United States Environmental Protection Agency
Office of Research and Development Washington, DC 20460
Office of Environmental Information Washington, DC 20460
EPA/625/R-00/003
February 2000
http://www.epa.gov/empact

EPA

Report of the December 15, 1999 EPA Satellite Forum on Ozone Monitoring, Mapping, and Public Outreach

EMPACT

Environmental Monitoring for Public Access & Community Tracking

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February 2000

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U.S. Environmental Protection Agency
National Risk Management Research Laboratory
Office of Research and Development
Cincinnati, Ohio 45268

Printed on Recycled Paper

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ACKNOWLEDGMENTS

Development of the December 15, 1999 Satellite Forum on Ozone Mapping, Monitoring, and Public Outreach was managed by Scott Hedges (U.S. Environmental Protection Agency [EPA], National Risk Management Research Laboratory), with technical guidance from Dennis Doll (EPA, Education and Outreach Group) and Richard Wayland (EPA, Office of Air Quality, Planning and Standards). Gratitude is expressed to Karl Coleman and the production crew at North Carolina State University, to Alison Davis of EPA's Office of Air Quality, Planning and Standards who moderated the satellite forum, and to each of the presenters for their time and contributions.

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1. INTRODUCTION

This report provides a summary of the U.S. Environmental Protection Agency's (EPA's) December 15, 1999 satellite forum on technology transfer tools for ozone monitoring, mapping, and public outreach.

Chapter 1 provides information about the purpose of the satellite broadcast, along with background information on the planning and production of the broadcast. Chapter 2 contains summaries of the presentations made during the satellite forum. Chapter 3 summarizes the live question-and-answer sessions held during the broadcast. Appendix A contains the agenda for the broadcast. Appendix B provides information about viewership, and Appendix C contains the satellite forum Workshop Guide, which was prepared by North Carolina State University. The Workshop Guide contains the presentation materials prepared by individual speakers.

2. BACKGROUND AND PURPOSE

The U. S. Environmental Protection Agency (EPA) created the EMPACT program in 1997 to take advantage of new technologies that make it possible to provide environmental information to the public in near real time. EMPACT is working with 86 metropolitan areas across the country to help deliver time-relevant environmental information to the general public to help them understand the condition of their environment and make day-to-day environmental risk management decisions. A key function of EMPACT is to integrate technical communication among the 86 EMPACT communities, state agencies, and EPA.

As part of EMPACT's technical communication efforts, one of the EMPACT projects, AirNow, was discussed in a satellite videoconference broadcast on December 15, 1999. The purpose of AirNow is to provide the public with real-time information about ozone pollution in an easy-to-understand pictorial format. AirNow is a collaborative effort among EPA, state and local air quality agencies, and regional organizations to collect, quality assure, and transfer real-time air quality information to the public.

The videoconference was convened by EPA's Office of Air Quality, Planning and Standards (OAQPS), in conjunction with and support from the EMPACT program. The December 15 videoconference was the second in a three-part series dealing with AirNow. The first, which was broadcast on November 10, 1999, focused on the Air Quality Index (AQI). The third, scheduled for Spring, 2000, will focus on the health effects of ozone.

Participants in the satellite forum included representatives of EPA and state and local air quality agencies. They provided information on several topics, including: the EMPACT program; major components of AirNow's program to design, implement, and operate an ozone monitoring network, an automated data transfer system (ADTS), an ozone mapping system (MapGen), and conduct public outreach; and key sections of the technology transfer handbook and companion CD-ROM entitled *Ozone Monitoring, Mapping, and Public Outreach: Delivering Real-Time Ozone Information to Your Community*. (The complete agenda is included in this report as Appendix A.)

Target audiences for the satellite forum included managers and decision-makers interested in implementing ozone programs in their communities or learning about new technologies and new approaches for disseminating real-time information; technicians responsible for implementing ozone programs; and communications specialists involved in communicating information to the public about ozone

The satellite forum was produced by EPA's Air Pollution Distance Learning Network (APDLN), a digital educational satellite broadcasting network of 127 governmental and university broadcast affiliates located across the United States. The APDLN is a collaborative partnership between EPA, State and local air pollution control agencies, and North Carolina State University. The

broadcast could be viewed at one of the 127 APDLN satellite downlink sites; at another site with satellite downlink capability using Ku and C band satellite coordinates; or via a live Internet simulcast.

Efforts were made to publicize the broadcast through the EPA EMPACT steering committee, EMPACT project leads, participating agencies in the Ozone Mapping Project, and other agencies and organizations such the Northeast States for Coordinated Air Use Management (NESCAUM), the Mid-Atlantic Regional Air Management Association (MARAMA), STAPPA/ALAPCO, the Air and Waste Management Association (AWMA), the Ozone Transport Commission (OTC), and the Local Government Environmental Assistance Network (LGEAN). Special emphasis was placed on publicizing the broadcast in EMPACT communities not served by an APDLN satellite downlink facility.

Videocassettes (VHS format) of the December 15 broadcast are available. Individuals in the public sector (i.e., state, local, and federal agencies) may obtain copies from Dennis Shipman, U.S. EPA, Office of Air Quality, Planning and Standards, Education and Outreach Group (919-541-54770, e-mail: shipman.dennis@epa.gov). There is no fee for copies to the public sector. Individuals in the private sector may obtain copies from Christine Murphy, Industrial Extension Service, North Carolina State University (919-515-5874, e- mail: Christine_Murphy@ncsu.edu). The fee is $35.00.

3. PRESENTATION SUMMARIES

This chapter contains summaries of each of the presentations made during the December 14 satellite broadcast. Appendix C, the Workshop Guide prepared by North Carolina State University, contains each speaker's presentation overheads.

Environmental Monitoring
Denice Shaw
U.S. Environmental Protection Agency
Office of Research and Development/EMPACT Program

Denice Shaw provided background on EPA's EMPACT Program. She explained that the EMPACT program is a Presidential initiative whose mission is to assist communities to implement sustainable monitoring that provides current and accurate information to citizens about their environment. It is operated by a steering committee with members from each of the EPA regions and program offices and from partner Federal agencies including the U.S. Geological Survey (USGS) and the National Oceanographic and Atmospheric Administration (NOAA).

The EMPACT Program stresses the need for community ownership of the program, projects, and data. Monitoring and data management are managed locally (with the provisions that are necessary for secondary access to the data). Data interpretation is the responsibility and privilege of the community. All projects are executed through community leadership and are based on sound science.

Ms. Shaw stated that EMPACT serves as a model within EPA for environmental monitoring and as a catalyst for incorporating new and innovative science.

EMPACT projects monitor parameters that affect human and ecological health. EMPACT projects include monitoring of air quality (such as AirNow), drinking water, beaches, rivers, lakes, and streams. EMPACT currently has monitoring projects in 84 cities across the U.S. It also supports a series of research grants for community-led monitoring in 16 cities. The program also supports pure research to advance the ability to do real-time monitoring and reporting of environmental information.

Ms. Shaw concluded by stating that the EMPACT Program exists to provide communities with the opportunity to implement new technology, data management solutions, and communication tools to provide citizens and the public with accurate and timely information about their environment.

The Ozone Mapping Project
Chet Wayland
U.S. EPA, Office of Air Quality, Planning and Standards

Mr. Wayland provided background information on the Ozone Mapping Project. He explained that the project is a collaborative effort among federal, state, and local air quality agencies to collect, quality assure, and transfer real-time air quality information to the public. He added that the project is intended to provide the public with fast and easy access to understandable air quality information that can assist them in making good health-based decisions about their daily activities.

He then provided a brief history of the Ozone Mapping Project. The Maryland Department of the Environment and the Maryland Chapter of the American Lung Association initiated the concept of ozone mapping in late 1994, and it was put into operation on a regional basis in the Baltimore-Washington, D.C. area in 1995. In 1997, ozone mapping was piloted on a regional basis by Region 1 of the U.S. EPA, covering 14 northeastern states. In 1998, under a grant from the EMPACT Program, EPA/OAQPS expanded the Ozone Mapping Project and undertook full implementation of the mapping system in the eastern U.S.

Mr. Wayland then provided an overview of the mapping process and its five primary components: state and local monitoring networks, the Automated Data Transfer System, the Data Collection Center, map generation, and outreach:

- *State and local monitoring networks* are the actual monitors in the field that states maintain to collect ozone data. (Mr. Wayland displayed a map showing the location of ozone monitors in states that participated in the Ozone Mapping Project in 1999.)

- *The Automated Data Transfer System* is the system used to transfer data from the monitors to state host computers and then to EPA's Data Collection Center.

- *The Data Collection System* is the heart of the ozone mapping system. It is where the data are stored, manipulated, quality assured, and prepared for map generation.

- *Map Generation.* Once the data are quality assured and ready to be gridded and interpolated, ozone maps are generated. The following types of maps are generated each day and following each of the seven daily polls: animated maps for that day, and maps showing the previous day's peak ozone levels (both 1-hour and 8-hour averages). The map's colors correspond to the colors associated with the Air Quality Index.

- *Outreach.* The ozone maps are disseminated via EPA's AIRNOW website (http://www.epa.gov/airnow); via state/local agencies that participate in the Ozone Mapping project; and via Weather Service Providers (WSPs) who provide the maps to local television stations for incorporation in weather broadcasts.

Currently, the ozone mapping project covers 61 EMPACT cities with complete coverage in 29 eastern states and California. Future plans are to extend coverage throughout the contiguous U.S. EPA will also expand mapping beyond ozone to include other pollutants; real-time mapping of particulate matter is scheduled for 2001.

Mr. Wayland discussed how the Ozone Mapping Project has been received by the public. He stated that, between May and September 1999, the AIRNOW website received over 1.2 million "hits" per month (which is double the number received in 1998). The program has received numerous positive comments from the public, including daycare providers, asthmatics, outdoor workers, exercisers, and air awareness program providers. Major successes in 1999 including getting the Weather Channel and major weather service providers to cover the ozone map. Additionally, the Ozone Mapping Project received the Government Technology Leadership Award in 1998.

Mr. Wayland concluded by saying that comments received about the Ozone Mapping Project have been very helpful, and they will continue to be helpful as the program continues to move forward.

Data Collection and Transfer for Ozone Mapping
Phil Dickerson
U.S. EPA, Office of Air Quality, Planning and Standards

Mr. Dickerson provided an overview of the Automated Data Transfer System (ADTS). He also explained how to set up a State Host Computer (SHC) to connect with the EPA Data Collection Center (DCC) and the ADTS. Finally, he provided troubleshooting tips on using the ADTS.

He began his presentation by providing a brief overview of the regulations, found in 40 CFR 58, that pertain to ambient air monitoring networks. In 1979, EPA promulgated ambient air monitoring regulations, which established SLAMS (State and Local Monitoring Stations) networks (used to demonstrate if an area is meeting national ambient air quality standards [NAAQS]) and NAMS (National Air Monitoring Stations) networks (used to supply data for national policy and trend analyses). Then, in 1993, EPA promulgated the PAMS (Photochemical Assessment Monitoring Stations) rule. PAMS are required to obtain more comprehensive and representative data about ozone air pollution in ozone nonattainment areas designated as serious, severe, or extreme. (The ozone mapping system generally makes use of these already installed monitoring networks.) In July, 1997, EPA promulgated rules that require monitoring for fine particulate matter.

Mr. Dickerson then discussed the ADTS. He described the ADTS as the "heart" of the DCC. The ADTS runs on EPA's Valley internal UNIX Server, which is located in Research Triangle Park,

North Carolina. It is responsible for merging data provided by State Host Computers, QA/QC of that data, and making calculations such as daily peak values and Air Quality Index (AQI) values.

He then described how data flow within the ADTS. He explained that ozone monitors measure ground-level ozone concentrations. These data are fed into "data loggers" that record and store the data. State Host Computers (SHCs) poll the data loggers at specified polling times and ready the data for delivery to the ADTS. SHCs connect to the DCC before the end of each polling window and transfer the observations from midnight until the polling hour. The ADTS then merges all agency data received from the SHCs into a master file. Among other things, the ADTS runs a QA/QC program on the data, calculates peaks and AQI values, interpolates for single hours missing. It also generates gridded data for delivery to Weather Service Providers, and then produces the master observed data (OBS) file. Every participating agency in the Ozone Mapping System can access the master OBS file, which is a good way for them to check their own data and see what the data in surrounding areas look like. Once the ozone animations have been checked by the DCC operations crew, they are posted to the AIRNOW website (http://www.epa.gov/airnow).

Mr. Dickerson explained the steps involved in setting up a State Host Computer to connect to the DCC/ADTS is to obtain an EPA user ID and password. He said that he can set these up for new users or they can be set up by your local EPA Regional Office. He explained that, to convert the data acquisition platform's format to the Ozone Mapping System format, SHCs must either run the ESC Ozone Mapping Module or custom software to convert the data from the agency's acquisition system's format to the ozone mapping system's format. Once the data are in their proper format, the user ID and password assigned by EPA are used to forward the data to the DCC via FTP (file transfer protocol). Shortly after the data are delivered to the DCC, it is run through the ADTS, and then the master OBS file and is available for use in generating ozone maps.

Mr. Dickerson next provided a number of troubleshooting tips for using the DCC. He said that EPA security policies mandate that a user has only three tries to log into the DCC. After the third try, the user's account is locked. He advised that users be careful when experimenting. After two tries, wait an hour or two before trying again to log on so that you do not immediately encounter your third unsuccessful log-in attempt and have your account disabled.

He also said that users who have trouble connecting to the DCC should check with their local firewall/security group to see if their FTP access is restricted. If so, some modifications to your firewall may be necessary.

He also advised users to troubleshoot in discrete segments. For example, as a first step, check to see if you are getting your data from the data logger onto the State Host Computer. Next, make sure the data are getting converted to Ozone Mapping System format. As a third step, make sure your user ID and password are valid by trying a manual FTP. Next, log into the DCC to see what

your data look like; make sure it arrived in the proper directory and has the correct format. Finally, make sure your data look correct in the master OBS file after the QA/QC process.

Mr. Dickerson concluded his presentation by urging people to call EPA if they experience a problem. With a highly automated system that takes data from nearly 50 users, things can get overlooked and problems can recur for days on end. Because EPA does not want to miss your data, call if you have a problem.

Making Ozone Maps

Neil Wheeler
Sonoma Technology, Inc.

Mr. Wheeler provided an overview of the Map Generator (MapGen) software and its capabilities.

MapGen produces still-frame images, both in the Windows BMP format and in CompuServe GIF format; animations (BMP and GIF) and gridded ASCII files. He explained that MapGen works by reading ozone monitoring station data and interpolating them to regular grid locations. MapGen can use two different interpolation/extrapolation techniques: (1) inverse distance weighing, where the influence of the station drops off proportional to the distance from the grid point; or (2) Kriging, which uses a correlation of values to create a model of what values should be at the regular grid. The gridded data can then be passed on to a contouring routine or written to a file for later use. The end result are maps that contain color-filled contours that represent different concentration levels of ozone and their associated health effects.

He then discussed the minimum requirements for operating MapGen. These include: an IBM PC-compatible computer with a Pentium processor (133 MHz or better); 16 megabytes of RAM; 100 megabytes of free disk space; a super VGA monitor with 24-bit color display; and Windows 95, 98, or NT 4.0.

MapGen can be downloaded from MCNC's web site (http://envpro.ncsc.org/OMS). The download files can be accessed by anonymous file transfer protocol (ftp) or through a web browser. The *readme.txt* file explains how to install the software. The current release of MapGen on the MCNC web site is approximately two years old. An updated version will be available in 2000.

Mr. Wheeler then described sources of data that can be used to generate maps with MapGen. Data are available from EPA's Data Collection Center (DCC). In addition, some currently available polling software packages have an ozone mapping module that converts data to a form suitable for use with MapGen. In addition, a conversion program (*airs2oms*) is distributed with MapGen that reads data in AIRS (Aerometric Information Retrieval System) formats and generates MapGen-ready files.

Mr. Wheeler explained that making maps with MapGen is basically a 6-step process: reading the data; selecting the area you want to map; selecting a variable (e.g., peak or average concentrations); selecting gridding and other options; adding annotations such as graphics or text; and finally plotting or animating the map. He then conducted a live demonstration of how to make a map using MapGen. The demonstration showed how to use MapGen's file, customize, plot, animate, and help menus.

One of the powerful things about MapGen is its scripting capability. It includes a complete scripting language (which is documented in the MapGen User's Guide). MapGen also features sample scripts that can be used with scheduling software to generate maps on a regular basis.

Mr. Wheeler completed his presentation by discussing resources that can be accessed for troubleshooting MapGen. These include the MapGen User's Guide, which is available from the MapGen help menu. The User's Guide is also available at http://envpro.ncsc.org/OMS. MCNC also maintains a "ticket" system, which can be accessed at http://envpro.ncsc.org/products/ticket.html. This system allows a user to enter a "ticket" with problems, comments, or suggestions. Users can also review previously entered tickets. The technology transfer handbook *Ozone Monitoring, Mapping, and Public Outreach: Delivering Real-Time Ozone Information to Your Community,* released in September, 1999, is also a useful troubleshooting resource. It is available in HTML and PDF formats on the EPA AIRNOW website (http://www.epa.gov/airnow). In addition, EPA's WebBoard (http://ttnwww.rtpnc.epa.gov/ozmap) contains a conference area where users can post questions and check to see if any questions have been addressed in previous postings.

If users need additional information about MapGen, they can contact Steve Fine of MCNC at 919-248-9255 (fine@ncsc.org) or Neil Wheeler of Sonoma Technology, Inc. at 707-665-9900 (neil@sonomatech.com).

The EPA Ozone Handbook
Jan Connery
Eastern Research Group, Inc.

Jan Connery of Eastern Research Group, Inc. (ERG) provided information about EPA's handbook *Ozone Monitoring, Mapping, and Public Outreach: Delivering Real-Time Ozone Information to Your Community.* (She explained that ERG is the contractor that provided support to EPA in developing the handbook.)

Ms. Connery explained that the goal in writing the handbook was to provide communities with a complete map to designing an ozone program at the local level. EPA wanted the handbook to be a useful tool to communities at all stages in program development—from those who currently have nothing in place and are considering whether to establish a program, to communities that have some components in place and would now like to have a comprehensive program.

The handbook, which is available in both print and CD-ROM formats, was written with several audiences in mind: managers and decisionmakers who may be considering whether to develop an ozone program; technicians responsible for setting up and operating ozone monitoring, data transfer, and mapping systems; and communications specialists who would be responsible for ozone outreach programs.

Ms. Connery discussed the content of the handbook. For ozone monitoring, the handbook explains how to design, site, operate, and maintain an ozone monitoring system. In the area of data collection and transfer, it provides guidance on how to develop, operate, and maintain a system to retrieve, manage, and distribute real-time ozone data. It also explains how to use that ozone data to create ozone maps. It also provides guidance on how to develop an outreach program to communicate information about real-time ozone levels to the public. Finally, the handbook contains references to more than 100 web-based information sources, such as other organizations' websites, EPA technical guidance, downloadable software products, and Internet news groups.

To help make the handbook as relevant and useful as possible for local communities, EPA sought the input of the user community at three stages. At the beginning of the project, managers from state and local air quality agencies across the country were asked about what types of guidance they would find useful, and their answers were used to shape the handbook's content. Also, state and local air quality agencies that have experience in setting up ozone programs were interviewed to develop detailed case studies for the handbook. These case studies highlight the successes and lessons learned by these agencies in developing and implementing their own ozone programs. Finally, two agencies—the Maryland Department of the Environment and the Mississippi Department of Environmental Quality—pilot-tested a draft version of the handbook, and their input was used to produce the final version.

As the last portion of her presentation, Ms. Connery discussed Chapter 6 of the handbook, which provides step-by-step guidance on how to develop an ozone outreach plan. She explained that a first step is to determine the goals of your outreach effort—in other words, what do you want to achieve through outreach? For ozone outreach, for example, a goal might be to motivate members of the public to reduce their personal exposure to ozone when levels are high, or take action such as carpooling to help reduce ozone levels. Another early step in outreach planning is to identify your target audiences. Target audiences for ozone programs might include the public, school children, physicians, business leaders, journalists, and weather broadcasters. The next step is to develop key points or messages. For ozone, a message for the public might be that "elevated ozone levels can harm your health" or that "you can access the ozone map to find out about current ozone levels." A final step is to identify what types of outreach mechanisms or products would be most appealing to the target audience and what distribution channels will be used to get the outreach information or materials to target audiences.

Ms. Connery said that many innovative ozone outreach programs have already been implemented in communities across the country. These have included:

- Working with TV stations and weather service providers to have the ozone map shown regularly during weather reports.

- Launching intensive campaigns to encourage broadcast and print media coverage during ozone season.

- Creating web sites that include ozone maps and other ozone-related information.

- Working with schools to provide information about ozone in science and health classes.

- Developing "ozone action day" programs aimed at encouraging people, businesses, and industries to take voluntary measures to help reduce ozone levels on days when they are high.

- Operating hotlines that provide recorded information about current and forecasted ozone levels.

Ms. Connery concluded her presentation by emphasizing the importance of partnership. For ozone outreach, some key partners have included schools, local media, and local businesses. Partnering with other organizations to implement outreach programs is a great way to leverage costs, strengthen the outreach effort, and increase its success in achieving the outreach goals.

North Carolina's Air Awareness Program
Lisa Grosshandler
North Carolina Department of Natural Resources

Ms. Grosshandler provided information about the Air Awareness program, North Carolina's outreach and education program about ground-level ozone. Her discussion focused on the following key aspects of the program: coalitions, forecasting, and education.

The Air Awareness program includes coalitions of key business in each of the regions for which the program is in effect. The Air Awareness program holds meetings with these coalitions that are intended to introduce coalition members to the concept of ground-level ozone, its health effects, the ozone standard, and how the standard could affect North Carolina businesses. The Air Awareness program works with each coalition to set up a kick-off event at the beginning of each ozone season. These events have been both large and small, depending on the wishes of the local metropolitan area. The larger events have reached both school children and the general public. For example, in the Triangle area, a kick-off event was held at the Durham Bulls park in connection with a game. At that event, Greg Fishel, a television meteorologist from WRAL-TV in Raleigh, gave the first ozone forecast of the season. The Air Awareness program includes an end-of-season thank-you to coalitions, both in the local newspaper and at an end-of-season lunch.

Forecasting is another key feature of the Air Awareness program. During the ozone season, color-coded forecasts are provided through a website, a toll-free hotline, and an automated system that sends out forecasts via fax and e-mail. During weekdays, forecasts are given by 3:00 p.m. every day. Ozone Action Days are called on predicted Code Orange and Code Red days. On Ozone Action Days, the public and businesses are asked to take voluntary actions to reduce the precursors to ozone formation.

Ms. Grosshandler said that North Carolina has placed a great deal of emphasis on ozone education. She then provided information about several of the education tools used by the Air Awareness program. These include: an "Ozone Zone" educational video that presents information on ozone in a humorous way (and which also includes the U.S. EPA's "Ozone: Double Trouble" video); an "Air Jeopardy" game, which is played on computers in a classroom setting; the "Air Adventures" puppet show, which is performed for pre-kindergarten through second grade students and shows how ozone is formed and how it affects plants and people; the Air Avenger Superhero, who is a costume character who talks to children about ways to reduce air pollution and who also appears in animated videos; and various classroom activities, which may include live demonstrations of monitoring equipment. Ms. Grosshandler showed an animated video clip featuring the Air Avenger.

Other educational tools include: an exhibit both that is taken to teacher conferences, fairs, and other events; contests, such as an end-of-season contest for coalition members and a coloring contest for kids; a media campaign, which includes animated videos/commercials featuring the Air Avenger and radio spots geared to adults; coalition site-coordinator training; and a media day, which is a 2-hour training that provides television and radio personnel with information about ozone and its health effects. Ms. Grosshandler commented that media days have been very helpful in getting the media to agree to provide ozone forecasts. In 1999, the ozone forecast was provided in 75 percent of the state's markets.

Ms. Grosshandler concluded her presentation by discussing some of the challenges that face the Air Awareness program. Among other things, these include quantifying the success of the program. (North Carolina is looking into U.S. EPA guidance on how to quantify emissions reductions that result from voluntary programs.) Another challenge is keeping the program fresh (e.g., coming up with new ideas and fresh faces and keeping coalition members excited throughout the ozone season—especially with as many Code Orange days as North Carolina has). She concluded her presentation by advising states and localities that are developing ozone outreach programs to talk to other states about their ozone education and outreach programs and the lessons they have learned.

Ozone Comes to Television!
Greg Fishel
WRAL-TV, Raleigh, North Carolina

Mr. Fishel, a meteorologist from WRAL-TV in Raleigh, North Carolina, explained how his station displayed ozone data during newscasts throughout the 1999 ozone season. In addition to showing ozone maps during news broadcasts, on Code Orange and Code Red days, the station displayed "ozone alert" icons in the corner of the screen during other programming.

According to Mr. Fishel, WRAL-TV's coverage of ozone data in 1999 was a natural outgrowth of the strong relationship the station has developed with the North Carolina Division of Air Quality over the last two or three years. He commented that real-time ozone data is an effective way to illustrate for the public the reality of air quality problems. He added that showing ozone data on television promotes public actions to reduce ozone concentrations; when people see real-time ozone data, they are more likely to be motivated to take steps to reduce ground-level ozone.

Mr. Fishel explained how the station accesses and displays ozone data. The North Carolina Division of Air Quality retrieves ozone concentration data by polling ozone monitors throughout the state. They then send it to the U.S. EPA, which processes the data and sends it to Weather Service Providers (WSPs). WRAL-TV receives its data from Weather Central, Inc., a WSP based in Madison, Wisconsin. The station retrieves the data from Weather Central via dial-up connection. (In 2000, Weather Central will deliver data via satellite.) Once WRAL receives its data from Weather Central, they transfer the data to a graphic display system (an SGI Octane), which interpolates the hourly data to make color-contoured, animated ozone maps. (The maps are based on the colors specified in EPA's Air Quality Index rule.)

Mr. Fishel then discussed several steps that could be taken to improve the process of getting real-time ozone information on television. First, the "observation-to-display" time needs to be reduced. Currently, it takes nearly three hours for data collected at monitors to be ready for display on the air. (In 1999, the only option available to WRAL-TV was to show viewers a recap of what happened earlier in the day.) Second, this transmission speed limited the number of ozone monitors in North Carolina that could be polled at any given hour. If transmission speeds were improved, data from all monitoring stations could be included in television broadcasts, which would provide a more complete picture of North Carolina air quality. Finally, it would be helpful to provide the public with forecast data in the same format as observed data. Mr. Fishel commented that this would help improve people's understanding of ozone data if the display modes for forecasted and observed data were consistent.

Mr. Fishel concluded his presentation by stating that feedback about WRAL-TV's ozone coverage has been positive. The public is genuinely interested in seeing a type of data they have not seen before. Also, seeing ozone data in near real-time has helped the public see that air quality is a legitimate issue in North Carolina. He also commented that the public expressed some concern about threshold level for displaying ozone alert icons. WRAL-TV displayed these icons on both Code Orange and Code Red days. Because Code Orange days are so frequent in North Carolina, some people were concerned that the public might be "desensitized" by the frequent appearance of the Code Orange icon; however, the station chose to display the Code Orange icon

as a service to individuals whose health is affected when concentrations reach "Code Orange" levels.

Ozone Maps on Television
Tim Dye
Sonoma Technology, Inc.

Tim Dye of Sonoma Technology, Inc., explained how ozone maps get on television. It is particularly important to get ozone maps on television, he said, because television reaches such a broad audience. One broadcast of the ozone map can reach millions of households.

In 1995, the Maryland Department of the Environment and the American Lung Association were able to get ozone maps shown on WRC-TV in the Baltimore-Washington, D.C. area. Then, in 1996, the New Jersey Department of Environmental Protection was successful in having the local PBS channel show the maps. In 1998, the U.S. EPA, in cooperation with 20 Eastern states and California, approached the Weather Service Providers (WSPs), and the ozone map received some limited television coverage that year. In Sacramento, the ozone map received good coverage by one local station in 1998. In 1999, EPA, in cooperation with 30 Eastern states and California, worked closely with the WSPs and improved television coverage of the map. Mr. Dye then provided background on how the U.S. EPA has worked with WSPs to get them to carry the ozone map. He said that EPA made an informational presentation at the 1998 National Association of Broadcasters meeting and exhibited at the 1998 and 1999 American Meteorological Society's Broadcaster's meetings.

Mr. Dye then provided some detailed information about WSPs. He explained that WSPs are companies that supply weather data, images, and forecasts to television stations, newspapers, private industry, and the public. There are five WSPs: AccuWeather, Kavouras, the Weather Channel, Weather Central, and Weather Services International (WSI). He said that television stations want their graphics to be distinct from those of other television stations, and WSPs have the hardware and software that conform to television standards and allow stations to customize the maps to achieve a distinctive look. He added that television weathercasters do not have the time to manipulate images or download images, such as the ozone map, from the web. WSPs provide high-speed, automated delivery of data in the form that television stations want and need.

He then showed a schematic illustrating the flow of ozone data from ozone monitors to television stations. He explained that WSPs reformat gridded ozone data supplied to them by EPA and send the reformatted data to television stations by satellite or dial-up connection. Television stations then conduct further customization of the data and maps.

He reported that the response from WSPs has been generally favorable. At this point, Weather Central has been the most positive of the WSPs and picked up the ozone map in both 1998 and 1999. In addition, the Weather Channel has posted city-specific ozone forecasts on its website. In 1999, WSI and Kavouras both ingested the data and sent it to television stations. AccuWeather, however, has yet to sense a demand for the ozone maps from its client stations and therefore has not yet picked up the ozone map. Mr. Dye cited some issues that are preventing widespread distribution of the ozone map: it is not yet a nationwide product; it is not a year-round product;

and the information is not as "real-time" as weathercasters desire. (EPA is focusing on this issue to try to improve turnaround time.) In addition, WSPs are reluctant to invest resources in a product for which the demand is unknown at this time.

Mr. Dye then played a series of video clips showing how the ozone map has been covered during weather broadcasts.

He said that television coverage of the ozone map has been particularly successful in North Carolina and in Sacramento, California—due largely to the efforts of Lisa Grosshandler and Kerry Shearer, the ozone public information officers for North Carolina and Sacramento, respectively. Kerry and Lisa were successful because they met with and educated television meteorologists, generated interest in the ozone maps, encouraged local television stations to contact WSPs to show demand for the maps, and stayed in touch with the stations throughout the ozone season. The results are that the ozone map received more "air play" in these regions than in any other region covered by the ozone map.

Mr. Dye concluded his presentation by talking about what is needed to get additional coverage of the ozone map on television stations. He urged state public outreach officials to contact television stations to: explain that the ozone maps are available; encourage the stations to contact their WSP; explain to weathercasters how ozone affects health; explain what the ozone maps show; and develop relationships with television stations.

Ozone Action Days: The Baltimore-Washington, D.C. Metropolitan Region's ENDZONE Program

Tad Aburn and Randy Mosier
Air Quality Planning Program, Maryland Department of the Environment

Tad Aburn, Randy Mosier, and additional staff from Maryland's Air Quality Planning Program discussed the ENDZONE program, the ozone outreach and education program for the Baltimore-Washington, D.C. metropolitan region.

Mr. Aburn explained that Maryland has been working on its ozone program since the early 1990s. The program has evolved from a simple forecasting program to a multifaceted program that includes forecasting, mapping, and media campaigns. He then provided a brief history of the ozone program for the Baltimore-Washington area. In 1993, the Maryland Department of the Environment worked with the University of Maryland to develop and test an ozone forecasting methodology. In 1994, color-coded forecasting began in the Baltimore area, and in 1995, forecasting was expanded to cover the Washington area. 1995 was also the first year of the ENDZONE program. The Ozone Action Days program was initiated in 1996. "Code Red" media coverage was extensive during both the 1995 and 1997 ozone seasons. In 1999, both Ozone Action Days and ENDZONE partnerships increased significantly.

Bill Buroughs, Managing Director of ENDZONE Partners, discussed ENDZONE's outreach campaign. ENDZONE ran an extensive public education campaign in 1999 and spent $204,000 to broadcast messages across the Baltimore-Washington region. He then showed a video clip about Ozone Action days that was broadcast during the 1999 ozone season.

Next, Jonathan Priday of Maryland's Air Quality Planning Program discussed the ENDZONE Partner's Ozone Action Days program. He said that the backbone of any ozone outreach program is its partners. ENDZONE Partners include businesses, local nonprofit agencies, and state and local agencies. ENDZONE Partners receive daily ozone forecasts via fax or e-mail. They also are notified when air quality levels exceed federal standards. On Ozone Action Days, ENDZONE Partners recommend that people limit using light-duty vehicles (including refueling), avoid non-industrial painting, and curtail the use of land and garden equipment and consumer aerosol products. Mr. Priday then showed a video clip on Ozone Action Days, which was aired by WJZ-TV.

Michael Woodman, a meteorologist with Maryland's Air Quality Planning Program, provided information about ozone forecasting. He said that the forecast is developed by reviewing satellite images and other forecasting services provided by the National Weather Service and then plugging weather information into an ozone regression model developed by the University of Maryland. The final ozone forecast is determined during a conference call with meteorologists from the Maryland Department of the Environment, the University of Maryland, the Virginia Department of Environmental Quality, and the Washington Council of Governments.

Next, Chuck Cramer, a planner with Maryland's Air Quality Planning Program, explained how the ozone forecast is distributed to the public. The forecast is faxed to over 50 media outlets (e.g., local television and radio stations and newspapers) and to over 300 businesses in the region. Businesses then pass the forecast information along to their employees. Mr. Cramer said that the forecast has generated more media coverage than all other media efforts combined and has resulted in routine daily media coverage of ozone air quality. "Code Red" has become a message that is widely understood within the Baltimore-Washington media market.

Finally, Randy Mosier, a planner with Maryland's Air Quality Planning Program, explained Maryland's ozone mapping system and discussed the results of the ozone outreach initiative. Mr. Mosier said that the map was originally conceptualized and piloted by the Maryland Department of the Environment and the American Lung Association of Maryland. The map is based on data collected from monitors in Maryland, Washington, D.C., Virginia, Pennsylvania, and Delaware. A software package was developed for use by local television stations to show the formation and movement of ozone pollution across the region. The map was first aired on television stations in Baltimore and Washington in 1995.

Mr. Mosier then discussed some of the successes of ozone outreach efforts in the Baltimore-Washington region. The Ozone Action Days program has grown steadily, from 91 partners in 1996 to over 300 in 1999. He said that daily forecasts have made "Code Red" a common phrase

that has people talking about air quality all the time. Survey results have shown that seven out of ten people across the region have heard the "Code Red" message, and 90 percent of the public in the region see air quality as a top environmental problem. In addition, more that 40 percent of the public believe that they can individually make a difference in air quality, and 35 percent reported taking voluntary actions to help reduce ground-level ozone during "Code Red" alerts.

Mr. Mosier concluded his presentation by sharing some lessons learned. He said that it is important to begin an outreach program by getting state and local government agencies on board. It is also important to develop a strong relationship with local media outlets and to work closely with regulated industries who may be willing to develop a program (i.e., participate as an Ozone Action Day partner) and be seen as participating in a positive environmental activity. He advised folks to have plenty of informational material on hand during site visits to media, businesses and industries, and other agencies. Finally, it is important to get a head start on the summer ozone season.

4. SUMMARY OF LIVE QUESTION-AND-ANSWER SESSIONS

This chapter contains a summary of the two live question-and-answer sessions that were held during the December 15 satellite broadcast. Questions were received from viewers by phone or fax during the broadcast. Each question that was asked during each session is presented, followed by a summary of the participant's response.

Question and Answer Session #1

Panel: Chet Wayland, EPA/OAQPS
Phil Dickerson, EPA/OAQPS
Neil Wheeler, Sonoma Technology, Inc.
Charles Pietarinen, New Jersey DEP
Jan Connery, ERG, Inc.

***[For Chet Wayland]* How will the Ozone Mapping Project continue after the EMPACT program ends?**

Mr. Wayland explained that EPA established the Ozone Mapping Project to try to build the infrastructure for ozone monitoring, data transfer, and mapping within states and local communities. After EMPACT funding ends, states and localities will be in a position to continue to provide the real-time data. EPA's Office of Air Quality, Planning and Standards will continue to maintain the Data Collection Center and the map generation operations in Research Triangle Park, North Carolina.

***[For Chet Wayland]* When will the ozone mapping project be expanded to add additional pollutants?**

Mr. Wayland noted that Charles Pietarinen of the New Jersey DEP mentioned during his presentation that New Jersey already provides real-time particulate matter (PM) data for the state of New Jersey. Many areas of the country already have the capability to provide PM data. EPA hopes to provide some PM data on the AIRNOW website as early as this summer (the summer of 2000). If not by then, then definitely by the summer of 2001, EPA hopes to have the data collection system set up and ready to handle PM data.

***[For Phil Dickerson]* Please explain how the ADTS (Automatic Data Transfer System) calculates peak 8-hour concentrations.**

Mr. Dickerson explained that because data on peak concentrations are available only the following day, and peak values are calculated from that data. EPA does not do any kind of predictive modeling.

***[For Neil Wheeler]* The ozone animations give the appearance that the ozone plume migrates from one area to another, sometimes counter to the winds. Can you display animated wind vectors on the map to clarify this origin/movement confusion?**

Mr. Wheeler explained that wind vectors cannot be displayed on the ozone maps. He commented that it would be a nice feature, particularly for air quality analysts and meteorologists. The ozone maps were designed as tools for public outreach, and unfortunately, they don't have the capability to show wind vectors.

***[For Neil Wheeler]* How small an area can be mapped with MapGen?**

Mr. Wheeler explained that there is essentially very little limitation on the size of areas you can map with MapGen. MapGen allows you to show something as small as a football field, if observations were available at that resolution.

***[For Charles Pietarinen]* Does the New Jersey DEP provide Air Quality Index (AQI) reports and/or forecasts for $PM_{2.5}$ or annual PM_{10}?**

Mr. Pietarinen responded that New Jersey does not provide AQI products for the annual (PM_{10}) standards. New Jersey does have continuous measurements of $PM_{2.5}$ at five locations that are included in the index calculation, and New Jersey uses a tool called Smokeshade as a surrogate measure for PM_{10} at thirteen locations in the state.

***[For Charles Pietarinen]* What are some the issues regarding the mapping of particulates?**

Mr. Pietarinen said that one issue involves establishing enough monitoring sites so that you have sufficient spatial coverage to create a legitimate map for that parameter. A second issue has to do with averaging time. For ozone, a one-hour predictor is used for an eight-hour value. This type of system doesn't seem to work as well for fine particulate matter, for which the standard is based on a 24-hour average.

***[For Phil Dickerson]* What do you do if a state or local agency finds incorrect values after the data have been submitted to the data collection center? Can those values be corrected?**

Mr. Dickerson explained that there are seven polls each day. Each poll is inclusive from midnight of that day until the current polling hour. At any poll, a state or local agency can resubmit data that occurred before that poll. Also, there is a "last-chance" poll the following day which EPA uses to calculate the peak maps. A state or local agency can deliver its entire data set for that day during that poll. It becomes more complicated if a state or local agency needs to change data after the "last-chance" poll, because EPA then has to re-QA the data and redraw maps. EPA encourages agencies to check their data daily to try to correct errors on the same day, if possible.

***[For Phil Dickerson]* Can an agency set its own quality assurance parameters?**

Mr. Dickerson said that the QA system is very flexible. The full range of QA parameters, such as maximum, minimum, and rate of change, can be set for every station and every hour.

***[For Neil Wheeler]* When is the updated version of MapGen going to be available?**

Mr. Wheeler responded that an updated version of MapGen was delivered to EPA in June, 1999, but it was not put into general distribution due to budget constraints. However, a completely new release will be made available this year (2000). In the interim, if people need to get the latest version of MapGen, they should contact Phil Dickerson.

***[For Neil Wheeler]* Is there some way to show only a few roads and rivers on the map?**

Mr. Wheeler explained that MapGen includes the entire data sets for roadways and rivers, so when applying the roads/rivers feature, the maps contains an awful lot of information. He suggested the following ways to create maps with a subset of roads and/or rivers. (1) Create your own customized data set with a geographical information system (GIS) and select only certain road types or certain areas. (MapGen includes documentation that explains how to do this.); or (2) Generate an image with all the roads or rivers. Taking that image and using it as a background, trace in roads or rivers with a graphics tool such as Corel Draw or any tool that works with Windows metafiles. The Windows metafiles can be used with MapGen to provide an overlay. That way, you can create maps that include only the roads that you want to show.

***[For Jan Connery]* Where can a person get more information on setting up an Ozone Action Day Program? How do they find out what's involved?**

Ms. Connery responded that the EMPACT guidance manual *Ozone Monitoring, Mapping, and Public Outreach* includes a chapter devoted to outreach. Furthermore, EPA has developed an entire guidance document devoted to the subject of developing community action programs. The document, entitled *Community Action Programs: A Blueprint for Program Design* was published in 1999. It leads the reader through all the steps involved in setting up this type of program, and it provides examples for some of the materials that existing programs have used. It can be obtained at http://www.epa.gov/oms/traq.

***[For Charles Pietarinen]* Which of your public outreach efforts have been most successful?**

Mr. Pietarinen said that New Jersey's most successful efforts are media-oriented because they reach the largest audience. New Jersey's daily press releases, which include the air quality index and forecast values, as well as New Jersey's air quality media advisories have been the most successful in reaching people. He added that New Jersey is very excited about the web-based applications it has developed. The website address is http://www.state.nj.us/dep/airmon.

***[For Jan Connery]* Can you talk about how to build partnerships? What types of roles partners could play, and who those partners could be?**

Ms. Connery emphasized that partnerships are tremendously important to outreach programs. Identifying partners is one of the first steps to take in establishing an ozone outreach program. Partners for ozone outreach efforts might include businesses; the media; elected officials; transportation agencies; gas stations; schools; and day care centers.

Many ozone outreach programs currently have businesses as partners. Businesses can instantly notify hundreds or thousands of their employees through e-mail or voice mail. They can create incentives for participating in Ozone Action Days such as flex time, vanpooling, telecommuting options, free lunches, and prizes. They can also help track participation and provide leadership and funding.

One of the key things to think about in recruiting businesses is to help them understand the benefits they will receive from their involvement, such as good PR and recognition from the press. Many Ozone Action Day programs make a point of publicizing the role of partners through the media so that the partners can receive widespread recognition. Additionally, Ozone Action Day programs host ozone season kickoffs and end-of-the-season events to recognize partners and present awards.

Ms. Connery stated that another key partner is the media. They provide a very important channel for educating and notifying the public. Information about ozone levels can be conveyed on the news, through weather broadcasts, traffic advisories, talk shows, and—if budgets can support it—paid advertising. It is very important to start working with the media before the ozone season begins. Ms. Connery recommended meeting with the media in person to get their buy-in and support and to explain the program, and how they can help. She also recommended making an effort to keep in touch with them throughout ozone and provide them information they need.

***[For Chet Wayland]* Is the National Weather Service picking up ozone maps, and will they distribute them to local media outlets nationwide?**

Mr. Wayland began by explaining the difference between the National Weather Service and Weather Service Providers. The National Weather Service is a federal agency that gathers and maintains U.S. meteorological data. Weather Service Providers, on the other hand, are private agencies that collect the data from the National Weather Service and other entities and then distribute the data to local TV stations in their proper formats.

Mr. Wayland explained that the Ozone Mapping Project is working to provide ozone data and the ozone map to all Weather Service Providers. The map was made available to Weather Service Providers this past summer. He encouraged people involved in ozone outreach to talk to their local TV contacts and tell them that the data are available from Weather Service Providers for their local weather forecast.

***[For Charles Pietarinen]* Does the New Jersey program get together with media outlets before the ozone season starts?**

Mr. Pietarinen stated that New Jersey usually holds an Ozone Action Day media event before ozone season starts. The event is designed to increase awareness and to thank partners and get them geared up for the upcoming season. In past years, New Jersey has also held a media event for the press and television stations to let them know how ozone information is being made available to them and to suggest ways that they can use it. He added that some TV and radio stations carry New Jersey's ozone information on a daily basis. Others only want to pick it up when there is a "real" story because pollution is very high.

***[For Charles Pietarinen]* What is one of the more creative outreach efforts you have seen?**

The Philadelphia Ozone Action Partner has a mascot called the Smoginator, who does radio spots. One of my favorite outreach events was held at Veterans Stadium where the Philadelphia Phillies play. It was an ozone-free barbeque to kick off the season. We invited Ozone Action partners and we held a student poster contest. Winners were invited to meet the Philly Phanatic (the team mascot) and get free hot dogs. There were also some vendor demonstrations of electric lawnmowers and solvent-free paints.

***[For Jan Connery]* Have any attempts been made to evaluate the success of ozone outreach efforts?**

Ms. Connery stated that a number of programs conduct some form of evaluation to track their successes, and they have shown very good results. Some of the things to look at when planning an evaluation are: how many people you are reaching through your program; how effectively your messages and materials are raising awareness and understanding; and how your efforts are motivating people to change their behavior.

Before you start your outreach program, you can administer a pre-campaign survey to identify current understanding and awareness and establish a baseline. Using focus groups, you can also test your messages and your draft outreach products. Once you have implemented your program, you can conduct periodic evaluations and end-of-the-season evaluations. By comparing these results to the baseline, you can understand how well your program is working and identify areas for improvement.

Ms. Connery stated that telephone surveys are cost-effective and can be done rapidly. It is important to try to reach people the evening of the ozone action day while their experiences and choices of the day are fresh in their minds. Ms. Connery highly recommended devoting a portion of an ozone outreach budget to evaluation.

Question and Answer Session #2

Panel: Chet Wayland, EPA/OAQPS
Greg Fishel, WRAL Television
Lisa Grosshandler, NC DAQ

***[For Chet Wayland]* How can I get ozone maps on the air?**

Mr. Wayland said that first you need to determine if ozone maps are currently available in your area. He said that the maps are currently available for thirty states in the U.S. EPA hopes to expand the maps nationwide by the end of 2000. Next, contact your local TV stations, who you need to work with very closely to make sure the maps get on the air. Explain that the maps are available from their Weather Service Provider. Explain to them how ozone affects health and why it is important to show the maps on the air. Explain what the map shows in terms of the different colors, the contour levels, and the accompanying health messages. You will want to develop a relationship with that TV station so that when they have questions, they know who to call. Work with them daily, if needed, to make sure they understand what the product is.

***[For Greg Fishel]* When did you start using the maps, and how can we convince our own local stations to participate?**

Mr. Fishel said that the summer of 1999 was the first year that his station used the ozone maps. As Chet Wayland mentioned, the map will soon be available from all the different Weather Service Providers. He said that the only reason the ozone map was not covered by all the stations in his market this past summer was that only one Weather Service Provider had made the map available at that time. Mr. Fishel said that as all the providers get involved, there shouldn't be any reason why television stations wouldn't want access to the ozone data.

***[For Greg Fishel]* Is this information that stations are hungry for, or do people need to pitch it to them?**

Mr. Fishel replied that stations want to provide the information as a public service, but they need to be educated about the importance of air quality and how it relates to health. Mr. Fishel said that he could not think of a public service that would be much more valuable than giving people information that relates to their health.

***[For Chet Wayland]* When are the ozone maps valid? In other words, if a local station has a noon broadcast, are the maps real-time, or are they delayed?**

Mr. Wayland replied that EPA calls the maps "real-time," but to be more accurate, they should probably be called "near real-time." In 1999, EPA polled the states every two hours to get the data. When the data come in, EPA has to do some processing on it. EPA then ships it out to the

Weather Service Providers, who make it available to the local TV stations. Unfortunately, in some cases it took over 2½ hours to get the data to the TV stations.

Mr. Wayland said that EPA is redesigning the way in which the Agency is shipping data out to the Weather Service Providers. In 2000, Weather Central [a Weather Service Provider] is going to ship their data to their stations via satellite versus modem and file transfer protocol (ftp). Mr. Wayland said that this should improve the time it takes to get data to local stations and, ideally, EPA hopes to cut the current time in half. For example, on a 5:00 p.m. forecast, you would be able to get data that was current as of 4:00 p.m. Mr. Wayland concluded by stating that EPA hopes to go to hourly polling, and then the data will be available every hour. He hopes that in 2000, after a poll, data should be able to reach local TV stations within 45 to 50 minutes.

***[For Chet Wayland]* Are the data being shown for a particular time an estimate of an average based on current data?**

Mr. Wayland said that this is in fact correct. He added that the eight-hour average for ozone creates a tough communications challenge, especially when dealing with real-time data. Real data comes in every hour from the monitors, and EPA again collects the data every two hours. EPA then displays the data using the Air Quality Index, which is based on the eight-hour average. If EPA were to show data based on an eight-hour average calculation, the noon eight-hour average would not be shown until 4:00 p.m., because it is based on the midpoint eight-hour average. EPA has developed a surrogate approach that allows the Agency to relate one-hour data to the eight-hour averages. The correlation is very good, somewhere between 0.80 and 0.94, depending on where you live. Mr. Wayland concluded by saying that if technology ever advances to the point where data are received instantaneously, we can obviously shorten that window. Right now, with the eight-hour component, this approach is the best we can do.

***[For Greg Fishel]* Do you have any advice from lessons you've learned?**

Mr. Fishel said that on Code Orange and Code Red days, his station started putting little icons in the corner of the TV screen at times throughout the day to let people know that it is a Code Red or Code Orange day. However, the station also used an icon to alert people when a heat advisory was in effect. The station found that people were confused by the ozone and the heat icons. Of course, in a lot of cases, ozone and heat warnings coincided. However, we wanted to make sure that we were not confusing people, so we changed the color and the shape of the icons to make them more easily distinguishable.

***[For Greg Fishel]* Will it desensitize people if you continue to use Code Orange days as the threshold for displaying your icons on the screen?**

Mr. Fishel responded that his station has been concerned about possibly desensitizing people, but they post the icons for Code Orange days in the interest of public health. He reported that the station has received some complaints from people who said that they do not want the icon on

their screen unless it's a Code Red day. At this point, however, his station has taken the attitude that there are enough affected people with respiratory issues to justify posting the icon on Code Orange days.

***[For Lisa Grosshandler]* How has it worked out having a fun outreach campaign on something as serious as ozone?**

Ms. Grosshandler responded that warning folks on the dangers of ozone is a very serious matter, but her agency wanted to avoid a "sky is falling" advertising campaign.

Her agency used the Air Avenger to gear its ad campaign toward children. They modeled the campaign after their recycling outreach program, which was also targeted at children. They are now trying to educate children on what ground-level ozone is, in hopes that they will transfer that knowledge to their parents. She added that some of the Air Avenger commercials produced in the last year have been very serious in their approach to getting across what the color codes are and what they mean. They have also produced radio ads that are geared more towards adults and use adult humor to get across the message. She also said that they are now trying to put together a focus group to help generate ideas about where to go from here.

***[For Lisa Grosshandler]* Did you have a good budget for this, and does a campaign like this take a lot of money?**

Ms. Grosshandler responded that the campaign has taken a fair amount of money. Educating the public is an important part of North Carolina's ozone reduction strategy, and they have been very fortunate in receiving support for their outreach program. She commented that the most expensive part of the program was not producing the ads, but buying the time to place the ads on television.

***[For Lisa Grosshandler]* Do you see your campaign moving to a more hard-nosed approach in this next year?**

Ms. Grosshandler stated that although they will try to focus a bit more on the seriousness of ozone, they will also keep the fun side of the campaign for the kids.

APPENDIX A
Agenda

EPA Satellite Forum on Ozone Monitoring, Mapping, and Public Outreach

AGENDA

December 15, 1999
1:00–4:00 p.m., Eastern Time

1:00–1:05	Introduction *Chet Wayland, U.S. EPA/Office of Air Quality, Planning and Standards*
1:05–1:15	EPA's EMPACT Program: Bringing real-time environmental information to cities across the nation *Denice Shaw, U.S. EPA/Office of Research and Development/EMPACT Program*
1:15–1:30	The Ozone Mapping Project *Chet Wayland, U.S. EPA/Office of Air Quality, Planning and Standards*
1:30–1:50	Ozone Data Collection and Transfer for Ozone Mapping *Phil Dickerson, U.S. EPA/Office of Air Quality, Planning and Standards*
1:50–2:05	New Jersey's Ozone Data Transfer System *Charles Pietarinen, New Jersey Department of Environmental Protection*
2:05–2:20	Making Ozone Maps Using Real-Time Data *Neil Wheeler, Sonoma Technology, Inc.*
2:20–2:35	EPA's Ozone Monitoring, Mapping, and Public Outreach Technology Transfer Handbook and CD-ROM *Jan Connery, Eastern Research Group, Inc.*
2:35–2:45	Break
2:45–3:30	Ozone Outreach Program Sucess Stories
	North Carolina's Air Awareness Program *Lisa Grosshandler, North Carolina Department of the Environment and Natural Resources*
	Getting the Ozone Maps on Television *Tim Dye, Sonoma Technology, Inc.*
	The DC-Baltimore Area's Endzone Program: An ozone action day program *Randy Mosier and Tad Aburn, Maryland Department of the Environment*
3:30–3:55	Live Question-and-Answer Session (Panel)
3:55–4:00	Wrap-Up

APPENDIX B
Satellite Broadcast Viewership

APPENDIX B
Satellite Broadcast Viewership

1. Attendance at Air Pollution Distance Learning Network (APDLN) Downlink Sites

As of February 3, 2000, 58 of the 127 APDLN downlink sites had reported on attendance at the December 15 satellite broadcast. A total of 117 people attended the broadcast at the 58 sites reporting. (Note that this number does not reflect a complete count of all attendees at APDLN downlink sites but only the total number of attendees at sites that reported. EPA's Education and Outreach Group estimates total attendance at APDLN downlink sites to have been 196 individuals.)

The chart below shows the number of attendees for each site reporting. Sites that reported zero attendees are not listed. EMPACT metropolitan areas are designated with an asterisk.

City	Attendees
Montgomery, AL	14
Little Rock, AR*	3
Ventura, CA	1
San Diego, CA*	2
Fresno, CA*	4
Washington, DC*	4
Clearwater, FL*	6
Orlando, FL*	1
West Palm Beach, FL*	4
Fort Lauderdale, FL*	3
Atlanta, GA*	3
Urbandale, IA	5
Indianapolis, IN*	6
Evansville, IN	2
Frankfort, KY	3
Boston, MA*	4
Lansing, MI	5

City	Attendees
Asheville, NC	3
Bismarck, ND	1
Trenton, NJ	1
Albany, NY*	4
Dayton, OH*	4
Akron, OH*	1
Oklahoma City, OK*	5
Philadelphia, PA*	2
Columbia, SC	4
Nashville, TN*	2
Austin, TX*	4
Arlington, TX	3
Salt Lake City, UT*	3
Richmond, VA*	2
Madison, WI	3
Charleston, WV*	1
TOTAL	**117**

2. Internet Simulcast Viewership

A total of 25 individuals accessed the URL address to view the December 15 satellite broadcast via Internet simulcast. The available data do not provide the geographic location of those who accessed the simulcast.

3. Viewership at Ku and C Band Downlink Sites

There are no data available on the number of individuals who viewed the broadcast using Ku and C band coordinates. ERG implemented a web-based sign-in and evaluation form that would have provided some data on individuals who viewed the broadcast via Internet and Ku and C band. Completion of the forms was voluntary and required logging on to ERG's website to access the forms. Unfortunately, due to an interruption in service with ERG's Internet Service Provider on the day of the satellite broadcast, the evaluation form did not function and no data were received.

APPENDIX C
Workshop Guide

Environmental Programs

APTI Workshop T-040

Ozone Monitoring, Mapping and Public Outreach

Workshop Guide

APTI Workshop T-040

Developed by Environmental Programs - North Carolina State University
EPA Cooperative Assistance Agreement CT-825724

Industrial Extension Service College of Engineering North Carolina State University

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(Revision: 9/99)

Fax Question Sheet

APTI Workshop T-040

Ozone Monitoring, Mapping and Public Outreach

December 15, 1999

Voice: (800) 742-9813 ***Fax: (800) 553-7656***

Please write your question and direct it to the appropriate presenter if possible.

Question for:_____

Question from: _____

City/State:_____ Office Phone Number: ( ) _____

Spacenet Inc. Trouble Line: 1 (800) 770-2887

APTI Workshop T-040

Ozone Monitoring, Mapping and Public Outreach

Presented by OAQPS

Broadcast Agenda

December 15, 1999 1:00pm ET

SECTION		TOPIC
1		Introduction *Chet Wayland*
2		EPA's EMPACT Program *Denice Shaw*
3		The Ozone Mapping Project *Chet Wayland*
4		Data Collection and Transfer for Ozone Mapping *Phil Dickerson*
5		Success Story: New Jersey's Ozone Data Transfer System *Charles Pietarinen*
6		Making Ozone Maps *Neil Wheeler*
7		Use of the Ozone Monitoring, Mapping and Public Outreach Technology Transfer Handbook and CD *Jan Connery*
	10 MIN.	**BREAK**
8		Questions and Answers
9		North Carolina's Air Awareness Program *Lisa Grosshandler and Greg Fischel*
10		Getting the Ozone Maps on Television *Tim Dye*
11		The DC-Baltimore Area's Endzone Program *Tad Aburn & Randy Mosier*
12		Questions and Answers and Wrap up

Online Conference Site

In addition to submitting questions via fax machine or telephone during the broadcast, North Carolina State University Environmental Programs offers another means for you to communicate with the instructor and other course participants. An online conference site on the World Wide Web allows you to have your questions answered and participate in class discussions after the broadcast has ended.

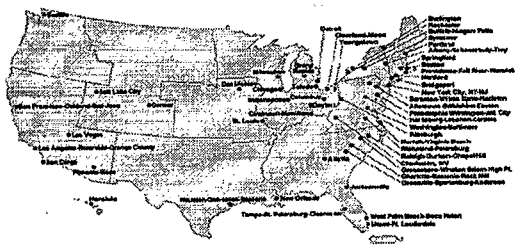
Use your Web Browser to access the online conference site at:

www.epin.ncsu.edu/t-040/

Environmental Monitoring

Denice Shaw, Ph.D.
Program Director
EMPACT

Where Are We Working?



Mission

- Assist communities to implement sustainable monitoring that provides current and accurate information about local environments

"Right To"

- Information based on best available science
- Accurate and quality assured information
- Current information about local environmental conditions

Background

- Agency model for monitoring incorporating new and innovative science
- Monitor parameters that affect human and ecological health
- Executed through community projects based on scientific collaborations

Background

- Steering committee
- 150+ participants and partners
- Community Owned
  - Monitoring
  - Data management (with provision for secondary access)
  - Interpretation
  - Access

Status

- Monitoring projects in 84 Cities
- Research grants for community-led monitoring in 16 cities (FY98)
- Research to advance real-time monitoring

AIRNOW - The Ozone Mapping Project

Chet Wayland

What is the Ozone Mapping Project?

- A collaborative effort between the Federal, State and Local Air Agencies to collect, quality assure, and transfer real-time air quality information to the public

What is the Ozone Mapping Project?

- Intended to provide the public with fast and easy access to understandable air quality information that can assist them in making good health-based decisions about their daily activities

History of the Ozone Mapping Project

- Mapping concept initiated by the Maryland Department of Environment and the Maryland-American Lung Association in the Baltimore area in late 1994

History of the Ozone Mapping Project

- Ozone mapping piloted in the northeast United States by EPA Region I in 1997

History of the Ozone Mapping Project

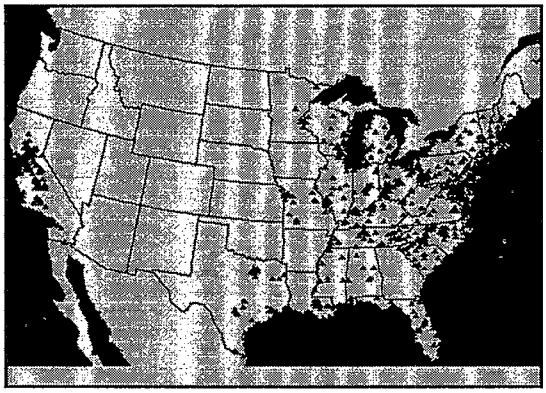
- Full implementation of the automated real-time ozone mapping system in the eastern United States begins in 1998 under the support of the EMPACT Program

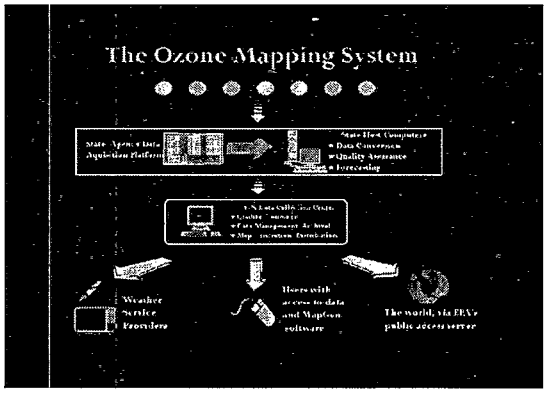
Overview of the Mapping Process

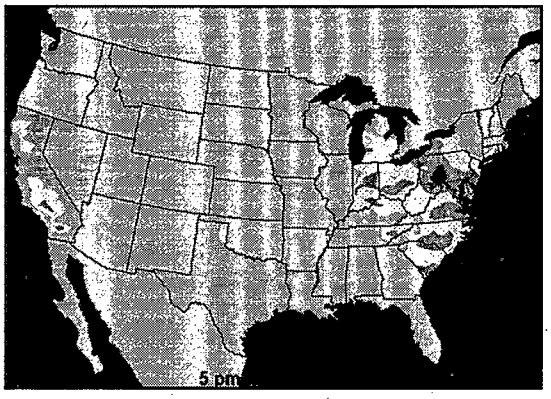
- 5 primary components
- State and Local monitoring networks
- Automated Data Transfer System (ADTS)

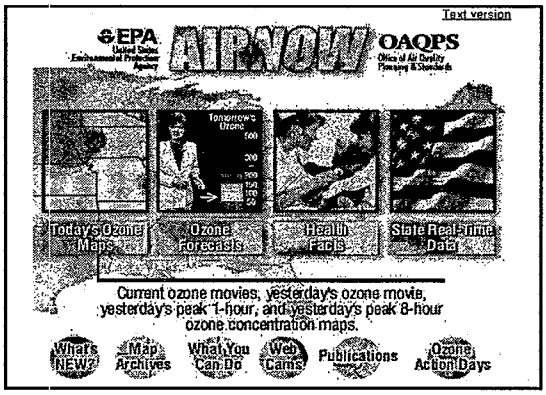
Overview of the Mapping Process

- Data Collection Center (DCC)
- Map Generation
- Outreach









Recap of Overview of the Mapping Process

- 5 primary components
- State and Local monitoring networks
- Automated Data Transfer System (ADTS)

Recap Overview of the Mapping Process

- Data Collection Center (DCC)
- Map Generation
- Outreach

What Areas are Participating in the Mapping Project?

- Current geographical coverage includes 61 EMPACT cities with complete coverage in 29 eastern States and California

What Areas are Participating in the Mapping Project?

- Future plans are to complete coverage in the contiguous United States and expand beyond ozone to include other pollutants such as particulate matter

How has the Ozone Mapping Project been Received by the Public?

- AIRNOW website received over 1.2 million accesses per month (May '99 - September '99)

How has the Ozone Mapping Project been Received by the Public?

- Numerous positive comments from the public (daycare, asthmatics, outdoor workers, exercisers, air awareness programs)

How has the Ozone Mapping Project been Received by the Public?

- Maps and forecasts carried by The Weather Channel and major Weather Service Providers as well as local TV weather forecasters

How has the Ozone Mapping Project been Received by the Public?

- Ozone Mapping Project received the Government Technology Leadership Award in 1998

Data Collection and Transfer for Ozone Mapping

Phil Dickerson,
EPA
OAQPS

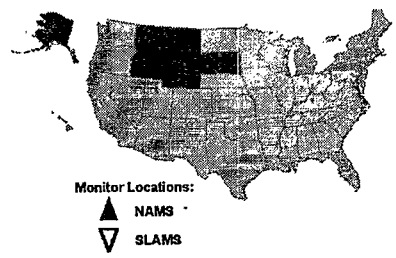
Regulatory History and Types of Monitoring Networks

- See 40CFR58:
  - Ambient Monitoring Regulations, May 1979
  - PAMS rules, February 1993
  - PM-fine regulations, July 1997

Regulatory History and Types of Monitoring Networks

- The ozone mapping system generally makes use of already installed monitoring networks

NAMS/SLAMS Ozone Monitors



How Ozone Monitoring Networks Measure Ground-level Ozone Concentrations:

- Data is fed into "data-loggers", which store the values for retrieval by data acquisition platforms

Description of the Automatic Data Transfer System (ADTS):

- The heart of the Data Collection Center
- Runs on EPA's Valley internal UNIX server
- Responsible for merging, QA/QC, all calculations (AQI, peaks)

Data Flow Within the ADTS - Overview of Using ADTS:

- Monitors collect ozone, record concentrations to data-loggers
- The State Host Computer (SHC) polls the data-logger at specified polling times

Data Flow Within the ADTS - Overview of Using ADTS:

- The SHC connects to the DCC before end of polling window and transfers the observations from midnight until the polling hour

Data Flow Within the ADTS - Overview of Using ADTS:

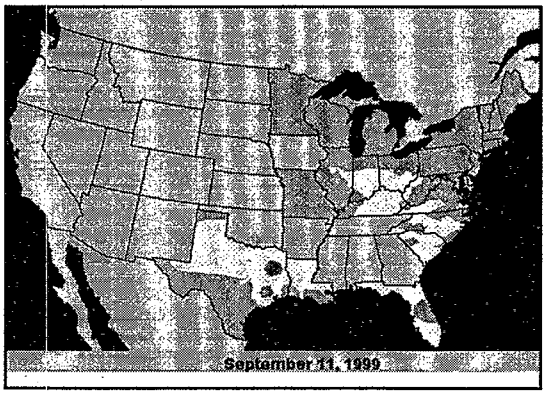
- ADTS merges all the agency data files into a master file, runs QA/QC program, calculates peaks and AQI values, interpolates for single hours missing, generates gridded data for Weather Service Providers, then produces the master OBS file

Data Flow Within the ADTS - Overview of Using ADTS:

- The master OBS file is available to all participating agencies and is also used by the MapGen software to generate the ozone animations and daily peak maps

Data Flow Within the ADTS - Overview of Using ADTS:

- Once the ozone animations have been checked by the DCC operations crew, they are posted to EPA's public web site



Setting up a host computer to connect to the DCC/ADTS:

- Must get an EPA user ID and password
  - Can be set up by your local EPA Regional Office, or by myself

Setting up a host computer to connect to the DCC/ADTS:

- SHC must either run the ESC Ozone Mapping Module, or custom software, to convert the data acquisition platform's format to the OMS format

Setting up a host computer to connect to the DCC/ADTS:

- Once the data is in the proper format, the user ID and password assigned by EPA are used to FTP the data to the DCC
- Shortly after the data is delivered, it is run through ADTS and the master OBS file is available for your use

Troubleshooting tips:

- EPA security policies mandate that you get only three tries to log into the DCC before your account is locked
- Be careful when experimenting
  - if you use two tries, wait an hour or two before trying again

Troubleshooting tips:

- If you have trouble connecting to the DCC, check with your local firewall/security group to see if your FTP access is restricted

Troubleshooting tips:

- Troubleshoot in discrete segments
  - 1) make sure you're getting the data from the data-logger
  - 2) make sure the data is getting converted to OMS format
  - 3) make sure your user ID and password are valid by trying a manual FTP

Troubleshooting tips:

- 4) log into the DCC and see what your data looks like
- 5) make sure your data looks correct in the master OBS file

Troubleshooting tips:

- The most important troubleshooting tip:
  - Call us immediately if you have a problem
    - With a highly automated system taking data from nearly 50 users, things can get overlooked and problems can reoccur for days on end
    - We do not want to miss your data, so call us if you have a problem

APTI Workshop T-040
AQI: Ozone Monitoring, Mapping and Public Outreach

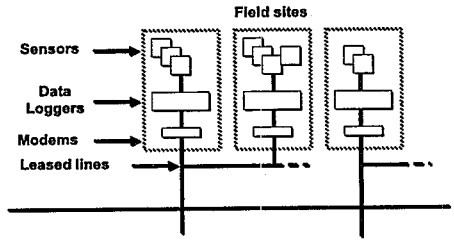
New Jersey's Ozone Data Transfer System

Charles Pietarinen
New Jersey Department of Environmental Protection

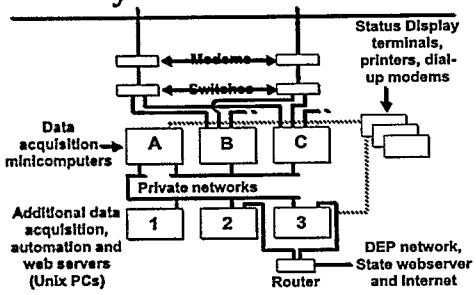
New Jersey's Ozone Data Transfer System

- Key features of the system
- How the system helps us provide timely data to the public
- Public outreach activities
- Lessons learned

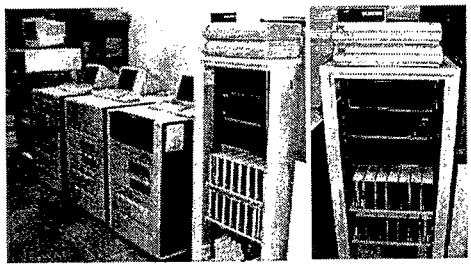
System Overview



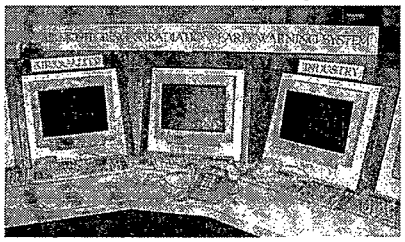
System Overview



Central System



Central System: Status Display



How the System Helps Provide Timely Data to the Public

- Reliability - greater than 99.999% uptime since 1991
- One minute polling cycle, while not essential, does help

How the System Helps Provide Timely Data to the Public

- Continuous data validation - plus ability to "filter" data
- Separate calibration files and remote calibration capability

How the System Helps Provide Timely Data to the Public

- Operating systems allow scripting, unattended file transfer, e-mail, etc.
- Custom report generator
- Report scheduling
- Dial-in capability

Public Outreach Activities

- AQI reports and forecasts, all pollutants, twice daily
- Toll-free recordings updated twice daily
- Touch-screen kiosks

Public Outreach Activities

- 24-hour-a-day web page and GIS updates
- Ozone mapping starting in 1996
- E-mail notification on unhealthy days

Touch Screen Kiosks

- Forecasts and current data on all pollutants
- Multimedia information on air pollution, health effects, etc.
- Historical air quality data
- Interactive game
- Used in designing web page

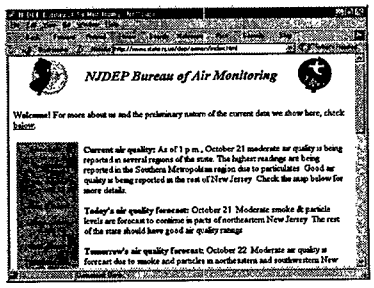
Air Quality Data on the Web

- Target audience: general public
- Provide current forecasts and air quality data for all pollutants
- Year-to-date ozone summaries
- Historical ozone data

Air Quality Data on the Web

- Explanatory information on the AQI, weather and air pollution, trends, standards, health effects, toxics, Ozone Action Days and more

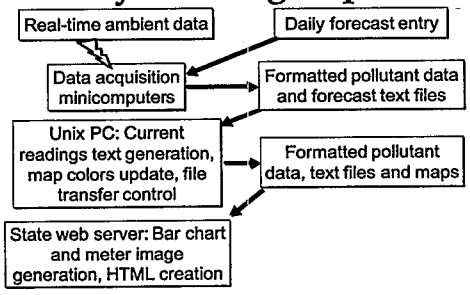
Web Content: Current/Forecast



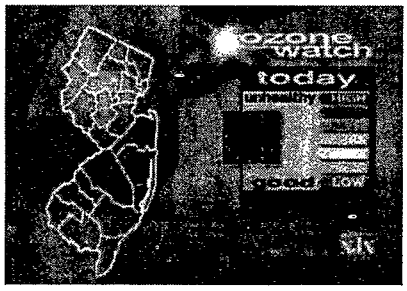
Web Design Considerations

- Main message visible at top
- Short page download time
- Layers of increasing detail
- Main message readable with any browser (including vision-impaired)

Hourly Web Page Updates



Ozone Mapping on TV



Lessons Learned

- System must be automated to be sustainable
- Media coverage is the most difficult part
- Make your point - know your audience

Lessons Learned

- Plan for new uses
- Accept that some bad data will get out
- Ozone is only part of the story

Making Ozone Maps

Neil Wheeler
Sonoma Technology, Inc.

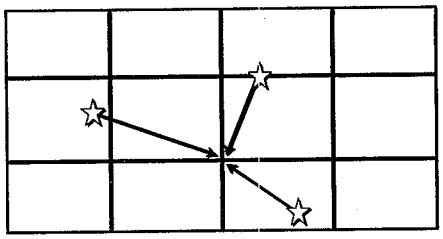
Overview

- The Map Generator software and its capabilities
- Obtaining the Map Generator
- Using the Map Generator
- Troubleshooting

The Map Generator (MapGen)

- How it works
  - Read station data
  - Interpolation to grid
  - Contouring
  - Annotation
  - Animation

"Gridding"



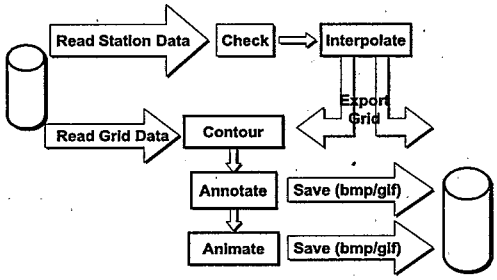
Interpolation/Extrapolation

- Inverse distance weighting
  - $1/R^N$
  - Maximum radius of influence
  - Temporally invariant
- Kriging
  - Variogram models and correlation
  - Spatially and temporally invariant

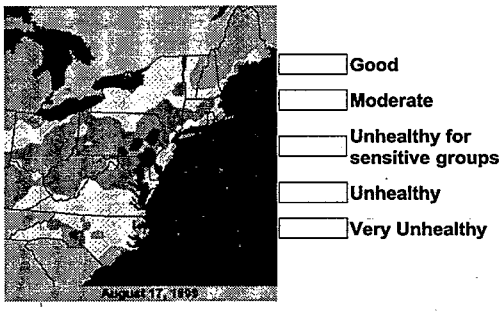
MapGen

- What it Produces
  - Still-frame images BMP or GIF
  - Animations: BMP (internal) or GIF (external)
  - Gridded ASCII files

Mapping Process



Color Filled Contours



Requirements

- 133 MHz Pentium-class CPU
- 16 MB RAM
- 100 MB free space on hard disk
- Windows 95/98/NT
- SVGA with 24-bit color display

Obtaining MapGen

- http:/envpro.ncsc.org/OMS
  - "Documentation"
  - "Register for and download MapGen"

Obtaining MapGen

- Note instructions on access via ftp
- http:/envpro.ncsc.org/OMS/pub
  - readme.txt
  - mg980611.exe (11 MB)
  - Updates

Using MapGen

- Getting Data
  - Polling software OMS modules
  - Data Collection Center
  - AIRS (airs2oms)
  - Other converters
  - Peaks and 8-hour averages
    - "QC" Quality Control/Merge Processor

Using MapGen

- Read data
- Select area
- Select variable
- Select options
- Annotation
- Plot/animate

MapGen Demonstration

- file menu
- customize menu
- plot menu
- animate menu
- help menu

Scripting MapGen

- Scripting language
- Sample scripts
- Scheduling
- Generic dates

Troubleshooting

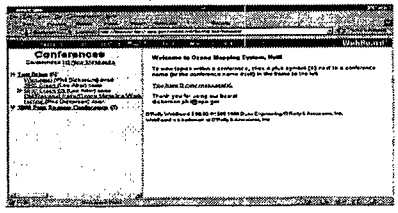
- MGS user guide
  - Help Menu
  - http://envpro.ncsc.org/OMS
- MCNC ticket system
  - http://envpro.ncsc.org/products/ticket.html
  - Enter a new ticket
  - Review previously entered tickets

Troubleshooting

- Ozone monitoring, mapping and public outreach: delivering real-time ozone information to your community
  - EPA/625/R-99/007
  - September 1999
  - http://www.epa.gov/airprogm/oar/oaqps/airnow/cdmanual.pdf

Troubleshooting

- EPA's WebBoard Conferences
  - http://ttnwww.rtpnc.epa.gov/ozmap/webboard/$webb.exe/~oms

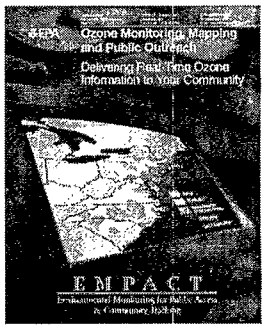


For further information about MapGen

- Steve Fine (MCNC)
  - (919) 248-9255
  - fine@ncsc.org
- Neil Wheeler (Sonoma Technology, Inc.)
  - (707) 665-9900
  - neil@sonomatech.com

The EPA Ozone Handbook

Janice Connery



The EPA Ozone Handbook Covers:

- Ozone monitoring: System design, siting, operation
- Data collection and transfer: System development, operation, and maintenance

The EPA Ozone Handbook Covers:

- Ozone mapping: How to create ozone maps
- Ozone outreach program: How to communicate ozone information to your community.

User Input Obtained for:

- Outline development
- Case studies
- Pilot testing of draft handbook

Requirements for Using the CD-ROM

- MAC- and PC-compatible
- CD-ROM drive
- Internet connection
- Internet browser (i.e., Netscape Navigator or Microsoft Internet Explorer)

Web Address

- http://www.epa.gov/airnow
  - Download the handbook

Web Address

- http://www.epa.gov/ttbnrmrl
  - Download the handbook
  - Order a print or CD-ROM copy of the handbook

Seven

- EMPACT Program U.S. EPA (8722R) 401 M Street, SW Washington, DC 20460
- Phone: 202-564-6791
- Fax: 202-656-1966
  - Order a copy of the handbook or CD-ROM

Key Steps in Creating an Outreach Plan for Ozone

- Define outreach goals
- Identify target audience(s)
- Develop key points/ "messages"
- Identify outreach products
- Identify distribution avenues

Successful Ozone Outreach Programs

- Getting ozone maps on TV
- Launching campaigns to encourage coverage media during ozone season
- Creating Web sites

Successful Ozone Outreach Programs

- Working with schools
- Developing "ozone action day" programs
- Operating hotlines

North Carolina's Air Awareness Program

Lisa Grosshandler

Key aspects of the North Carolina Air Awareness Program

- Coalitions
- Forecasting
- Education

Coalitions

- Site coordinators
- Kick-off events
- End-of-season thank you

Forecasting

- Color-coded forecast issued
- Forecasts are given by 3:00
- Ozone Action Days are called on predicted Orange and Red days

Education

- "Ozone Zone" educational video
- Air Jeopardy!
- "Air Adventures" puppet show
- Air Avenger Superhero
- Bookstore activities
- Classroom activities

Education

- Exhibit booth
- Contests
- Media Campaign
- Media Day
- Coalition site-coordinator training

Challenges for the NCAA

- Quantifying the success of the program
- Keeping it fresh

Ozone Comes to Television!

Greg Fishel

Reasons for Showing Ozone Data on Television

- Previous involvement with Air Awareness Program
- More effective way to show public reality of air quality problems
- Promote public action to reduce ozone concentrations

How We Get the Data

- DAQ retrieves data and sends to EPA
- EPA sends data to Weather Central Inc.
- We retrieve data from Weather Central via dial-up connection

How We Display the Data

- Data is transferred to an SGI Octane for display in animation form
- Color table is created for displaying the five different categories of air quality
- Data is displayed as an animation with time steps of one hour

Improvements Needed

- Need to reduce "observation to display" time (currently almost 3 hours)
- Need to make sure that all sensors are polled
- Need for forecast data from air quality models

Feedback

- Public genuinely interested in seeing a type of data they have not seen before
- Some concern about threshold level for displaying alerts

Ozone Maps on Television

Tim Dye
Sonoma Technology, Inc.
Petaluma, CA
Tim@sonomatech.com
(707) 665-9900

Purpose:

- Explain how ozone maps get on TV
- How you can help

Outline:

- Brief history of ozone maps on TV
- How did we get ozone maps on TV
- Response from Weather Service Providers

Outline:

- Example video clips
- Case studies:
  - Sacramento, CA
  - Raleigh-Durham, NC
- How you can help

History of the Ozone Map and Television

- 1995 Maryland Department of the Environment and the American Lung Association
  - Local mapping in Baltimore-DC area
  - Sent image to WRC-TV
  - Very labor intensive

History of the Ozone Map and Television

- 1996 New Jersey Department of Environmental Protection
  - Local mapping in New Jersey
  - Sent image to PBS News

History of the Ozone Map and Television

- 1997 Northeast/Mid-Atlantic states (NESCAUM-MARAMA)
- Sacramento, CA
- Began working to get ozone maps on TV

History of the Ozone Map and Television

- 1998 EPA in cooperation with states
  - 20 states
  - Approached TV stations and Weather Service Providers (WSPs)
  - Some limited TV coverage

History of the Ozone Map and Television

- 1998 Sacramento, CA
  - Expanded mapping in Sacramento Metropolitan area
  - Approached local TV stations
  - Good TV coverage on one station

History of the Ozone Map and Television

- 1999 EPA in cooperation with states
  - 30 states
  - Worked closely with WSPs
  - Improved TV coverage

How Did We Get Ozone Maps on TV

- Weather Service Providers (WSPs) are companies that supply...
  - weather data,
  - images,
  - forecast
- ...to TV stations, newspapers, private industry, and the public

Why Work with WSPs

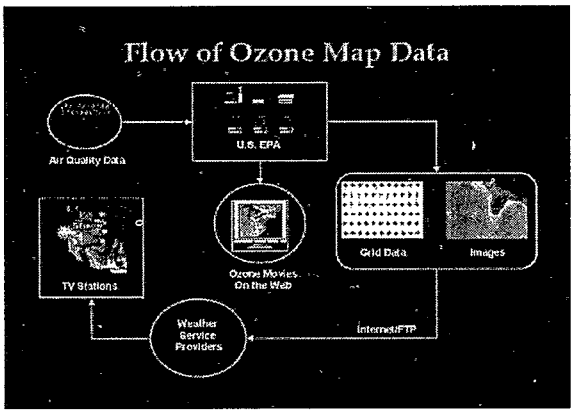
- TV stations want their own look and feel
- WSPs have software/hardware for TV standards
- TV Weathercasters are busy
- WSPs provide reliable high-speed data delivery

EPA Contacted Weather Service Providers

- 1998 National Association of Broadcasters Meeting
- 1998-1999 AMS Broadcaster's meetings
- Explained products (ozone maps and city-specific forecasts)

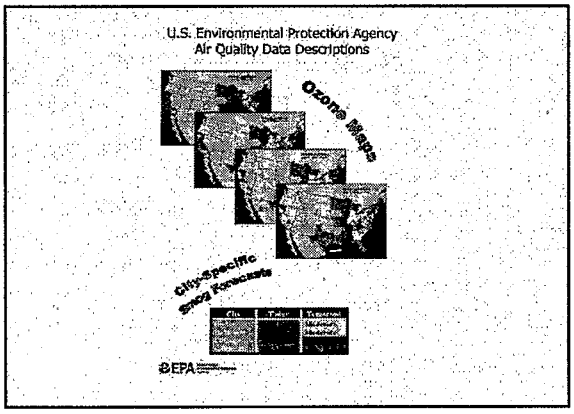
EPA Contacted Weather Service Providers

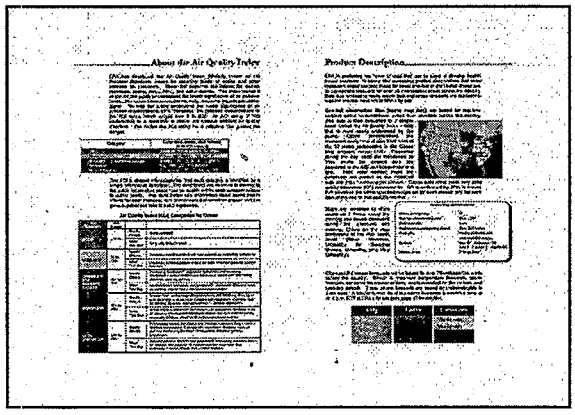
- Five WSPs
  - AccuWeather
  - Kavouras
  - The Weather Channel
  - Weather Central
  - Weather Services International (WSI)



How Did We Get Ozone Maps on TV

- Provided educational materials to WSPs
  - Several contact people were available to answer questions
  - 12 page pamphlet describing all aspect of the ozone map





Response From Weather Service Providers

- Generally Favorable
- WSPs want to see the demand increase - helps their business
- Weather Central - most positive; picked up in 1998 & 1999
- The Weather Channel - posted ozone forecasts on web page

Response From Weather Service Providers

- WSI - ingested data; sent to TV stations
- Kavouras - ingested data
- AccuWeather - waiting to hear from TV clients

Response From Weather Service Providers

- Some issues are preventing wide spread distribution on TV
  - Not yet nation wide
  - Not a year-round product
  - Not as real-time as TV weathercasters desire
  - Unknown demand

EXAMPLE VIDEO CLIPS

Case Studies Sacramento, Ca and Raleigh-Durham, NC

- Met with TV meteorologists
- Educated meteorologists
- Generated interest in the ozone maps
- Encouraged local TV stations to contact WSPs

Case Studies Sacramento, Ca and Raleigh-Durham, NC

- Continued to stay in touch
- Results: ozone maps get more "air play" - dozens of times

How Can You Help

- EPA has done most of its job
- WSPs have basically finished their job
- Now, it's up to state and local air quality staff

How Can You Help

- Here's what's needed:
  1 Local/state staff contact TV stations
    - Explain that ozone maps are available
    - Encourage them to contact their WSP
    - Explain how ozone affects health
    - Explain what ozone maps show
    - Develop relationships with TV stations

How Can You Help

2 WSPs will see the demand

3 Greater dissemination of ozone maps

Ozone Action Days: The Baltimore / Washington D.C. Metropolitan Region's ENDZONE Program

Tad Aburn
Program Manager
Air Quality Planning Program
Maryland Department of the Environment

MDE

Ozone Action Days: The Baltimore / Washington D.C. Metropolitan Region's ENDZONE Program

Randy Mosier
Planner
Air Quality Planning Program
Maryland Department of the Environment

MDE

Background - ENDZONE's Integrated Approach

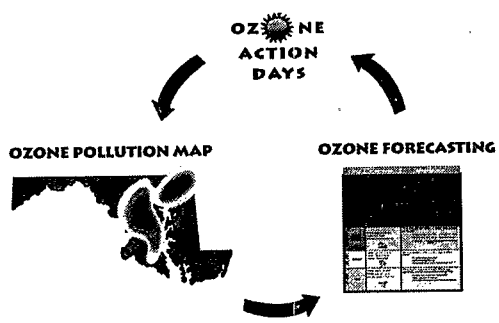
- 1993 -- Forecasting methodology tested
- 1994 -- Ozone Pollution Map piloted/Color-coded forecasting begins in Baltimore area
- 1995 -- Ozone Pollution Map airs, color-coded forecasting spreads to DC, ENDZONE Partners begins

Background - ENDZONE's Integrated Approach

- 1996 -- Ozone Action Days program starts
- 1997 -- Ozone Map spreads throughout the Northeast, "Code Red" press coverage explodes

Background - ENDZONE's Integrated Approach

- 1998 -- Media campaign, kids program, Ozone Mapping extends throughout most of the nation
- 1999 - Ozone Action Days / ENDZONE partnership increases significantly, forecasting methodology continues to improve



ENDZONE Partners Objectives

- Inform the public and businesses about air quality issues
- Promote and advance behavioral changes that will improve air quality

ENDZONE Partners Objectives

- Increase the number of member/partners in both the ENDZONE Partners and the Ozone Action Days Program

ENDZONE Partners Objectives

- Coordinating concerted media campaigns in the Baltimore/Washington D.C. metropolitan region
- Increasing public outreach
- Improving ozone forecasting efforts

ENDZONE™
PARTNERS
www.endzone-partners.org

OZONE ACTION DAYS
Do Your Share For Cleaner Air

ENDZONE Partners / Ozone Action Days Strategies

- Focus on the four areas of voluntary behavior change that will contribute most to avoiding ozone episodes, at the least cost

ENDZONE Partners / Ozone Action Days Strategies

- light duty vehicles (including refueling)
- non-industrial painting
- lawn and garden equipment
- consumer aerosol products

ENDZONE Partners / Ozone Action Days Strategies

- Continue to alert all segments of the population about the health risks of ground-level ozone
- Increase partnership for both Ozone Action Days and ENDZONE
- Work towards transitioning the program to an 8-hour standard for ground-level ozone

Recruiting and Working with ENDZONE Partners

- Membership open to any individual or organization willing to help stimulate voluntary actions
- Recruiting for ENDZONE Partners done mainly by Board of Directors

Recruiting and Working with ENDZONE Partners

- Recruiting for Ozone Action Days Partners performed by staff from Maryland Department of the Environment, Baltimore Metropolitan Council, Metropolitan Washington Council of Governments and Commuter Connections

Recruiting and Working with ENDZONE Partners

- Membership Benefits
  - Members receive daily ozone forecasts either via fax or email, and notification when air quality levels exceed federal standards

Recruiting and Working with ENDZONE Partners

- Informational brochures describing the Ozone Action Days Program, Air Quality Forecast Guide, and health tips and pollution prevention activities are provided - flags, forecast display charts and other promotional materials are also distributed to increase awareness

Recruiting and Working with ENDZONE Partners

- Staff work individually with each member providing support for developing and maintaining an Ozone Action Days program

Ozone Forecasting and Outreach

- Ozone Forecasting began in Baltimore during 1994 - expanded to Washington in 1995
- Dissemination of the color-coded ozone forecasts is the most under-appreciated element of MDE's and ENDZONE's integrated approach

Ozone Forecasting and Outreach

- "Code Red" air quality has become a message that is understood across the Baltimore / Washington media market

Ozone Forecasting and Outreach

- Has generated more media coverage than all other outreach efforts combined
- Results in routine daily media coverage of ozone air quality

Ozone Forecasting and Outreach

- Often results in the message being heard repeatedly throughout the day on radio and TV stations
- Has driven explosive coverage during severe ozone events

Ozone Forecasting and Outreach

- Forecast determined by meteorologists from Maryland Department of the Environment, University of Maryland, Virginia Department of Environmental Quality and the Washington Council of Governments

Ozone Forecasting and Outreach

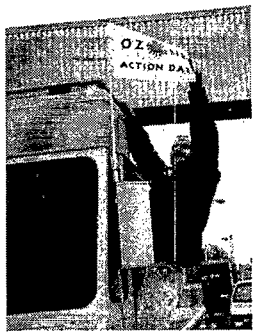
- Regression models and scientific expertise used to determine forecast
- Forecast set to color codes to indicate different levels of severity

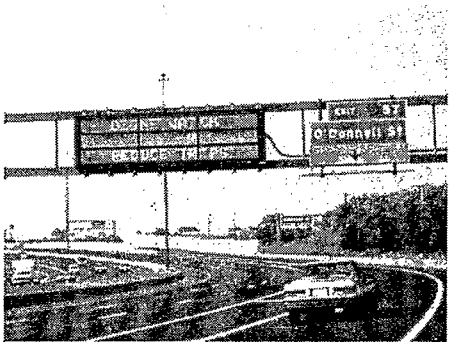
Ozone Forecasting and Outreach

- Faxed to local media and businesses who disseminated the message to the public and employees

Ozone Forecasting and Outreach

- Forecasts distributed to over 50 media outlets -- local television, radio stations, newspapers, state road signs and the National Weather Service





Ozone Pollution Mapping in Maryland

- Third piece of comprehensive effort in 1995
- Software package developed for local television stations to show the formation and movement of ozone pollution

Ozone Pollution Mapping in Maryland

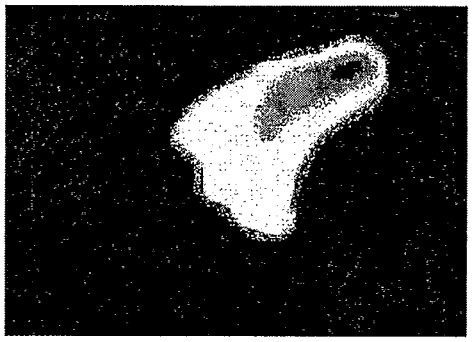
- Originally conceptualized (and piloted) by MDE and the American Lung Association of Maryland
- Collected data from monitors in Maryland, D.C., Virginia, Pennsylvania and Delaware

Ozone Pollution Mapping in Maryland

- Map aired on television stations in Baltimore and Washington in 1995 - In 1996, New Jersey public television began airing map

Ozone Pollution Mapping in Maryland

- Daily viewed by 860,000 people in the metropolitan area
- Now part of EPA/AIRNOW Ozone Mapping effort



Successes in Our Outreach and Education Efforts

- Daily Forecasts have made "Code Red" air quality a common phrase and have people talking about air quality all the time.

Successes in Our Outreach and Education Efforts

- Ozone Action Days Program grows steadily throughout the years
  - 1996 - 91 Partners
  - 1997 - 200 + Partners
  - 1998 - 260 + Partners
  - 1999 - 300 + Partners

Successes in Our Outreach and Education Efforts

- ENDZONE Partnership paid membership increases as well
  - 1997 - 27 Partners
  - 1998 - 42 Partners
  - 1999 - 52 Partners

Successes in Our Outreach and Education Efforts

- Survey results have shown
  - 7 out of 10 people across the region have heard the "Code Red" message
  - 90% of the public in the Baltimore and Washington region see air quality as a top environmental problem

Successes in Our Outreach and Education Efforts

- More than 40% believe that they can individually make a difference
- 25% reported taking voluntary actions to help reduce ground-level ozone during "Code Red" alerts

Successes in Our Outreach and Education Efforts

- Less direct (but equally important) success
  - Several programs that originally generated significant public opposition are now on the ground and running smoothly

Lessons Learned

- Start by getting state and local government agencies on board
- Develop a strong relationship with local media outlets
- Work closely with regulated industries who may be more willing to be seen participating in a positive environmental activity

Lessons Learned

- Disseminate daily color coded forecasts to the media
  - It will end up being the cornerstone of your program
  - It's simple and inexpensive

Lessons Learned

- Research businesses in your area to determine good candidates for an Ozone Action Days program (i.e. businesses with...)
  - large number of employees
  - work processes which could be episodically curbed

Lessons Learned

  - staff who could potentially telecommute and carpool
  - dynamic staff
- Have plenty of informational material on hand during site visits
- Take advantage of and promote the AIRNOW Ozone Map
- Get a head start on summer

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United States
Environmental Protection Agency
Center for
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