# The MONITOR

A Newsletter for National Park Service Air Quality Station Operators

Spring 1999

Volume 2 Number 2


## NETWORK NEWS

### ESC dataloggers coming to the network

As promised, in the previous newsletter, replacement ESC Model 8816 dataloggers are being deployed into the network. As of this writing, approximately one-third of the 35 stations scheduled for datalogger replacement have been completed. Dataloggers are replaced during scheduled semiannual visits, and all replacements should be completed by August 1999.

Acceptance of the new loggers by station operators has been generally good. Certainly the capabilities and hopefully the reliability of these new units are much greater, however, the ol' SumX and Odessa loggers were familiar to all and old habits are hard to break. Operation of the ESC loggers is straightforward. All operators have been able to master the required operations after an hour or so of introduction and a little time on their own. ARS has prepared a simplified operating procedure that walks operators through the most common operations. The major complaint received from operators is that daily summary printing takes more paper (and time) than previously. Please forward any comments you have to ARS or to John Ray of the NPS ARD. Station visit requirements are currently under review and your inputs are an important part of the review processes. Please see *Station Operations Under Review*, on page 8 of this newsletter.

Initializing the ESC dataloggers sometimes poses a challenge and it will be awhile before all features are well understood. So please be patient, ARS has been directed to only support those features that are required to operate the station and to complete routine station maintenance. If you have a special datalogger need please discuss it with John Ray of the NPS ARD.

If you are currently interrogating your station's logger remotely, you will have to change or upgrade your communications hardware and software. The new logger requires communication at 19200 baud and VT100 terminal emulation. See *Remote Communication With ESC Loggers*, on page 3 of this newsletter.

## What's inside:



### New NTN/NADP sites coming to parks

Within the next six months the National Trends Network/National Atmospheric Deposition Program (NTN/NADP) will install new wet deposition monitors at seven parks. The sites to be added to the national network include:

- Hawaii Volcanoes National Park (PRIMENet)
- Voyageurs National Park
- Mount Rainier National Park
- Death Valley National Park
- Joshua Tree National Park
- Pinnacles National Park
- Lassen Volcanic National Park

These sites are in parks where we also operate dry deposition filter packs. To get estimates of total deposition, we need to have both wet and dry data. The chemical constituents that are of most interest to the NPS ARD are hydrogen ion (expressed as pH), nitrate, ammonium, and sulfate. These are the chemical stressors that can cause chronic and episodic acidification of surface waters and soils.

These sites will join a national network of over 200 sites, coordinated by the Illinois State Water Survey, located in Champaign, Illinois. The NTN/NADP network has been operating for 20 years, and is the longest running atmospheric deposition network in the U.S. The data from all the sites are used to generate isopleth maps of annual deposition throughout the U.S. These data and map products can be viewed on the NTN/NADP website at *http://nadp.sws.uiuc.edu*. Welcome to the seven new site operators and site supervisors, who are now working with the NADP Program Office and the NPS ARD to install these sites.

***NETWORK NEWS continued on page 3....***

## SITE OPERATOR FOCUS
## Donna Meisky dedicated to monitoring in Sequoia-Kings Canyon National Parks

Since the summer of 1994, Donna Meisky has provided her services as Air Resources Technician in Sequoia and Kings Canyon National Parks. The two parks lie back-to-back in the southern Sierra Nevada mountains of California. Donna's primary job is maintaining the parks' air quality monitoring equipment. When the parks' Air Resources Specialist position was vacant in 1997 and 1998, however, Donna filled in as program manager.

Donna currently maintains two air quality stations: Lookout Point and Lower Kaweah. Each station is equipped with a continuous ozone sampler and a full range of meteorological sensors. Lookout Point, which is solar/wind powered, also has a CASTNet filter pack dry deposition system. Lower Kaweah has a visibility camera. The parks also have a four-module IMPROVE sampler and a PRIMENet UV-B monitor at Ash Mountain and plans are in the works to reopen the Ash Mountain air quality station closed in 1995.

Though site operator duties keep her busy, Donna assists with air-related research, is a member of the parks' Diversity Work Group, and serves as Employee Transportation Coordinator. "I encourage park employees to decrease the amount of pollution they generate, especially when air quality levels are unhealthful," says Donna, "I hope to make a difference; I hope to educate people."

Donna Meisky, Air Resources Technician, feels approaching rainfall at Sequoia - Kings Canyon National Parks, California.

Before becoming a term employee at Sequoia-Kings Canyon, Donna worked as a seasonal for several years. After earning a B.A. in biology from the University of Minnesota, she began her career with the park service as a fee collector at Organ Pipe Cactus National Monument, Arizona. She then worked as an interpreter at Apostle Islands National Lakeshore, Wisconsin, and Badlands National Park, South Dakota, and monitored spotted owls and marbled murrelets at Mount Rainier National Park, Washington. Donna was converted to permanent status last summer and is enjoying the job security of being a "Permanent AirHead." In her free time, she enjoys, among other things, skiing, swimming in the river ("the best thing about 100+ degree temperatures"), and making excursions into town for a bit of culture.

## DATA COLLECTION SUMMARY

Data collection statistics for July through December 1998 are:

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

| | | |
|---|---|---|
| Big Bend | Canyonlands | Chiricahua |
| Craters of the Moon | Denali | Everglades |
| Glacier | Great Basin | Grand Canyon |
| Great Smoky Mtns. (Cove Mountain) | Great Smoky Mtns. (Look Rock) | Hawaii Volcanoes |
| Lassen Volcanic | Mammoth Cave | Mount Rainier |
| North Cascades | Olympic | Rocky Mountain |
| Shenandoah | Theodore Roosevelt | Voyageurs |
| Yellowstone | Yosemite | |

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

| | | |
|---|---|---|
| Death Valley | Mesa Verde | Pinnacles |
| Sequoia-Kings (Lookout Point) | | |

- The entire network achieved 89.3% final validation of ambient air quality parameters.

## GLOSSARY OF ACRONYMS

**ARS -** Air Resource Specialists, Inc.

**CASTNet -** Clean Air Status and Trends Network

**ESC** - Environmental Systems Corporation

**IMPROVE -** Interagency Monitoring of Protected Visual Environments.

**NTN/NADP -** National Trends Network / National Atmospheric Deposition Program

**NPS ARD -** National Park Service Air Resources Division.

**"Pothead" -** sampling inlet mounted atop a tipping tower

**PRIMENet -** Park Research and Intensive Monitoring of Ecosystems Network.

**UV-B -** ultraviolet-B

***NETWORK NEWS continued from page 1....***

## NPS ARD website offers monitoring info

Have you visited the National Park Service Air Resources Division's web pages recently? If not, you're missing out on a lot of information. Visit *http://www.nature.nps.gov/ard/gas* soon, and see for yourself the interesting facts and information about air quality monitoring operations that are right at your fingertips.

The Air Quality and Deposition Monitoring webpage provides the following information:

- Monitoring program information, including:
  - An overview of the NPS continuous monitoring network operation, currently comprised of 33 ozone and meteorological stations, annual data summaries, and *The Monitor* newsletter.
  - Enhanced monitoring in cooperation with regional programs.
  - The passive sampler monitoring program.
  - The dry deposition monitoring network.
  - The wet deposition monitoring network.
  - The UV-B monitoring network and links to UV-B information pages.
- A monitoring history database

  Query the database for information about monitoring at specific parks, monitoring networks, or parameters measured.
- Individual parks

  Find information about specific parks, including air resource programs, general park information, climate, facilities, visitor activities, and more.
- Real-time data

  View a real-time photograph of conditions at Great Smoky Mountains National Park, North Carolina/Tennessee, and real-time air quality data updated every 15 minutes.
- AIRS database

  Find information on the EPA AIRS (Aerometric Information Retrieval System) link, including basic facts about the AIRS database, publications using AIRS data, AIRS data contacts, and much more.

Visit *http://www.nature.nps.gov/ard/gas* regularly for the latest updates on network information and operations.

## Station check reminders

ARS regularly reviews data to identify problems quickly, however, some problems are not obvious and the station operators have the best ability to review current conditions. Check these reminders to ensure you are not overlooking important details:

1. Observe the wind speed and direction as you enter the station and review the data from the datalogger. Does the information make sense?

2. Stations with a "pothead" ozone inlet will have a flow rotameter near the glass manifold. Does the rotameter ball indicate adequate flow, typically a ball height of 10 to 15?

3. Do precipitation amounts agree with known conditions over the past week?

4. Take special care in checking systems after a summer thunderstorm. Are any circuit breakers tripped? Does the telephone have a dial tone?

5. Always check to ensure all meteorological signal conditioning cards are returned to "operate." Did you turn off or make any temporary adjustments to the heating or cooling during the station visit? Is the modem on?

6. Get into the habit of reviewing current data just before you leave. Are all columns marked "on-line" and do the values make sense?

These reminders and others will reduce unnecessary data loss, and add to the quality of the data collected.

## Remote communication with ESC loggers

If you check your station's datalogger remotely via modem, you will need to make some changes in your communications software and hardware. Set your software baud rate to 19200, 8 data bits, no parity, and 1 stop bit. Terminal emulation will need to be VT 100. After connecting with the station, you should have a blank terminal screen. The ESC 8816 will expect the following entry: "Escape XXAQM" where XX is the two-character logger ID code for your station. For example, logging into the ESC 8816 at Rocky Mountain National Park would require the following sequence after connection: *Esc**RMAQM***. You may then login at the required password level and interrogate or capture data files.

Many operators have been successful using HyperTerminal to access their ESC datalogger. This software comes standard in Windows 95/98/NT. Find it in "Programs/Accessories/HyperTerminal." Section E.3 of the ESC manual discusses the HyperTerminal configuration.

***NETWORK NEWS continued on page 8....***

## LAB TALK

## It's Tuesday, do you know where your analyzer particulate filter is?

In the rush to get all your station chores done during Tuesday station visits, you have to take the time to check and change the analyzer particulate filters, which keep particles from contaminating the instrument's optics. Configuration changes over the last few years may have left some operators unsure of which filter belongs where and how often they should be changed. The following discussion addresses these issues, a review for some but good information for all.

Most stations now employ a two-filter system, one at the top of the 10-meter "pothead" and the other inside the shelter on the sample line just before the analyzer input.

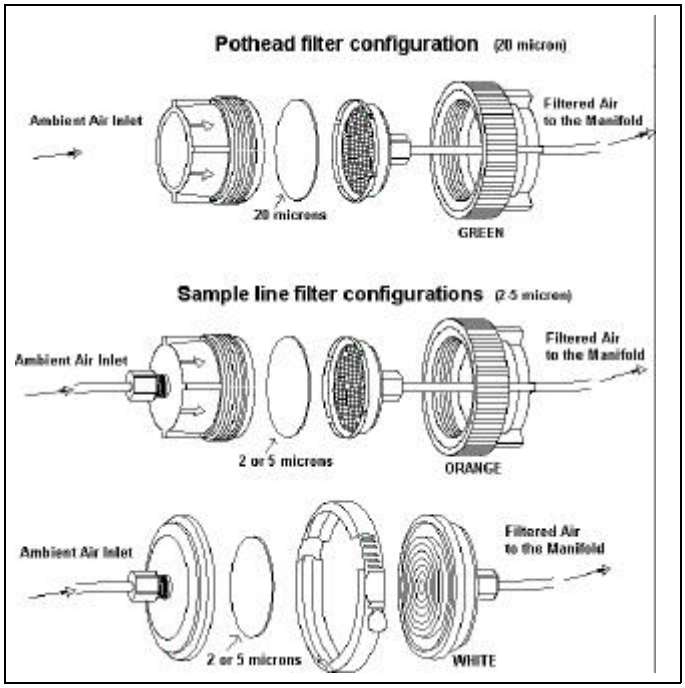
**Pothead filter**

The ozone (or $SO_2$) pothead filter holder has a green knurled retaining ring. This green ring identifies the holder to accept a 20-micron pore-size filter. The packages of 10 filters supplied by ARS are clearly marked 20 Micron Filters for use in green filter holders (highlighted in green). If the filter envelope gets separated from its plastic bag, Savillex #1150 can identify it.

**Sample line filter**

The sample line filter holder should have an orange clamp nut (or a white Mace brand holder), and it accepts the 2 or 5 micron pore-size filters. These filters are also are supplied in packages of 10 and are clearly marked 2 or 5 Micron Filters for use in orange or white filter holders (highlighted in orange) on their plastic bag. These are Savillex #1131. If your station does not fit this description, or you're not sure, give ARS a call to discuss it with a technician.

Now that we have found them, we need to know how often to change them. The answer of course is before they get dirty. If you can see dirt on the filter, ozone is being lost. The pothead (green) filter should be changed every week at parks influenced by urban areas or nearby dust sources. Parks in remote, less dusty areas require filter changes approximately every two weeks. The analyzer input (inside) filter (orange or Mace brand) needs changing less often, but at least monthly. Adjust your change schedule to the amount of dirt you see on the filter. Make sure to tighten the filter holder halves securely with filter wrenches and note all filter activities in the logbook!




## NEWS FROM THE FIELD

### Stations receive makeover

Air Resource Specialists, Inc., in cooperation with the National Park Service Air Resources Division, has upgraded or replaced numerous air quality monitoring stations over the past few years. That trend continues to provide for air quality monitoring facilities that will be both adequately sized and long-lasting.

Rocky Mountain National Park received a replacement shelter this winter and the Pinnacles station received new instrument racks and a complete instrument reinstallation. On tap this spring will be a new shelter for the Sequoia-Kings Canyon Lower Kaweah station. Technicians will be busy preparing the "guts" of the system for a May delivery date.

### Virgin Islands station takes a beating

Hurricane Georges paid a visit to the U.S. Virgin Islands last fall, and left its calling card. The storm took a toll on the islands, but the air quality instrumentation held up solid. According to station operator Captain Sandy West, "The hurricane lifted the air quality shelter and tilted it several inches sideways. After the storm left, the station was without electricity for six weeks. The equipment held up but it took a while to put it all back in place."

The Brewer spectrophotometer, mounted on the shelter's roof, was temporarily removed in anticipation of the storm's approach, and was reinstalled several weeks later.

***NEWS FROM THE FIELD continued on page 7....***

## A LOOK AT THE DATA
## Interpreting wind rose plots

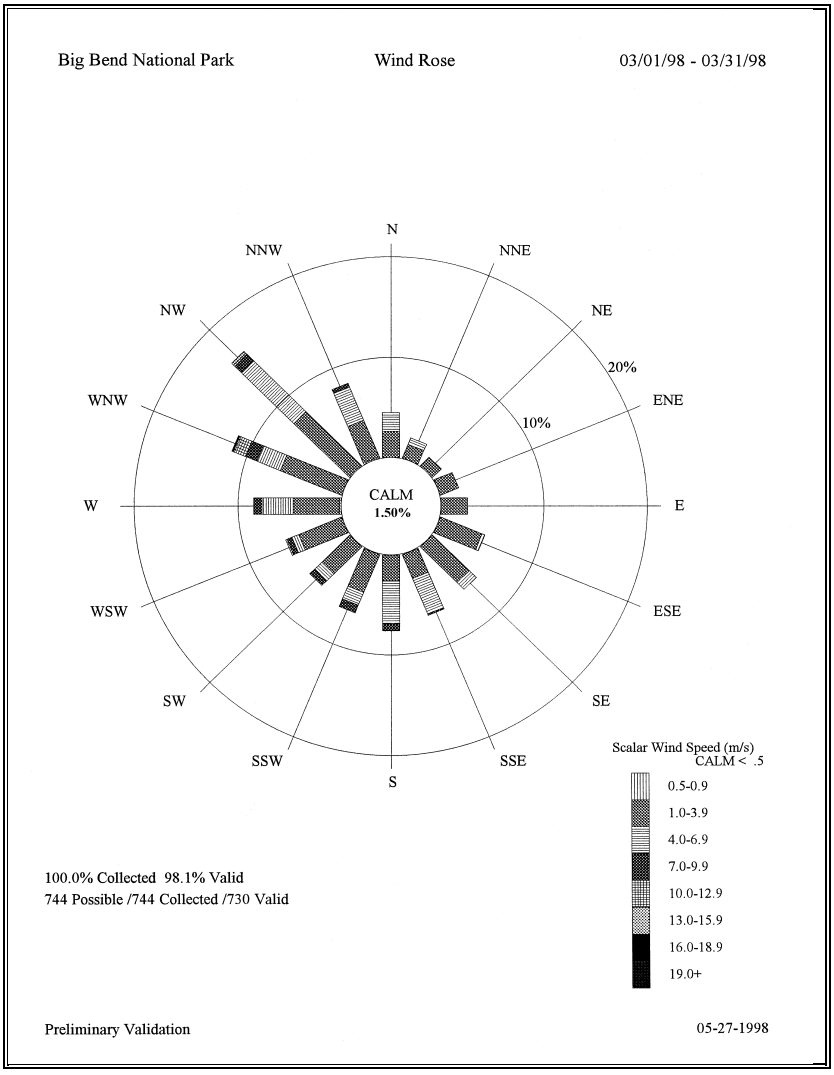
Wind rose plots are prepared for both monthly and annual ambient air quality reports. A wind rose is a diagram that shows the distribution of wind direction and speed over a period of time.

The diagram consists of a circle from which 16 bars emanate, one for each compass point. The length of each bar is proportional to the frequency that wind blew from that direction, and the frequency of calm conditions is entered in the center. Each bar is further divided by wind speed class. In the example below, calm conditions occur 1.5% of the time and the frequency of winds from the 16 directions are scaled against concentric circles represented in 10% increments. In the example below, the 10% frequency level of wind occurrence is displayed by the middle circle, and the 20% level is displayed by the outermost circle. These defined percentages may change, depending upon the data.

The bars emanating outward from the center of the circles identify the frequency of wind coming from that direction. A symbol key correlates the patterns of the bars to wind speed.

In the example below, winds at Big Bend National Park during March 1998 came from the northwest about 16% of the time. About 8% of the northwest winds were 1.0 - 3.9 meters per second in strength, about 7% were 4.0 to 6.9 meters per second, about 1% were 7.9 - 9.9 meters per second, and about 0.5% were 13.0 - 15.9 meters per second . The total all of these speeds is about 16%, or the value of the entire northwest bar.

A general way to interpret this wind rose is that a majority of the winds came from the northwest quadrant. The prevailing wind was from the northwest and the least wind came from the northeast. The strongest winds (greater than 10 m/s) came from the west-northwest.




Monthly Wind Rose Plot
for Big Bend National Park,
March 1998.

All winds and calm conditions combined equal 100.0% of all valid wind data for that plotting period. Both wind speed and wind direction data must be valid to be plotted as hourly data. The wind sensors at each ambient air quality station take readings every 5 seconds. These readings are converted to a 5-minute average and then an hourly average. At least 45 minutes of data are needed for an hourly average to be valid and plotted. Invalid data are generally caused by maintenance being performed at the time of the wind sensor measurement, power failures, or instrument malfunction.

Wind roses provide information about the winds themselves, or they can be used in conjunction with other data types to determine where and when gaseous air pollutants were transported through the atmosphere.

Telephone the Information Management Center at ARS if you have any questions about interpreting this or any other type of data plot.

## AIR QUALITY MONITORING NETWORK
## Site contact information

**John Ray, Network Program Manager**
**Telephone: 303/969-2820**
**E-mail: John_D_Ray@nps.gov**

| Park Name | Contact Name | E-mail Address | Telephone |
|---|---|---|---|
| Acadia NP | Bill Gawley* | bill_gawley@nps.gov | 207-288-5463 |
| | Bob Breen | bob_breen@nps.gov | 207-288-5463 |
| Big Bend NP | John Forsythe* | john_h_forsythe@nps.gov | 915-477-2251 |
| Canyonlands NP | Colin Smith* | colin_smith@nps.gov | 435-259-4712 |
| Chiricahua NP | Walt Saenger* | | 520-824-3560 |
| | Alan Whalon | alan_whalon@nps.gov | |
| Craters of the Moon NM | John Apel* | john_apel@nps.gov | 208-527-3279 |
| Denali NP | Andrea Blakesley* | andrea_blakesley@nps.gov | 907-683-9545 |
| Death Valley NP | Arnie Peterson* | arnie_peterson@nps.gov | 760-786-3233 |
| Everglades NP | Dan Obenauer* | dan_obenauer@nps.gov | 305-242-7881 |
| | Bob Zepp | bob_zepp@nps.gov | 305-242-7881 |
| Glacier NP | Lindy Key* | c/o bill_michels@nps.gov | 406-888-7854 |
| Grand Canyon NP | Carl Bowman* | grca_air_quality_coordinator@nps.gov | 520-638-7817 |
| Great Basin NP | Melissa Renfro* | melissa_renfro@nps.gov | 702-234-7331 |
| Great Smoky Mountains NP | Jim Renfro* | jim_renfro@nps.gov | 423-436-1708 |
| | Scott Berenyi* | scott_berenyi@nps.gov | 423-430-4749 |
| Hawaii Volcanoes NP | Tamar Elias* | telias@usgs.gov | 808-967-8652 |
| | Karin Schlappa* | schlappa@soest.hawaii.edu | 808-985-6070 |
| Hawaii - Thurston | David Foote | david_foote@ccmail.itd.nps.gov | 808-985-6076 |
| Joshua Tree NP | Chris Holbeck* | chris_holbeck@nps.gov | 760-367-5563 |
| Lassen Volcanic NP | Nicole Tancreto* | nicole_tancreto@nps.gov | 530-595-4444 |
| Mammoth Cave NP | Bob Carson* | bob_carson@nps.gov | 502-749-2508 |
| Mesa Verde NP | Marilyn Collier* | | 970-529-5069 |
| Mount Rainier NP | Brendan Brokes* | brendan_brokes@nps.gov | 360-569-2211 |
| North Cascades NP | Rachel Mazur* | rachel_mazur@nps.gov | 360-873-4590 |
| Olympic NP | Patte Danisiewicz* | patte_danisiewicz@nps.gov | 360-452-4501 |
| | Shelley Hall | shelley_hall@nps.gov | |
| Pinnacles NM | Chad Moore* | chad_moore@nps.gov | 831-389-4485 |
| Rocky Mountain NP | Mary King | | 970-586-1399 |
| Sequoia-Kings Canyon NP | Donna Meisky* | donna_meisky@nps.gov | 559-565-3127 |
| | Annie Esperanza | annie_m_esperanza@nps.gov | 559-565-3172 |
| Shenandoah NP | Shane Spitzer* | shane_spitzer@nps.gov | 540-999-3434 |
| Theodore Roosevelt NP | Steve Hagar* | steve_hagar@nps.gov | 701-623-4466 |
| Virgin Islands NP | Sandy West* | None | 340-779-8950 |
| | Chuck Weikert | chuck_weikert@nps.gov | 340-693-8950 |
| Voyageurs NP | Jim Schaberl* | jim_schaberl@nps.gov | 218-283-9821 |
| Yellowstone NP | Darcy Burger* | c/o gary_youngblood@nps.gov | 307-242-2401 |
| Yosemite NP | Katy Warner* | katy_warner@nos.gov | 209-372-0477 |

* Air quality station operator

## JOHN'S PUZZLE PAGE

Puzzle Page Questions

- Name the national park that has an underground river and over 300 miles of explored and mapped passages, making it the longest recorded cave system in the world.
- Going-to-the-Sun Highway, reaching an elevation of 6,664 feet as it crosses the Continental Divide is in what national park?
- What is the annual average snowfall at Crater Lake National Park, Oregon?
- What current national park was originally known as Lafayette National Park?
- What National Park Service region administers Mt. St. Helens National Volcanic Monument?
- Anasazi is a Navajo word associated with many southwestern national monuments. What does the word mean?

Get the answers when you phone in your multipoint calibration results!

Cryptogram

A cryptogram is a coded message in which one letter is substituted for another. *Example:* Etgpyikybp = Multipoint.

"Lv Rbyoybny Xbc Rbvlyfl"

Name this park:_____

***NEWS FROM THE FIELD continued from page 4....***

### Air quality data educates GRSM visitors

Air quality station operators at Great Smoky Mountains National Park are doing their part to help educate park visitors. An interpretive air quality display, which provides real-time air quality measurements, and information about its effect on other resources and public health, is now on display in the Sugarlands Visitor Center. The same information in a different format is also available to visitors of the World Wide Web.

Computers are used to collect the data from the Look Rock air quality station, about 23 miles west of the visitor's center. Station operators maintain a nephelometer, an ozone analyzer, and meteorological sensors (air temperature, relative humidity, wind speed, wind direction, and precipitation). A digital camera is also located on an observation tower near the station. Computers transmit data and images from the monitoring equipment to the visitor center every 15 minutes, where they are graphically displayed on computer monitors in the air quality display and on the Internet.

The interpretive air quality display and Internet link provides visitors with a better understanding of air quality issues and how these affect other natural resources at Great Smoky Mountains National Park. Funding for the project was provided by the National Park Service - Air Resources Division, the U.S. Environmental Protection Agency, the Great Smoky Mountains Natural History Association, and Great Smoky Mountains National Park.

To view a real-time scene and related air quality data at Great Smoky Mountains National Park, visit:

*http://www.nature.nps.gov/ard/parks/grsm/LookRockWeather.htm*

For more information about the air quality exhibit, refer to *Park Science*, Volume 19, Number 1, or contact:

Jim Renfro / Great Smoky Mountains National Park
Telephone: 423/436-1708
or
Dee Morse / National Park Service ARD
Telephone: 303/969-2817

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*NETWORK NEWS continued from page 3....*

## UV spectrophotometer network complete

In February 1999, the last installation of 14 Brewer spectrophotometers was completed for the PRIMENet (Park Research and Intensive Monitoring of Ecosystems Network). PRIMENet is a cooperative program between the Environmental Protection Agency and the National Park Service to monitor air quality and UV radiation at selected park index sites, representing important ecosystem types. Some of the Brewer instruments have been collecting data on the solar spectrum and on total column ozone for more than a year. The 14th network site was recently installed at Hawaii Volcanoes National Park, on the roof of the Hawaii Volcano Observatory. The other parks that are now operating Brewers include: Acadia, Great Smoky Mountains, Shenandoah, Everglades, Big Bend, Sequoia, Olympic, Glacier, Rocky Mountain, Canyonlands, Virgin Islands, Denali, and Theodore Roosevelt National Parks. The data collected at these parks are being used to interpret research data on the effects of stresses on natural ecosystems. A two-year effort is now planned to investigate the possible effects of UV-B radiation on amphibian populations in three PRIMENet parks: Glacier, Olympic, and Sequoia. For more information on this interagency program, please visit the PRIMENet website at:

*http://www.nature.nps.gov/ard/prime.htm.*

## Station operations under review

Tired of checklists, datalogger-to-strip chart comparisons, and rushing to complete data packets? You will be pleased to know that efforts are being made to streamline all these procedures. Although some redundant procedures have been removed over the past few years, operator validation procedures have not changed significantly since the NPS-ARD consolidated air quality operations 15 years ago.

Operator validation procedures have yielded a consistently validated and well-understood data set, however, technological advances may allow opportunities for numerous validation streamlining. The new dataloggers, along with the future addition of in-station personal computers, will allow this to happen. This combination of data collection hardware will allow completion of electronic versions of checklists, logbooks, and multipoint and other logs, and their electronic transfer to the IMC. In addition, an electronic version of the strip chart will replace the mechanical version in place since time began, and will allow service technicians to review detailed data remotely. I hear you saying, "I'll believe it when I see it," and you're right, this will take some time to develop and implement. Development will first lead to a prototype system that will be thoroughly tested. The results of prototype testing will be used to develop an operational system. ARS will begin deploying operational systems in early 2000. For more information, contact:

John Ray / National Park Service ARD
Telephone: 303/969-2820

**The MONITOR**

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Air Resource Specialists, Inc.

1901 Sharp Point Drive Suite E
Fort Collins, CO 80525
Telephone: 970/484-7941
Toll Free: 1-800/344-5423
Fax: 970/484-3423
E-mail: info@air-resource.com

Newsletter production consultant:
John D. Ray - Program Manager, NPS ARD
Telephone: 303/969-2820

Editor:
Gloria S. Mercer - Air Resource Specialists, Inc.

NPS Ambient Air Quality Monitoring Network