

AIR POLLUTION EMISSION INVENTORIES FOR
WASHINGTON DULLES INTERNATIONAL AIRPORT
AND
RONALD REAGAN WASHINGTON NATIONAL AIRPORT
FOR
CALENDAR YEARS 2002, 2008, AND 2009

Prepared for:

Metropolitan Washington Airports Authority
Washington, DC



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Air Pollutant Emission Inventories for Washington Dulles International Airport and Ronald Reagan Washington National Airport for Calendar Years 2002, 2008, and 2009

Introduction

The Metropolitan Washington Council of Governments (MWCOG) is finalizing emissions inventories for their 8-Hour Ozone SIP and has requested the Metropolitan Washington Airports Authority (MWAA) to provide aircraft operations, GSE, and motor vehicle data and pollutant emissions for calendar years 2002, 2008, and 2009 for Washington Dulles International Airport (IAD) and Ronald Reagan Washington National Airport (DCA). In addition, emissions from both IAD and DCA for each of the analysis years (2002, 2008, and 2009) for an “ozone season day” (which requires using site specific “ozone season” mixing height and temperature data) were also requested.

Historical data and available forecasts of future year activity levels at each airport were used as the basis for the emissions inventory calculations for 2002 and 2009. Emissions for 2008 were estimated by adjusting the activity levels calculated for 2009 by the difference in forecasted aircraft operations or enplanements for each airport between 2009 and 2008.

Operational Emissions Inventories

Emissions inventories are quantities of air pollutants emitted over a given time period, and provide information about pollutant contributions from various sources. Annual and Ozone Season Day emissions of carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NO_x), particulate matter of 10 microns and smaller (PM₁₀), particulate matter of 2.5 microns and smaller (PM_{2.5}), and sulfur dioxide (SO₂) in tons per year and tons per day were estimated separately for IAD and DCA.

The airport-related sources of emissions that were included in these inventories are aircraft, Ground Support Equipment (GSE), aircraft Auxiliary Power Units (APU), and onsite motor vehicles on roadways and in parking facilities. No stationary sources were included in these analyses. For the IAD analysis only, a subset of GSE emissions has been calculated for the Mobile Lounges, which are vehicles used primarily as shuttles between the Main Terminal and the midfield concourse, and between the Main Terminal and aircraft parked on hardstands. Onsite motor vehicles include all traffic on major roads on airport property. Emissions from motor vehicles idling at the curbsides are not included in this assessment. Emissions from Parking Facilities include emissions from vehicles idling and moving around inside the parking facilities.

For these analyses, emissions were calculated using the latest version of the FAA approved program EDMS¹ (currently Version 4.4) using standard EDMS parameters and databases except where airport-specific inputs were available and more appropriate as described below.

¹ *Emissions and Dispersion Modeling System (EDMS)*. U.S. Department of Transportation, Federal Aviation Administration, Office of Environment and Energy. Washington, DC. Version 4.4. November 2005.

Aircraft

Historical data and available forecasts of future year aircraft operations at each airport were used as the basis for the emissions inventory calculations. The annual operations used in the analyses for each airport are provided in **Table 1** below. Aircraft operations and fleet mix data for the IAD 2002 analysis were taken from the IAD Final Environmental Impact Statement (FEIS)², and data for the 2009 analysis were derived by taking the 2010 data from the IAD FEIS and adjusted for the difference in operations between 2010 and 2009. Aircraft operations and fleet mix data for the DCA 2002 analysis were taken from an emissions inventory prepared by Metropolitan Washington Airports Authority (MWAA)³, and data for the 2009 analysis were derived from the Draft Part 150 Study⁴ prepared for DCA.

**TABLE 1
ANNUAL OPERATIONS, ENPLANEMENTS, AND TAXI TIMES**

	2002	2008	2009
Washington Dulles International Airport (IAD):			
Annual Operations	372,636	496,053	530,895
Annual Enplanements	8,515,498	12,932,987	14,089,988
Annual Average Aircraft Taxi Time (min.)	20.36	22.02 ¹	22.02
Ronald Reagan Washington National Airport (DCA):			
Annual Operations	215,691	283,482	284,196
Annual Enplanements	6,440,801	8,336,738	8,447,535
Annual Average Aircraft Taxi Time (min.)	16.93	18.12 ¹	18.12

¹ The taxi time used for 2008 was assumed to be equal to the 2009 taxi time.

Sources: URS Corporation, 2004 and 2006.

Aircraft/engine combinations and individual aircraft engine emission factors were obtained from the EDMS database. The activities of an aircraft in its airborne and ground-based operational modes are referred to as a Landing and Takeoff (LTO) cycle. An LTO cycle equals two operations (i.e., one landing and one takeoff). LTO data are modeled in EDMS.

EDMS automatically calculates the times-in-mode for the approach/landing, climbout and takeoff modes for each aircraft classification type (e.g., heavy jet, turbo prop, etc.). For the IAD and DCA analyses in 2002, taxi/idle times were taken from the FAA's ASPM data base⁵. For the IAD analysis for 2009, the taxi/idle times were derived from the SIMMOD airfield operational analysis combined with measurements of aircraft taxiing distances at the airport under the alternative improvement plans⁶ and adjusted to account for having the crosswind taxiways in place. For the 2009 analysis at DCA, data from the FAA's ASPM data base for 2004 were used and assumed to remain unchanged between 2004 and 2009.

² Final Environmental Impact Statement for New Runways, Terminal Facilities and Related Facilities at Washington Dulles International Airport, Department of Transportation, Federal Aviation Administration, Washington Airports District Office, Dulles, VA. August 2005.

³ Supporting Data – 2002 Emissions Inventory, Aircraft and Ground Support Equipment, Ronald Reagan Washington National Airport, Metropolitan Washington Airports Authority, Office of Engineering, May 2003.

⁴ *Ronald Reagan Washington National Airport, FAR Part 150 Noise Exposure Maps and Noise Compatibility Program*, Metropolitan Washington Council of Governments, September 2004.

⁵ FAA's ASPM data based website www.apo.data.faa.gov/faamatsall.htm.

⁶ *Capacity Review and Alternatives for the Fourth and Fifth Runways at Washington Dulles International Airport – Final Report*. HNTB, February 2002.

Consistent with FAA guidelines⁷, it was also assumed that aircraft emissions above the atmospheric mixing height would have no ground-level effect and were not included in the inventory. See the table of Climatological Modeling Parameters in the discussion of the Ozone Season analysis below for the mixing heights and temperatures used in the analyses.

Ground Support Equipment

GSE used to service aircraft includes baggage and pushback tugs; baggage and cargo loaders; fuel trucks and other service vehicles. Aircraft Auxiliary Power Units (APU) are onboard, turbine powered engines used primarily to provide electricity and air conditioning to an aircraft when the main engines are shut down. For the IAD analysis, the GSE and APU fleet, fuel types and operating times were derived from in-the-field surveys performed at the airport in February 2004⁸. Wherever necessary, these data were supplemented with information contained in the EDMS database of GSE and APU, which is also the source of the GSE emission factors. For the DCA analysis, GSE default equipment and time-in-mode data available in EDMS were used, except that all gasoline powered equipment was assigned to be diesel powered. In both analyses, EDMS default assignments for APUs were used and the time-in-mode was set to 7 minutes as recommended by FAA when all or most of an airport's gates have electrical connections and pre-conditioned air⁹. Also in both analyses, EDMS default assignments for deicer trucks were included with the time-in-mode set to 1.5¹⁰ minutes as was used in the IAD FEIS. While the use of deicer trucks during the ozone season (see below) does not occur, the very small error introduced by including this source in ozone season estimates is negligible: less than 0.01 tons per day of VOC and NOx.

Mobile Lounges

For the IAD analysis only, a subset of GSE emissions has been calculated separately for the Mobile Lounges, which are vehicles used primarily as shuttles between the Main Terminal and the midfield concourse. Emission rates and activity levels for 2002 for Mobile Lounges were obtained from the IAD FEIS, which was based on a 1999 Emission Inventory prepared by MWA, in April 2001. For this analysis, it was assumed that the use of Mobile Lounges at IAD for 2008 and 2009 would be the same as in 2002 because the Mobile Lounges will not be replaced by the Automated People Mover that will connect the terminals until the latter half of 2009. Therefore, Mobile Lounge emissions are held constant from 2002 through 2009.

Motor Vehicles

For this analysis, onsite motor vehicles (i.e., cars, vans, limousines, buses, trucks, etc.) are the motor vehicles that are operating on the airport's primary internal roadway network. These motor vehicles are primarily associated with airport patron, employee, and cargo truck trips operating within the airport's borders. Traffic volumes on the roadways for the IAD analysis were based on the *Project Definition Document - North Area Roads*¹¹ and roadway travel distances were derived from scaled drawings of the

⁷ *Air Quality Procedures for Civilian Airports & Air Force Bases*, AEE-120. U.S. Department of Transportation, Federal Aviation Administration, Office of Environment and Energy. Washington, DC. Report Number FAA-AEE-97-03. April 1997.

⁸ Appendix G of the Final Environmental Impact Statement for New Runways, Terminal Facilities and Related Facilities at Washington Dulles International Airport, Department of Transportation, Federal Aviation Administration, Washington airports District Office, Dulles, VA. August 2005.

⁹ Personal communication from J. Draper, FAA, to J. Pehrson, Camp Dresser & McKee Inc., November 4, 1998.

¹⁰ Personal communication from T. Thrasher, CSSI, Inc., to D. Wilson, URS Corporation, February 25, 2004.

¹¹ *Project Definition Document - North Area Roads*, HNTB Corporation, January 2001.

IAD Airport Layout Plan (ALP). Traffic volumes on the roadways for the DCA analysis were derived from traffic count data for 2003 supplied by HNTB¹² and adjusted based on enplanements. Roadway travel distances were derived from scaled drawings of the DCA ALP.

The motor vehicle engine emission factors were derived from the EPA mobile source emissions model, MOBILE 6.2¹³. For the IAD analysis, Fairfax County-specific motor vehicle operating characteristics (i.e., fleet mix, emission control programs, operating temperatures, etc.) were obtained from the Metropolitan Washington Council of Governments (MWCOCG)¹⁴ for use in the IAD FEIS. For the DCA analysis, Arlington County-specific motor vehicle operating characteristics (i.e., fleet mix, emission control programs, operating temperatures, etc.) were obtained from the MWCOCG SIP documents available on the MWCOCG website.

Parking Facilities

Emissions from motor vehicles accessing airport parking facilities were also quantified. Volumes of vehicles entering and exiting the parking facilities for the IAD analysis for 2002 were taken directly from the IAD FEIS, and vehicle volumes for the IAD analysis for 2009 were derived from the 2010 vehicle volumes in the IAD FEIS and adjusted for the difference in aircraft enplanements between 2010 and 2009.

Volumes of vehicles entering and exiting the public parking facilities for the DCA analysis for 2002 were derived from vehicle volume data collected by MWAA in 2004¹⁵ and adjusted for the difference in aircraft enplanements between 2004 and 2002. Vehicle volumes for the public parking facilities for 2009 were derived from vehicle volumes collected at DCA in 2004 by MWAA and adjusted for the difference in aircraft enplanements between 2004 and 2009.

Vehicle volumes for the DCA rental car parking facility for 2002 were provided by MWAA¹⁶; vehicle volumes for the rental car parking facility in 2009 were derived from the rental car volumes for 2002 and adjusted for the difference in aircraft enplanements between 2002 and 2009. Vehicle volumes for the employee parking facilities for 2002 were developed from data collected at DCA in 2002¹⁷; employee vehicle volumes for 2009 were derived from vehicle volumes collected at DCA in 2002 and adjusted for the difference in aircraft enplanements between 2002 and 2009.

Ozone Season/Ozone Day Emissions

Following FAA guidelines⁷, the operational emissions inventories for IAD and DCA were initially prepared for annual average conditions. However, the SIP for the Washington DC-MD-VA area is based on the management and control of Ozone precursors (i.e., NO_x and VOCs), principally during the peak “Ozone production season” (i.e., May 1st to September 15th). Because some climatic factors (i.e., ambient temperature and atmospheric mixing height) have an effect on aircraft and motor vehicle performance

¹² Personal communication from G. Ceballos, HNTB Corporation, to A. Goldman, URS Corporation, December 2005.

¹³ Approved final version of MOBILE6.2 computer program released by memorandum *Policy Guidance on the Use of MOBILE6.2 and the December 2003 AP-42 Method for Re-entrained Road Dust for SIP Development and Transportation Conformity*. Margo Tsigiotis Oge, Director, Office of Transportation and Air Quality, and Steve Page, Director, Office of Air Quality Planning and Standards. U.S. Environmental Protection Agency. Washington, DC. February 24, 2004.

¹⁴ Personal communication from S. Kumar, MWCOCG, to D. Wilson, URS Corporation, April, 2003.

¹⁵ Personal communication from C. Baummer, MWAA, to A. Goldman, URS Corporation, December 12, 2005.

¹⁶ Personal communication from C. Baummer, MWAA, to D. Wilson, URS Corporation, February 27, 2006.

¹⁷ *Ronald Reagan Washington National Airport, Landside Planning Study, Facilities Planning Study of Public/Employee Parking and Rental Car Facilities*, HNTB Corporation, December 2004.

characteristics, the operational emission inventory results were recalculated to reflect these “Ozone Season” conditions. “Ozone Day” emissions are derived by using the “Ozone Season” mixing height and “Ozone Season” temperature to calculate the “Ozone Year” emissions and then dividing by 365.

This adjustment to the emissions inventory was accomplished by factoring in the effects of the lower atmospheric mixing height and higher ambient temperatures that are characteristic of the O₃ season in the region. These parameters, shown in **Table 2**, are based on climatological data for the Sterling, Virginia area. The methodology used to determine the IAD mixing heights is provided in the IAD FEIS in Appendix G-3. For DCA, the mixing height calculated for IAD was increased by the difference in elevation between the two airports (+280 feet). Temperature data used in the MOBILE6.2 calculations was obtained from the MWCOG MOBILE6.2 input files.

**TABLE 2
CLIMATOLOGICAL MODELING PARAMETERS**

Conditions	Mixing Height (feet AGL)	Minimum Ambient Temperature (° F)	Maximum Ambient Temperature (° F)
Washington Dulles International Airport (IAD):			
Annual Average Daily	1,608	42.6	65.6
Ozone Season	1,412	68.5	95.0
Ronald Reagan Washington National Airport (DCA):			
Annual Average Daily	1,888	48.6	66.4
Ozone Season	1,692	68.5	95.0

Sources: NCDC; URS Corporation, 2004 and 2006.

In both the Annual Average calculation and the Ozone Season calculation, the mixing height values are lower than the “default” 3,000-foot value available in EDMS. FAA guidelines⁷ recommend using “real world” data whenever it is available, as in this case. Within the EDMS model, these changes in mixing height and temperature have an effect on aircraft emissions in the approach and climb out modes; and within MOBILE6.2, changes in temperatures have an effect on the emissions from motor vehicles.

Emissions Inventories

The emissions inventories for IAD and DCA for 2002, 2009, and 2008 are provided in the tables below. Aircraft emissions for 2008 were estimated by adjusting the aircraft emissions calculated for 2009 by the difference in forecasted aircraft operations for each airport between 2009 and 2008. GSE and APU emissions for 2008 were estimated by adjusting the GSE emissions calculated for 2009 by the difference in forecasted aircraft operations at each airport between 2009 and 2008. Emissions for Mobile Lounges at IAD for 2008 were kept the same as the data used in the IAD FEIS for the 2002 Conditions. Emissions from Onsite Motor Vehicles for 2008 were estimated by adjusting the Onsite Motor Vehicle emissions calculated for 2009 by the difference in forecasted aircraft enplanements at each airport between 2009 and 2008, and further adjusted to account for the difference in the motor vehicle emission factors for each pollutant for the 30 mph speed category between 2009 and 2008.

The annual air pollutant emissions inventories for IAD for 2002, 2009, and 2008 are presented in **Tables 3, 5, and 7**, respectively; and the Ozone Day emissions for IAD are presented in **Tables 4, 6, and 8**, for 2002, 2009, and 2008, respectively. The annual air pollutant emissions inventories for DCA for 2002,

2009, and 2008 are provided in **Tables 9, 11, and 13**, respectively; and the Ozone Day emissions for DCA are provided in **Tables 10, 12, and 14**, for 2002, 2009, and 2008, respectively.

TABLE 3
WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)
ANNUAL AND DAILY AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2002¹

Source	Pollutant					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Annual Emissions in Tons Per Year (tpy)						
Aircraft ²	1,205.3	257.1	864.3	23.3 ³	23.3 ³	71.9
Ground Support Equipment (GSE) ⁴	3,453.4	134.4	208.4	8.5	8.9	19.9
Auxiliary Power Units (APU) ⁴	59.6	4.3	45.8	<0.1	<0.1	6.3
Mobile Lounges ⁵	3.6	6.1	125.1	2.7	2.7	6.7
Onsite Motor Vehicles ⁶	411.9	30.2	103.4	1.8	2.8	2.0
Parking Facilities ⁷	70.5	10.3	13.9	0.2	0.3	0.2
Total Annual Emissions (tpy)	5,204.3	442.4	1,360.9	36.5	38.0	107.0
Daily⁸ Emissions in Tons Per Day (tpd)						
Aircraft	3.30	0.70	2.37	0.06	0.06	0.20
Ground Support Equipment (GSE)	9.46	0.37	0.57	0.02	0.02	0.05
Auxiliary Power Units (APU)	0.16	0.01	0.13	<0.01	<0.01	0.02
Mobile Lounges	0.01	0.02	0.34	0.01	0.01	0.02
Onsite Motor Vehicles	1.13	0.08	0.28	0.01	0.01	0.01
Parking Facilities	0.19	0.03	0.04	<0.01	<0.01	<0.01
Total Daily Emissions (tpd)	14.25	1.21	3.73	0.10	0.10	0.30

- ¹ Annual 2002 emissions were computed using EDMS Version 4.4 and the latest version of MOBILE6.2, using the activity levels and data used in the IAD FEIS for 2002.
- ² A total of 372,636 annual aircraft operations were modeled for 2002. An aircraft taxi time of 20.36 minutes taken from the FAA's ASPM database for 2002 for IAD was used in the inventory.
- ³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 13.3 tpy from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.
- ⁴ GSE and APU emissions were determined based on onsite data from surveys completed at IAD in February 2004.
- ⁵ Emissions for Mobile Lounges were kept the same as the data used in the IAD FEIS for the 2002 conditions. These calculations are not included in the EDMS data files.
- ⁶ Onsite motor vehicles include all roads located on the airport property, except for the portions of Route 28 (Sully Road), Route 606 (Old Ox Road), and the Dulles Greenway located on Airport property, and do NOT include emissions from vehicles idling at curbside or parking facility emissions. MOBILE6.2 emission factors were determined from files obtained from MWCOG.
- ⁷ Parking facilities include vehicles parking in the following parking facilities: Daily Garage 1, Daily Garage 2, Hourly Lot, Valet Lot, Blue Economy Lot (in 2002 only), Gold Economy Lot, Purple Economy Lot, Employee Lot 1, Employee Lot 2, and the Rental Car Lot. Vehicle volumes for 2002 were taken from the IAD FEIS.
- ⁸ Daily Emissions are the Annual Emissions divided by 365 and are in units of tons per day (tpd).

Source: EDMS Version 4.4 (URS Corporation, 2006); IAD FEIS, 2005.

TABLE 4
WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)
ESTIMATED OZONE DAY¹ AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2002
IN TONS PER DAY (TPD)

Source	Pollutant (tpd)					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Aircraft ²	3.28	0.70	2.24	0.06 ³	0.06 ³	0.19
Ground Support Equipment (GSE) ⁴	9.46	0.37	0.57	0.02	0.02	0.05
Auxiliary Power Units (APU) ⁴	0.16	0.01	0.13	<0.01	<0.01	0.02
Mobile Lounges ⁵	0.01	0.02	0.34	0.01	0.01	0.02
Onsite Motor Vehicles ⁶	1.31	0.09	0.28	<0.01	0.01	0.01
Parking Facilities ⁷	0.19	0.03	0.04	<0.01	<0.01	<0.01
Total Ozone Day Emissions	14.41	1.22	3.60	0.09	0.10	0.29

¹ "Ozone Day" emissions are derived by using the "Ozone Season" mixing height and "Ozone Season" temperature to calculate the "Ozone Year" emissions and then dividing by 365.

² A total of 372,636 annual aircraft operations were modeled for 2002. An aircraft taxi time of 20.36 minutes taken from the FAA's ASPM database for 2002 for IAD was used in the inventory.

³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 0.04 tpd from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.

⁴ GSE and APU emissions were determined based on onsite data from surveys completed at IAD in February 2004.

⁵ Emissions for Mobile Lounges were kept the same as the data used in the IAD FEIS for the 2002 conditions. These calculations are not included in the EDMS data files.

⁶ Onsite motor vehicles include all roads located on the airport property, except for the portions of Route 28 (Sully Road), Route 606 (Old Ox Road), and the Dulles Greenway located on Airport property, and do NOT include emissions from vehicles idling at curbside or parking facility emissions. MOBILE6.2 emission factors were determined from files obtained from MWCOG.

⁷ Parking facilities include vehicles parking in the following parking facilities: Daily Garage 1, Daily Garage 2, Hourly Lot, Valet Lot, Blue Economy Lot (in 2002 only), Gold Economy Lot, Purple Economy Lot, Employee Lot 1, Employee Lot 2, and the Rental Car Lot. Vehicle volumes for 2002 were taken from the IAD FEIS.

Source: EDMS, Version 4.4 (URS Corporation, 2006); IAD FEIS, 2005).

TABLE 5
WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)
ANNUAL AND DAILY AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2009¹

Source	Pollutant					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Annual Emissions in Tons Per Year (tpy)						
Aircraft ²	2,109.8	410.7	1,471.2	26.8 ³	26.8 ³	125.0
Ground Support Equipment (GSE) ⁴	4,643.3	178.3	217.6	13.4	13.9	27.5
Auxiliary Power Units (APU) ⁴	72.1	5.8	91.6	<0.01	<0.01	12.3
Mobile Lounges ⁵	3.6	6.1	125.1	2.7	2.7	6.7
Onsite Motor Vehicles ⁶	332.9	26.1	66.7	1.6	2.8	0.7
Parking Facilities ⁷	63.4	8.9	11.1	0.2	0.3	0.1
Total Annual Emissions (tpy)	7,225.1	635.9	1,983.3	44.7	46.5	172.3
Daily⁸ Emissions in Tons Per Day (tpd)						
Aircraft	5.78	1.13	4.03	0.07	0.07	0.34
Ground Support Equipment (GSE)	12.72	0.49	0.60	0.04	0.04	0.08
Auxiliary Power Units (APU)	0.20	0.02	0.25	<0.01	<0.01	0.03
Mobile Lounges	0.01	0.02	0.34	0.01	0.01	0.02
Onsite Motor Vehicles	0.91	0.07	0.18	<0.01	0.01	<0.01
Parking Facilities	0.17	0.02	0.03	<0.01	<0.01	<0.01
Total Daily Emissions (tpd)	19.79	1.75	5.43	0.12	0.13	0.47

¹ Annual 2009 emissions were computed using EDMS Version 4.4 and the latest version of MOBILE6.2, using forecasted activity levels for IAD for 2009.

² A total of 530,895 annual aircraft operations were modeled for 2009. An estimated aircraft taxi time of 22.02 minutes for 2009 was used in the calculations. This value was derived from the SIMMOD model output for 2010 used in the IAD FEIS (HNTB, 2002) and adjusted to account for having the crosswind taxiways in place.

³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 9.7 tpy from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.

⁴ GSE and APU emissions were determined based on onsite data from surveys completed at IAD in February 2004.

⁵ Emissions for Mobile Lounges were kept the same as the data used in the IAD FEIS for the 2002 conditions. These calculations are not included in the EDMS data files.

⁶ Onsite motor vehicles include all roads located on the airport property, except for the portions of Route 28 (Sully Road), Route 606 (Old Ox Road), and the Dulles Greenway located on Airport property, and do NOT include emissions from vehicles idling at curbside or parking facility emissions. MOBILE6.2 emission factors for 2009 were derived from files obtained from MWCOG accounting for the appropriate calendar year. Vehicle volumes for 2009 were derived from the vehicle volumes for 2010 used in the IAD FEIS and adjusted for the difference in aircraft enplanements between 2010 and 2009.

⁷ Parking facilities include vehicles parking in the following parking facilities: Daily Garage 1, Daily Garage 2, Hourly Lot, Valet Lot, Gold Economy Lot, Purple Economy Lot, Employee Lot 1, Employee Lot 2, the Future Lot, the Rental Car Bus Lot, and the Rental Car Lot. Vehicle volumes for 2009 were derived from the 2010 volumes used in the IAD FEIS and adjusted for the difference in aircraft enplanements between 2010 and 2009.

⁸ Daily Emissions are the Annual Emissions divided by 365 and are in units of tons per day (tpd).

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 6
WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)
ESTIMATED OZONE DAY¹ AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2009
IN TONS PER DAY (TPD)

Source	Pollutant (tpd)					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Aircraft ²	5.75	1.12	3.81	0.07 ³	0.07 ³	0.33
Ground Support Equipment (GSE) ⁴	12.72	0.48	0.60	0.04	0.04	0.08
Auxiliary Power Units (APU) ⁴	0.20	0.02	0.25	<0.01	<0.01	0.03
Mobile Lounges ⁵	0.01	0.02	0.34	0.01	0.01	0.02
Onsite Motor Vehicles ⁶	0.88	0.08	0.18	<0.01	0.01	<0.01
Parking Facilities ⁷	0.16	0.02	0.03	<0.01	<0.01	<0.01
Total Ozone Day Emissions	19.72	1.74	5.21	0.12	0.13	0.46

- ¹ "Ozone Day" emissions are derived by using the "Ozone Season" mixing height and "Ozone Season" temperature to calculate the "Ozone Year" emissions and then dividing by 365.
- ² A total of 530,895 annual aircraft operations were modeled for 2009. An estimated aircraft taxi time of 22.02 minutes for 2009 was used in the calculations.
- ³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 0.03 tpd from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.
- ⁴ GSE and APU emissions were determined based on onsite data from surveys completed at IAD in February 2004.
- ⁵ Emissions for Mobile Lounges were kept the same as the data used in the IAD FEIS for the 2002 Conditions. These calculations are not included in the EDMS data files.
- ⁶ Onsite motor vehicles include all roads located on the airport property, except for the portions of Route 28 (Sully Road), Route 606 (Old Ox Road), and the Dulles Greenway located on Airport property, and do NOT include emissions from vehicles idling at curbside or parking facility emissions. MOBILE6.2 emission factors for 2009 were derived from files obtained from MWCOG. Vehicle volumes for 2009 were derived from the vehicle volumes for 2010 used in the IAD FEIS and adjusted for the difference in aircraft enplanements between 2010 and 2009.
- ⁷ Parking facilities include vehicles parking in the following parking facilities: Daily Garage 1, Daily Garage 2, Hourly Lot, Valet Lot, Gold Economy Lot, Purple Economy Lot, Employee Lot 1, Employee Lot 2, the Future Lot, the Rental Car Bus Lot, and the Rental Car Lot. Vehicle volumes for 2009 were derived from the 2010 volumes used in the IAD FEIS and adjusted for the difference in aircraft enplanements between 2010 and 2009.

Source: EDMS, Version 4.4 (URS Corporation, 2006).

**TABLE 7
WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)
ANNUAL AND DAILY AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2008**

Source	Pollutant					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Annual Emissions in Tons Per Year (tpy)						
Aircraft ¹	1,971.3	383.8	1,374.7	25.1	25.1	116.8
Ground Support Equipment (GSE) ²	4,338.6	166.6	203.3	12.6	13.0	25.7
Auxiliary Power Units (APU) ²	67.3	5.5	85.6	<0.01	<0.01	11.5
Mobile Lounges ³	3.6	6.1	125.1	2.7	2.7	6.7
Onsite Motor Vehicles ⁴	324.9	26.1	70.3	1.6	2.8	0.6
Parking Facilities ⁵	61.9	8.9	11.7	0.2	0.3	0.1
Total Annual Emissions (tpy)	6,767.6	597.0	1,870.7	42.2	43.9	161.4
Daily⁸ Emissions in Tons Per Day (tpd)						
Aircraft	5.40	1.05	3.77	0.07	0.07	0.32
Ground Support Equipment (GSE)	11.89	0.46	0.56	0.03	0.04	0.07
Auxiliary Power Units (APU)	0.18	0.01	0.23	<0.01	<0.01	0.03
Mobile Lounges	0.01	0.02	0.34	0.01	0.01	0.02
Onsite Motor Vehicles	0.89	0.07	0.19	<0.01	0.01	<0.01
Parking Facilities	0.17	0.02	0.03	<0.01	<0.01	<0.01
Total Daily Emissions (tpd)	18.54	1.63	5.12	0.11	0.13	0.44

¹ Aircraft emissions for 2008 were estimated by adjusting the aircraft emissions calculated for 2009 by the difference in forecasted aircraft operations for IAD between 2009 and 2008. A total of 496,053 annual aircraft operations were assessed in 2008.

² GSE and APU emissions for 2008 were estimated by adjusting the GSE emissions calculated for 2009 by the difference in forecasted aircraft operations at IAD between 2009 and 2008.

³ Emissions for Mobile Lounges for 2008 were kept the same as the data used in the IAD FEIS for the 2002 conditions.

⁴ Emissions from Onsite Motor Vehicles for 2008 were estimated by adjusting the Onsite Motor Vehicle emissions calculated for 2009 by the difference in forecasted aircraft enplanements at IAD between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

⁵ Emissions from Parking Facilities for 2008 were estimated by adjusting the Parking Facilities emissions calculated for 2009 by the difference in forecasted aircraft enplanements at IAD between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

⁶ Daily Emissions are the Annual Emissions divided by 365 and are in units of tons per day (tpd).

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 8
WASHINGTON DULLES INTERNATIONAL AIRPORT (IAD)
ESTIMATED OZONE DAY¹ AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2008
IN TONS PER DAY (TPD)

Source	Pollutant (tpd)					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Aircraft ²	5.37	1.05	3.56	0.07	0.07	0.31
Ground Support Equipment (GSE) ³	11.89	0.46	0.56	0.03	0.04	0.07
Auxiliary Power Units (APU) ³	0.18	0.01	0.23	<0.01	<0.01	0.03
Mobile Lounges ⁴	0.01	0.02	0.34	0.01	0.01	0.02
Onsite Motor Vehicles ⁵	0.87	0.08	0.18	<0.01	0.01	<0.01
Parking Facilities ⁶	0.16	0.02	0.03	<0.01	<0.01	<0.01
Total Ozone Day Emissions	18.48	1.64	4.90	0.11	0.13	0.43

¹ "Ozone Day" emissions are derived by adjusting the 2009 "Ozone Season" estimated emissions to 2008 conditions and dividing by 365.

² Aircraft emissions for 2008 were estimated by adjusting the aircraft emissions calculated for 2009 by the difference in forecasted aircraft operations for IAD between 2009 and 2008. A total of 496,053 annual LTO operations were assessed in 2008.

³ GSE and APU emissions for 2008 were estimated by adjusting the GSE emissions calculated for 2009 by the difference in forecasted aircraft operations at IAD between 2009 and 2008.

⁴ Emissions for Mobile Lounges for 2008 were kept the same as the data used in the IAD FEIS for the 2002 conditions.

⁵ Emissions from Onsite Motor Vehicles for 2008 were estimated by adjusting the Onsite Motor Vehicle emissions calculated for 2009 by the difference in forecasted aircraft enplanements at IAD between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

⁶ Emissions from Parking Facilities for 2008 were estimated by adjusting the Parking Facilities emissions calculated for 2009 by the difference in forecasted aircraft enplanements at IAD between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 9
RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)
ANNUAL AND DAILY AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2002¹

Source	Pollutant					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Annual Emissions in Tons Per Year (tpy)						
Aircraft ²	512.4	55.8	477.6	9.1 ³	9.1 ³	45.7
Ground Support Equipment (GSE) ⁴	123.7	15.5	134.0	10.3	10.6	19.4
Auxiliary Power Units (APU) ⁴	8.5	0.6	7.3	<0.01	<0.01	1.0
Onsite Motor Vehicles ⁵	144.2	14.8	36.2	0.8	1.2	0.8
Parking Facilities ⁶	13.4	2.7	2.0	<0.1	0.1	<0.1
Total Annual Emissions (tpy)	802.2	89.4	657.1	20.2	21.0	66.9
Daily⁷ Emissions in Tons Per Day (tpd)						
Aircraft	1.40	0.15	1.31	0.02	0.02	0.13
Ground Support Equipment (GSE)	0.34	0.04	0.37	0.03	0.03	0.05
Auxiliary Power Units (APU)	0.02	<0.01	0.02	<0.01	<0.01	<0.01
Onsite Motor Vehicles	0.40	0.04	0.10	<0.01	<0.01	<0.01
Parking Facilities	0.04	0.01	0.01	<0.01	<0.01	<0.01
Total Daily Emissions (tpd)	2.20	0.24	1.81	0.05	0.05	0.18

¹ Annual 2002 emissions were computed using EDMS Version 4.4 and the latest version of MOBILE6.2, using activity levels for DCA for 2002.

² A total of 215,691 annual operations were modeled for 2002. Aircraft emissions were based on aircraft fleet mix and operations data prepared by MWAA in May 2003 using an aircraft taxi time of 16.93 minutes taken from taken from the FAA's ASPM database for 2002 for DCA was used in the inventory.

³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 3.3 tpy from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.

⁴ GSE default equipment and time-in-mode data available in EDMS Version 4.4 was used, except that deicer equipment was added to the GSE equipment list and all gasoline powered equipment was assigned to be diesel powered. For APU equipment, EDMS default assignments were used and the time-in-mode was set to 7 minutes as recommended by FAA when all or most of an airport's gates are electrified.

⁵ Onsite motor vehicles include all roads located on the airport, except for the George Washington Memorial Parkway. Onsite Motor Vehicles do NOT include parking facility emissions. MOBILE6.2 emission factors were determined from files obtained from MWCOG. Vehicle volumes for 2002 were derived from vehicle volumes collected in 2003 by HNTB and adjusted for the difference in aircraft enplanements between 2003 and 2002.

⁶ Parking facilities include vehicles parking in the following public parking facilities: Garage A, Daily Lot A2, Garage B/C, Hourly Lot A, and the Economy Lot. Rental cars were located in Garage A; and 24 employee parking lots were consolidated at two locations – the Crew Lot U at the south end of the airport and a hypothetical central location near Garage A. Vehicle volumes for 2002 were derived from vehicle volumes collected at DCA in 2004 by MWAA and adjusted for the difference in aircraft enplanements between 2004 and 2002.

⁷ Daily Emissions are the Annual Emissions divided by 365 and are in units of tons per day (tpd).

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 10
RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)
ESTIMATED OZONE DAY¹ AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2002
IN TONS PER DAY (TPD)

Source	Pollutant (tpd)					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Aircraft ²	1.39	0.15	1.25	0.02 ³	0.02 ³	0.12
Ground Support Equipment (GSE) ⁴	0.34	0.04	0.37	0.03	0.03	0.05
Auxiliary Power Units (APU) ⁴	0.02	<0.01	0.02	<0.01	<0.01	0.01
Onsite Motor Vehicles ⁵	0.45	0.04	0.10	<0.01	<0.01	<0.01
Parking Facilities ⁶	0.04	0.01	0.01	<0.01	<0.01	<0.01
Total Ozone Day Emissions	2.24	0.25	1.75	0.05	0.05	0.18

¹ "Ozone Day" emissions are derived by using the "Ozone Season" mixing height and "Ozone Season" temperature to calculate the "Ozone Year" emissions and then dividing by 365.

² A total of 215,691 annual operations were modeled for 2002. Aircraft emissions were based on aircraft fleet mix and operations data prepared by MWAA in May 2003 using an aircraft taxi time of 16.93 minutes taken from the FAA's ASPM database for 2002 for DCA was used in the inventory.

³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 0.01 tpd from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.

⁴ GSE default equipment and time-in-mode data available in EDMS Version 4.4 was used, except that deicer equipment was added to the GSE equipment list and all gasoline powered equipment was assigned to be diesel powered. For APU equipment, EDMS default assignments were used and the time-in-mode was set to 7 minutes as recommended by FAA when all or most of an airport's gates are electrified.

⁵ Onsite motor vehicles include all roads located on the airport, except for the George Washington Memorial Parkway. Onsite Motor Vehicles do NOT include parking facility emissions. MOBILE6.2 emission factors were determined from files obtained from MWCOG. Vehicle volumes for 2002 were derived from vehicle volumes collected in 2003 by HNTB and adjusted for the difference in aircraft enplanements between 2003 and 2002.

⁶ Parking facilities include vehicles parking in the following public parking facilities: Garage A, Daily Lot A2, Garage B/C, Hourly Lot A, and the Economy Lot. Rental cars were located in Garage A; and 24 employee parking lots were consolidated at two locations – the Crew Lot U at the south end of the airport and a hypothetical central location near Garage A. Vehicle volumes for 2002 were derived from vehicle volumes collected at DCA in 2004 by MWAA and adjusted for the difference in aircraft enplanements between 2004 and 2002.

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 11
RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)
ANNUAL AND DAILY AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2009¹

Source	Pollutant					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Annual Emissions in Tons Per Year (tpy)						
Aircraft ²	716.6	80.3	636.3	9.7 ³	9.7 ³	60.9
Ground Support Equipment (GSE) ⁴	143.8	13.7	108.4	12.6	12.9	24.3
Auxiliary Power Units (APU) ⁴	10.2	0.7	8.4	<0.01	<0.01	1.2
Onsite Motor Vehicles ⁵	100.9	11.3	22.7	0.6	1.0	0.3
Parking Facilities ⁶	8.8	1.8	1.2	<0.01	0.1	<0.01
Total Annual Emissions (tpy)	980.3	107.8	777.0	22.9	23.7	86.7
Daily⁷ Emissions in Tons Per Day (tpd)						
Aircraft	1.96	0.22	1.74	0.03	0.03	0.17
Ground Support Equipment (GSE)	0.39	0.04	0.30	0.03	0.04	0.07
Auxiliary Power Units (APU)	0.03	<0.01	0.02	<0.01	<0.01	<0.01
Onsite Motor Vehicles	0.28	0.03	0.06	<0.01	<0.01	<0.01
Parking Facilities	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Total Daily Emissions (tpd)	2.68	0.29	2.12	0.06	0.07	0.24

¹ Annual 2009 emissions were computed using EDMS Version 4.4 and the latest version of MOBILE6.2, using forecasted activity levels for DCA for 2009.

² A total of 284,196 annual operations were modeled for 2009. An aircraft taxi time of 18.12 minutes was taken from the FAA's ASPM database for 2004 for DCA and was assumed to be the same in 2009.

³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 2.5 tpy from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.

⁴ GSE default equipment and time-in-mode data available in EDMS Version 4.4 was used, except that deicer equipment was added to the GSE equipment list and all gasoline powered equipment was assigned to be diesel powered. For APU equipment, EDMS default assignments were used and the time-in-mode was set to 7 minutes as recommended by FAA when all or most of an airport's gates are electrified.

⁵ Onsite motor vehicles include all roads located on the airport, except for the George Washington Memorial Parkway. Onsite Motor Vehicles do NOT include parking facility emissions. MOBILE6.2 emission factors were determined from files obtained from MWCOG. Vehicle volumes for 2009 were derived from vehicle volumes collected in 2003 by HNTB and adjusted for the difference in aircraft enplanements between 2003 and 2009.

⁶ Parking facilities include vehicles parking in the following public parking facilities: Garage A, Daily Lot A2, Garage B/C, Hourly Lot A, and the Economy Lot. Rental cars were located in Garage A; and 24 employee parking lots were consolidated at two locations – the Crew Lot U at the south end of the airport and a hypothetical central location near Garage A. Vehicle volumes for 2002 were derived from vehicle volumes collected at DCA in 2004 by MWAA and adjusted for the difference in aircraft enplanements between 2004 and 2009.

⁷ Daily Emissions are the Annual Emissions divided by 365 and are in units of tons per day (tpd).

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 12
RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)
ESTIMATED OZONE DAY¹ 2009 ESTIMATED AIRPORT-RELATED AIR POLLUTANT EMISSIONS
IN TONS PER DAY (TPD)

Source	Pollutant (tpd)					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Aircraft ²	1.95	0.22	1.66	0.03 ³	0.03 ³	0.16
Ground Support Equipment (GSE) ⁴	0.39	0.04	0.30	0.03	0.04	0.07
Auxiliary Power Units (APU) ⁴	0.03	<0.01	0.02	<0.01	<0.01	<0.01
Onsite Motor Vehicles ⁵	0.27	0.03	0.06	<0.01	<0.01	<0.01
Parking Facilities ⁶	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Total Ozone Day Emissions	2.66	0.29	2.04	0.06	0.07	0.23

- ¹ "Ozone Day" emissions are derived by using the "Ozone Season" mixing height and "Ozone Season" temperature to calculate the "Ozone Year" emissions and then dividing by 365.
- ² A total of 284,196 annual operations were modeled for 2009. An aircraft taxi time of 18.12 minutes was taken from the FAA's ASPM database for 2004 for DCA and was assumed to be the same in 2009.
- ³ Results calculated in EDMS 4.4 for jet aircraft using the FAA's First Order Approximation (FOA) method. Results also include a contribution of 0.01 tpd from piston and turboprop aircraft calculated separately using the FAA's FOA method and are not included in the EDMS data files.
- ⁴ GSE default equipment and time-in-mode data available in EDMS Version 4.4 was used, except that deicer equipment was added to the GSE equipment list and all gasoline powered equipment was assigned to be diesel powered. For APU equipment, EDMS default assignments were used and the time-in-mode was set to 7 minutes as recommended by FAA when all or most of an airport's gates are electrified.
- ⁵ Onsite motor vehicles include all roads located on the airport, except for the George Washington Memorial Parkway. Onsite Motor Vehicles do NOT include parking facility emissions. MOBILE6.2 emission factors were determined from files obtained from MWCOG. Vehicle volumes for 2009 were derived from vehicle volumes collected in 2003 by HNTB and adjusted for the difference in aircraft enplanements between 2003 and 2009.
- ⁶ Parking facilities include vehicles parking in the following public parking facilities: Garage A, Daily Lot A2, Garage B/C, Hourly Lot A, and the Economy Lot. Rental cars were located in Garage A; and 24 employee parking lots were consolidated at two locations – the Crew Lot U at the south end of the airport and a hypothetical central location near Garage A. Vehicle volumes for 2002 were derived from vehicle volumes collected at DCA in 2004 by MWAA and adjusted for the difference in aircraft enplanements between 2004 and 2009.

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 13
RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)
ANNUAL AND DAILY AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2008

Source	Pollutant					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Annual Emissions in Tons Per Year (tpy)						
Aircraft ¹	714.8	80.1	634.7	9.7	9.7	60.8
Ground Support Equipment (GSE) ²	143.4	13.7	108.1	12.5	12.9	24.3
Auxiliary Power Units (APU) ²	10.2	0.7	8.4	<0.01	<0.01	1.2
Onsite Motor Vehicles ³	105.7	12.1	25.4	0.7	1.1	0.3
Parking Facilities ⁴	9.2	1.9	1.4	<0.01	<0.1	<0.01
Total Annual Emissions (tpy)	983.3	108.5	778.0	22.8	23.7	86.4
Daily⁵ Emissions in Tons Per Day (tpd)						
Aircraft	1.96	0.22	1.74	0.03	0.03	0.17
Ground Support Equipment (GSE)	0.39	0.04	0.30	0.03	0.04	0.07
Auxiliary Power Units (APU)	0.03	<0.01	0.02	<0.01	<0.01	<0.01
Onsite Motor Vehicles	0.29	0.03	0.07	<0.01	<0.01	<0.01
Parking Facilities	0.03	0.01	<0.01	<0.01	<0.01	<0.01
Total Daily Emissions (tpd)	2.70	0.30	2.13	0.06	0.07	0.24

¹ Aircraft emissions for 2008 were estimated by adjusting the aircraft emissions calculated for 2009 by the difference in forecasted aircraft operations for DCA between 2009 and 2008. A total of 283,482 annual operations were assessed in 2008.

² Ground Support Equipment and Auxiliary Power Unit emissions for 2008 were estimated by adjusting the GSE emissions calculated for 2009 by the difference in forecasted aircraft operations at DCA between 2009 and 2008.

³ Emissions from Onsite Motor Vehicles for 2008 were estimated by adjusting the Onsite Motor Vehicle emissions calculated for 2009 by the difference in forecasted aircraft enplanements at DCA between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

⁴ Emissions from Parking Facilities for 2008 were estimated by adjusting the Parking Facilities emissions calculated for 2009 by the difference in forecasted aircraft enplanements at DCA between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

⁵ Daily Emissions are the Annual Emissions divided by 365 and are in units of tons per day (tpd).

Source: EDMS, Version 4.4 (URS Corporation, 2006).

TABLE 14
RONALD REAGAN WASHINGTON NATIONAL AIRPORT (DCA)
ESTIMATED OZONE DAY¹ AIRPORT-RELATED AIR POLLUTANT EMISSIONS FOR 2008
IN TONS PER DAY (TPD)

Source	Pollutant (tpd)					
	CO	VOCs	NO _x	PM _{2.5}	PM ₁₀	SO ₂
Aircraft ²	1.95	0.22	1.65	0.03	0.03	0.16
Ground Support Equipment (GSE) ³	0.39	0.04	0.30	0.03	0.04	0.07
Auxiliary Power Units (APU) ³	0.03	<0.01	0.02	<0.01	<0.01	<0.01
Onsite Motor Vehicles ⁴	0.29	0.03	0.07	<0.01	<0.01	<0.01
Parking Facilities ⁵	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Total Ozone Day Emissions	2.68	0.30	2.04	0.06	0.07	0.23

- ¹ "Ozone Day" emissions are derived by adjusting the 2009 "Ozone Season" estimated emissions to 2008 conditions and dividing by 365.
- ² Aircraft emissions for 2008 were estimated by adjusting the aircraft emissions calculated for 2009 by the difference in aircraft operations between 2009 and 2008. A total of 283,482 annual operations were assessed in 2008.
- ³ Ground Support Equipment and Auxiliary Power Unit emissions for 2008 were estimated by adjusting the GSE emissions calculated for 2009 by the difference in aircraft operations between 2009 and 2008.
- ⁴ Emissions from Onsite Motor Vehicles for 2008 were estimated by adjusting the Onsite Motor Vehicle emissions calculated for 2009 by the difference in forecasted aircraft enplanements at DCA between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.
- ⁵ Emissions from Parking Facilities for 2008 were estimated by adjusting the Parking Facilities emissions calculated for 2009 by the difference in forecasted aircraft enplanements at DCA between 2009 and 2008, and the difference in the "All Vehicles" category of MOBILE6.2 emission factors for each pollutant between 2009 and 2008.

Source: EDMS, Version 4.4 (URS Corporation, 2006).