RT Sphere of Influence: Air Quality and Lung Health

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Faculty Disclosure:

This presentation is being sponsored by

Monaghan Medical Corporation

I gratefully acknowledge their support of lung health for our patients, and education for health professionals.

Objectives

- Health and Disease
- Importance of Environment
- Air Quality and Air Pollution
- Environmental Aerosols and Source Reduction
- Expanding Our Sphere of Influence

WE KNOW HEALTH WELL in its absence

Andrew Weil, MD

Weil A. Health and Healing, 1983,1998,
Houghton Mifflin Co, Boston

Health & Disease

- Genetics
- Lifestyle
  - Smoking
- Environment
  - Living Conditions, School, Workplace
  - 2nd and 3rd Hand Smoke
  - Outdoor Environment
  - Temperature, Humidity, Air Quality
  - Environmental Dilemmas
- Vaccinations, Medical Care

Our Understanding of Disease

- **Classical** – mystery and religious causation
  - We still see cultural variations in this realm
- **Medical** – curing disease and germ theory
  - Our roots as RT's fall mostly in this realm
- **Health Promotion** – disease prevention
  - No smoking campaigns, asthma triggers, etc.
- **Ecological** – influence of the environment
  - Antecedents of disease, environmental mediation (source reduction – particles, VOC's, and other bad stuff)

Air Quality - Hippocrates

- Greek physician, lived around 400 B.C.
- Writings attributed to him have provided principles underlying modern medicine
- Argued for understanding natural sciences and logical cause and effect relationships
- *On Airs, Waters, and Places* – **human well-being is influenced by the totality of environmental factors**: living habits, climate, topography of the land, and ***quality of air***, water, and food

Cockerham WC. Medical Sociology 6th ed., UAB, Prentice Hall, NJ, 1978-1995, p 3

Fast-Forward from 400 B.C.

- Hippocratic Oath has stood the test of time
  - Help the sick
  - First do no harm
  - Confidential doctor-patient relationship
- What can we learn today about the ***quality of air*** and how it impacts related diseases for our patients, *and* health for *all* of us?
- What could possibly have affected air quality back then before the industrial revolution?

Mummies and Air Pollution

- "Egyptian Mummies Hold Clues of Ancient Air Pollution"
- 15 Mummies From Broad Section of Egyptian Life Including Workers and Noble Upper Class
- Mummified Lungs all Showed Particulates – not unlike what may be found today
- Cooking, metal working, mining, resuspension of particulates by sand storms

(http://www.livescience.com/14420-ancient-egyptian-mummies-lung-disease-pollution.html, Accessed 7/17/11)

"Teach your children what we have taught our children, that the earth is our mother. Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web, he does to himself."

From: "Where is the Eagle?"
By Chief Seattle of the Puget Sound Indians, **1854**

California Dreaming

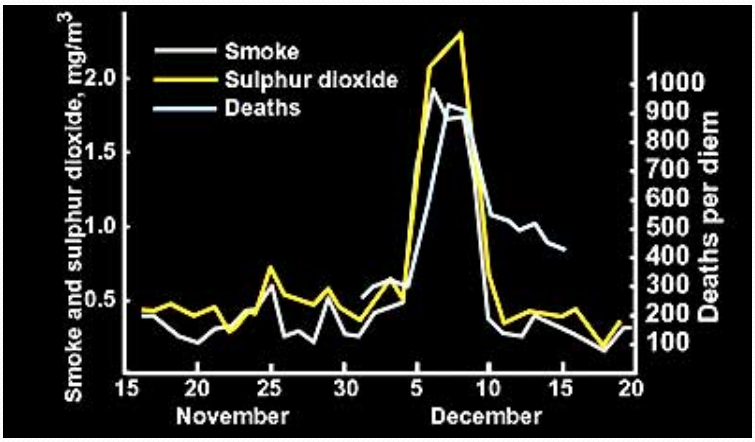
- Summer, 1943 – First recognized episodes of smog in LA
- Visibility – 3 blocks
- Burning eyes, respiratory discomfort, nausea, and vomiting
- Termed a "gas attack“ blamed on a nearby butadiene plant
- Situation did not improve when plant shut down
- 1945 – City began its air pollution control program
- 1946 – Recognition that county wide collaboration necessary
- Urban sprawl, population growth, more vehicles

California Air Resources Board 2012

Lethal Haze

- October 1948, Donora, PA over 5 days
- Pocket of warm air passing high above trapped cooler air below which sealed in the pollutants from steel and zinc smelter
- Affected almost half of the town's 14,000 residents
- Death toll rose to nearly 40.
- Donora was extreme, but it reflected a trend
- Consequence of industrial growth

Killer Fog in London - 1952



Sunday, Dec. 7th – Visibility Fell to 1 Ft.
Tuesday, Dec. 9th – Winds swept it away
Deaths may have approached 12,000

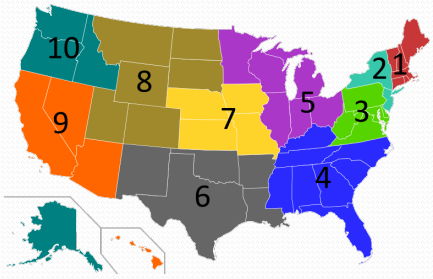
www.npr.org, Accessed 9/11/12

New York City – 1966

Source: ALA

National Ambient Air Quality Standards

- Air Pollution Control Act of 1955 – **Provided Funds for Research**
- Federal Clean Air Act of 1963 – **1st Fed legislation for Air Pollution Control, under PHS**
- Federal Clean Air Act of 1970 – **Comp. Fed and State Regulations, EPA**
- Major amendments 1977, 1990



US EPA Region 4

Serves AL, FL, GA, KY, MI, ***NC***, SC, TN, & 6 Tribes

- Criteria Pollutants
  - Carbon Monoxide (CO)
  - Lead (Pb)
  - Nitrogen Dioxide (NO_2)
  - Sulfur Dioxide (SO_2)
  - Ozone (O_3)
  - Particulate Matter (e.g., PM_{10} and $PM_{2.5}$)

Air Quality Index (AQI) Values

Color	Range	Levels of Health Concern
Green	0-50	Good
Yellow	51-100	Moderate
Orange	101-150	Unhealthy for Sensitive Groups
Red	151 to 200	Unhealthy
Purple	201 to 300	Very Unhealthy
Maroon	301 to 500	Hazardous

Other Countries

- "Behind the Wall" news story on NBC News 12/6/11
- China begins to admit 'fog' is really smog"
- Analysis of BeijingAir data – only 13 days of "good" air quality this past year
- "…if Beijing's fine particulate concentration even reached the polluted levels of Los Angeles, life expectancy may increase by over five years."

http://behindthewall.nbcnews.com/_news/2011/12/06/9244068-china-begins-to-admit-fog-is-really-smog, Accessed 12/6/11

Outdoor and Indoor Air Quality

- Air pollution is the 13th leading cause of death worldwide (AHA)
- Environmental Asthma Triggers
- Homes, Schools, Workplace
- Housing Conditions
  - Building Codes
  - Energy Efficiency
- 2005 American Housing Survey
  - 53% rated homes as 8, 9, or 10, even though houses had severe problems
- ETS
- Go Outside and Get Some Fresh Air!

Go Outside and Get Some Fresh Air

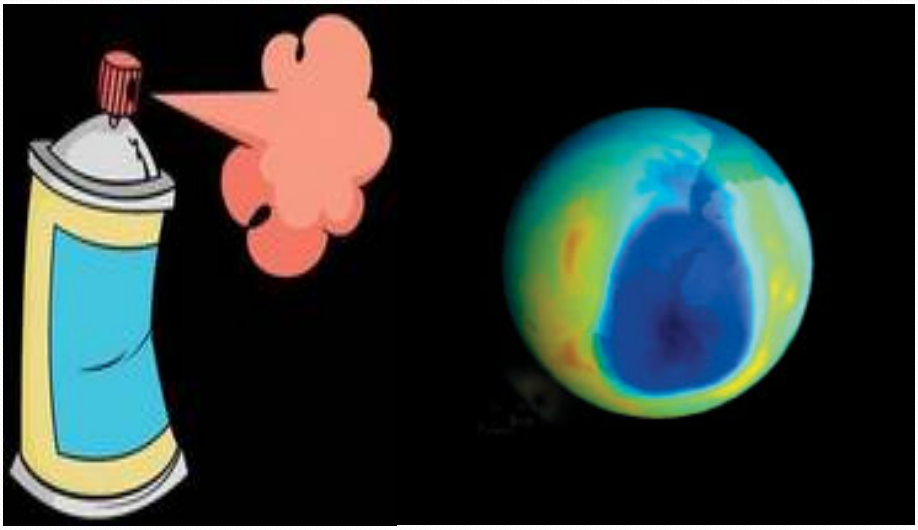
"Unless you have asthma yourself it might be hard to understand what an asthma attack feels like… I would personally describe it as a feeling of drowning."

"You need to know that I love school. It was really hard for me during 5th grade when I missed 27 days of school."

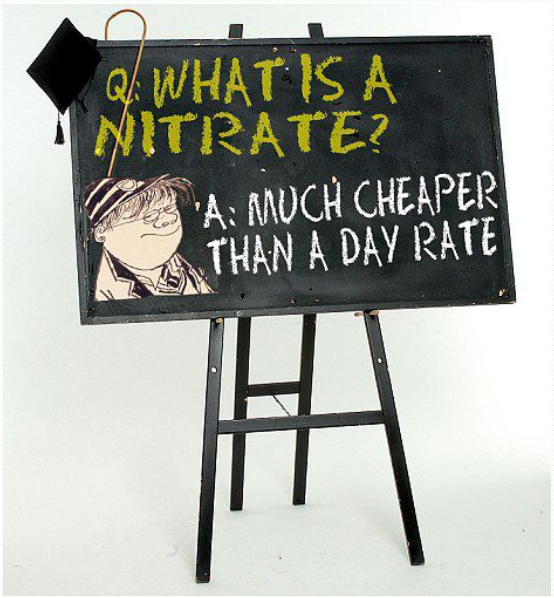
"I want to talk briefly about Ozone Alert Days. I feel most people do not understand how this effects kids with asthma. On these days, I can't run around outside. I may not even be able to spend ANY time outside. I need to be in air conditioning for the most part on these days. I get frustrated when this changes my plans for the day. Sometimes these alerts last for many days."

From Testimony of Nick Friend, a 7th Grader with Asthma, at U.S. Senate Field Briefing on Asthma, Providence, RI 5/29/12

Ozone - I Though We Didn't Have Enough?

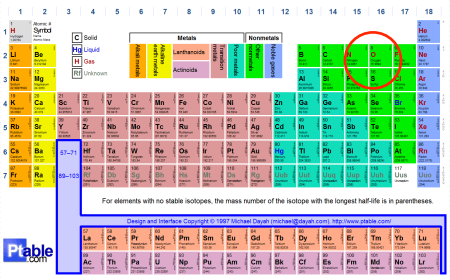


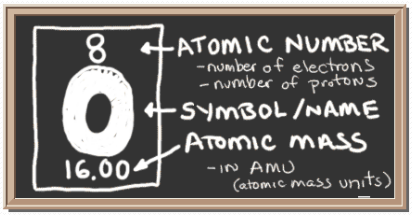
- **Stratospheric Ozone**
  - Ozone Layer
  - 10-30 miles above sea level
  - ***Protective***
- **Tropospheric Ozone**
  - Sea level to 10 miles above
  - Formed by photochemical reactions
  - Natural and man-made emissions of VOC's (HC's) & NOx reacting in presence of heat and sunlight
  - Principal pollutant
  - ***Unhealthy to breathe***



We Know About Oxygen, Right?

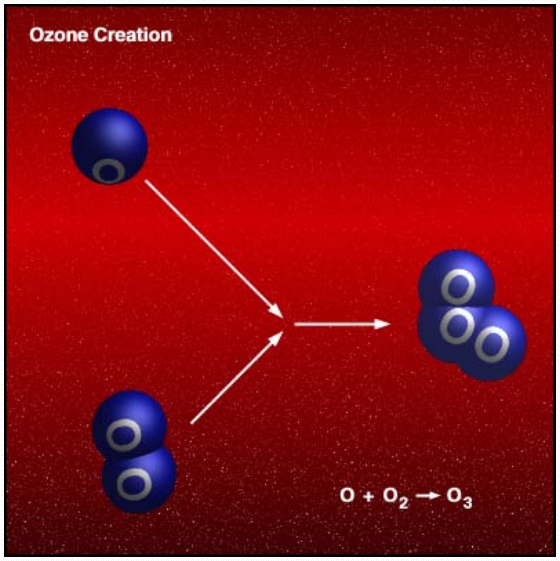
Periodic Table of Elements





- Why do we call it O2?

www.chem4kids.com & ptable.com, accessed 8-3-11



(http://www.nasa.gov/missions/earth/f-ozone.html, Accessed 7/18/11)

Ozone (O_3) Formation $O_2 + O (+ M) = O_3$

- M is mass to absorb the heat energy from the reaction
- Oxygen **atoms** primarily come from photolysis of NO_2 by UV radiation from the sun, which breaks down into NO + **O**
- O_3 + NO produces O_2 + NO_2 which completes the cycle
- Photochemical oxidation of VOC's provides an additional pathway to explain ozone accumulation in urban areas

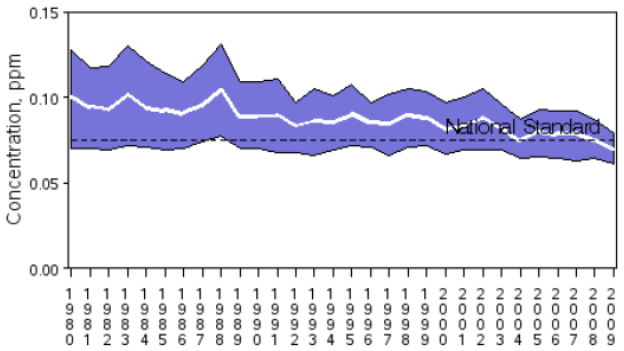
http://www.fraqmd.org/OzoneChemistry.htm, Accessed 7/18/11)

Chemical Precursors of Ozone

- **Nitrogen Oxides (NOx)**
  - Burning Fossil Fuels
  - Primarily Motor Vehicles and Power Plants
- **Volatile Organic Compounds (VOC)**
  - Cars, Gasoline Burning Engines, Consumer Products (Paints, Insecticides, Cleaners), Industrial Solvents and Chemical Manufacturing

Ozone Air Quality, 1980 - 2009

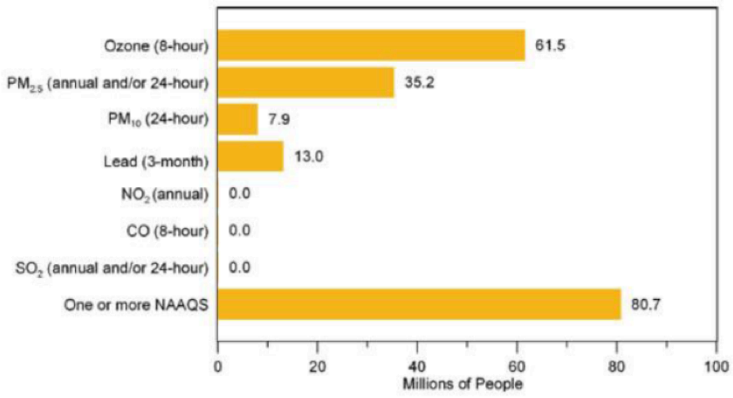
(Based on Annual 4th Maximum 8-Hour Average)
National Trend based on 255 Sites



1980 to 2009 : 30% decrease in National Average

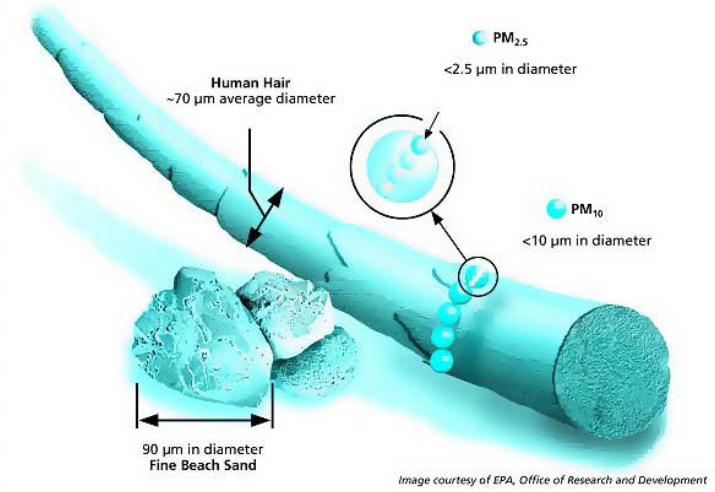
(http://www.epa.gov/airtrends/ozone.html#ozloc, Accessed 6/5/11)

Number of People Living in Counties with Air Quality Concentrations Above the Level of the NAAQS in 2009



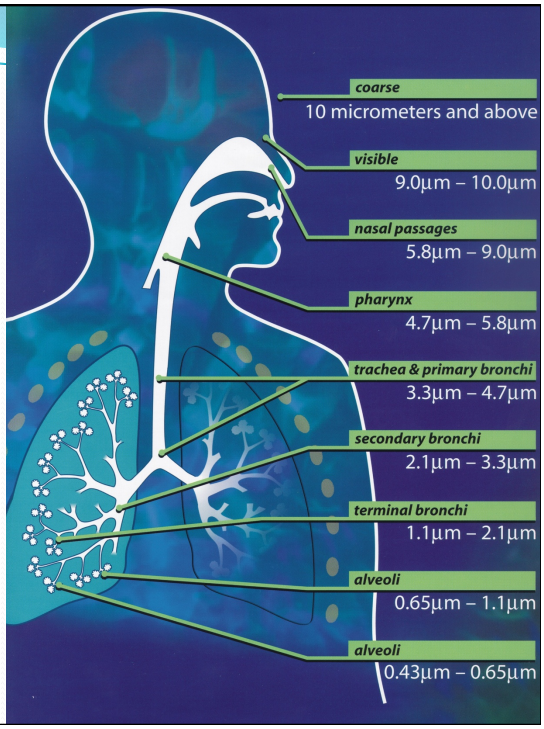
(http://www.epa.gov/airtrends/aqtrends.html, Accessed 6/5/11)

Particulate Matter (PM 10 & PM 2.5)

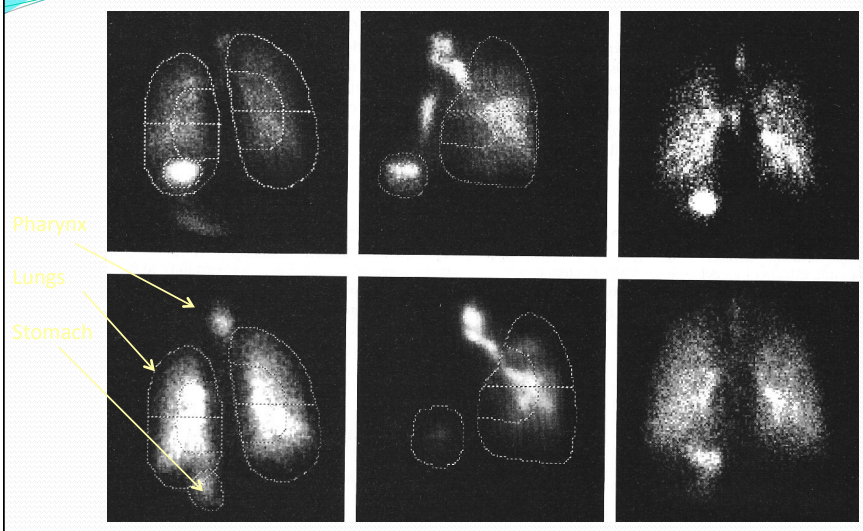


http://www.epa.gov/air/particlepollution/basic.html, Retrieved 1/31/09

Importance of Particle Size with Medical Aerosols, and Reason for Concern with Environmental Aerosols



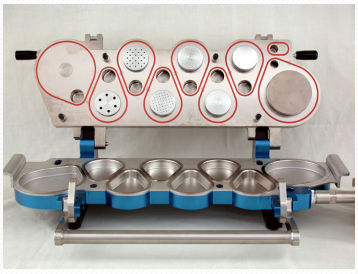
Deposition of Medical Aerosols



^{133}Xe Equilibrium Scan, Conventional SVN (Above); Aero-Eclipse BAN (Below)

Respiratory Care 2005;50(9):1152/Journal of Aerosol Med 2001

Medical Aerosols



Environmental Aerosols

4 Stage Cascade Impactor

Source: http://www.epa.gov/dears/studies.htm, Retrieved 1/12/09

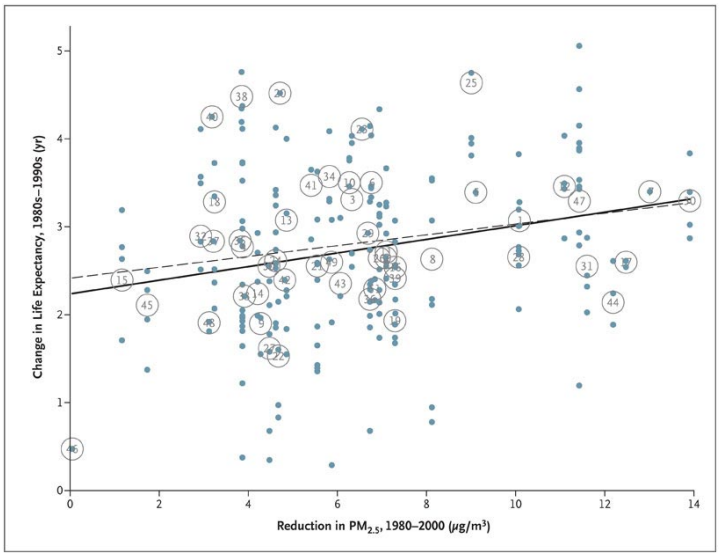
Nebulizers or Engines – Aerosol Behavior

- Environmental Conditions
  - Humidity
  - Dispersion Medium
  - Electrostatics & Triboelectrification
  - Topography of the Land
- Particle Size
- Inertial Impact and Sedimentation
- Evaporation
- Resuspension
- **Do we want it *or not want it* in the lung?**

Health Implications

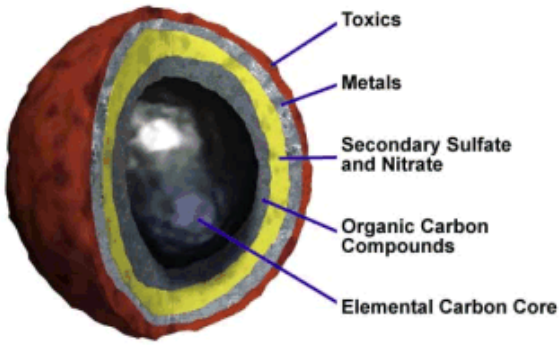
- Consistent evidence that the level of PM10 is associated with the rate of death from all causes and from cardiovascular and respiratory illnesses.
- Daily variations of PM10 were positively associated with daily variations in mortality.
- With diesel there are also fine particles (PM 2.5) and ultra-fine particles less than 0.1 microns (viral size).
- Ultra-fine particles are a major portion of the particles within airborne PM

Samet JM, Dominici F, Curriero FC, Coursac I, Zeger SL. Fine particulate air pollution and mortality in 20 US cities, 1987–1994. N Engl J Med 2000; 343: 1742–9. and Dominici F, McDermott A, Zeger SL, Samet JM. National maps of the effects of particulate matter on mortality: exploring geographical variation. Environ Health Perspect 2003; 111: 39–44



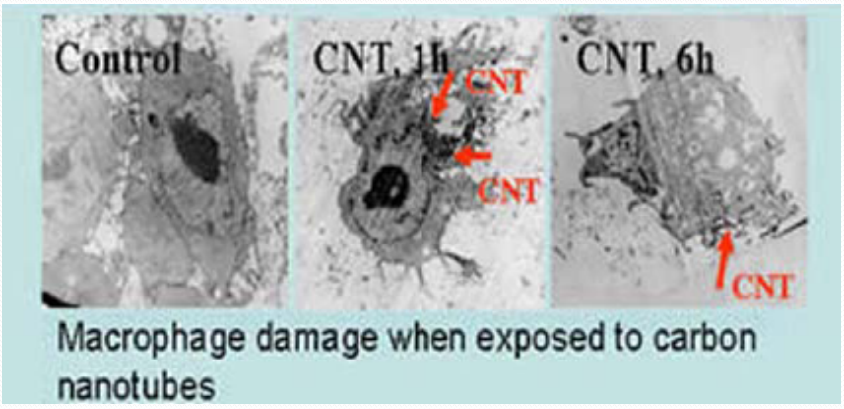
Pope CA et al. NEJM 2009; 360(4): 376-86

A Diesel Particle Up Close



Source: Clean Air Task Force, www.catf.us, Retrieved 1/10/09

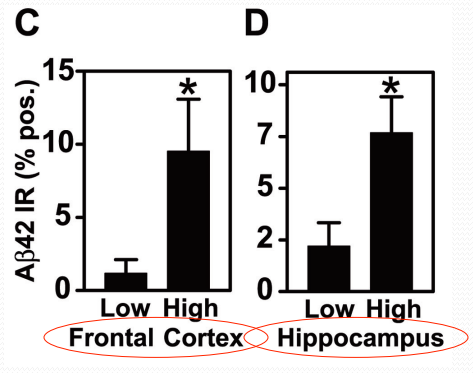
NIOSH Aerosol Nano-Particle Research



Macrophage damage when exposed to carbon nanotubes

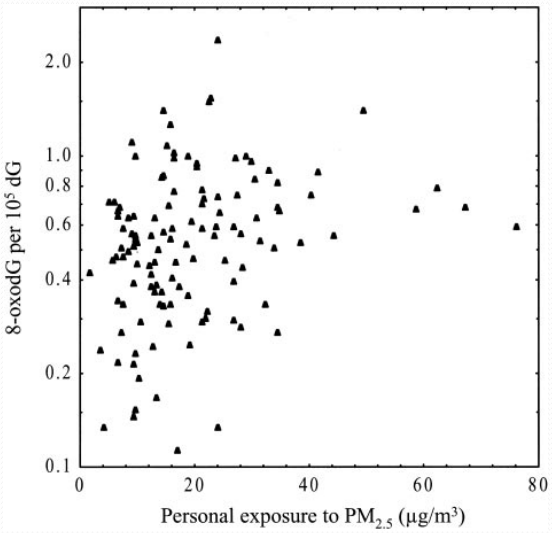
NIOSH, 2008

Brain Aβ42 with Low and High Pollution



Graph Source: Toxicol Pathol 2004; 32; 655-6 http://tpx.sagepub.com/cgi/content/abstract/32/6/650, Accessed 1/10/09

Lymphocyte Oxidative DNA Damage



Biomarker 8-oxodG, n=68

Cancer Epidemiol Biomarkers Prev 2003; 12:191-196

International Agency for Research on Cancer

World Health Organization

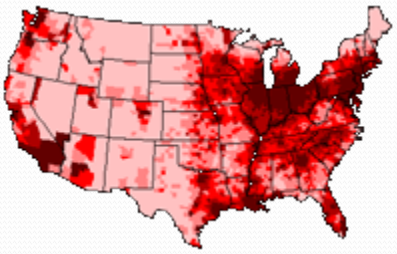
PRESS RELEASE
N° 213

12 June 2012

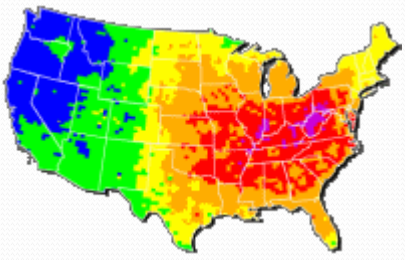
IARC: DIESEL ENGINE EXHAUST CARCINOGENIC

Lyon, France, June 12, 2012 -- After a week-long meeting of international experts, the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), today classified diesel engine exhaust as **carcinogenic to humans (Group 1)**, based on sufficient evidence that exposure is associated with an increased risk for lung cancer.

Public Health Risk



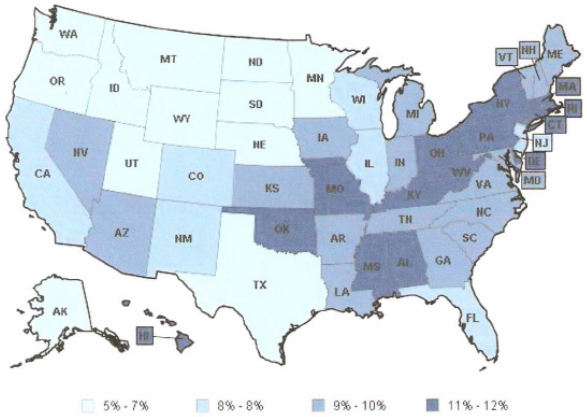
From Diesel Exhaust



From Power Plants

Source: http://www.catf.us/, Retrieved 1/12/09

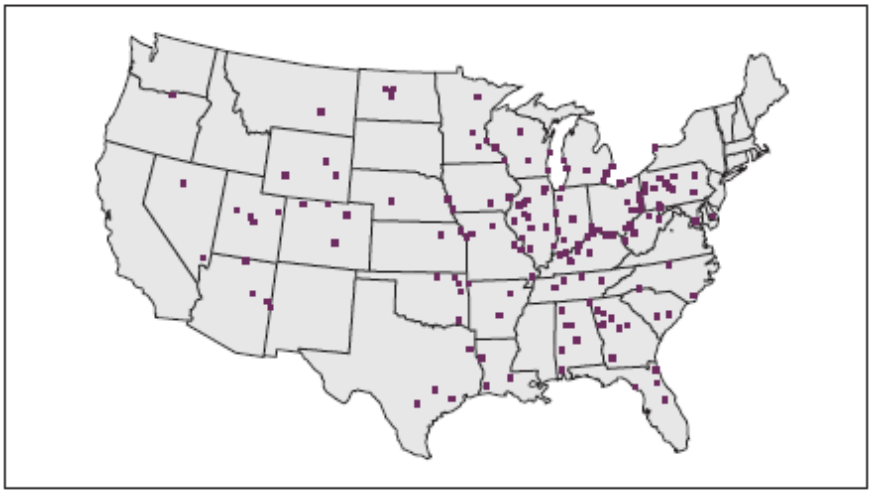
Nationwide Childhood Asthma Map



Percent of children with asthma problems (Percent) – 2007

KIDS COUNT Data Center, www.kidscount.org/datacenter
A Project of the Annie E. Casey Foundation

Figure 4: Location of Coal Power Plants with Operating Tall Stacks, as of December 2010



Sources: GAO and Map Resources (map).

Taller Smokestacks

- **1970:** 2 tall stacks (stacks over 500 ft)--in the U.S.
- **1972:** EPA authorized the use of tall smokestacks instead of emissions limits.
- **Mid-'70's:** 4 different circuit courts of appeal had ruled that the Clean Air Act required real emissions controls and not just increased stack heights
- **1977:** Congress enacted section 123 of the Clean Air Act, which barred the construction of smokestacks taller than called for by good engineering practice
- **1985:** number of tall stacks had grown to more than 180 (23 over 1000 ft)

- Statue of Liberty: 305 ft
- Washington Monument: 555 ft
- **Smokestack in Jefferson, OH: 1,000 ft**
- **Smokestack in Rockport, IN: 1,038 ft**
- Eiffel Tower in France: 1,063 ft.
- **Smokestack in Marshall, WV: 1,204 ft**
- Empire State Building: 1,250 ft

Acadia National Park on a *Clear* Day

Visual Range 199 miles

PM 2.5 1.4 ug/m3

Ozone 39 ppb

http://www.epa.gov/oar/visibility/monitor.html#Acadia, Accessed 1/10/08

Acadia National Park on a *Hazy* Day

Visual Range 30 miles

(Was 199)

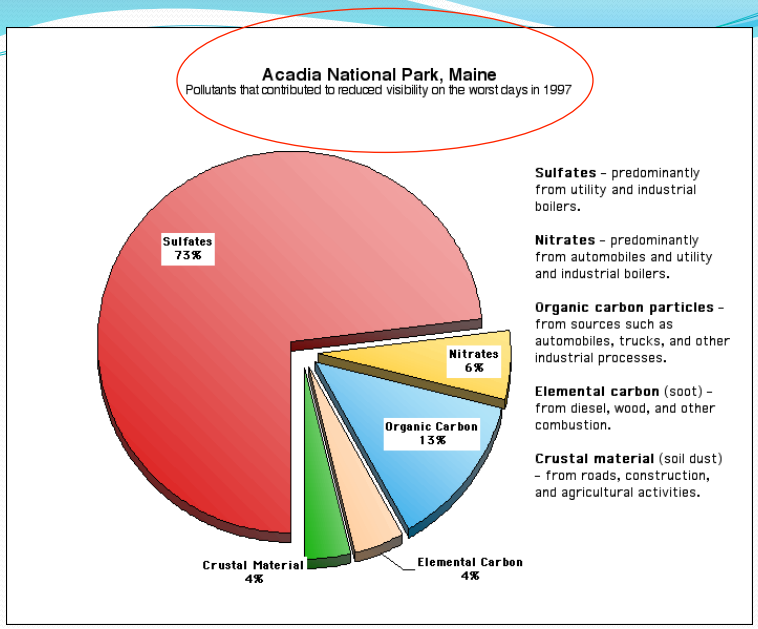
PM 2.5 = 17.1 ug/m3

(Was 1.4)

Ozone = 104 ppb

(Was 39)

http://www.epa.gov/oar/visibility/monitor.html#Acadia, Accessed 1/10/08



http://www.epa.gov/air/visibility/parks/acad_p.html, Retrieved 1/10/09

Officials warn of poor RI air quality

By The Associated Press
Published: **July 17, 2011**

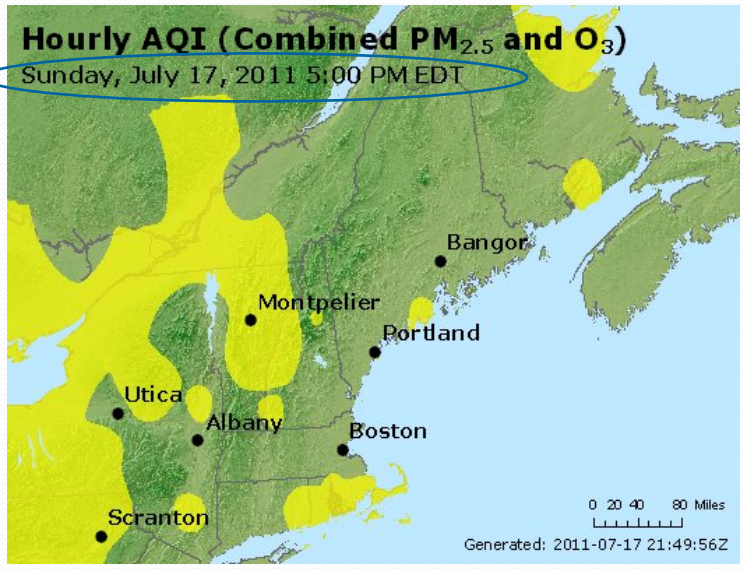
PROVIDENCE --

The Rhode Island Department of Environmental Management says air quality could reach unhealthy levels in the southern half of the state as the weekend starts winding down.

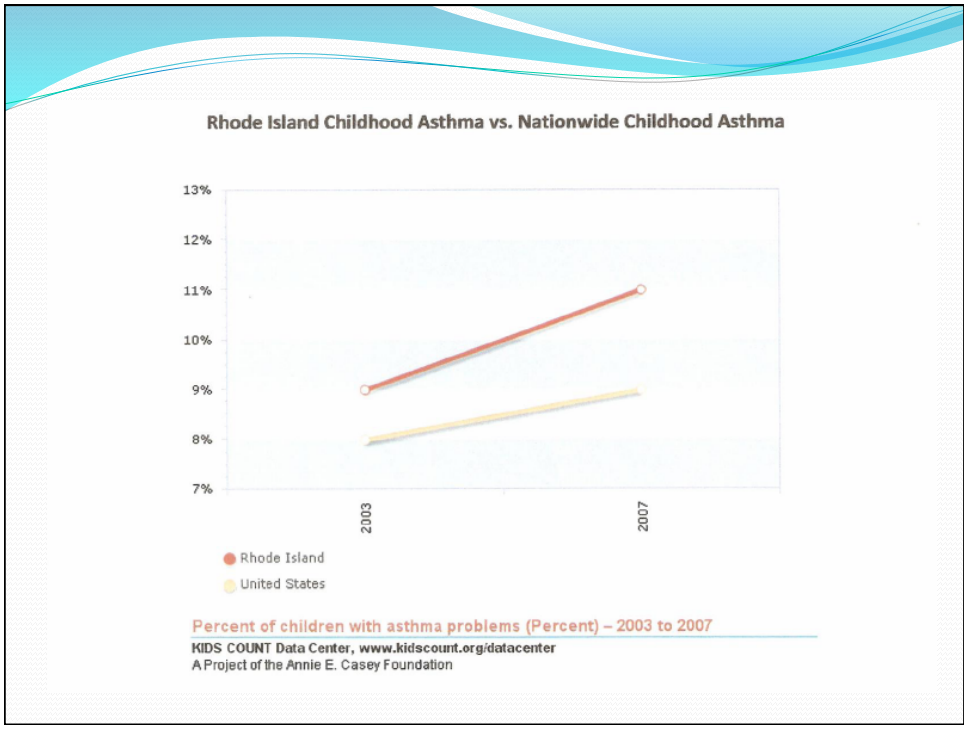
The agency says humid weather and winds from the west and southwest on Sunday afternoon and early evening could result in high concentrations of ground-level ozone, a major component of smog.

It *also advises people to stay in an air-conditioned environment if possible, especially those who have asthma and other respiratory difficulties*.

(Source: www.turnto 10.com, Accessed 7/17/11)



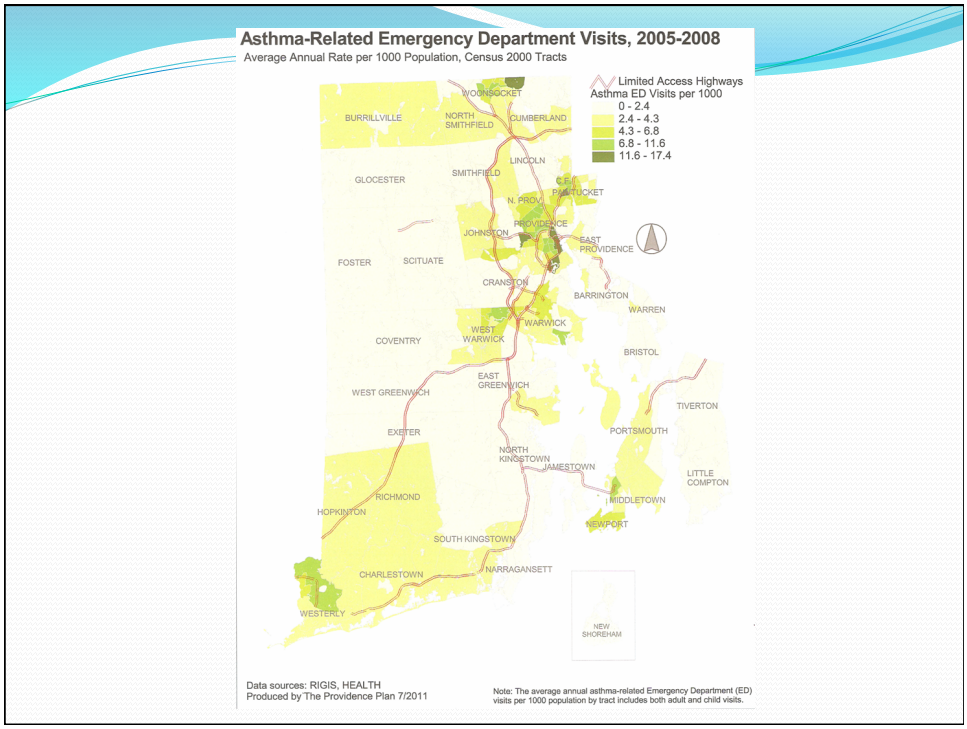
(Source: http://www.epa.gov/region1/aqi/index.html)



RI Childhood Asthma Health Care Costs

- Est. 39,000 children (17%) ever diagnosed with asthma
- 27,000 children (11%) currently have asthma
- Health care use (ED & hospitalizations) highest for children < 5
- Avg. hospital stay 2 days with avg. charge $7,840
- Under age 5 highest charges, 6 x charges for age 12-17
- RI – 2007 – 1856 ED visits by children with primary dx of asthma – avg. charge of $1,823 per visit
- < Age 5 accounted for 46% of all ED visits with avg. charge of $2,013 per visit

(Children with Asthma, 2011 Rhode Island KIDS COUNT Factbook / Health, p 74)



Pediatric Patient Asthma-Related ED Visits in RI from 2005-2009 & Associations with SES

- Examine effects of short-term exposure to ambient concentrations of ozone and PM 2.5 on Pedi ED visits for asthma and URI's, and whether strength of association was modified by SES
- Real increases in relative risk for children enrolled in Medicaid and living in high poverty neighborhoods
- Automobile exhaust , heavily traveled I 95 & I 195 road associations
- "Even at relatively low concentrations of ozone and PM 2.5, outdoor pollution contributes to the burden of emergency department visits for pediatric asthma and upper respiratory infections in children of lower socioeconomic status."

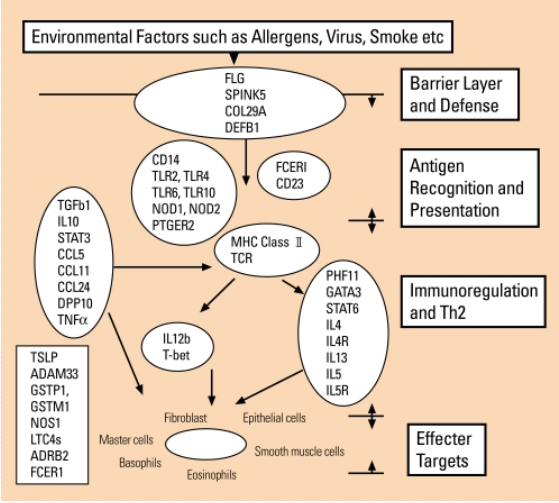
Perlman DN, Gong J, Wellenius GA
Brown University – RI HEALTH – June, 2011

Airway Remodeling in Asthma

- Repeated episodes of allergic inflammation that damage the surface epithelium of the airway and cause structural changes.
- Poorly understood mechanisms likely contribute and are responsible for cellular hyperplasia, hypertrophy and changes in matrix deposition (sub-epithelial collagen).
- **Thought to have occurred late in disease process secondary to chronic inflammation until more recently.**

J Allergy Clin Immunol 2003, Pharmacol Ther. 2006, Tohoku J Exp Med. 2006

Environment & Genetics



(Allergy Asthma Immunol Res. 2010 October; 2(4): 215–227)

Short-term effects of PM10 and NO2 on respiratory health among children with asthma or asthma-like symptoms: a systematic review and meta-analysis

"We found clear evidence of effects of PM10 on the occurrence of asthma symptom episodes, and to a lesser extent on cough and PEF. The results for NO2 are more difficult to interpret because they depend on the lag times examined. There was an indication of effect modification by several study conditions."

(Weinmayr et al. Environ Health Perspect. 2010 Apr;118(4):449-57. Epub 2009 Nov 12, Accessed 6/5/11)

Lung radiology and pulmonary function of children chronically exposed to air pollution

- Analyzed the CXRs of 249 clinically healthy children
  - 230 from southwest Mexico City and 19 from Tlaxcala
  - Children from southwest Mexico City were chronically exposed to ozone levels exceeding the U.S. National Ambient Air Quality Standards for an average of 4.7 hr/day and to concentrations of PM2.5 above the annual standard.
- CXRs of Mexico City children
  - Bilateral hyperinflation (151 of 230) 66%!
  - Increased linear markings (121 of 230) 53%
  - Hyperinflation and interstitial markings significantly more common in Mexico City children ($p < 0.0002$ and 0.00006 respectively)

(Calderon-Garciduenas et al. Environ Health Perspect. 2006 Sep;114(9):1432-7, Accessed 6/5/11)

- CT Scans – 25 selected Mexico City children with abnormal CXRs
  - Mile bronchial wall thickening in 10 of 25
  - Prominent central airways seen in 4 of 25
  - Air trapping in 8 of 21
  - Pulmonary nodules in 2 of 21
- Only 7.8% of Mexico City Children had abnormal lung function tests based on predicted values.
- Findings important for children residing in polluted environments
- Bronchiolar disease could lead to later chronic pulmonary disease

(Calderon-Garciduenas et al. Environ Health Perspect. 2006 Sep;114(9):1432-7, Accessed 6/5/11)

Air pollution, aeroallergens, and emergency room visits for acute respiratory diseases and gastroenteric disorders among young children in six Italian cities.

- "Air pollution is associated with triggering of wheezing and gastroenteric disorders in children 0-2 years of age; more work is needed to understand the mechanisms to help prevent wheezing in children."

(Orazzo et al. *Environ Health Perspect. 2009 Nov;117(11):1780-5. Epub 2009 Aug 13, Accessed 6/5/11)*

Short-term health effects of particulate and photochemical air pollution in asthmatic children.

"This study showed that, although within international air quality standards, the prevailing levels of photo-oxidant and particulate pollution in spring and early summer had measurable short-term effects on children with mild-to-moderate asthma."

(Just et al. Eur Respir J. 2002 Oct;20(4):899-906., Accessed 6/5/11)

Effect of early life exposure to air pollution on development of childhood asthma.

- Total of 3,482 children (9%) were classified as asthma cases.
- Observed a statistically significantly increased risk of asthma diagnosis with increased early life exposure to CO, NO, NO2, PM10, SO2, and black carbon and proximity to point sources.
- Traffic-related pollutants were associated with the highest risks.
- "These data support the hypothesis that early childhood exposure to air pollutants plays a role in development of asthma."

(Clark et al. Environ Health Perspect. 2010 Feb;118(2): 284-90.Accessed 6/5/11)

Cognitive Effects in Children

- Relation between black carbon, a marker for traffic particles, and cognition among **202 Boston, Massachusetts, children (mean age = 9.7 years**, SD 1.7) in a prospective birth cohort study (1986-2001)
- Black carbon levels estimated with a validated model
- Analysis controlled for sociodemographic factors, blood lead level, tobacco smoke exposure, and birth weight
- Black carbon (per interquartile range increase) was associated with decreases in multiple measures of Composite Intelligence, Verbal, and visual subscales.
- Concluded: **"Higher levels of black carbon predicted decreased cognitive function across assessments of verbal and nonverbal intelligence and memory constructs."**

Am J Epidemiol. 2008 Feb 1;167(3):280-6, Accessed 1/10/09

Exposure While Riding School Buses

- Continuous PM 2.5 collected during 85 trips aboard 43 school buses in Washington State
- Bus concentrations influenced by bus age, diesel oxidative catalysts, and roadway concentrations
- "These results confirm that children are exposed to air pollution from the bus and other roadway traffic while riding school buses. In-cabin air pollution is higher than roadway concentrations and is likely influenced by bus characteristics."

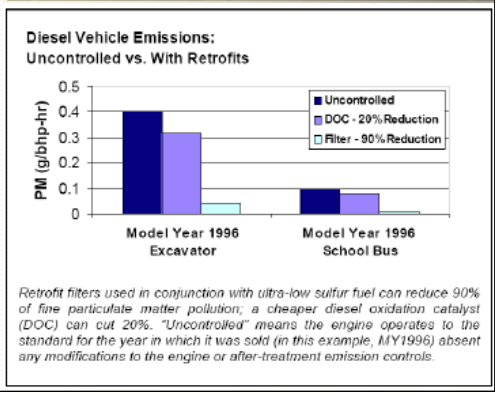
Adar SD et al. Atmos Environ. 2008 Oct; 42(33):7590-7599

Is Asthma Education Enough?

Nature 2001; 409(8): p.671

Upstream Solutions

- Retrofitting Existing Engines
- Cleaner Fuels
- Anti-Idling
- Replacement with 2007 or Newer Engine Models
- Private Company Investment
- Partnerships with Industry
- Local, County, State, and Federal Action
- Involvement!



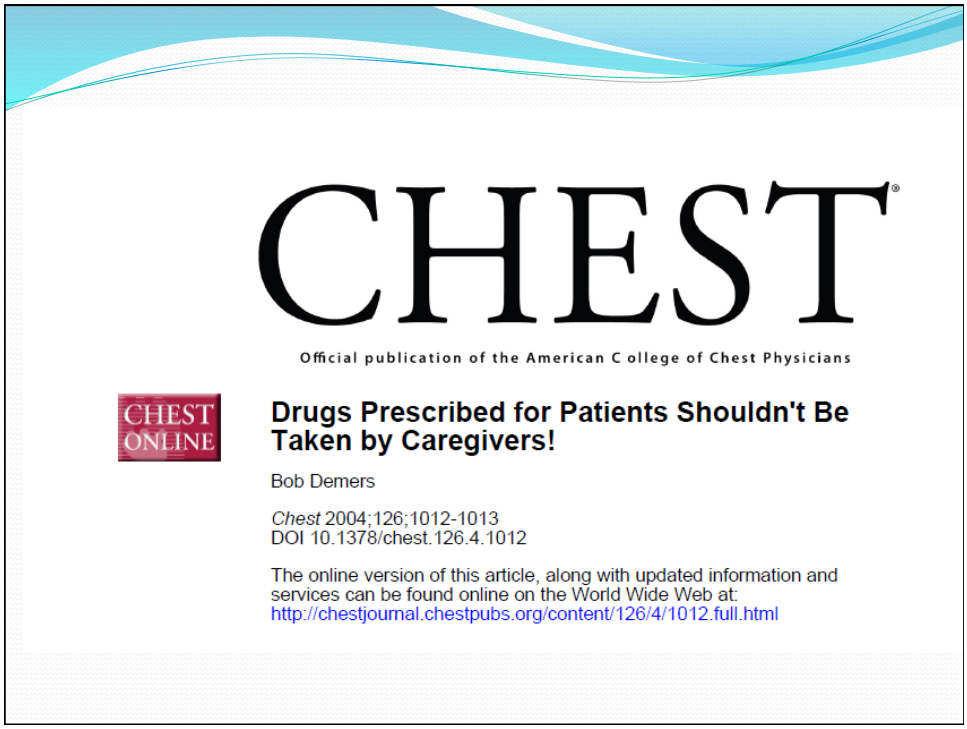
Retrofit filters used in conjunction with ultra-low sulfur fuel can reduce 90% of fine particulate matter pollution; a cheaper diesel oxidation catalyst (DOC) can cut 20%. "Uncontrolled" means the engine operates to the standard for the year in which it was sold (in this example, MY1996) absent any modifications to the engine or after-treatment emission controls.

Industrial & Occupational Safeguards

- NIOSH
- Wildfires
- Dusts - Silica
- Asbestos
- Diesel PM Exposure in Mines
- **What about Exposure to Fugitive Medical Aerosols – Our ADL?**

Clearing *Our* Air

- Frequent or Continuous Nebulizaton
  - Does this increase caregiver exposure as well?
  - Can choice of method or device achieve source reduction in the hospital or home setting?
- Device Selection
  - Precision and Source Reduction
  - MDI, DPI, BAN, Filtration, Neg. Press.
  - Purchasing Department & Collaboratives
  - PFT Lab
  - What Would be Our Advice for Concerns About Pharmacological Exposure or Aerosolized Microbes?



CHEST

Official publication of the American College of Chest Physicians

CHEST ONLINE

Drugs Prescribed for Patients Shouldn't Be Taken by Caregivers!

Bob Demers

Chest 2004;126;1012-1013
DOI 10.1378/chest.126.4.1012

- Commentary on study in same issue of CHEST by *Dimich et al*
- Aerosolized ribavirin, as well as aerosolized pentamidine isethionate, can trigger reactive airway disease in RCP's repeatedly exposed to trace amounts of those agents in the course of their work
- Suggestion that RCPs might be singularly vulnerable to RAD by virtue of their choice of profession is not new.

"Clinicians have enough to think about as they pursue their day-to-day activities of administering care to patients. Worrying about potential exposure to aerosolized drugs, airborne pathogens, and/or endotoxins shouldn't need to be added to our list of concerns. And, separate and distinct from that issue, drugs that are prescribed for patients should be taken by patients, and should not be shared by the practitioners who are obliged to be within arm's length."

Bob Demers, BS, RRT

- **Asthma among Health Care Professionals** Rask-Andersen and Tarlo *Am. J. Respir. Crit. Care Med.* **2007**; 175: 633-634
- **Second-hand exposure to aerosolized intravenous anesthetics propofol and fentanyl may cause sensitization and subsequent opiate addiction among anesthesiologists and surgeons,** McAuliffe PF, Gold MS et al, Med Hypotheses, **2006**;66(5):874-82
- **Fentanyl abuse and dependence: further evidence for second hand exposure hypothesis,** Gold MS, Melker RJ et al, J Addic Dis, **2006**;25(1):15-21
- **Respiratory Health Survey of Respiratory Therapists**, Dimich-Ward, etal, Chest, **2004** Oct;126(4):1048-53
- **(S)-Albuterol activates pro-constrictory and pro-inflammatory pathways in human bronchial smooth muscle cells,** Aqrawal DK et al, J Allergy Clin Immunol. **2004** Mar; 113(3):503-10
- **Second Hand (S) Albuterol: RT Exposure Risk Following Racemic Albuterol**, Bettye Carnathan, RRT etal, Respiratory Care, October **2001**
- **(S)-Albuterol Increases Intracellular Free Calcium by Muscarinic Receptor Activation and a Phospholipase C-Dependent Mechanism in Smooth Airway Muscle**, Mitra S, Ugur M et al, Molecular Pharmacology, **1998**
- **Asthma Risk and Occupation as a Respiratory Therapist**, Christiani DC and Kern DG, Am Rev Respir Dis, **1993**
- **Asthma in Respiratory Therapists**, Kern DG, Frumkin H, Ann Intern Med, **1989** May; 110(10):767-73

Distribution of Work-related Asthma Cases by Occupation in Massachusetts, 1993-2006

Managerial & professional workers accounted for one-third of all cases, with nurses and teachers as the most frequently reported occupations within this group.

Occupation		
Managerial and Professional	**206**	**32.6%**
Nurses	**84**	**13.3%**
Teachers	54	8.6%
Managers	26	4.1 %
Engineers/scientists	10	1.6 %
All Other	32	5.1 %
Operators/Repair/Laborers	**171**	**27.1 %**
Construction/painters	21	3.3 %
Mechanics/repairers	20	3.2 %
Assemblers	13	2.1 %
Spray painting	12	1.9 %
Plastic/metal machine operators	12	1.9 %
Welders	12	1.9 %
Textile/apparel	10	1.6 %
All other	71	11.3 %

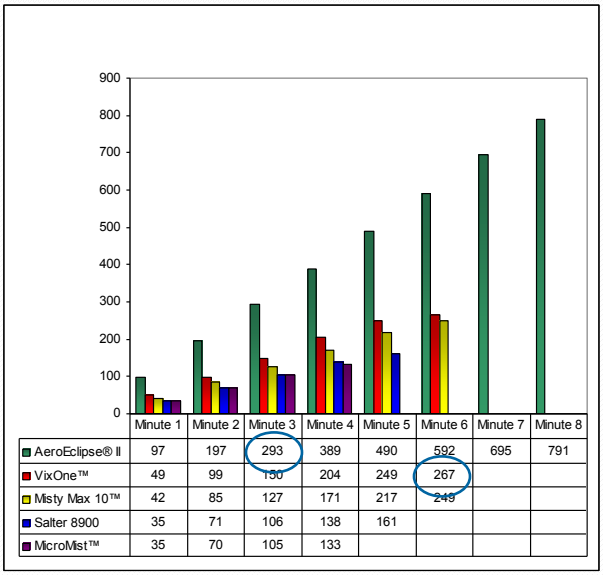
Burden of Asthma in Massachusetts, April 2009

Precision and Source Reduction

- MDI/VHC, DPI
- AeroEclipse® II BAN
- AeroEclipse® R BAN

(Reduces Fugitive Losses to Environment - Like Anti-Idling with Engines)

Respirable Dose Comparisons



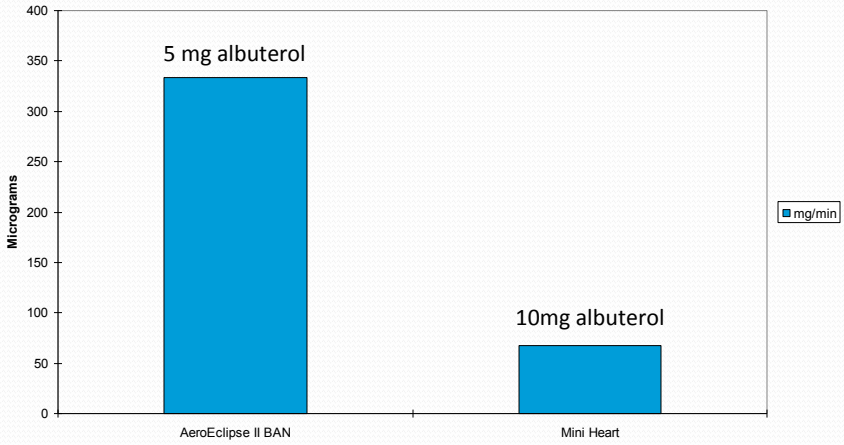
	Minute 1	Minute 2	Minute 3	Minute 4	Minute 5	Minute 6	Minute 7	Minute 8
AeroEclipse® II	97	197	293	389	490	592	695	791
VixOne™	49	99	150	204	249	267		
Misty Max 10™	42	85	127	171	217	249		
Salter 8900	35	71	106	138	161			
MicroMist™	35	70	105	133				

Respirable Dose of Ventolin (2.5mg in 3ml)

- 78.4% FPF
- 2.8 micron MMAD

TMI Aerosol Lab, 2006

Environmental Protection *and* Efficiency



Mini Heart Nebulizer with Dragon Mask, Adam Model, (2ml (5mg/ml) Albuterol Sulphate and 18ml Saline) Pari Breathing Simulator, Vt=250ml, I:E Ratio= 1:2, Breathing Rate=12bpm, Runtime =1 min, 8.0lpm flow supplied by 50psi medical air.

Comparison of a BAN vs. a Conventional Continuous-Output Nebulizer in Treating Acute Asthma in a Pedi ED

Preliminary findings of ongoing RCT - Rose et al 10/1/10 AAP

- Children 1-17 Pedi ED Acute Asthma
- 151 to date (target 240),
- Initial treatment conv neb, then randomized to BAN or conv group
- Identical regimen - standardized asthma algorithm
- 25 of 76 pts in the BAN group (32.9%) required hospitalization vs

  33 of 75 pts in the cont nebulizer group (44%)
- 41 of 76 respondents in the BAN group (53.9%) "strongly agreed" that they would feel comfortable receiving treatments with the same type of nebulizer in the future vs 20 of 74 (27%) in the cont group

(Rose J, Cancelliere S, Matye P et al. Pediatrics, Division of Pediatric Emergency Medicine, Rainbow Babies and Children's Hospital/Case Medical Center, Cleveland, OH)

Air Quality Advocates in Hospitals

- Asthma Incidence – genetics and environment
- Ribavirin, Pentamidine, Antibiotics, Morphine… beta agonists and anticholinergics?
- Mucomyst made my skin itch!
- Change the Cidex in the break room
- Aerosol delivery approaches for new medications, surfactants, immune modulators, gene therapies
- Fugitive medical aerosols
- Reducing source emissions outdoors and indoors where we can

Expanding Our Sphere of Influence

- Educate yourself on issues that effect lung health
- Make a difference where you can (PTA, school involvement, asthma coalitions)
- Hospital Brand Familiarity & Outreach
- Community and Church groups
- Professional Organizations & Collaboration
- Building Relationships for the Future (*Our* Future)
- Legislative Affairs
- Networking

Getting Involved - Letter Writing

June 12, 2007

Representative Peter T. Ginaitt, Chair
Committee on Environment and Natural Resources
State of Rhode Island
House of Representatives
Providence, RI 02903

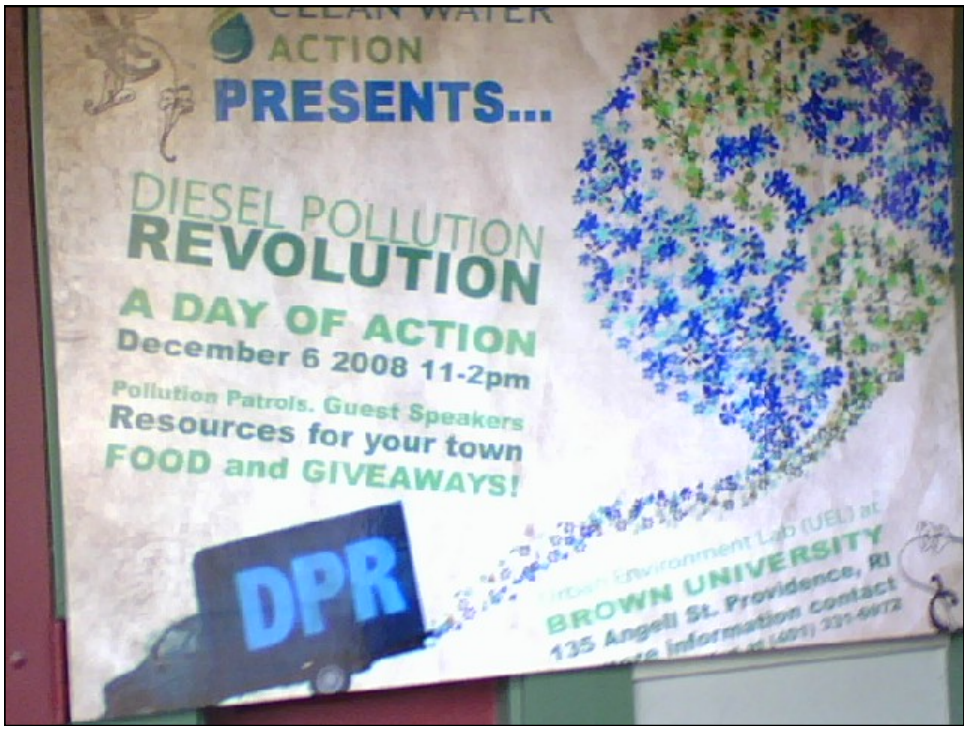
RE: The Diesel Emissions Reduction Act of 2008 (H 5574)

I am a respiratory therapist and asthma educator… ***(Background)***

Diesel fuel emissions are irritating because… ***(Expert commentary)***

On my own behalf, as well as on behalf of the Rhode Island Society for Respiratory Care… ***(Plea)***

Creating a healthier environment through clean air efforts such as controlling diesel emissions will benefit not only those who are most at risk with current lung diseases or who are particularly vulnerable such as school children, but indeed all Rhode Islanders. ***(Benefit)***



Frank Stevenson, P.E.

Supervising Air Quality Specialist, RI DEM Office of Air Resources

Annie Costner

Diesel Pollution Coalition Campaign Organizer, Clean Water Action

Diesel Pollution Patrol

Citizen-based advocacy for cleaner air

Join a Diesel Pollution Patrol in Your Community!

What is a Diesel Pollution Patrol?

Ordinary citizens can monitor diesel activity in their community and educate the public about the need to curb emissions

- Count the number of diesel vehicles that cross a busy intersection near your home, school or work. Record the totals at 10 or 15 minute intervals.
- Use stopwatches! Time idling diesel vehicles and buses. Give them a pollution ticket and inform that Rhode Island law prohibits idling past five minutes.
- Locate the nearest bus terminal and monitor the frequency of individual bus routes. Are the buses full or empty?
- Write a letter to the editor of your local paper and to your State Representative or Senator. Tell them the results of your patrol and why we need government action to protect public health. Then send us a copy!

Sign up your friends today!

Location _____

Names

_____
_____
_____
_____
_____
_____
_____
_____

Contact us for help with a patrol or to let us know the results of yours!

Annie Costner acostner@cleanwater.org

Clean Water Action 741 Westminster St.
Providence RI 02903 (401) 331-6972

Local Government Partnerships

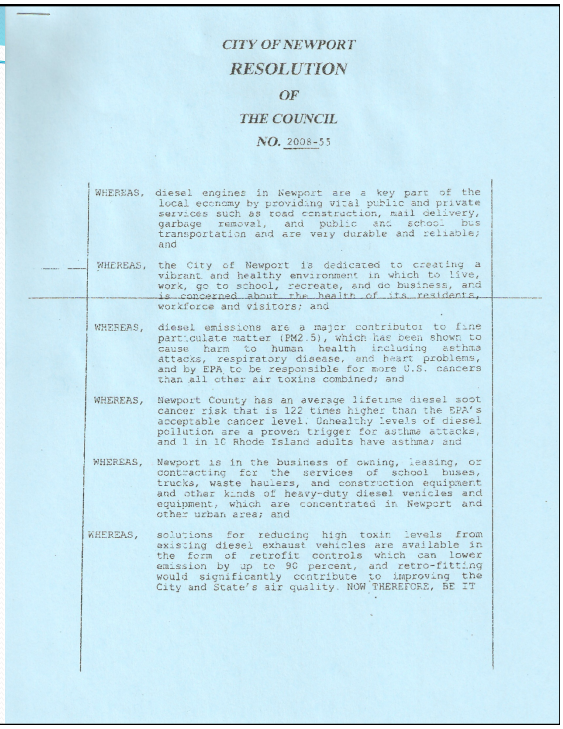
Adverse Health Effects of Diesel Particle Air Pollution

An Overview for the Providence City Council

James E. Ginda, MA, RRT, AE-C, CHES

Kent Hospital
Warwick, Rhode Island

- Anti-Idling Ordinances



CITY OF NEWPORT
RESOLUTION
OF
THE COUNCIL
NO. 2008-55

WHEREAS, diesel engines in Newport are a key part of the local economy by providing vital public and private services such as road construction, mail delivery, garbage removal, and public and school bus transportation and are very durable and reliable; and

WHEREAS, the City of Newport is dedicated to creating a vibrant and healthy environment in which to live, work, go to school, recreate, and do business, and is concerned about the health of its residents, workforce and visitors; and

WHEREAS, diesel emissions are a major contributor to fine particulate matter (PM2.5), which has been shown to cause harm to human health including asthma attacks, respiratory disease, and heart problems, and by EPA to be responsible for more U.S. cancers than all other air toxins combined; and

WHEREAS, Newport County has an average lifetime diesel soot cancer risk that is 122 times higher than the EPA's acceptable cancer level. Unhealthy levels of diesel pollution are a proven trigger for asthma attacks, and 1 in 10 Rhode Island adults have asthma; and

WHEREAS, Newport is in the business of owning, leasing, or contracting for the services of school buses, trucks, waste haulers, and construction equipment and other kinds of heavy-duty diesel vehicles and equipment, which are concentrated in Newport and other urban area; and

WHEREAS, solutions for reducing high toxin levels from existing diesel exhaust vehicles are available in the form of retrofit controls which can lower emission by up to 90 percent, and retro-fitting would significantly contribute to improving the City and State's air quality. NOW THEREFORE, BE IT

Become a "Go to" Person for Other Stakeholders Delivering Your Message

Adverse Health Effects of Diesel Particle Air Pollution

An Overview for the DEM Clean Diesel Workshops

Presented by: Nicole Poepping, Clean Water Action
Created By: James E. Ginda, MA, RRT, AE-C, CHES

United States Senate
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, DC 20510–6175

June 1, 2011

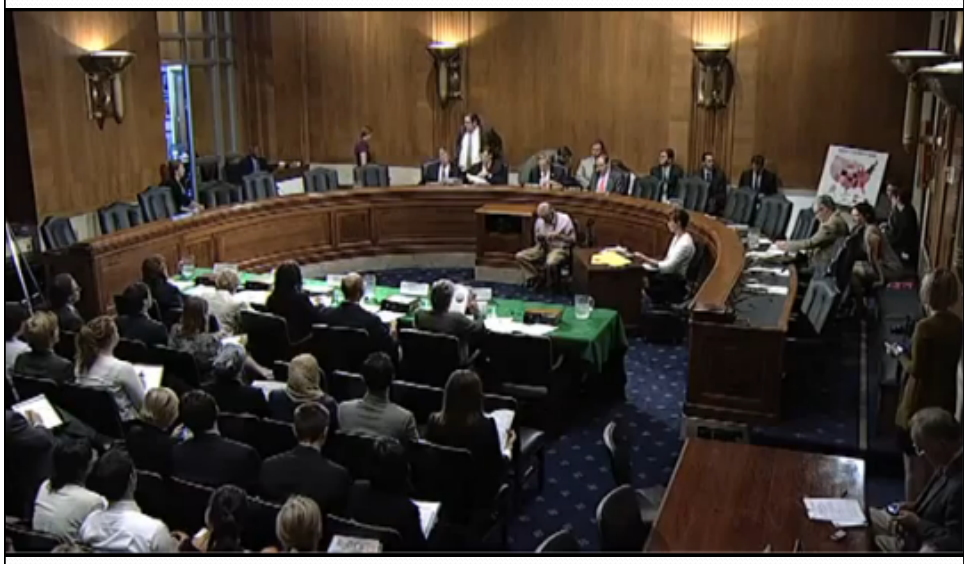
Mr. James E. Ginda, MA, RRT, AE-C, CHES
Supervisor, Respiratory Care
Kent Hospital
455 Toll Gate Rd.
Warwick, RI 02886

Dear Mr. Ginda:

On behalf of the Senate Committee on Environment and Public Works, we invite you to testify before the Subcommittee on Clean Air and Nuclear Safety and the Subcommittee on Children's Health and Environmental Responsibility at a hearing entitled, "Air Quality and Children's Health." The hearing will be held on Wednesday, June 8, 2011, beginning at 10:00 AM in Room 406 of the Dirksen Senate Office Building. The purpose of this hearing is to review the impacts of air pollution on children's health in the United States.

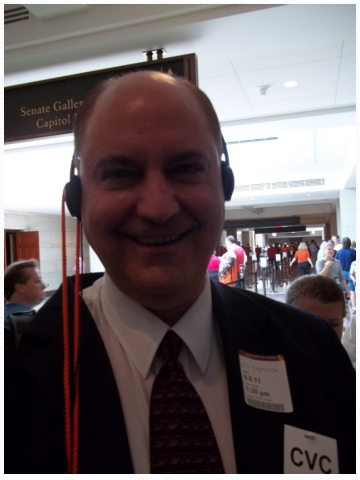
AMERICAN ASSOCIATION FOR RESPIRATORY CARE

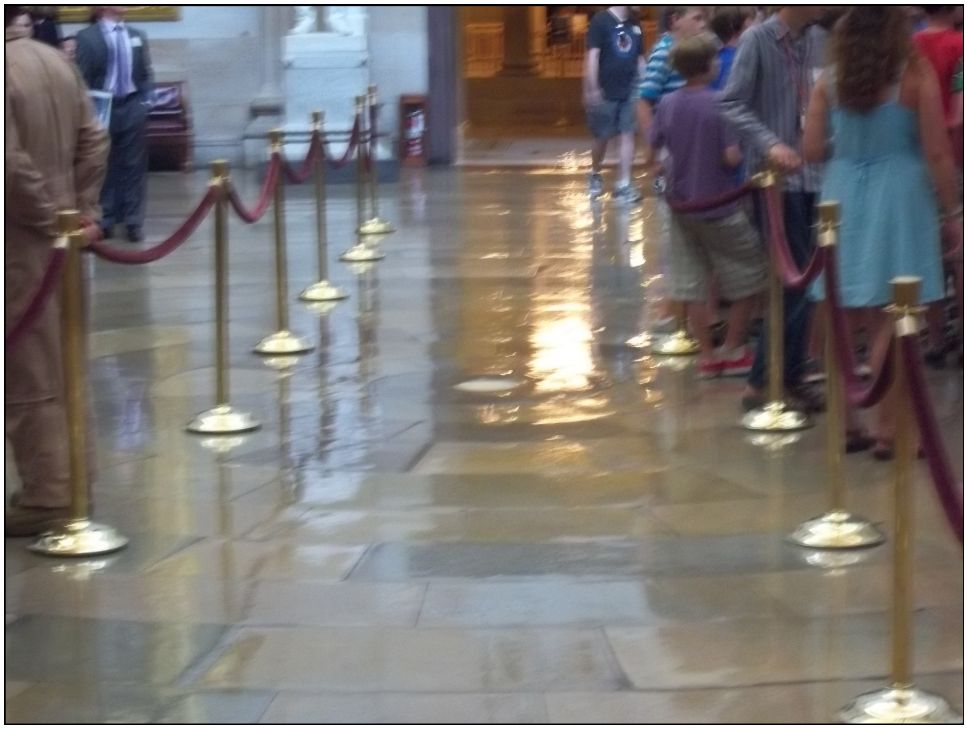

DIRKSEN
SENATE OFFICE BUILDING

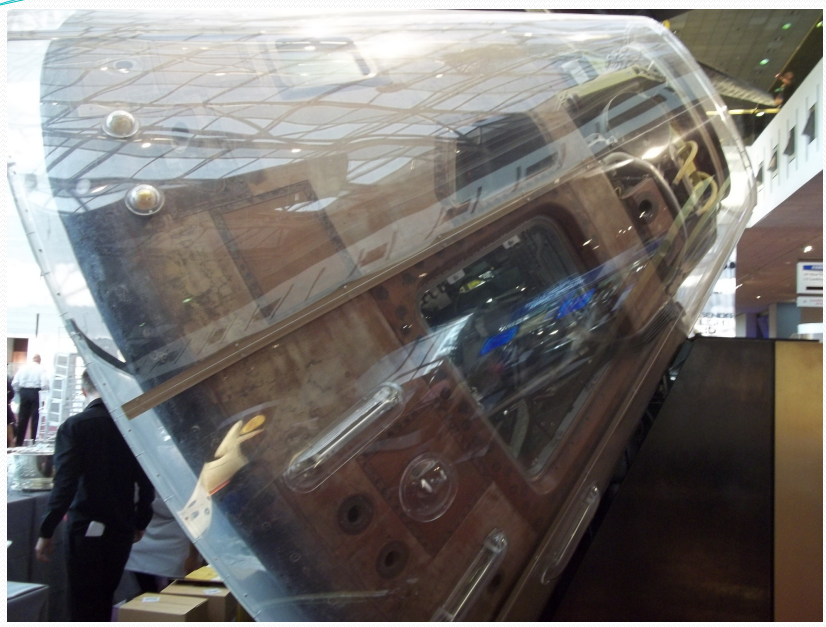


U.S. Senate Hearing

- 5 minute Opening Statements by Senators
- 5 minute Opening Statement by each of the 5 witnesses
- 2 rounds of questioning by Senators
- Supporting Documentation 18 Pages with References to 24 International Studies, Copies of Written Testimony
- Detailed written responses to followup questions
  - 1 Question from Senator Tom Carper
  - 7 Questions from Senator David Vitter


CVC

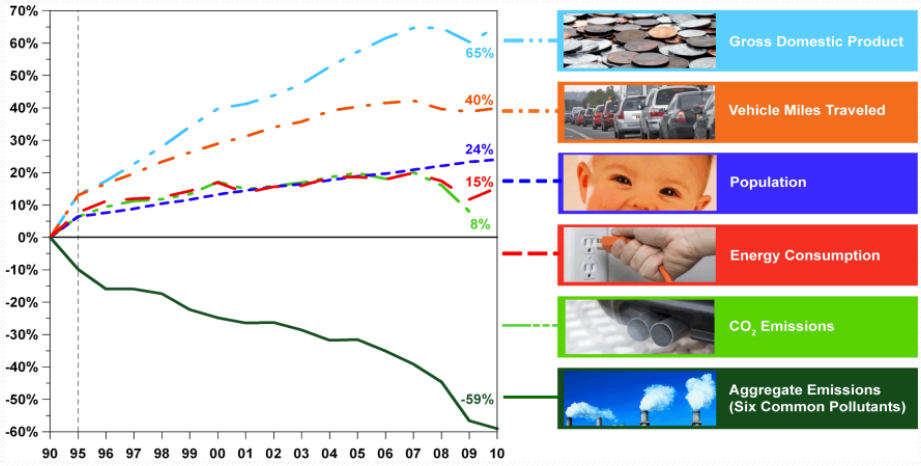




Downstream & Upstream

- Water Filtration
- The Mountain Stream
- Business on the River
- Population Health

Politics – Air Pollution and the Economy



ALA & EPA, 2012

Summary and Reflections from this Summer

- Health & Disease
- Environment
- Air Quality
- Lung Health
- Sphere of Influence
- It Adds Up!

Thank You!

jginda@cox.net www.jginda.com