U.S. Environmental Protection Agency

Summary Minutes of the EPA Science Advisory Board (SAB)
SAB Workgroup on Air Monitoring Plan Public Teleconference

Wednesday, September 14, 2005 – 3:10 to 6:00 p.m. Eastern Time

EPA Science Advisory Board (SAB) Staff Office
1025 F. Street, N.W., Washington, DC 20004

Panel Members: See Panel Roster – Appendix A

Dates & Times: Wednesday, September 14, 2005, 3:10 – 6:00 PM Eastern Time

Location: Teleconference convened at: SAB Staff Office, 1025 F St., N.W., Washington, DC

Purpose: The purpose of this teleconference meeting was to allow the members of the SAB workgroup to discuss the Agency's draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina* (September 13, 2005). This Draft Plan was prepared by the Office of Air Quality Planning and Standards; the Office of Research and Development; The Region 4 Air, Pesticides, and Toxics Management Division; and the Region 6 Multimedia Planning and Permitting Division (These materials are posted at the SAB's website, www.epa.gov/sab and will be found in the FACA file for this teleconference.

Participants: Workgroup Chair: Dr. Armistead (Ted) Russell

Members:
Dr. David T. Allen
Dr. Judith Chow
Dr. H. Barry Dellinger
Dr. Kenneth Demerjian
Mr. Eric Edgerton
Dr. David S. Ensor
Mr. Henry (Dirk) Felton
Dr. Philip Hopke
Dr. Petros Koutrakis
Dr. Paul J. Lioy
Dr. Frederick J. Miller
Dr. Maria Morandi
Mr. Richard L. Poirot
Dr. Warren H. White
Dr. Yousheng Zeng
Dr. Barbara Zielinska

EPA SAB Staff:	Mr. Fred Butterfield, Designated Federal Officer (DFO) Dr. Vanessa Vu, SAB Staff Office Director Dr. Anthony Maciorowski, SAB Staff Office Associate Director for Science
Other EPA Staff:	Donna Ascenzi, Region 6 Kuenja Chung, Region 6 Larry Elmore, OAR, OAQPS Richard Guillot, Region 4 Tim Hanley, OAR, OAQPS James Homolya, OAR, OAQPS Mike Jones, OAR, OAQPS Jacqueline Lewis, Region 4 Phil Lorang, OAR, OAQPS Jan Moneysmith, Region 6 Douglas Neeley, Region 4 Duane Newell, OSWER, ERTC Sharon Nizich, OAR, OAQPS Mike Papp, OAR, OAQPS Sharon Reinders, OAR, OAQPS Joann Rice, OAR, OAQPS John Schaum, ORD, NCEA William Schrock, OAR, OAQPS Van Shrieves, Region 4 Nealson Watkins, OAR, OAQPS Becky Weber, Region 6
Other participants:	Anthony Lacey, *Inside EPA* Jennifer Mouton, Louisiana DEQ

Meeting Summary

The discussion largely followed the issues and general timing as presented in the teleconference meeting agenda (Appendix B).

EPA's draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina* represents the Agency's initial description of a proposed general concept for ambient air monitoring in the areas affected by Hurricane Katrina. The plan was designed to provide ambient air monitoring information for areas that may be adversely affected by the direct storm effects (flooding, destruction of buildings and their contents, damage to industrial facilities, infrastructure restoration) or activities aimed at clean-up, start-up of industrial facilities, infrastructure restoration, rebuilding, and resettlement. The Agency is commended for preparing the plan under difficult circumstances, and for seeking external scientific advice so early its development. The individual comments prepared by workgroup members are attached.

Several overarching themes arose during the teleconference. The present plan represents a first step in an evolving process. As the plan evolves, the SAB workgroup recommends that the

specific short-term, mid-term, and long term monitoring objectives be clearly articulated. Clearly stated objectives are crucial for parameter selection, site selection and monitor placement. The SAB Workgroup recommends that continuous real time monitoring of particulate matter (PM) is important as the first line of monitoring, as is the establishment of stations for hazardous air pollutants. Burn monitoring and restoration of ambient air monitors should be separated and clearly identified as two tracks in the draft plan. The workgroup notes that the plan was conceived using conventional and well proven methods. Although this monitoring approach has much to offer for emergency response, the workgroup also recommends that thought be given to innovative methodologies that may reduce data collection and interpretation time.

The workgroup also recommends coordination of sampling and monitoring to allow data obtained for water, sediments, and biologicals to inform air monitoring. Burning is always challenging, and will become a major source once it is initiated. The critical design element for burning is near-field exposure. Existing satellite data may prove useful in delineating plumes. A number of detailed recommendations are included in the meeting minutes and in the individual member comments. The SAB Workgroup would like to thank the Agency for the opportunity of providing advice in this time of national need.

WEDNESDAY, SEPTEMBER 14, 2005

Convene Meeting, Call Attendance, Introduction and Administration

Mr. Fred Butterfield, Designated Federal Officer (DFO) for the CASAC, opened the meeting and the teleconference line, called attendance, and welcomed all attendees. He stated the purpose of the teleconference, and referenced the recent SAB Staff Office *Federal Register* notification to convene workgroups of experts for rapid consultative advice on scientific and technical issues from Hurricane Katrina (70 FR 54046, September 13, 2005). Mr. Butterfield also pointed-out that the Agency's draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina* (September 13, 2005) and other information relating to both this SAB Workgroup on Air Monitoring Plan, including member biosketches, and to this teleconference are posted on the SAB Web page at URL: http://www.epa.gov/sab/hurricane_katrina_wg_activities.htm. Mr. Butterfield stated that there would be an opportunity to provide brief, oral public comments; however, he also remarked that ascertained no one had indicated that they wished to do so in advance of this conference call meeting.

Mr. Butterfield noted that the members of this workgroup were drawn from the membership of EPA's Science Advisory Board (SAB), the Clean Air Scientific Advisory Committee (CASAC) and the Advisory Council on Clean Air Compliance Analysis (chartered advisory committees), their standing committees, subcommittees, and advisory panels; in other words, all workgroup members were already appointed as Special Government Employees (SGEs) and had therefore each of them had already submitted a Confidential Financial Disclosure Form (EPA Form 3110-48) and had undergone SAB office review with respect to any potential financial conflicts-of-interest or appearances of a lack of impartiality.

(Mr. Butterfield had previously informed the members of this workgroup that this teleconference will constitute "consultative advice" to the Agency from this SAB Workgroup; therefore, there will be no report from the workgroup and, accordingly, there will be no need for a subsequent SAB, CASAC, Council "parent committee" review. Furthermore, the DFO mentioned that the minutes from this teleconference meeting will constitute the written summary of workgroup members' advice and recommendations. Workgroup members' individual review comments on the ambient air monitoring plan will be appended to the meeting minutes.)

Purpose of Meeting and Welcome by OAQPS

Dr. Ted Russell, SAB Workgroup on Air Monitoring Plan Chair, thanked the members of the Workgroup for their willingness to serve on such short notice, and also thanked EPA staff not only for producing the draft air monitoring plan but also for responding to members' questions. Dr. Russell also asked the SAB Workgroup members to submit any individual review comments to the DFO as soon as possible.

Overview of EPA's Draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina* and Report from the Field

Mr. Phil Lorang of the EPA Office of Air Quality Planning and Standards (OAQPS) provided some context to EPA's Draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina* (Draft Plan), and updated SAB Workgroup members on some portions in the Draft Plan that have been updated since version 6 of the plan was disseminated approximately 48 hours earlier.

Duane Newell of EPA's Office of Solid Waste and Emergency Response (OSWER) provided a brief view from the field. Mr. Newell indicated that the entire situation cannot be assessed from New Orleans but will ultimately need to look across the entire region. He indicated that the Louisiana Department of Environmental Quality is now also involved in planning. Mr. Newell stated that perimeter stations were a good idea; however, the dynamics of the area has changed since the storm, and burning will probably occur throughout the area. He also stated that the public may be let in sooner than originally expected, and getting monitors in place is crucial. However, barriers to monitor placement exist due to the lack of power and infrastructure.

Following Mr. Newel's comments, Mr. Butterfield asked if any members of the public wished to make public comments. Hearing none, Dr. Russell initiated a general discussion of Draft Plan. Workgroup members then began to provide suggestions on the Draft Plan.

Summary of SAB Workgroup Discussion and Deliberations in Response to the Charge Questions

The charge questions from OAQPS to the SAB Workgroup on Air Monitoring Plan are found in Appendix C. Workgroup members' individual written comments on the Agency's draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina* are contained in Appendix D.)

Several SAB workgroup members agreed that the Draft Plan needed better articulation of overall objectives. Clearly stated objectives are crucial to both burn-site and monitor placement. A workgroup member made the point that biological parameters of the population at risk also

needed to be known for appropriate monitor placement. As an example, African-Americans screen out less particulate matter through their nasal passages than Caucasian populations and are therefore at higher risk. Another member asked whether burn site need to be established at this point in time. He thought that burn centers might be mobile as well as fixed.

A member then asked if monitoring plans were being coordinated with other agencies. The EPA representative replied that EPA has specifically been tasked with contaminant characterization, but that other agencies were involved, including FEMA, CDC, the U.S. Army Corps of Engineers, the Office of Science and Technology Policy (OSTP), and the Louisiana Department of Environmental Quality. Most current monitoring is being conducted with real-time monitors for personnel protection as well as overflights, and the Agency wants to get fixed stations in place.

A member indicated that, to date, little detailed data has been posted on EPA's Web site. Several compounds are listed but they appear along with a number of non-detects. The member inquired whether more detailed data was available. The EPA representative responded that data were being posted as it became available following quality assurance verification

A member indicated that when the burn centers come on-line, they will swamp other air sources. Another member stated that burn center locations had not been confirmed although candidate sites may be operating for several months and may be designated for solid waste. Another member stated that burning out of town would be good news.

A member indicated that when sediments begin to dry, exposure to dusts will be a concern. Another member agreed and states that following they World Trade Center collapse, very coarse particles were the immediate problem, and this will probably occur in New Orleans. Another member indicated that the plan and/or charge questions contained no discussion of debris transport, safety concerns, or personal monitors for workers.

Next, the topic of discussion turned to monitoring approaches. One member asked about resources and the possibility of non-traditional source monitoring. Mobile monitoring at distribution points and release sites would provide spatial distributions and flux information. Another member asked if anyone has an assessment of what may be in different facilities, gas stations, industries, etc. The EPA representative indicated that reconnaissance teams and response teams are in the field, but there are sites that can't be accessed.

A member stated that vast areas were contaminated, problems will not go away quickly, and that there were long-term concerns. He suggested using remote operating weather stations; indicated that HYSPLIT4 is problematic for local scales although good for synoptic patterns; and thought that NOx, VOCs, and Ozone may be less important over the long term than chemical spills, dioxin from burning, and persistent bio-accumulative toxic substances. The latter are probable from inefficient incineration. Another member agreed saying that traditional air pollution is not where the action is right now. This member also indicated that, since high meteorological data resolution was required to run HYSPLIT, rather than using HYSPLIT to generate trajectories, mesoscale meteorological models should be used. Finally, he noted that Air quality researchers in Texas are currently running the MM5 meteorological model to develop daily air quality

forecasts for eastern Texas, and that the Agency might consider MM5 with a finer grid resolution.

Another member indicated there had been discussions about alternative monitoring approaches, but that there a lot to be said for starting with approaches that you know how to do. Conventional approaches can tell you where the smoke and dust is. The filter species data can look at the total exposure, which is a good start.

Dr. Russell thanked the workgroup for their input, indicated that they had already begun to address the charge questions and suggested the workgroup move toward specific responses to the charge questions.

CHARGE QUESTION 1

"The plan identifies several situations as needing to be addressed by the post-storm monitoring program:

- ***Flooded Areas***
- ***Areas Damaged by Flood or Winds – Other Considerations***
- ***Open Burning of Biomass, Building Debris, and Other Debris***

Are these the situations that should most receive monitoring attention?"

Discussion began with the suggestion that emissions from transport or solid waste needs to be addressed. Lake Pontchartrain might be a sustained source of volatiles. Siting issues are important and the burning scenarios have not yet been finalized. Debris disposal options need to be innovative.

At the World Trade Center, ground-based monitoring of plumes was found to be difficult and a tethered balloon would be useful. Additionally, PM_{10} data was valuable early on, and posting that data on a Web site one or two times a day would be useful for New Orleans as well.

CHARGE QUESTION 2

"Are the pollutants that are the targets of the monitoring aimed at these situations appropriate?"

Continuous real time monitoring of PM_{10} and $PM_{2.5}$ is important as the first line of monitoring, followed by grab samples of smoke at industrial sites. The latter could be analyzed quickly to determine what's actually there. The original dust and smoke samples from the World Trade Center site were useful for determining what to monitor there. Chloromethane, acrolein, PAHs, dioxins, and furans would be more important than VOCs. Ozone and NO_X are not too important.

Initial establishment of general station areas stations throughout New Orleans for asbestos, metals, oil spills, benzene, toluene, and xylene would be useful. Then, assess the results and determine what specific compounds should be monitored over time, until monitoring can be

phased-out. A similar approach could be employed for burn sites. Burn monitoring and restoration of ambient air monitors should be separated and clearly identified as two tracks in the Draft Plan.

A suggestion was made that water quality and sediment data could be a useful guide for ambient air. However, burning will result in the formation of additional chemicals that would not be found in early water and sediment samples. Dust samples from surfaces once they dry would also prove useful. SO_2 also has the potential to be a contributor to the mix of ambient pollutants. Major sources include refineries and coking emissions, and emissions could also occur from burning. Aethelometers would be useful for obtaining real time data, particularly using the 315 nm extra wavelength.

Radiological materials from hospitals may have been released due to flooding and building damage and should be considered. Biologicals are important and are not addressed in the current draft plan. As time goes on, the biologicals (*e.g.*, endotoxins, pathogens) will be a more important issue as things dry out and volatilize.

Asbestos facilities must have management plans. Asbestos containing buildings should be identified and treated differently than non-asbestos containing buildings

CHARGE QUESTION 3

> **"To the extent that EPA has been able to describe or reference the monitoring methods, equipment, and quality assurance activities in the document, is this appropriate? What advice do you have for EPA as we further develop the methods and equipment plans?"**

PM_{10} is primary, with emphasis on real-time and fast response as the priority. Once objectives stabilize, recheck monitoring. Fast gas chromatography (GC) methods, like those developed by Ed Overton of LSU, should be included as a candidate instrument for the sampling plan to allow monitoring of multiple organics in minutes in real time.

Widespread burning might cause direct exposures to a number of compounds such as dioxins and furans. H_2S emissions may also increase, particularly as things start to dry out. Additionally, deposited material on streets from burning and dry dust re-suspension may be a problem.

Lake Pontchartrain may also be a source of volatiles. PM and VOCs could be monitored at the surface by mobile monitoring equipment.

CHARGE QUESTION 4

> **"Are the pre-storm state-operated sites and the proposed samplers for each (as listed in the footnote on page 4 of the draft plan) likely to be relevant to monitoring the air quality aftermath of the storm itself and of the recovery efforts, if they can begin operation about three or four weeks? Should this restoration be lower or higher priority than establishing the burning-oriented monitoring sites?"**

Pre-storm monitoring sites were developed for other conditions, most were population exposure cited, and should have a lower priority. The initial focus should be on issues of the storm's aftermath, followed by siting the fixed monitors as New Orleans is re-developed.

"What advice do you have for siting the three fixed air toxics sites so that they will succeed in characterizing the constituents of the smoke from the burning facilities and their relative concentrations? How far downwind should they be?"

Burning is always very challenging. The critical design element for monitoring is near-field exposure. Locating burning sites in or away from cities is always a concern. Some information might be gleaned from sugar cane burning in Louisiana, which often results in a broad cloud of smoke under the inversion rather than a plume. Existing satellite data may provide some understanding of plume behavior under Louisiana climactic conditions for part of the year. One member asked whether satellite data with greater resolving power than that commercially-available be accessed. Regarding how far downwind, the sites should be equally spaced on a log scale to get insight for linear and non-linear transport. Minimums and maximums have to be determined after the sites are established.

"The plan proposes that the portable $PM_{2.5}$ monitors be placed in the predicted plume path each day, at a variety of downwind distances. What range of distances should be used? Is the concept of using $PM_{2.5}$ concentrations from one of these portable monitors (which is intended to be in the center of the plume each day) along with the $PM_{2.5}$ measurements at the associated fixed air toxics site (which may be off the center line of the plume some days or even outside the plume entirely) and meteorology data to estimate air toxics concentrations at the location of the portable $PM_{2.5}$ monitor workable? Is the $PM_{2.5}$ concentration alone likely to be valuable information, if no meaningful estimates of specific air toxics can be made using this scheme?"

Land sea-breeze meteorology might effect local situations and should be examined in the context of canisters. PM_{10} and $PM_{2.5}$ monitors go hand-in-hand. It would be best to co-locate them.

CHARGE QUESTION 5:

"The HYSPLIT4 (HYbrid Single-Particle Lagrangian Integrated Trajectory model) tool provided by NOAA has the advantage of being well known and accessible. Is it suitable for providing estimates of the likely path of the ground-level impact of the plume from burning facilities of interest? How far downwind (in terms of miles or hours of transport) should trajectories be displayed for? Is there another approach that should be considered as a way to meet the objective of giving state/local agencies information on likely plume path so that they may inform the public if they choose?"

Mesoscale models may be more fruitful for forecasting than what is proposed, along with using satellite data**.**

The Lawrence Livermore Laboratory has different models to predict plumes. The Agency might check to see if they would be available to assist EPA. There is also a group at Texas A&M University conducting daily prognostic modeling that already includes New Orleans. The grid is almost where you want to be. EPA might contact them for assistance as well.

OTHER QUESTIONS AND ISSUES

It is easier to monitor mercury gases than mercury particulates and not that difficult to do. Should the Agency monitor gaseous mercury?

The Agency should triage the problem and be guided by water, sediment, and dust samples to decide.

Debris collection and burning should be separated into classes to limit toxic-waste burning. There will probably be trees, debris, white debris, and hazardous wastes. The latter should go only to permitted hazardous waste landfills to the extent that they can be identified.

The SAB workgroup recommends publicizing and picking up hazardous household wastes because people will not have transportation.

EPA needs a much better statement of the objectives for this Draft Plan. Focus the objectives on immediate needs. After people begin to get their lives back in shape, develop short-term, mid-term, and long-term goals.

Portable generators and battery operated monitors will be needed initially due to the absence of power.

The National Institute for Occupational Safety and Health (NIOSH) should be involved in training emergency workers.

The Agency should coordinate biological monitoring for endotoxins with other monitoring activities. Biologicals can be collected with ambient air monitors. The U.S. Centers for Disease Control and Prevention (CDC) will typically focus on water pathogens, not endotoxins and other biological that might be present.

EPA should strongly consider ambient air monitoring in Baton Rouge, LA. The influx of people and automobiles has been dramatic and may provide a unique learning opportunity.

Summary, Wrap-up, Next Steps and Closing Remarks

Dr. Russell again thanked the members of the SAB Workgroup for their participation and reiterated the request that they provide their individual review comments to Mr. Butterfield as soon as possible. Mr. Butterfield seconded this request, specifically asking that these be sent to him electronically by no later than noon on Thursday, September 15. He commented that once these minutes are finalized and posted on the SAB web page, he would send the

URL address to each of the workgroup members. Mr. Butterfield once again thanked the Chair and the members of the workgroup for their participation in this consultation.

The DFO adjourned the meeting at approximately 5:40 PM.

Submitted:

/s/

Fred A. Butterfield, III

Fred A. Butterfield, III
DFO

Certified as True:

/s/

Armistead (Ted) Russell, Ph.D.

Armistead (Ted) Russell, Ph.D.
SAB Workgroup Chair

Date: September 16, 2005

APPENDICES

Appendix A – Roster of the SAB Workgroup on Air Monitoring Plan

U.S. Environmental Protection Agency
EPA Science Advisory Board (SAB) Staff Office
SAB Workgroup on Air Monitoring Plan

CHAIR

Dr. Armistead (Ted) Russell, Georgia Power Distinguished Professor of Environmental Engineering, Environmental Engineering Group, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

WORKGROUP MEMBERS

Dr. David T. Allen, The Gertz Regents Professor in Chemical Engineering, Department of Chemical Engineering, University of Texas, Austin, TX

Dr. Judith Chow, Research Professor, Desert Research Institute, Air Resources Laboratory, University of Nevada, Reno, NV

Dr. H. Barry Dellinger, Patrick F. Taylor Chair, Department of Chemistry, Louisiana State University, Baton Rouge, LA

Dr. Kenneth Demerjian, Professor and Director, Atmospheric Sciences Research Center, State University of New York, Albany, NY

Mr. Eric Edgerton, President, Atmospheric Research & Analysis, Inc., Cary, NC

Dr. David S. Ensor, Senior Fellow and Center Director, Center of Aerosol Technology, RTI International, Research Triangle Park, NC

Mr. Henry (Dirk) Felton, Research Scientist, Division of Air Resources, Bureau of Air Quality Surveillance, New York State Department of Environmental Conservation, Albany, NY

Dr. Philip Hopke, Bayard D. Clarkson Distinguished Professor, Department of Chemical Engineering, Clarkson University, Potsdam, NY

Dr. Petros Koutrakis, Professor of Environmental Science, Environmental Health, School of Public Health, Harvard University, Boston, MA

Dr. Paul J. Lioy, Deputy Director and Professor, Environmental and Occupational Health Sciences Institute, UMDNJ – Robert Wood Johnson Medical School, Piscataway, NJ

Dr. Frederick J. Miller, Consultant, Cary, NC

Dr. Maria Morandi, Assistant Professor of Environmental Science & Occupational Health, Department of Environmental Sciences, School of Public Health, University of Texas – Houston Health Science Center, Houston, TX

Mr. Richard L. Poirot, Environmental Analyst, Air Pollution Control Division, Department of Environmental Conservation, Vermont Agency of Natural Resources, Waterbury, VT

Dr. Warren H. White, Research Professor, Crocker Nuclear Laboratory, University of California – Davis, Davis, CA

Dr. Yousheng Zeng, Air Quality Services Director, Providence Engineering & Environmental Group LLC, Baton Rouge, LA

Dr. Barbara Zielinska, Research Professor, Division of Atmospheric Science, Desert Research Institute, Reno, NV

SCIENCE ADVISORY BOARD STAFF

Mr. Fred Butterfield, CASAC Designated Federal Officer, 1200 Pennsylvania Avenue, N.W., Washington, DC, 20460, Phone: 202-343-9994, Fax: 202-233-0643 (butterfield.fred@epa.gov) [Physical/Courier/FedEx Address: Fred A. Butterfield, III, EPA Science Advisory Board Staff Office (Mail Code 1400F), Woodies Building, 1025 F Street, N.W., Room 3604, Washington, DC 20004, Telephone: 202-343-9994]

Appendix B – Teleconference Agenda

U.S. Environmental Protection Agency
EPA Science Advisory Board (SAB)
SAB Workgroup on Air Monitoring Plan

Public Teleconference
Wednesday, September 14, 2005 – 3:10 to 6:00 p.m. Eastern Time

EPA Science Advisory Board (SAB) Staff Office
1025 F. Street, N.W., Washington, DC 20004

Purpose of Teleconference: To Conduct a Consultation on EPA's *Concept Plan for Ambient Air Monitoring After Hurricane Katrina*

Meeting Agenda

Wednesday, September 14, 2005

3:10 p.m.	**Convene Teleconference; Call Attendance; Introductions and Administration**	Mr. Fred Butterfield, SAB Workgroup DFO
3:20 p.m.	**Opening Remarks and Review of Agenda**	Dr. Armistead Russell, SAB Workgroup Chair
3:25 p.m.	**Overview of EPA's Draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina***	Mr. Phil Lorang, Office of Air Quality Planning and Standards (OAQPS)
3:35 p.m.	**Report from the Field**	EPA Region 6 and/or OSWER Emergency Response Staff
3:45 p.m.	**Public Comment Period**	Mr. Butterfield (Moderator)
4:00 p.m.	**Members' Consultation on EPA's Draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina***	SAB Workgroup Members
5:50 p.m.	**Summary and Next Steps**	Dr. Russell, Mr. Butterfield
6:00 p.m.	**Adjourn Meeting**	Mr. Butterfield

Appendix C – Charge Questions

Charge Questions for SAB Workgroup Consultation on

EPA's *Concept Plan for Ambient Air Monitoring After Hurricane Katrina*

September 12, 2005

1. Risk Situations Addressed

The plan identifies several situations as needing to be addressed by the post-storm monitoring program:

- *Flooded Areas*
- *Areas Damaged by Flood or Winds – Other Considerations*
- *Open Burning of Biomass, Building Debris, and Other Debris*

Are these the situations that should most receive monitoring attention?

2. Pollutants to be monitored

Are the pollutants that are the targets of the monitoring aimed at these situations appropriate?

3. Monitoring methods, equipment, and quality assurance activities

To the extent that EPA has been able to describe or reference the monitoring methods, equipment, and quality assurance activities in the document, is this appropriate? What advice do you have for EPA as we further develop the methods and equipment plans?

4. Siting

The document envisions five types of monitoring sites, but specifies the exact locations only of the second of the five listed below:

a. A mobile monitoring unit — Trace Atmospheric Gas Analyzer (TAGA) —is already in operation in New Orleans for purposes of addressing the first of the risk situations described in the first question above.

b. The pre-storm, state-operated monitoring sites in New Orleans and the coast of Mississippi. These would be restored to their original capabilities, plus some sites in New Orleans would be enhanced with additional (but conventional) capability, mostly but not exclusively to better address PM.

c. A "ring" of up to ten fixed-site $PM_{2.5}$ monitoring locations between the evacuated area of New Orleans and outlying populated areas. About half of these would have collocated PM_{10} samplers also. These sites are intended to provide information on metals that may be released from burning and other activities in New Orleans and be transported to downwind areas.

d. Three fixed-site gas and particle air toxics monitoring sites. One would be collocated with one of the ring sites. The other two would be placed downwind of open burning facilities elsewhere.

e. Three or more portable $PM_{2.5}$ continuous monitors that would be used to "chase plumes" from selected open burning facilities.

Are the pre-storm state-operated sites and the proposed samplers for each (as listed in the footnote on page 4 of the draft plan) likely to be relevant to monitoring the air quality aftermath of the storm itself and of the recovery efforts, if they can begin operation about three or four weeks? Should this restoration be lower or higher priority than establishing the burning-oriented monitoring sites?

What advice do you have for siting the three fixed air toxics sites so that they will succeed in characterizing the constituents of the smoke from the burning facilities and their relative concentrations? How far downwind should they be?

The plan proposes that the portable $PM_{2.5}$ monitors be placed in the predicted plume path each day, at a variety of downwind distances. What range of distances should be used? Is the concept of using $PM_{2.5}$ concentrations from one of these portable monitors (which is intended to be in the center of the plume each day) along with the $PM_{2.5}$ measurements at the associated fixed air toxics site (which may be off the center line of the plume some days or even outside the plume entirely) and meteorology data to estimate air toxics concentrations at the location of the portable $PM_{2.5}$ monitor workable? Is the $PM_{2.5}$ concentration alone likely to be valuable information, if no meaningful estimates of specific air toxics can be made using this scheme?

5. Trajectory predictions

The HYSPLIT4 (HYbrid Single-Particle Lagrangian Integrated Trajectory model) tool provided by NOAA has the advantage of being well known and accessible. Is it suitable for providing estimates of the likely path of the ground-level impact of the plume from burning facilities of interest? How far downwind (in terms of miles or hours of transport) should trajectories be displayed for? Is there another approach that should be considered as a way to meet the objective of giving state/local agencies information on likely plume path so that they may inform the public if they choose?

Appendix D – Written Comments from Individual SAB Workgroup Members

This appendix contains the written comments of the individual members of the SAB Workgroup on Air Monitoring Plan who submitted such comments electronically. The comments are included here to provide a range of individual views expressed by members of the Workgroup as part of its consultation on the Agency's draft *Concept Plan for Ambient Air Monitoring After Hurricane Katrina*. These comments do not represent the views of the SAB Workgroup, the EPA Science Advisory Board, or the Agency itself. Workgroup members providing written comments are listed on the next page, and their individual comments follow.

Workgroup Member **Page #**

Dr. David T. Allen

Rather than use HYSPLIT to generate trajectories, mesoscale meteorological models, possibly coupled with eulerian photochemical models should be used.

Air quality researchers in Texas are currently running the MM5 meteorological model, coupled with CMAQ, to develop daily air quality forecasts for eastern Texas. The modeling domain being used includes the New Orleans area, and it would be relatively simple to run the model in a trajectory mode for New Orleans. Use of this modeling capability will likely provide the most accurate forecasts that are currently possible for plume trajectories in the New Orleans area.

Dr. Judith Chow

September 14, 2005

To: Fred Butterfield, Designated Federal Officer, Clean Air Scientific Advisory Committee (CASAC)
Subject: Follow-up on Conference Call Regarding "Conceptual Plan for Air Monitoring After Hurricane Katrina"

It was a very informative two hour conference call. The EPA should be commended for drafting the Concept Plan in such a short period of time. I look forward to reviewing the revised plan.

As I mentioned, there are 15 Remote Automated Weather Stations (RAWS) in Louisiana, and 24 RAWS in Mississippi that primarily monitor the weather for air quality, rating fire danger, and providing information for research applications (http://www.fs.fed.us/raws/). It may be worthwhile to contact the U.S. Forest Service Program Manager Kolleen Shelley (208-387-5871, kshelley@fs.fed.us) or the Bureau of Land Management Remote Sensing Unit Leader Herb Arnold (208-387-5196, Herb_Arnold@nifc.blm.gov) regarding:

- Can they allocate some stations in New Orleans, especially surrounding burning facilities? It may be useful to have some at ground level and others on tall buildings.
- How many RAWS in Louisiana and Mississippi are still operational after Hurricane Katrina? Can their data be used to assist EPA air quality monitoring and modeling efforts to better understand micrometeorology, local transport, and forecasts?

Although the EPA is leaning toward monitoring with equipment they are familiar with, many of the fast-response real-time measurements (e.g., TSI or Grimm portable condensation particle counters (CPCs), EchoChem PAH real-time monitors, dual-wavelength or seven-color aethalometers, and nephelometers) have been well-tested as part of the U.S. EPA Supersite program and may be able to assist in monitoring plumes from open burning. Since many of the Supersites have completed monitoring, there may be instruments readily available for this emergency response.

As was discussed, mobile van monitoring such as TAGA is a good start. The EPA may want to consider adding the abovementioned fast-response particle monitors to get < 1 minute averaging time from the mobile van. Dr. Jeff Brook (416-739-4916, jeff.brook@ec.gc.ca) of Environment Canada also has a van that is equipped with a real-time GC/MS along with other fast-response monitors that can be used for emergency response. It might be worthwhile to contact Dr. Brook and seek international collaboration.

The resuspension of contaminated soil deserves more attention. If it is feasible, the EPA should collect samples on polycarbonate filters for Scanning Electron Microscopy (SEM)/ X-Ray Fluorescence (XRF) analysis. This was done after the World Trade Center event and was found to be helpful in identifying unusual pollutants that would not normally be observed. These unusual species may be of importance for exposure assessment.

Dr. H. Barry Dellinger

Barry Dellinger Comments on EPA's Concept Plan for Ambient Air Monitoring After Hurricane Katrina

1. EPA's plan currently focuses on traditional air pollutants, such as ozone. This is not the issue. Background levels will be far lower than normal due to lack of operating motor vehicles and other air pollution sources due a lack of anthropogenic activity as a result of evacuations.

2. Restart of chemical manufacturing facilities should be monitored for release of off-spec product and start-up emissions.

3. Coarse particle concentrations are probably a good surrogate for construction/cleanup activity. Areas with high coarse particle fluxes can be subsequently investigated for cleanup type pollution such as lead and asbestos.

4. Fine particle concentrations are probably a good surrogate for combustion generated pollution. Areas with high fine particle fluxes can be subsequently investigated for combustion-generation pollution such as dioxins, PAHs.

5. There will be chlorine present in brackish water that can result in formation of chlorinated hydrocarbons and metal chlorides. Chlorinated hydrocarbons such as dioxins are of obvious concern. Metal chlorides will be water soluble and volatile and thus may have higher air concentrations than normal. There should be special emphasis on metals that form volatile chlorides to see if their atmospheric concentration is elevated (same for water).

6. Recognizing the dynamic situation of the recovery effort, a short term, mid term, and long term plan should be instituted.

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Dr. Kenneth Demerjian

Comments on Concept Plan for Ambient Air Monitoring after Hurricane Katrina

The plan needs to spell out what is the primary purpose/focus of the monitoring effort. I assume it is characterize the air quality of various atmospheric contaminants with know health risks that have been introduced into the local environments by non traditional sources as a result damage from Hurricane Katrina and to track changes in the air quality of these and other pollutant species introduced as part of the clean and reconstruction of the devastated areas. The monitoring plan should identify phases and timeframes for monitoring scenarios with respective to the various pollutant sources associated with the ongoing activities identified with the clean up and reconstruction.

Is EPA limited to address monitoring air quality in Katrina effected areas using only existing capabilities (i.e. BOA contractors and analytical contractors)? This may be short sited and EPA should consider accessing monitoring technologies from other agencies, research organizations and universities.

For example, introduction of mobile platforms with fast response instrumentation capable of characterizing none tradition sources could be deployed to monitor HAPS/VOCs, PM_{mass}, and $PM_{composition}$. Such platforms can characterize spatial distribution of these pollutants over large areas in relatively short time periods.

I would suggest, if not done as yet, that an assessment of flood impacts on local fuel storage (gas stations, residential fuels, distribution centers, and major refineries) and major TS storage sites (possibly through review of Toxic Substances Inventory TSI) be performed. Those sites being addressed by emergency response toxic release teams need to be identified and considered for follow-up area source emissions characterization.

There should be an effort to characterize Lake Pontchartrain as a source of HAPS/VOC gases and PM organic emissions. An initial indication of how important the lake might be as source of these air pollutants should come from water quality monitoring of the lake.

I would suggest implementing a coupled mesoscale/chemical transport models (e.g. ETA-CTM) air quality forecast models or adapt a mesoscale forest fire burn models for addressing the burning of debris and the transport of the source plumes.

Mr. Eric Edgerton

1. Risk Situations Addressed

The plan identifies several situations as needing to be addressed by the post-storm monitoring program:

- *Flooded Areas*
- *Areas Damaged by Flood or Winds – Other Considerations*
- *Open Burning of Biomass, Building Debris, and Other Debris*

Are these the situations that should most receive monitoring attention?

Indoor air quality should be a major priority; however, I assume this aspect of monitoring will be covered by other agencies. What about alternate power generation? Will there be a high concentration of diesel/gasoline generators in the city?

2. Pollutants to be monitored

Are the pollutants that are the targets of the monitoring aimed at these situations appropriate?

I would place highest priority on characterizing three things: 1) composition of smoke from burning activities; 2) composition of $PM_{Katrina}$ generated by cleanup and resettlement; and 3) real-time concentration of smoke and dust indicators in and around population centers. Regarding items 1 and 2, these appear to be extremely complex mixtures of organic and inorganic debris and its entirely unclear if they are more, less or equally harmful as typical "wood smoke" and "dust". Emphasis should be produced on HAPs (especially products of incomplete combustion), and biologicals. Once composition is known, it should be possible to generate appropriate alerts, both to the general population and to burn/cleanup personnel. Regarding item 3, some combination of real-time mass monitors (BAM, TEOM) aethalometers and perhaps nephelometers should identify PM excursions and help distinguish between smoke-dominated versus $PM_{Katrina}$-dominated events. CO might be useful for detecting smoke plumes, but perhaps not as easily deployed and operated as the aethalometer.

The next level of priority should be given to known pollutants emanating from chemical facilities and point sources.

Low priority (no extra effort) should be given to ozone, NO, NOx, NOy and SO2.

3. Monitoring methods, equipment, and quality assurance activities

To the extent that EPA has been able to describe or reference the monitoring methods, equipment, and quality assurance activities in the document, is this appropriate? What advice do you have for EPA as we further develop the methods and equipment plans?

Real-time methods for plume surveillance and public notification; PUF samplers and integrated filter samplers for characterizing sources; dust swabs for characterizing what pollutants might be aerosolized during cleanup/resettlement. As noted during the call, care will need to be taken to ensure filters are not overloaded near sources. By the same token, sampling does not necessarily need to integrate over 24 hour periods. Design calculations should be done to ensure adequate and meaningful detection limits for key species. Routine VOC sampling (PAMS pollutants) should be limited to point sources monitoring.

4. Siting

Are the pre-storm state-operated sites and the proposed samplers for each (as listed in the footnote on page 4 of the draft plan) likely to be relevant to monitoring the air quality aftermath of the storm itself and of the recovery efforts, if they can begin operation about three or four weeks? Should this restoration be lower or higher priority than establishing the burning-oriented monitoring sites?

What advice do you have for siting the three fixed air toxics sites so that they will succeed in characterizing the constituents of the smoke from the burning facilities and their relative concentrations? How far downwind should they be?

The plan proposes that the portable $PM_{2.5}$ monitors be placed in the predicted plume path each day, at a variety of downwind distances. What range of distances should be used? Is the concept of using $PM_{2.5}$ concentrations from one of these portable monitors (which is intended to be in the center of the plume each day) along with the $PM_{2.5}$ measurements at the associated fixed air toxics site (which may be off the center line of the plume some days or even outside the plume entirely) and meteorology data to estimate air toxics concentrations at the location of the portable $PM_{2.5}$ monitor workable? Is the $PM_{2.5}$ concentration alone likely to be valuable information, if no meaningful estimates of specific air toxics can be made using this scheme?

Depending on location and the timing of cleanup activities, State operated sites should be brought back into operation. These sites should be outfitted with real-time analyzers (see above) as funding and equipment availability permits. A core subset of sites should also be equipped with PUF samplers, etc. to obtain detailed composition information. Emphasis should be on sites best situated to provide information on population exposure.

I see limited value in the plume chasing exercise. The burn plan appears to be in the formative stage. Given that burning may be highly distributed, the idea of looking at individual plumes from a limited number of sites may no longer apply. This is a difficult task and one which can be

reasonably replaced with a good 3-D transport model. Modeling results can be used not only to understand transport but to inform "burn" 'no burn" decisions.

5. Trajectory predictions

The HYSPLIT4 (HYbrid Single-Particle Lagrangian Integrated Trajectory model) tool provided by NOAA has the advantage of being well known and accessible. Is it suitable for providing estimates of the likely path of the ground-level impact of the plume from burning facilities of interest? How far downwind (in terms of miles or hours of transport) should trajectories be displayed for? Is there another approach that should be considered as a way to meet the objective of giving state/local agencies information on likely plume path so that they may inform the public if they choose?

HYSPLIT is readily available, but it should be supplemented by more advanced models better able to handle complexities 3-D transport, including coastal meteorology.

Dr. David S. Ensor

A summary of my comments.

The air quality monitoring plan needs to be integrated with the biological aerosol monitoring. For example if properly selected, the air monitoring filters can be extracted for PCR analysis (per Biowatch) and endotoxins. The analysis of deposited dust is a good idea and would quickly indicate if serious problems exist. Also, it has been our experience that spore emissions from mold tends to be at its greatest as the mold dries (not mentioned in the call.) There is a good possibility that asthma incidence could be elevated for years to come in the region.

Dr. Henry (Dirk) Felton

General Comments:

It is difficult if not impossible to monitor a plume or multiple plumes from the ground. The idea of setting up monitors in downwind (in plume) areas is not realistic. Downwind plumes are often elevated and shift as the wind and boundary layer interact. Setting up multiple high frequency (at least hourly) monitors (PM-10) will provide more information for area exposures that result from a combination of area sources and plumes. Local met should be included with as many of these monitors as possible. Regional truck based Lidar, satellite and perhaps tethered balloon data can be used to help determine the boundary layer and to assess the altitude and potential impact of the pollutants from larger sources such as regional burn centers.

From experience gained after setting up and operating World Trade Center ambient monitoring, we found that the most valuable monitoring was hourly mass PM-10 and PM-2.5 data that was representative of areas/neighborhoods. The data was posted on a web site very quickly and was easily accessed by fire/police/emergency personnel and by State and Federal personnel. The data was labeled unverified and was eventually replaced by verified data months later. The data could be downloaded for official as well as for independent groups looking at modeling, risk and exposure. I don't recall any password being required to get on to the site. The transparency of placing all (officially sanctioned) monitoring data on this website made the air program results from the World Trade Center almost universally accepted by the public.

The area monitoring sites should be selected so that they represent an area large or small that is expected to have similar ambient concentrations. This provides an economy of monitoring and provides public officials of a clear indication of which neighborhoods are expected to be safe for the public. The experience of State monitoring staff and the Regional EPA office should be able to help Federal officials with selecting appropriate representative locations.

Concentrated samples such as street sweepings, silt, water and dust samples should be used to determine specific compounds that may potentially become an ambient air problem at least prior to when the burn centers begin operation.

Charge Questions:

1. Flooded areas should be low on the priority list. I would concentrate on the areas that were not flooded and particularly the areas that have been drained. There is no need to concentrate on open burning until the burning plan is available. The EPA should try to influence how and where the burning takes place. Can at least some of the debris be placed in railroad cars for transfer to a facility with suitable pollution controls?
2. Less emphasis should be placed on O3, SO2 and NO2 until the PM and toxics are better characterized. BC and CO may assist the models in determining impacts from potential plumes from open burning.
3. Some of the routine accepted methods can very simply be modified to obtain data that is better suited to this situation. The PM-2.5 FRMs for instance can be switched to PM-10 as long as Coarse particles are an issue. Most of the STN samplers can be switched to

PM-10 or TSP. FRM samplers can be used to collect asbestos samples. I strongly support Ken Demerjian's suggestion that an advanced mobile lab such as the Aerodyne Research Inc. system be operated in the area. The system has been implemented in many areas including NYC and Mexico City. It has the capability of quickly locating species or contaminants that may not have been previously anticipated.

4. I would rather see an emphasis on neighborhood monitoring than "ring" monitoring. The problem with a ring is that the peripheral sites may be influenced by sources outside of the affected areas. It is preferable to know the actual concentrations right in the areas where people will soon be attempting to move back in. Having enough of these sites will assist in plume effect modeling and in future risk assessments.

Logistic Comments:

The STN program can be used to quickly add additional trace metals, EC/OC and ions. . There is no need to restrict potentially toxic concentrations to PM-2.5. The size cut can be removed from most of the Speciation Trends Samplers (STN) (R&P and MetOne) samplers to provide something close to TSP for metals and ions. This should be done as long as there is a significant local source of PM Coarse.

Orders for MetOne Ebams generally have lead times on the order of 5 weeks. MetOne is currently backed up due to an order for the Lower Manhattan Development Corp. (LMDC) for 28 units. Most of these were required by EPA Region 2 who insisted on both PM-2.5 and PM-10 at each monitoring site. LMDC could do an adequate job by monitoring PM-10 with ½ the number of samplers.

The data from the Ebam may read higher than the FRM data due to the inclusion of a higher percentage of volatile material. This should be "predicted" so that data users are not surprised when they see a 30% difference between what they historically expect from an area versus what the new network measures.

Asbestos samples can be obtained by making minor modifications to available PM-2.5 FRMs. The R&P 2025 sequential sampler was used in NYC to obtain samples for asbestos. Forty-seven mm Cellulose filters were used in place of Teflon and the inlets were replaced by TSP inlets borrowed from R&P.

NEXTEL sells a high power, hardened cellular modem (IR1600 with GPS) that can communicate directly with any serial device including ESC Data loggers. This would help expand real-time data acquisition if the NEXTEL cellular network comes back in a useful fashion prior to land lines.

The PEP program has equipment and trained operator/contractors that could be used to quickly expand the amount of manual monitoring in the New Orleans area. These single event samplers could be used to expand the number of sites where FRM quality PM-10 or PM-2.5 samples could be collected. The Teflon filters should also be analyzed for elements.

The EPA ORD also has a collection of instruments at least on loan (Bob Vanderpool) that could potentially be borrowed to expand both the manual and the continuous monitoring. I would try to avoid having data from too many different monitoring technologies due to the differences in the resulting data that may obscure actual on the ground differences in concentrations.

Dr. Philip Hopke

I want to join the general comments on the need for clearer short, intermediate, and long term monitoring objectives. Only with such objectives can one fully fashion a plan that will meet the identified needs.

It is recognized that the monitoring plan needs to be flexible since there will be changing problems in terms of the air emissions and changing populations that might be exposed. There is a major concern of the limited view of the problems in terms of only those things typically monitored for without recognizing the potential for major differences from the norm.

It is disturbing that the issue of pathogens is passed to others for considerations without a clear approach to a comprehensive monitoring program covering the full range of airborne hazards.

There is no mention of the potential for radioactivity release and an approach to ensure that this is not a problem. Given EPA's expertise in its labs at Montgomery and Las Vegas, this is a failure to fully utilize their resources in a time of potential need.

There is no mention of coordination with other agencies except the local air quality agency. Do other agencies (Public Health Service) have responsibility for disease organisms?

I have just gotten off the teleconference reviewing the Katrina Monitoring Plan and [SAB Staff Office Director] Vanessa [Vu] pointed out that it might be worthwhile for us as CASAC to provide a letter to the Administrator voicing some of the concerns that were raised. I have tried to frame them in a short paragraph as follows:

> "The EPA's response to the air monitoring needs of the Katrina disaster continues to show the stove piping problems that plague the Agency's ability to fully respond in a way to provide adequate protection for the public health. The monitoring plan prepared by OAQPS only reflects their limited view of classical criteria and hazardous air pollutants and has not been able to fully address all of the related issues such as pathogens and biological materials. There needs to leadership from the highest levels of the Agency to provide a comprehensive and integrated view of the hazards associated with a disaster such as that posed by the aftermath of Hurricane Katrina such that the full range of airborne hazards are assessed and public health protected to the maximum extent possible in such a situation."

This can be reworded (given that I am writing this at 6 in the morning), but I do think we should point out that there needs to be an Agency process that takes more comprehensive views of such problems as arise from a disaster like Katrina and not piecemeal the responses and hope that there are not major pieces missing.

Philip K. Hopke
Clarkson University
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Dr. Frederick J. Miller

Concept Plan for Ambient Air Monitoring after Hurricane Katrina
Review Comments: Fred J. Miller, Ph. D., Fellow ATS
September 15, 2005

Relative to Draft #6 of the ambient air monitoring plan developed by OAQPS staff, I offer the following comments, recognizing that the whole situation is highly dynamic and that new information will undoubtedly lead to changes in the air monitoring plan. First, I offer a couple of general comments concerning objectives.

- The draft plan currently lacks clear objectives as to how the data will be used and by whom. Without this aspect being better defined, it is difficult to assess whether the plan will be useful.
- EPA should establish short, near-term, and long-term objectives for the ambient air monitoring plan. The needs for air monitoring data will change with time as well as the intended objectives, so these must be clearly articulated.
- Significant coordination with other governmental agencies is expected and will be critically needed. For example, if the monitoring of biologicals will not be one of EPA's air monitoring objectives, the Agency still needs to ensure that another agency will address this aspect of monitoring for public health.

The following comments are offered relative to the charge questions that the SAB Workgroup was asked to address.

- Risk situations addressed – Transport of cleanup debris should be added as one of the risk situations that should receive significant monitoring attention. The activities surrounding movement of debris will lead to coarse particle releases that are not typical for urban air sheds and will be a cause for public health concern. The other area that should be added involves the restarting of chemical plants. There are likely to be problems with equipment, accidental and intentional releases, etc., such that an assessment of the potential health impacts of these activities will be needed.
- Pollutants to be monitored – The flooding, sewage release, dead animals, and chemical and petroleum leakages have turned a large portion of the gulf coast around New Orleans into the human equivalent of a giant livestock feed lot. As such, when the sediment dries out, there will be massive releases of coarse particles containing all sorts of chemical contaminants and human excrement as well as bacteria, molds, fungi and the like. The burning operations will generate fine mode particles and various gases. Whatever the ultimate sampling plan, I <u>strongly recommend that PM10 and PM2.5 monitors always be collocated</u>.

  Monitoring of ozone and NOx is not likely to be a high priority during the cleanup and first parts of the rebuilding activities. Similarly, unless a significant point source of SO2 can be identified, I would not spend much time monitoring this pollutant. The public health issue for SO2 basically translates into concern for exercising asthmatics passing by

where a plume has just touched down. So unless exceedingly high SO2 levels are anticipated, this pollutant is not likely to pose a public health threat.

- Monitoring methods, equipment, and QA activities – The Agency needs to have clear objectives for the monitoring plan and then develop the monitoring plan to meet them.
- Siting – As with the World Trade Center disaster, the release of coarse mode particles will dominate all others. The current draft monitoring plan appears to put more emphasis on PM2.5 monitoring than on PM10 monitoring, which would be a mistake in my opinion. Both fine and coarse mode particles will be problematic and should be given equal weight initially.

  Restoration of the pre-storm state-operated sites should have a lesser priority than monitoring cleanup, demolition, and burning operations. The rebuilding of New Orleans may well be done in such a manner that the current monitoring sites are no longer the best locations to place monitors. The location of state-operated sites for regulatory compliance is an issue that should be set aside for now as it is worthy of its own analysis and planning activities.

  The draft plan discusses siting three fixed air toxics sites for the purpose of characterizing the constituents of the smoke from the burning facilities and their relative concentrations. Three sites may be selected, but multiple monitors will be needed that are place at various distances from the air toxic sites if the Agency is going to capture data adequate for assessing public health risks from these sites. Locating monitors by equally spacing them on a logarithmic distance scale should provide the best opportunity to understand the kinetics of transport and reactions going on in the atmosphere.

  Population centers may well be different during the cleanup and rebuilding phases compared to the eventual repopulation of the area. EPA and other agencies should be aware that risk calculations for population exposures to PM2.5 may well need to be modified in view of the large African American population in the gulf coast area. Compared to Caucasians, African American's nasal deposition efficiency is 60% less for 1 and 2 μm particles; hence they have significantly increased lung deposition and may be at increased risk for pulmonary effects.

Dr. Maria Morandi

Charge Questions for SAB Workgroup Consultation on

EPA's *Concept Plan for Ambient Air Monitoring After Hurricane Katrina*

September 12, 2005

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1. Risk Situations Addressed

The plan identifies several situations as needing to be addressed by the post-storm monitoring program:

- *Flooded Areas*
- *Areas Damaged by Flood or Winds – Other Considerations*
- *Open Burning of Biomass, Building Debris, and Other Debris*

Are these the situations that should most receive monitoring attention?

EPA has identified most of the situations that should receive most monitoring attention. In addition, Lake Pontchartrain should be considered a potential source of airborne pollutants because contaminated flood waters are being pumped to the lake. VOCs and contaminated water droplets (produced by wind and surf action) are likely to be released for some time. Analyses of lake water samples taken at varying depths may help ascertain if this is a potential source of air pollutants. Indoor air in damaged buildings and residential housing that may be partially occupied prior to and during remedial activities is a concern not addressed in the plan. If not within EPA's purview, indoor air monitoring should be addressed by other agencies such as NIOSH and/or CDC.

2. Pollutants to be monitored

Are the pollutants that are the targets of the monitoring aimed at these situations appropriate?

It is difficult to define a complete list of target compounds with incomplete knowledge of all potential sources and emissions thereof (e.g., industrial sources). Based on what would be predicted from the type of sources in the area, the target pollutants are reasonable but the emphasis in terms of monitoring intensity should be reconsidered. For example, intensive sampling for ozone does not appear to be necessary given the conditions on the ground, while sampling for PAHs, dioxins/dibenzofurans during burning activities is only described tentatively in the plan and should be elevated in terms of monitoring priorities. The plan also indicates that monitoring for biological contaminants will be done by CDC. It is important that EPA

coordinates or collaborates with the CDC in this activity so that air monitoring for biocontaminants of health concern other than waterborne pathogens (for example endotoxin, mold spores, and non-viable bioaerosols) are included in the sampling plan.

3. Monitoring methods, equipment, and quality assurance activities

To the extent that EPA has been able to describe or reference the monitoring methods, equipment, and quality assurance activities in the document, is this appropriate? What advice do you have for EPA as we further develop the methods and equipment plans?

The monitoring methods appear appropriate but there should be a clearer definition of the objectives each type of monitoring is meant to address. For example, short term monitoring performed with equipment with higher method detection limits may be appropriate for general surveys, identifying potential "hot spots and issuing warnings, but may not be sufficiently sensitive for speciation of compounds of concern at low levels. Longer term measurements are more likely to provide more reliable concentrations for compounds present at low concentrations but are not adequate for monitoring peak concentrations that may occur over short periods of time. A clearly presented compilation of the accuracy, precision, and detection limits for each type of monitoring will avoid confusion likely to occur when results are provided to the public.

4. Siting

The document envisions five types of monitoring sites, but specifies the exact locations only of the second of the five listed below:

a. A mobile monitoring unit — Trace Atmospheric Gas Analyzer (TAGA) —is already in operation in New Orleans for purposes of addressing the first of the risk situations described in the first question above.

This is appropriate.

b. The pre-storm, state-operated monitoring sites in New Orleans and the coast of Mississippi. These would be restored to their original capabilities, plus some sites in New Orleans would be enhanced with additional (but conventional) capability, mostly but not exclusively to better address PM.

It is not clear that the location and number of pre-storm sites would necessarily meet monitoring requirements for the current conditions and emissions from post-storm activities. For example, are the existing sites appropriately located and sufficient to monitor coarse PM associated with resuspended wind-blown dust and that generated by vehicles and recovery activities? It is also not clear either if the pre-storm would meet the sitting criteria they were originally designed for once the area is rebuilt. It would be advisable to reconsider the pre-storm sites in terms of the current monitoring needs and only operate those that meet current conditions.

c. A "ring" of up to ten fixed-site $PM_{2.5}$ monitoring locations between the evacuated area of New Orleans and outlying populated areas. About half of these would have collocated PM_{10} samplers also. These sites are intended to provide information on metals that may be released from burning and other activities in New Orleans and be transported to downwind areas.

The location of burning activities is not clearly stated in the plan. If all burning activities were to be conducted within NO (which in my opinion is not a good alternative given the combination of topography and the high probability of diurnal inversions leading to frequent fumigation conditions), a ring of samplers around the city would make sense. If instead materials are transported outside the city for burning at specific locations, the sitting of monitors obviously depends on the specific location of the burning sites.

d. Three fixed-site gas and particle air toxics monitoring sites. One would be collocated with one of the ring sites. The other two would be placed downwind of open burning facilities elsewhere.

Please see answer above. If the 10 sites are used, one collocated monitor for air toxics appears insufficient; at a minimum there should be two, one in each general upwind and downwind area. As to the number and location of the other two, it depends on the number and type of burning facilities. If debris/refuse is classified and segregated by type prior to burning, there should be a monitor downwind of at least each type of burning facility.

e. Three or more portable $PM_{2.5}$ continuous monitors that would be used to "chase plumes" from selected open burning facilities.

See answer above. The approach appears reasonable, but the number of samplers obviously depends on how many plumes are considered a concern.

Are the pre-storm state-operated sites and the proposed samplers for each (as listed in the footnote on page 4 of the draft plan) likely to be relevant to monitoring the air quality aftermath of the storm itself and of the recovery efforts, if they can begin operation about three or four weeks? Should this restoration be lower or higher priority than establishing the burning-oriented monitoring sites?

The immediate concern are VOCs emitted from contaminated flood waters and soil and PM (and components such as metals) generated as waters recede. Other NAAQS pollutants are not as relevant in the near time frame. Measurements for combustion-related pollutants (PAHs, dioxins, etc) should also have priority in order to have a baseline prior to the commencement of burning activities. Given the conditions in the ground and the resource-constrained environment, having a narrower universe of target chemicals monitored at more locations is likely to yield more useful information than monitoring a broader range of chemicals at a reduced number of sampling sites. Restoration should be targeted for the PM and VOCs, and not for NAAQS such as ozone; lead should be measured in all PM filter samples, both fine and coarse; CO could be added as an indicator of burning activities. Sitting of monitors for specific burning operations should start as soon as it is decided where these operations might be located.

What advice do you have for siting the three fixed air toxics sites so that they will succeed in characterizing the constituents of the smoke from the burning facilities and their relative concentrations? How far downwind should they be?

It is not clear to me that three fixed sites will be sufficient to characterize the smoke form all burning activities if the materials to be burned are segregated prior to burning. Specific monitoring locations will depend on where the burning sites are located. Monitors will need to be placed in the near vicinity of burning activities and downwind from them in areas that have populations. Satellite photography (or aircraft photography) can be used to ascertain the impact of the burning plume(s) quickly after disposal starts so that monitoring sites can be better placed (either by establishing new sites or by relocating existing ones)

The plan proposes that the portable $PM_{2.5}$ monitors be placed in the predicted plume path each day, at a variety of downwind distances. What range of distances should be used? Is the concept of using $PM_{2.5}$ concentrations from one of these portable monitors (which is intended to be in the center of the plume each day) along with the $PM_{2.5}$ measurements at the associated fixed air toxics site (which may be off the center line of the plume some days or even outside the plume entirely) and meteorology data to estimate air toxics concentrations at the location of the portable $PM_{2.5}$ monitor workable? Is the $PM_{2.5}$ concentration alone likely to be valuable information, if no meaningful estimates of specific air toxics can be made using this scheme?

Satellite/aircraft photography could be used to visually track plume movement and establish how far monitoring should be done. It may be useful to see if there are existing photographs of agricultural (sugar cane) burning typically done in the late spring in southern Louisiana to have a sense of the direction and extent of ground-level combustion plume movement in this area of the country. Obviously, local effects (for example, lake breezes) could alter the micrometeorology in the NO area and this should also be considered. In addition to PM2.5, PM10 should also be considered because open combustion at ground is likely to result in generation of large particles too. Estimating air toxics at the location of the portable instrument based on the association between the fixed and portable monitors does not seem appropriate unless there was an specific air toxic (i.e., a unique tracer) for the combustion source(s). The plan does not address how the portable instrument will be transported along the plume path but, if done in a vehicle it would be possible to add a battery-operated personal sampling pump/personal impactor to collect aerosol for later analysis. PM concentrations will be useful information even in the absence of specific air toxic determination.

5. Trajectory predictions

The HYSPLIT4 (HYbrid Single-Particle Lagrangian Integrated Trajectory model) tool provided by NOAA has the advantage of being well known and accessible. Is it suitable for providing estimates of the likely path of the ground-level impact of the plume from burning facilities of interest? How far downwind (in terms of miles or hours of transport) should trajectories be displayed for? Is there another approach that should be considered as a way to meet the objective of giving state/local agencies information on likely plume path so that they may inform the public if they choose?

I do not have personal experience with the capabilities of this model but key questions that need to be addressed before it is used are the performance of this model for predicting concentrations through the range of potential meteorology conditions and capability for accommodating local topographic features, the availability of local meteorology data, and the time frame of the predicted estimates (short term peak concentrations or long term average concentrations.

Dr. Armistead (Ted) Russell

Some in initial comments/questions:

I appreciate the rapid response of OAQPS in recognizing the need to characterize ambient contaminant concentrations resulting from Katrina and developing this plan. Not surprisingly, the plan is rather short on some details, but some additional information, if available, would be helpful in our review.

First, my major concerns align, for the most part, with those identified by OAQPS, i.e., increased levels of organics, metals and pathogens. I would, however, add mold and mold-related biological contaminants to that list. I have not idea how the extremely high levels of mold being experienced mean in terms of public/worker health, nor what happens when you burn mold-infested material.

It is far from apparent either how many or what type of debris-burning facilities are planned. How many will impact sampling design. If there are many, a more distributed system makes sense. As to what type, the document notes fixed sites, possibly with fixed air curtains, will be used. How much screening of fuel is not apparent. I suspect there will be a reasonable amount of halogenated feed, leading to halogenated organics. Can you provide any additional information as to size and technologies involved?

While the concern over pathogens is mentioned, there appear to be no related sampling being planned.

Given the time lag between a filter-based PM observation and getting the results, and that TEOMs have shown to give very reasonable results, I look to filter -based measurements to provide speciation details. These measurements are not being used for compliance, so one does not really need to use an FRM monitor if another approach is preferable. Am I missing something?

You should add CO to the NATTS monitoring sites. It is probably a better tracer for doing quick estimates of toxic exposure assessment. Likewise, think of adding something like an aethalometer or a semicontinuous EC/OC monitor.

What is the time lag on the mercury measurements? Will turn-around be fast enough to make a difference?

While I appreciate the time crunch, the paragraph stating the "a system will be developed for linking ambient data to whatever information is available on the burning facility..." is vague, and overly general. It is also probably wrong, and will not be followed, for very practical reasons. I would note that you will attempt to "link ... with pertinent data on the burning facilities."

There is mention made to relating the ambient monitoring results to chemical specific sampling at the above three sites. However, there is no other information on the source sampling, so it is difficult to specify what type of measurements should be made. To the extent possible, please provide information on the source sampling.

There is no information on how often VOCs will be sampled in relation to the plume studies.

In regards to responsibilities, who provides monitors and personnel to do the sampling?

In addition to my prior comments:

Charge Questions:

1. a. Areas near facilities that had very toxic and radioactive species.
   b. Primarily concentrate on populated regions.

2. a. Include mold, more focus on dioxins and furans. Speciation of PM10.
   b. Do not worry so much about things like O3, NOx, traditional VOCs.
   c. More focus on continuous monitors.

3. Monitoring methods: add aethalometers. More on speciation of PM. Coordinate with those sampling biologicals.

4. Siting: Focus on populated regions. Don't worry about plumes so much.

5. Trajectory predictions: Might be better tools than HYSPLIT... Consider MM5/WRF with tracers.

Dr. Warren H. White

CONCEPT PLAN FOR AMBIENT AIR MONITORING AFTER HURRICANE KATRINA
Comments by Warren H. White, 9/14/05

The authors should be complimented on their draft Plan, whose thoughtful identification of issues, options and resources laid a good foundation for this afternoon's teleconference. I applaud their focus on existing competences and proven technology.

I think one message that emerged clearly this afternoon was that certain measurements can and should be started without waiting until overarching objectives are clarified and a comprehensive program is optimized for them. In particular, continuous or semi-continuous PM data (from TEOMs, BAMs, nephelometers, and/or aethelometers) have immediate value to those on the ground and provide lasting context for the interpretation of more-specific measurements that require more time to process.

Given the scale of the flooding in time as well as space, it seems possible that the resulting contamination of soils, buildings, and vegetation will have a somewhat generic chemical composition. To the degree that this is the case, early analyses of easily collected "grab" samples should be helpful in focusing more comprehensive chemical characterization efforts.

Monitors are typically – and understandably – sited to maximize the independent information provided by each individual one. The value obtained globally by "wasting" a monitor or two is often overlooked until later efforts to integrate and make sense of the whole data set. It is only at that stage that analysts wish they had the information on actual, real-world data quality that comes only from collocated monitoring, and the information on "background" levels that comes only from a comparable set of measurements clearly outside the study area. Even in this ER situation, I hope the Agency can include some of this "redundancy" in its measurements.

Dr. Yousheng Zeng

Comments on *Concept Plan for Ambient Air Monitoring after Hurricane Katrina*

SAB Workgroup Member: Yousheng Zeng

September 14, 2005

Response to Charge Question 1:

I generally agree in terms of situations to be addressed. However, the objectives of the program and the end uses of the data to be collected through this effort are not very clear.

Response to Charge Question 2:

Section VI (Pollutants to Be Measured) should include H_2S (from industrial sources in the area such as refineries and from waste decomposition). Considering public's concern on HF in industrial facilities in the area, EPA may consider HF. I would suggest putting the pollutants into two or three categories and manage them accordingly. For example, PM should be in a group for high priority, large coverage, and sustainable for a relatively long period of monitoring. Acute air toxic pollutants from industrial sources, such HF, should be in a group for a quick survey in a targeted small area and relevant duration (e.g., start-up of a large industrial facility). Some pollutants that are less critical to this effort but are part of pre-storm monitoring stations, such as NOx, ozone, etc., can be put into another category. This will also help to clarify the objectives of the program. The plan should also delineate the effort to help state restoring pre-storm monitors and the effort of the emergency monitoring. The objectives of the two efforts are different.

Response to Charge Question 3:

Nephelometer type of monitors should be included for fast survey of PM conditions. The microFAST GC developed by Dr. Ed Overton at Louisiana State University may be evaluated for its suitability considering (1) its portability and analytical cycle of a few minutes, and (2) several organic HAPs are included in the scope.

Response to Charge Question 4:

Siting should be guided by some dispersion modeling analyses.

Regarding plume tracking monitors, the objective of the effort is not clear. If the objective is to characterize the profile of the emissions, the proposed plume tracking monitors (source-oriented monitoring) make some sense. If the objective is to monitor exposure of the public to the pollutants, the monitors should be receptor-oriented and should be sited based on population center rather than plume. This siting approach will

also generate source characterization type of information by (1) having multiple sites in nearby locations, (2) collocating two identical monitors and making them wind-direction activated (one being turned on and the other off when they are in the plume zone and reverse when they are not in the plume zone), or having just one wind-direction activated monitor at each station and being turned on only it is in the plume zone.

Based on what I heard from unofficial sources, there will be several centralized burn sites in St. Tammany Parish. These sites will operate for several months or longer. There may be less or none such centralized burn site in the city of New Orleans. If this is true, EPA should factor this in its siting decisions.

Response to Charge Question 5:

The standard HYSPLIT model may not have the fine resolution need for this purpose. The effect of Lake Pontchartrain may cause different wind fields in the area of interest. EPA should consider similar tools developed in Texas for similar scale and purpose.

Dr. Barbara Zielinska

Review of the EPA document: Concept Plan for Ambient Air Monitoring
After Hurricane Katrina (Draft #6)

Barbara Zielinska
Desert Research Institute

September 14, 2005

My main points regarding this document are as follows:

1. I agree with the other members of the Panel that the goals of this monitoring program should be better defined in terms of the immediate needs, intermediate goals and long-term objectives.
2. Regarding the risk situation addressed (charge question #1) I would add demolition of damaged structures, transport of debris, and restarting of existing industrial facilities
3. Charge question #2, pollutants to be monitored:
    a. I would add chloromethane (methyl chloride) to the proposed gaseous HAPs list, since it is released during biomass burning (it is also a HAP)
    b. I would add polycyclic organic matter (POM, or PAH) to the list, since it is produced during burning of any material
    c. I think it is important to address PCBs, polychlorinated dioxin&furans, in addition to asbestos, selected metals and particle-associated and gaseous mercury
    d. I think speciated VOCs (in terms of ozone precursors, or PAMS compounds) are of lower priority
    e. Also ozone and probably NOx/NO2 are less important
    f. Continuous CO is important as burning/increased transport indicator
    g. I strongly endorse getting continuous PM10 and PM2.5 mass data
4. Charge question #3, monitoring methods:
    a. I think that mobile monitoring platforms that could be deployed and move easily from site to site when necessary, would be highly desirable
    b. Some of the mobile units could use several simple, inexpensive and proved continuous monitoring methods, for example battery-powered passive electrochemical CO unit (Langan T15), portable PID monitor (ppbRAE) for ambient organic gases that have an ionization potential of less than 10.6 eV (i.e. aromatic compounds, olefins, etc), TSI DustTrak nephelometer to monitor fine particle concentrations, etc. Although these instruments would not provide the highest quality ambient data, they could quickly detect the elevated pollution levels in the area.
    c. Some mobile platforms could also be equipped with time-integrated canister and filter samplers, if a power source (such as generators, bunk of batteries) is available
    d. In my opinion, fixed 24-hr sampling time for canisters and speciation filters is not always necessary and shorter sampling times, covering the duration of the plume should be considered

5. Charge question #4 – sitting:
    a. Again, in my opinion, the mobile monitoring platforms should be given higher priority over fixed sites
    b. The pre-storm state-operated sites may be useful in a longer run, especially if they are situated in strategic places
    c. High temporal resolution of PM10 and PM2.5 mass is very important information either alone or in conjunction with other data.
6. In my opinion the information concerning biological aerosol, such as mold, fungi, endotoxins, viruses, etc. is very important. The coordinated effort between various agencies in obtaining these data would be highly desirable.