



## **Improved Fleet Management Practices To Reduce Harmful Diesel Emissions**

Developed by the Asthma Regional Council of New England

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### **Asthma and the Environment**

According to a groundbreaking report released by the Asthma Regional Council of New England (ARC) in May 2003, New England has the highest regional rate of adult asthma in the nation. Of the seven states that have the highest rates in the country of adult asthma, five of them are in New England. Over one million adults now have asthma in our region. From 1980 to 1996, the number of asthmatics doubled to over 15 million. The highest rate of increase occurred in children over five years old. We know that asthma is strongly influenced by exposures in the environment, both indoors and outdoors. Recent research suggests asthma, in some cases, is caused by environmental exposures including diesel emissions from school buses.

### **About ARC**

ARC is a coalition of public agencies, private organizations and researchers in New England. Its members bring the diverse perspectives and resources of health, housing, education, environment, managed care and advocacy organizations together to focus on asthma. Leaders with knowledge, resources and determination have joined forces to swiftly identify and implement solutions to improve the lives of those with asthma.

### **Improved School Bus Fleet Management**

ARC members developed this set of guidelines as an informational tool for transportation directors and school superintendents. The document outlines best practices for school bus fleet management that can result in reduced diesel emissions.

#### **Avoid idling to reduce engine wear.**

*Letting an engine idle does more damage to the engine than starting and stopping and produces unnecessary emissions.*

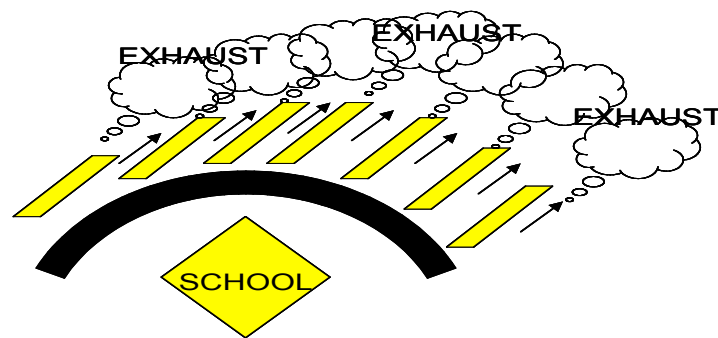
- Running an engine at low speed (idling) causes twice as much wear on internal parts as driving at regular speeds does. Additional wear can increase maintenance costs and shorten the life of the engine. One hour of idling burns one gallon of fuel. Reducing idling reduces emission and saves on fuel costs. Typical fuel consumption during engine start-up is equivalent to about 30 seconds of engine idling.

### **Stagger Arrival and Drop-Offs (Queuing Strategies).**

*Queued idling buses tend to have the highest levels of particulates and black carbon.*

- Idling buses typically accumulate diesel exhaust that may be retained during the ride, depending upon bus ventilation rates. Particulate and carbon concentrations rise rapidly once idling begins. Strategies to reduce idling and wait times amongst buses are very effective in reducing particulates. Figure 2 below demonstrates a dismissal practice that avoids traditional head to tail lining up of buses. In this approach bus exhaust is not near the intake for other buses or the school heating system. It also offers a safety advantage as children walk in front (and not behind) the buses while loading and unloading.

**FIGURE 2. EFFECTIVE QUEUING TO REDUCE CHILDREN'S EXPOSURE TO EMISSIONS**



Plymouth South School District, MA

### **Avoid “caravanning” for field trips and events.**

*Caravanning with other school buses or diesel buses can create a chain of harmful emissions passed from bus to bus.*

- School bus drivers should be instructed to avoid caravanning with other diesel buses whenever possible. At schools which have more than one bus transporting children to and from school, instituting a policy of staggered departure times of buses at that school would significantly reduce children’s exposure to diesel related pollutants.

### **Seat children near the front of bus.**

*If conventional diesel buses are not full, children should be encouraged to sit nearer the front of the bus than the rear.*

- Studies conducted in California indicate that the front of the bus compartment receives less exhaust intake than the rear.



### **Use routing software or employ detailed routing strategies.**

*Routing software can be very effective in reducing drive time which reduces children's exposure to diesel while riding the bus and can save on fuel costs.*

- Districts and/or bus providers can purchase and use routing and planning software that has helped numerous districts reduce fleet size, save on fuels, and minimize rider time. The following examples demonstrate this:
- **MSAD 47 School District, Maine.** Approximately 2,100 students from MSAD 47 (Rome, Oakland, Sidney and Belgrade) ride 34 buses on 48 single routes every school day morning and afternoon. The fleet averages 400,000 miles annually. In the first year using routing software, over 22,000 miles were eliminated, and a newly budgeted route was postponed. During the second year, an established route was totally eliminated. District two-year savings approximate \$80,000 and significantly reduced the diesel emissions in the community.<sup>1</sup>
- **Bridgewater/Rayham School District, Massachusetts.** Using routing software, the district was able to eliminate seven buses from the typical routes. This generated savings to the district of approximately \$280,000 per year and substantially reduced diesel emissions in the community.

### **Tailor Length of Bus Route to buses of different ages.**

*The length of bus routes affects the magnitude of children's exposure to air pollutants in the interior compartment.*

- Time in transit between home and school can vary depending upon the size of the community. Consider using new buses on longer routes to minimize overall emissions.

<sup>1</sup> Goff, L. "VersaTrans Software and E-911 Road Centerline Data Improve School Bus Routes and Save Money," as extracted from [http://www.state.me.us/newsletter/mar2004/versatran\\_software\\_and\\_e.htm](http://www.state.me.us/newsletter/mar2004/versatran_software_and_e.htm), March 2004.

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