmium, arsenic, etc.).

The NPS is concerned about airborne contaminants because they can pose serious health threats to wildlife and humans, as some of these compounds tend to "biomagnify" in the food chain. Biological effects of airborne contaminants include impacts on reproductive success, growth, behavior, disease, and survival. Inventories of contaminants from six ecosystem components (snow, water, sediment, lichen, bark, and fish) will be conducted in six key parks in the west and Alaska, if sufficient funding can be acquired. Contaminant concentrations in wild foods hunted or gathered by subsistence-users will also be assessed in Alaska.

The U.S. Environmental Protection Agency, the U.S. Geological Survey, and several universities are working with the NPS on this assessment.

***NETWORK NEWS** continued on page 6....*

STATION OPERATOR FOCUS

Cove Mountain's seasonal personalities keep Larry Blackwelder active

Larry Blackwelder was concerned that he'd get bored in his retirement. So not long after retiring he joined Great Smoky Mountain National Park's Volunteers in Park (VIP) program, and he has been active in it ever since.

Larry has been the station operator at the park's Cove Mountain air quality site for three years, where he continues his career in pollution prevention. Upon retiring from the Air Force as a physicist, Larry spent several years as an environmental science and engineering consultant. His doctorate in environmental engineering and master's degree in environmental physics and systems management enabled him to consult for the Department of Energy (DOE) on pollution prevention matters. "With the DOE I was involved in the smokestack, or pollution source end of things; here at Cove Mountain I'm on the receiving end," Larry said.

After working with the DOE, Larry began his own consulting business in environmental management. Upon retiring a second time he wanted to stay involved in technical areas so he joined the VIP program at Great Smokies. His two obligations in the program are the weekly servicing visit to Cove Mountain, and year-round maintenance of a visitor trail. The Cove Mountain station includes ozone, sulfur dioxide, carbon monoxide, and NO/NOy monitors, and meteorology sensors (air temperature, relative humidity, wind speed, wind direction, barometric pressure, solar radiation, and precipitation). Monitoring at the site is supported by both the NPS and the Tennessee Valley Authority.

Larry Blackwelder has been a member of Great Smoky Mountains National Park's VIP program for 3 years. Servicing the air quality site at Cove Mountain involves a weekly 8-mile round-trip hike to the station and back.

Servicing the Cove Mountain station requires an 8-mile round-trip hike to the site. This, in addition to the 2 1/2 miles of trail Larry maintains, "... allows me to see the Smokies in all four seasons -- the different personalities of the seasons," Larry said.

According to Larry, "Upon retirement I was concerned about boredom. I found this not the case; however, my days are completely full. I keep at my own pace and do what I want to do, and that is my definition of retirement."

DATA COLLECTION SUMMARY

Data collection statistics for July through December 2001 are listed below.

- Sites with final validation of ambient air quality parameter collection greater than 90% include:

  Acadia
  Chiricahua
  Denali
  Death Valley
  Glacier
  Great Basin
  Grand Canyon
  Great Smoky Mtns. (Cades Cove)
  Great Smoky Mtns. (Clingman's Dome)
  Great Smoky Mtns. (Cove Mountain)
  Great Smoky Mtns. (Look Rock)
  Hawaii Volcanoes (Observatory)
  Hawaii Volcanoes (Thurston Lava Tubes)
  Hawaii Volcanoes (Visitor's Center)
  Joshua Tree
  Mammoth Cave
  Mesa Verde
  Mount Rainier
  North Cascades
  Olympic
  Pinnacles
  Rocky Mountain
  Sequoia-Kings Canyon (Ash Mountain)
  Sequoia-Kings Canyon (Lower Kaweah)
  Shenandoah
  Theodore Roosevelt
  Virgin Islands
  Voyageurs
  Yellowstone
  Yosemite

- Sites with final validation of ambient air quality parameter collection greater than 80% include:

  Canyonlands
  Everglades
  Lassen Volcanic

- The entire network achieved an average of 90.7% final validation of ambient air quality parameters.

FEATURE ARTICLE

NPS site operator training opportunities are plentiful and at your fingertips

NPS air quality station operators have several opportunities and options to receive training, in addition to that initially supplied. Many of these are readily available as detailed below.

Internet training courses

Internet training courses, which include both instrument operation and air pollution topics, are available from almost any desktop PC. General air pollution information and instruction may be found at many Web sites. EPA's Office of Air Quality Planning and Standards, Air Pollution Training Institute at *http://www.epa.gov/air/oaqps/eog/apti.html* has several Web-based self-instruction courses.

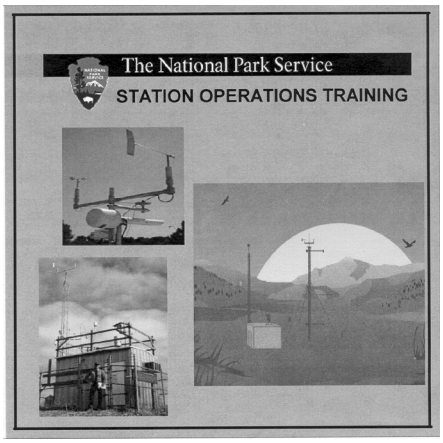
The Ambient Monitoring Technology Information Center (AMTIC) Web site (*http://www.epa.gov/ttn/amtic*) is another great place to receive information on monitoring programs, monitoring methods, scientific papers, and regulations. It also provides numerous links to related air pollution topics.

DataView training materials

Training materials provided in DataView and in written format may be accessed directly at your air quality station.

Tools within DataView can be used to further your understanding of instrument response to recent weather or pollution episodes. For example, display the 8- or 15-day StackPlot (Data Plots, StackPlots, Gas Met Stack Plot) and observe the relationship between intense solar radiation and ozone. Watch for an inverse relationship between relative humidity and ozone. Many sites exhibit up/down valley winds; watch for temperature or other meteorological changes when these winds change. Feel free to telephone ARS if you need further explanation of these events and what they signify.

In addition to review of actual data, the Glossary and recently released Station Operations Training CD-ROM may spark your curiosity with useful information.



The Station Operations Training CD-ROM was delivered to all air quality station operators in April 2002.

Instrument manuals

Each station should possess instrument manuals for the currently issued instrumentation. All of the air quality instrument manuals have "Theory of Operation" sections that explain the instrument's operating principle. Other information can be learned from the manuals' "TroubleShooting Tree."

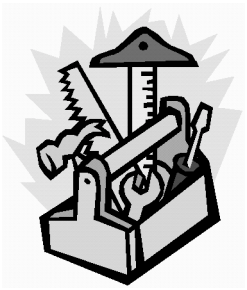
Conferences and meetings

Meetings and conferences provide excellent opportunities for station operators to learn more about air pollution topics and to meet with other operators. Meeting and conference schedules may be obtained from park staff or intra-agency newsletters or memos.

Site visits

Visits by maintenance contractors, audit technicians, or NPS ARD personnel provide the opportunity to learn more about air pollution causes and effects and get the latest "scoop" from the head office.

The most direct and available training may be during scheduled station maintenance visits. The purpose of these visits is to both verify and maintain monitoring equipment, and train operators. All the maintenance staff are willing and expect to spend time with the operator to review new or different procedures or equipment and to discuss specific instrument problems or operational techniques.



OPERATOR'S TOOLBOX

Gas analyzer multipoint checks

Zeros, precisions, and span checks all test analyzers at specific points, but these tests do not dynamically test analyzers throughout their entire operating range as required per EPA protocols. Routine multipoint checks fulfill this requirement.

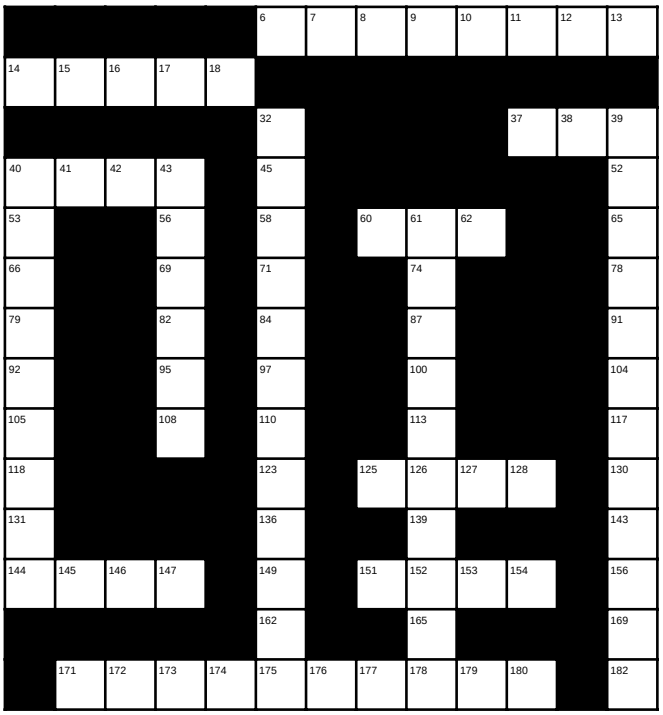
A review of completed multipoints conducted by site operators during 2001 revealed very few stations in the network had the required number of completed multipoint checks. NPS guidelines specify operators perform these multipoint checks monthly. ARS recommends performing them on the first Tuesday of each month.

With the development of DataView, many equipment status checks that were required weekly were deferred to the monthly multipoints. When multipoints are not completed, these routine analyzer/calibrator status checks are not completed either. The potential for invalidating large blocks of critical ozone data increases without routine multipoint checks; therefore, monthly multipoint checks must be performed by every site operator.

If you are a new operator or even an experienced operator with questions about multipoint procedures, remember that all configurations of ozone analyzer/calibrator combinations are well documented in DataView. Go to *Station Documentation* and then *Multipoint Checklist* to open the checklist specific to your site configuration. The Checklist Instructions may be immediately accessed from the checklist form if needed. These instructions are very detailed and contain illustrations to help guide the multipoint. Here are a few general guidelines:

- Multipoints should take less than an hour to complete and must be done monthly.
- You may need to extend the time length of the "Diagspan" if it is scheduled for less than 30 minutes. Call ARS for assistance with this or any other difficulty with the multipoint check.
- Upon completion of the multipoint, review the results immediately by selecting the *Results* page.
- Call ARS from the station to report any failed multipoints.
- Call ARS to have any of your questions answered.

PUZZLE PAGE



Across

6 NPS is determining the risk to ecosystems and food webs from what kind of contaminants?
14 How many parks is ozone measured in? Less than ____.
37 Funds from what will enable some park stations to continue monitoring?
40 What instrument doesn't have EPA certification status?
60 What is giving us a tool to evaluate air quality?
125 Return what card to request more annual reports?
144 The portable AQ station resembles what?
151 For the first time, ARD will support what monitoring?
171 A TEOM will be installed at what park this summer?

Down

32 The WACAP is to be applied where?
39 Operator Larry Blackwelder operates what station?
40 Ozone inlet changes eliminate the need for what?
43 How old are the UPSs in the network?
61 What park will get a 2B Tech ozone analyzer this summer?

***NETWORK NEWS** continued from page 2....*

Mapping air quality: Let's share data

The monitoring strategy for air quality in the parks has focused on Class I areas and the determination of baseline values and trends. We have always believed that our best indicators of air quality in the parks was from direct measurements in the parks; that is still true, but what if we just want an approximate value? Ozone concentrations have been measured in less than 50 parks, when will the other 230+ park units be monitored?

Geographic Information Systems (GIS) are giving us a new tool to evaluate air quality for essentially all the park units by using maps of interpolated data. Ozone has persistence, mixes well, and is transported over hundreds of miles. That allows us to interpolate the values between multiple measurement points to get pretty good estimates of ozone (see Figure 1) at places where we haven't monitored.

The NPS Air Resources Division and University of Denver researchers have jointly created a series of air quality interpolation maps for ozone, visibility, wet acidic deposition, and other factors that give us estimates for all parks. You can view these maps in color using the Air Atlas at *http://www2.nature.nps.gov/ard/gas/airatlas-du/viewer_index.htm*. This prototype is a decision tool. Where is ozone high? What parks are likely to be in areas that exceed the national standard? Where do we have monitoring? Where do we need monitoring? The maps show us the connection between parks from pollutants carried on the winds.

Zoom in enough on the Air Atlas maps and there is a disappointment waiting. There just isn't enough detail to show what is happening in mountainous terrain. Are the ozone concentrations really the same on both sides of the continental divide in Rocky Mountain National Park? Only additional monitoring within a park can answer this kind of question, either with continuous analyzers or with passive ozone samplers. A detailed ozone study with 60 monitoring sites at Great Smoky Mountains allowed for some detailed interpolations (see Figure 2). We are working on spatial estimates from the GIS method that will approach that level of detail.

From the GIS mapping project we have been able to identify a large number of ozone monitoring stations that are within 30 - 50 km of park boundaries. These monitoring stations may serve as surrogate monitors for the parks.

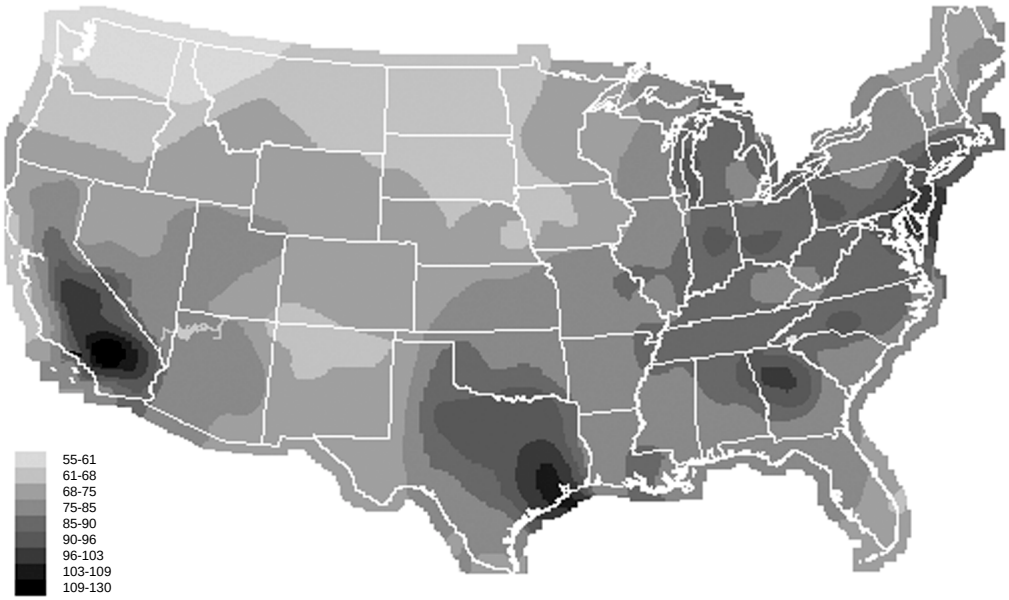


Figure 1. 4th highest annual maximum ozone concentrations at in the United States during 1995-1999.

For a full list of what parks may have nearby monitoring, see the map products at *http://www2.nrintra.nps.gov/ard/gas/NRC_AQ_mon1.htm*. Just as important, we have identified the areas where monitoring coverage needs to be improved in order to have better pollutant estimates. A number of sites selected for the new Natural Resource Challenge monitoring came from the GIS analysis.

Seasonal Average Ozone at Great Smoky Mtns. NP
30-m resolution

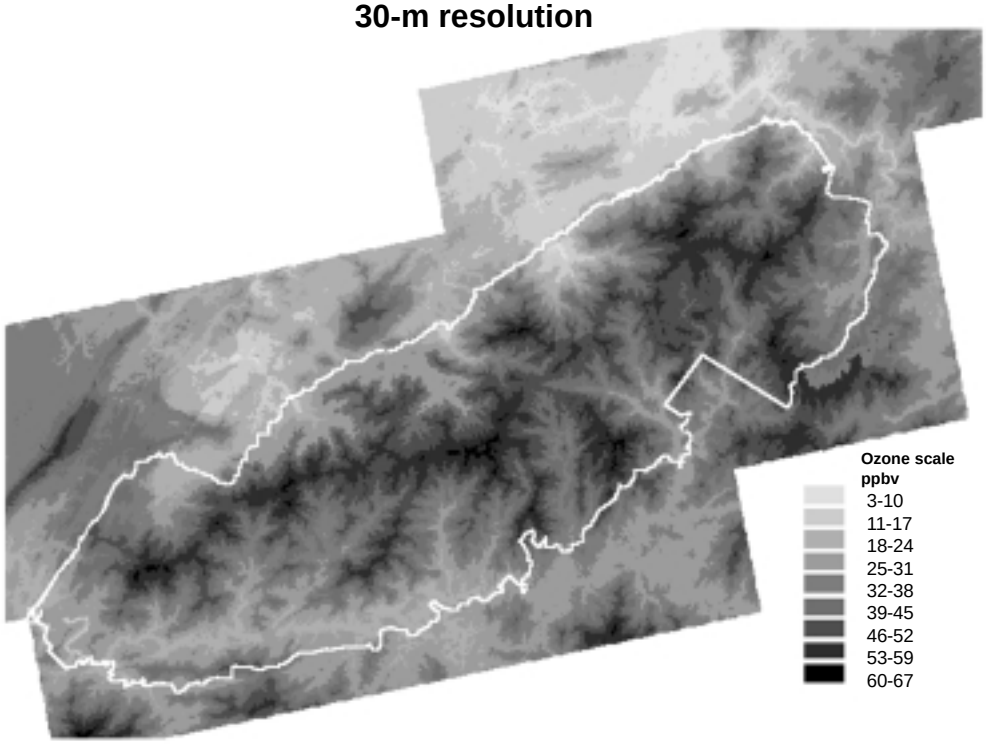


Figure 2. Seasonal average ozone concentrations at Great Smoky Mountains National Park, North Carolina/Tennessee.

UPS replacements for Brewers

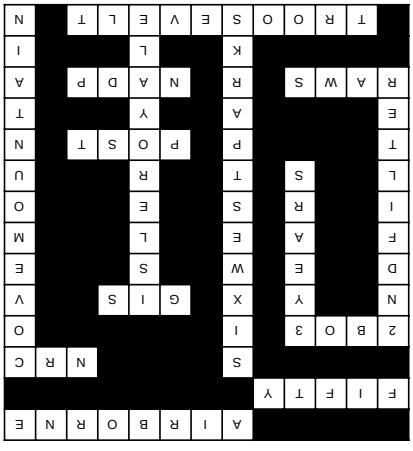
Sites with Brewer instruments were originally set up with uninterruptible power supplies (UPSs) to eliminate the need to resynchronize the system clock between the Brewer instrument and the Brewer computer. These UPS' are now at least three years old and many of the unit's backup batteries have become exhausted. Replacement units will be sent to each site with a Brewer instrument for the operator to replace. Please send your original UPS back to ARS quickly so it may be serviced and sent on to the next location. Laura Wilson of ARS will be coordinating the UPS replacements.

Feedback requested on annual reports

ARS personnel are compiling data and information for the Gaseous Pollutant Monitoring Program's 2001 annual reports. The reports are scheduled to be delivered to each site by July 31st.

Along with each hardcopy delivered, a postcard will be enclosed asking if you need a data diskette or would prefer an electronic copy (.PDF) of the report instead of hardcopy. Please respond to the postcards if you no longer wish a hardcopy report. Also note any address changes or corrections, or if you have any additional comments regarding the annual reports.

Puzzle answers...



Ozone inlet changes

Ozone inlet configuration changes are in progress at most stations in the network. The new configuration eliminates the glass manifold, manifold pump, and one of the particulate filters. The simplified configuration uses the analyzer sample pump to bring the ambient sample into the instrument from the 10-meter sampling height. This configuration has several advantages over the previous manifold configuration including: eliminates possible manifold leaks; allows for span, zero, and precision checks to be made through the entire sample manifold; and eliminates the need for a second filter. ARS field specialists will make the changes and instruct site operators during twice-annual visits.

CASTNet 2000 annual report available

The Clean Air Status and Trends Network (CASTNet) has released its annual report for 2000. ARS mailed CDs containing this report to each monitoring site. If you haven't received yours, call ARS for a CD, or visit the Internet at *http://www.epa.gov/castnet/library* to download it from the Internet.

Portable AQ station under development

Through funding by the NPS ARD, ARS has been developing a low power, portable air quality monitoring station. The station will include measurements for ozone, CASTNet-style filter pack sampling, wind speed and direction, air temperature, relative humidity, solar radiation, and precipitation. The station will resemble a small Remote Automated Weather Station (RAWS) with a single mast for ozone and meteorological measurements and cabinet enclosures to house the datalogger and monitoring and sampling equipment. The station will be primarily for summer season use, and will be powered from batteries charged with solar panels.

Ozone measurement will be made with a 2B Tech ozone analyzer (a small, low power analyzer based on the UV photometric measurement technique). The 2B Tech analyzer will provide a continuous ozone measurement, which will be stored by the station's Campbell Scientific datalogger as hourly averages along with the meteorological data.

The 2B Tech ozone analyzer does not have EPA certification status, so its data cannot be used for regulatory purposes, but the data will be valuable in parks where no data currently exist and year-round monitoring is either not necessary or is cost prohibitive.

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