Marilyn Bardet <mjbardet@sbcglobal.net> 9/30/2008 12:00 PM >>>
Charlie,
This article posted by USC refers to the Southern California Children's Health Study, a long-term study undertaken between 1993 and 2001, which deals with lung function development of children chronically exposed to ozone. Dr. Tager discussed this study at Benicia First's forum. He said that 1500 children were studied for lung function over 8 years. For the So-Cal study, he described the "zone of influence" that would characterize effects of traffic pollution as the distance of 500 meters from a freeway.

Dr. Tager cited residential distance to freeways and traffic exposure as highly significant impacts on lung function. "Lung function is a better indicator of mortality--better than blood pressure." (Quote from my notes taken at the forum.) He also said that lung sacs develop fully in the first 20 weeks of life. Lung function is diminished as measured between ages 10 and 18 years.

USC News

Smog May Cause Lifelong Lung Deficits

09/08/04

A long-term USC study following the pulmonary health of children in polluted L.A. areas signals likely health problems in adulthood.

By Alicia Di Rado

By age 18, the lungs of many children who grow up in smoggy areas are underdeveloped and will likely never recover, according to a study in this week's issue of the New England Journal of Medicine.

The research is part of the Children's Health Study, the longest investigation ever into air pollution and kids' health.

Between 1993 and 2001, study scientists from the Keck School of Medicine of USC tracked levels of major pollutants in 12 Southern California communities while following the pulmonary health of 1,759 children as they progressed from 4th grade to 12th grade.

The 12 communities included some of the most polluted areas in the greater Los Angeles basin, as well as several low-pollution sites outside the area.

Keck School researchers previously found that children who were exposed to more air pollution scored more poorly on respiratory tests. In this latest study, researchers analyzed the same children's respiratory health at age 18, when lungs are almost completely mature.

"Teenagers in smoggy communities were nearly five times as likely to have clinically low lung function, compared to teens living in low-pollution communities," said W. James Gauderman, associate professor of preventive medicine at the Keck School and lead author of the study.

People with clinically low lung function have less than 80 percent of the lung function expected for their age – a significant deficit that would raise concerns during a doctor's exam.

"When we began the study 10 years ago, we had no idea we would find effects on the lung this serious," said John Peters, Hastings Professor of Preventive Medicine in the Keck School, director of the Southern California Environmental Health Sciences Center and senior author of the study.

Study technicians traveled to participating schools every year and tested children's lung function, a measure of how well their lungs work. As an example, someone with sub par lung function cannot exhale and blow up a balloon as quickly or as big as someone with good lung function.

Researchers correlated the students' lung health measurements with levels of air pollutants monitored in the communities during the same time period.

They found greater deficits in lung development in teenagers who lived in communities with higher average levels of nitrogen dioxide, acid vapor, particulate matter with a diameter of less than 2.5 micrometers (about a tenth the diameter of a human hair) and elemental carbon.

"These are pollutants that all derive from vehicle emissions and the combustion of fossil fuels," Gauderman said.

Deficits in lung function have both short- and long-term effects.

“If a child or young adult with low lung function were to have a cold, they might have more severe lung symptoms, or wheezing,” Gauderman said. “They may have a longer disease course, while a child with better lung function may weather it much better.”

Potential long-term effects are more alarming. “Low lung function has been shown to be second only to smoking as a risk factor for all-cause mortality,” Gauderman said.

Lung function grows steadily as children grow up, peaking at about age 18 in women and sometime in the early 20s in men. Lung function stays steady for a short time and then declines by 1 percent a year throughout adulthood.

As lung function decreases to low levels in later adulthood, the risk of respiratory diseases and heart attacks increases.

Researchers are unsure how air pollution may retard lung development.

Gauderman believes chronic inflammation may play a role, with air pollutants irritating small airways on a daily basis. Scientists also suspect that pollutants might dampen the growth of alveoli – tiny air sacs in the lungs.

The research team will continue to follow the study participants into their early 20s, when their lungs will mature and stop developing entirely. The team seeks to find out if the participants begin to experience respiratory symptoms and if those who moved away from a polluted environment show benefits.

The California Air Resources Board, National Institute of Environmental Health Sciences and Hastings Foundation supported the research.

Sept. 30, 2008

Mayor and Councilmembers

Benicia Herald

Letters to the Editor:

One of my concerns about the up-coming Seeno/Discovery Builders project is about what happens in the four watersheds currently on this property. In the Seeno project, these areas of naturally draining water are scheduled to be filled, with all existing native plant and animal life extinguished.

The environmental study on this project is inadequate and does not address this issue. Seeno/Discovery Builders is known for ignoring environmental guidelines. How can this effect Benicia?

Where is this naturally draining water going to end up after Seeno/Discovery Builders eliminates its natural channels? Maybe into Lake Herman, Benicia's drinking water supply.

This issue has been ignored by Seeno/Dis-covery Builders. Mr. Seeno doesn't live here. We do. We drink the water. This project needs more study of it's environmental impacts.

Please urge our city councilmembers, before Oct. 7, 2008, to vote "no" on the current project and require a thorough environmental assessment on any project, thereby protecting our health.

Sue Johnson
153 Enclave Place
745-9349

Marilyn Bardet <mjbardet@sbcglobal.net> 9/30/2008 1:21 PM >>>
Charlie,
Here are 3 fact sheets I made, quoting basic info from our 3 main speakers at the Benicia First Forum, Sept 18.
I've also taken the City's land use map (1999) and drawn in the "zone of influence" which Dr. Tager describes as characterizing the outer range of traffic pollution's effects as demonstrated in the So-Cal Children's Health Study. I will be bringing this map in, for reproduction at smaller scale, and for use at the Oct 7th meeting. Meanwhile, here are the fact sheets.

-- Marilyn
for Benicia First

Facts **from the Benicia First Forum**

Air Quality & Children's Health

Sept. 18, 2008

From:

Dr Ira Tager, Md., Epidemiologist, Professor, Director, UC Berkeley School of Public Health Prevention Research Center

"Lung sacs develop fully in the first 20 weeks of life."

"Lung function is a better indicator of mortality—better than blood pressure."

"The Southern California Children's Health Study was conducted for 10+ years, between 1993 and 2001, and followed 5,500 children for chronic exposures to air pollution. Marker pollutants were diesel PM [particulate matter at 10 and 2.5 microns] and NOX_2. A sub-set of this study, conducted for 8 years involved 1,500 children. The main concern was traffic exposure's affect on lung function and residential distance to freeways. . . For this study, the "zone of influence" that would characterize effects of traffic pollution was 500 meters from a freeway."

"Hazards of traffic pollution include tire and brake fragments, tailpipe toxics (NOX, CO, Hydrocarbons and PM [particulate matter]. Allergins and other biological agents add to cumulative effects of roadway pollution."

About health effects in children and adolescents:
"An 89%increase in asthma risk is associated to living close to a freeway."

Facts **from the Benicia First Forum**

Air Quality & Children's Health

Sept. 18, 2008

From:

Dr. Paul Roberts, Phd., Exec Vice Pres. & Chief Scientific Officer, Sonoma Technologies Inc.

Dr. Roberts recently completed the "Mobile Source Air Toxics Study" in Las Vegas, Nevada, which was conducted for one year, monitoring air quality at three schools that are located adjacent to Highway 95. The research was funded by a U.S. 95 Settlement Agreement between the Sierra Club and the Nevada Dept. of Transportation and FHWA [Federal Highway Administration].

The required components of the study were:

- **monitoring at the three school sites**
- **Filtration added to HVAC systems at schools**
- **Bus retrofit program**
- **Bus idling education**
- **FHWA gradient study (with EPA, ongoing research)**

"At all three school sites, high black carbon concentrations are seen at low wind speeds regardless of direction."

"Morning concentrations dominate indoor and outdoor exposure (summer); overnight and morning concentrations dominate in winter."

"Low wind speeds often allow high pollutant concentrations on both sides of the roadway (with sound wall)."

"Wind conditions and time-of-day have a significant influence on near-roadway exposure."

Facts **from the Benicia First Forum**

Air Quality & Children's Health

Sept. 18, 2008

From:

Jenny Bard, Director of Regional Air Quality Programs, American Lung Association of California

"Lungs have 300 million avioli—[if laid out] enough to fill a tennis court."

"Livermore has the highest ozone level in the Bay Area."
[Benicia also shows high levels of ozone, as monitored at the Tennys Drive monitoring station.]

"Ozone is made up of nitrogen oxides + volatile organic compounds (VOC's) especially when temperatures are high. With global warming, we can expect more smog, more days of excedences of federal levels for ozone containment."

"Wood burning is the greatest cause of particulate emissions (PM) in the Bay Area. Diesel emissions, including PM, are the most harmful emissions in the Bay Area."

"Black soot on windowsills is likely diesel soot." [black carbon].

"The smallest particles, PM 2.5 microns, are so tiny they by-pass airway defenses and are absorbed into the bloodstream."

"We need to protect public health with adequate margin of safety."

"The Lung Assoc. in California is supporting AB32, for getting greenhouse gas reductions associated to traffic. The secondary benefit to reducing traffic is the reduction of health risks posed by traffic emissions."

From 1847
Benicia General Plan
Into the 21st Century

Facts from the Benicia First Forum

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Near-Roadway Exposure to Air Pollution
with Examples from a Study of MSATs at Three Schools Next to U.S. 95 in Las Vegas, NV

Prepared by:
Paul T. Roberts,
Michael C. McCarthy, and Steven G. Brown
Sonoma Technology, Inc.
Petaluma, CA

Presented to:
Benicia First! Forum on Air Quality and Children's Health
Benicia, CA
September 18, 2008

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Air Quality Research and Innovative Solutions

600000-3413

Near-Roadway Exposures – Outline

- Near-source (primary) pollutants, in context
- Introduction to U.S. 95 MSAT (Mobile Source Air Toxics) Study
- Monitoring sites at schools, parameters measured
- Typical characteristics of CO, NO/NO_x, and black carbon (BC) at these sites
- Example of upwind/downwind BC concentrations
- Example of hydrocarbon concentrations
- Preliminary summary of MSAT characteristics
- Mitigation Lessons Learned

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Primary and Regional Pollutants

Potential Sources	Near-Source Pollutants			Ozone Precursors and Other Regional Pollutants
	PM	BC	MSAT	
Cars/Trucks/Buses	✓	✓	✓	✓
Rail	✓	✓	✓	✓
Ships	✓	✓	✓	✓
Ag Operations				✓
Refineries	✓	✓	✓	✓
Power Plants (gas)				✓
Forest/Ag/Grass Fires				✓
Fireplaces/Woodstoves	✓	✓	✓	
Wind-blown Dust	✓			✓

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U.S. 95 Settlement Agreement

Court Settlement Agreement between Sierra Club and NDOT/FHWA regarding urban freeway expansion where three schools are adjacent to roadway

Required components of settlement

- MSAT monitoring study at schools (this study)
- Filtration added to HVAC systems at schools
- Bus retrofit program
- Bus idling education
- FHWA gradient study (with EPA, ongoing research)

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Introduction to U.S. 95 MSAT Study

MSAT Study Objectives

- Characterize outdoor and indoor concentrations at schools (student exposure)
- Determine U.S. 95 vehicle contributions (before and after new lanes opened)
- Determine MSAT removal efficiencies of new filtration systems

Focus on priority MSATs

- Diesel particulate matter
- Gaseous components: benzene, 1,3-butadiene, acrolein, formaldehyde, and acetaldehyde

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U.S. 95 MSAT Study Measurements

Routine Network (May 2007-May 2008)

- Semi-continuous black carbon (Aethelometer) (10 sites)
- CO (3 sites)
- NO/NO_x (1 site)
- Meteorological parameters (4 sites)

Intensive Measurements (May/June 2007, January 2008)

- 2-hr hydrocarbon and carbonyl samples (10 sites)

Routine Traffic Data at Two Locations

- 5-minute traffic counts, by lane, with vehicle-class bins and vehicle speeds

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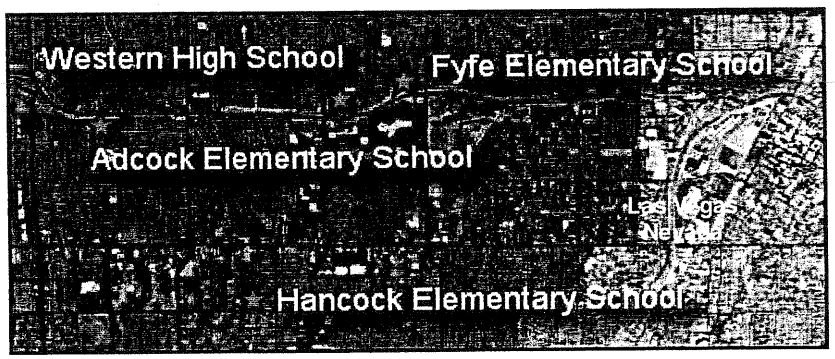
Monitoring Sites at Schools



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Fyfe Elementary School Monitoring Sites

Ambient is 20 meters from sound wall (SW); air inlet is 76 meters from SW.

Legend: ◦ Air Inlet ▫ Classroom ◆ Ambient

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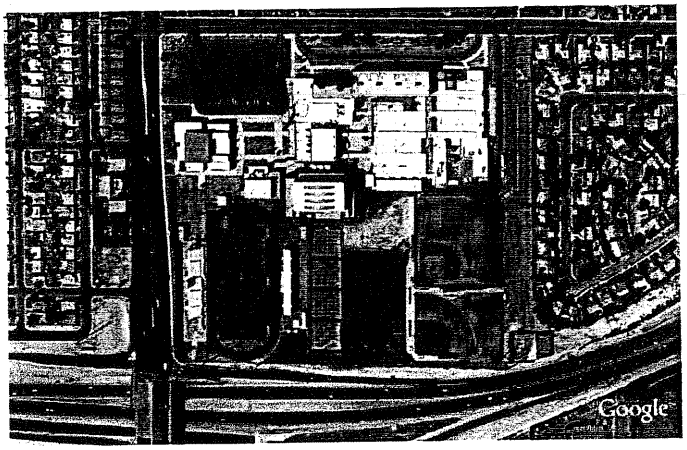
Western HS Monitoring Sites



Ambient is 136 meters from sound wall (SW); air inlet is 317 meters from SW.

Legend: Air Inlet Classroom Ambient

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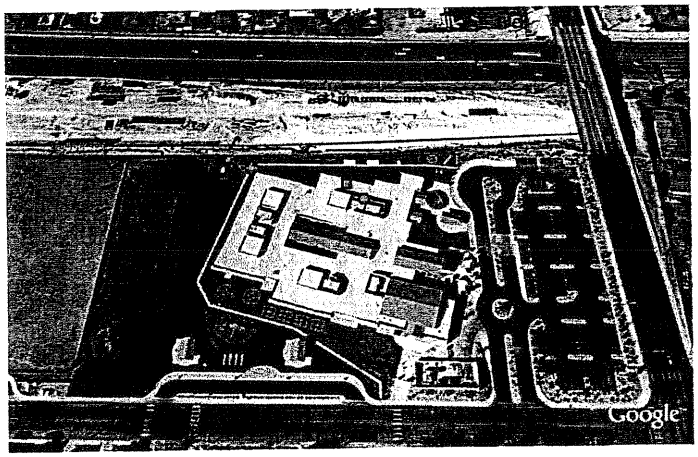
Adcock Elementary School Monitoring Sites



Ambient is 17 meters from sound wall (SW); air inlet was 39 meters from SW; air inlet for new system is 33 meters from SW.

Legend: Air Inlet Classroom Ambient

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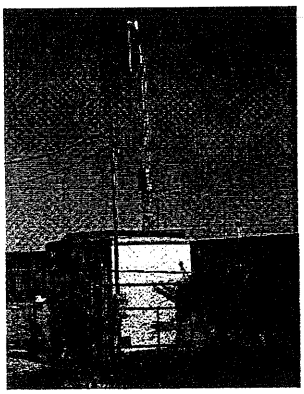
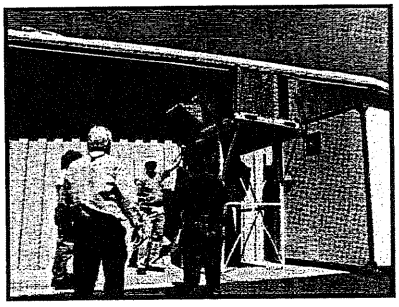
Fyfe Trailer and Shelter Next to Classroom (Before HVAC Changes)



20 meters from sound wall



76 meters from sound wall

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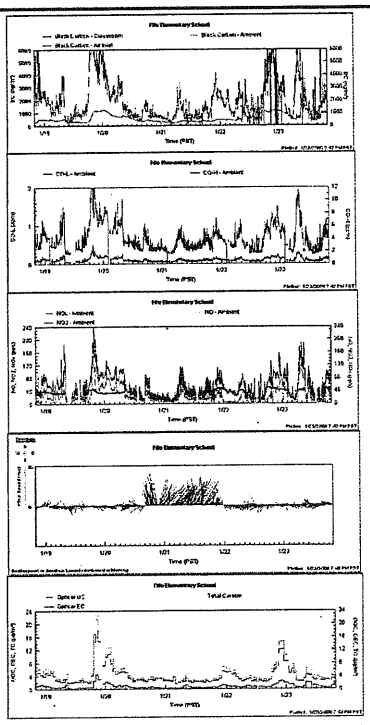
Typical Time-Series of Concentrations at Fyfe in Winter

- BC, CO, NO, OC, and EC profiles are similar.
- Wind speed, wind direction, and source strength have a major influence on concentrations.



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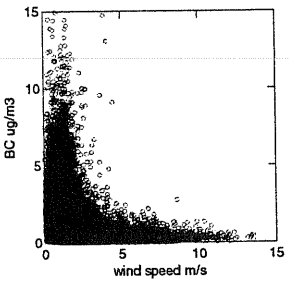
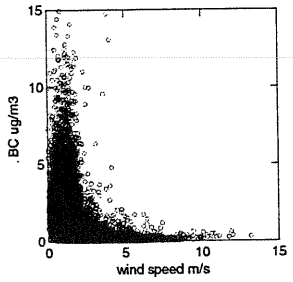
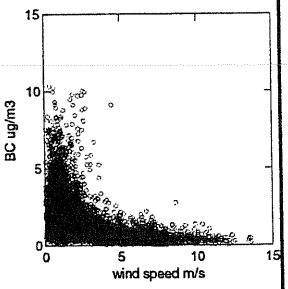
Fyfe, Ambient Monitor, December–Early March



BC vs. windspeed, all hours, N=25,780, 5-min



BC vs. windspeed, all hours, winds from the north, N=12,871



BC vs. windspeed, all hours, winds from the south (freeway), N=6580

High BC concentrations are seen at low wind speeds regardless of direction. Also note that concentrations are higher at wind speeds > 2 m/s when winds are from the south (U.S. 95).

North=290-70 degrees
South=110-250 degrees

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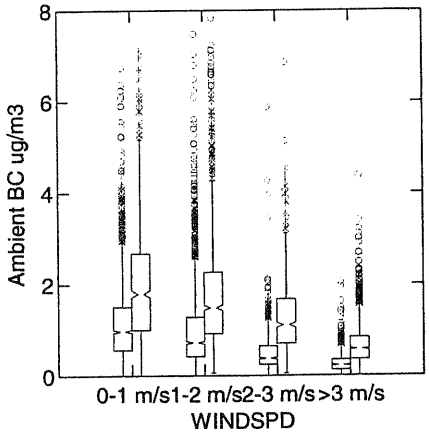
BC Concentrations Upwind and Downwind Influence of Wind Speed



FDNAUP

- ad upwind
- fy downwind

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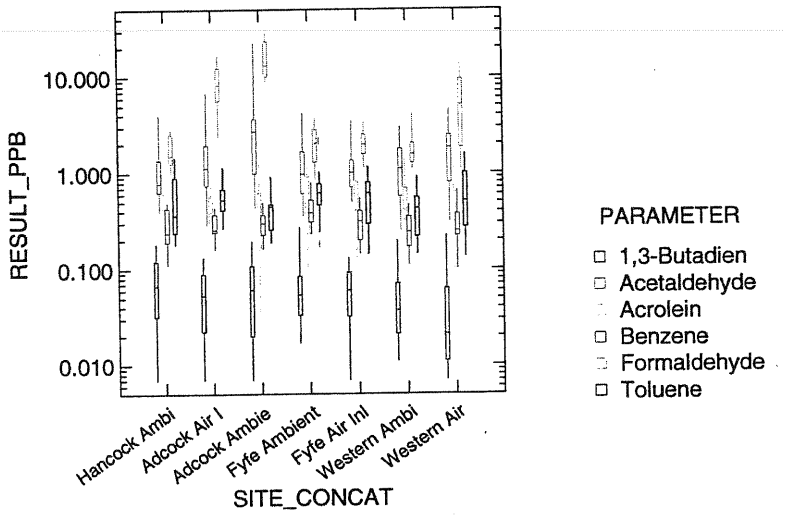
Winter 0900-1100
Gaseous Concentrations Distribution



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Preliminary Summary of Ambient MSAT Characteristics

- Fresh pollutants go up and down together.
- Morning concentrations dominate indoor and outdoor exposure (summer); overnight and morning concentrations dominate in the winter.
- Expected pollutant gradients are not always evident.
- Low wind speeds often allow high pollutant concentrations on both sides of roadway (with a sound wall).
- Wind conditions and time-of-day have a significant influence on near-roadway exposure.

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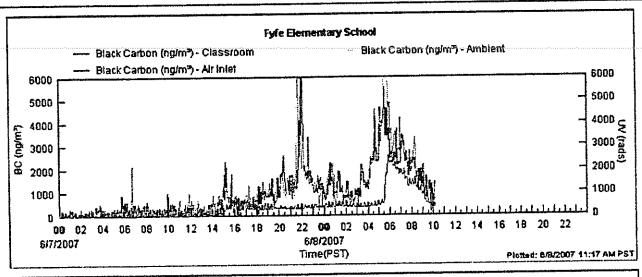
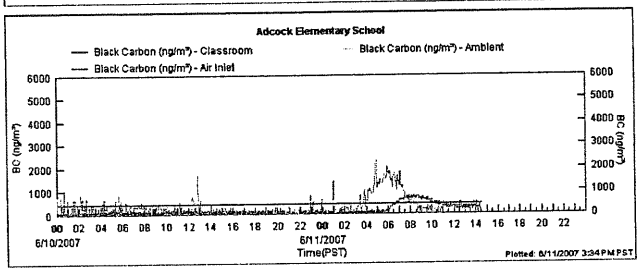
Example BC Time-Series Showing Classroom Being Filled with Rush-hour Pollution by HVAC (Before HVAC Changes)





Note HVAC start time and different rate of ambient dilution vs. indoor dilution.

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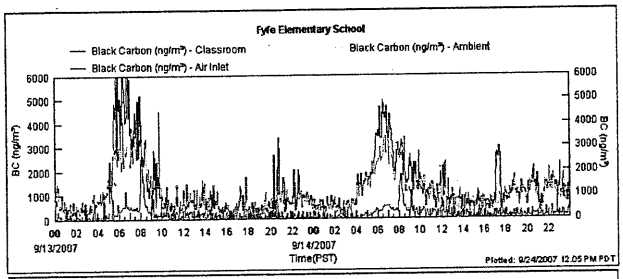
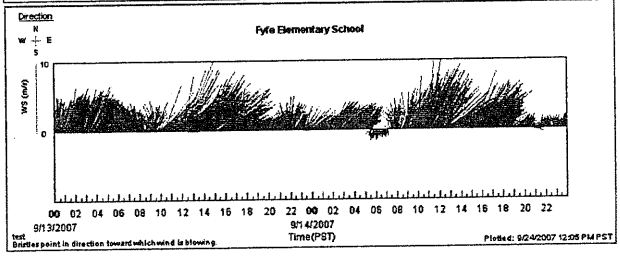
Example BC Time Series Showing Low BC Concentrations in Fyfe Classroom, Except When Door Left Open by the Teacher (After HVAC Changes)





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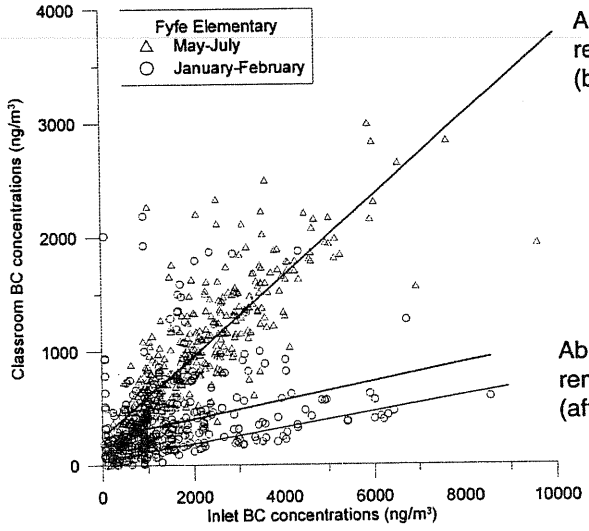
Indoor and Air Inlet BC Concentrations at Fyfe Before and After HVAC Changes



About 65% removal efficiency (before)

About 88% removal efficiency (after)

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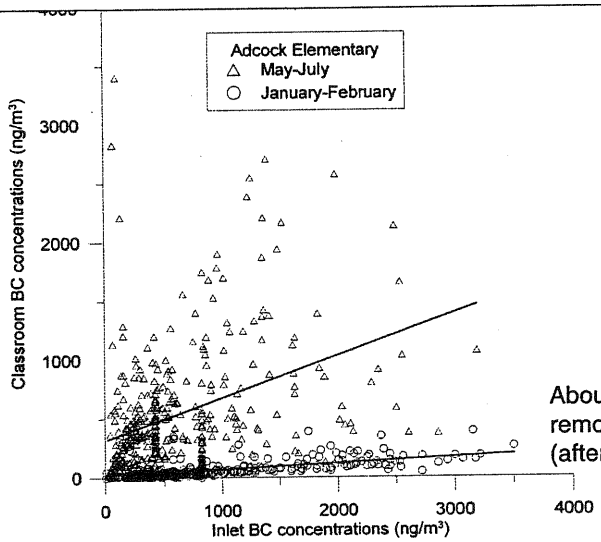
Indoor and Air Inlet BC Concentrations at Adcock Before and After HVAC Changes



About 94% removal efficiency (after)

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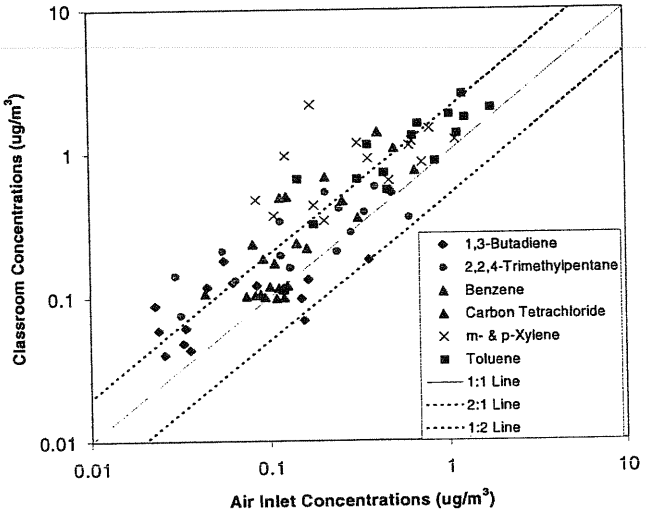
Indoor VOC Concentrations at Adcock (Summer) Higher than Outdoor for All Species Except CCl4



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Preliminary Summary of MSAT Filtration Characteristics

- Modest BC removal with existing HVAC systems in (summer).
- Significant BC removal with new HVAC filtration (winter).
- Adcock system removes more BC than Western or Fyfe.
- Indoor concentrations are often higher than outdoors for several gaseous MSATs (indoor sources or time lag in system?).

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Mitigation Lessons Learned, So Far

- Typical HVAC operation can fill classroom with polluted air early in the morning which can result in higher concentrations indoors (than outdoors) later in morning.
- Leaving classroom doors open to outdoor hall can defeat filtration system.
- Diurnal pattern of pollution is an important consideration for exposure and mitigation (for both classroom and outdoors).

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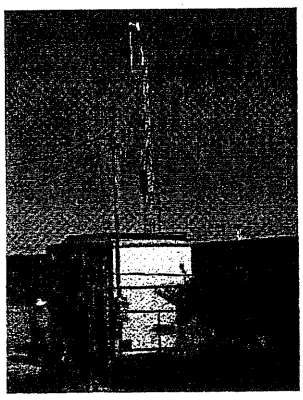
Acknowledgments



This work is funded by the Nevada Department of Transportation (NDOT); John Terry is the NDOT Project Manager. Joanne Spaulding and Jane Feldman (Sierra Club), Pat Mohn (NDOT), and Rich Baldauf (EPA) contributed to the design of this study. Joey Landreneau and David Vaughn (STI) performed the monitoring and sampling.

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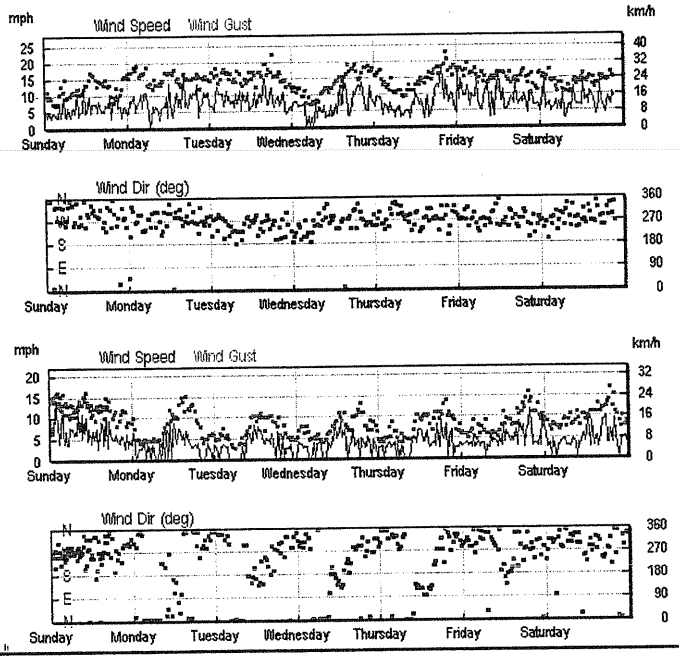
Example of Winds in Benicia; 9/13/08 and 9/6/08 (KCABENIC3)



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