Southwest Region University Transportation Center

Idle Reduction Programs and Potential Benefits to Schools

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16. Abstract

School districts in Texas and many other states have, in recent years, increased the "walk zones" surrounding schools to a 2-mile perimeter. Inside this perimeter, either no school bus service is offered, or service is offered only with a fee to parents. Many families living in these neighborhoods opt to drive their children to school, resulting in daily traffic congestion in front of schools (and often spilling onto adjacent streets). The increased vehicle traffic surrounding school facilities presents safety concerns, increases congestion and emissions caused by vehicle idling, and can discourage walking and bicycling even for children living closer to the school. This project will measure the cost benefits of implementing a school bus idle reduction program as a means to offset the cost of increased bus service. Increased bus service would provide a less congested school zone thus providing a safer environment for walkers and bike riders living less than 1 mile from school.

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by

Michelle Hoelscher

Texas Transportation Institute

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Southwest Region University Transportation Center
Texas A&M University System
College Station, Texas 77843-3135

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ABSTRACT

This project examines the cost and benefits of implementing an idle reduction program as a means to offset the cost of increased bus service and improve air quality. Increased bus service would provide a less congested school zone thus providing a safer environment for walkers and bike riders living less than 1 mile from school.

School bus idle reduction programs across the country have shown a significant reduction in gallons of fuel used. In addition to cost and fuel savings as incentive measures for districts, adding increased safety and improved air quality would provide extra motivation for the schools to implement the idle reduction and parent education programs. Offering parents increased bus service may be a reasonable way to attempt to reduce school zone traffic. However, if parents are unwilling to make an alternate mode choice, increasing the service would become cost-prohibitive. Attitudes toward mode choice were evaluated. The opportunity to engage all levels of the community would build additional awareness of regional air quality and school zone safety.

EXECUTIVE SUMMARY

BACKGROUND

Reducing the minimum distance for bus service (for instance, to 1 mile instead of 2) ultimately increases the overall cost of providing service to a wider area. While cost increase is a concern, there are other measures that can be implemented to negate the overall cost of increased bus service while improving safety and air quality at the same time. One such solution would be the implementation of school bus and passenger car idle reduction programs.

School districts in Texas and many other states have, in recent years, increased the "walk zones" surrounding schools to a 2-mile perimeter. Inside this perimeter, either no school bus service is offered, or service is offered only with a fee to parents. Many families living in these neighborhoods opt to drive their children to school, resulting in daily traffic congestion in front of schools (and often spilling onto adjacent streets). The increased vehicle traffic surrounding school facilities presents safety concerns, increases congestion and emissions caused by vehicle idling, and can discourage walking and bicycling even for children living closer to the school.

OBJECTIVES

The primary objective of this study is to measure the costs and benefits of implementing a school bus idle reduction program as a means to offset the cost of selected increased school bus service within the 2-mile minimum busing area. Additionally, this study also sought to understand the mode choice of parents and if a connection between poor air quality in the school zone and traffic congestion, existed in the parents' perception. An important factor to consider was the potential to influence mode choice through education and public outreach. Findings of this study will help determine whether there is an opportunity to influence mode choice through education and awareness. Potential positive mode shift outcomes would reflect increased walking, biking, or riding the school bus. The primary focus of such outreach would outline the positive aspects and overall benefits of the changes in mode shift from passenger vehicle to the alternative modes of walking, biking, and riding the bus.

METHODS

Information and primary data for this report were gathered through conducting three surveys of transportation providers including school bus drivers and parents. Supplemental information and background on school bus idle reductions programs in the state of Texas and across United States were gathered through internet research and literature reviews. The primary objectives of this study are to:

- Determine awareness of the benefits of idle reduction programs among bus drivers and parents in a local community.
- Identify costs and benefits of implementing a school bus idle reduction program.
- Understand reasons for mode choice decisions among parents.
- Determine level of current knowledge regarding the relationship between air quality and traffic congestion.
- Identify public education and awareness resources to increase knowledge about the benefits of idle reduction programs.

Study findings will help increase knowledge about the negative effects of vehicle idling among communities and school districts and the positive benefits of implementing school bus and passenger car idle reduction programs. School bus idle reduction programs across the country have shown a significant reduction in gallons of fuel used.

RECOMMENDATIONS

Recommendations are as follows:

- Create an awareness program.
- Form a "Green Team."
- Define campaign goals and messages.
- Define your audiences.
    - Parents.
    - School bus drivers.
    - School administrators.
- Develop outreach strategies.
- Implement an idle reduction awareness program.

- Provide handouts to parents about the effects of idling in the school zone.
- Measure your success through surveys.

CHAPTER 1: INTRODUCTION

Idling vehicles and buses waste fuel and money and have negative impacts for everyone. Idling impacts air quality, health, and transportation budgets for both school districts and parents. Money can be saved and quality of life improved as a result of vehicle and bus idle reduction programs.

BACKGROUND

When cars and buses idle, they release unhealthy exhaust fumes that have been linked to asthma and lung cancer. Children are more susceptible to exhaust pollution because their lungs are still developing and they breathe at a faster rate than adults. Diesel exhaust from idling school buses is particularly harmful and can accumulate on and around buses, posing a health risk to drivers and children. When buses and cars sit idle in and around schools, the exhaust can also pollute the air inside school buildings, posing a health risk to children throughout the day.

Changes in Mode Distribution

How children get to school, whether it be by foot, bus or parents car has changed. In the 1960's and 1970's, it was more common to see children walking and biking to school. Now, it has been observed, more children are either riding the bus or being driven to school by their parents. "Thirty years ago, 60% of children living within a 2-mile radius of a school walked or bicycled to school. Today, that number has dropped to less than 15%. Roughly, 25% commute by school bus, and well over half are driven to/from school in vehicles. And back then, 5% of children between the ages of 6 and 11 were considered to be overweight or obese. Today, that number has climbed to 20%. These statistics point to a rise in preventable childhood diseases, worsening air quality and congestion around schools, and missed opportunities for children to grow into self reliant, independent adults" (*1*).

School Bus Safety

School buses play an important part in getting our children safely to and from school and a better choice in terms of safety, air quality, efficiency (cost savings) than privately-owned vehicles. In the United States nearly 600,000 school buses transport 24 million students to school daily. Each year buses travel 4.3 billion miles as children take nearly 10 billion school bus rides.

In Texas, approximately 35,000 public school buses transport over 1.4 million Texas children every day (*2*). School buses are one of the safest forms of transportation accounting for less than 0.5% of Texas roadway crashes. Statistics specific to Texas are as follows (*2*):

- Average number of students transported by school buses daily: 1.4 million.
- Number of occupants injured in crashes involving a school bus: 1,058.
- Percentage of Texas roadway crashes that involve a school bus: less than 0.5%.
- Number of children that died in school bus-related crashes: 1.

"Each year approximately 800 school-aged children are killed in motor vehicle crashes during normal school travel hours. This figure represents about 14% of the 5,600 child deaths that occur annually on U.S. roadways and 2% of the nation's yearly total of 40,000 motor vehicle deaths. Of these 800 deaths, about 20 (2%)—5 school bus passengers and 15 pedestrians— are school bus–related. The other 98% of school-aged deaths occur in passenger vehicles or to pedestrians, bicyclists, or motorcyclists. A disproportionate share of these passenger vehicle–related deaths (approximately 450 of the 800 deaths, or 55%) occur when a teenager is driving. At the same time, approximately 152,000 school-age children are non-fatally injured during normal school travel hours each year. More than 80% (about 130,000) of these nonfatal injuries occur in passenger vehicles; only 4% (about 6,000) are school bus–related (about 5,500 school bus passengers and 500 school bus pedestrians), 11% (about 16,500) occur to pedestrians and bicyclists, and fewer than 1% (500) are to passengers in other buses" (*3*).

Negative Impacts of Pupil Transportation

"Increased auto travel contributes to unhealthy air. Nationwide, mobile sources emit approximately 30% of the ozone precursors nitrogen oxides and hydrocarbons, but these proportions increase in automobile-dependent metropolitan areas. There is overwhelming evidence linking ozone and other air pollutants to respiratory ailments in children, including upper respiratory infections and asthma. Almost five million children in the U.S. suffer from asthma, causing 14 million lost school days per year (*4*). Over the last 25 years, rates of asthma have increased 160% in children up to age 4 years and 74% in children ages 5 to 14 years.[1] The

[1] Center for disease Control and Prevention, "Surveillance for Asthma – United States, 1960–1995: CDC Surveillance Summaries, April 24, 1998," *MMWR Morbidity and Mortality Weekly Report*, Vol. 47 (SS-1), 1998, pp. 1–27.

traffic generated by auto travel to school exacerbates traffic congestion and contributes to the health impacts of auto emissions. The estimate by Gene Benton, city traffic engineer for Santa Rosa, California, that the number of cars on the road between 7:15 a.m. and 8:15 a.m. jumps 30% during the school year,[2] is typical.

Yet, there is strong evidence that reducing air pollution from automobile use can protect children's health. For example, during the 1996 Atlanta Olympic Games, when driving was reduced and ambient ozone levels fell by 27.9%, emergency room visits for asthma dropped by 41.6%. These results suggest that replacing some car trips with walking, biking, and transit will reduce vehicle miles and associated pollutants (*5*).

The good news is that there is something that can be done about it. School districts can implement an Idle-Reduction program and many states and localities, including several in North Texas, are enacting laws that prohibit unnecessary idling. An updated inventory of these rules is available from the American Transportation Research Institute, see Appendix A.

The primary objectives of this study are to:

- Determine awareness of the benefits of idle reduction programs among bus drivers and parents in a local community.
- Identify costs and benefits of implementing a school bus idle reduction program.
- Understand reasons for mode choice decisions among parents.
- Determine level of current knowledge regarding the relationship between air quality and traffic congestion.
- Identify public education and awareness resources to increase knowledge about the benefits of idle reduction programs.

Study findings will help increase knowledge about the negative effects of vehicle idling among communities and school districts and the positive benefits of implementing school bus and passenger car idle reduction programs. School bus idle reduction programs across the country have shown a significant reduction in gallons of fuel used. "We fully implemented our bus idling policy beginning with the 2004–2005 school year. In 2004–2005, although we drove 3,716 more miles than 2003–2004, we used 10,470 fewer gallons of diesel fuel. I believe that employees are supporting the idling policy and that their continued attention tour school bus idling guidelines should pay even greater dividends for our students and the community in the

[2] Ann Dubay, "See Dick and Jane sit in Traffic," *The Press Democrat*, September 7, 2003.

future" says Billy McCoy, Director of Operations, CEH, Lincoln Public Schools, Lincoln, Nebraska. Programs such as the one in Lincoln understand the values of idle reduction both in economy and the environment. Understanding that cost and fuel savings are an incentive measure for districts, adding increased safety and improved air quality would provide extra motivation for the schools to implement the idle reduction and parent education programs. The opportunity to engage all levels of the community would build additional awareness of regional air quality and school zone safety.

Information and primary data for this report were gathered through conducting three surveys of transportation providers including school bus drivers and parents. Supplemental information and background on school bus idle reductions programs in the state of Texas and in the United States was gathered through internet research and literature reviews.

CHAPTER 2: METHODS

DATA AND METHODOLOGY

The case study schools chosen for this study were Sam Rayburn Middle School and Mitchell Elementary School in Bryan, Texas. They were chosen as the case study schools based on their proximity to each other and the need to address the significant amount of private vehicle traffic around both schools, notably Sam Rayburn, during the afternoon peak drive time. Figure 1 illustrates (by a heavy dashed line) the private vehicle traffic queue that was observed during data collections and survey distribution.

Also noted in Figure 1, Sam Rayburn Middle School and Mitchell Elementary School are located within 2 miles of each other; however, one cannot travel from one school to the other within that distance. Their locations and proximity to each other can serve as a potential site for future outreach and mode shift encouragement with regard to walking and cycling to school.

A proposed roadway addition, by the City of Bryan, can been seen in Figure 1, the frontage road to the neighborhood on the north side of Sam Rayburn. This new thoroughfare could potentially increase the likelihood of walking and biking to Sam Rayburn from the adjacent neighborhood. With this impending change, the need to understand and potentially address parent mode choice was apparent at Sam Rayburn Middle School as traffic queuing in the afternoon peak posed a traffic issue on the Highway 6 frontage road. Texas regulations for school bus routes, funding and hazardous roadway route definitions can be found in Appendix B, Texas Education Code – Section 42.155. Transportation Allotment.

Figure 1. Map of Sam Rayburn and Mitchell Elementary Schools

Two surveys were developed and conducted to understand driver behavior of the two target audiences, parents and school bus drivers. The parent and school bus driver surveys are found in Appendix C, D and D respectively. The survey of parents was developed and conducted to understand:

- Mode choice.
- Distance of travel.
- Wait time and idling time in the school zone.
- Willingness to switch modes.
- Knowledge of air quality awareness.
- Interest in learning ways to improve air quality around school zones.

The school bus driver survey was developed and conducted to understand:

- Route time.
- Wait time and idling time in the school zone.
- Knowledge of air quality awareness.
- Interest in learning ways to improve air quality around school zones.

The parent surveys were distributed throughout Mitchell Elementary via in-class folders. Parents were requested to return completed surveys in a postage-paid envelope. Out of the 970 student surveys distributed, 120 were returned or 12.4%.

Distribution to parents at Sam Rayburn differed in distribution method. Students and primary researchers distributed the survey when school recessed for the day. During this distribution of the parent survey, observational wait times, traffic queues, and idling data were collected. Using this method, 433 parents volunteered to accept and return the survey given to them by the researchers. An introduction was made and the parents were told why the survey was being conducted, which was to gain understanding of idling patterns and air quality awareness in the school zone. Out of the 433 surveys distributed, a much better response rate was gained at 18% or 78 surveys.

Parent Survey

The parent survey was developed utilizing an existing parent travel mode survey through the Safe Routes to School National Partnership (*6*) and an environmental survey constructed by Drive Clean Across Texas (*7*) constructed to understand environmental awareness and driver behavior. In addition, the research team added specific questions related to the objectives of this study that were not addressed in the surveys referenced.

Questions were selected or developed for each of the surveys that targeted the data needed to understand the following of parental behavior:

- Mode choice.
- Distance of travel.
- Wait time and idling time in the school zone.
- Willingness to switch modes.
- Knowledge of air quality awareness.
- Interest in learning ways to improve air quality around school zones.

CHAPTER 3: PARENT SURVEY RESULTS

MODE CHOICE, A NATIONAL TREND

For years now, we have all read about the increase of obesity in our country, the decline of funding for exercise programs in schools and that our sitting in traffic is wasting money in terms of fuel, lost productivity and contributing to poor air quality. If one looks at these issues and connects the dots, one might conclude something could be done about these issues. "Increases in car travel to school are significant. According to the most recently released 2001 National Household Travel Survey (NHTS), less than 15% of students between the ages of five and 15 walked to or from school, and 1% biked.[3] In 1969, at the time of the first Nationwide Personal Transportation Survey (predecessor to NHTS), 48% of students walked or biked to school.[4] A survey by the Centers for Disease Control and Prevention (CDC) found that even children living close to school were not walking or biking in large numbers; only 31% of children ages five to 15 who lived within a mile of school walked or biked.[5] In 1969, the comparable figure was close to 90%.[6]

Why the decline in walking and biking to school? In the CDC survey, parents cited long distances as a primary barrier to their children walking or biking to school.[7] Yet even the majority of short school trips are made by auto or bus, indicating that other factors were also at work. One goal of this study is to shed light on what those other factors are. A poor walking environment is linked to auto dependence in the general population and would be expected to discourage walking and cycling to school. "Poor walking environment" in this case means a built environment that has low densities, little mixing of land uses, long blocks, incomplete sidewalks, and other hallmarks of our current patterns of development" (*5*).[8]

Suggestions and solutions are plenty as noted in the CDC survey. Primary to the solutions suggested that would increase walking and biking to school – thus reducing traffic and

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[3] Bureau of Transportation Statistics, National Household Travel Survey, NHTS Version 1.0 CD (Preliminary Release), January 2003.

[4] This figure applies to students in elementary and intermediate grades, the closest counterparts to the 5–15 age range reported for 2001. Federal Highway Administration (FHWA), "Transportation Characteristics of School Children," Report No. 4, Nationwide personal Transportation Study, Washington, D.C., July 1972.

[5] A.M. Dellinger and E.E. Staunton, "Barriers to Children Walking and Bicycling to School – United States, 1999," *Morbidity and Mortality Weekly*, Vol. 51, No. 32, 2002, pp. 701–704.

[6] FHWA, op. cit.

[7] Dellinger and Stauton, op. cit.

[8] Reid Ewing and Robert Cervero, "Travel and the Built Environment," *Transportation Research Record 1780*, 2001, pp. 87–114.

congestion and improving school zone air quality – is building a better walking environment. It has also been observed that providing a better built walking environment does not necessarily lead to increased walking and biking to school. The "If you build it, they will come." philosophy does not always work. Educating the public on the benefits of building and utilizing, the walking environment must also be included.

Mode Choice, Bryan, Texas

In Bryan, Texas, the declining rate of children walking and biking to school is no different. Within the Sam Rayburn Middle School and Mitchell Elementary School zones, the near absence of walking and biking mirrors this national trend happening in neighborhoods all across the country. The benefits of walking and biking are many yet these two neighborhood schools, Sam Rayburn Middle School and Mitchell Elementary, are not seeing the benefit of reduced parent vehicle traffic one might expect of schools located in close proximity to a neighborhood. Sam Rayburn Middle School as shown in Tables 1 and 2, 100% of the respondents stated their children arrived to school by either personal vehicle or school bus. No respondents indicated their children walked at any time during the school week. The method of distributing the surveys to parents during school dismissal may have impacted the high rate of return for students that were car-riders only. During survey distribution and vehicle data collection researchers observed students walking past the lines of cars and noted the presumed departure mode of walking by approximately 50 students.

Table 1. School arrival mode, Sam Rayburn Middle School

School arrival mode – Sam Rayburn Middle School					
Days per week	Walk	Bike	Bus	Family vehicle	Carpool
1	0	0	0	1	2
2	0	0	0	1	0
3	0	0	2	0	3
4	0	0	0	2	0
5	0	0	5	62	7

Table 2. School departure mode, Sam Rayburn Middle School

School departure mode – Sam Rayburn Middle School					
Days per week	Walk	Bike	Bus	Family vehicle	Carpool
1	0	0	1	4	2
2	0	0	2	2	1
3	0	0	2	4	1
4	0	0	2	4	1
5	0	0	2	56	6

Mitchell Elementary survey respondents reported a higher percentage of walkers and bike riders. As shown in and Table 4, modes varied slightly from school arrival mode and school departure mode. Children walking or biking to school was slightly lower at 12.5% than children walking home from school at slight increase of 15%. Children depart school by bus at a slightly higher rate of 21.6% than those who arrive by bus at 15.8%. Overall, the largest portion of children arrives to school by car at 85%. Children departing school by car is slightly lower at 71.7%. Looking at the data, the slight increase in children walking home from school in the afternoon could explain the slight decline of afternoon car riders.

Table 3. School arrival mode, Mitchell Elementary

School arrival mode – Mitchell Elementary					
Days per week	Walk	Bike	Bus	Family vehicle	Carpool
1	2	1		1	1
2	1	1		5	1
3	0	2	1	4	0
4	0	2	2	0	0
5	2	4	16	88	2

Table 4. School departure mode, Mitchell Elementary

School departure mode – Mitchell Elementary					
Days per week	Walk	Bike	Bus	Family vehicle	Carpool
1	2	0	0	4	0
2	2	3	3	4	1
3	1	1	3	3	1
4		2	12	0	0
5	3	4	8	72	1

Distance of Travel

There are many barriers to walking or biking to school, one of which is distance to school. Without the proper infrastructure such as sidewalks and crosswalks at intersections, the difficulty of walking and biking safely is increased. With only three middle schools serving Bryan, it is understandable that many students attending Sam Rayburn Middle School would live more than 2 miles from school, and their mode is either bus or car. As the results show in Table 5, 36% of the respondents surveyed stated they lived more than 2 miles from school and over 40% lived more than 5 miles.

Table 5. How far does your child live from school?

	Rayburn		Mitchell	
	Response Percent	**Response Count**	**Response Percent**	**Response Count**
Less than 1/4 mile	1.3%	1	8.5%	10
More than 1/4 mile less than 1/2 mile	2.7%	2	14.4%	17
More than 1/2 mile less than 1 mile	4.0%	3	5.9%	7
More than 1 mile less than 2 miles	13.3%	10	11.9%	14
More than 2 miles	36.0%	27	20.3%	24
More than 5 miles	40.0%	30	38.1%	45
Don't know	2.7%	2	0.8%	1
answered question		**75**		**118**
skipped question		**3**		**2**

The potential to increase the mode of children walking and biking appear to be greater at Mitchell Elementary as more respondents live within the 1- to 2-mile range of walking distance. As show in Figure 1, Mitchell Elementary is located within a neighborhood. This neighborhood is well equipped for students to walk as sidewalks and crosswalks were part of the neighborhood planning. Bike lanes, however, are not as prevalent.

Wait Time and Idling Time in the School Zone

Researchers collected data of parent wait time and idling using two methods. Sam Rayburn Middle School data were collected on site through observation as well through the surveys distributed. The parent wait time and idling time data for Mitchell Elementary was collected through returned surveys so it is perceived, not observed behavior. The researchers

only evaluated afternoon wait time and idling behavior. Survey responses specific to wait time and idling time in the school zone are show in Table 6 through Table 11.

Sam Rayburn

The traffic queuing and idling times varied between the two schools, in large part due to location and differing numbers of student enrollment. Sam Rayburn has a larger student population and is located on a major highway frontage road. The additional need for student pedestrian infrastructure was noted as an area in need of improvement.

Based on data collected over three days, an average of 200 cars was observed during school recess time. Vehicles begin arriving in the school pick up zone as early as 45 minutes prior to school dismissal. Of these approximately 20 cars were not idling. Most vehicles observed arrived approximately 30 minutes prior to school dismissal. As more cars arrived, problems with queuing on the frontage road begin and lasted around 30 minutes as parents picked up their children in the designated area. During the first observation in 2008, queuing was a severe problem on the frontage road that spanned the length of the school grounds. See Figure 1 for reference. During observations and data collection in 2009, queuing was slightly alleviated by creating a "no parking zone" directly in front of the school. The no parking zone is marked in red (Figure 1). In an effort to alleviate some of the traffic overflow, a staging area for parents was created in the grassy area circled in Figure 1.

Table 6. How long does it normally take to travel to pick up your child from school?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Less than 5 minutes	2.6%	2	79.8%	16
5–10 minutes	34.6%	27	79.8%	27
11–20 minutes	39.7%	31	80.7%	24
21–30 minutes	15.4%	12	95.8%	10
More than 30 minutes	7.7%	6	78.2%	1
Don't know/Not sure	0.0%	0	23.5%	3
answered question		**78**		**81**
skipped question		**0**		**39**

Table 7. How many minutes before the afternoon bell rings do you typically arrive to pick up your child from school?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Less than 5 minutes	18.4%	14	12.9%	9
5–10 minutes	21.1%	16	32.9%	23
11–20 minutes	36.8%	28	18.6%	13
21–30 minutes	14.5%	11	5.7%	4
More than 30 minutes	10.5%	8	11.4%	8
Don't know/Not sure	2.6%	2	18.6%	13
answered question		**76**		**70**
skipped question		**2**		**50**

Table 8. Of that time picking your child up from school, how much time is related to traffic congestion near the school zone?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Less than 5 minutes	24.7%	19	44.7%	34
5–10 minutes	35.1%	27	32.9%	25
11–20 minutes	16.9%	13	9.2%	7
21–30 minutes	14.3%	11	2.6%	2
More than 30 minutes	6.5%	5	0.0%	0
Don't know/Not sure	2.6%	2	10.5%	8
answered question		**77**		**76**
skipped question		**1**		**44**

Table 9. Do you arrive early to pick up your child from school to avoid traffic congestion?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Less than 5 minutes	20.3%	13	43.8%	32
5–10 minutes	18.8%	12	56.2%	41
11–20 minutes	20.3%	13		
21–30 minutes	18.8%	12		
More than 30 minutes	12.5%	8		
Don't know/Not sure	9.4%	6		
answered question		**64**		**73**
skipped question		**14**		**47**

Table 10. How long do you wait in line to pick up your child at the designated pick-up area?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Less than 5 minutes	9.5%	7	34.2%	26
5–10 minutes	32.4%	24	36.8%	28
11–20 minutes	35.1%	26	17.1%	13
21–30 minutes	16.2%	12	5.3%	4
More than 30 minutes	6.8%	5	0.0%	0
Don't know/Not sure	0.0%	0	9.2%	7
answered question		**74**		**76**
skipped question		**4**		**44**

Table 11. During the time you are waiting in the pick-up line as stated above, how long is your car turned on?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Yes	58.4%	45	64.6%	51
Yes, but only half the time	22.1%	17	11.4%	9
No	20.8%	16	24.1%	19
answered question		**77**		**79**
skipped question		**1**		**41**

Willingness to Switch Modes

As part of this study, researchers wanted to understand the potential of parents allowing their children to walk, bike, or take the bus. If parents would allow their children to walk, bike, or take the bus, the potential to improve congestion in the school zone would exist.

As shown in Table 12, a total 40 respondents indicated their children have asked if they could walk or bike to/from school. A total of 48 respondents indicated they would allow their children to walk to school alone as shown in Table 13. The number of respondents that would allow their child to walk to school with a parent, for example, in a walking school bus, doubled. Provided the reason why parents would not allow their children to walk or bike, an open-ended comment section was provided. A large majority of respondents wrote in their concerns. The concerns most reported, which influenced their decision to allow child to walk or bike to school included:

- Too much traffic congestion.
- Distance too far.
- No sidewalks.
- No proper crosswalks.
- School located on a busy highway with no sidewalks.
- Child abduction, general safety.

Table 12. Has your child asked you for permission to walk or bike to/from school?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Yes	11.3%	8	28.8%	32
No	88.7%	63	71.2%	79
answered question		**71**		**111**
skipped question		**7**		**9**

Table 13. At what grade would you allow your child to walk or bike without an adult to/from school?

School Respondents	K	1st	2nd	3rd	4th	5th	6th	7th	8th	Response Count
Rayburn	0	0	3	1	2	1	3	0	2	12
Mitchell	3	4	0	5	9	7	4	2	2	36
									Total	48

Table 14. At what grade would you allow your child to walk or bike with an adult to/from school?

School Respondents	K	1st	2nd	3rd	4th	5th	6th	7th	8th	Response Count
Rayburn	12	2	0	2	1	0	3	0	1	21
Mitchell	32	5	5	10	2	2	3	0	0	59
									Total	80

Understanding the potential exists to switch modes is important in determining strategies to increase students walking and biking to school. These data suggest the potential exists to convert a portion of students from car rider to walker or biking with organized walking school buses or cooperative walking teams within the neighborhood. School buses also play an important role in reducing traffic congestion in and around the school zone. The majority of

parents who responded to our survey indicated they lived within the school bus service zone shown in Table 15.

Table 15. Do you live where school bus service is provided?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Yes	74.0%	54	70.4%	81
No	26.0%	19	29.6%	34
answered question		**73**		**115**
skipped question		**5**		**5**

Table 16. Has your child asked you for permission to ride the school bus?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Yes	27.1%	19	52.2	59
No	72.9%	51	47.8	54
answered question		**70**		**113**
skipped question		**8**		**7**

Of the survey respondents, the large majority of parents whose children attended elementary school had children interested in riding the bus as show in Table 16. However, once children enter middle school that interest drops sharply along with parents allowing their children to ride the school bus as shown in Table 17.

Table 17. At what grade would you allow your child to ride the school bus to/from school?

Answer Options	**K**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**Response Count**
Rayburn	19	3	0	1	0	0	8	2	0	33
Mitchell	42	6	5	5	4	5	21	0	0	88
									Total	121

Extending school bus service where it would otherwise not be offered is an expensive endeavor. A school district would need a clear understanding of ridership potential in order to make the extended service fiscally responsible. This study looked briefly at the potential interest of parents allowing the use of school buses as a means of transportation. As show in Table 18, there is moderate interest in receiving school bus service where it is not currently provided. 56.5%, or 35 respondents from Rayburn Middle School and 69.5% or 57 respondents from

Mitchell Elementary School indicated if school bus service was provided, they would utilize the service.

Table 18. If you live where there is no bus service, would you allow your child to ride the bus if it were offered?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Yes	56.5%	35	69.5%	57
No	43.5%	27	30.5%	25
answered question		**62**		**82**
skipped question		**16**		**38**

Whether school bus service is accessible or not sometimes is not the primary hurdle, many other issues factor into the decision of parents allowing their children to ride the bus to school. Providing the service does not automatically guarantee ridership. As show in Table 19 and Table 20, other factors such as scheduling and safety play a role in the decision making process. The top reasons reported that kept parents from allowing their children to ride the bus from home to school or from school to home were:

- School bus route schedule, particularly in the a.m.
- Child's participation in activities before or after school.
- Parents' job flexibility allows them time to drive children to or pick them up from school.
- On-board safety concerns such as seatbelts and behavior.

Table 19. If you have bus service, which of the following issues affect your decisions to not allow your child to ride the bus to school? (check all that apply)

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Distance	15.9%	10	6.8%	5
Convenience of driving	14.3%	9	17.6%	13
School bus a.m. pick-up time too early	38.1%	24	47.3%	35
School bus a.m. pick-up time too late	7.9%	5	6.8%	5
Child's participation in before-school activities	34.9%	22	5.4%	4
Do not have flexible work hours	4.8%	3	6.8%	5
Flexible work hours allow me to drive my child to school	39.7%	25	37.8%	28
On-board safety (i.e., seatbelts, behavior)	44.4%	28	35.1%	26
On-board safety (i.e., crash, bus breakdown)	17.5%	11	16.2%	12
Other (please specify)		9		12
answered question		**63**		**74**
skipped question		**15**		**46**

Table 20. If you have bus service, which of the following issues affect your decisions to not allow your child to ride the bus home from school? (check all that apply)

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Distance	14.8%	9	8.1%	5
Convenience of driving	19.7%	12	16.1%	10
School bus a.m. drop-off time too early	9.8%	6	27.4%	17
School bus a.m. drop-off time too late	27.9%	17	14.5%	9
Child's participation in after-school activities	36.1%	22	30.6%	19
Do not have flexible work hours	4.9%	3	9.7%	6
Flexible work hours allow me to pick up my child from school	36.1%	22	30.6%	19
On-board safety (i.e., seatbelts, behavior)	45.9%	28	38.7%	24
On-board safety (i.e., crash, bus breakdown)	18.0%	11	17.7%	11
Other (please specify)		6		15
answered question		**61**		**62**
skipped question		**17**		**58**

Understanding parents' awareness of the school districts encouragement of the school bus program was noted as neutral. As show in Table 21, the opinion of respondents stated that the Bryan Independent School District (BISD) neither encouraged nor discouraged school bus ridership.

Table 21. In your opinion, how much does your child's school district encourage or discourage school bus ridership?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Strongly encourage	2.9%	2	5.4%	6
Encourage	8.6%	6	10.8%	12
Neither	82.9%	58	82.0%	91
Discourage	1.4%	1	0.9%	1
Strongly Discourage	4.3%	3	0.9%	1
answered question		**70**		**111**
skipped question		**8**		**9**

To improve potential ridership opinion thus potentially increasing ridership among existing routes, it is recommended the district send out a bi-annual bus report to parents including information such as major incidents, fuel usage, driver kudos, and idle reduction efforts (if implemented) to save fuel consumption. Such a publication could offset some of the concerns of on-board safety and improve any potential negative aspects the district and parents may have regarding school bus service. It is recommended that a survey be administered, via the web, to gauge the current satisfaction rate of school bus service provided. The audiences could include parents, students, and school district employees.

Air Quality Awareness

Understanding baseline awareness of an outreach campaigns' primary issue is imperative. When implementing a public education campaign it is important to measure baseline awareness so that you can measure the increased understanding of the topic or measure if any behavior was modified through your education efforts. In this study, the researchers sought to measure current general knowledge and awareness of air quality issues in Texas.

Current awareness of the greatest source of air pollution comes from vehicle exhaust is high. Respondents indicated exhaust was to their knowledge the greatest contributor to air pollution in Texas. However, a majority of respondents indicated they are neutral to somewhat informed about air quality issues in Texas.

Table 22. To the best of your knowledge, which of the following is the greatest source of air pollution in Texas?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Pollution emissions from oil refineries	26.8%	19	24.3%	27
Pollution emissions from manufacturing plants	22.5%	16	13.5%	15
Exhaust from cars, trucks and buses	76.1%	54	63.1%	70
Dust from construction	9.9%	7	11.7%	13
Dust and other emissions from farming and ranching	0.0%	0	9.9%	11
Other (please specify)		5		7
answered question		**71**		**111**
skipped question		**7**		**9**

As shown in Table 23, a large portion of respondents indicated they thought they were somewhere between somewhat informed or not informed at all about air quality in Texas. This indicates there is room for increasing knowledge of this issue through outreach and education. In the event an outreach program to reduce parent idling in the school zone is implemented, the organizers would have this baseline data to measure any increased awareness through their efforts.

Table 23. How informed would you say that you are about air quality issues in Texas?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Very informed	11.5%	9	7.6%	9
Somewhat informed	43.6%	34	39.8%	47
Neutral	12.8%	10	27.1%	32
Not very informed	29.5%	23	17.8%	21
Not at all informed	2.6%	2	7.6%	9
answered question		**78**		**118**
skipped question		**0**		**3**

Table 24. How interested would you say that you are in air quality issues?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Very interested	37.2%	29	33.9%	40
Somewhat interested	35.9%	28	39%	46
Neutral	16.7%	13	17.8%	21
Not very interested	9.0%	7	6.8%	8
Not at all interested	1.3%	1	2.5%	3
answered question		**78**		**118**
skipped question		**0**		**2**

Table 25. How interested would you be in learning simple ways to improve air quality in your school zone?

	Rayburn		Mitchell	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Very interested	26.0%	20	33.9%	40
Somewhat interested	44.2%	34	39%	46
Neutral	22.1%	17	17.8%	21
Not very interested	6.5%	5	6.8%	8
Not at all interested	1.3%	1	2.5%	3
answered question		**77**		**118**
skipped question		**1**		**2**

While many respondents indicated they were only somewhat informed in Table 23, Table 24 and Table 25 suggest the interest for receiving information about air quality, specifically as it relates to air quality in the school zone. Knowing information such as how informed parents are of the school zone air quality issue also provides good baseline data by which the district could measure success of their outreach efforts. An increase in how informed the parents become of the issue would indicate a margin of success in outreach efforts.

CHAPTER 4: BUS DRIVER SURVEY

Understanding school bus driver behavior is an integral piece of reducing school bus emissions and school zone emissions from school buses. During the initial literature review for existing school bus driver behavior surveys, the researchers were unable to find existing surveys from which this survey could be customized. Researchers then looked to the parent surveys in this study to determine relevant questions that could be used in the bus driver survey. Questions in the parent survey related to driver behavior and willingness to learn about idling, emissions, and air quality were used in the bus driver survey. Through the school bus survey, researchers wanted to understand:

- Wait time and idling time in the school zone.
- Potential for idling time reduction.
- Drivers' knowledge of air quality awareness.
- Drivers' interest in learning ways to improve air quality around school zones.

Working backward from these key questions, the balance of the survey questions was constructed. The survey results were qualitative as no school bus idling data were collected through observation as the parent idling data were.

Surveys were handed to each driver at the BISD transportation services primary location where the buses are housed. As each driver clocked in for their route, they were asked to complete the survey. Details about who was doing this research and why were provided in person as well as in the introduction letter given along with the survey. The school bus driver survey was confidential. Drivers were asked to return the survey in a large box. Of the 98 surveys distributed, 41 were returned or 42%. The school bus driver survey can be found in Appendix E of this report.

Not only do parents contribute to idling in the school zone, school buses do too. Studies routinely discuss the harmful effects of diesel exhaust in the school zone. Studies state not only how emissions from school buses affect the outdoor air quality, but the exhaust can also permeate inside the schools through air conditioning intakes. When creating school bus loading and unloading zones, schools should take into consideration the location of these outdoor air intakes that carry the exhaust throughout the school.

ESTIMATION OF IDLING IMPACTS FOR BRYAN ISD SCHOOL BUSES

The findings from the survey of school bus idling described in this chapter enabled researchers to estimate the approximate idling emissions and fuel consumption impacts of school bus idling in the BISD, and the potential for fuel and cost savings and emissions reduction due to the implementation of an idle reduction policy. The survey results were compiled and the daily idling time for the entire fleet, on an average weekday, was estimated to be approximately 66 hours in the morning (a.m. idling) and 46 hours in the afternoon (p.m. idling). The daily emissions impact (for a.m. and p.m. idling) was estimated for key pollutants—Oxides of Nitrogen (NOx), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO), as shown in Table 26. The idling emissions rates used for these calculations were based on EPA's MOBILE6 emissions model for Brazos County. Composite rates were used to take into account model year distributions among the school bus fleet. The fuel consumption due to the idling was also calculated, based on the average idling fuel consumption rate obtained from EPA's MOVES emissions model. These calculations are also presented in Table 26. The annual emissions and fuel consumption were also estimated, assuming 250 days of bus operation (since BISD runs its buses all year).

Table 26. Estimation of emissions and fuel consumption due to Bryan ISD school bus idling

Description	Pollutant (tons)			Fuel Consumption (gal)
	Nox	VOC	CO	
Daily AM Idling	0.002	0.0003	0.001	56.6
Daily PM Idling	0.002	0.0003	0.001	39.5
Annual Total	**1.17**	**0.15**	**0.66**	**24031.8**

Potential Benefits of Idle Reduction

The findings from this rough analysis indicate that idling from school buses has a sizeable impact in terms of NOx emissions (over a ton per year) and fuel consumption (over 24,000 gallons wasted annually). If a fuel cost of $3.00 per gallon is assumed, this translates to approximately $72,000 in fuel costs. The implementation of an idle reduction policy that reduces idling by 50% can help save approximately $36,000 in fuel and over half a ton of NOx emissions each year. Even a 25% reduction in idling can save around 6,000 gallons of fuel and a third of a ton of NOx annually.

Air Quality Awareness, School Bus Drivers

As noted in the in Chapter 3 regarding parental awareness of air quality, it is important to understand the baseline awareness of any issue you wish to improve awareness of. The ability to measure improvements in awareness levels can go along way at showing progress toward goals to improve awareness. More importantly however, is the measure of behavior modification. If drivers, parents, and professional modify their idling behavior in large part because of an awareness campaign, you have found the recipe of a successful campaign.

Tables 27 through 31 provide a glimpse of current measures of issues related to idling and environmental awareness. The response percentages are similar to those of the parent surveys. As show in Table 27, most respondents (63%) believe air pollution is the biggest environmental problem in our area or region. The good news show in Table 28 is that slightly more than 77% of respondents are very or somewhat interested in the air quality issue they believe to the biggest environmental problem in our area. Survey respondents being interested in the topic leads to interest in being educated on the topic of air quality. Table 29 also reflects a willingness to be open to new information as only a small portion of survey respondents are "very informed" on the topic of air quality.

Table 267. If you had to choose from the following categories, what would you say is the biggest environmental problem in the Brazos Valley?

	Response Percent	Response Count
Air Pollution	63.3%	19
Water Pollution	13.3%	4
Ground and soil pollution	30.0%	9
Other (please specify)		5
	answered question	**30**
	skipped question	**11**

Table 28. How interested would you say that you are in air quality issues?

	Response Percent	Response Count
Very interested	37.5%	15
Somewhat interested	35.0%	14
Neutral	20.0%	8
Not very interested	7.5%	3
Not at all interested	0.0%	0
	answered question	**40**
	skipped question	**1**

Table 29. How informed would you say that you are about air quality issues in Texas?

	Response Percent	Response Count
Very informed	15.0%	6
Somewhat informed	37.5%	15
Neutral	35.0%	14
Not very informed	12.5%	5
Not at all informed	0.0%	0
answered question		**40**
skipped question		**1**

Table 30. To the best of your knowledge, which of the following is the greatest source of air pollution in your community?

Answer Options	Response Percent	Response Count
Pollution emissions from oil refineries	2.8%	1
Pollution emissions from manufacturing plants	5.6%	2
Exhaust from cars, trucks and buses	77.8%	28
Dust from construction	19.4%	7
Dust and other emissions from farming and ranching	5.6%	2
Other (please specify)		3
answered question		**36**
skipped question		**5**

Table 31. How interested would you be in learning simple ways to improve air quality in your school zone?

	Response Percent	Response Count
Very interested	35.0%	14
Somewhat interested	35.0%	14
Neutral	17.5%	7
Not very interested	12.5%	5
Not at all interested	0.0%	0
answered question		**40**
skipped question		**1**

As show in Table 31, survey respondents believe exhaust from cars, trucks, and buses to be the primary source of pollution in our community. Table 32 shows 70% of respondents are either "very interested" or are "somewhat interested" in learning simple ways to improve air quality in their school zones. As primary contributors of poor air quality in their school zones, school bus drivers play a key role in improving the school zone air quality.

ESTIMATION OF IDLING IMPACTS DUE TO PARENTS' IDLING

The survey of parents' idling habits during afternoon pick-up (described in Chapter 3) was used to conduct a rough analysis of emissions and fuel consumption impacts at the Sam Rayburn Middle School and Mitchell Elementary School. Based on the findings from the idling survey, the total daily afternoon idling for all parents' vehicles was estimated at 52 hours per day at the Sam Rayburn Middle School. The emissions impact of this idling (for NOx, VOC, and CO) was estimated based on rates for Brazos County from the MOBILE6 emissions model. Fleet composite rates were used, and averaged between passenger cars and pickup trucks, to obtain rates representative of the vehicle fleet. The fuel consumption rates were estimated in a similar manner, using data from EPA's MOVES emissions model. The daily estimated fuel consumption and emissions for the Sam Rayburn Middle School are as shown in Table 32. The annual emissions and fuel consumption were also estimated by assuming 180 days of idling per year (the number of mandatory days of school attendance in Texas).

Since the idling data were not available for parents at Mitchell Elementary School, the annual emissions and fuel consumption impact were extrapolated from the findings for the middle school. The calculations were based on the assumption of similar idling patterns, and based on the ratio of student enrollment (873 students in the middle school and 459 in the elementary school). These finding are also shown in Table 32.

Table 32. Estimation of emissions and fuel consumption due to parents' afternoon idling

Description	Pollutant (tons)			Fuel Consumption (gal)
	Nox	VOC	CO	
Sam Rayburn - Daily Observed	0.0001	0.0001	0.0033	24.1
Sam Rayburn - Annual Estimated	0.026	0.024	0.585	**4330.6**
Mitchell Elementary - Annual Estimated (Extrapolated from Enrollment data)	0.013	0.013	0.308	**2276.9**
Estimated Annual Total	0.039	0.037	0.893	**6607.5**

As shown in the table, afternoon idling by parents' cars for the two schools together contribute to nearly a ton of Carbon Monoxide emissions and over 6,000 gallons of wasted fuel. Thus, the reduction of idling near schools can also potentially reduce emissions and save fuel.

CHAPTER 5: RECOMMENDATIONS

INCREASE AWARENESS

While researchers were distributing the surveys to willing participants, parents and teachers commented they were interested in the topic of air quality and congestion in their school zone. Many asked, "Well, what can be done about it?" The answer is simple—there are many things that can be done to educate those in the school zone. The challenge is modifying their behavior. During most months, when school is in session, temperatures can be high – 85 degress and upwards to the mid-90's in the afternoon. To ask a parent to turn off their car and possibly risk offending them is a challenge to say the least. However, many student organizations have experienced receptive and understanding parents once approached. Many independent school districts in the San Antonio region have school zone idle reduction programs. They have found success through a positive approach. Students and Parent Teacher Organizations organize "Green Teams." Using a cardboard fan as their print hand-out they are able to share idle reduction education materials that also help the parents being asked to turn off their air conditioner. The tool will educate and help cool them off during the heat. Some teams are able to raise money for battery powered water spray fans. These special rewards are given to those parents who sign a "no idle" promise that states they will always turn their car off in the school zone. Recommendations are as follows:

- Create an awareness program.
- Form a "Green Team."
- Define campaign goals and messages.
- Define your audiences.
    - Parents.
    - School bus drivers.
    - School administrators.
- Develop outreach strategies.
- Implement an idle reduction awareness program.
- Provide handouts to parents about the effects of idling in the school zone.
- Measure your success through surveys.

Figure 2. Marketing Cycle

See Figure 2 for an example of a marketing and outreach plan cycle. Provided in Appendix F through Appendix J are examples of successful idle reduction campaign and materials developed by each campaign.

APPENDIX A:
AMERICAN TRANSPORTATION RESEARCH INSTITUTE COMPENDIUM OF IDLING REGULATIONS

COMPENDIUM OF IDLING REGULATIONS

The information in this table is for reference purposes only and should not be relied upon for regulatory compliance. This information may contain errors and omissions and is subject to change. Actual state, county or city codes should be referenced for specific requirements. On-line users may access these codes by clicking on the individual regulations.

State	Maximum Idling Time	Exemptions
Arizona, Maricopa County	**5 minutes** (30 min. for bus passenger comfort or 60 min/90 min if greater than 75° F) **Fines:** $100 – 1st violation $300 – 2nd+ violations	- Traffic or adverse weather conditions - Emergency or law enforcement purposes - Power takeoff involving cargo or work functions - Conform to manufacturer's specifications - Maintenance or diagnostics - Hours of service compliance
Maricopa County Vehicle Idling Restriction Ordinance. Maricopa County Air Quality Department (602) 506-6010, www.maricopa.gov/aq		
California	**5 minutes** **Fines:** Minimum $300 Subsequent penalties can range from $1,000 to $10,000	- Bus passengers are onboard or 10 minutes prior to boarding - Traffic conditions - Queuing beyond 100' of residential - Adverse weather conditions or mechanical difficulties - Vehicle safety inspection - Service or repair - Power takeoff involving cargo or work functions - Prevent safety or health emergency - Emergency vehicles - California low-NOx idling label
CA Code of Regs, Title 13, Div. 3, Art. 1, Ch. 10, §2485. California Air Resources Board (800) 242-4450, www.arb.ca.gov		
California, City of Sacramento	**5 minutes** (prohibits refrigeration unit operation within 100' of residential or school unless loading/unloading) **Fines:** Not <$100 nor >$25,000 per violation *(Title 1, Ch. 1.28.010)*	- Traffic conditions/control - Traffic conditions - Vehicle safety inspection - Service or repair - Conform to manufacturer's specifications - Power takeoffs involving cargo or work functions - Prevent safety or health emergency - Hours of service compliance @ truck/rest stop - To recharge hybrid electric vehicles - California low-NOx idling label
Sacramento City Code, Title 8, Ch. 8.116. City of Sacramento Department of Transportation (916) 264-5011, www.cityofsacramento.org/transportation		

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COMPENDIUM OF IDLING REGULATIONS

Virginia	**10 minutes for diesel vehicles (3 minutes for all other vehicles) in commercial or residential urban areas** **Fines:** Not >$25,000 *(CV 10.1-1316)*	- Auxiliary power
Virginia Administrative Code, Title 9, 5-40-5670(B). Virginia Dept. of Environmental Quality (804) 698-4000, www.deq.state.va.us/air		
West Virginia <NEW>	**15 minutes in any 60-minute period** **Fines:** $150 - $300	- Traffic conditions/controls - Prevent safety or health emergency or in accordance w/ safety regulations - Emergency vehicles - Maintenance, service or repair - Federal or state inspections - Power auxiliary equipment - Security inspections - Mechanical difficulties - Sleeping or resting in a sleeper berth if <40° or >75° F & legally parked *(expires May 1, 2012)* - Sampling, weighing, loading or unloading - Waiting for a police escort for a permitted load - California low-NOx idling label - Powered by clean diesel technology or biodiesel fuels
West Virginia Senate Bill No. 183. West Virginia State Police Headquarters (304) 746-2100, www.wvstatepolice.com		

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COMPENDIUM OF IDLING REGULATIONS

California, Placer County	**5 minutes** (prohibits refrigeration unit operation within 1000' of residential or school unless loading/unloading) **Fines:** $50 Minimum	- Traffic conditions/control - Traffic conditions - Vehicle safety inspection - Service or repair - Conform to manufacturer's specifications - Power takeoffs involving cargo or work functions - Prevent safety or health emergency - Hours of service compliance @ truck/rest stop - To recharge hybrid electric vehicles - Operate intermittent equipment - Alternatively fueled vehicles - Attainment areas - California low-NOx idling label
Placer County Code, Article 10.14 Placer County Air Pollution Control District (530) 745-2330 www.placer.ca.gov/airpollution/airpolut.htm		
Colorado, City of Aspen	**5 minutes within any 1 hour** **Fines:** $1,000 maximumand/or 1 year imprisonment *(§1.04.080)*	- Safety reasons - To achieve an engine temperature of 120° F and an air pressure of 100 lbs/square inch
City of Aspen Municipal Code §13.08.110 Aspen Environmental Health Department (970) 920-5039, http://www.aspenpitkin.com/Departments/Environmental-Health/Air-Quality/		
Colorado, City & County of Denver	**10 minutes in any 1-hour period** **Fines:** Not >$999 and/or 1-year imprisonment *(DMC §1-13)*	- Less than 20° F for previous 24-hour period - Less than 10° F - Emergency vehicles - Traffic conditions - Being serviced - Auxiliary equipment
Denver Municipal Code §4-43. Denver Department of Environmental Health, Division of Environmental Quality, (720) 865-5452, http://www.denvergov.org/DEQ		
Connecticut	**3 minutes** **Fines:** Not >$5,000 per week *(RCSA Title 22a §174-12(c))*	- Traffic conditions or mechanical difficulties - Ensure safety or health of driver/passengers - Auxiliary equipment - Conform to manufacturer's specifications - Less than 20° F - Maintenance - Queuing to access military installation
Regulations of Connecticut State Agencies Title 22a, §174-18(b)(3). State of Connecticut Department of Environmental Protection; Bureau of Air Management (860) 424-3027, www.dep.state.ct.us		
Delaware	**3 minutes** (15 minutes: 32° to -10° F; No limit: Less than -10° F) **Fines:** $50 - $500 per offense *(Title 7, Ch. 60, §6005 & §6013)*	- Traffic conditions or mechanical difficulties - Conform to manufacturers specifications - Repair - Emergency vehicles - Using auxiliary equipment/power take off - Power during sleeping or resting beyond 25 miles of truck stop with available electrified equipment - Vehicle safety inspections
Regulation 45, Excessive Idling of Heavy Duty Vehicles. Delaware Division of Air & Waste Management (302) 739-9402, www.awm.delaware.gov/		

Updated: September 2010

COMPENDIUM OF IDLING REGULATIONS

District of Columbia	**3 minutes** (5 minutes if less than 32° F) **Fines:** $500, doubles for each subsequent violation	- Power takeoff
District of Columbia Municipal Regulations Title 20, §900.1. District of Columbia Department of Health Environmental Health Administration Air Quality Division (202) 535-2257, www.dchealth.dc.gov		
Florida	**5 minutes** **Fines:** TBD	- Traffic conditions - Emergency or law enforcement purposes - Verify vehicle is safe to operate - Power work-related operations - Prevent safety or health emergency - Sleeping or resting in a sleeper berth *(exemption expires Sept. 30, 2013)*
Heavy-Duty Vehicle Idling Reduction. Department of Environmental Protection, Air Resource Management (850) 488-0114, www.dep.state.fl.us/Air		
Georgia, City of Atlanta	**15 minutes** (25 minutes if less than 32° F for passenger comfort/safety) **Fines:** $500 minimum	- To perform needed work - Traffic conditions - Natural gas or electric vehicles
Code of Ordinances §150-97(c). City of Atlanta, Office of Transportation (404) 330-6501, www.atlantaga.gov/Government/PublicWorks		
Hawaii	"No person shall cause, suffer, or allow any engine to be in operation while the motor vehicle is stationary at a loading zone, parking or servicing area, route terminal or other off street areas…" (3 minutes for start up/cool down or passenger loading/unloading) **Fines:** Not <$25 nor >$2,500 per day *(106 HRS §342B-47)*	- Adjustment or repair - Auxiliary equipment or power takeoff - Passenger loading/unloading = 3 min. - At start-up and cool down for more than 3 min.
Hawaii Administrative Rules §11-60.1-34. Hawaii State Department of Health, Clean Air Branch (808) 586-4200, http://www.hawaii.gov/health/environmental/air/cab/index.html		
Illinois Cities: Aux Sable, Goose Lake, Oswego Counties: Cook, DuPage, Lake, Kane, McHenry, Will, Madison, St. Claire, Monroe	**10 minutes within any 60 minute period** (30 minutes within any 60 minute period: Waiting to weigh, load or unload freight; No limit: Less than 32° F or greater than 80° F) **Fines:** $90 – 1st conviction; $150 – 2nd & subsequent convictions in 12 month period	- Less than 8,000 lbs. GVWR - Traffic conditions/controls - Prevent a safety or health emergency - Emergency or law enforcement purposes - Service or repair - Government inspection - Power takeoffs involving cargo or work functions - Resting in a sleeper berth - Mechanical difficulties - Queuing - Idle reduction technologies
625 Illinois Combined Statute 5/11-1429 Illinois Department of Transportation (217) 782-7820, www.dot.state.il.us		

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Illinois, Chicago	**3 minutes in any 60-minute period** (No limit: <32° F or >80° F) **Fines:** $250	- Emergency vehicles - Power auxiliary equipment - Service or repair or government inspection - Traffic conditions - Idle reduction technologies - Mechanical difficulties - Exhaust filter regeneration
http://www.amlegal.com/library/il/chicago.shtml. City of Chicago, Department of Environment (312) 744-7606, http://www.CityofChicago.org		
Maine	**5 minutes in any 1 hour period** (No limit: < 0° F; 15 min/hr: 0° - 32° F) **Fines:** $25 - $500 – 1st offense; $150 - $500 for each subsequent offense *(MRSA §585-K(5))*	- Traffic conditions - Prevent safety or health emergency - Emergency or law enforcement purposes - Maintenance, servicing, repairing, or diagnostic purposes - State or federal inspections - Power work-related operations - Sleeper berth a/c or heat during rest or sleep periods - A/C or heat while waiting to load/unload - Mechanical difficulties if receipt of repair is submitted w/in 30 days
Public Law, Chapter 582. Maine Bureau of Motor Vehicles (207) 624-9000, www.maine.gov/sos/bmv		
Maryland	**5 minutes** **Fines:** Not >$500 (MC § 27-101(b))	- Traffic conditions or mechanical difficulties - Heating, cooling or auxiliary equipment - Conform to manufacturer's specifications - Accomplish intended use
Maryland Transportation Code §22-402©(3). Maryland Department of the Environment (410) 537-3000, www.mde.state.md.us		
Massachusetts	**5 minutes** **Fines:** Not >$100 – 1st Not >$500 for each succeeding offense	- Being serviced - Delivery for which power is needed & alternatives unavailable - Associate power needed & alternatives unavailable
General Laws of Massachusetts Ch. 90: § 16 A. Massachusetts Department of Environmental Protection (617) 292-5500, www.mass.gov/dep		
Michigan, Detroit <NEW>	**5 consecutive minutes in any 60-minute period** **Fines:** 1st = Warning; 2nd = $150 to operator and/or $500 to owner	- Traffic conditions - Power auxiliary equipment - Emergency vehicles - Motionless for >2 hours & <25° F - State inspections - Hybrid vehicle recharging - Electric, hydrogen or natural gas powered vehicles
Detroit City Code, Part 3, Sec. 55-6-91. Detroit Police Department, Parking Enforcement Hotline (313) 967-1752, www.detroitmi.gov		

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Minnesota, Minneapolis	**0 minutes in residential areas between 10 p.m. and 6 a.m.** (including refrigeration units) **Fines:** $700 maximum and/or 90 days imprisonment *(Title 1, Ch. 1)*	- Permitted construction equipment - Compliance with traffic signals or signs - Emergency or law enforcement purposes
Code of Ordinances, City of Minneapolis, Minnesota, Title 15, Ch. 389.100(7) & (8). Minneapolis Environmental Management (612) 673-5897, www.ci.minneapolis.mn.us/environment/		
Minnesota, City of Owatonna	**15 minutes each 5 hours in residential areas** **Fines:** $1,000 maximum and/or 90 days imprisonment *(Chapter XI, Section 1100:00)*	None
Owatonna City Code, Chapter IX, Section 900:10. City of Owatonna (507) 444-4300, www.ci.owatonna.mn.us		
Minnesota, City of St. Cloud	**5 minutes, West St. Germain Street from 8th to 10th Avenue** **Fines:** $100 *(SCOO §706:35)*	None
St. Cloud City Ordinance §700:90. City of St. Cloud, Parking Violations (320)255-7209, www.ci.stcloud.mn.us		
Missouri Counties: Clay, Franklin, Jackson, Jefferson, Platte, St. Charles, St. Louis	**5 minutes in any hour** (30 minutes/hour when waiting to load/unload) **Fines:** TBD	- Traffic conditions/controls - Prevent safety/health emergency - Emergency purposes - Maintenance/repair - State or federal inspections - Power work-related operations - During government-mandated rest periods - Mechanical difficulties - Auxiliary power units
Missouri Code of State Regulations, Division 10, Chapters 2.390 and 5-385. Missouri Department of Natural Resources, Division of Environmental Quality (573) 751-4817, www.dnr.mo.gov/env/apcp/index.html		
Missouri, City of St. Louis	**5 minutes in any hour** (10 minutes if < 32° F) **Fines:** Up to $100	- Emergency vehicles - Transporting special needs persons - Power for auxiliary purposes - Traffic or adverse weather conditions - Repair or diagnostics - Engaged in the delivery of goods
St. Louis City Ordinance 68137. City of St. Louis, Department of Air Pollution Control (314) 613-7300, www.stlouis.missouri.org/citygov/airpollution		
Missouri, St. Louis County	**3 consecutive minutes** **Fines:** Maximum $1,000 and/or 1 year imprisonment (§612.390)	- Operating a loading, unloading, or processing device - Emergency vehicles
St. Louis County Air Pollution Control Code §612.340. St. Louis County Air Pollution Control (314) 615-8924, http://www.co.st-louis.mo.us/doh/environ/airpollut		

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Nevada	**15 minutes** **Fines:** Not <$100 nor >$500 – 1st; Not <$500 nor >$1,000 – 2nd; Not <$1,000 nor >$1,500 – 3rd; Not <$1,500 nor >$2,500 – 4th and subsequent; offense(s) over a 3-year period *(NAC445B.727)*	- Variance has been issued - Emergency vehicles - Snow removal equipment - Repair or maintain other vehicles - Traffic congestion - Maintenance at repair facility - Emission contained & treated per Commission - To perform specific task
NV Administrative Code Ch. 445B.576. Nevada Division of Environmental Protection; Bureau of Air Pollution Control (775) 687-9350, www.ndep.nv.gov/bapc		
Nevada, Clark County, (including Las Vegas)	**15 minutes** **Fines:** Not >$10,000 *(CCAQR §09)*	- Variance has been issued - Emergency vehicles - Repair or maintain other vehicles - Traffic congestion - Emission contained & treated per Control Officer - To perform a specific task - Maintenance at repair facility
Clark Co. Air Quality Regs. §45. Clark County Department of Air Quality Management (702) 455-5942, http://www.accessclarkcounty.com/depts/daqem/aq/		
Nevada, Washoe County (including Reno)	**15 minutes** **Fines:** Not >$250 – 1st offense Not <$250 nor >$500 – 2nd and subsequent offenses *(WCDBHR §020.040(E))*	- Emergency vehicles - Snow removal equipment - Repair or maintain other vehicles - Traveling on public right-of-way - To perform specific task - Maintenance at repair facility
Washoe Co. District Board of Health Regs. §040.200. Washoe County District Health Department, Air Quality Management (775) 784-7200, www.co.washoe.nv.us/health		
New Hampshire	**5 minutes if greater than 32° F** (15 minutes: 32° F to -10° F) Fines: TBD	- Traffic conditions - Emergency vehicles - Power takeoff or heat/cool passengers - Maintenance or diagnostics - Defrost windshield - Less than -10° F
Air Resources Division Admin. Rules Env-A 1101.05. New Hampshire Department of Environmental Services, Air Resources Division (603) 271-1370, www.des.state.nh.us		
New Jersey	**3 minutes** (15 min. if stopped for ≥ 3 hrs. & < 25° F) **Fines:** $100 for 1st; $200 for 2nd; $500 for 3rd; $1,500 for 4th & subsequent offenses *(NJAC 7:27A3.10(m)(14))* **Penalties:** For commercial vehicle and property owner, $250 for first violation, $500 for second violation, $1000 for third and each subsequent violation.	- Traffic conditions - Mechanical operations - Waiting or being inspected - Performing emergency services - Being repaired or serviced - Use of sleeper berth in non-residential areas *(before April 30, 2011)* - Auxiliary power unit/generator set, bunk heaters, etc. - Sleeper berth with 2007 or newer engine or diesel particulate filter *(after April 30, 2011)*
New Jersey Administrative Code Title 7, Ch. 27-14.3. New Jersey State Department of Environmental Protection, Air Quality Management, Regulatory Development (609) 292-2795, www.state.nj.us/dep/aqm		

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New York	**5 minutes** **Fines:** Not <$375 nor >$15,000 – 1st offense; Not >$22,500 – 2nd offense & subsequent offenses *(NYSCL Ch. 43-B, §71,2103(1))*	- Traffic conditions - Comply with passenger comfort laws - Auxiliary power or maintenance - Emergency vehicles - Within mines or quarries - Parked for more than 2 hrs & less than 25° F - State Inspections - Recharging hybrid electric vehicles - Farm vehicles - Electric vehicles
New York Code of Rules & Regulations Title 6, Ch. 3 Part 217-3.2. New York State Department of Environmental Conservation; Division of Air Resources (518)402-8292, www.dec.ny.gov		
New York City	**3 minutes** (1-minute if adjacent to a public school) **Fines:** Not <$50 nor >$500 and/or imprisonment for 20 days – 1st; Not <$100 nor >$1,000 and/or imprisonment for not >30 days – 2nd offense; Not <$400 nor >$5,000 and/or imprisonment for not >4 months – 3rd & subsequent offenses. *(NYCAC 24-190(g))*	- Emergency vehicles - Operate loading, unloading or processing device
New York City Administrative Code Title 24-163. New York City Department of Environmental Protection (212) 639-9675, www.nyc.gov/dep		
New York, New Rochelle	**5 minutes** **Fines:** Not more than $50 and/or 15 days imprisonment – 1st offense; Not more than $100 and/or 45 days imprisonment – 2nd offense within 18 months; Not more than $250 and/or 90 days imprisonment – 3rd & subsequent offenses within 18 months *(CCNR §312-68)*	- Traffic conditions - Comply with passenger comfort laws - Auxiliary power or maintenance - Emergency vehicles - Within mines or quarries - Parked for more than 2 hrs & less than 25° F - State Inspections - Recharging hybrid electric vehicles - Farm vehicles - Electric vehicles
Code of the City of New Rochelle, Part II, Ch. 312, Art. II, §312-33. City of New Rochelle, Code Enforcement/Abatement (914) 654-2051, www.newrochelleny.com		
New York, Rockland County	**3 consecutive minutes** **Fines:** Not >$250 and/or 15 days imprisonment for 1st; not >$1,000 and/or 15 days imprisonment for 2nd & subsequent offenses *(LL #4, § 4)*	- Traffic conditions - Comply with passenger comfort laws - Power for auxiliary purposes - Maintenance - Performing emergency services
Laws of Rockland Co. Part II, Ch. 377. Rockland County Department of Health (845) 364-2512, www.co.rockland.ny.us/health		

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COMPENDIUM OF IDLING REGULATIONS

North Carolina <NEW>	**5 consecutive minutes in any 60-minute period** **Fines:** TBD	- Traffic conditions/controls - Emergency vehicles - Power auxiliary equipment - Manufacturer's recommendations - Federally mandated rest or sleep periods *(expires May 1, 2011)* - Auxiliary power units - California low-NOx idling label - Safety or health emergency Heavy-duty farm vehicles
North Carolina Administrative Code Title 15A, Ch. 2D.1010. North Carolina Division of Air Quality, (919) 733-3340, www.ncair.org		
Ohio, Cleveland	**5 minutes in any 60-minute period** (10 minutes/hour at loading docks/areas or if <32° F or >85° F) **Fines:** $150	- Prevent safety or health emergency - Traffic conditions/controls - Emergency vehicles - Service or repair - Vehicle safety inspection - Power auxiliary equipment - Sleeping or resting in a sleeper berth - Mechanical difficulties - Idle reduction technologies
Cleveland Traffic Code Ch. 431.44. City of Cleveland, Department of Public Safety (216) 664-2200, http://www.city.cleveland.oh.us/CityofCleveland/Home		
Ohio, Maple Heights	**5 minutes in any 60-minute period** (10 minutes/hour at loading docks/areas or if <32° F or >85° F) **Fines:** $150	- Prevent safety or health emergency - Traffic conditions/controls - Emergency vehicles - Service or repair - Vehicle safety inspection - Power auxiliary equipment - Sleeping or resting in a sleeper berth - Mechanical difficulties - Idle reduction technologies
Maple Heights Traffic Code Ch. 432.42. City of Maple Heights, Police Department (216) 662-5884, http://mapleheights.cuyahogacounty.us/dept/police.asp		
Ohio, South Euclid	**0 minutes** (20 min./hr: Loading/ unloading; No limit: <32° F or >85° F) **Fines:** $50 – 1st conviction $150 – 2nd & subsequent conviction in 12-month period	- Traffic conditions/controls - Prevent safety or health hazard - Emergency vehicles - Service or repair - Vehicle safety inspection - Power auxiliary equipment - Sleeping or resting in a sleeper berth - Mechanical difficulties - Idle reduction technologies - Queuing
South Euclid Traffic Code Ch. 339.13. City of South Euclid, Division of Police (216) 381-1234, http://www.southeuclidpolice.com/Home.html		

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COMPENDIUM OF IDLING REGULATIONS

Pennsylvania	**5 minutes in any 1 hour period** (15 min/hr if sampling, weighing, or loading or unloading) **Fines:** $150 - $300 per offense (plus civil penalties up to $1000)	- Traffic conditions - Prevent safety or health emergencies - Comply with manufacturer's specifications - Emergency or law enforcement purposes - Maintenance or repair - Government or security inspections - Power work-related operations - Mechanical difficulties - Sleeper berth a/c or heat during rest or sleep periods when temperatures <40° F or >75 ° F & parked legally *(exemption expired May 1, 2010)* - Vehicles with CARB low-NOx idle labels
Diesel-Powered Motor Vehicle Idling Act. Department of Environmental Protection, Bureau of Air Quality (717) 787-9495, www.dep.state.pa.us/dep/deputate/airwaste/aq		
Pennsylvania, Alleghany County	**5 minutes** (20 min./hour if less than 40° F or more than 75° F) **Fines:** Warning – 1st offense; $100 – 2nd offense $500 – 3rd & subsequent offenses	- Traffic conditions - Boarding & discharging passengers - Queuing - Cool down/warm up per manufacturer's recommendations - Sleeping/resting in truck - Safety inspections - Ensure safe operation - Emergency vehicles - Power accessory or service equipment - Repair or diagnostics
County of Allegheny Ordinance No. 16782, §2105.92. Allegheny County Health Department, Air Pollution Control (412) 687-2243, www.achd.net		
Pennsylvania, City of Philadelphia	**2 minutes or 0 minutes for layovers** (5 minutes if less than 32° F) (20 minutes if less than 20° F) **Fine:** $300	None
Air Management Reg. IX §3(A). Philadelphia Department of Public Health, Air Management Services (215) 685-7578, www.phila.gov/health/		
Rhode Island	**5 minutes in any 1 hour period** (No limit: < 0° F; 15 min./hr between 0° and 32° F) **Fines:** Not >$100 – 1st offense; Not >$500 for each succeeding offense *(APCR §45.6)*	- Traffic conditions - Ensure health or safety of driver/passengers - Power work-related operations - Sleeper cabs during federally mandated rest periods *(exemption expired July 1, 2010)* - Maintenance, servicing, repairing, or diagnostic purposes - State or federal inspections - Emergency or law enforcement purposes - Auxiliary power unit/generator set
Air Pollution Control Regulation No. 45. Department of Environmental Management, Office of Air Resources (401) 222-6800, www.dem.ri.gov		

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COMPENDIUM OF IDLING REGULATIONS

South Carolina	**10 minutes in any 1 hour period** **Fines:** $75 for each offense *(SCCL §56-35-40)*	- Traffic conditions - Prevent safety or health emergency - Emergency or law enforcement purposes - Maintenance, servicing, repairing, or diagnostic purposes - State or federal inspections - Power work-related operations - Sleeper berth a/c or heat during (a) rest or sleep periods; (b) <40° F or >80 ° F; or (c) at rest areas, terminals, truck stops, or legal parking locations >500' from homes or schools - While waiting to load/unload
South Carolina Code of Laws 56-35-10. State Transport Police (803) 896-5500, www.scstp.org		

Texas Cities: Arlington, Austin, Bastrop, Benbrook, Cedar Hill, Celina, Colleyville, Dallas, Elgin, Euless, Georgetown, Hurst, Hutto, Keene, Lake Worth, Lancaster, Little Elm, Lockhart, Luling, Mabank, McKinney, Mesquite, North Richland Hills, Pecan Hill, Round Rock, Rowlett, San Marcos, University Park, Westlake Counties: Bastrop, Caldwell, Collin, Hays, Kaufman, Tarrant, Travis, Williamson	**5 minutes, April – October** (30 minutes for bus passenger comfort or transit operations) **Fine:** Varies by jurisdiction	- 14,000 lbs GVW or less - Traffic conditions - Emergency or law enforcement - To perform needed work - Maintenance or diagnostics - Defrost windshield - Airport ground support - Rented/leased vehicles - Owners of rented/leased vehicles
Texas Administrative Code Title 30 § 114.512. Texas Commission on Environmental Quality (512) 239-1000, www.tceq.state.tx.us		

Utah	"A person operating or in charge of a motor vehicle may not permit the vehicle to stand unattended without: (a) stopping the engine..." **Fines:** Not >$750 and/or not >90 days imprisonment *(UC 76-3-204; 301)*	None
Utah Code Title 41-6a-1403. Utah Department of Public Safety (801) 965-4461, www.publicsafety.utah.gov		

Utah, Salt Lake County	**15 minutes** **Fines:** Not >$1,000 and/or not >6 months imprisonment – 1st; Not >$2,500 and/or not >1 year imprisonment – 2nd & following; offense(s) within 2 years *(UC 76-3-204; 301)*	- Power refrigeration unit if greater than 500 ft from any residence - Heat/cool sleeper berth if greater than 500 ft from any residence - Emergency vehicles
Salt Lake City-County Health Dept. Regulation #28 4.1.9. Salt Lake Valley Health Department, Environmental Health Services, Air Pollution Control (801) 313-6720, http://www.slvhealth.org/programs/airPollutionControl/		

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APPENDIX B:
TEXAS EDUCATION CODE - SECTION 42.155.
TRANSPORTATION ALLOTMENT

Texas Education Code - Section 42.155.
Transportation Allotment

§ 42.155. TRANSPORTATION ALLOTMENT.

(a) Each district or county operating a transportation system is entitled to allotments for transportation costs as provided by this section.

(b) As used in this section: (1) "Regular eligible student" means a student who resides two or more miles from the student's campus of regular attendance, measured along the shortest route that may be traveled on public roads, and who is not classified as a student eligible for special education services.

(2) "Eligible special education student" means a student who is eligible for special education services under Section 29.003 and who would be unable to attend classes without special transportation services.

(3) "Linear density" means the average number of regular eligible students transported daily, divided by the approved daily route miles traveled by the respective transportation system.

(c) Each district or county operating a regular transportation system is entitled to an allotment based on the daily cost per regular eligible student of operating and maintaining the regular transportation system and the linear density of that system. In determining the cost, the commissioner shall give consideration to factors affecting the actual cost of providing these transportation services in each district or county. The average actual cost is to be computed by the commissioner and included for consideration by the legislature in the General Appropriations Act. The allotment per mile of approved route may not exceed the amount set by appropriation.

(d) A district or county may apply for and on approval of the commissioner receive an additional amount of up to 10% of its regular transportation allotment to be used for the transportation of children living within two miles of the school they attend who would be subject to hazardous traffic conditions if they walked to school. Each board of trustees shall provide to the commissioner the definition of hazardous conditions applicable to that district and shall identify the specific hazardous areas for which the allocation is requested. A hazardous condition exists where no walkway is provided and children must walk along

or cross a freeway or expressway, an underpass, an overpass or a bridge, an uncontrolled major traffic artery, an industrial or commercial area, or another comparable condition.

(e) The commissioner may grant an amount set by appropriation for private or commercial transportation for eligible students from isolated areas. The need for this type of transportation grant shall be determined on an individual basis and the amount granted shall not exceed the actual cost. The grants may be made only in extreme hardship cases. A grant may not be made if the students live within two miles of an approved school bus route.

(f) The cost of transporting career and technology education students from one campus to another inside a district or from a sending district to another secondary public school for a career and technology program or an area career and technology school or to an approved post-secondary institution under a contract for instruction approved by the agency shall be reimbursed based on the number of actual miles traveled times the district's official extracurricular travel per mile rate as set by the board of trustees and approved by the agency.

(g) A school district or county that provides special transportation services for eligible special education students is entitled to a state allocation paid on a previous year's cost-per-mile basis. The maximum rate per mile allowable shall be set by appropriation based on data gathered from the first year of each preceding biennium. Districts may use a portion of their support allocation to pay transportation costs, if necessary. The commissioner may grant an amount set by appropriation for private transportation to reimburse parents or their agents for transporting eligible special education students. The mileage allowed shall be computed along the shortest public road from the student's home to school and back, morning and afternoon. The need for this type transportation shall be determined on an individual
basis and shall be approved only in extreme hardship cases.

(h) Funds allotted under this section must be used in providing transportation services.

(i) In the case of a district belonging to a county transportation system, the district's transportation allotment for purposes of determining a district's foundation school program allocations is determined on the basis of the number of approved

daily route miles in the district multiplied by the allotment per mile to which the county transportation system is entitled.

(j) The Texas School for the Deaf is entitled to an allotment under this section. The commissioner shall determine the appropriate allotment.

(k) Notwithstanding any other provision of this section, the commissioner may not reduce the allotment to which a district or county is entitled under this section because the district or county provides transportation for an eligible student to and from a child-care facility, as defined by Section 42. 002, Human Resources Code, or a grandparent's residence instead of the student's residence, as authorized by Section 34.007, if the transportation is provided within the approved routes of the district or county for the school the student attends.

Added by Acts 1995, 74th Leg., ch. 260, § 1, eff. May 30, 1995.
Amended by Acts 1997, 75th Leg., ch. 1071, § 17, eff. Sept. 1,
1997; Acts 2001, 77th Leg., ch. 169, § 4, eff. Sept. 1, 2001;
Acts 2003, 78th Leg., ch. 201, § 32, eff. Sept. 1, 2003.

Section: Previous 42.104 42.105 42.106 42.151 42.152 42.153 42.154 42.155 42.156 42.157 42.158 42.251 42.2511 42.2512 42.2513 Next

Explanation of Hazardous Routes Evaluation Criteria

Regular route bus service is provided to students based upon eligibility criteria as set forth by school district policy.

Hazardous Transportation Review

The Texas Education Agency provides funding guidelines to school districts to evaluate areas within 2 miles of schools. The guidelines are:

A. Regular Students – those regular and special education students who do not require special transportation services (as addressed under subsection "B" of this section) [TEC, Sections 25.036, 34.011, and 42.155(b)(1) and (d)]

1. Eligible student riders (including transfers as addressed below) must:

a. legally reside two or more miles from their campus of regular attendance as measured along the shortest route that may be traveled on public roads [hereinafter, "two-or-more-mile student"]; or

b. legally reside in a designated area within two miles of their campus of regular attendance which, as determined by the respective district's board of trustees (see subsection "A 5" of "section "II" for related requirements), would subject them to hazardous traffic conditions if they walked to or from school [hereinafter, "hazardous-area student"],

5. Student rider eligibility should be determined in accordance with the following:

a. All distance measurements should be made in a reasonably accurate and consistent manner using the shortest route that may be traveled on public (not private) roads between an established prominent landmark at the respective student's campus (preferably, the flag pole or main entrance to the campus) and the private road/driveway or walkway/main entrance to the student's legal residence. However, local district policy regarding student rider eligibility criteria may be more restrictive, such as establishing a two-mile radius or longer walking distance from the campus.

b. Where one-way streets, no through streets, prohibited turns, or other comparable traffic restrictions exist along the route to or from school, the distance measured from home to school could differ significantly from the distance measured from school to home. In such instances, the longer of the two distance measurements may be used to establish rider eligibility for transportation allotment purposes.

HAZARDOUS CONDITIONS

The District may apply to the commissioner of education for an additional amount of up to 10% of its regular transportation allotment to be used for the transportation of students living within two miles of the school they attend who would be subject to hazardous traffic conditions if they walked to school. The Board or its designee shall provide to the commissioner the definition of hazardous conditions applicable to the District and shall identify the specific hazardous areas for which the allocation is requested. A hazardous condition exists where no walkway is provided and students must walk along or cross a freeway or expressway, an underpass, an overpass or a bridge, an uncontrolled major traffic artery, an industrial or commercial area, or another comparable condition. Education Code 42.155(d)

APPENDIX C:
MITCHELL ELEMENTARY PARENT SURVEY

Dear Parent or Caregiver,

The Texas Transportation Institute at Texas A&M University is conducting a study regarding parent driving patterns and wait times in and around school zones. In addition, there are a few questions related to your thoughts on the environment and air quality.

Mitchell Elementary has agreed to be a part of this ***voluntary*** survey and the results will be evaluated to better understand travel issues and wait times around Mitchell Elementary.

After completing this survey, **please return it by mail in the provided postage-paid envelope by May 30**. Your responses are very important to us and will be kept confidential. No identifying information is collected during this survey.

For questions regarding survey instructions or the survey itself, please contact research conductor, Ms. Michelle Hoelscher, Texas Transportation Institute, by phone at 979-847-8724 or by email at m-hoelscher@tamu.edu, Texas A&M University.

Thank you for time and participation in this survey!

Sincerely,

Michelle Hoelscher
Texas Transportation Institute

The Institutional Review Board (IRB) – Human Subjects in Research, Texas A&M University, has reviewed this research study. For problems or questions regarding subjects' rights, you may contact the IRB by phone at 979-458-4067 or by email at irb@tamu.edu.

Part I: General Background and Travel Information

1. **What is the grade level of the child who brought home this survey? (K – 5)** _____

2. **Is the child who brought home this survey male or female?**

   - ❑ Male
   - ❑ Female

3. **How many children do you have in Kindergarten through 8th grade?**

   _____ # Children in Elementary School

   _____ # Children in Middle School

4. **If you have a child in Middle School, what school do they attend?**

   _____

5. **What is the nearest intersection to your home?** (i.e., Longview Dr. and Grove Dr.)

_____ *and* _____

6. **How far does your child live from school?**

   - ❑ Less than ¼ mile
   - ❑ More than ¼ mile less than ½ mile
   - ❑ More than ½ mile less than 1 mile
   - ❑ More than 1 mile less than 2 miles
   - ❑ More than 2 miles
   - ❑ More than 5 miles
   - ❑ Don't know

Part II: Getting to School

7. **How many days per week does your child travel to school by each of the following methods?**

   - ❑ Walk _____ days per week
   - ❑ Bike _____ days per week
   - ❑ School Bus _____ days per week
   - ❑ Family Vehicle (only with children from your family) _____ days per week
   - ❑ Carpool (riding with children from other families) _____ days per week
   - ❑ Other: _____

8. **How long does it normally take for your morning trip to Mitchell Elementary school?** *If you do not drive your child to or from school, skip to question 14.*

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

9. **During your morning trip to school, how much time is related to traffic or congestion near the school zone?**

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

10. **How many minutes before the morning bell rings does your child typically arrive to school?**

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

11. **If you arrive earlier than 10 minutes before the morning bell rings, is it to avoid congestion?**

- ❑ Yes
- ❑ No

12. **How long do you wait in line to drop off your child at the designated drop-off area?**

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

13. **During the time you are waiting in the drop-off line time as stated above, is your car turned on?**

- ❑ Yes, the entire time
- ❑ Yes, but only part of the time
- ❑ No

Part III: Getting Home from School

14. How many days per week does your child leave by each of the following methods?

- ❑ Walk _____ days per week
- ❑ Bike _____ days per week
- ❑ School Bus _____ days per week
- ❑ Family Vehicle (only with children from your family) _____ days per week
- ❑ Carpool (riding with children from other families) _____ days per week
- ❑ Other: _____

15. How long does it normally take to travel to pick up your child from school? *If you do not drive to pick up your child from school, please skip to question 20.*

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

16. How many minutes before the afternoon bell rings do you typically arrive to pick up your child from school?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

17. Do you arrive early to pick up your child from school to avoid traffic congestion?

- ❑ Yes
- ❑ No

18. Of that time picking up your child from school, how much time is related to traffic congestion near the school zone?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

19. How long do you wait in line to pick up your child at the designated pick-up area?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

20. During the time you are waiting in the pick-up line as stated above, how long is your car turned on?

- ❑ Yes
- ❑ Yes, but only half the time
- ❑ No

Part IV: Walk, Bike or Bus – Child Transportation

21. Has your child asked you for permission to walk or bike to/from school?

- ❑ Yes
- ❑ No

22. At what grade would you allow your child to walk or bike *without* an adult to/from school?

- ❑ Grade (K – 8) _____
- ❑ I would not feel comfortable at any grade *(please explain below)*

_____

23. At what grade would you allow your child to walk or bike *with* an adult to/from school?

- ❑ Grade (K – 8) _____
- ❑ I would not feel comfortable at any grade *(please explain below)*

_____

24. Do you live where school bus service is provided?

- ❑ Yes
- ❑ No

25. Has your child asked you for permission to ride the school bus?

- ❑ Yes
- ❑ No

26. At what grade would you allow your child to ride the school bus to/from school?

- ❑ Grade (K – 8) _____
- ❑ I would not feel comfortable at any grade *(please explain below)*

_____

27. If you live where there is no bus service, would you allow your child to ride the bus if it were offered?

- ❑ Yes
- ❑ No

28. If you have bus service, which of the following issues affect your decision to *not allow* your child to ride the bus *to* school? (check all that apply)

- ❑ Distance
- ❑ Convenience of driving
- ❑ School bus a.m. pick-up time too early
- ❑ School bus a.m. pick-up time too late
- ❑ Child's participation in before-school activities
- ❑ Do not have flexible work hours
- ❑ Flexible work hours allow me to drive my child to school
- ❑ On-board safety (i.e., seatbelts, behavior)
- ❑ Travel safety (i.e., crash, bus breakdown)
- ❑ Other: _____

29. If you have bus service, which of the following issues affect your decision to *not allow* your child to ride the bus *home from* school? (check all that apply)

- ❑ Distance
- ❑ Convenience of driving
- ❑ School bus arrives at home too early
- ❑ School bus arrives at home too late
- ❑ Child's participation in after-school activities
- ❑ Do not have flexible work hours
- ❑ Flexible work hours allow me to pick up my child from school
- ❑ On-board safety (i.e., seatbelts, behavior)
- ❑ Travel safety (i.e., crash, bus breakdown)
- ❑ Other: _____

30. In your opinion, how much does your child's school district encourage or discourage school bus ridership?

- ❑ Strongly encourage
- ❑ Encourage
- ❑ Neither
- ❑ Discourage
- ❑ Strongly discourage

Part V: Environment & Air Quality

31. If you had to choose from the following categories, what would you say is the biggest environmental problem in the Brazos Valley?

- ❑ Air pollution
- ❑ Water pollution
- ❑ Ground and soil pollution
- ❑ Other (*specify*): _____

32. How interested would you say that you are in air quality issues?

- ❑ Very interested
- ❑ Somewhat interested
- ❑ Neutral
- ❑ Not very interested
- ❑ Not at all interested

33. How informed would you say that you are about air quality issues in Texas?

- ❑ Very informed
- ❑ Somewhat informed
- ❑ Neutral
- ❑ Not very informed
- ❑ Not at all informed

34. Thinking of the air quality in your local area, how would you rate it on a scale where 1 is very good and 10 is very bad?

<very good> 1 2 3 4 5 6 7 8 9 10 <very bad>

35. To the best of your knowledge, which of the following is the greatest source of air pollution in Texas?

- ❑ Pollution emissions from oil refineries
- ❑ Pollution emissions from manufacturing plants
- ❑ Exhaust from cars, trucks and buses
- ❑ Dust from construction
- ❑ Dust and other emissions from farming and ranching
- ❑ Other (*specify*): _____

36. To the best of your knowledge, which of the following is the greatest source of air pollution in your community?

- ❑ Pollution emissions from oil refineries
- ❑ Pollution emissions from manufacturing plants
- ❑ Exhaust from cars, trucks and buses
- ❑ Dust from construction
- ❑ Dust and other emissions from farming and ranching
- ❑ Other (*specify*): _____

37. How interested would you be in learning simple ways to improve air quality in your school zone?

- ❑ Very interested
- ❑ Somewhat interested
- ❑ Neutral
- ❑ Not very interested
- ❑ Not at all interested

Part VI: The following information is for statistical purposes only. All of your answers are very important to us. This information will not be used in any way to identify you.

38. What is your age?

- ❑ 16 – 24
- ❑ 25 – 34
- ❑ 35 – 44
- ❑ 45 – 54
- ❑ 55 – 64
- ❑ 65 and over

39. What is your gender?

- ❑ Male
- ❑ Female

40. Please describe your household type:

- ❑ Married with child(ren)
- ❑ Single parent family
- ❑ Other (*specify*): _____

41. Including yourself, how many people live in your household?

_____

42. All together, how many motor vehicles (including cars, vans, trucks, and motorcycles) are available for use by members of your household?

_____

43. What is the make, model and year of the primary vehicle used for school transport?

- ❑ Make _____ (i.e., Chevrolet, Honda, Buick)
- ❑ Model _____ (i.e., Malibu, Accord, Skylark)
- ❑ Year _____ (i.e., 1985, 1999, 2003)

44. What category best describes your occupation?

- ❑ Professional / Managerial
- ❑ Technical
- ❑ Sales / Retail
- ❑ Administrative / Clerical
- ❑ Manufacturing
- ❑ Stay-at-home parent
- ❑ Seeking work
- ❑ Other (*specify*): _____

45. What is the last year of school you have completed?

- ❑ Less than high school
- ❑ High school graduate
- ❑ Some college / vocational
- ❑ College graduate
- ❑ Postgraduate degree

46. What is the best estimate of your hourly wage rate?

- ❑ Less than $10
- ❑ $10.01 to $15
- ❑ $15.01 to $20
- ❑ $20.01 to $30
- ❑ $30.01 to $40
- ❑ $40.01 to $50
- ❑ $50.01 to $60
- ❑ $60.01 to $100
- ❑ Over $100

Thank you for your time!

Comments:

_____

_____

_____

_____

APPENDIX D:
SAM RAYBURN MIDDLE SCHOOL PARENT SURVEY

Dear Parent or Caregiver,

The Texas Transportation Institute at Texas A&M University is conducting a study primarily regarding parent driving patterns and wait times in and around school zones. In addition, there are a few questions included that are related to your thoughts on air quality.

Sam Rayburn Middle School has agreed to be a part of this ***voluntary*** survey and the results will be evaluated to better understand travel issues and wait times around your school zone.

After completing this survey, **please return it by mail in the provided postage-paid envelope by May 30**. Your responses are very important to us and will be kept confidential. No identifying information is collected during this survey.

For questions regarding survey instructions or the survey itself, please contact research conductor, Ms. Michelle Hoelscher, Texas Transportation Institute, by phone at 979-847-8724 or by email at m-hoelscher@tamu.edu, Texas A&M University.

Thank you for time and participation in this survey!

Sincerely,

Michelle Hoelscher
Texas Transportation Institute

The Institutional Review Board (IRB) – Human Subjects in Research, Texas A&M University, has reviewed this research study. For problems or questions regarding subjects' rights, you may contact the IRB by phone at 979-458-4067 or by email at irb@tamu.edu.

Part I: General Background and Travel Information

1. **What is the grade level of the child who brought home this survey? (6 – 8) _____**

2. **Is the child who brought home this survey male or female?**

   - ❑ Male
   - ❑ Female

3. **How many children do you have in Kindergarten through 8th grade?**

   _____ # Children in Elementary School

   _____ # Children in Middle School

4. **If you have children in Elementary School, what school do they attend?**

   _____

5. **What is the nearest intersection to your home?** (i.e., Longview Dr. and Grove Dr.)

   _____ *and* _____

6. **How far does your child live from school?**

   - ❑ Less than ¼ mile
   - ❑ More than ¼ mile less than ½ mile
   - ❑ More than ½ mile less than 1 mile
   - ❑ More than 1 mile less than 2 miles
   - ❑ More than 2 miles
   - ❑ More than 5 miles
   - ❑ Don't know

Part II: Getting to School

7. **How many days per week does your child travel to school by each of the following methods?**

   - ❑ Walk _____ days per week
   - ❑ Bike _____ days per week
   - ❑ School Bus _____ days per week
   - ❑ Family Vehicle (only with children from your family) _____ days per week
   - ❑ Carpool (riding with children from other families) _____ days per week
   - ❑ Other: _____

8. **How long does it normally take for your morning trip to Rayburn Middle school?**
   - ❑ Less than 5 minutes
   - ❑ 5 – 10 minutes
   - ❑ 11 – 20 minutes
   - ❑ 21 – 30 minutes
   - ❑ More than 30 minutes
   - ❑ Don't know / Not sure

9. **During your morning trip to school, how much time is related to traffic or congestion near the school zone?**

   - ❑ Less than 5 minutes
   - ❑ 5 – 10 minutes
   - ❑ 11 – 20 minutes
   - ❑ 21 – 30 minutes
   - ❑ More than 30 minutes
   - ❑ Don't know / Not sure

10. **How many minutes before the morning bell rings does your child typically arrive to school**
    - ❑ Less than 5 minutes
    - ❑ 5 – 10 minutes
    - ❑ 11 – 20 minutes
    - ❑ 21 – 30 minutes
    - ❑ More than 30 minutes
    - ❑ Don't know / Not sure

11. **If you arrive earlier than 10 minutes before the bell rings, is it to avoid congestion?**

    - ❑ Yes
    - ❑ No

12. How long do you wait in line to drop off your child at the designated drop-off area?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

13. During the time you are waiting in the drop-off line, as stated above, is your car turned on and running?

- ❑ Yes, the entire time
- ❑ Yes, but only part of the time
- ❑ No

Part III: Getting Home from School

14. How many days per week does your child leave school by each of the following methods?

- ❑ Walk _____ days per week
- ❑ Bike _____ days per week
- ❑ School Bus _____ days per week
- ❑ Family Vehicle (only with children from your family) _____ days per week
- ❑ Carpool (riding with children from other families) _____ days per week
- ❑ Other: _____

15. How long does it normally take to travel to pick up your child from school?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

16. How many minutes before the afternoon bell rings do you typically arrive to pick up your child from school?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

17. Of that time picking your child up from school, how much time is related to traffic congestion near the school zone?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

18. Do you arrive early to pick up your child from school to avoid traffic congestion?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

19. How long do you wait in line to pick up your child at the designated pick-up area?

- ❑ Less than 5 minutes
- ❑ 5 – 10 minutes
- ❑ 11 – 20 minutes
- ❑ 21 – 30 minutes
- ❑ More than 30 minutes
- ❑ Don't know / Not sure

20. During the time you are waiting in the pick-up line as stated above, how long is your car turned on?

- ❑ Yes
- ❑ Yes, but only half the time
- ❑ No

Part IV: Walk, Bike or Bus – Child Transportation

21. Has your child asked you for permission to walk or bike to/from school?

- ❑ Yes
- ❑ No

22. At what grade would you allow your child to walk or bike *without* an adult to/from school?

- ❑ Grade (K – 8) _____
- ❑ I would not feel comfortable at any grade *(please explain below)*

_____

23. At what grade would you allow your child to walk or bike *with* an adult to/from school?

- ❑ Grade (K – 8) _____
- ❑ I would not feel comfortable at any grade *(please explain below)*

_____

24. Do you live where school bus service is provided?

- ❑ Yes
- ❑ No

25. Has your child asked you for permission to ride the school bus?

- ❑ Yes
- ❑ No

26. At what grade would you allow your child to ride the school bus to/from school?

- ❑ Grade (K – 8) _____
- ❑ I would not feel comfortable at any grade *(please explain below)*

  _____

27. If you live where there is no bus service, would you allow your child to ride the bus if it were offered?

- ❑ Yes
- ❑ No

28. If you have bus service, which of the following issues affect your decision to *not allow* your child to ride the bus *to* school? (check all that apply)

- ❑ Distance
- ❑ Convenience of driving
- ❑ School bus p.m. drop-off time too early
- ❑ School bus p.m. drop-off time too late
- ❑ Child's participation in after-school activities
- ❑ Do not have flexible work hours
- ❑ Flexible work hours allow me to pick my child up from school
- ❑ On-board safety (i.e., seatbelts, behavior)
- ❑ Travel safety (i.e., crash, bus breakdown)
- ❑ Other: _____

29. If you have bus service, which of the following issues affect your decision to *not allow* your child to ride the bus *home from* school? (check all that apply)

- ❑ Distance
- ❑ Convenience of driving
- ❑ School bus arrives at home too early
- ❑ School bus arrives at home too late
- ❑ Child's participation in after-school activities
- ❑ Do not have flexible work hours
- ❑ Flexible work hours allow me to pick up my child from school
- ❑ On-board safety (i.e., seatbelts, behavior)
- ❑ Travel safety (i.e., crash, bus breakdown)
- ❑ Other: _____

30. In your opinion, how much does your child's school district encourage or discourage school bus ridership?

- ❑ Strongly encourage
- ❑ Encourage
- ❑ Neither
- ❑ Discourage
- ❑ Strongly discourage

Part V: Air Quality

31. If you had to choose from the following categories, what would you say is the biggest environmental problem in the Brazos Valley?

- ❑ Air pollution
- ❑ Water pollution
- ❑ Ground and soil pollution
- ❑ Other (*specify*): _____

32. How interested would you say that you are in air quality issues?

- ❑ Very interested
- ❑ Somewhat interested
- ❑ Neutral
- ❑ Not very interested
- ❑ Not at all interested

33. How informed would you say that you are about air quality issues in Texas?

- ❑ Very informed
- ❑ Somewhat informed
- ❑ Neutral
- ❑ Not very informed
- ❑ Not at all informed

34. Thinking of the air quality in your local area, how would you rate it on a scale where 1 is very good and 10 is very bad?

<very good> 1 2 3 4 5 6 7 8 9 10 <very bad>

35. To the best of your knowledge, which of the following is the greatest source of air pollution in Texas?

- ❑ Pollution emissions from oil refineries
- ❑ Pollution emissions from manufacturing plants
- ❑ Exhaust from cars, trucks and buses
- ❑ Dust from construction
- ❑ Dust and other emissions from farming and ranching
- ❑ Other (*specify*): _____

36. To the best of your knowledge, which of the following is the greatest source of air pollution in your community?

- ❑ Pollution emissions from oil refineries
- ❑ Pollution emissions from manufacturing plants
- ❑ Exhaust from cars, trucks and buses
- ❑ Dust from construction
- ❑ Dust and other emissions from farming and ranching
- ❑ Other (*specify*): _____

37. How interested would you be in learning simple ways to improve air quality in your school zone?

- ❑ Very interested
- ❑ Somewhat interested
- ❑ Neutral
- ❑ Not very interested
- ❑ Not at all interested

Part VI: The following information is for statistical purposes only. All of your answers are very important to us. This information will not be used in any way to identify you.

38. What is your age?

- ❑ 16 – 24
- ❑ 25 – 34
- ❑ 35 – 44
- ❑ 45 – 54
- ❑ 55 – 64
- ❑ 65 and over

39. What is your gender?

- ❑ Male
- ❑ Female

40. Please describe your household type:

- ❑ Married with child(ren)
- ❑ Single parent family
- ❑ Other

41. Including yourself, how many people live in your household?

_____

42. All together, how many motor vehicles (including cars, vans, trucks, and motorcycles) are available for use by members of your household? _____

43. What is the make, model and year of the primary vehicle used for school transportation?

- ❑ Make _____ (i.e., Chevrolet, Honda, Buick)
- ❑ Model _____ (i.e., Malibu, Accord, Skylark)
- ❑ Year _____ (i.e., 1985, 1999, 2003)

44. What category best describes your occupation?

- ❑ Professional / Managerial
- ❑ Technical
- ❑ Sales / Retail
- ❑ Administrative / Clerical
- ❑ Manufacturing
- ❑ Stay-at-home parent
- ❑ Seeking work
- ❑ Other (*specify*):
  _____

45. What is the last year of school you have completed?

- ❑ Less than high school
- ❑ High school graduate
- ❑ Some college / vocational
- ❑ College graduate
- ❑ Postgraduate degree

46. What is the best estimate of your hourly wage rate?

- ❑ Less than $10
- ❑ $10.01 to $15
- ❑ $15.01 to $20
- ❑ $20.01 to $30
- ❑ $30.01 to $40
- ❑ $40.01 to $50
- ❑ $50.01 to $60
- ❑ $60.01 to $100
- ❑ Over $100

Thank you for your time!

Comments (include positive or negative comments on the new relocation of entrance and exit ramps from Highway 6 in front of Sam Rayburn):

_____

_____

_____

APPENDIX E:
SCHOOL BUS DRIVER SURVEY

Dear Transportation Provider,

The Texas Transportation Institute at Texas A&M University is conducting a study regarding school bus travel and wait times in and around school zones. Additionally, we have added a few questions regarding thoughts on environment and air quality. A complimentary survey of parents' choice of travel modes, driving patterns, and wait times is being conducted May 20 through May 23 at Sam Rayburn Middle School and Mitchell Elementary.

This survey is voluntary *and confidential.* Participation in this survey will in no way affect your employment status. Your responses will be kept confidential and no identifying information is asked during this survey. **After completing this survey, please place in the return box marked "Texas Transportation Institute" located at the Bryan ISD Transportation Services front desk.**

For questions regarding survey instructions or the survey itself, please contact research conductor, Ms. Michelle Hoelscher, Texas Transportation Institute, by phone at (979) 847-8724 or by email at m-hoelscher@tamu.edu, Texas A&M University.

Thank you very much for time and participation in this survey!

Sincerely,

Michelle Hoelscher
Texas Transportation Institute

The Institutional Review Board (IRB) – Human Subjects in Research, Texas A&M University, has reviewed this research study. For problems or questions regarding subjects' rights, you may contact the IRB by phone at 979-458-4067 or by email at irb@tamu.edu.

Part I: The Morning Route (Route 1)

1. **What is the year, make and model of your bus?**

   Year: _____

   Make: _____

   Model: _____

2. **What time do you arrive at the school bus yard for the a.m. shift?**

   ___:____ a.m.

3. **At what time do you start the bus engine and prepare for the route?**

___:___ a.m.

4. **At what time to you leave the yard to begin your route?**

___:___ a.m.

5. **About what time do you reach your first stop?**

___:____ a.m.

6. **What time do you reach your last stop?**

___:____ a.m.

7. **Your route is done – what time do you arrive to school for the first morning run?**

___:____ a.m.

8. **How many minutes does it take the students to unload your bus?**

- ❑ 1 – 5 minutes
- ❑ 6 – 10 minutes
- ❑ 11 – 15 minutes
- ❑ More than 15 minutes

9. **Once the students have unloaded, how much longer are you in the school loading zone?**

- ❑ 1 – 5 minutes
- ❑ 6 – 10 minutes
- ❑ 11 – 15 minutes
- ❑ More than 15 minutes

10. **Does the school bus remain running during the time students are unloading and while you are waiting to depart the school loading zone?**

- ❑ Yes
- ❑ No

11. **During your first a.m. route, do you experience traffic?**

- ❑ Light traffic
- ❑ Moderate traffic
- ❑ Heavy traffic
- ❑ Traffic frequently effects my route schedule

Part II: The Morning Route (Route 2)

12. What time do you depart school drop #1 to begin your second route?

____:_____ a.m.

13. At what time do you start the bus engine and prepare for the route?

____:____ a.m.

14. At what time to you leave the yard to begin your route?

____:____ a.m.

15. About what time do you reach your first stop?

____:____ a.m.

16. What time do you reach your last stop?

____:____ a.m.

17. Your route is done – what time do you arrive to school for second morning run?

____:____ a.m.

18. How many minutes does it take the students to get off the bus?

- ❑ 1 – 5 minutes
- ❑ 6 – 10 minutes
- ❑ 11 – 15 minutes
- ❑ More than 15 minutes

19. Once the students have unloaded, how much longer are you in the school loading zone?

- ❑ 1 – 5 minutes
- ❑ 6 – 10 minutes
- ❑ 11 – 15 minutes
- ❑ More than 15 minutes

20. Does the school bus remain running during the time students are unloading and while you are waiting to depart the school loading zone?

- ❑ Yes
- ❑ No

21. During your a.m. route, do you experience traffic?

- ❑ Light traffic
- ❑ Moderate traffic
- ❑ Heavy traffic
- ❑ Traffic frequently effects my route schedule

Part III: The Afternoon Ride Home

22. What time do you arrive at the school bus facility for the p.m. shift?

___:____ p.m.

23. At what time do you start the bus engine and prepare for the afternoon trip?

___:___ p.m.

24. At what time to you leave the yard for the afternoon route?

___:___ p.m.

25. What time to you typically arrive at school to pick up the for the afternoon bus route?

___:___ p.m.

26. How many minutes does it take the students to load your bus once the afternoon school bell rings?

- ❑ 1 – 5 minutes
- ❑ 6 – 10 minutes
- ❑ 11 – 15 minutes
- ❑ More than 15 minutes

27. Once the students have all loaded, how much longer are you in the school bus loading zone?

- ❑ 1 – 5 minutes
- ❑ 6 – 10 minutes
- ❑ 11 – 15 minutes
- ❑ More than 15 minutes

28. Will the engine be running during the time students are loading and while you are waiting to depart the school loading zone?

- ❑ Yes
- ❑ No

29. During your afternoon route, do you experience traffic?

- ❑ Light traffic
- ❑ Moderate traffic
- ❑ Heavy traffic
- ❑ Traffic frequently effects my route schedule

Part IV: Environment & Air Quality

47. If you had to choose from the following categories, what would you say is the biggest environmental problem in the Brazos Valley?

- ❑ Air pollution
- ❑ Water pollution
- ❑ Ground and soil pollution
- ❑ Other (*specify*): _____

48. How interested would you say that you are in air quality issues?

- ❑ Very interested
- ❑ Somewhat interested
- ❑ Neutral
- ❑ Not very interested
- ❑ Not at all interested

49. How informed would you say that you are about air quality issues in Texas?

- ❑ Very informed
- ❑ Somewhat informed
- ❑ Neutral
- ❑ Not very informed
- ❑ Not at all informed

50. Thinking of the air quality in your local area, how would you rate it on a scale where 1 is very good and 10 is very bad?

<very good> 1 2 3 4 5 6 7 8 9 10 <very bad>

51. To the best of your knowledge, which of the following is the greatest source of air pollution in Texas?

- ❑ Pollution emissions from oil refineries
- ❑ Pollution emissions from manufacturing plants
- ❑ Exhaust from cars, trucks and buses
- ❑ Dust from construction
- ❑ Dust and other emissions from farming and ranching
- ❑ Other (*specify*): _____

52. To the best of your knowledge, which of the following is the greatest source of air pollution in your community?

- ❑ Pollution emissions from oil refineries
- ❑ Pollution emissions from manufacturing plants
- ❑ Exhaust from cars, trucks and buses
- ❑ Dust from construction
- ❑ Dust and other emissions from farming and ranching
- ❑ Other (*specify*): _____

53. How interested would you be in learning simple ways to improve air quality in your school zone?

- ❑ Very interested
- ❑ Somewhat interested
- ❑ Neutral
- ❑ Not very interested
- ❑ Not at all interested

Comments about your route, traffic safety observances or general information related to travel and route safety:

_____

_____

_____

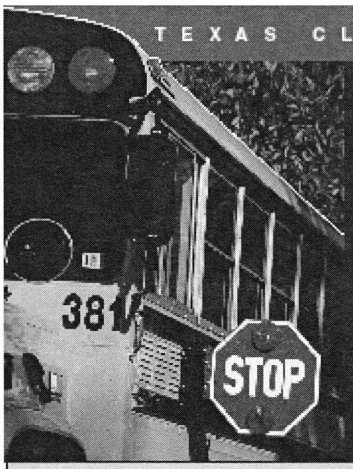
_____

_____

THANK YOU FOR YOUR TIME!

APPENDIX F:
TEXAS CLEAN SCHOOL BUS PROGRAM

TEXAS CLEAN SCHOOL BUS PROGRAM



Diesel Exhaust and School Bus Idling: What You Should Know

Diesel exhaust from idling school buses can accumulate in and around a bus and pose a health risk, particularly to children. School districts can help by taking some simple steps to reduce idling time and to adopt smart driving practices, both of which reduce air pollution.

How Are Children Affected?

Air pollution from diesel vehicles has health implications for everyone, but children are more likely susceptible to this pollution because they breathe more air relative to their body weight and their respiratory systems are still developing. Diesel exhaust contains small particles, known as fine particulate matter, as well as smog-forming and toxic air pollutants. Exposure to diesel exhaust can aggravate asthma, allergies, and respiratory problems. Some studies suggest that long-term exposure increases the risk of lung cancer.

Why Should School Districts Upgrade School Buses in Their Fleets?

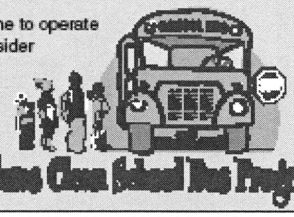
School buses remain the safest way to transport children, and their diesel engines are both durable and economical. However, the Texas Education Agency reports that more than 33 percent of the school buses in local fleets are more than 10 years old. In the years since these vehicles were purchased, several advancements in vehicle and engine technology have helped reduce emissions from school buses.

Recommended Actions to Reduce Diesel Pollution

There are a number of steps that schools can take to reduce exposure to diesel exhaust.

Adopt Idling Guidelines

- School bus drivers should turn off their buses as they arrive at loading or unloading areas to eliminate idling time and reduce harmful emissions.
- If buses need the engine to operate the flashing lights, consider changing the circuit configurations so that the flashing lights can be powered by the battery without the engine running.



Work Closely with School Districts and Bus Drivers to Support the Idling Guidelines

- Inform bus drivers of the health benefits from reducing diesel exhaust by not idling.
- Highlight the dollar savings of reduced fuel consumption as a result of less idling. A typical school bus burns approximately one-half gallon of diesel fuel for each hour it idles. If a school district operates 50 buses 180 days a year and each bus reduces its idling time by 30 minutes per day, at an average of $2.00 per gallon of diesel fuel, the school district would save $4,500 per school year in fuel costs. The table below shows the amount spent on idling alone as the price of fuel increases.

Price of diesel fuel	Amount spent on idling for 50 buses annually
$2.50	$4,500.00
$3.00	$5,625.00
$3.50	$6,750.00
$4.00	$9,000.00

What is the Texas Commission on Environmental Quality Doing?

Funding Vehicle Retrofits

Funding is available through the Texas Clean School Bus Program to help school districts when purchasing and installing emissions reduction technologies such as diesel particulate filters, diesel oxidation catalysts, partial flow-through filters, and crankcase filters.

Funding Vehicle Replacements

Funding is available to school districts located in designated counties through a separate TCEQ program, the Texas Emissions Reduction Plan (TERP). TERP grants cover part of the cost of buying a new, lower-emitting school bus. You can find out more about the TERP grants and how your district might qualify at <www.terpgrants.org>.

www.texascleanschoolbus.org

For more information about the Texas Clean School Bus Program, or to find out more about how your school district can reduce school bus emissions, call the TCEQ at 512-239-3100, or e-mail <cleanbus@tceq.state.tx.us>.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
GI-374 (4/09) *printed on recycled paper*

Are there other ways to reduce emissions?

School districts can also adopt voluntary strategies to help reduce school-bus emissions, which can also help improve fuel economy.

Consider these voluntary strategies:

- Begin a voluntary idling limit for school buses.
- Enhance maintenance programs for school buses.

Are there other sources of funding?

Yes, there are a number of sources throughout Texas that provide funding to retrofit, repower, and replace school buses. Visit our Web site <www.texascleanschoolbus.org> to view a complete, detailed list of all of these programs.

How do I get more information?

TCEQ staff is available to help you with grant applications and can provide other resources.

Web site: **www.texascleanschoolbus.org**

Phone: 512-239-3100

To receive the most up-to-date program information by e-mail, send an e-mail to <cleanbus@tceq.state.tx.us>.

Texas Commission on Environmental Quality

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GI-381 Rev. 4/09

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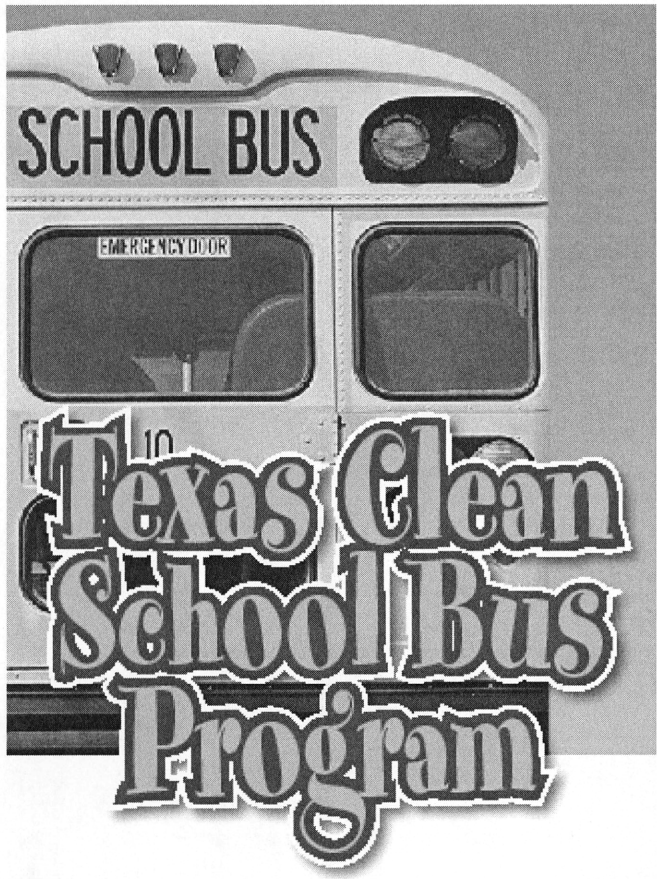


Protecting the health of schoolchildren and bus drivers

What is the Texas Clean School Bus Program?

The Texas Clean School Bus Program is a comprehensive program designed to improve the health of schoolchildren and bus drivers by reducing emissions of diesel exhaust from school buses. The program, offered by the Texas Commission on Environmental Quality (TCEQ), is designed to:

- I Award grants for eligible projects that reduce pollutants from diesel exhaust.
- I Educate school district personnel about options that can improve the school bus fleet and benefit health and the environment.
- I Educate school district personnel about the emissions and potential health impacts associated with diesel bus idling, with a goal of eliminating unnecessary idling.

Why should we pay attention to emissions from school buses?

Air pollution from diesel vehicles has health implications for everyone, but children are especially susceptible because they breathe more air relative to their body weight and their respiratory systems are still developing.

Diesel exhaust contains small particles, known as fine particulate matter, as well as smog-forming and toxic air pollutants. Exposure to diesel exhaust can aggravate asthma, allergies, and respiratory problems. Some studies suggest that long-term exposure increases the risk of lung cancer.

How do I get funding to upgrade my school bus?

Funding is available through the Texas Clean School Bus Program to all public school districts and charter schools in Texas that operate one or more diesel-powered school buses, or a transportation system provided by a countywide school district. The grant funds cover the purchase and retrofitting of emission-reduction devices.

All sizes of diesel-powered school buses are eligible for grant funding. The bus proposed for retrofit must operate on a regular daily route to and from a school and have at least five years of remaining useful life, unless the applicant agrees to remove the retrofit device at the end of the life of the bus and install the device on a different eligible bus. The program encourages applicants to reuse an operational retrofit device on another vehicle when retiring a retrofitted bus. Applicants must certify in the application that each specific bus retrofit project meets the eligibility requirements.

What retrofits are available?

School districts have several ways to retrofit their buses with newer technology that helps to reduce emissions. Some options are listed below:

Closed crankcase filtration system:

A closed crankcase filtration system is a device that uses an air filter to trap particulate matter. By installing a closed crankcase filtration system, particulate-matter emissions can be reduced inside a bus by 80 percent.

Diesel particulate filter:

A diesel particulate filter can be installed between the engine and the exhaust pipe of a diesel-powered bus. The filter is effective in reducing particulate-matter emissions by 60 to 90 percent.

Diesel oxidation catalyst:

An oxidation catalyst is a type of advanced catalytic converter for diesel vehicles. Oxidation catalysts can perform on either regular diesel or ultra-low sulfur diesel fuel. This type of retrofit can reduce particulate-matter emissions by 20 to 40 percent.

Partial flow-through filter:

A partial flow-through filter uses a two-stage filter to trap and reduce particulate matter. This filter can reduce particulate-matter emissions by more than 70 percent.

How much money can a school district qualify to receive?Your school district's grant amount depends on which retrofit device is selected for each school bus. Visit our Web site <www.texascleanschoolbus.org> for the most current conditions regarding the total amount a school district may apply for and the limits on how much money can be reimbursed for each retrofit device

APPENDIX G:
CONROE, TX ISD
SCHOOL BUS IDLE REDUCTION

Measuring pollution levels inside Texas school buses

Tests conducted at The Woodlands, Texas, in March 2006

March 2007

A joint project of
Environmental Defense
The Clean Air Task Force
The Conroe Independent School District

Pollution levels are elevated inside Texas school buses; retrofit devices work to reduce risk

In March 2006, Environmental Defense partnered with the Conroe Independent School District and the Clean Air Task Force to investigate the presence of diesel exhaust particles inside school buses and to measure the impact on in-cabin air quality of various pollution control devices installed on school buses.

The results from this project confirm that the bus's own exhaust can enter the bus during the course of a regular school bus route. The tests also showed that an engine filter and a tailpipe filter, used in combination, dramatically reduce the amount of key diesel pollutants inside school buses.

Background

While school buses are the safest way for children to get to school, they present hidden health hazards. More than 90% of Texas' 35,000 school buses emit unhealthy diesel pollution that gets into the bus cabin, where Texas children breathe it in.

Several studies show that air pollution levels inside school buses can be up to five times greater than levels outside the bus. This surprising result is due to emissions from the bus itself that make their way into the bus cabin. The pollution comes from two sources: the tailpipe and the engine crankcase. The crankcase is vented to the air, just a few feet from the bus's front door. Because buses stop frequently and open their doors regularly, a bus's own emissions can enter the cabin. The result is often a significantly elevated level of pollution in the air inside the bus.

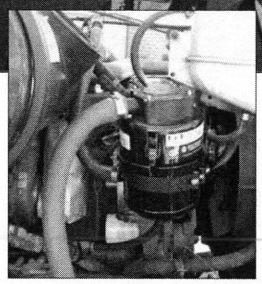


Figure 1 (above): **Diesel particulate filter** (Source: Clean Air Task Force)

Figure 2 (left): **Closed crankcase filtration system**

Diesel exhaust is composed of tiny particles of "soot" (particulate matter, or PM), smog-forming oxides of nitrogen, and a complex mixture of gases, many of which are known to cause cancer. Epidemiological studies have shown that it is dangerous to be exposed to the types of pollution found in diesel exhaust, even for short periods. Diesel pollution is linked to dizziness, coughing, increased incidence and severity of asthma attacks, chronic bronchitis, and—over time—heart disease, increased cancer risk and even premature death.

Evidence continues to mount that children, especially those with asthma, are exceptionally sensitive to the effects of fine particulate matter. Diesel pollution puts children at particular risk: Children breathe more rapidly than adults and inhale more pollutants per pound of body weight, and their developing bodies do not have the full range of defenses to battle foreign substances. Exposures during childhood are of special concern because children's developmental processes can easily be disrupted, and the resulting damage may be irreversible. Additionally, exposures that occur early in life appear more likely to lead to disease than do exposures later in life.

Methodology

The purpose of the demonstration project was to investigate the levels of diesel particulate matter (PM) inside school bus cabins and to test the effectiveness of various retrofits in reducing in-cabin PM. The project design included three test scenarios: "Representative Bus Ride", "Idling in a Bus Queue", and "Bus Following" tests. In all runs, the school bus cabins were outfitted with a suite of instruments that test four different parameters of particulate matter. These include; (1) fine particulate matter ($PM_{2.5}$), smaller than 2.5 micrometers in diameter; (2) ultrafine particulate matter ($PM_{1.0}$); (3) black carbon; and (4) particle-bound Polycyclic Aromatic Hydrocarbons[1] (PAH).

Two types of retrofit filters were tested in the study: a diesel particulate filter (DPF) and a closed crankcase filtration system (CCFS). Diesel particulate filters, installed in place of standard mufflers, capture particulate emissions that normally would exit the tailpipe; they can reduce tailpipe particulate emissions by 85%. Closed crankcase filtration systems, installed under the bus's hood, trap oil mists and reroute crankcase emissions back to the engine air intake, effectively eliminating those emissions that normally would vent directly to the outside air.

During the "Bus Ride" scenarios, a control vehicle—kept approximately 50 to 100 feet ahead of the bus—was driven with windows down to measure pollutant levels in the ambient air in front of the bus. The lead vehicle was set up with identical instruments as the test buses, except for the PAH monitor. In this portion of the study, conventional yellow school buses, with the windows closed, followed an actual, typical school bus route designated by the Conroe ISD fleet manager. The bus route was approximately 45 minutes long and traversed a light suburban area in The Woodlands, Texas. This route minimized the number of other vehicles encountered, thereby enhancing the ability to detect bus "self-pollution" and reduce the influence of other diesel sources.[2] Buses whose ages and mileage were typical of the fleet average were picked by the Conroe ISD fleet manager.

At each stop of the bus, one minute in duration, measurements of wind direction relative to the bus were recorded outside the bus. Wind speed and direction were recorded in order to investigate the influence of tailpipe emissions (rear winds) or engine crankcase emissions (front winds) on self-polluting exhaust entering the cabin. PM and black carbon data are reported as "net" concentrations by subtracting from the raw data the average value of outdoor ambient air concentration as measured by the lead van during a bus run. These "net" concentrations represent the contributions of localized sources of diesel pollution, dominated by the bus itself, to the interior bus cabin.

Several different technology configurations tested in the Bus Ride scenario are summarized in Table 1.

In addition to the bus ride scenarios, the "Idling in a Bus Queue" test measured the in-cabin air quality of a bus in the middle of a queue of three conventional buses. All three buses idle for 20 minutes and the middle bus has the front door closed for 10 minutes and then open for 10 minutes.

Finally, in the "Bus Following" test, we tested the effect of the bus's emissions on ambient air by following a conventional bus with no retrofits.

Table 1:
Scenarios and technology configurations tested

"Bus Ride" tests
- Conventional bus run (two runs)
- Diesel Particulate Filter (DPF)
- Closed Crankcase Filtration System (CCFS)
- The 'Optimal Solution' (Both DPF & CCFS)

"Idling in a Bus Queue" (20 minutes)
"Bus Following" test

Findings

The results of these tests indicate that retrofitting with available technologies reduces fine particle and black carbon levels inside the school bus cabin. These technologies, in conjunction with idling reduction programs, can provide significant air quality benefits for children riding in school buses.

Key results from our monitoring campaign are summarized below. All the results can be downloaded from our **www.cleanbuses.org** website.

"Bus Ride" tests

Like other in-cabin school bus air quality studies, we found that diesel particulate matter enters the school bus as the bus proceeds through its normal daily route. We observed frequent increases of $PM_{2.5}$ and black carbon

Figure 3. School bus run 2. Conventional bus with no controls (net $PM_{2.5}$ levels)

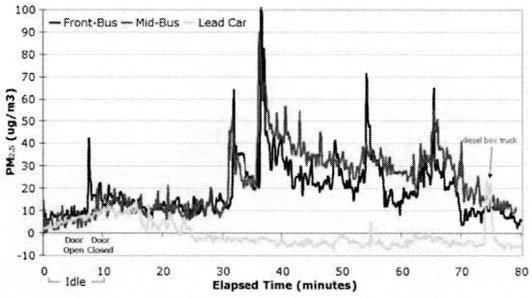
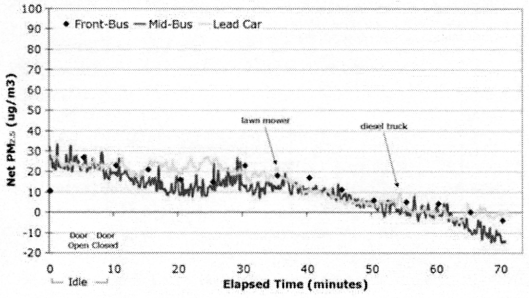


Figure 4. 'Optimal Solution' bus with crankcase filter and diesel particulate filter



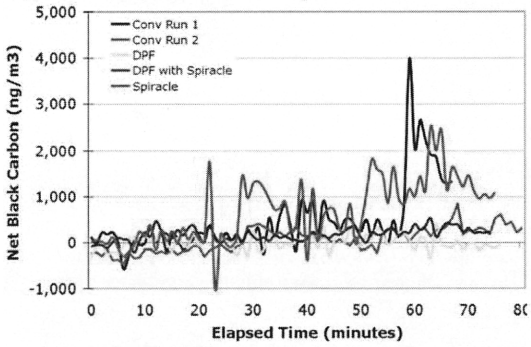
when the bus door was opened on the test route. Unlike in similar tests in other cities, we did not observe significant increases in levels of ultrafine particles in the conventional non-retrofitted bus and we were not able to use our PAH data due to technical difficulties with the instrument.

Figure 3 shows that fine particle levels build up and stay elevated inside a school bus with no control devices. Monitors at the front and middle of the bus both show the same pattern of self-pollution from the bus. Throughout the bus ride, the $PM_{2.5}$ levels[3] ranged from 10 to 100 ug/m^3. For comparison, the Environmental Protection Agency's health based 24-hour standard for $PM_{2.5}$ exposure is 35 ug/m^3.

The greatest reduction in pollution levels and increased benefits to in-cabin air quality resulted from using both the crankcase and the tailpipe filter technologies in what we call the "Optimal Solution." Figure 4 shows that fine particle ($PM_{2.5}$) levels inside the bus with both controls are essentially the same as the ambient outside air.[4]

Black carbon was elevated inside the bus in both non-controlled bus runs as well as in the bus outfitted with only a closed-crankcase filtration system. Both bus runs outfitted with diesel particulate filters (DPF) measured very low levels of black carbon in the cabin.

Figure 5. Black carbon comparison – bus rides



"Idling in a Bus Queue" test

We tested how in-cabin air quality was affected by idling—specifically in school bus queues. In this 20-minute idling test, a bus is sandwiched between two other buses, with front bumpers lined up with the back ends of the buses in front. The particulate monitors were located in the middle bus, which had all windows closed for the duration of the test.

As shown in Figure 7, levels of fine and ultra-fine particles increased even with the front door closed. The highest levels of particulate matter were reached when the door opened after 10 minutes of idling (as it can do in loading and unloading areas at schools).

Figure 6. Configuration of bus queue

"Bus Following" test

In this test, the control van followed a conventional bus with no controls on a 20-minute bus ride including simulated bus stops. Levels of ultrafine particles in the minivan were elevated for most of the ride and exceeded the maximum levels of the monitoring instrument five times during the test. Fine particle levels were elevated as well, but not as significantly as ultrafine particles. Consistent with similar tests in other cities, this supports previous findings that tailpipes are the main source of ultrafine particles in diesel exhaust.

Figure 7. Fine and ultrafine PM in bus queue

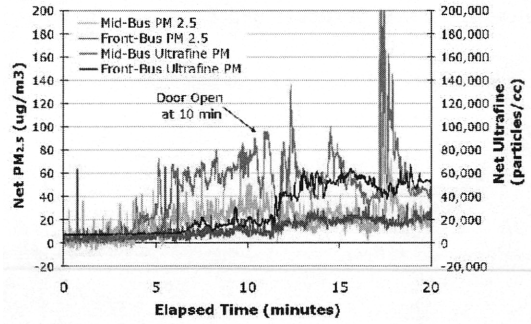
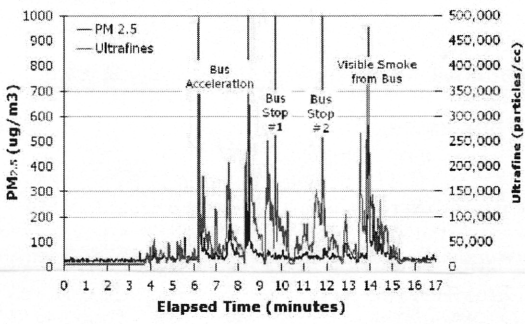


Figure 8. "Bus Following" test



Comparison of Conroe ISD to other cities

This study shows that the crankcase is the dominant source of in-cabin levels of $PM_{2.5}$ and that the installation of a closed-crankcase filtration system (CCFS) effectively removes most in-cabin $PM_{2.5}$.

The Clean Air Task Force has provided the following figures depicting results of school buses they have tested in five different cities. The first chart, Figure 9 (below), shows fine particle ($PM_{2.5}$) levels in all uncontrolled buses. The second chart, Figure 10, shows the very low levels of fine particles in all retrofitted buses tested. It is clear that even in buses retrofitted with only a crankcase filter, the $PM_{2.5}$ levels are dramatically reduced.

In our Conroe study, buses retrofitted with diesel particulate filters (DPF) also showed reduced levels of black carbon (BC) inside the bus cabin. However, the effectiveness of DPFs for reducing ultrafine particles ($PM_{1.0}$) and PAH was inconclusive, even though similar studies in other cities have shown DPFs effectively remove ultrafine particles, black carbon and PAH—all originating from the tailpipe.[5]

Figures 11 and 12 (next page) show the reduction in ultrafine particle levels inside bus cabins in five different cities for buses retrofitted with DPFs versus those not retrofitted with DPFs. Some of the buses in Figure 11, in five different cities, have closed crankcase filter systems installed. The fact that ultrafine particle levels are reduced upon addition of a DPF supports the conclusion that DPFs are most effective at reducing ultrafine particles inside the bus.

Although we are unsure why the Conroe data for ultrafine PM differed from other cities' school buses, we believe the differences may be due to the prevalence of intermittent and strong headwinds (vs. winds from rear of bus), turbulent air and high humidity.

The idling/queuing test provided valuable information about how emissions build up inside the bus even if the doors are closed and showed that normal idling practices like opening the door after idling for an extended period of time can significantly increase levels of both fine and ultrafine particles.

Conclusions

- Diesel particle emissions build up inside Texas school buses and can be attributed to the buses' own exhaust.
- The exhaust can be traced to the tailpipe and to the open crankcase, which is vented at the front of the bus.
- In our demonstration project, the fine particle ($PM_{2.5}$) and black carbon levels were the most significantly elevated[6] pollutants in buses without control devices.

Policy implications and recommendations

Texas children are indeed getting an extra dose of diesel pollution when they ride the bus to school, fieldtrips, sporting events and other extracurricular activities. As evidenced in hundreds of studies, diesel exhaust has serious implications for the health and well being of our children. Even though children may spend only a small portion of their day on buses, the high exposures they receive inside the bus can add considerably to their daily and annual exposures.

Children, especially those with asthma, are exceptionally sensitive to the effects of diesel pollution. Across the country, asthma is considered to be the number one childhood disease; in Texas, one in ten people suffer from asthma. The disease is one of the most frequent reasons for hospital admissions of children. While asthma has a strong eco

Figure 9. Composite fine particle ($PM_{2.5}$) data from school buses without crankcase controls

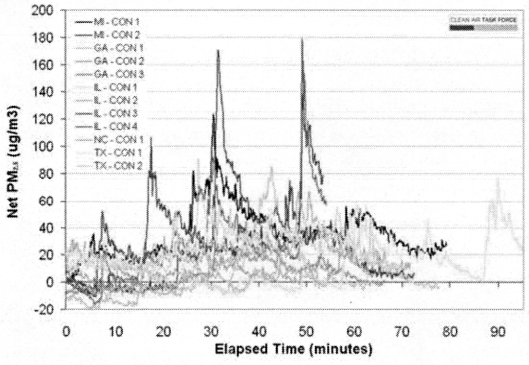


Figure 10. Composite fine particle ($PM_{2.5}$) data from school buses with crankcase controls

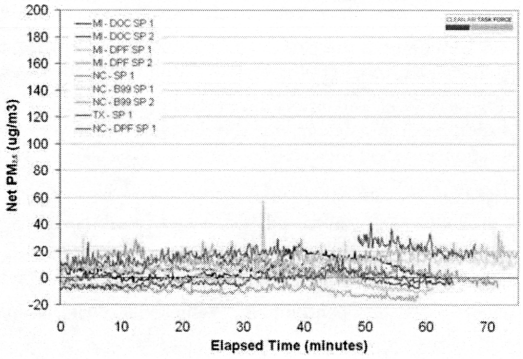


Figure 11. Ultrafine particle data from school buses in 5 cities, without diesel particulate filter

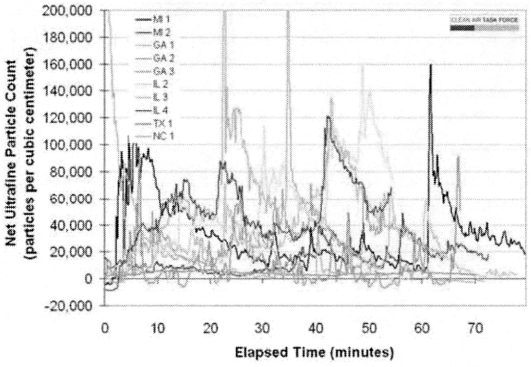
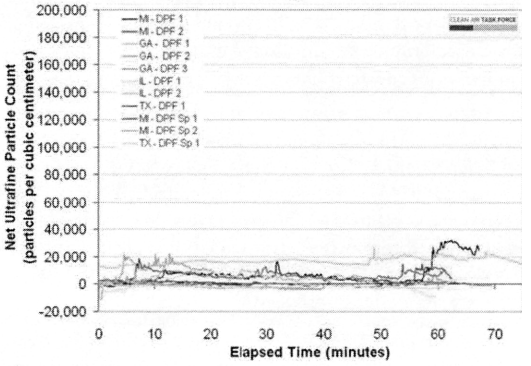


Figure 12. Ultrafine particle data from school buses in 5 cities, with diesel particulate filter



nomic impact in terms of hospital and medication costs, it has immeasurable impacts on children's long-term learning and development. Asthma is one of the leading causes of school absenteeism, nights of interrupted sleep and days of restricted activity.

In addition to needed technological changes, it is clear from the "Idling in a Bus Queue" test that idling reduction is a necessary step for reducing children's and bus drivers' exposure to diesel pollution inside school buses. In addition, those teachers who spend numerous hours on "bus duty" are also exposed to high levels of diesel pollution while making sure our children enter and exit the buses safely.

Added to the health benefits of reduced idling is the lowered fuel consumption that will help school districts save money in a time of tight budgets and increasing needs.

The good news is that affordable technologies exist to significantly reduce these emissions and the health risk to Texas children. Together, a diesel particulate filter and a closed crankcase filtration system reduce diesel pollution by up to 95%, bringing it to the level of a new, clean 2007 diesel bus.

And because of the unique exposures that occur on school buses, reducing diesel emissions from school buses is cost-effective. According to one published analysis, "it is less expensive *per gram inhaled by a student* to reduce emissions from school buses than from an average vehicle" even if emission reductions were many times more expensive *per gram emitted* from school buses than from an average vehicle.[7]

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[1] PAHs are a toxic class of chemicals. Diesel exhaust contains 40 toxic chemicals.

[2] Hill, Zimmerman and Gooch, 2005, "A Multi-City Investigation of the effectiveness of Retrofit Emissions Controls in Reducing Exposures to Particulate Matter in School Buses.

[3] Hill, Levy, et al, and others have found that the Dust Trak ($PM_{2.5}$ Monitor) is known to overestimate concentrations sometimes from a factor from 2-3. Please note, however, that a study also shows that fresh PM emissions show a 1-1 correlation and so in this analysis we present the $PM_{2.5}$ measurements minus the ambient constant only.

[4] The sloping baseline is due to a reduction of ambient pollution levels during the bus run.

[5] Hill, Zimmerman and Gooch, 2005, and Fitz, D.R., Winer, A.M., et al., "Characterizing the Range of Children's Pollutant Exposure During School Bus Commutes," Final Report to the California Air Resources Board, 2003.

[6] Note: No data for PAH, so levels could have been elevated as in other in-cabin studies.

[7] Marshall, J.D. and Behrentz, E., "Vehicle Self-Pollution Intake Fraction: Children's Exposure to School Bus Emissions," 2005. Environmental Science & Technology, p. 2559.

For more information

A more detailed discussion about the need to clean up Texas school buses is available at **www.cleanbuses.org**.

This analysis was written by Betin Santos, manager of the Houston Clean Air for Life Campaign. She can be reached at **bsantos@environmentaldefense.org** or **(713) 942-5821**.

Questions can also be directed to Dr. Ramón Alvarez at **ralvarez@environmentaldefense.org** or **(512) 691-3416**.

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Houston Office: 2028 Buffalo Terrace • Houston TX 77019-2496 • (713) 942-5821

APPENDIX H:
PLANO, TX – EXTENDING SCHOOL BUS SERVICE POLICY

Teamwork for Excellence

PLANO
Independent School District

Transportation Services
Department
600 Seabrook
Plano, Texas 75023
(469) 752-0780
Fax (469) 752-0781

FARE BUSING GUIDELINES & PROCEDURES

The Fare Busing service was established to offer fee based bus transportation to students who are not otherwise eligible for regular transportation due to living less than 2-miles from their assigned school. This service is managed on a space available, area available, first come, first served basis. Fifteen of our schools do not offer regular education transportation of any kind including Fare Busing due to all students living within 2-miles of the respective school. Application must be made each year for each student.

The fee for Fare Busing for the 2009-2010 school year will increase to $38.50 per month or portion of month per student and is payable in advance of riding. Payment is due by the 10th of the proceeding month. For instance, the fee for service during the month of October must be paid no later than September 10th. If payment is not received when due, parents will receive notice through mail, phone or e-mail. If not resolved, the student will be removed from the program after a 2-week notification resulting in a need for a new application to be submitted which may affect the placement status of the student. Our department is unable to send reminders for you to pay. Please take the time each month to pay for the following month.

Fare Busing students will be assigned to existing stops on bus routes as space and time allows. The availability of seats varies with each route. The Transportation Services Department may also establish pickup points in neighborhoods with no existing busing, but any additional stops could be more than one mile from the school. Bus routes will be added where feasible and with Board approval.

Students in the Fare Busing Program must follow the same safety rules and are subject to the same disciplinary steps as other students. The driver may not accept payment for the Fare Busing Program this must be submitted to the Fare Busing Office or through the PayPAMS system accessed through www.pisd.edu.

Any cancellation of service must be submitted in writing to our office. If no cancellation notification is provided, we will assume the service is still being used and you will be expected to remit the fee.

Fare busing is only available to students attending schools within the student's Board-approved school attendance boundary and not available to transfer students.

Enrollment procedures

1. Print and complete the Fare Busing Application.
2. Submit the application by fax to (469) 752-0781.
3. Allow our staff at least 5 business days to process your application and determine whether you are eligible and if we have room on a bus in your area to accommodate your request. Although we will make every attempt to establish bus service in time for the first day of school, in some cases we must delay placement for 3-10 school days to determine the eligible student load on the bus in your area.

APPENDIX I:
MINNESOTA IDLE REDUCTION PROGRAM INFORMATION

Minnesota Pollution Control Agency

School Idling Policy Notification

Sample Article for Parents/School Newsletters

Protecting Students' Health by Protecting them from Vehicle Exhaust

In May 2002, Minnesota adopted a new state law to protect the health and safety of children at school from harmful diesel emissions. This law calls for schools to reduce the unnecessary idling of buses near the school building, and when possible reroute bus parking and loading farther away from the school's air-intake vents.

Why is idling of vehicles a problem?

- **Vehicle exhaust is hazardous to human health, especially children's.** Studies have linked pollution from vehicles to increased rates of cancer, heart and lung disease, asthma and allergies. Children breathe more rapidly and inhale more pollutants per pound of body weight than adults, and their lungs are still developing. A study by Yale University found that students on school buses are exposed to five to fifteen times the levels of particulate pollution. Levels are especially high when buses idle and line up back-to-front. Idling of cars also increases the levels of pollution near schools.
- **Idling wastes resources and damages the environment.** Burning fuel needlessly costs money and contributes to air pollution problems that harm plant and animals.
- **Idling vehicles can be easily stolen or can cause damage if accidentally engaged.**
- **Today's cars and buses do not need to be warmed up, except in extremely cold conditions (below 0° F).** In fact, for modern diesel engines idling can actually be harder on the engine than driving down the road.

____ *(Name)* __ School *(District)* has taken the following steps to protect our students from vehicle exhaust and comply with the law:

(Use all that apply)

- Implemented a no-idling policy for all vehicles at every school building.
- Posted "no idling" signs and alerted bus drivers, parents, and administrators that engines should be turned off when a vehicle is waiting, or parked.
- Redesigned bus parking zones to move bus parking area away from school air intake vents and park buses at a diagonal to avoid front-to-back passing of emissions.
- Required targeted maintenance of the bus fleet to reduce emissions.
- Invested in cleaner fuels and technologies, such as exhaust pipe retrofits for current buses and use of bio-diesel.

Parents and guardians are essential to ensuring the protection of children's health from vehicle exhaust. We appreciate your support in following our new no idling policy when visiting our schools.

For more information on the risks of idling, contact the Minnesota Pollution Control Agency at 651-296-6300, or visit http://www.pca.state.mn.us/air/schoolbusretrofits.html.

Minnesota Pollution Control Agency

Sample School Board Policy to Limit School Bus Idling

A. Purpose

This policy seeks to reduce student and driver exposure to diesel exhaust particulate matter by limiting unnecessary idling of school buses pursuant to Minn. Stat. § 123B.885 (diesel school buses: operation of engine: parking).

B. Applicability

This policy applies to district-owned school buses and contracted school buses while being operated for the purpose of transporting the school district's students at public expense.

C. Idling control measure

1. **The school district shall:**
   a) Relocate school building air intake systems more than 100 feet away from school bus parking areas when practical and shall take other measures to reduce intake of school bus exhaust where relocating intake systems is not feasible, such as regulating closure of air intake vents.

2. **A driver of a diesel school bus:**
   a) must turn off the bus upon reaching a school or other destination and must not turn on the engine until necessary to depart from the school or destination; and
   b) must park the bus at least 100 feet from a known and active school air intake system, unless the school district has determined that alternative locations block traffic, impair student safety or are not cost-effective

3. **The employer of the school bus driver must ensure that:**
   a) the bus or vehicle driver upon employment, and as necessary thereafter, is informed of the requirements of this policy and the reasons therefore

4. **The employer of the school bus driver must ensure that:**
   a) all complaints of non-compliance are reviewed and remedial action is necessary

D. Exemptions

The requirement that a driver of a diesel school bus must turn off the bus and must refrain from idling does not apply for the period or periods during which idling is necessary under the following circumstances:

1. **Turbo-diesel engine cool down or warm up**

   a) To cool down a turbo-charged diesel engine for a period not to exceed five minutes before turning off the engine. (The cool down should be in accordance with the bus manufacturer's specifications).

   b) To warm up a turbo-charged diesel engine for a period not to exceed three minutes. (The warm up should be in accordance with the bus manufacturer's specifications).

*Sample school board policy created by the former Minnesota Office of Environmental Assistance and the Sierra Club Air Toxics Campaign. OEA and the Sierra Club would like to thank transportation directors throughout Minnesota for assistance in developing this sample policy. | December 2002

APPENDIX J:
IDLE REDUCTION CAMPAIGN REPORT

MISSISSAUGA, CANADA

"Towards an Idle-Free Zone in the City of Mississauga"

Final Report

February, 2003

Lura CONSULTING

Brenda Sakauye, Environmental Co-ordinator for the City of Mississauga and Chair of the Mississauga Air Quality Advisory Committee, helps launch the City's Idle-Free Zone campaign.

Mississauga's Anti-Idling Campaign was made possible through generous funding from Natural Resources Canada and the leadership of Brenda Sakauye, Environmental Co-ordinator for the City of Mississauga and Chair of the Mississauga Air Quality Advisory Committee. Lura Consulting was retained to assist with campaign development and evaluation, including the preparation of this report. If you have any questions regarding the campaign or this report, please contact:

Catherine Ray
Senior Market Development Officer
Transportation Energy Use Division
Office of Energy Efficiency
Natural Resources Canada
580 Booth Street -12th floor
Ottawa, Ontario
K1A OE4
Phone: 613.995.5264
Fax 613.952.8169
CRay@NRCan.gc.ca

Brenda Sakauye
Environmental Co-ordinator
City of Mississauga
Infrastructure and Environmental Planning
Transportation and Works Department
3484 Semenyk Court
Mississauga, Ontario
L5C 4R1
Phone: 905.615.3217
Fax: 905.615.3173
Brenda.Sakauye@city.mississauga.on.ca

David Dilks
Vice-President
Lura Consulting
107 Church Street, Suite 400
Toronto, Ontario
M5C 2G5
Phone: 416.410.3888 ext. 2
Fax 416.536.3453
ddilks@lura.ca

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1.0 Introduction and Context

1.1 Campaign Backdrop and Objectives

Increasingly, Canadians are recognizing that idling a vehicle while parked makes no sense. Unnecessary vehicle idling is a habit that is costing us millions of dollars a year in wasted fuel and is producing needless pollution – contributing to problems like climate change and smog, which affect the health of all Canadians. And to top it off, idling is not even good for a vehicle's engine, contrary to popular belief.

Mississauga's Anti-Idling Campaign – "Towards an Idle-Free Zone in the City of Mississauga" – was launched in October 2001 to help Mississaugans kick the idling habit. "I am declaring Mississauga an idle-free zone," said Mayor Hazel McCallion to mark the start of the year-long, city-wide campaign.

Mississauga's campaign had the following primary objectives:

1. Test the anti-idling tools and information offered on Natural Resource Canada's (NRCan) Web-based tool kit, *The Idle-Free Zone,* on a city-wide scale;
2. Reduce unnecessary vehicle idling throughout Mississauga; and
3. Enhance Mississauga's climate protection initiatives.

In addition, the campaign was specifically designed to help achieve a number of environmental and community benefits:

- Increased community awareness of concrete actions that can be taken by individuals to reduce greenhouse gas emissions;
- Increased community knowledge of the problems associated with vehicle idling, and the benefits of making the City of Mississauga an "idle-free zone";
- Reduced CO_2 emissions from idling vehicles in Mississauga;
- Reduced fuel costs and vehicle wear and tear; and
- Improved local air quality.

Key Campaign Features

Clean Air Initiatives. The City of Mississauga incorporated the campaign into its clean air and climate change agenda.

Evaluation. The Anti-Idling Campaign included a strong evaluation component, with surveys and studies to measure the success of each major campaign initiative as well as the overall campaign.

Public Awareness. Efforts to inform people about vehicle idling included a mix of advertising, posters, signs, local and national media and Web-based communications.

Workplace Initiative. An important component of the Anti-Idling Campaign was the program implemented to reduce idling by municipal employees, using both fleet and personal vehicles.

Personal Interventions at Community Locations. In order to help change behaviours associated with unnecessary idling, Mississauga recognized the importance of speaking with people where idling is occurring, at schools, GO Transit passenger pick-up sites and community centres, among others.

1.2 *The Idle-Free Zone* Web-Based Tool Kit

NRCan has developed a Web-based tool kit, *The Idle-Free Zone* (www.oee.nrcan.gc.ca/idling), to assist municipalities and community groups in taking action to curb unnecessary vehicle idling at the local level. The Web site has extensive information to support the design and development of anti-idling campaigns. To help refine the tool kit and test its effectiveness, NRCan identified two Canadian cities – Mississauga and Greater Sudbury – to pilot city-wide Anti-Idling Campaigns, drawing on the initiatives and approaches contained in the tool kit, prior to future campaign roll-outs in other Canadian cities and broader, national implementation. In addition to providing valuable information, the Web site includes specific tools such as:

- Market research on attitudes and behaviours related to idling, and barriers to public participation in anti-idling campaigns.
- "What you can do" as an individual, group, business, municipality or school, and tips for setting up community-wide or site-specific anti-idling initiatives.
- An overview of Community-Based Social Marketing, and how its techniques can be applied to reduce unnecessary idling.
- The Anti-Idling Tool Kit, including:
  - Fact sheets on idling;
  - Calculators and worksheets;
  - Games and quizzes;
  - Ready-to-use graphics such as logos, images, posters, brochures, stickers, a PowerPoint presentation, an information card, an idling observation form, the Personal Five-Step Action Plan and sample letters to the editor.

In particular, the Web site graphics and sample materials provide an important starting point for campaigns, enabling the key communications materials – posters, banners, cling vinyl windshield decals, air fresheners and information cards – to be developed quickly and cost-effectively.

1.3 Funders and Partners

The "Towards an Idle-Free Zone in the City of Mississauga" campaign was initiated and funded by NRCan's Office of Energy Efficiency, on behalf of the Government of Canada. The City of Mississauga, Ontario was identified as one of the initial test locations for the pilot campaign because of its leadership role in taking action on local environmental initiatives and its efforts to develop a Local Action Plan to reduce corporate energy consumption and greenhouse gas emissions. City of Mississauga staff were instrumental in the development and implementation of the campaign.

Partners for the individual campaign components included:

- University of Toronto at Mississauga (provision of four environmental intern students as Anti-Idling Campaign project staff to conduct personal interventions with drivers);
- GO Transit (GO Transit initiative);
- Peel District School Board and Dufferin-Peel Catholic District School Board (schools initiative); and
- The Canadian Petroleum Products Institute (private sector initiative).

1.4 Campaign Development and Core Initiatives

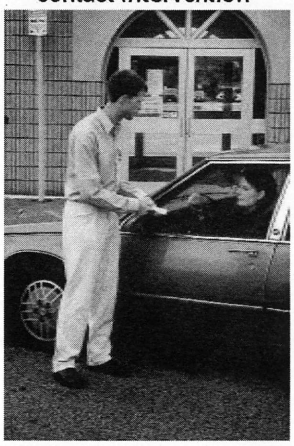
Working together, the City of Mississauga and NRCan identified anti-idling projects and initiatives that were appropriate for implementation as part of the city-wide campaign. The proposed campaign was then presented to and endorsed by Mississauga's Air Quality Advisory Committee and General Committee (which includes all members of City Council). Six core campaign initiatives were confirmed for implementation over the year-long campaign:

- Public awareness and media campaign
- Workplace initiative
- Schools initiative
- GO Transit initiative
- Private sector initiative
- Municipal hotspots initiative

1.5 Community-Based Social Marketing

The campaign used the unique methodologies of Community-Based Social Marketing (CBSM) to encourage drivers to avoid idling their engines. CBSM is an innovative approach to facilitating behaviour change, emphasizing personal contact and communications, and providing an attractive alternative to traditional information-based public outreach campaigns. It involves identifying the barriers to an activity, designing a strategy to overcome those barriers using knowledge from the social sciences, piloting the strategy to ensure that it is successful, and then implementing it on a broader scale.

CBSM in action: a personal contact intervention



CBSM approaches have been used with increasing success to address the idling issue in numerous Canadian communities over the past several years, including Toronto schools and transit stations as part of the "Turn It Off" project (2000). The results from that project were invaluable in developing the Anti-Idling Campaign approaches at the site level.

Drawing on the approaches of Community-Based Social Marketing, it was determined that an effective anti-idling strategy would include the following elements:

- First, **motorists need to be reminded to turn off their vehicles when parked.** To accomplish this, it was decided that the campaign would use metal signs at the various locations where implementation was to occur. This site-level awareness-building approach would be augmented by an over-arching media campaign, including newspaper, transit shelter and radio advertising.

- Second, **personal contact is important.** It was determined that the campaign would feature the use of anti-idling project staff to approach motorists and speak to them about the importance of avoiding unnecessary idling.

- Third, **motorists would be asked to make a commitment** to avoid idling while parked for more than ten seconds.

CBSM methodologies were applied in the schools, GO Transit, private sector and municipal hotspots initiatives, and were adapted for use in the workplace initiative.

1.6 Report Overview

This report presents results and highlights of the overall evaluation of the Campaign, as well as highlights and results from the six major campaign initiatives. It is organized into the following sections:

Section 2.0, Campaign Materials, summarizes the development of the campaign materials and includes examples of the types of materials used during the campaign.

Section 3.0, Key Campaign Components, describes and summarizes the results of the six core campaign initiatives that were part of the year-long campaign, including the Public Awareness and Media Campaign, Workplace Initiative, Schools Initiative, GO Transit Initiative, Private Sector Initiative and Municipal Hotspots Initiative.

Section 4.0, Campaign Evaluation, reports on the knowledge, attitudes and behaviours of City residents and key project target audiences concerning vehicle idling both before and after the campaign was implemented, illustrating the effectiveness of the campaign in changing residents' awareness of and willingness to take action on the idling issue.

Section 5.0, Key Learnings, summarizes the important lessons that were learned during the course of implementing this campaign that will help in the development of future anti-idling campaigns in other municipalities.

Section 6.0, Campaign Costs, details the costs expended to produce the communications materials, as well as the amount of staff time needed, to assist other municipalities in planning for and initiating their own anti-idling campaigns.

Section 7.0, Future Directions, describes and highlights some possible further opportunities and partnerships that are available to the City of Mississauga as a result of this campaign.

This report has been prepared by Lura Consulting, the firm retained by NRCan and the City of Mississauga to assist with campaign development and evaluation. The report is intended to provide highlights of the city-wide campaign. The more detailed reports that are associated with each of the specific initiatives described in each of the sections below are listed in Appendix A.

What Mississaugans Said about the Campaign

"You guys are doing a great job...keep it up!"

"You should talk to the bus drivers and truck drivers too."

"I wish we could have a project like this all across the country...(and) the world!"

"I am often appalled at the number of idling vehicles I encounter on a daily basis, while walking or running... thank you for your commitment and concern regarding our air supply."

"This is really one of those no-cost improvements to the environment that doesn't impinge at all on personal comfort."

"I agree with you 100 percent. It's incredible how many people leave their engines idling without a thought!"

"I love the campaign – great idea."

"Thank you for raising your concerns about needless engine idling. Good luck with your continued work in this area."

"Ongoing education with facts and figures is the only solution..."

"Your Anti-Idling Campaign is a terrific idea. Best wishes in your enlightened endeavour."

"It is wonderful what you are doing in Mississauga, I wish it were everywhere!"

2.0 Campaign Materials

The campaign made use of a wide variety of communications materials which were drawn from the graphics and tools on *The Idle-Free Zone* Web site and adapted for use in Mississauga's campaign. These materials included:

- Graphics and logos;
- Information cards;
- "Cling-vinyl" windshield decals;
- Posters;
- Advertisements used in bus shelters and newspapers; and
- Metal street signs.

Campaign Centrepiece Graphic

Key Anti-Idling Campaign Messages

"Idle-Free Zone. Turn engine off."

"Idling is killing our environment."

"Idling for more than 10 seconds uses more fuel than restarting your engine."

"You can save fuel, money and contribute to cleaner air by turning your engine off when parked."

"Idling gets you nowhere!"

"If every Canadian motorist avoided idling their vehicle for just 5 minutes each day of the year, we could prevent more than 1 million tonnes of carbon dioxide from entering the atmosphere."

"All it takes is the turn of a key."

Information Cards

These were provided to motorists at participating locations. The card indicated that turning off your engine when parked saves money, has health and environmental benefits, and promotes more efficient use of energy. Two versions of the card were developed, with the version with the young child used at the school locations.

Vehicle Windshield Decals

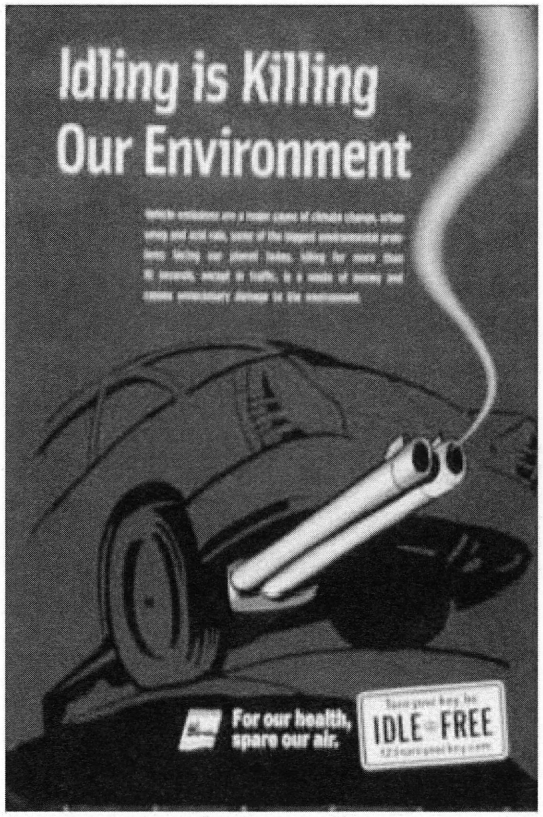
Project staff asked motorists to make a public commitment to turn their engine off when parked by placing a "cling vinyl " decal in their vehicle's windshield.

Metal Street Sign

These were placed in parking and "kiss-and-ride" areas at each of the intervention sites where motorists were most likely to leave their engines running while parked, to remind them to not idle.

Transit Shelter Advertisement and Poster In Community Locations

These large posters were used in the media campaign as transit shelter advertisements and bus tails. Smaller versions were also published in the Mississauga News daily paper and produced as posters and distributed as part of the schools package to give the campaign additional "reach" and serve as another reminder to motorists to turn their engines off when parked.



3.0 Key Campaign Components

3.1 Public Awareness and Media Campaign

Purpose
To generate widespread awareness of the anti-idling campaign and its key messages.

Approach
A comprehensive communications strategy, including a media relations component, was developed along with specific communications initiatives relating to each core campaign component to reach out to City residents with information about the problem of vehicle idling, what the City is doing about it, and what individuals and community groups can do to get involved as well. Tracking the media's interest in and coverage of the media launch events and campaign also allowed the project team to gauge the general level of interest in the topic and the reach of the campaign's key messages.

Awareness-building activities included:

- Media releases and events, which generated coverage in newspapers and on the radio and television;
- Advertising in newspapers, on the radio, on buses and in bus shelters;
- Posters and campaign information in community locations; and
- A dedicated internet Web site (www.123turnyourkey.com), articles on the City of Mississauga intranet Web site and in employee newsletters.

Allan Rock
Minister of Industry
News Conference for Private Sector Initiative

Results

- ✓ A mid-campaign telephone survey revealed that 53% of Mississauga residents were aware of the campaign, increasing to a significant **69% who have seen, read or heard about the Campaign** in the post-Campaign survey.
- ✓ **Print and electronic coverage of the campaign reached over 12 million readers, listeners and viewers.**

- ✓ Media coverage of the campaign was extensive locally and nationally (see a partial list of media coverage on the next page).
- ✓ **There were over 10,000 visits to the campaign Web site**, 62 requests for materials and comments from 176 individuals across Canada (as well as several from the U.S. and one each from Portugal and Hong Kong).
- ✓ Of those who commented, **90% indicated their support for the Campaign** and indicated that idling is a problem.

Summary of Media Coverage

Selected local media

- "Engine idling targeted," *Toronto Star*, Oct. 17, 2001
- "City goes green with anti-idling crusade," *Mississauga News*, Oct. 19, 2001
- "Prevent car-idling hazards," *Ottawa Citizen*, Dec. 7, 2001
- "Kids on patrol for car idlers," *Mississauga News*, Jan. 11, 2002
- Rogers Television, First Local Show
- Fairchild Television
- CFTO-TV
- CFRB-AM, Ted Woloshyn Show
- CFTR-AM

Selected national and international media

- World Health Organization meeting on Cities and Health, Sept. 2001
- "Joint effort signals new way to fund city projects," Globe & Mail, Aug. 30, 2001
- "We can't stay idle about idling cars," Globe & Mail, Oct. 25, 2001
- "$1.2 million up in smoke," Municipal World, Dec. 2001
- "City of Mississauga hires students to make idle threats," *National Post*, Nov. 23, 2001
- "Please stop your engines," *Canadian Living*, May 2002
- "Healthy Living Cities," *Canadian Geographic*, May/June 2002

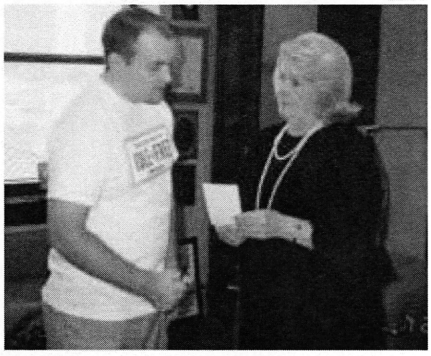
3.2 Workplace Initiative

Purpose
To generate awareness and reduce unnecessary idling by City employees, when using personal and fleet vehicles.

Approach
The Workplace Initiative included two distinct components, both of which were geared toward City of Mississauga staff:

1. **Employee Initiative** – a campaign to generate employee awareness of the idling issue (through posters, internal e-mail, information on the City's intranet, employee newsletters, presentations and events) and engagement (by distributing the information card and vehicle sticker to each employee with their pay stubs, personal contact with staff at the Civic Centre to seek a commitment to display the sticker as well as a Corporate-wide contest, drawing prizes for vehicles found displaying the sticker).

An environmental studies student from the University of Toronto at Mississauga bringing the anti-idling message to City Councillor Maja Prentice.



2. **Fleet Initiative** – research to identify the best ways to reduce idling in fleets (transit and other City municipal fleets) vehicles. Research consisted of:
   - Best practices profiles of Canadian municipalities and private sector firms that have taken action to address idling in their jurisdictions;
   - Interviews with managers of fleets and fleet vehicles; and
   - Focus groups with drivers, mechanics and union representatives.

   Based on research results, a strategy was developed to present custom-designed training workshops to each department and division in the City that manages fleets and fleet drivers.

Results
Following the Workplace Initiative, it was found that:
- ✓ **96%** of City employees were aware of the anti-idling campaign;
- ✓ **31%** reported that the campaign had changed their idling behaviour;
- ✓ Anti-idling windshield stickers were placed on most City fleet vehicles and on over 10% of personal staff vehicles;
- ✓ Key City divisions (Parks, Works, Transit) have developed and implemented guidelines or communications approaches to reduce idling among fleet drivers;
- ✓ Meetings with Transit management have resulted in a new policy **reducing the maximum idling time for City buses from 15 minutes to 5 minutes**; and
- ✓ Staff workshops have been proposed to encourage further idling reductions.

3.3 Schools Initiative

Purpose
To generate awareness and reduce unnecessary idling by drivers – parents and caregivers – picking up children at Mississauga elementary schools.

Schools Media Launch Event

Approach
Distribution of anti-idling information kits (including posters, information cards, decals, suggested activities and curriculum ideas) to approximately 200 public and Catholic elementary schools in Peel Region. At a sub-set of 20 schools, metal signs were installed and project staff conducted commitment interventions and an evaluation component with drivers using information cards and vehicle stickers. Meetings were also held with school bus management to encourage school bus drivers not to idle when picking up children from schools.

Results
Before the interventions were conducted, 54% of drivers were observed idling their vehicles while waiting for children.

Almost **500 drivers** were approached at 20 elementary schools visited by campaign staff:
- ✓ **90%** were willing to discuss the idling issue;
- ✓ **85%** accepted the anti-idling information card;
- ✓ **82%** accepted the windshield decal; and
- ✓ Almost **40%** were observed to immediately post the decal on their windshield.

The combination of signs and personal contact at the elementary schools was tremendously successful:
- ✓ The frequency of idling **decreased from 54% to 29%;** and
- ✓ The duration of idling **decreased from 8 minutes to 3.5 minutes.**

In addition, school bus management advised bus companies and bus drivers to minimize their unnecessary idling during pick-ups and drop-offs.

3.4 GO Transit Initiative

Purpose
Generate awareness and reduce unnecessary idling by drivers picking up passengers at all eight GO Transit stations in Mississauga.

Approach
Commitment interventions were conducted in the passenger pick up locations of all eight of Mississauga's GO Transit stations, using metal anti-idling signs, information cards and vehicle stickers. An evaluation component was also conducted at a subset of four stations to measure the effectiveness of this component.

GO Transit Media Launch Event
with Eldred King, Chair of GO Transit; Catherine Ray, Natural Resources Canada; George Carlson, Mississauga Ward 6 Councillor; and GO Bear, the GO Transit mascot

Results
- ✓ **48%** of drivers were observed idling their vehicles while waiting to pick up commuters at GO stations prior to the initiative;
- ✓ Almost **1,400 drivers** were approached during station visits;
- ✓ **92%** were willing to discuss the idling issue;
- ✓ **91%** accepted the anti-idling information;
- ✓ **81%** accepted the vehicle sticker;
- ✓ Almost **14%** were observed to immediately post the decals on their windshield;
- ✓ The frequency of idling **increased** slightly (48% to 54%);
- ✓ The duration of idling **increased** slightly (by 20 seconds); and
- ✓ GO Transit installed 40 anti-idling signs permanently.

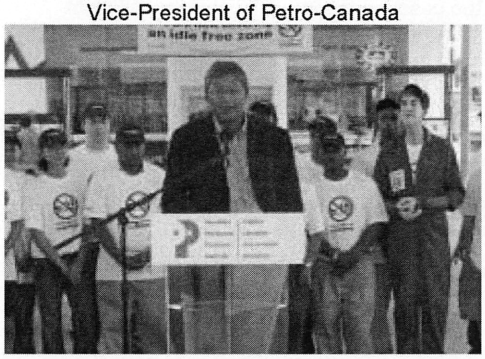
As a result of a drop in temperature and reduced daylight that occurred between the baseline and follow-up evaluation components, it is likely that the initiative **prevented even greater idling increases** as winter set in.

3.5 Private Sector Initiative

Purpose
To generate awareness of the idling issue among Mississauga businesses and industries, and to enlist these businesses and industries to co-promote anti-idling messages to their employees, fleet drivers and customers.

Approach
Anti-idling information packages were circulated to over 200 businesses and industries in Mississauga. In addition, the Canadian Petroleum Products Institute (CPPI) partnered with Mississauga on an awareness building campaign (media campaign and interventions). Commitment interventions were conducted by project staff at over 50 Esso, Sunoco, Canadian Tire, Shell and Petro-Canada gas stations in Mississauga, using anti-idling signs, banners, sandwich boards, information cards, vehicle stickers and air fresheners. An evaluation component was also conducted at a subset of stations to measure the effectiveness of this component. Participating CPPI member companies also introduced the Anti-Idling Campaign to their employees through the distribution of campaign materials, and posting of anti-idling signs at head office locations in the Greater Toronto Area.

Boris Jackman
CPPI Chair and Executive
Vice-President of Petro-Canada



Results
As a result of the distribution of anti-idling information kits to Mississauga businesses and industries:

- ✓ **Eight companies co-promoted the City's anti-idling message** to staff and public during their Earth Day 2002 events (AECL, Pratt & Whitney, AstraZeneca, Fuji Photo Film, Bentall Real Estate Services and Square One Mall in Mississauga, as well as Dofasco in Hamilton and Ford Motor Company in Oakville); and
- ✓ **Numerous requests have been received** for windshield decals (6000+), information cards (7700+), posters and metal anti-idling signs. For example, Cooksville Chrysler distributed information cards and windshield decals to their service customers for several months following private sector initiative.

Following the CPPI campaign, surveys showed that:

- ✓ The reaction of drivers to being approached by the CPPI anti-idling project staff at the participating gas station sites was overwhelmingly positive. Of the over 11,000 motorists who were approached in the two weeks of the initiative:
  - ✓ **86%** were willing to discuss idling issues with the project staff;
  - ✓ **85%** accepted the information card;
  - ✓ **81%** accepted the cling vinyl windshield decal, making a commitment to reduce unnecessary idling; and
  - ✓ **20%** made their commitment to reduce idling public by posting the decal in their windshields on the spot.

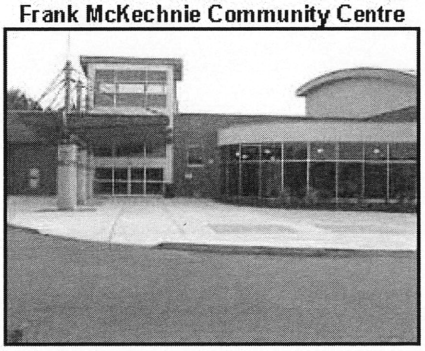
- ✓ In general, members of the public felt that gas stations are a good place to share information about the issue of vehicle idling.
- ✓ The initiative resonated with the public and is likely to persuade changes in vehicle idling behaviour. Concerned that vehicle idling is a problem, **almost half (46%) of those surveyed following the initiative said that the anti-idling initiative is likely to motivate them to change their current idling behaviours.**

3.6 Municipal Hotspots Initiative

Purpose
To generate awareness of the idling issue and reduce unnecessary idling by drivers at municipal facilities where idling has been observed.

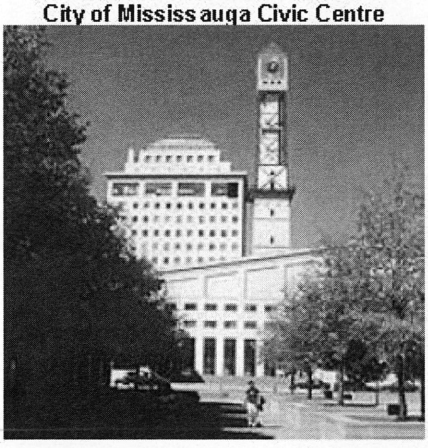
Approach
The Municipal Hotspots Initiative was intended to address unnecessary idling that occurs at City-controlled public buildings such as libraries, arenas and community centres. Information cards were distributed to all municipal facilities. Metal anti-idling signs were installed at 20 facilities. Four locations (Mississauga Civic Centre, Cawthra Community Centre, Frank McKechnie Community Centre, and Meadowvale Community Centre) that reported having high traffic volumes at specific times were selected to receive personal contact interventions and evaluation.

Frank McKechnie Community Centre



Results
- ✓ Almost **250 drivers** were approached by project staff during the municipal site visits, with:
  - ✓ **78%** willing to discuss the idling issue;
  - ✓ **71%** accepting anti-idling information;
  - ✓ **64%** accepting the windshield decal, making a commitment to reduce idling; and
  - ✓ **34%** posting the decal on the spot, making public their commitment to reduce idling;
- ✓ The frequency of idling **increased** (35% to 62%).
- ✓ The duration of idling **decreased** (by 27 seconds). As with the GO Transit initiative, this was largely due to a significant drop in average temperature and reduced daylight by the end of the initiative. It is likely that the initiative **prevented even greater idling increases** as weather worsened.

City of Mississauga Civic Centre



4.0 Campaign Evaluation

Overview

The two city-wide campaigns (in Mississauga and Greater Sudbury) were pilots to test the effectiveness of the tool kit and the approach prior to full-scale implementation in other municipalities across the country. Because of this, strong emphasis was placed on monitoring and measuring the campaign's effectiveness, so that key learnings could be incorporated in future campaigns.

To that end, each of the campaign's individual initiatives included an evaluation component to gauge the effectiveness of each strategy. These evaluations were conducted using a variety of methods, such as:

- Collecting baseline and follow-up data on the frequency and duration of idling at each location;
- Conducting surveys to determine changes in people's awareness of idling issues; and
- Tracking intervention results to determine how well received the interventions were and drivers' overall willingness to discuss the topic, receive anti-idling information and make a commitment to reduce unnecessary idling.

These individual evaluation results are reported on in the sections on each component (see Section 3.0).

In addition to the evaluations conducted on each component, the overall year-long campaign was also evaluated by conducting city-wide pre- and post-campaign residential telephone surveys and intercept interviews with drivers waiting to pick up passengers at GO Transit stations in the City of Mississauga. These results are reported below.

Purpose and Approach

Pre- and Post-Campaign Telephone Surveys

The impact of the Idle-Free Zone Campaign was measured using pre- and post-campaign telephone surveys to gain an understanding of vehicle idling behaviours, to examine the frequency of vehicle idling in various locations in Mississauga, and to get a sense of the perceptions and attitudes concerning vehicle idling currently held by City residents. Two telephone surveys were undertaken:

- A pre-campaign survey – conducted in late September, 2001 – was used to establish benchmark data for awareness of and attitudes towards unnecessary vehicle idling.
- A post-campaign survey – conducted in late October, 2002 – was completed to measure the effectiveness of the campaign, and provide a basis for comparison with the pre-campaign benchmark data.

In each survey, more than 150 interviews were completed. Households were selected at random from the City of Mississauga telephone directory, and surveyors asked to speak to the

member of the household who does the most driving. The survey results for a sample this size are accurate within +/- 8.0 percentage points, 19 times out of 20.

Intercept Interviews
Forty brief three-minute intercept interviews were also conducted with drivers of vehicles in the "kiss and ride" lanes of GO Transit stations in Mississauga in late September in order to receive "in-person" opinions on the planned campaign prior to its launch, and gain a better understanding of vehicle idling behaviours, the frequency of idling at GO Transit stations, and to get a sense of which methods of communication would be most effective in reaching City residents.

Results

Pre-Campaign Survey
- ✓ 90% believe that idling causes unnecessary air pollution.
- ✓ 1 in 3 Mississaugans report idling at least once on the last day they drove.
- ✓ The average Mississaugan reports idling for 3 to 5 minutes (depending on the location) while waiting in their vehicle.
- ✓ 90% agree that "turning my vehicle off when parked is the right thing to do."
- ✓ 94% support community action to reduce unnecessary idling.
- ✓ 34% have heard of the phrase "idle free zone."

Intercept Interviews
- ✓ When leaving their engines running, 59% do so for climate control.
- ✓ When turning their engines off, 31% do so for out of concern for the environment and 31% do so to save money and conserve fuel.
- ✓ 65% believe vehicle idling is a problem.
- ✓ 27% suggested placing anti-idling signage at appropriate locations and 24% suggested running an advertising campaign in the local newspaper, radio or on TV.

Post-Campaign Survey
- ✓ **95%** believe that idling causes unnecessary air pollution (up 5%).
- ✓ **93%** agree that "turning my vehicle off when parked is the right thing to do" (up 3%).
- ✓ **57%** have heard of the phrase "idle free zone" (up 23%).

- ✓ Overall, the Campaign reached a large proportion of Mississauga residents. A significant **69% claim to have seen, heard or read about the Campaign.**

Those who were exposed to the Campaign...

- ✓ Say they **idle less – about 3-4 times less** (depending on the location) than those who have not been exposed.
- ✓ **Report idling for a fraction of the time** – just over 1 minute compared to almost 4 minutes for those who have not been exposed.
- ✓ **Are much more likely to change their idling behaviour** – 57% say that the Campaign will have a strong or moderate impact on their idling in the future.

In addition, **the campaign had a greater effect on men than on women**, who reported that they idle less and hold more negative attitudes toward idling regardless of whether or not they were exposed to the campaign.

5.0 Key Learnings

Through the course of the planning, development and implementation of the City of Mississauga's Idle-Free Zone campaign, project staff learned a number of important lessons that would be useful for other municipalities and private sector companies to be aware of when beginning their own anti-idling campaigns.

Key Learning	Background
1. **Council and senior management support is critical.**	The Mississauga campaign team fostered and received strong support from their Council and senior management. The Mayor helped launch the campaign, and formal council endorsement was sought and received. The initiative was first introduced through the air quality advisory committee, which is comprised of department heads and Councillors – ensuring both political and staff support. Similarly, the campaign results were presented to both Committee and Council at the campaign's conclusion.
2. **Partnerships are the key to success.**	Community partners are needed to effectively implement anti-idling campaigns. The City of Mississauga struck partnerships with GO Transit, both school boards, the Canadian Petroleum Products Institute and with the University of Toronto at Mississauga – whose students were instrumental in implementing several of the campaign initiatives. Partnerships with boards and associations increase the comfort level and receptiveness of individual member organizations that might consider participating in the campaign. Following communications with these representative organizations, arrangements can then be made with individual managers and staff at each site to install signs and proceed with other campaign activities, such as on-site visits by campaign staff.
3. **Address the vehicle idling "myths."**	The three idling "myths," that 1) your engine should be warmed up before driving; 2) idling is good for your engine; and 3) shutting off and restarting your vehicle uses more gas than if you let it idle, are widely held in Mississauga and elsewhere, and need to be addressed front and centre as part of any anti-idling campaign.
4. **Get your own house in order.**	It is much easier and more effective to ask the public to get involved once the municipality has already taken action internally to reduce idling. To demonstrate their own commitment to its anti-idling initiative, Mississauga launched a workplace initiative to reduce idling across all municipal operations, including public transit, in parallel with efforts to reduce idling at other community locations.

Key Learning	Background
5. Personal interventions are most effective in the warmer months.	It is important to conduct personal interventions during the summer months (May, June, July, August and September) as much as possible for the following reasons: • Studies have shown that weather and outside air temperature have a strong effect on idling behaviour. If weather worsens or temperatures drop over the course of the initiative, or between baseline and follow-up evaluation measurements, idling is likely to increase. If an evaluation component is being included in the campaign, it is important to plan the interventions and evaluations to happen at a time of year when weather conditions are as least likely to change as possible. • Drivers are most willing to interact with project staff when it is warm outside. • The amount of available daylight is greatest, making it easier and safer to implement interventions through high traffic times such as evening rush hour.
6. When selecting optimal locations for personal interventions, focus on drivers that are: **a) parents;** **b) non-transient; and** **c) "captive" audiences.**	Some locations are better for conducting personal interventions than others in terms of ease of implementation and ability to control variables and measure changes in idling behaviour. In addition to criteria for selecting implementation sites that have been identified in other reports (particularly the "Turn It Off" report), some additional factors to consider that became apparent during the course of this campaign were: • The "kind" of drivers that use the site is important. The Schools initiative was the most successful, likely because the drivers there were largely parents and caregivers, as opposed to general drivers, and that group may be more apt to be affected by the health and environmental messages of the campaign. • Ideally, the site would be frequented by a non-transient (i.e. regular) population of drivers. In addition to being caregivers, the drivers at schools were the most homogeneous and non-transient, giving the project staff the greatest chance of speaking with every driver using the site. • Drivers should be a "captive audience" for a sufficient length of time to allow effective interventions. During the Municipal Hotspots Initiative, parents with young children were often so rushed and distracted that the interventions had to be shortened to a degree that likely reduced their effectiveness. The optimal time to approach drivers to discuss idling is at the end of the day, as they are generally less hurried at this time than during the morning rush hour. This is also the time when they are most likely to be idling while waiting in their vehicles, with some drivers arriving 10-15 minutes prior to the arrival of their passengers and leaving their engines running the entire time. Once a long list of potential implementation sites has been compiled, site visits should be conducted to confirm suitability and determine the exact location at each site where the interventions (and baseline and follow-up evaluations, if any) should be conducted.

Key Learning	Background
7. Gear the campaign to target men in particular.	The overall campaign telephone surveys indicated that the campaign had a greater effect on men than on women, who reported that they idle less and hold more negative attitudes toward idling regardless of whether or not they were exposed to the campaign. Therefore, there is more opportunity to reduce idling by targeting men with behaviour change and awareness building approaches when designing both the interventions and the public awareness and media campaign and when creating key messages and selecting locations and methods of approach.
8. Effective communications materials are a key component of a successful promotional campaign.	Communications materials are a key component of a successful promotional campaign. Some effective strategies in Mississauga's campaign were to: • Draw extensively on the images, information and graphic materials available on NRCan's *Idle-Free Zone* tool kit Web site (http://www.oee.nrcan.gc.ca/idling). The tool kit is a great starting point and the content can be tailored for local use. In many cases it is only necessary to add your logo. The images can also be used to create your own new materials, such as t-shirts, hats, bookmarks, radio advertisements or your own anti-idling Web site. • The City of Mississauga used strong messaging, images and colours to promote the campaign. The bright red colour made the posters, bus shelter and bus tail advertisements stand out well. Having communications expertise on the project team will make the campaign go more smoothly. • A Web site is a great low-cost way to make anti-idling information readily accessible and allows regular updates as the campaign progresses. Contact information allows visitors to easily make inquiries, comments or suggestions, and response time and printing costs can be minimized by referring to the Web site. The City of Mississauga used a catchy vanity name (www.123turnyourkey.com) which made promotion of the Web site easier and more effective. The City's corporate Web site also linked to www.123turnyourkey.com. • If metal street signs are part of the campaign, assume that they will be permanent at the locations where they are first used. Campaign partners initially requested that the signs only be used during the course of the interventions and then decided that they liked the signs so much that they should remain as permanent installations. This means that they should be installed securely and according to the sign policies of the institution or company on whose property the sign is to be placed. Most important is to ensure that the signs are made to be reflective, so that they continue to be visible to drivers even after dark. • When printing information cards, take the opportunity to maximize the exchange of information by printing them double-sided, with the facts and myths on the back side, along with contact phone numbers and web addresses, in addition to the main campaign messages on the front.

Key Learning	Background
9. Place metal street signs close to the areas where idling occurs.	Some of the sites that may be selected to receive anti-idling personal interventions will be in places where much of the idling occurs in designated pick-up and drop-off zones called "kiss and ride" areas. These areas often function much like drive-thru lanes at fast food restaurants, with drivers dropping off or picking up their passengers and then continuing on. In many cases, these areas are posted with "no stopping or "no parking" signs. In other cases, much of the idling may occur at the front entrance to a building, sometimes marked as a fire route with signs indicating that vehicles should not be stopped in those areas. As such, the introduction of "no idling" signs may not be possible in these areas – signs will have to be posted elsewhere. It should be recognized that many different locations – walls, fences, existing signposts, etc. – will need to be considered for sign placement. Further, in some cases, idling may be most prevalent in areas adjacent to and outside of facility properties, such as on a nearby street. In these instances, approval from the local municipality will be needed to erect the signs. The key objective is to install the signs as close as possible to the areas where idling is occurring, without contradicting signs already posted, or contravening any municipal by-laws. Good communication is needed with the facility personnel who will be installing the signs to discuss issues relating to sign placement and installation.
10. Seek creative ways to find and manage project staff and volunteers.	The Mississauga campaign used Community-Based Social Marketing approaches from the *Idle-Free Zone* tool kit, which involved personal interventions by project staff to help reduce idling at community locations. One of the ways Mississauga filled its staffing needs was through a unique environmental internship arrangement with the University of Toronto Mississauga.
11. Ensure project staff are knowledgeable about all the campaign initiatives.	When conducting interventions, project staff may encounter questions and comments from drivers about other places where they have observed idling to be a problem, such as at major transit nodes, taxi stands, school buses in front of schools, or drive-thrus. It is useful for project staff to be able to describe the other components of the campaign, assure drivers that many efforts are being made to address idling and air quality issues in general, explain why the current location was selected, and inform drivers that their comments will be recorded and passed on to the appropriate staff.
12. Project staff should offer to place the decal on the windshield on behalf of drivers.	To increase the number of decals (and thus commitments) drivers make, use an approach and script that has project staff offer to place the decal on the windshield on behalf of the driver. Use of the decal more than doubled once that approach was used during the course of this campaign.

Key Learning	Background
13. Project staff should work in male-female pairs as much as possible.	Although project staff can effectively work alone if the implementation site is not too busy, it is more effective for them to work in pairs if the sites are busy, allowing them to approach and speak with a greater number of drivers. In addition, working in pairs increases the project staff's safety and comfort, especially when the interventions occur outside after dark. Furthermore, when project staff work in male-female teams, it allows women to preferentially approach women, which may help some female drivers feel more comfortable discussing anti-idling issues, accepting the information and making a commitment.

11.0 Campaign Costs

Overall costs for the campaign are outlined below in two broad categories: campaign development and implementation; and evaluation.

Campaign Development and Implementation Costs

The costs to the City of Mississauga to develop and implement the campaign included staff salaries and production of campaign materials. The estimated cost in staff time for the year-long campaign was approximately $50,000. This included the involvement of a senior project manager (part-time); a project coordinator (half-time, on average); and a communications consultant from the City's public affairs section (as required on a task-by-task basis). There was no cost to the City for the anti-idling project staff as these were provided free of charge through the intern environmental student program at the University of Toronto, Mississauga.

Production costs totaled approximately $30,500 and are itemized in the following table. It should be noted that the creative costs were minimal as the City was able to use the free, downloadable graphics and materials from *The Idle-Free Zone* Web site as a starting point for developing the various campaign materials.

With the city's population of 625,000, campaign costs amounted to about 13 cents per resident.

Anti-Idling Campaign Production Costs

Item/Quantity	Overall Cost	Unit Cost
Creative design/development	$830	-
Information cards (50,000)	$1,414	$0.03
Cling vinyl decals (50,000)	$3,855	$0.08
Posters (5000)	$1,925	$0.39
Metal signs (265), including installation	$10,000	$37.74
Transit shelter ads/bus tails (65)	$3,443	$52.97
Radio advertising	$4,703	-
Newspaper advertising	$2,522	-
Contest/flyers	$910	-
T-shirts for project staff	$354	-
Launch	$223	-
Letterhead	$225	-
Misc. (copying, supplies, etc.	$193	-
TOTAL	**$30,597**	**-**

Campaign Evaluation Costs

Campaign evaluation costs were covered by NRCan as part of funding for the pilot project, and totaled approximately $50,000. This included two telephone surveys, pre-campaign interviews, and baseline and follow-up data collection for each of the initiatives – GO Transit, schools and municipal "hotspots" – that involved personal contact interventions by the campaign project staff.

12.0 Sustaining the Campaign

The "Towards an Idle-Free Zone in the City of Mississauga" pilot project has been extremely successful not only in achieving local objectives of reducing idling and improving local air quality, but also as an example of a comprehensive campaign upon which future similar municipal initiatives throughout Canada can be based.

12.1 Current Activities

Communicating the Campaign Results

With the completion of Mississauga's Anti-Idling Campaign, the results are being communicated widely in order to generate additional awareness of the anti-idling message. Some of the many ways that results are being communicated include:

To the public:
- Drafting short articles for City Councillors to include in their newsletters;
- Creating "filler" advertisements for the Mississauga News to use when they have space to fill;
- Preparing some notes for the Mayor to use on television to address the anti-idling issue and speak about the results on "Mayor's Hour";
- Advertising in the media, such as further bus shelter advertisements and bus tails; and
- Developing advertisement on the "idling myths" for the Mississauga News.

To campaign partners:
- Sending campaign report and cover letter to each of the campaign partners; and
- Including a sample newsletter to the school boards that could be used in school newsletters.

To City staff, Committees and Council:
- Posting the results and other clean air tips on the City's intranet site, *Inside Mississauga*;
- Writing an article for the staff news bulletin *Network*; and
- Circulating NRCan's anti-idling newsletters to Council, senior management and City committees.

To other municipalities:
- Posting a "Top Ten" list of tips to other municipalities interested in starting their own campaign on the www.123turnyourkey.com Web site; and
- Writing articles to include in NRCan's anti-idling newsletters.

To businesses:
- Writing an article for the Mississauga Board of Trade publication.

Continuing Actions Already Underway

There are a number of low-cost steps that are being taken to keep the anti-idling message in the forefront of Mississauga residents' minds. Some of these include continuing actions already underway, such as:

- Maintaining the Web site;
- Responding to information requests;
- Distributing promotional materials to City facilities;
- Distributing promotional materials to the private sector;
- Providing advice to the GTA Clean Air Council; and
- Providing advice to municipalities and communities when requested.

12.2 Other Opportunities

Further Outreach to the Private Sector

The outreach to the private sector that occurred as part of the Private Sector Initiative resulted in substantial interest from a number of companies, most notably Cooksville Chrysler, who attached decals and information cards to all of their customers' receipts.

Further opportunities to co-promote the anti-idling message could be sought through partnerships with other car dealerships as well as other vehicle-oriented businesses, including but not limited to:

- Lube, muffler and oil change shops;
- Car wash companies; and
- Ontario DriveClean centres.

Fleets Initiative

The extensive research and consultation activities that took place as part of the Fleets Initiative could be advanced by continuing to work with NRCan staff in the FleetSmart program to design and produce anti-idling and fuel efficiency workshops for delivery to City of Mississauga fleet drivers in the spring of 2003.

Schools

Because the Schools Initiative was the most successful of all the Anti-Idling Campaign components, the City could partner with local community groups such as Greenest City or Eco Mississauga to conduct further interventions at the rest of the Mississauga schools that were not included in the original initiative.

Appendix A List of Campaign Initiative Reports

Initiative Reports

- GO Transit Commitment Interventions: Summary Report, April 2002
- Workplace Initiative Summary Report, April 2002
- Fleet Research Initiative: Final Report June 2002
- Schools Commitment Interventions Summary Report, August 2002
- Municipal Hotspots Summary Report, November 2002
- Private Sector Summary Report, December 2002

Evaluation Reports

- Interviews at GO Stations in Mississauga: Summary Report October 2001
- Baseline Resident Telephone Survey: Summary Report October 2001
- Mississauga Idle-Free Survey Report, October 2002
- Assessing the Impact of the Mississauga Idle-Free Campaign: Advanced Statistical Analyses, October 2002

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