



Children's Exposure to Diesel Engine Exhaust – Important Facts For Consideration

How Bad is Diesel Exhaust?

Diesel exhaust is a sooty cocktail containing 40 different chemicals classified as “Toxic Air Contaminants” by the State of California¹ and “hazardous air pollutants” by the US EPA under the Clean Air Act.²

Diesel exhaust has been associated with premature mortality, increased risk of lung cancer among truck drivers, immunological reactions including inflammation of the airways, airway constriction, asthma, chronic bronchitis, reductions in pulmonary function, chronic cough, phlegm, chest tightness, wheezing and increased susceptibility to infections.³

Diesel exhaust has been demonstrated in more than 30 human epidemiological studies to increase cancer risk.⁴

The state of California identified diesel engine exhaust as a known carcinogen in 1990⁵ and the US EPA designates diesel exhaust a likely human carcinogen.⁶

California's South Air Coast Air Quality Management District recently estimated that 90% of the cancer risk from air pollutants in the area and 70% state-wide is associated with diesel emissions. Two national associations of air pollution regulators have

¹ California Air Resources Board Toxic Air Contaminant List, December 1999, <http://www.arb.ca.gov/toxics/catable.htm>

² Wargo, J., “Children's Exposure to Diesel Exhaust on School Buses,” February 2002, p.10.

³ Wargo, p. 23.

⁴ California Air Resources Review Board, Findings of the Scientific Review Panel on “The Report on Diesel Exhaust” as adopted at the Panel's April 22, 1998, Meeting, p.4. <http://www.arb.ca.gov/toxics/dieseltac/de-fnds.pdf>

⁵ State of California Environmental Protection Agency Office of Environmental Health Hazard Assessment Safe Drinking Water and Toxic Enforcement Act of 1986, “Chemicals Known to the State to Cause Cancer or Reproductive Toxicity,” February 3, 2006, p. 6.

http://www.oehha.ca.gov/prop65/prop65_list/files/P65single20306.pdf

⁶ <http://www.epa.gov/cleanschoolbus/>

estimated, based on lifetime risk, that diesel exhaust is responsible for 125,000 excess cancer cases in the United States each year.⁷

Who is at Risk?

People with existing heart or lung disease, asthma or other respiratory problems are most sensitive to the health effects of fine particles from diesel exhaust.

Due to a child's developing body and lungs, narrower airways, faster metabolism, and faster breathing rate than adults, children riding our buses are the most susceptible population to the hazards of diesel exhaust.⁸

Are California School Children Exposed?

In California roughly one million children ride to school every day on diesel powered buses. Students spend an hour and a half each weekday in a school bus, which means that the average child riding the bus to and from school can be exposed to 270 hours of elevated levels of diesel exhaust per year.⁹

Studies by the California Air Resources Board and others have established that much of a bus' own diesel exhaust enters the cabin from cracks in the exhaust train and through windows and doors. This phenomenon, called "self-pollution," is responsible for a significant portion of the diesel exhaust kids breathe inside the bus cabin.

Nationally, the average school bus is 9 years old and emits nearly two times more pollution per mile than a big rig truck.¹⁰ As of 2003, roughly fifty percent of California school buses were more than 15 years old. These buses, built before 1991, are allowed to release at least six times more toxic soot and three times more smog forming nitrogen oxides than newer models; which means that as of 2003, half of the buses in California were exposing children to a significantly increased cancer risk.¹¹

Since 2003, both the Los Angeles and San Francisco Unified School Districts have taken initiative to modernize their school bus fleets. While modernizing school bus fleets with newer diesel buses is an improvement, it does not eliminate the problem.

⁷ State and Territorial Air Pollution Program Administrators and the Association of local Air Pollution Control Officials, "Cancer Risk from Diesel Particulate: National and Metropolitan Area Estimates for the United States," March 15, 2000, p. 2. <http://www.4cleanair.org/comments/Cancerriskreport.PDF>

⁸ US EPA Clean School Bus USA Program, <http://www.epa.gov/cleanschoolbus/humanhealth.htm>

⁹ US EPA Clean School Bus USA Program, <http://www.epa.gov/cleanschoolbus/> and US Department of Education, http://nces.ed.gov/surveys/pss/tables/table_15.asp

¹⁰ Union of Concerned Scientists, School Bus Report Card 2006, http://www.ucsusa.org/clean_vehicles/big_rig_cleanup/clean-school-bus-alliance-action-alert-7.html#Preview_UCS_School_Bus_Report_Card_2006

¹¹ UCS Pollution Report Card, http://www.ucsusa.org/clean_vehicles/big_rig_cleanup/pollution-report-card.html p. 17.

California school children continue to be exposed to diesel exhaust. Furthermore, many smaller school districts throughout the state have yet to act.

To date, of the 25,000 school buses in California, seventy percent (17,500 school buses) are diesel-powered and only a small fraction of these have been outfitted with emissions controls. Furthermore, roughly 700 buses still in use in California were built before 1977.¹²

How much diesel exhaust are kids breathing?

A recent study recently found that children riding on diesel fueled school buses in the Los Angeles area inhale roughly one million times more school bus exhaust (by mass) than non-riders in the general population.¹³

Closing the bus' windows simply makes the situation worse. One study conducted by the California Air Resources Board found that concentrations of diesel vehicle-related pollutants are significantly higher on board diesel school buses when the windows are closed due to the intrusion of the bus' own exhaust.¹⁴

What effect does diesel exhaust have on children?

Diesel exhaust contains significant levels of small particles, known as fine particulate matter (PM 2.5). Fine particles are so small that several thousand of them could fit on the period at the end of this sentence. Fine particles pose a significant health risk because they can pass through the nose and throat and lodge themselves in the lungs. These fine particles can cause lung damage and premature death. They can also aggravate conditions such as asthma and bronchitis.¹⁵

Nearly 94% of diesel particles are less than 2.5 micrometers. These smaller particles are able to penetrate children's narrower airways reaching deeply into the lung, where they are more likely to be retained. Pound for pound children breathe nearly 50% more air than is inhaled by adults.¹⁶

Children on school buses are exposed at times to levels of fine particulate matter (PM 2.5) that are five to fifteen times higher than background levels.¹⁷

¹² MEMO, April 25, 2006, (Tom Plenys, LAUSD to Tim Carmichael, Coalition for Clean Air) Re: LAUSD Contracted Bus Fleet.

¹³ Marshall, J., Behrentz, E. "Vehicle Self-Pollution Intake Fraction: Children's Exposure to School Bus Emissions," *Environmental Science & Technology* 39 (8): 2559.

¹⁴ California Air Resources Board Final Report "Characterizing the Range of Children's Pollutant Exposure During School Bus Commutes," October 2003, p. 166.

http://www.eere.energy.gov/afdc/apps/toolkit/pdfs/carb_bus_emission.pdf

¹⁵ US EPA Clean School Bus USA Program, <http://www.epa.gov/cleanschoolbus/humanhealth.htm>

¹⁶ Wargo, p.10.

¹⁷ Wargo, p.10.

Under federal law, the emissions children are exposed to by riding in schools buses, translate into *significant* risk of cancer to children. In fact, these exposures pose as much as 23 to 46 times the cancer risk level considered significant under federal law.¹⁸

While children make up 25% of the population, they represent about 40% of the asthma cases. Research indicates that diesel exhaust may increase the frequency and severity of asthma attacks and may lead to inflammation of the airways that can cause or worsen asthma.¹⁹

Cleaner Technologies Exist and Need to be Implemented

Federal, state and local governments have set aside funds earmarked exclusively to help public and private school fleet operators cover the incremental costs of purchasing cleaner alternatives. These funding sources are still relatively limited, however, and parents, educators, and school administrators across the country need to pressure their elected officials to make replacement of old, dirty diesel school buses a top budgetary priority.

Additional References

Several agencies, universities and environmental health groups have looked at this problem and have found diesel emissions pose a health threat to children riding school buses.

Union of Concerned Scientists:

http://www.ucsusa.org/clean_vehicles/big_rig_cleanup/pollution-report-card.html

National Resource Defense Council:

<http://www.nrdc.org/air/transportation/schoolbus/sbusinx.asp>

California Air Resources Board:

<http://cleanenergy.org/pdf/CARB%20Report.pdf>

Yale University:

<http://www.yale.edu/environment/popup/events/spring02/bushazard.html>

Environment and Human Health, Inc.:

<http://www.ehhi.org/diesel/>

Clean Air Task Force:

http://www.catf.us/publications/reports/CATFPurdue_Multi_City_Bus_Study.pdf

¹⁸ Natural Resources Defense Council and the Coalition for Clean Air, "No Breathing in the Aisles: Diesel Exhaust Inside School Buses," p.1, January 2001. <http://www.nrdc.org/air/transportation/schoolbus/schoolbus.pdf>

¹⁹ Natural Resources Defense Council and Coalition for Clean Air, p. 16.