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Highway Health Hazards

How highways and roads cause health problems in our communities—and what you can do about it.



Highway Health Hazards

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This report is one of many reports the Sierra Club issues about sprawl. To read previous reports or for more information in our Challenge to Sprawl Campaign, please visit our web site at: www.sierraclub.org/sprawl.

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Executive Summary

“Traffic presents a unique public health threat due to the toxicity of its emissions and its extensive integration into our lives and communities. The stakes are high including excess cancers and children’s asthma rates occurring at epidemic proportions. This threat can no longer be ignored; it must be clearly understood and addressed.”

—ASSOCIATE PROFESSOR TIM BUCKLEY
BLOOMBERG SCHOOL OF PUBLIC HEALTH
JOHNS HOPKINS UNIVERSITY

A critical consequence of sprawling development and reliance on highways as a principal means of transportation is tailpipe pollution. Evidence is increasing that air pollution from vehicles increases a wide range of health risks. This report summarizes more than 24 peer-reviewed studies that document health hazards caused by pollution from cars, trucks, and other vehicles. It also describes current debates over major highway projects occurring in more than ten communities around the country.

Key Findings from Scientific Studies:

- A Johns Hopkins study shows association between traffic and curbside concentrations of cancer causing pollutants.

- The Journal of the American Medical Association study links soot in diesel exhaust to lung cancer, cardiopulmonary disease and other causes of death.
- A Denver study shows children living near busy roads are six to eight times more likely to develop leukemia and other forms of cancer.
- A Journal of the American Medical Association study finds that increasing public transportation along with other traffic control measures during the 1996 Atlanta Olympics reduced acute asthma.
- The California South Coast Air Quality Management District did a Multiple Air Toxics Exposure Study-II, the most comprehensive study of urban toxic air pollution, showing that vehicle exhaust is the source of cancer-causing air pollutants in Southern California.

A significant body of scientific evidence is emerging that links pollution from motor vehicles to a range of human health problems including asthma, lung cancer and premature death.

Federal transportation policy has long focused on expanding the highway system as its principal goal. Approximately 80 percent of federal transportation funding is spent on highways. But by designing communities to reduce reliance on vehicles and giving people more transportation choices like trains and clean buses, we can diminish the health risks associated with highway pollution. Crucial public policy changes must include a more balanced transportation policy, greater emphasis on public transportation systems and other options such as walking and bicycling. In addition, we need to limit development near new roadways.

Health Effects from Highway Pollution

“I don't think that they should build a school that lies along a freeway.”

—BARRY WALLERSTEIN, EXECUTIVE OFFICER,
SOUTH COAST AIR QUALITY
MANAGEMENT DISTRICT

Air pollution is a major risk to our health and safety and is the contributing cause of nearly 100,000 premature deaths each year,¹ more than twice the number of deaths from car crashes.² In 2002, almost half of all Americans - or 137 million people - lived in counties with unhealthy air laden with one or more criteria air pollutants, according to the American Lung Association.³

A major source of this air pollution is the exhaust from the tailpipes of trucks and cars. A variety of dangerous pollutants are released daily from the extensive networks of busy highways that border countless neighborhoods and businesses. These pollutants cause numerous adverse health effects including cancer, asthma, and heart attacks. In addition, asthma, which is exacerbated by pollution from trucks and cars, is the leading serious chronic illness among children and the number one reason children miss school.⁴

The main cancer-causing pollutants from trucks and cars are diesel particulate matter and Volatile Organic Compounds (VOCs) such as benzene, 1,3-butadiene, formaldehyde, and polycyclic aromatic hydrocarbons (PAHs).

In recent years the relationship between vehicle pollution and increased cancer risk has received considerable scientific attention. A Denver study

shows that children who live within 250 yards of a road with 20,000 or more vehicles per day are eight times more likely to get leukemia and six times more likely to get other cancers. The authors of the study attribute most of this risk to the VOCs in motor vehicle exhaust.⁵ As the graphic shows, roadways create a corridor of pollution for the drivers and residents nearby.

Highway Air Pollution and Public Policy

Bush Administration Transportation Policy: Fewer Transportation Choices and More Pollution

Just as public transportation ridership is reaching record numbers,⁶ the Bush administration is proposing to diminish investment in diverse transportation choices in America within the Senate Bill 1071 that has yet to be approved by the legislature.⁷ The administration is recommending greater incentives for highways than for cleaner public transportation projects. Under their plan communities would pay 50 percent of the cost for new public transportation projects. Completing only 20 percent of the new proposed road projects would put public transportation alternatives further out of their reach. In addition, the administration proposes spending less than one dollar on train transit projects for every four dollars spent on highways.

The administration's transportation plan fails to adequately fund the Congestion Mitigation and Air Quality Improvement (CMAQ) program that spurs transportation projects that improve a region's air quality. Demand for the CMAQ is expected to skyrocket, as the number of regions with unhealthy air

SECTION 1

Traffic Growing Three Times Faster than Population

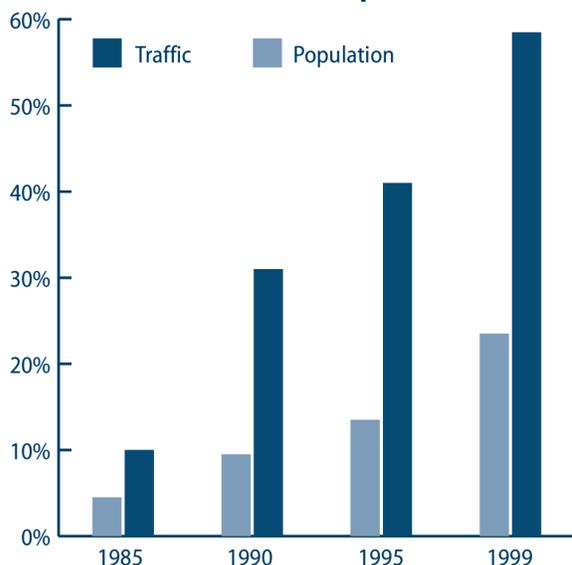


FIGURE 1

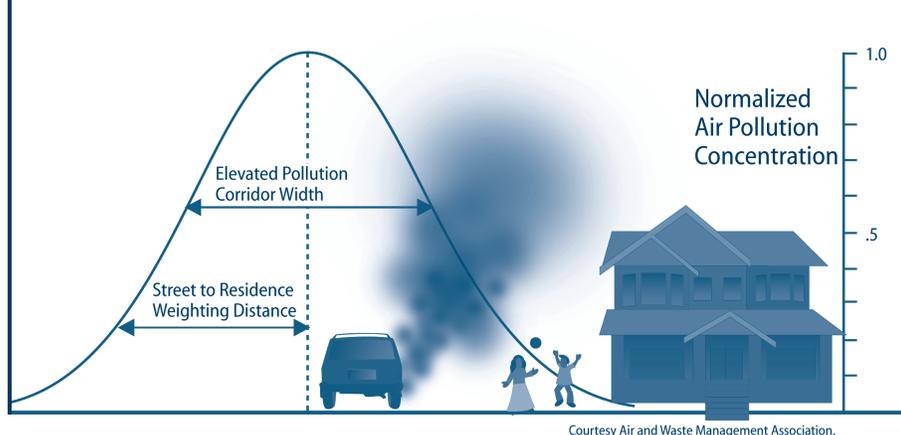
will more than double in the next few years, but funding for this critical program is to increase by less than 10 percent.

Other Bush administration proposals would make it more difficult to ensure that pollution from transportation does not violate air quality standards. The administration also wants to reduce the frequency of check-ups from three to five years. These check-ups ensure that transportation plans conform with local air quality needs. In addition, the administration proposes to ignore the long-term effects of new road construction on air quality. The administration suggests examining how road construction would affect air quality over a ten-year period instead of a twenty-year period, as is current practice. Long-term studies, like the current 20-year period, give us a better idea of the effects of road construction on air pollution.

More Highways, More Sprawl, More Pollution

Poorly designed, sprawling development requires building more roads. Increasingly, new developments are scattered across the landscape with wide

Busy Roads Create a Pollution Corridor for Those Nearby



Courtesy Air and Waste Management Association.

FIGURE 2

streets and driveways, cul-de-sacs, large parking lots, and single-use areas such as office parks or residential sub-divisions with few sidewalks and few connections to other developments.⁸ By keeping the places we live independent of our workplace, the average length of our commute increased by over one-third (from 8.5 to 11.6 miles) between 1983 and 1995.⁹ Increased sprawl forces people to drive further each year. As the graph shows, between 1985 and 1999, traffic in the U.S. (measured as vehicle miles traveled (VMT)) increased three times faster than population because of a lack of transportation choices and sprawl.¹⁰

One Atlanta study showed that new highway construction on suburban land is the leading contributor to sprawling development.¹¹ In another study, the Texas Transportation Institute (TTI) and Surface Transportation Policy Project (STPP) showed that a 10 percent increase in the size of a highway network is associated with a 5.3 percent increase in additional driving.¹² The study also illustrated that longer car trips, aside from generating more pollution, are also the leading cause of traffic congestion, which in turn leads to even greater air pollution.¹³

Solutions: How We Can Reduce Health Risks from Vehicle Pollution

The Bush administration, along with state and local governments, should promote smart growth, reduce sprawl, and increase transportation choices. By revitalizing existing communities and designing new developments that have bus, bike, or train service to reduce the reliance on cars, travel will be easier for people.



Building better communities cuts traffic and reduces the distance that commuters have to travel.

Increasing Transportation Choices Decreases Pollution

We can do better. Providing transportation choices such as trains, buses, sidewalks, biking paths, and ridesharing are key aspects of healthy communities where residents can have the option not to drive. Taking these steps would reduce traffic, minimize air pollution, and protect our health, our families, and our future. A 2001 study published in the *Journal of American Medical Association* showed that providing more transportation choices and other traffic control measures during the Atlanta Olympic Games in 1996 reduced traffic 22 percent, air pollution by 28 percent, and asthma attacks by up to 44 percent in children.¹⁴

Better Community Design Cuts Traffic

Efficient development brings houses, workplaces, and shopping areas closer together and reduces the distance of daily commuter travel. Mixed-use design allows integration of residential and commercial zones, making it possible to live near your place of work.¹⁵ This efficient design can be accomplished through infill, transit-oriented development, zoning, and brownfields redevelopment. Transit-oriented development places new development within easy walking distance of a major transit center. Centering activities on a transit station and providing pedestrian-friendly walkways makes transit a convenient mode of transportation. It revitalizes neighborhoods and reduces traffic by up to 20 percent according to the Land Use Transportation Air Quality Connection (LUTRAQ) study from Portland, Oregon.¹⁶



PHOTO ALBERT MELCHER

Businesses, public space, and transportation co-exist on this downtown Denver street.

Changes in Federal Transportation Policy Can Cut Pollution and Provide More Transportation Choices

- Federal and state transportation agencies should balance transportation investments between highways and alternative forms of transportation including public transit, bike paths, and sidewalks.
- They should also support a “fix it first” mentality, which uses resources to maintain existing roads before building new ones. This spends fewer tax dollars for new car-only transportation projects.
- In addition, the EPA and DOT should conduct health risk studies in its environmental review of new road projects with more than 150,000 vehicles per day and provide that information to the public as part of transportation decision-making processes.

We Can Take Action in Our Communities for Clean Transportation

- We can carpool, bus, or take the train to work whenever possible to reduce traffic and pollution; encourage local governments to use clean-burning buses and hybrid cars for public transportation systems and government vehicles.
- Ask our local governments and workplaces to offer more public transportation incentives.
- Incentives might include “Commuter Choice Checks” that give workers a tax deduction for the money they spend using public transit to commute to work, tax credits for walking or biking, or a parking cash-out.

Twenty-Four Scientific Studies Link Health Risks with Highway Pollution

“Our studies suggest that children who live near busy roads are more likely to get leukemia and other forms of cancer. It would be prudent to study such cancer risks near all busy roads where elevated VOC levels are likely.”

—DR. HOWARD WACHTEL,
UNIVERSITY OF COLORADO

The following peer-reviewed and published studies concluded that there is a link between traffic-related air pollution and health risks. The health risks include increased likelihood of asthma, cancer, premature and low-birth weight babies, and a generally higher risk of death. Where possible, we put the researcher’s contact information.¹⁷

1. Children Living Near Busy Roads More Likely to Develop Leukemia, Cancer

A 2000 Denver study showed that children living within 250 yards of streets or highways with 20,000 vehicles per day are six times more likely to develop all types of cancer and eight times more likely to get leukemia. The study looked at associations between traffic density, power lines, and all childhood cancers with measurements obtained in 1979 and 1990. It found a weak association from power lines, but a strong association with

highways. It suggested that Volatile Organic Compound pollution from traffic may be the cancer promoter causing the problem.

Pearson, Wachtel; Robert L. Pearson, and Kristie Ebie. (2000). Distance-weighted traffic density in proximity to a home is a risk factor for leukemia and other childhood cancers. *Journal of Air and Waste Management Association* 50:175-180.

Contact: Professor Howard Wachtel, Department of Electrical Engineering, University of Colorado. phone: (303) 492-7713, e-mail: wachtel@colorado.edu.

2. Road Traffic Contributes to the Origin of Childhood Leukemia

A 2004 Italian study found that Childhood Leukemia is partially caused by roadside emissions in the Province of Varese. The authors conducted a population-based, case-controlled study in the Province of Varese, northern Italy, which was covered by a population-based cancer registry. Their study found that the risk of childhood leukemia was almost four times higher for heavily exposed children compared to children whose homes were not exposed to road traffic emissions of benzene. Children either inhale Benzene as a gas or particulate matter which has absorbed benzene. Their model included traffic density divided into two groups—one greater and one less than 10,000 vehicles per day, distance, and weather conditions to estimate benzene concentration. The researcher’s data suggests that motor vehicle traffic emissions are involved in the origin of childhood leukemia.

“Childhood Leukemia and Road Traffic: A population-based Case-Control study.” Crosignani P; Tittarelli A; Borgini A; Codazzi T; Rovelli A; Porro E; Contiero P; Bianchi N; Tagliabue G; Fissi R; Rossitto F; Berrino F. *International Journal of Cancer*, 2004, V108, N4 (FEB 10), P 596-599 2004-02-10

3. Increasing Public Transportation and Cutting Traffic Reduces Asthma Attacks

This 2001 Journal of the American Medical Association study found that increasing public transportation along with other traffic control measures during the 1996 Atlanta Olympics reduced

SECTION 3

acute asthma attacks by up to 44 percent in children, reduced ozone concentrations by 28 percent, and morning peak traffic by 22.5 percent. These data provide support for efforts to reduce air pollution and improve health via reductions in motor vehicle traffic.

Friedman, Michael; Kenneth Powell MD; Lori Hutwagner; Leroy Graham; Gerald Teague. Impact of Changes in Transportation and Commuting Behaviors During the 1996 Summer Olympic Games in Atlanta on Air Quality and Childhood Asthma, *Journal of the American Medical Association*, 2001; 285:897-905.

Contact: Michael S. Friedman, National Center for Environmental Health, Center for Disease Control and Prevention, email: mff7@cdc.gov.

4. Soot Particulate Matter Linked to Lung Cancer, Cardiopulmonary Mortality

A recent study appearing in the *Journal of the American Medical Association* showed that day-to-day exposure to soot or fine particulate matter, a major component of tailpipe pollution increased the risk of various adverse health effects. More specifically the study shows that each 10 microgram/meter³ elevation in fine particulate air pollution leads to an 8 percent increased risk of lung cancer deaths, a 6 percent increased risk of cardiopulmonary mortality (heart attacks) and 4 percent increased risk of death from general causes.

Pope, Clive Arden III; Richard P. Burnett, et al. Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution. *Journal of the American Medical Association*, March 6 2002— Vol. 287, No. 92.

Contact: Clive Arden Pope, Brigham Young University, phone: (801) 422-2157, e-mail: cap3@email.byu.edu.

5. Truck Traffic Linked to Childhood Asthma Hospitalizations

A study in Erie County, New York (excluding the city of Buffalo) found that children living in neighborhoods with heavy truck traffic within 220 yards of their homes had increased risks of asthma hospitalization. The study examined hospital admission for asthma amongst children ages 0-14, and residential proximity to roads with heavy traffic.



Over the last 50 years we have torn down communities to build highways. We need to rebuild our future with clean transportation and better community design.

Lin, Shao; Jean Pierre Munsie; Syni-An Hwang; Edward Fitzgerald; and Michael R. Cayo; (2002). Childhood Asthma Hospitalization and Residential Exposure to State Route Traffic. *Environmental Research*, Section A, Vol. 88, pp. 73-81.

6. Pregnant Women Who Live Near High Traffic Areas More Likely to Have Premature and Low Birth Weight Babies

Researchers observed an approximately 10-20 percent increase in the risk of premature birth and low birth weight for infants born to women living near high traffic areas in Los Angeles County. In particular, the researchers found that for each one part-per-million increase in annual average carbon monoxide concentrations where the women lived, there was a 19 percent and 11 percent increase in risk for low-birth weight and premature births, respectively.

Wilhelm, Michelle and Beate Ritz. (2002). Residential Proximity to Traffic and Adverse Birth Outcomes in Los Angeles County, California, 1994-1996. *Environmental Health Perspectives*. doi: 10.1289/ehp.5688.

Contact: Beate Ritz, Department of Epidemiology, School of Public Health, UCLA, phone: (310) 206-7458, e-mail: britz@ucla.edu.

7. Traffic Increased Cancer-Causing Pollution Levels at Tollbooth

A 2003 study published in the *Journal of Air &*

You do not need to be a public health official to know that it is dangerous to breathe diesel exhaust.



Waste Management shows that there is a “significant association between vehicle traffic and curbside concentrations of the carcinogens benzene, 1,3-butadiene, and particle-bound polycyclic aromatic hydrocarbons (PAH).” The measurements, which were taken at the Baltimore Harbor Tunnel toll-booth, show that much of the daily pollutant variability was explained by traffic volume, class and meteorology. The study provides a model for estimating curbside pollution levels associated with traffic that may be relevant to exposures in the urban environment.

Sapkota, Amir and Buckley, Timothy J. The Mobile Source Effect on Curbside 1,3-Butadiene, Benzene, and Particle-Bound Polycyclic Aromatic Hydrocarbons Assessed at a Tollbooth. *Journal of Air & Waste Management*. 53:7400748.

Contact: Dr. Timothy J. Buckley, Department of Environmental Health Sciences, Johns Hopkins Bloomberg School of Public Health; phone: (410) 614-5750, e-mail: tbuckley@jhsph.edu.

8. Air Inside Cars Typically Contains More Dangerous Air Pollutants than Outside

The results of 23 separate scientific studies shows that in-car air pollution levels frequently reach concentrations that may threaten human health. The reports show that the air inside of cars typically contains more carbon monoxide, benzene, toluene, fine

particulate matter, and nitrogen oxides than ambient air at nearby monitoring stations. These pollutants are particularly dangerous for children, the elderly, and people with asthma or other respiratory conditions.

Kimbrell, Andrew. In-Car Air Pollution: The Hidden Threat to Automobile Drivers. International Center for Technology Assessment. July 2000.

Contact: Andrew Kimbrell, phone: (202) 547-9359, email: kimbrell@icta.org

9. People Who Live Near Freeways Exposed to 25 Times More Soot Particulate Pollution

Studies conducted in the vicinity of Interstates 405 and 710 in Southern California found that the number of ultra-fine soot particles in the air was approximately 25 times more concentrated near the highways and that pollution levels gradually decrease back to normal (background) levels around 300 meters, or nearly 330 yards, downwind from the highway. The researchers note that motor vehicles are the most significant source of ultra-fine particles, which have been linked to increases in mortality and morbidity. Recent research concludes that ultra-fine soot particles are more toxic than larger particles with the same chemical composition. Moreover, the researchers found considerably higher concentrations of carbon monoxide pollution near the highways.

Zhu, Yifang; William C. Hinds; Kim Seongheon; Si Shen; Constantinos Sioutas. Concentration and size distribution of ultra-fine particles near a major highway. *Journal of the Air and Waste Management Association*. September 2002. And, Study of ultra-fine particles near a major highway with heavy-duty diesel traffic. *Atmospheric Environment*. 36(2002), 4323-4335.

10. Motor Vehicle Pollution Dominate Cancer Risk

The most comprehensive study of urban toxic air pollution ever undertaken shows that motor vehicles and other mobile sources of air pollution are the predominant source of cancer-causing air pollutants in Southern California. Overall, the study showed that motor vehicles and other mobile sources accounted for about 90 percent of the cancer risk from toxic air pollution, most of which is from diesel soot (70 percent of the cancer risk). Industries and

other stationary sources accounted for the remaining 10 percent. The study showed that the highest risk is in urban areas where there is heavy traffic and high concentrations of population and industry.

South Coast Air Quality Management District. Multiple Air Toxics Exposure Study-II. March 2000.

Contact: Steve Barbosa, phone: (909) 396-2171, sbarbosa@aqmd.gov. or Barbara Weller, California Air Resources Board, phone: (916) 324-4816.

11. Lung Function Reduced Among Children Living Near Truck Traffic

A European study determined that exposure to traffic-related air pollution, "in particular diesel exhaust particles," may lead to reduced lung function in children living near major motorways.

Brunekreef, B; N.A. Janssen ; J. DeHartog; H. Harssema ; M. Knap; P. Van Vliet (1997). "Air pollution from truck traffic and lung function in children living near motorways." *Epidemiology*. 8(3):298-303.

12. Traffic-Related Air Pollution Associated with Respiratory Symptoms in Two Year Old Children

This cohort study in the Netherlands found that two year old children who are exposed to higher levels of traffic-related air pollution are more likely to have self-reported respiratory illnesses, including wheezing, ear/nose/throat infections, and reporting of physician-diagnosed asthma, flu or serious cold.

Brauer, Dr. Michael J. et al. (2002). Air Pollution from Traffic and the Development of Respiratory Infections and Asthmatic and Allergic Symptoms in Children. *American Journal of Respiratory and Critical Care Medicine*. Vol. 166 pp 1092-1098.

Contact: Dr Michael Brauer, School of Occupational and Environmental Hygiene, University of British Columbia, Vancouver, British Columbia, Canada. Phone: (604) 822-9585, e-mail: brauer@interchange.ubc.ca.

13. Asthma Symptoms Caused by Truck Exhaust

A study was conducted in Munster, Germany to determine the relationship between truck traffic and asthma symptoms. In total, 3,703 German students, between the ages of 12-15 years, completed a written and video questionnaire in 1994-1995. Positive associations between both wheezing and allergic rhinitis and truck traffic were found during a 12



month period. Potentially confounding variables, including indicators of socio-economic status, smoking, etc., did not alter the associations substantially.

Duhme, H.; S.K. Weiland, et al. (1996). The association between self-reported symptoms of asthma and allergic rhinitis and self-reported traffic density on street of residence in adolescents. *Epidemiology* 7(6):578-82.

14. Proximity of a Child's Residence to Major Roads Linked to Hospital Admissions for Asthma

A study in Birmingham, United Kingdom, determined that living near major roads was associated with the risk of hospital admission for asthma in children younger than five years of age. The area of residence and traffic flow patterns were compared for children admitted to the hospital for asthma, children admitted for non-respiratory reasons, and a random sample of children from the community. Children admitted with an asthma diagnosis were significantly more likely to live in an area with high traffic flow (more than 24,000 vehicles/ 24 hrs) located along the nearest segment of main road.

Edwards, J.; S. Walters, et al. (1994). Hospital admissions for asthma in preschool children: relationship to major roads in Birmingham, United Kingdom. *Archives of Environmental Health*. 49(4):223-7.

15. Exposure to Cancer-Causing Benzene Higher for Children Living Near High Traffic Areas

German researchers compared 48 children who lived in a central urban area with high traffic density

Many schools are located near busy roads in addition to having diesel buses idling nearby.

Despite strong opposition prior to its construction, Salt Lake City's TRAX system is running strong. It carries over 20,000 riders every day—many of whom commuted in cars before switching to rail.



with 72 children who lived in a small city with low traffic density. They found that the blood levels of benzene in children who lived in the high-traffic-density area were 71 percent higher than those of children who lived in the low-traffic-density area. Blood levels of toluene and carboxyhemoglobin (formed after breathing carbon monoxide) were also significantly elevated (56 percent and 33 percent higher, respectively) among children regularly exposed to vehicle pollution. Aplastic anemia, a serious condition in which bone marrow stops producing blood cells, and leukemia were associated with excessive exposure to benzene.

Jermann E, H. Hajimiragha, A. Brockhaus, I Freier, U. Ewers, A. Roscovanu: Exposure of children to benzene and other motor vehicle emissions. *Zentralblatt für Hygiene und Umweltmedizin* 189:50-61, 1989.

16. Air Pollution from Busy Roads Linked to Shorter Life Spans for Nearby Residents

Dutch researchers looked at the effects of long-term exposure to traffic-related air pollutants on 5,000 adults. They found that people who lived near a main road were almost twice as likely to die from heart or lung disease and 1.4 times as likely to die from any premature cause compared with those who lived in less-trafficked areas. The authors say traffic emissions contain many pollutants that might be responsible for the health risks, such as ultra-fine particles, diesel soot, and nitrogen oxides, which have been linked to cardiovascular and respiratory problems.

Hoek, Brunekreef, Goldbohn, Fischer, van den Brandt. (2002). Association Between Mortality and Indicators of Traffic-related Air Pollution in the Netherlands: A Cohort Study. *Lancet*, 360 (9341): 1203-9.

17. Asthma More Common for Children Living Near Highways

A study of nearly 10,000 children in England found that wheezing illness, including asthma, was more likely with increasing proximity of a child's home to main roads. The risk was greatest for children living within 90 yards of the road.

Venn et al. (2001). Living Near A Main Road and the Risk of Wheezing Illness in Children. *American Journal of Respiratory and Critical Care Medicine*. Vol. 164, pp 2177-2180.

18. Exposure to Nitrogen Dioxide (NO₂) from Vehicles Exacerbates Asthma Attacks

Researchers at St. Mary's Hospital in Portsmouth, England determined that while 80 percent of asthma attacks are initially caused by viral infections, exposure to traffic pollution can increase symptoms as much as 200 percent. The team measured the exposure of 114 asthmatic children between ages eight-eleven from nonsmoking families over almost a whole year. They found a strong correlation between higher NO₂ pollution and the severity of an attack.

Chauhan, A.J., et al. Personal exposure to nitrogen dioxide (NO₂) and the severity of virus-induced asthma in children. *Lancet*. Volume 361 Issue 9373 Page 1939.

19. A School's Proximity to Highways Associated with Asthma Prevalence

A study of 1,498 children in 13 schools in the Province of South Holland found a positive relationship between school proximity to highways and asthma occurrence. Truck traffic intensity and the concentration of pollutants measured in schools were found to be significantly associated with chronic respiratory symptoms.

Van Vliet, P., M. Knape, et al. (1997). Motor vehicle exhaust and chronic respiratory symptoms in children living near freeways. *Environmental Research*. 74(2): 122-32.

20. Five Times More Deaths Due to Air Pollution than Traffic Accidents

This study analyzed the affect of traffic-related air pollution and traffic accidents on life expectancy in the area of Baden-Wurttemberg, Germany. It estimated that almost five times more deaths in this region resulted from motor vehicle pollution than from traffic accidents.

Szagan and Seidel. (2000). Mortality due to road traffic in Baden-Aurttemberg. *Gesundheitswesen*. 62(4): 225-33.

21. Cancer Risk Higher Near Major Sources of Air Pollution, Including Highways

A 1997 English study found a cancer corridor within three miles of highways, airports, power plants, and other major polluters. The study examined children who died of leukemia or other cancers from the years 1953-1980, where they were born and where they died. It found that the greatest danger lies a few hundred yards from a highway or polluting facility and decreases as you get further away from the facility.

Knox and Gilman (1997). Hazard proximities of childhood cancers in Great Britain from 1953-1980. *Journal of Epidemiology and Community Health*. 51: 151-159.

22. Diesel Exhaust Linked to Asthma

This study found that particulate matter from diesel trucks can act as an irritant in the airway causing asthma. The authors show that diesel exhaust can trigger asthma attacks in individuals with no

pre-existing asthmatic history. When a natural allergen, such as pollen, was added to the situation, the reaction was even more dramatic.

Pandya, Robert, et al. "Diesel Exhaust and Asthma: Hypothesis and Molecular Mechanisms of Action." *Environmental Health Perspectives Supplements* Volume 110, Number 1, February 2002.

23. Low Levels of Air Pollution Cause Asthma Attacks

Exposure to miniscule amounts of ozone and soot particulate matter 2.5 µm or less (PM2.5) in air at levels above current U.S. Environmental Protection Agency (EPA) standards is a risk factor for respiratory symptoms in children with asthma.

Daily respiratory symptoms and medication use were examined prospectively for 271 children younger than 12 years with physician-diagnosed, active asthma residing in southern New England. Exposure to ambient concentrations of ozone and PM 2.5 from April 1 through September 30, 2001, was assessed using ozone (peak 1-hour and 8-hour) and 24-hour PM 2.5. Logistic regression analyses using generalized estimating equations were performed separately for maintenance medication users (n = 130) and nonusers (n = 141). Associations between pollutants (adjusted for temperature, controlling for same- and previous-day levels) and respiratory symptoms and use of rescue medication were evaluated.

Mean (SD) levels were 59 (19) ppb (one-hour



Don't inhale!
In-car pollution contains more toxins than ambient air according to a California study.



One happy commuter!

Lea loves Disney's monorail, but wishes that she had more transportation choices sooner.

24. Motor Vehicle Air Toxins Cause High Pollution Levels Inside Homes

An air pollution study was done as a part of the West Oakland Diesel Truck Emissions Reduction Initiative. Researchers measured diesel particulates near mobile and idling trucks at the West Oakland Port. An aethalometer was used to measure indoor toxins and a high level of diesel particulates was found. The people who lived in these homes were exposed indoors to five times the level of diesel particulates that people were exposed to outdoors in other areas of Oakland.

W. Buchan, M.D. and M. Chan Jackson; Container Truck Traffic Assessment and Potential Mitigation Measures for the West Oakland Diesel Truck Emission Reduction Initiative, from "Clearing the Air, Reducing Diesel Pollution in West Oakland," a Report to Pacific Institute, 654 13th Street, Preservation Park, Oakland, California 94612, by TIAX LLC, 1601 S. De Anza Blvd., Suite 100, Cupertino, California 95014, November, 2003

The following technical reports are online at: <http://www.pacinst.org/diesel/>

1. TIAX Diesel Truck Study (TIAX, 2003)
2. West Oakland Diesel Particulate Matter Emissions Inventory and Air Quality Monitoring Study (Pacific Institute (PI), 2003)
3. Summary of Studies (PI, 2003)
4. Data Gap Analysis (PI, 2003)

average) and 51 (16) ppb (8-hour average) for ozone and 13 (8) $\mu\text{g}/\text{m}^3$ for PM_{2.5}. In co-pollutant models, ozone level but not PM_{2.5} was significantly associated with respiratory symptoms and rescue medication use among children using maintenance medication; a 50-ppb increase in one-hour ozone was associated with increased likelihood of wheeze (by 35 percent) and chest tightness (by 47 percent). The highest levels of ozone (one-hour or eight-hour averages) were associated with increased shortness of breath and rescue medication use. No significant, exposure-dependent associations were observed for any outcome by any pollutant among children who did not use maintenance medication.

Asthmatic children using maintenance medication are particularly vulnerable to ozone, controlling for exposure to fine particles, at levels below EPA standards.

Gent, Janneane PhD; Elizabeth W. Triche, PhD; Theodore R. Holford, PhD; Kathleen Belanger, PhD; Michael B. Bracken, PhD; William S. Beckett, MD; Brian P. Leaderer, PhD, Association of Low-Level Ozone and Fine Particles With Respiratory Symptoms in Children With Asthma, *Journal of the American Medical Association*. 2003; 290:1859-1867.

<http://jama.ama-assn.org/cgi/content/abstract/290/14/1859>.

Highway Health Hazard Stories

The following stories highlight transportation-related air pollution issues from around the country. As metropolitan areas continue to sprawl and traffic congestion worsens, communities are facing important long-term decisions about transportation. The Sierra Club believes that widening and building new highways is not only poor transportation policy but also threatens public health.

We realize that there are transportation challenges around the country, but we believe that reasonable, alternative solutions exist that expand transportation choices, reduce congestion, and help to clean our air.

We have included stories from California, Illinois, Nevada, New Hampshire, Ohio, Texas, Utah, Washington, D.C. and Wisconsin.

California

Challenge. Existing air pollution laws in Southern California set the maximum emission limits for toxic pollution from individual facilities, but cumulative emissions of toxic pollutants are not regulated. Highways are an important contributor to the cumu-

lative emissions of toxic air pollutants in a given area but are currently not regulated as individual facilities.

Solution. The South Coast Air Quality Management District is developing a plan that would entail new public notification requirements for schools and home builders and make the regional air pollution control agency more prominent in land use decisions. One proposal for the plan would require developers of new schools, hospitals, day care centers, and home builders to provide notice to their patrons of toxic emissions within 1,000 feet. The presence of any freeway, or potentially busy boulevard, within 1,000 feet could trigger the notice. "I don't think that they should build a school that lies along a freeway," said Barry Wallerstein, Executive Officer of the South Coast Air Quality Management District.¹⁸

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Illinois

Challenge. The Illinois Department of Transportation is planning to expand the Eisenhower Expressway through Oak Park. The Illinois Tollway Authority has proposed building tollways; Route 53 into Lake County north of Chicago and I-355 in Will County south of Chicago. These highways and tollways will create hundreds of thousands of added truck and car trips near neighborhoods, schools, and parks. Families with small children could be put at risk, but are unaware of the health consequences of larger roadways near their homes.



Children design alternative transportation options. Why won't the Bush administration put more money into clean buses and trains?

Solution. The Illinois DOT and Tollway authority should examine the cancer, asthma, and other health impacts on local neighborhoods, schools and children and invest more in public transportation to reduce traffic and pollution risks.

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Nevada

Challenge. Public health and environmental advocates in Las Vegas support widening U.S. 95 from six to ten lanes. A Sierra Club supported independent study concluded that widening U.S. 95 would cause up to 1,400 more cancers per one million people over 70 years or more than 1000 times the EPA goal of one-in-a-million cancer risk. The Sierra Club is suing to stop the project, because the Bush Administration failed to consider health consequences and alternatives to highway construction as required by law.

Solution. When alternatives to the project are assessed it will quickly become evident that less polluting options exist, such as clean diesel buses and light rail. In order to avoid significant increases in cancer causing emissions from trucks and cars, more highway lanes should not be considered a reasonable option.

For more information see USA Today article by John Ritter titled "Lawsuit Pits Risks and Roads." USA Today, Friday, March 7, 2003 at www.usatoday.com/news/nation/2003-03-06-vegas-highway-usat_x.htm.

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New Hampshire

Challenge. The U.S. EPA Region 1's office has accused the state of New Hampshire of failing to prepare for the environmental impact of the rapid population boom that is expected to follow the widening of Interstate-93, the main commuter highway connecting the state to Boston, Massachusetts. This is one of the highways that the Bush administration has fast tracked for approval, which may not leave enough time to study the health implications of widening Interstate-93. New Hampshire plans to spend \$18 million to ease the environmental impacts of the highway project, but that is far too little to address a likely population boom in more than 20 New Hampshire communities that would tax existing services and threaten open spaces, drinking water supplies, and wildlife.

Solution. Robert Varney, head of the EPA for New England, called for a total of \$52 million to be allocated to environmental protections and threatened delays in the highway project if the environmental concerns weren't adequately addressed. The state is counting on federal highway dollars to cover 80 percent of the cost of the \$350 million project, meaning the EPA has significant say in the highway's future. The EPA should focus on alternative transportation plans, such as clean buses and a rail system, which would protect public health and the environment. In addition, environmental leaders are looking for mitigation and technical assistance to protect towns bordering the highway and teach them how to protect themselves.

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Ohio

Cincinnati Challenge. In the fall of 2003, after a two-year long study of increasing gridlock on I-75 in SW Ohio, one of the nation's most congested interstate highway sections, a committee representing local regional governments and the Ohio Department of Transportation (ODOT) recommended building passenger train service from downtown Cincinnati to the northern suburbs along I-75.

However, the committee's recommendation also included a plan to widen the highway by one or two lanes, despite clear evidence from an independent consultant that high frequency passenger trains in this area are the "only solution to the congestion problem."

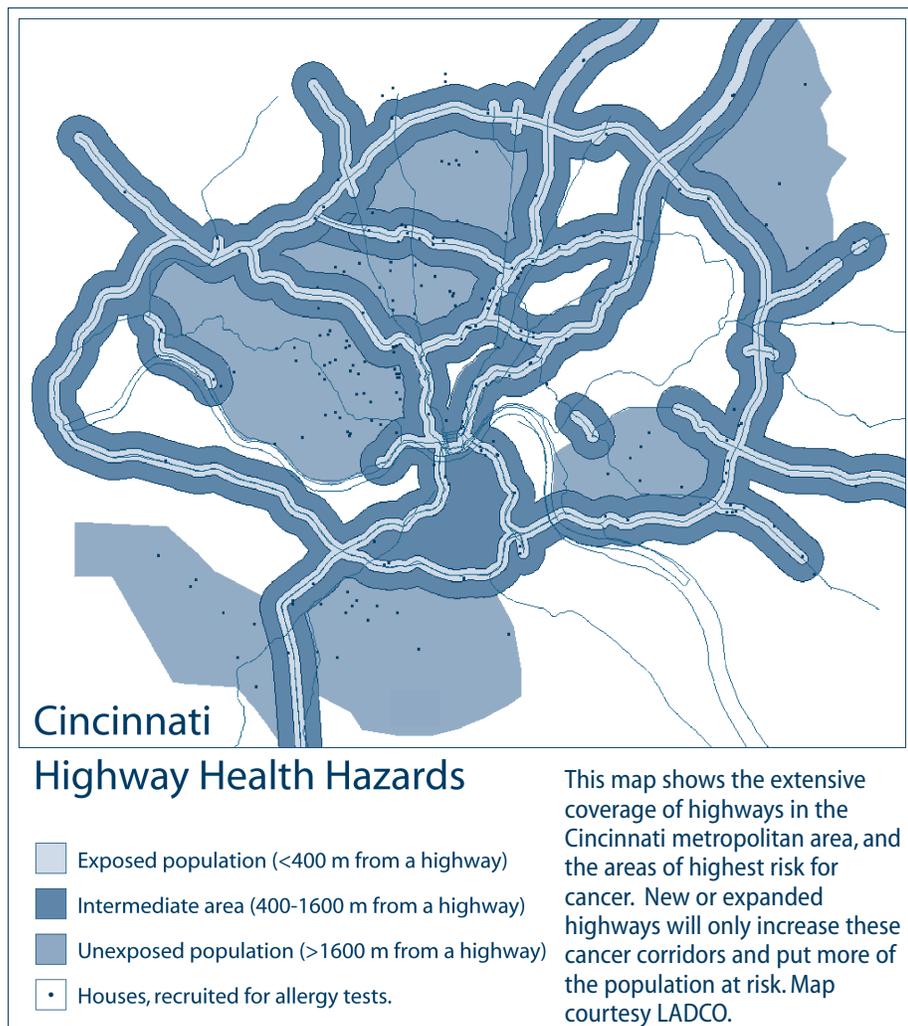
The study's own expert consultants predict that widening I-75 by one lane would result in a 30% increase in region-wide traffic by 2030, and at no time would widening by one lane improve traffic congestion levels above "failing" levels as measured by ODOT.

Furthermore, a cost-benefit study, conducted by HLB Decision Economics of Maryland and directed by a panel of economists and transportation experts from Cincinnati-area businesses, universities, and governments, found that "the benefits from highway expansion would be concentrated in the early years of the life cycle of the project and that these benefits erode over the years," whereas "the light rail train benefits grow over the years because commuters would divert to transit as congestion worsens in the corridor."

Analysis of the proposed train route projected more than \$900 million in net benefits over the next 30 years, with an 8.5 percent rate of return on the investment. The economic benefits of train service include time savings, affordable mobility, and a decrease in air pollution, among other benefits.

Solution. Throughout the study local representatives from the public interest, land use, and academic communities advocated that the public

FIGURE 3



health, environmental, and land use impacts of the each alternative solution be thoroughly examined. One of the most promising solutions raised by several members of the committee is to combine several smart growth land use planning in coordination with the passenger train service. Unfortunately, the committee refused to include these critical factors in the study.

Because Cincinnati has long struggled with poor air quality and the SW Ohio and Northern Kentucky area currently fails to meet federal smog and soot health standards, the proposed highway expansion is likely to have long-term, negative public health impacts.

The Sierra Club strongly supports the passenger train solution and calls for smarter land use practices to support it. We also continue to push for a full eval-

uation of the impact on sprawl and air quality of the proposed highway project.

The Lake Michigan Air Directors are currently assessing the health impacts of highways in the Cincinnati area.

Columbus Challenge. According to a report released by the Ohio Environmental Council, more than a quarter million people in central Ohio live in a diesel hot spot, or an area with chronically elevated levels of toxic air pollutants from diesel engine exhaust. The people living in these areas are at greater risk of suffering from a variety of adverse health effects including asthma, cancer, and even premature death. The hot spots include corridors surrounding all of the Interstate Routes 70, 71, 270, and 670; the U.S. Routes 23, 33, and 36; and portions of State Routes 13, 16, 31, 37, 79, 104, 161, and 315.

Solution. The report recommends both local and state actions to rectify the problem. At the local

level, all school and public transit buses should be retrofitted and switch to ultra-low sulfur diesel fuel. In addition, all vehicles owned or contracted by local governments (i.e. garbage trucks, construction equipment and other city services) should also be retrofitted and powered by cleaner fuel. At the state level, assistance programs should be developed to help localities fund their retrofitting and fuel switching agenda. The state can also mandate that all privately-owned vehicles must retrofit and use ultra-low diesel fuel to reduce pollution.

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Texas

Challenge. The Houston area has been at the center of much debate over major freeway expansions, most notably the Katy Freeway and the Grand Parkway. The Katy Freeway traverses the City of Houston, serving over 200,000 vehicles a day. Local transportation officials plan to enlarge the highway to more than 18 lanes, greatly increasing the number of vehicles traveling through some of the more densely populated areas of the city and surrounding areas.

The Grand Parkway is a proposed series of highway segments that would constitute the fourth "loop" around Houston. Built through or near many small towns, it is considered critical for major housing and commercial developments in the city's suburbs that would be built near the Grand Parkway path, soon after the highway's construction. Portions of Grand Parkway have recently been included in both the I-69 and Trans-Texas Corridor (T-TC) "NAFTA" trade route, which would drastically increase international truck traffic to the region. T-TC is designed to be a road-rail-utility corridor 1 mile wide.

Solution. The current highway expansion plans will hurt neighboring cities and towns but will do little in the long-term to alleviate congestion and urban

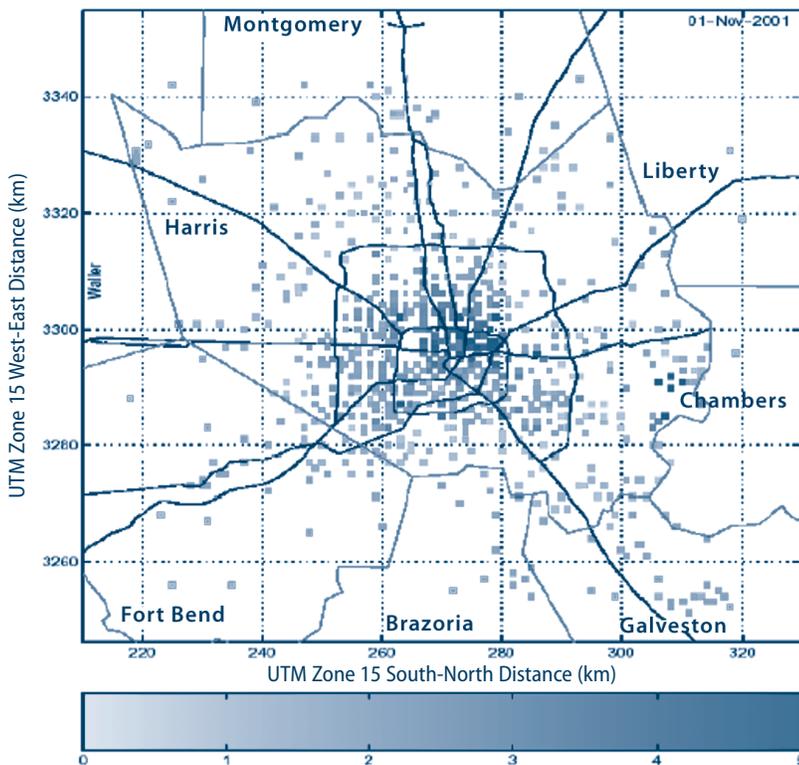


FIGURE 4
Particulate Matter Concentrations, Houston Metro Area

Annual Average Ambient Concentrations of Diesel PM in Houston, 1996, based on Dispersion Modeling Using Industrial Source Complex Short Term (ISCST3) model.



sprawl. Instead of continuing to build new lanes that will induce further sprawl and increase the number of cars on the roads, the Texas Department of Transportation (TXDOT) and Federal Highway Administration (FHWA) should focus on safer and more reasonable alternatives.

For the Katy Freeway, transit alternatives such as expanded rail system and more bus routes should be pursued. A coalition of residents affected by the Katy Freeway expansion project has called upon TXDOT to halt their old and ineffective plan, and adopt an alternative plan which will improve mobility without harming the health and livelihood of citizens. Their alternative plan for the freeway calls for a combination of depressing the road, adding rail and a dense planting of trees to protect schools and residential areas from dangerous fine particulates in freeway pollution.

For the Grand Parkway, resources should be allocated on a "fix it first" approach. Before constructing new freeways to serve a projected population that would not exist without this new road, resources should be focused to more needy projects. For example, a number of existing and poorly maintained highways should be fixed and improved to avoid flooding and relieve unnecessary congestion for existing towns and neighborhoods near portions of the proposed route.

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Utah

Challenge. Utah's Salt Lake City metropolitan area runs along the base of the 10,000 ft. Wasatch Mountains. During winter months low lying, high-pressure inversions trap air pollution from automobiles directly at the level people breathe. This problem causes cases of childhood asthma and respiratory illnesses of the public. In January, 2004 Utah began another winter inversion, filling hospitals with respiratory victims. The state is asking people not to drive and prohibiting wood burning stoves and fireplaces.

Exacerbating the problem, Utah is undertaking three highway expansions. The State of Utah is preparing for another expansion of I-15 to the north, pushing through court the first phase of a new 125-mile bypass freeway ironically named the Legacy Highway, and beginning an Environmental Impact Statement process for a second phase of Legacy in western Salt Lake County re-named for political and legal reasons, the Mountain View Corridor. Each of these projects facilitates massive sprawling development and increases automobile dependency. Legacy Highway would also act as a trucking bypass route, which would significantly increase the pollution from trucks in the metropolitan area.

Solution. Utah should postpone new road building and change their priority to building a regional transit system first. This could be accomplished by expanding upon the very popular and

Air pollution obscuring downtown Salt Lake City is hard on eyes and harmful to children's lungs.

successful two existing light rail lines and adding commuter train and bus rapid transit construction to the mix. A regional transit system would encourage smarter development patterns that would reduce automobile use and protect public health from air pollution related illnesses.

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Washington D.C. Metro Area

ICC Challenge. In 2002, the Maryland Legislature passed a resolution urging that a five year old study concerning the Inter-County Connector (ICC) be restarted. The new Governor, Robert Ehrlich, favors re-starting the study and building the highway as quickly as possible. The Sierra Club has raised the health issue to the Legislature, to public officials, and to the public in various materials. Pro-highway advocates say the ICC will improve air quality and health by getting cars traveling at higher speeds, and thus emitting less pollution. However, data previously highlighted in this report would suggest otherwise.

Solution. Instead of adding a highway extremely close to communities throughout much of Maryland, the state should instead examine ways to implement realistic alternative forms of transportation. A train system is the option that holds the most promise.

Wilson Bridge Challenge. The fate of this project was formally decided in 1997. But since then the Sierra Club has urged Maryland and Virginia to choose train, rather than High Occupancy Vehicle lanes, for the bridge. The Sierra Club has stressed the air quality benefits from less traffic and more public transit.

Solution. Instead of expanding the bridge to hold more cars, the state should instead add a lane for commuter train. Many of the drivers who utilize the Wilson Bridge are commuters traveling to the fairly concentrated downtown of the District of Columbia. As a result, Metrorail would be an effective method for transporting many of these workers.

Beltway Challenge. Virginia Department of Transportation issued a DEIS in 2002 which proposed widening the Beltway from eight lanes to ten or twelve lanes. Sierra Club organized against the proposal with the message that widening the Beltway would worsen air quality and hurt public health. The Beltway already passes in close proximity to many communities surrounding the DC area. Further expansion would undoubtedly worsen air pollution and put more people at risk of cancer and other adverse health effects.

“**C**onsiderable scientific evidence links higher rates of asthma and other respiratory problems with freeway proximity. Residents who live near freeways would clearly benefit from lower, not higher traffic volumes.”

—DR. SETH FOLDY, FORMER CITY OF MILWAUKEE HEALTH COMMISSIONER

Solution. The Beltway does not have a subway line that mirrors its path around the city. Before any lane expansion should even be considered, people should be given the option of traveling around the perimeter of the city on public transit and particularly on a new Metrorail line.

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Wisconsin

S.E. Challenge. Southeast Wisconsin road builders and developers proposed a massive highway expansion project for Hwy I-94 and Hwy 45. The impact of highway expansion will be the greatest in Milwaukee County, where numerous schools are within a mile of highways. Milwaukee County is also home to minorities and lower income residents in metropolitan Milwaukee. The plan is to increase the number of lanes of I-94 and Hwy-45 from six lanes to eight lanes of traffic. This plan would increase air pollution, encourage augmented traffic flow, and will put at risk Wisconsin residents' ability to breathe clean air.

Solution. Since highly traveled road corridors are becoming hazardous to our health, then one logical alternative would be to utilize transportation investments to slow the growth of vehicle miles traveled on our roadways. The best example of that is the transportation improvements in Portland, Oregon that considered land use and air quality issues during the planning process. Milwaukee is an area of non-compliance for ground-level ozone pollution, Portland is not.

Madison Challenge. The City of Madison and WI DOT are reconstructing East Washington Avenue to ease the flow of traffic, now at 55,000 vehicles per day. This route runs near East High School and several grade schools. Pollution monitors show high levels of soot or particulate pollution already. Wisconsin DOT is also expanding the Verona Road interchange located near many neighborhoods.

Solution. The DOT should assess the cancer and smog risks to these schools, and nearby neighborhoods, and consider alternatives like streetcars, commuter trains, and clean buses that can cut traffic and pollution risks.

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Appendix

Resources and Local Information

Endnotes

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Appendix

Resources and Local Information

www.sierraclub.org/sprawl is a comprehensive website with information on cutting traffic and air pollution

Statistics on pedestrian safety, congestion, federal transportation spending, and household transportation expenditures can be found for each state and some smaller regions at:

<http://transact.iracorp.com/states/default.asp>

Maps of local cancer-causing pollution can be found at: <http://www.epa.gov/ttn/atw/nata/>

To find local traffic or VMT (Vehicle Miles Traveled), check your local Metropolitan Planning Organization (MPO) or find regional statistics on congestion, travel delay, fuel consumption and congestion cost at:

http://mobility.tamu.edu/ums/mobility_data/

Information on public transit spending, smog, and investment in transportation choices for our 50 largest cities can be found at: www.sierraclub.org/sprawl/report01/charts.asp.

Information on hazardous air pollution in your area can be found at the Environmental Defense website:

<http://www.scorecard.org/env-releases/hap/>

The "State of the Air" report, released by the American Lung Association can be found at: <http://lungaction.org/reports/stateoftheair2003.html>



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