

Motor Coach Idling Field Observation Study for Washington, DC, Metro Area



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Transportation and Regional Programs Division

and

SmartWay Transport Partnership Group

Office of Transportation and Air Quality
U.S. Environmental Protection Agency

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OVERVIEW

Motor coaches idle their main propulsion engine for long periods, primarily to maintain a comfortable interior compartment for their passengers (heat or air conditioning). Due to the cavernous interior compartment of motor coaches, maintaining a comfortable interior temperature requires substantially more time than the typical long-haul truck cab or personal passenger vehicle. In fact, it can take hours to bring the interior of a standing bus from 20 degrees Fahrenheit to 60 degrees Fahrenheit. Long-duration vehicle idling waste a considerable amount of fuel (up to a gallon per hour) and exposes the driver, passengers, and the general public to harmful diesel air emissions, such as particulate matter and other air toxics.

Unlike long haul trucks idling at truck stops which are largely hidden from public view, motor coach idling is highly visible. Motor coaches transport passengers to popular public destinations. Consequently, many state and local jurisdictions have received complaints about idling buses, and many of these states and local jurisdictions have promulgated laws that restrict vehicle idling. The city of Washington, DC is one jurisdiction that has passed an anti-idling law. In 1999, the DC Department of Health amended a municipal regulation (Title 20, §900.1) that applies to both gasoline and diesel engines. The DC idling law, which applies to buses with a seating capacity of twelve or more, restricts idling to three minutes. The law exempts private passenger vehicles, idling to power on-board equipment (e.g., cement mixers), and idling when the temperature is thirty-two degrees Fahrenheit or below (5 minutes only). Fines can be up to \$5,000. See Appendix G for more information on DC's anti-idling law.

In an effort to better understand motor coach idling, the Environmental Protection Agency (EPA) conducted a field observation of motor coaches in the Washington, DC metro area. The purpose of this study was to observe and report idling behavior of motor coaches in various zones in and around Washington, DC; and better understand the effectiveness of idling laws as applied to motor coaches. The ultimate goal is to reduce idling emissions through education, more effective laws, and strategies and technologies that reduce idling but maintain the needs of motor coach buses, their passengers, and the general public.

This study was conducted in the summer months of 2005, which generally have warmer temperatures and more tourists visiting the nation's capital than other months. Consequently, the findings from this study may reflect increased idling behavior during the summer season as compared to other seasons. Because Washington, DC has enacted an idling restriction law, this law also may have an effect on the behavior of motor coach operators while in the city. An evaluation of a similar-sized city without an idling law may provide differing results. It should be noted that this study was limited to experiences in the Washington, DC metro area only. Other jurisdictions may experience different results.

METHODOLOGY

Ten public zones were initially selected as locations to regularly monitor motor coach idling behavior. These zones were selected based on observations made around the major tourist attractions in Washington, DC. While other tourist attractions exist, initial observations found that motor coaches regularly visit these locations. The original locations are as follows:

1. North National Mall – Madison Dr. NW
2. South National Mall – Jefferson Dr. SW
3. Lincoln/F.D.R. Memorials – Ohio Dr. SW
4. National Cathedral
5. Waterfront
6. Arlington National Cemetery (in Virginia)
7. Union Station
8. US Capital/Supreme Court/Library of Congress
9. Ford's Theatre/Hard Rock Café/FBI Building
10. National Zoo

Observations occurred over a nine-week period, beginning on June 10, 2005 and ending on August 9, 2005. After a two-week trial observation period, zones 8, 9, and 10 were removed. Both the National Zoo (10) and U.S. Capitol (8) did not have sufficient numbers of buses to continue observations, and both zones had ongoing construction activities that limited the amount of parking (at the National Zoo) or had no parking at all (at the U.S. Capitol) for buses. Also, Ford's Theatre (9) area was mainly a drop-off zone, and not a parking area. Finally, the Lincoln/FDR Memorials site was determined to be too large for one zone observation, so the site was split into two different zones. The final zones for observation were as follows:

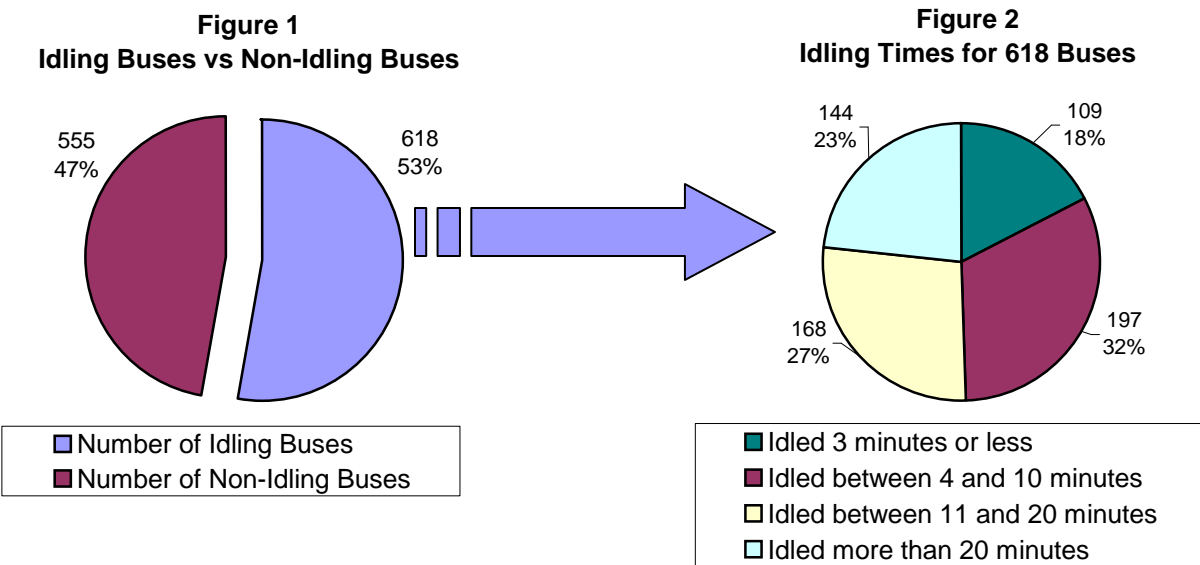
1. North National Mall – Madison Dr. NW
2. South National Mall – Jefferson Dr. SW
3. Lincoln Memorial
4. F.D.R. Memorial – Ohio Dr. SW
5. National Cathedral
6. Waterfront
7. Arlington National Cemetery
8. Union Station

These remaining eight zones were each visited a total of four times (with the exception of the South National Mall and F.D.R Memorial zones, which were visited 3 times), resulting in 30 full days of observations. Using a rotating schedule, each zone was visited on different days of the work week. Observations occurred in two shifts per location: from 10am-1pm and from 1pm-4pm. Each morning shift was viewed as independent from each afternoon shift, and information from one shift was shared with the second shift to avoid overlapping. In the end, the results from both shifts were combined into the results for the day.

RESULTS

General Results

Of the 1,173 observed buses, 618 buses (53%) were idling and 555 buses (47%) were not idling. As demonstrated in Figures 1 and 2, most of the idling trucks were in violation of the 3-minute Washington, DC idling law. The maximum idling time was 1 hour 9 minutes, and the median idling time was 11 minutes. The average idling time was 16 minutes.



Results by Shift

As would be expected during the summer months, more buses were observed idling during the afternoon hours than in the morning when the temperatures are higher. In addition, a larger proportion of these trucks were idling for over 3 minutes in the afternoon than in the morning.

Morning Observations (10am – 1pm):

Of 465 observed buses, 155 buses (33%) were idling and 310 buses (67%) were not idling. The maximum idling time was 38 minutes, and the median idling time was 17 minutes. The average idling time was 19 minutes. Figure 3 provides a breakdown of the number of trucks idling for various time intervals.

Afternoon Observations (1pm – 4pm):

Of 708 observed buses, 463 buses (65%) were idling and 245 buses (35%) were not idling. The maximum idling time was 1 hour 4 minutes, and the median idling time was 17 minutes. The average idling time was also 17 minutes. Figure 4 provides a breakdown of the number of trucks idling for various time intervals.

Figure 3
10am - 1pm Idling

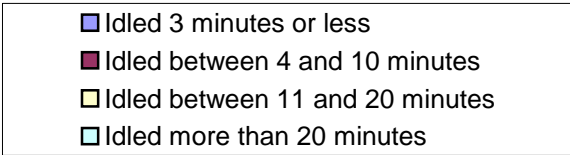
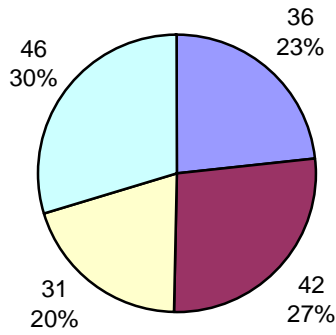
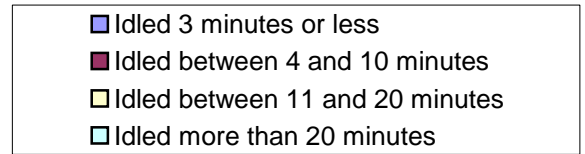
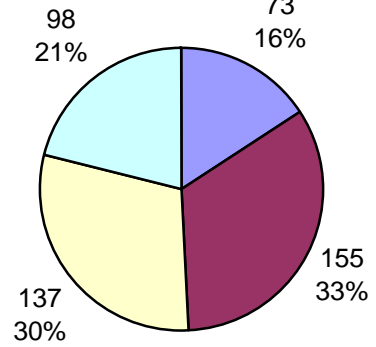


Figure 4
1pm-4pm Idling



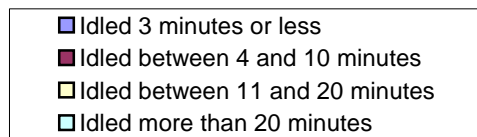
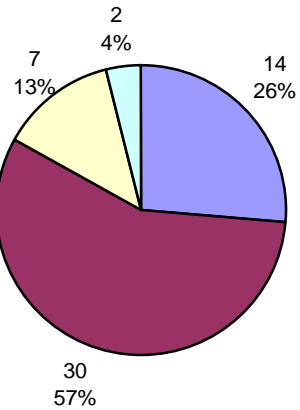
Results by Daily Temperature

Temperature – below 80°F

Of the 66 observed buses, 53 (80%) were idling and 13 buses (20%) were not idling. The maximum idling time was 29.5 minutes, and the median idling time was 5 minutes. The average idling time was 7 minutes.

Of the 53 buses that were observed idling, the majority of them were idling for over 3 minutes, in violation of the Washington, DC law. Figure 5 provides a breakdown of the number of trucks idling for various time intervals.

Figure 5
Idling Times at below 80°F



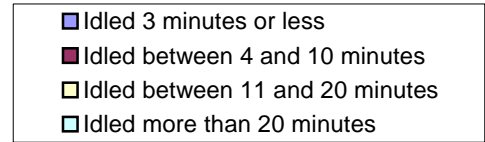
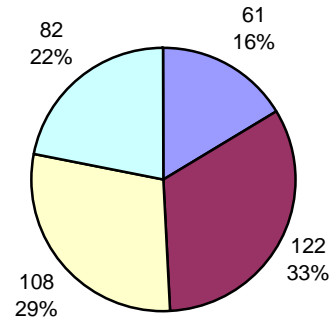
Temperature – between 80°F and 90°F

Of the 758 buses observed, 373 buses (49%) were idling and 385 buses (51%) were not idling. The maximum idling time was 1 hour 11 minutes, and the median idling time was 11 minutes. The average idling time was 16 minutes.

Of the 373 buses that idled, only 61 buses (16%) idled for 3 minutes or less. The remaining 312 buses (84%) idled for over 3 minutes and were in violation of the idling law for Washington, DC.

Continuing with the idling times breakdown: 122 buses (30%) idled for somewhere between 4 and 10 minutes, 108 buses (29%) idled for somewhere between 11 and 20 minutes, and 82 buses (22%) idled for more than 20 minutes. (Figure 6)

Figure 6
Idling Times at between 80°F and 90°F

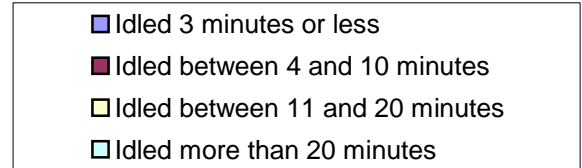
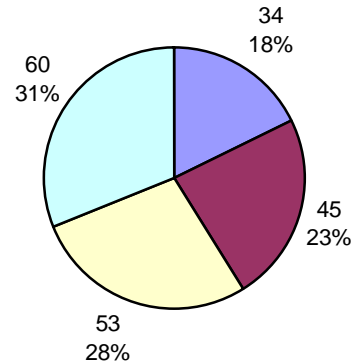


Temperature – above 90°F

Of the 349 buses observed, 192 buses (55%) were idling and 157 buses (45%) were not idling. The maximum idling time was 1 hour 11 minutes, and the median idling time was 12 minutes. The overall average idling time was 18 minutes.

Of the 192 buses that idled, only 34 buses (18%) idled for 3 minutes or less. The remaining 158 buses (82%) idled for over 3 minutes and were in violation of the idling law Washington, DC. Continuing with the idling times breakdown: 45 buses (23%) idled for somewhere between 4 and 10 minutes, 53 buses (28%) idled between 11 and 20 minutes, and 60 buses (31%) idled for more than 20 minutes. (Figure 7)

Figure 7
Idling Times at above 90°F



Results by Individual Sites

North National Mall – Madison Dr. NW

The area observed was Madison Dr. NW between 14th Ave. NW and 7th Ave. NW.

Overall, of the 1,173 total buses observed, 175 buses (15%) were observed at this zone, the 3rd highest out of the 8 sites. Of the 618 total idling buses observed, 109 idling buses (17%) were observed in this zone, which was the highest overall.

For the site, of the 175 buses observed, 109 buses (62%) were observed idling and 66 buses (38%) were not idling. The maximum idling time was 1 hour 6 minutes, and the median idling time was 13 minutes. The average idling time was 16.

Overall, of the 109 buses that idled, only 34 buses (31%) idled for 3 minutes or less. The remaining 75 buses (69%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 43 buses (40%) idled for somewhere between 4 and 10 minutes, 22 buses (20%) idled for somewhere between 11 and 20 minutes, and 10 buses (9%) idled for more than 20 minutes.

South National Mall – Jefferson Dr. SW

The area observed was Jefferson Dr. SW between 7th Ave. SW and 3rd Ave. SW.

Overall, of the 1,173 total buses observed, 196 buses (17%) were observed in this zone, the 2nd highest out of the 8 sites. Out of the 618 total idling buses observed, 94 idling buses (15%) were observed in this zone, which was 3rd highest out of 8.

For the site, of the 196 buses observed, 94 buses (48%) were observed idling and 102 buses (52%) were not idling. The maximum idling time was 2 hours 7 minutes, and the median idling time was 11 minutes. The overall average idling time was 19 minutes.

Overall, of the 94 buses that idled, only 36 buses (36%) idled for 3 minutes or less. The remaining 58 buses (64%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 25 buses (27%) idled for somewhere between 4 and 10 minutes, 22 buses (23%) idled for somewhere between 11 and 20 minutes, and 11 buses (12%) idled for more than 20 minutes.

Lincoln Memorial

The area observed was Daniel C. French Dr. SW between Lincoln Memorial Circle SW and Independence Ave. SW.

Overall, of the 1,173 total buses observed, 118 buses (10%) were observed in this zone, the 6th highest out of the 8 sites. Of the 618 total idling buses observed, 72 idling buses (12%) were observed at this zone, which was 5th highest out of 8.

For the site, of the 118 buses observed, 72 buses (61%) were observed idling and 46 buses (39%) were not idling. The maximum idling time was 37 minutes, and the median idling time was 8.5 minutes. The average idling time was 12 minutes.

Overall, of the 72 buses that idled, only 21 buses (29%) idled for 3 minutes or less. The remaining 51 buses (71%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 21 buses (29%) idled for somewhere between 4 and 10 minutes, 15 buses (21%) idled for somewhere between 11 and 20 minutes, and 15 buses (21%) idled for more than 20 minutes.

F.D.R. Memorial – Ohio Dr. SW

The area observed was W. Basin Dr. SW between Independence Ave. SW and Ohio Dr. SW and Ohio Dr. SW between W. Basin Dr. SW and the bridge over the Tidal Basin.

Overall, of the 1,173 total buses observed, 82 buses (7%) were observed in this zone, the 7th highest out of the 8 sites. Of the 618 total idling buses observed, 30 idling buses (5%) were observed at this zone, which was lowest overall.

For the site, of the 82 buses observed, 30 buses (37%) were observed idling and 52 buses (63%) were not idling. The maximum idling time was 50 minutes, and the median idling time was 12 minutes. The average idling time was 19 minutes.

Overall, of the 30 buses that idled, only 5 buses (17%) idled for 3 minutes or less. The remaining 25 buses (83%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 10 buses (33%) idled for somewhere between 4 and 10 minutes, 8 buses (27%) idled for between 11 and 20 minutes, and 7 buses (23%) idled for more than 20 minutes.

National Cathedral

The area observed was the bus drop-off zone in front of the National Cathedral.

Overall, of the 1,173 total buses observed, 72 buses (6%) were observed in this zone, the lowest overall. Out of the 618 total idling buses observed, 58 idling buses (9%) were observed at this zone, which was 7th highest out of the 8 sites.

For the site, of the 72 buses observed, 58 buses (81%) were observed idling and 14 buses (19%) were not idling. The maximum idling time was 22 minutes, and the median idling time was 3.5 minutes. The overall average idling time was 7 minutes.

Overall, of the 58 buses that idled, only 17 buses (29%) idled for 3 minutes or less. The remaining 41 buses (71%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 31 buses (54%) idled for somewhere between 4 and 10 minutes, 7 buses (12%) idled for somewhere between 11 and 20 minutes, and 3 buses (5%) idled for more than 20 minutes.

Waterfront

The area observed was Maine Ave. SW between M St SW and the Interstate 395 overpass.

Overall, of the 1,173 total buses observed, 229 buses (19%) were observed in this zone, the highest overall. Out of the 618 total idling buses observed, 66 idling buses (11%) were observed at this zone, which was 6th highest out of the 8 sites.

For the site, of the 229 buses observed, 66 buses (29%) were observed idling and 163 buses (71%) not idling. The maximum idling time was 1 hour 49 minutes, and the median idling time was 12 minutes. The average idling time was 22 minutes.

Overall, of the 66 buses that idled, only 10 buses (15%) idled for 3 minutes or less. The remaining 56 buses (85%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 19 buses (29%) idled for somewhere between 4 and 10 minutes, 19 buses (29%) idled for somewhere between 11 and 20 minutes, and 18 buses (27%) idled for more than 20 minutes.

Arlington National Cemetery

The area observed was the bus parking lot at the Arlington National Cemetery in Virginia.

Overall, of the 1,173 total buses observed, 162 buses (14%) were observed at this zone, the 4th highest out of the 8 sites. Out of the 618 total idling buses observed, 102 idling buses (11%) were observed at this zone, which was 2nd highest out of 8.

For the site, out of 162 buses observed, 102 buses (63%) were observed idling and 60 buses (37%) were not idling. The maximum idling time was 1 hour 32 minutes, and the median idling time was 13 minutes. The overall average idling time was 20 minutes.

Virginia has an anti-idling law which allows buses to idle for up to 10 minutes during hot weather in order to maintain power to the air conditioning system. Of the 102 buses that idled, only 47 buses (46%) idled for 10 minutes or less. The remaining 55 buses (54%) idled for over 10 minutes and were in violation of Virginia law. Continuing with the idling times breakdown: 17 buses (17%) idled for somewhere between 11 and 20 minutes and 38 buses (37%) idled for more than 20 minutes.

Union Station

The area observed was the parking garage behind Union Station.

Overall, of the 1,173 total buses observed, 139 buses (12%) were observed in this zone, the 5th highest overall. Out of the 618 total idling buses observed, 87 idling buses (14%) were observed at this zone, which was 4th highest out of the 8 sites.

For the site, of the 139 buses observed, 87 buses (63%) were observed idling and 52 buses (37%) were not idling. The maximum idling time was 1 hour, and the median idling time was 13 minutes. The average idling time was 18.9 minutes.

Overall, of the 87 buses that idled, only 14 buses (16%) idled for 3 minutes or less. The remaining 73 buses (84%) idled for over 3 minutes and were in violation of the Washington, DC idling law. Continuing with the idling times breakdown: 20 buses (23%) idled for somewhere between 4 and 10 minutes, 34 buses (39%) idled for somewhere between 11 and 20 minutes, and 19 buses (22%) idled for more than 20 minutes.

Summary of Results for All Sites

For all sites, a total of 1,173 parked buses were observed. Figure 8 demonstrates the number of buses (and the proportion of the total) that were parked at each site. Of these 1,173 buses, 618 were observed idling. Figure 9 shows the proportion of these buses that were idling at each site. The largest proportion of buses was observed idling at the

National Mall locations. Figure 10 demonstrates the average idling times for each site. The sites with the least idling were National Cathedral and Lincoln Memorial.

Figure 8
Number of Parked Buses by Site

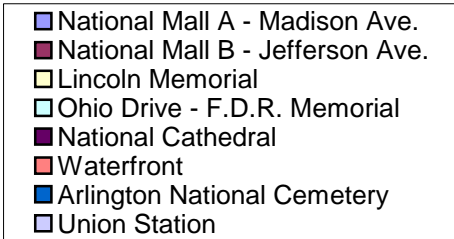
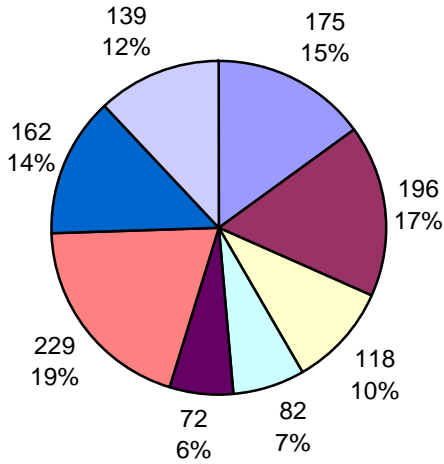


Figure 9
Number of Idling Buses by Site

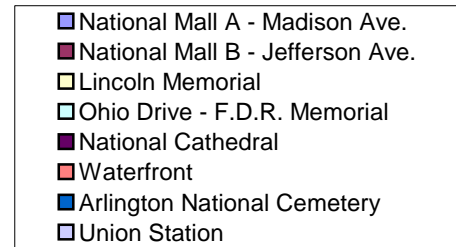
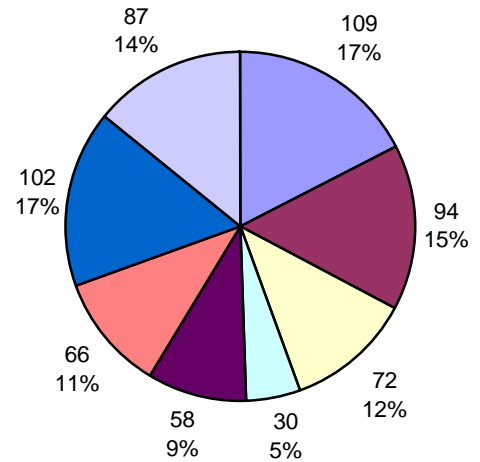
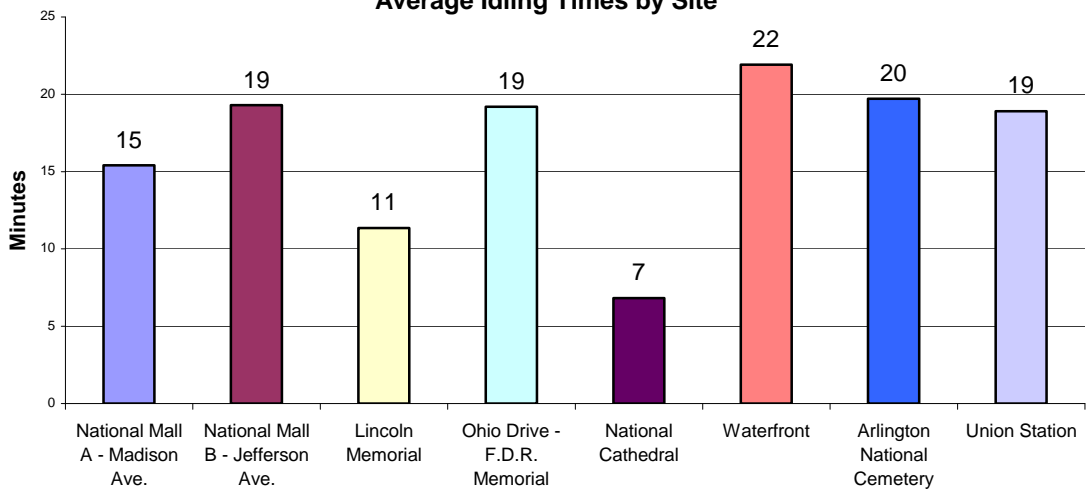


Figure 10
Average Idling Times by Site



CONCLUSION

This field observation found that motor coach idling in Washington, DC typically exceeds the city's legal limit of three minutes. The average or median idling times ranged from 15-30 minutes. When compared to average long-haul truck idling times of 6-8 hours per day, the motor coach idling activity appears minor by comparison. However, the proximity of motor coach idling emissions to the public is cause for concern.

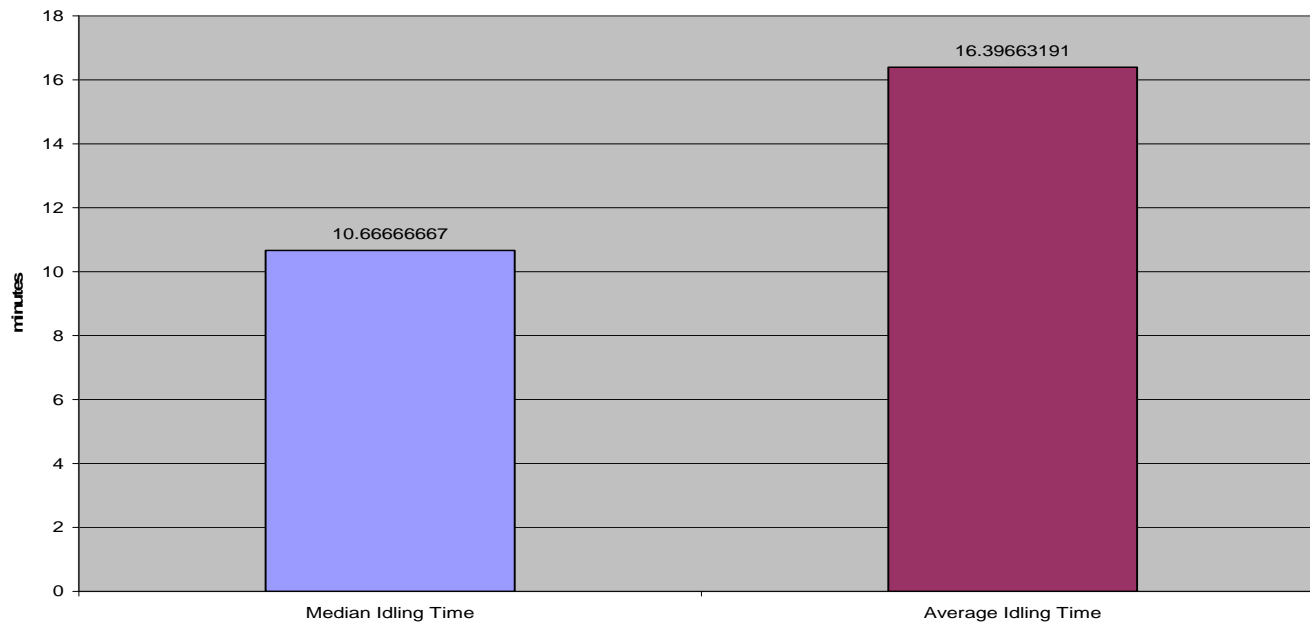
The field observation also discovered that while some motor coaches were observed idling with only the driver inside, the vast majority were observed idling during periods directly before the return of their customers, presumably to condition the bus for passenger comfort.

Appendix A

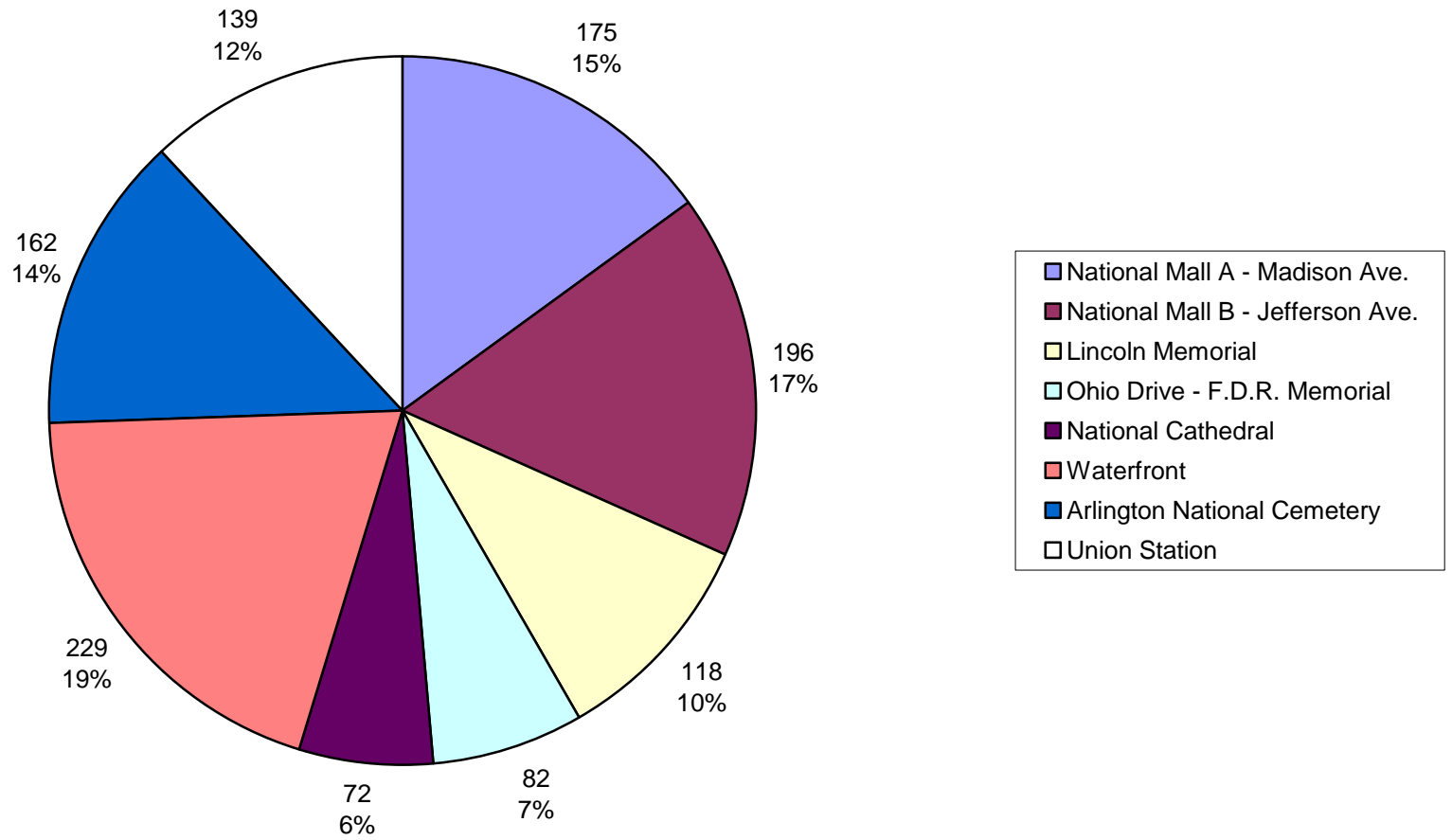
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| Median and Average Idling Times..... | 15 |
| Breakdown of Number of Parked Buses by Site | 16 |
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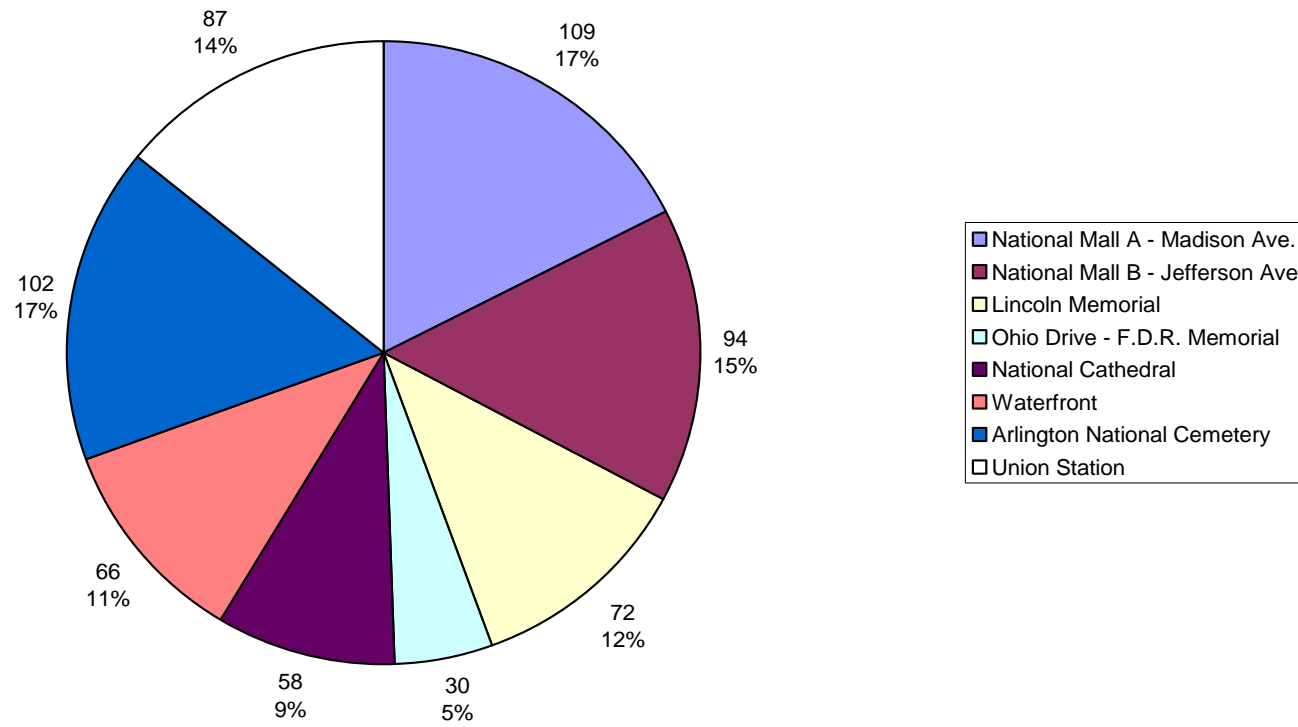
Median and Average Idling Times



Breakdown of Number of Parked Buses by Site



Breakdown of Number of Idling Buses by Site

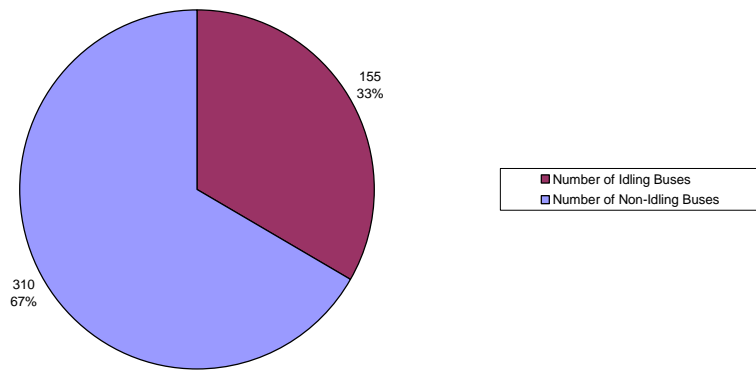


Appendix B

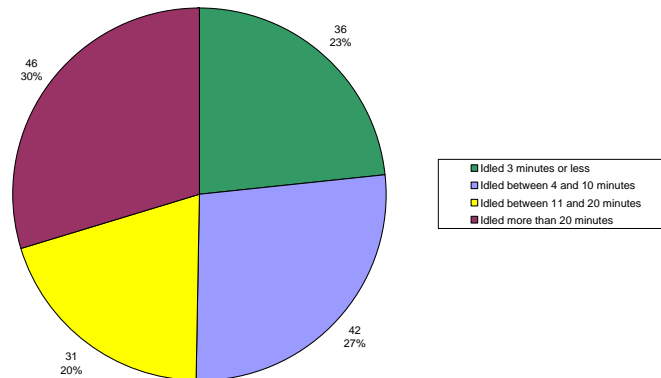
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| Median and Average Idling Times (1pm-4pm Observations)..... | 20 |

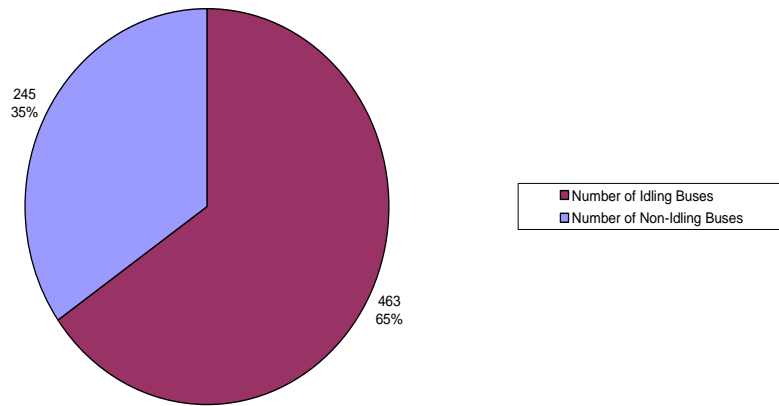
**Idling Buses vs Non-Idling Buses
(10am - 1pm Observations)**



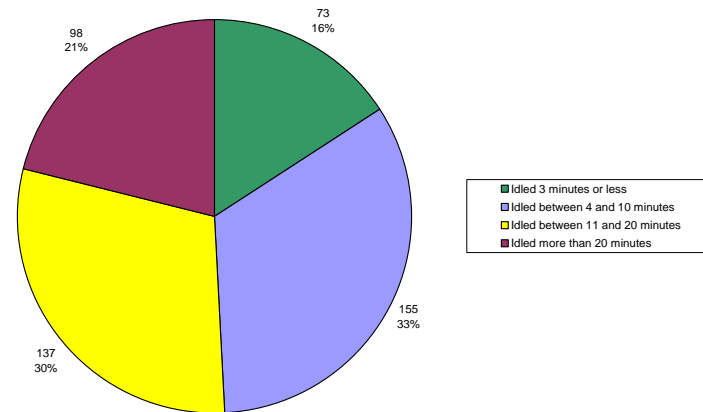
**Breakdown of Idling Times
(10am - 1pm Observations)**



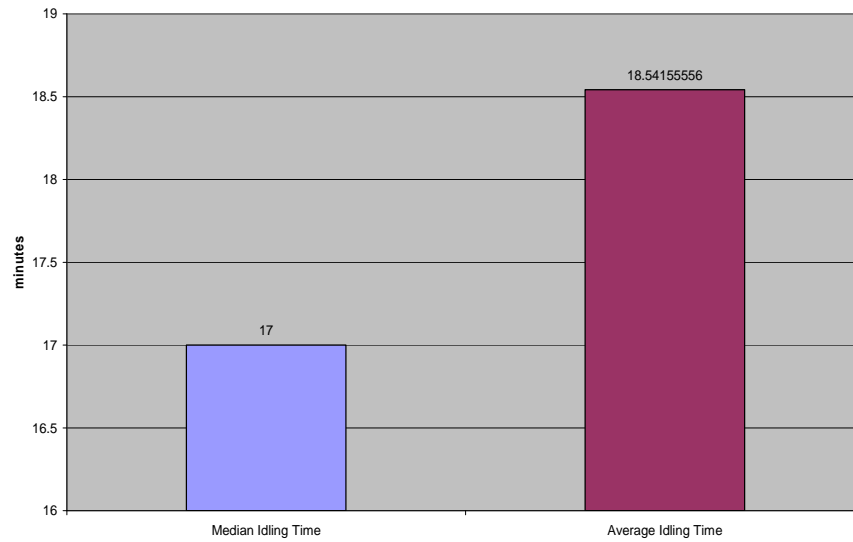
**Idling Buses vs Non-Idling Buses
(1pm - 4pm Observations)**



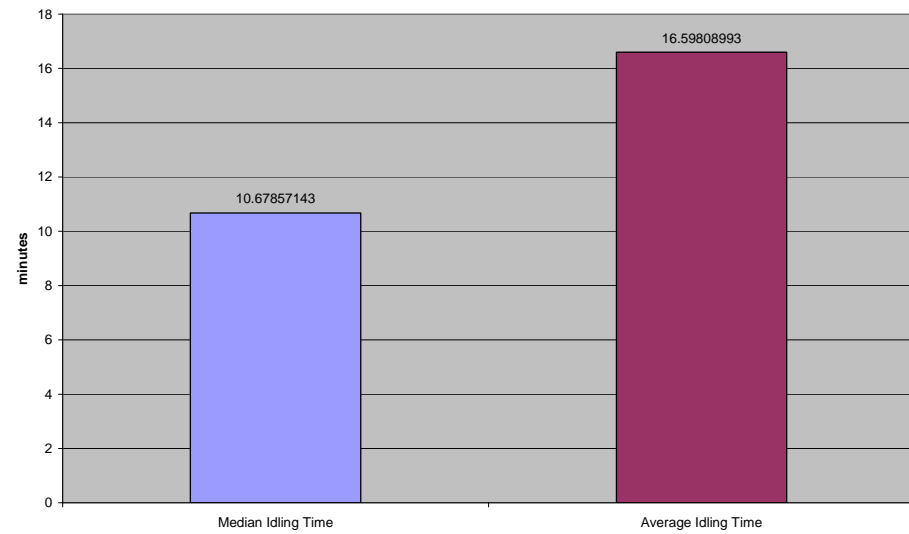
**Breakdown of Idling Times
(1pm - 4pm Observations)**



**Median and Average Idling Times
(10am - 1pm Observations)**



**Median and Average Idling Times
(1pm - 4pm Observations)**

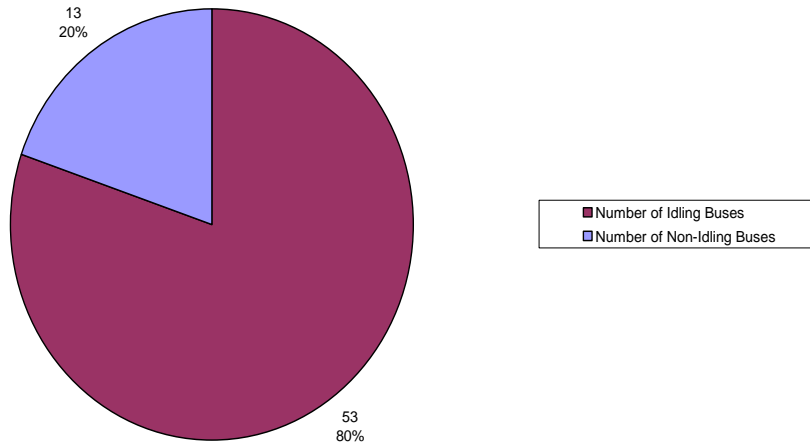


Appendix C

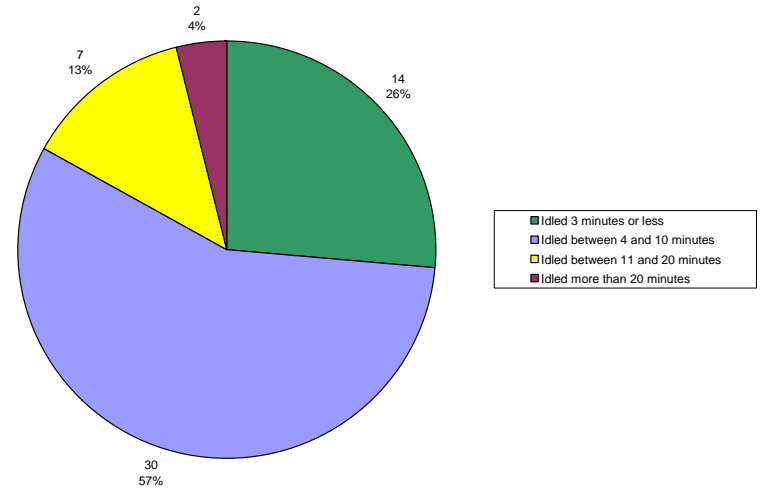
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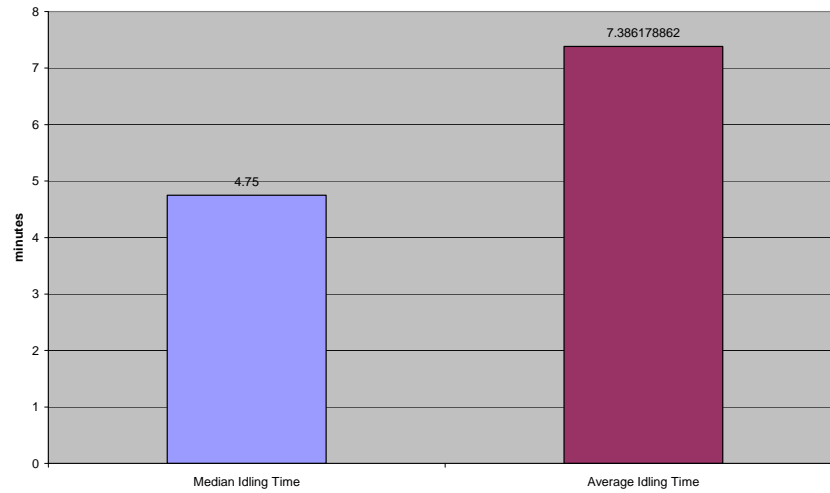
**Idling Buses vs Non-Idling Buses
(Temperatures below 80°F)**



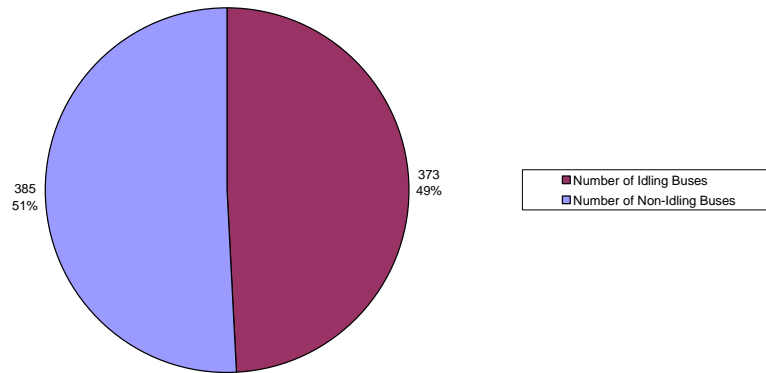
**Breakdown of Idling Times
(Temperatures below 80°F)**



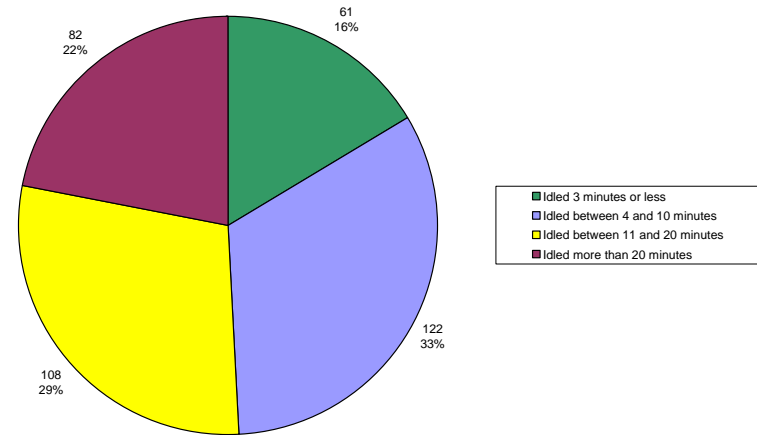
**Median and Average Idling Times
(Temperatures below 80°F)**



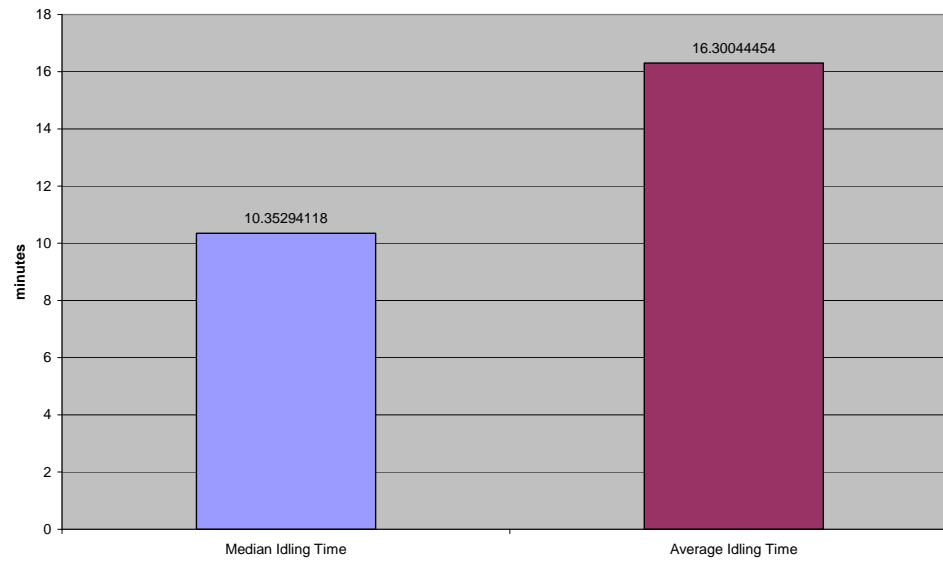
**Idling Buses vs Non-Idling Buses
(Temperatures between 80°F and 90°F)**



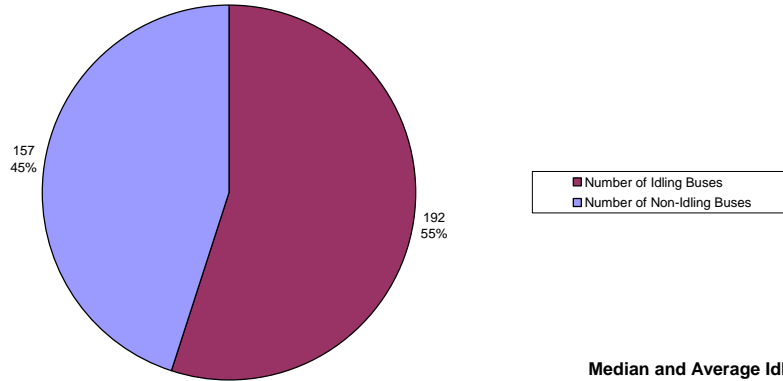
**Breakdown of Idling Times
(Temperatures between 80°F and 90°F)**



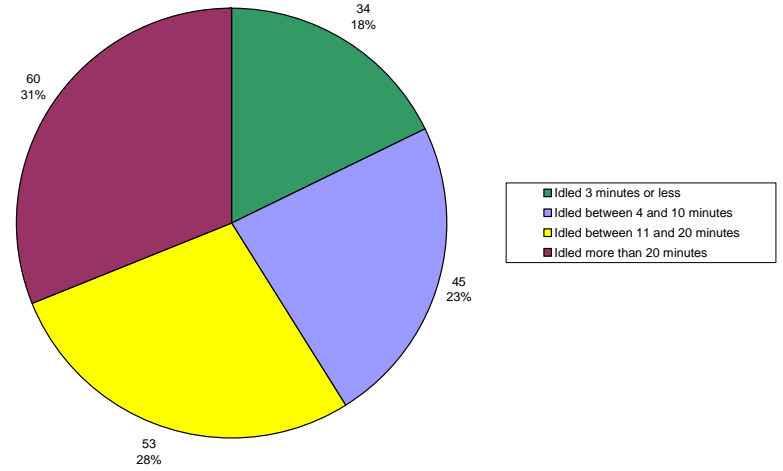
**Median and Average Idling Times
(Temperatures between 80°F and 90°F)**



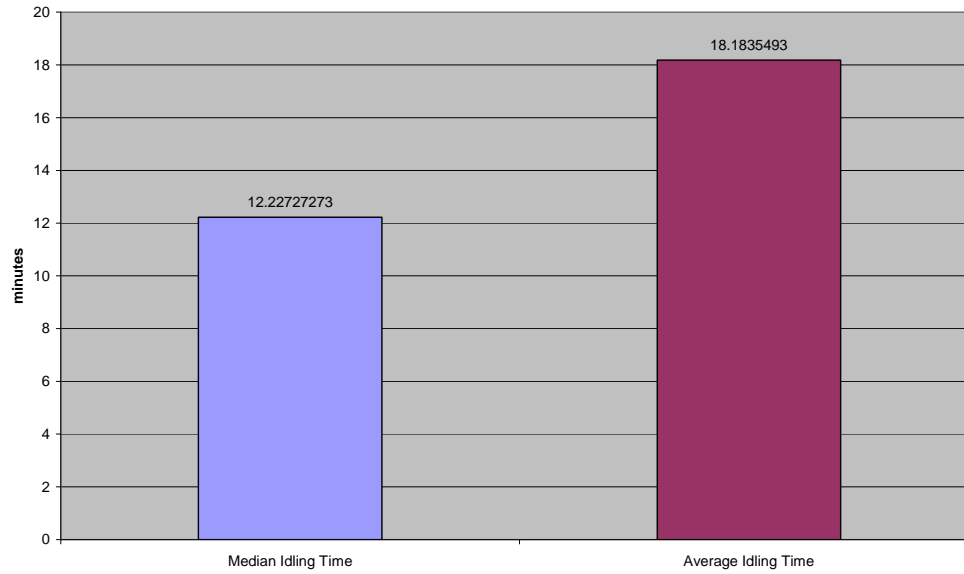
**Idling Buses vs Non-Idling Buses
(Temperatures above 90°F)**



**Breakdown of Idling Times
(Temperatures above 90°F)**



**Median and Average Idling Times
(Temperatures above 90°F)**

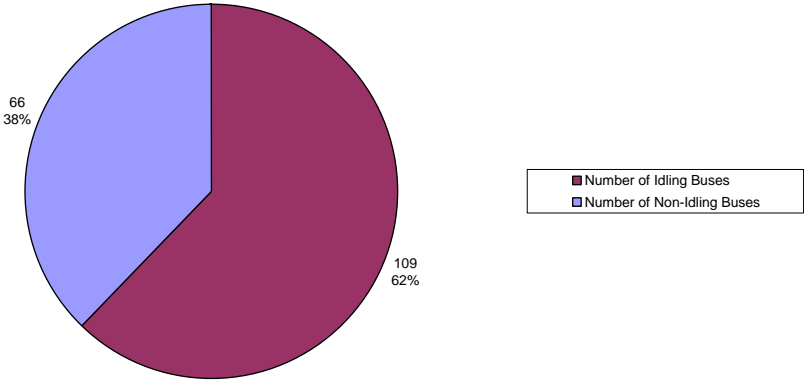


Appendix D

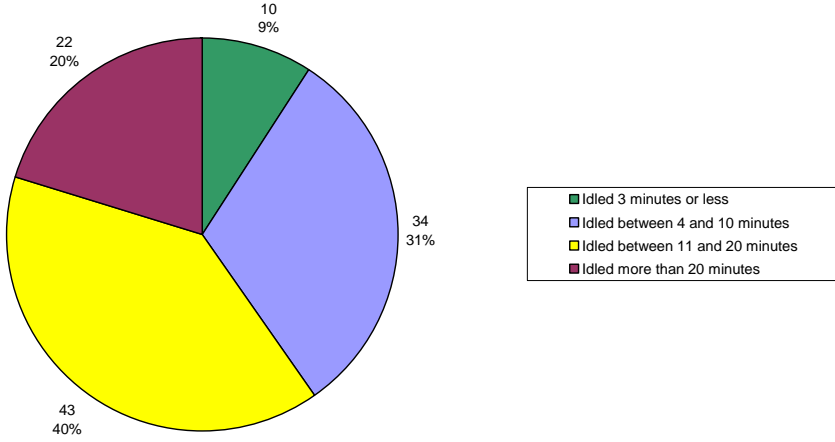
Results by Site

| | |
|---|----|
| North National Mall – Madison Dr. NW..... | 26 |
| South National Mall – Jefferson Dr. SW..... | 27 |
| Lincoln Memorial..... | 28 |
| F.D.R. Memorial – Ohio Dr. SW..... | 29 |
| National Cathedral..... | 30 |
| Waterfront..... | 31 |
| Arlington National Cemetery..... | 32 |
| Union Station..... | 33 |

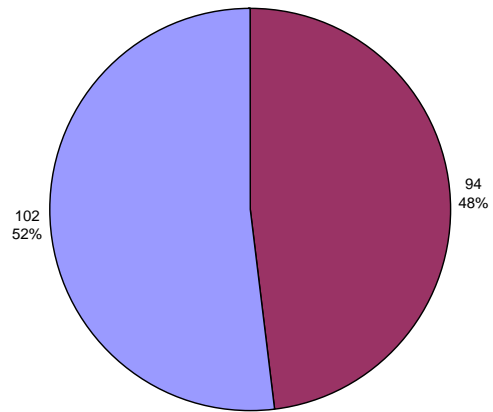
Idling Buses vs Non-Idling Buses
(North National Mall - Madison Dr. NW)



Breakdown of Idling Times
(North National Mall - Madison Dr. NW)

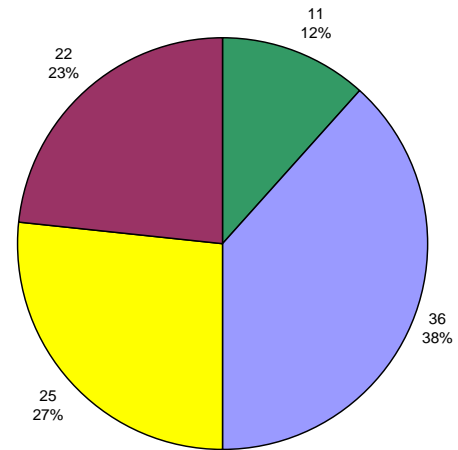


Idling Buses vs Non-Idling Buses
(South National Mall - Jefferson Dr. SW)



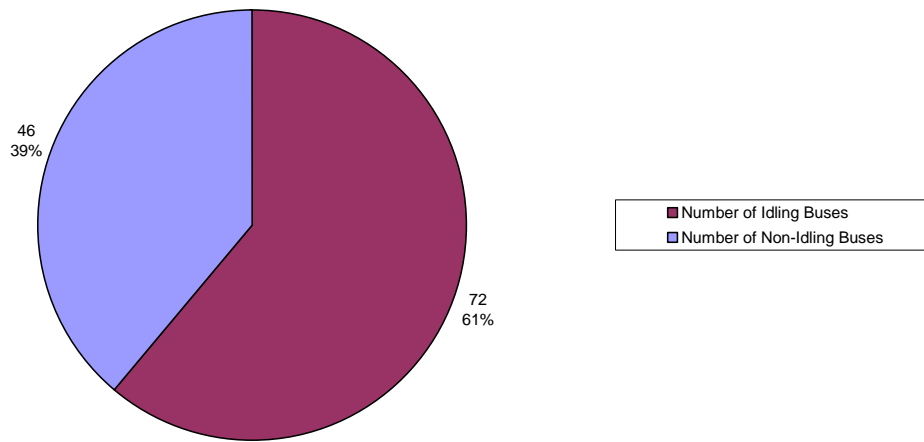
■ Number of Idling Buses
■ Number of Non-Idling Buses

Breakdown of Idling Times
(South National Mall - Jefferson Dr. SW)

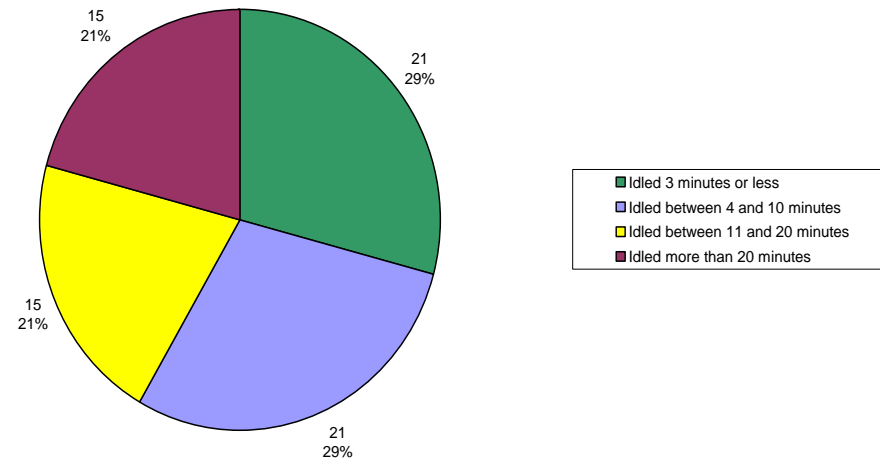


■ Idled 3 minutes or less
■ Idled between 4 and 10 minutes
■ Idled between 11 and 20 minutes
■ Idled more than 20 minutes

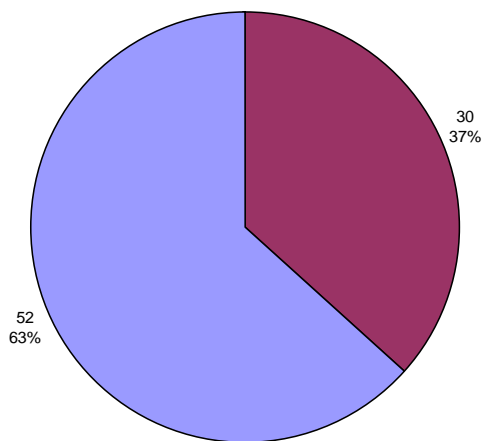
**Idling Buses vs Non-Idling Buses
(Lincoln Memorial)**



**Breakdown of Idling Times
(Lincoln Memorial)**

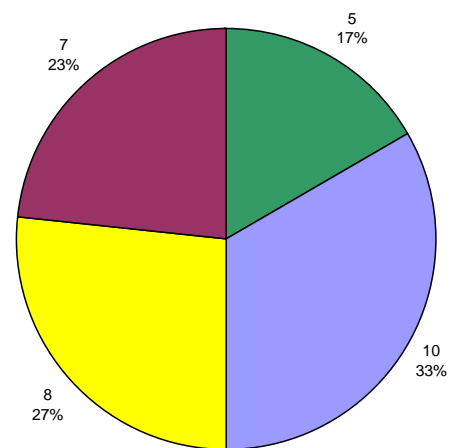


**Idling Buses vs Non-Idling Buses
(F.D.R. Memorial - Ohio Dr. SW)**



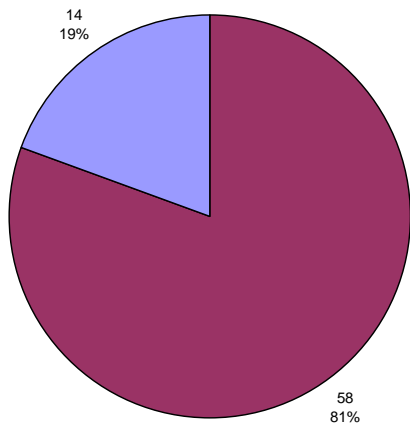
■ Number of Idling Buses
■ Number of Non-Idling Buses

**Breakdown of Idling Times
(F.D.R. Memorial - Ohio Dr. SW)**



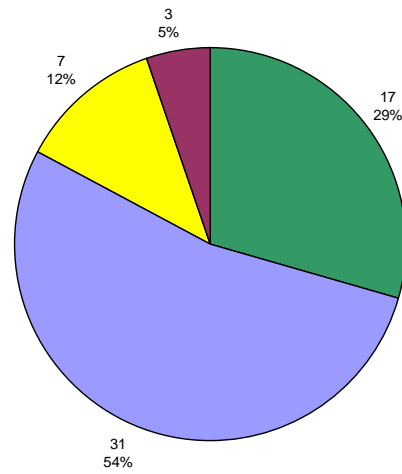
■ Idled 3 minutes or less
■ Idled between 4 and 10 minutes
■ Idled between 11 and 20 minutes
■ Idled more than 20 minutes

**Idling Buses vs Non-Idling Buses
(National Cathedral)**



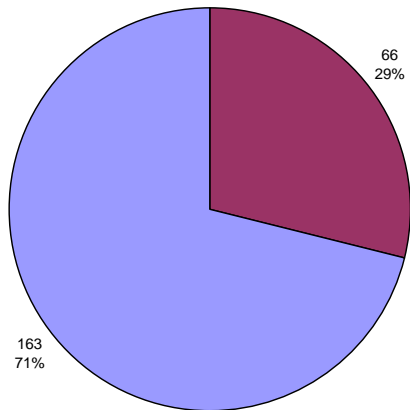
■ Number of Idling Buses
■ Number of Non-Idling Buses

**Breakdown of Idling Times
(National Cathedral)**



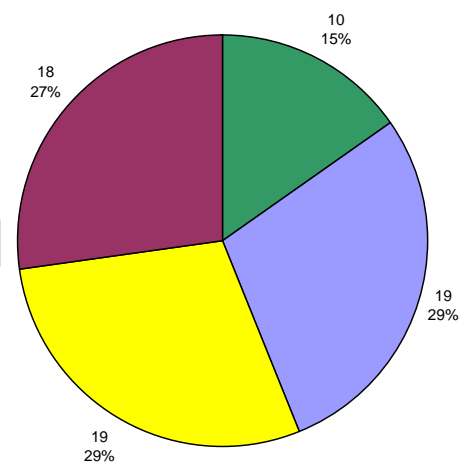
■ Idled 3 minutes or less
■ Idled between 4 and 10 minutes
■ Idled between 11 and 20 minutes
■ Idled more than 20 minutes

**Idling Buses vs Non-Idling Buses
(Waterfront)**



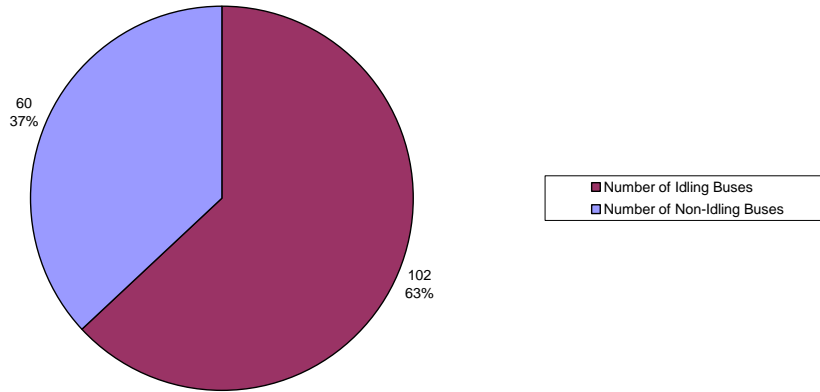
■ Number of Idling Buses
■ Number of Non-Idling Buses

**Breakdown of Idling Times
(Waterfront)**

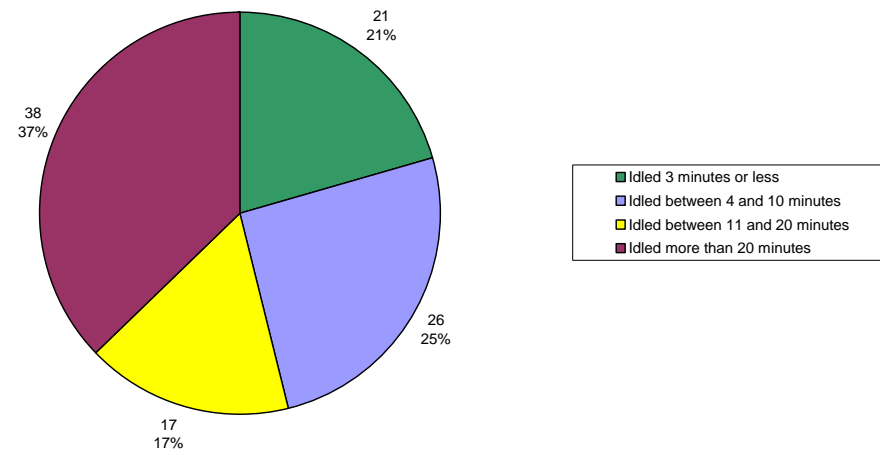


■ Idled 3 minutes or less
■ Idled between 4 and 10 minutes
■ Idled between 11 and 20 minutes
■ Idled more than 20 minutes

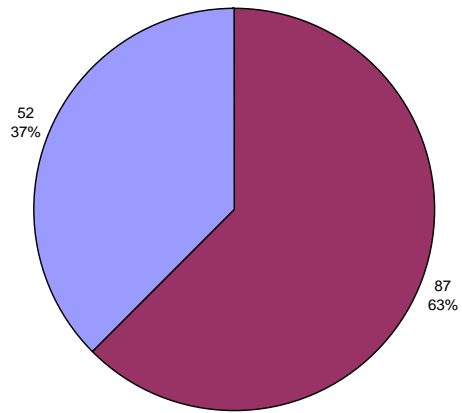
**Idling Buses vs Non-Idling Buses
(Arlington National Cemetery)**



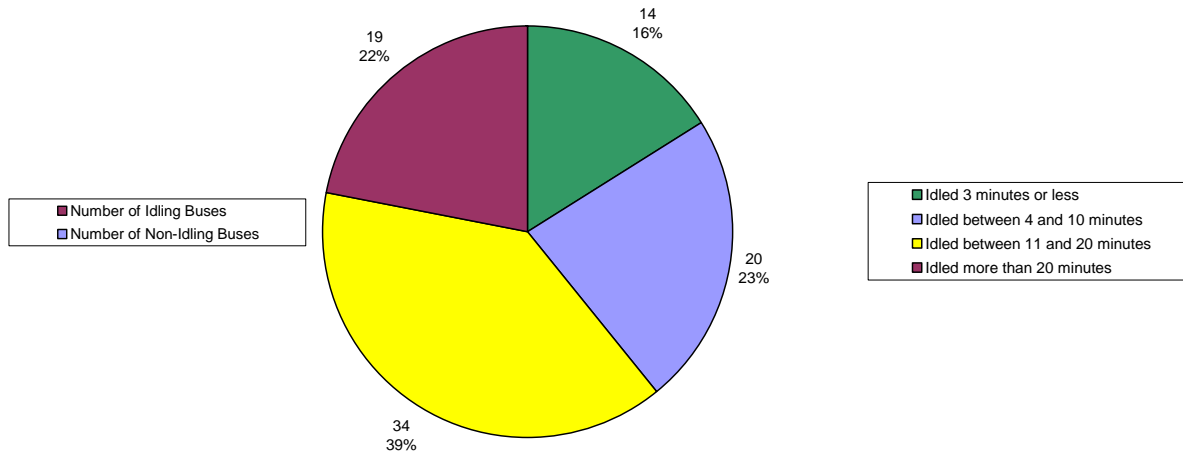
**Breakdown of Idling Times
(Arlington National Cemetery)**



**Idling Buses vs Non-Idling Buses
(Union Station)**



**Breakdown of Idling Times
(Union Station)**



Appendix E

Data

Number of Trucks Idling at Each Site, by Temperature and Shift

| Sites | Temperature | Not Idling | | Total | Idling | | Total |
|---|--------------------|------------|-----|------------|--------|-----|------------|
| | | AM | PM | | AM | PM | |
| North National Mall - Madison Dr. NW | Less than 80° | 12 | 0 | 12 | 0 | 0 | 0 |
| | 80°-90° | 8 | 27 | 35 | 8 | 71 | 79 |
| | More than 90° | 3 | 16 | 19 | 3 | 27 | 30 |
| | Total=175 | 23 | 43 | 66 | 11 | 98 | 109 |
| South National Mall - Jefferson Dr. SW | Less than 80° | 0 | 18 | 31 | 0 | 32 | 32 |
| | 80°-90° | 41 | 43 | 84 | 13 | 49 | 62 |
| | More than 90° | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total=116 | 41 | 61 | 102 | 13 | 81 | 94 |
| Lincoln Memorial | Less than 80° | 0 | 1 | 1 | 0 | 19 | 19 |
| | 80°-90° | 19 | 4 | 23 | 10 | 5 | 15 |
| | More than 90° | 20 | 2 | 22 | 20 | 18 | 38 |
| | Total=118 | 39 | 7 | 46 | 30 | 42 | 72 |
| F.D.R. Memorial - Ohio Dr. SW | Less than 80° | 0 | 0 | 0 | 0 | 0 | 0 |
| | 80°-90° | 23 | 29 | 52 | 10 | 20 | 30 |
| | More than 90° | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total=82 | 23 | 29 | 52 | 10 | 20 | 30 |
| National Cathedral | Less than 80° | 13 | 0 | 13 | 15 | 0 | 15 |
| | 80°-90° | 0 | 0 | 0 | 0 | 38 | 38 |
| | More than 90° | 0 | 1 | 1 | 0 | 5 | 5 |
| | Total=72 | 13 | 1 | 14 | 15 | 43 | 58 |
| Waterfront | Less than 80° | 46 | 0 | 46 | 5 | 0 | 5 |
| | 80°-90° | 16 | 39 | 55 | 2 | 26 | 28 |
| | More than 90° | 19 | 43 | 62 | 6 | 27 | 33 |
| | Total=229 | 81 | 82 | 163 | 13 | 53 | 66 |
| Arlington National Cemetery | Less than 80° | 36 | 0 | 36 | 9 | 0 | 9 |
| | 80°-90° | 0 | 9 | 9 | 0 | 35 | 35 |
| | More than 90° | 14 | 1 | 15 | 32 | 26 | 58 |
| | Total=162 | 50 | 10 | 60 | 41 | 61 | 102 |
| Union Station | Less than 80° | 0 | 0 | 0 | 0 | 0 | 0 |
| | 80°-90° | 40 | 6 | 46 | 22 | 34 | 56 |
| | More than 90° | 0 | 6 | 6 | 0 | 31 | 31 |
| | Total=139 | 40 | 12 | 52 | 22 | 65 | 87 |
| ALL SITES | Less than 80° | 107 | 19 | 139 | 29 | 51 | 80 |
| | 80°-90° | 147 | 157 | 304 | 65 | 278 | 343 |
| | More than 90° | 56 | 69 | 125 | 61 | 134 | 195 |
| | Total=1,186 | 310 | 245 | 568 | 155 | 463 | 618 |

| Number of Trucks Idling at Each Site, by Temperature, Shift, and Length of Time | | | | | | | | | | |
|---|--------------------|-------------------|-----------|-----------------|------------|------------------|------------|----------------------|-----------|------------|
| Sites | Temperature | 3 minutes or less | | 4 to 10 minutes | | 11 to 20 minutes | | More than 20 minutes | | Total |
| | | AM | PM | AM | PM | AM | PM | AM | PM | |
| North National Mall - Madison Dr. NW | Less than 80° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 80°-90° | 6 | 1 | 1 | 22 | 1 | 31 | 0 | 17 | 79 |
| | More than 90° | 0 | 3 | 1 | 10 | 1 | 10 | 1 | 4 | 30 |
| | Total=175 | 6 | 4 | 2 | 32 | 2 | 41 | 1 | 21 | 109 |
| South National Mall - Jefferson Dr. SW | Less than 80° | 0 | 2 | 0 | 18 | 0 | 6 | 6 | 0 | 32 |
| | 80°-90° | 4 | 5 | 5 | 13 | 17 | 2 | 14 | 2 | 62 |
| | More than 90° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total=116 | 4 | 7 | 5 | 31 | 17 | 8 | 20 | 2 | 94 |
| Lincoln Memorial | Less than 80° | 0 | 6 | 0 | 7 | 0 | 5 | 0 | 1 | 19 |
| | 80°-90° | 2 | 2 | 2 | 2 | 1 | 0 | 5 | 1 | 15 |
| | More than 90° | 6 | 5 | 4 | 6 | 4 | 5 | 6 | 2 | 38 |
| | Total=118 | 8 | 13 | 6 | 15 | 5 | 10 | 11 | 4 | 72 |
| F.D.R. Memorial - Ohio Dr. SW | Less than 80° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 80°-90° | 3 | 2 | 4 | 6 | 7 | 1 | 5 | 2 | 30 |
| | More than 90° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total=82 | 3 | 2 | 4 | 6 | 7 | 1 | 5 | 2 | 30 |
| National Cathedral | Less than 80° | 3 | 0 | 10 | 0 | 1 | 0 | 1 | 0 | 15 |
| | 80°-90° | 0 | 11 | 0 | 20 | 0 | 6 | 0 | 1 | 38 |
| | More than 90° | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 5 |
| | Total=72 | 3 | 14 | 10 | 21 | 1 | 6 | 1 | 2 | 58 |
| Waterfront | Less than 80° | 1 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 5 |
| | 80°-90° | 0 | 5 | 0 | 10 | 2 | 4 | 0 | 7 | 28 |
| | More than 90° | 0 | 4 | 1 | 5 | 5 | 7 | 0 | 11 | 33 |
| | Total=229 | 1 | 9 | 4 | 15 | 8 | 11 | 0 | 18 | 66 |
| Arlington National Cemetery | Less than 80° | 0 | 0 | 1 | 0 | 4 | 0 | 4 | 0 | 9 |
| | 80°-90° | 0 | 11 | 0 | 15 | 0 | 3 | 0 | 6 | 35 |
| | More than 90° | 7 | 3 | 6 | 4 | 3 | 7 | 16 | 12 | 58 |
| | Total=162 | 7 | 14 | 7 | 19 | 7 | 10 | 20 | 18 | 102 |
| Union Station | Less than 80° | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 80°-90° | 4 | 4 | 4 | 5 | 5 | 18 | 9 | 7 | 56 |
| | More than 90° | 0 | 6 | 0 | 11 | 0 | 11 | 0 | 3 | 31 |
| | Total=139 | 4 | 10 | 4 | 16 | 5 | 29 | 9 | 10 | 87 |
| ALL SITES | Less than 80° | 4 | 8 | 14 | 25 | 6 | 11 | 11 | 1 | 80 |
| | 80°-90° | 19 | 41 | 16 | 93 | 33 | 65 | 33 | 43 | 343 |
| | More than 90° | 13 | 24 | 12 | 37 | 13 | 40 | 23 | 33 | 195 |
| | Total=1,186 | 36 | 73 | 42 | 155 | 52 | 116 | 67 | 77 | 618 |

Appendix F

Sample Observation Form

TODAY'S DATE: _____
 TODAY'S TEMP. (F): _____
 LOCATION: _____
 OBSERVER (print): _____
 OBSERVER (signature): _____

| NO. | TOUR BUS COMPANY NAME | LICENSE PLATE # | IDLING START TIME (am/pm) | IDLING STOP TIME (am/pm) | TOTAL IDLING TIME (MIN/HR) | COMMENTS |
|-----|--------------------------|-----------------|------------------------------------|-----------------------------------|----------------------------------|----------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Total Buses Parked = xx
 Total Buses Idling = xx
 Min Idling Time = xx minutes
 Max Idling Time = xx minutes
 Median Idling Time = xx minutes
 Mean Idling Time = xx minutes xx seconds

Appendix G

Comments from the District of Columbia Air Quality Division

Although the District of Columbia Air Quality Division has focused compliance initiatives on engine idling in the past five years, the United States Environmental Protection Agency (EPA) Motor Coach Study conducted in the summer of 2005 indicates that more work still needs to be done.

The District of Columbia engine idling regulation was originally enacted in 1972. DC Rules & Regulations, Reg. 72-18. Later, the air quality regulations were reorganized and the idling regulation was adopted into Section 3 of the District's Air Pollution Control Act of 1984 (D.C. Law 5-165, effective March 15, 1985; 20 DCMR 900.1, as amended). In an effort to curb motor vehicle emissions the District has amended the engine idling regulation several times since its original inception. Recent amendments have targeted limiting the number of exceptions to the three (3) minute time period allowed for idling, and increasing the penalty amount for violations. These measures have been necessary to reduce the amount of emissions during warm weather months when ozone reaches unsafe levels. As a result of these amendments, the District's current engine idling regulation provides that:

The engine of a gasoline or diesel powered motor vehicle, the engine of a public vehicle for hire, including buses with a seating capacity of twelve (12) or more persons, on public or private space shall not idle for more than three (3) minutes while the motor vehicle is parked, stopped, or standing, including for the purpose of operating air conditioning equipment in those vehicles, except as follows:

- (a) To operate private passenger vehicles;
- (b) To operate power takeoff equipment including, dumping, cement mixers, refrigeration systems, content delivery, winches, or shredders; or
- (c) To idle the engine for five (5) minutes to operate heating equipment when the ambient air temperature is thirty-two degrees Fahrenheit (32°F) or below.

20 DCMR 900.1. The District of Columbia Department of Motor Vehicles (DMV) has a synonymous regulation codified in 18 DCMR 2418.3, which is enforced by other District and federal government agencies.

Although the District has taken many measures to improve the air quality, the DC metropolitan area continues to fall below air quality standards established in the federal Clean Air Act, 42 U.S.C. §7401 *et seq.* Accordingly, EPA has identified the DC metropolitan area as a non-attainment area for ozone and particulate matter (PM) ambient air quality standards. As the District has very few industrial activities, the largest and most significant sources of the District's air pollution problem are motor vehicles.

Vehicle exhaust emits nitrogen oxides (NO_x), carbon monoxide (CO), hydrocarbons (HC), including volatile organic compounds (VOCs), and particulate matter (PM) into the atmosphere. In the presence of heat and sunlight, these pollutants create ozone. Ozone and some of the other pollutants mentioned above, especially PM, are the cause of many respiratory illnesses. Vehicles are most inefficient while idling because the fuel is not completely combusted and pollutants are released in higher level than when the vehicle is in operation. Therefore, excessive idling leads not only to many respiratory illnesses, but also the exhaust fouls the air with various pollutants that erode buildings and monuments. In short, vehicle exhaust causes damage to personal and real property.

After observing an increase of violations in 2002 the District started an aggressive campaign to eradicate engine idling problems. The Air Quality Division stepped up enforcement and designed flyers to educate drivers about the engine idling regulation. Air quality inspectors hand out the flyers in high volume engine idling areas (markets, warehouses, and certain areas where tour buses park while waiting out the day), and the division sends the flyers to busing and trucking companies for postings in newsletters. In addition, the air quality attorney often settles cases for a lower penalty if the violator takes action to inform other drivers about the District's engine idling regulation (i.e. notices in newsletters, notices attached to paychecks, letters to each driver in smaller companies, etc.). Due to these compliance and enforcement efforts, engine idling has been reduced in the District.¹

A disconcerting part of the EPA Motor Coach Study is that many of the violations occurred in areas not patrolled by the Air Quality Division. The federal Park Police and Capitol Police have primary jurisdiction over zones 3, 4, 5, and 7, and a significant portion of zones 1 and 2. Therefore, the District's Air Quality Division must make better efforts to coordinate compliance initiatives with other District and federal agencies. The Air Quality Division plans to establish an engine idling task force with representatives from other agencies that have authority to enforce engine idling regulations including: the Department of Public Work's Parking Enforcement Division; the Department of Motor Vehicles; the Metropolitan Police Department's Motor Carrier Division; and federal agencies, such as the Park Police and Capitol Police.

The District needs cooperation from the busing industry as well. Tour buses that idle for cabin temperature is particularly important for the transportation of senior citizens who are susceptible to health problems. The District understands that a comfortable cabin temperature is important for senior citizen health, but so is the impact

¹ Notices of Infraction (tickets) issued for violations of the District's engine idling regulations:

| | | | |
|-------|---------|--------|-------------|
| 2000: | AQD 99 | DMV 32 | Total = 131 |
| 2001: | AQD 126 | DMV 15 | Total = 141 |
| 2002: | AQD 187 | DMV 10 | Total = 197 |
| 2003: | AQD 44 | DMV 20 | Total = 64 |
| 2004: | AQD 48 | DMV 41 | Total = 89 |

of inhalation from bus exhaust. The District cannot allow buses to idle for excessive periods of time simply to keep air conditioners running because that would frustrate the purpose of the idling law. Seniors who require ambulatory assistance and the wheelchair lift can take up to five minutes to safely load onto a bus. The District reasonably enforces the engine idling regulation and does not issue citations when passengers are loading or unloading.

Responsibility for controlling excessive idling must be shared with the government and the regulated industry. Engine idling can be greatly reduced through current technologies, such as mobile idle reduction technologies, which provide auxiliary power to replace or supplement diesel engine idling while the vehicle is stopped. These units reduce idling, reduce fuel consumption, extend engine maintenance intervals, reduce wear on engines and help vehicles comply with anti-idling laws. These technologies can be safely installed into one luggage space of tour buses, and would greatly reduce excessive idling. In addition, other technologies are available, such as stationary electrified parking spaces, wherein drivers hook up to a metered machine that provides heating, air-conditioning, phone service and electricity. Busing and trucking companies can install mobile idle reduction technologies on their own vehicles. However, a stationary electrified parking system would require a coordinated industry effort due to the necessity to have a convenient area where large vehicles could park and hook up to the machines.

The District is committed to reducing engine idling and is willing to work with the regulated industry and other governmental entities to accomplish this goal. The planned task force will help coordinate enforcement initiatives, but education and assistance with preventative technologies will provide the most benefit for the citizens and visitors to the District of Columbia.

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Counsel to the Air Quality Division

Neil Williams
Air Quality Division Environmental Engineer

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