

Memorandum

November 17, 2009

To: MOVES Task Force

From: Eulalie Lucas

Department of Transportation Planning

Subject: Preliminary Results of MOVESDraft2009 Model Sensitivity Tests

I. Introduction

At past meetings of the task force, staff presented initial results of MOVES model runs, which compared MOVES emissions estimates using all national default specifications with previously generated Mobile6.2 results for selected jurisdictions. Since then staff has been working to prepare local data inputs specific to jurisdictions in the Washington area and has executed a series of tests of the model for VOC and NOx in ozone season conditions. This memo describes these tests and provides draft results to date.

II. Sensitivity Tests

This memo transmits results from five sensitivity tests using EPA's draft version of MOVES for 2005 ozone season for Montgomery and Fairfax counties and the District of Columbia. Brief details of the five tests are listed as follows:

Test 1 inputs: MOVES default vehicle age distribution, MWCOG 2005 VIN decoded vehicle population, 2005 MOVES default annual VMT and vehicle type allocation and MOVES default percent distribution of VMT by vehicle and facility type.

Test 2 inputs: MWCOG vehicle age distribution, MWCOG 2005 VIN decoded vehicle population, 2005 MOVES default annual VMT and vehicle type allocation and MOVES default percent distribution of VMT by vehicle and facility type.

Test 3 inputs: MWCOG vehicle age distribution, MWCOG 2005 VIN decoded vehicle population, 2005 MOVES default annual VMT and vehicle type allocation and MOVES default percent distribution of VMT by vehicle and facility type.

Test 4 inputs: MWCOG vehicle age distribution, MWCOG 2005 VIN decoded vehicle population, 2005 MWCOG annual VMT and MWCOG vehicle type allocation and MOVES default percent distribution of VMT by vehicle and facility type.

Test 5 inputs: MWCOG vehicle age distribution, MWCOG 2005 VIN decoded vehicle population, 2005 MWCOG annual VMT and MWCOG vehicle type allocation and MWCOG percent distribution of VMT by vehicle and facility type.

Table 1 summarizes this information in a matrix format.

III. Assumptions and Input/Output Specifications

COG Emissions are based on the following inputs:

MWCOG Travel Demand Model Version 2.2/ 2009 CLRP (July 2009)

COG's COOP Round 7.2 forecasts

Mobile62 Rates:

2008 Vehicle Registration Data

2005 emissions were interpolated using 2002 and 2010 as data points.

MOVES Data include:

MOVES default values were applied for specifications associated with vehicle population such as scrappage and sales growth rates and for time of day allocation for travel data.

Table 2 lists the parameters used for a MOVES run. Similar specs were used for the other sample jurisdictions; processes varied by pollutant.

IV Preliminary Results

Results are listed in Table 3, by jurisdiction and trip cycle and test. Total emissions by pollutant are illustrated in the graphs following this table for VOC first followed by NOx. Decrements associated with each test using the National Defaults scenario as the base are also included as the final illustration of results and are shown in Table 4.

Table 1: Scenario Testing

Input Item	Test 1		Test 2		Test 3		Test 4		Test 5	
	Def.	Loc.								
Vehicle Age Distribution	X			X		X		X		X
Vehicle Population		X		X		X		X		X
Ann. VMT by Vehicle Type – Jurisdiction	X		X			X		X		X
Ann. VMT by Vehicle Type -Distributed by Veh. type	X		X		X		X		X	X
Vehicle Type VMT Percentages by Facility Type	X		X		X		X		X	X

Table 2. Primary MOVES Specifications for Ozone Day run

Input Items	DC	Montgomery County	Fairfax County
1. Scale			
2. Time Spans	Hour (Start Hour: 00:00 - 00:59; End Hour: 23:00 - 23:59)	County	
3. Geographic bounds	DC	Montgomery County	Fairfax County
4. On Road Vehicle Equipment	Select All	Select All	Select All
5. Road Type	Urban restricted and unrestricted	Select All	Urban restricted and unrestricted
6. Pollutants	Total Gaseous Hydrocarbons; Non-Methane Hydrocarbons; Non-Methane Organic Gases; NOx		
7. Processes	All Processes of trip cycle		
8. General Outputs	U.S. Tons, Joules, Miles		
9. Output Emission Details	24 Hour, County, Emission process		

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Table 3
2005 District of Columbia VOC and NOx Emissions (Daily)

	Mobile6(Network)		All Default		Test 1		Test 2		Test 3		Test 4		Test 5	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
Start	2.2156	1.1670	3.1511	3.6935	2.3965	2.8111	2.3965	2.8488	2.3965	2.8488	2.3965	2.8488	2.3965	2.8488
Running	5.0379	15.1030	4.1550	24.4485	3.8915	22.8492	3.7568	24.2436	3.6320	23.4382	3.4695	22.2753	3.5025	22.5205
Vehicle Related	1.0900	0.0000	5.4940	0.0000	4.9050	0.0000	4.5805	0.0000	4.5025	0.0000	4.1226	0.0000	4.1332	0.0000
Total	8.3435	16.2700	12.8001	28.1420	11.1930	25.6603	10.7338	27.0924	10.5310	26.2870	9.9886	25.1241	10.0322	25.3693

*Vehicle Related includes "Refueling Spillage Loss" "Refueling Displacement Va" "Evap Fuel Leaks" "Evap Vapor Venting" and "Evap Permeation" for VOC

*Vehicle Related of MOVES includes "Extended Idle Exhaust" "Crankcase Extended Idle E" for Nox

*Vehicle Related of MOBILE6 includes "DIURNAL" and "RESTGL" for VOC

2005 Fairfax County VOC and NOx Emissions (Daily)

	Mobile6(Network)		All Default		Test 1		Test 2		Test 3		Test 4		Test 5	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
Start	4.3793	2.3223	9.2690	10.8299	7.5464	8.8248	7.1613	8.1925	7.1613	8.1925	7.1613	8.1925	7.1613	8.1925
Running	10.3411	42.6183	12.4970	72.4390	12.1421	68.7705	9.8865	63.1622	8.7837	56.1168	9.1488	56.0488	8.4939	55.2243
Vehicle Related	2.6348	0.0000	16.3589	2.7107	15.1680	2.0612	12.2092	1.6301	11.4530	1.4483	11.0663	1.0091	11.1795	1.3733
Total	17.3551	44.9405	38.1248	85.9795	34.8565	79.6564	29.2570	72.9848	27.3980	65.7576	27.3763	65.2504	26.8347	64.7901

*Vehicle Related includes "Refueling Spillage Loss" "Refueling Displacement Va" "Evap Fuel Leaks" "Evap Vapor Venting" and "Evap Permeation" for VOC

*Vehicle Related of MOVES includes "Extended Idle Exhaust" "Crankcase Extended Idle E" for Nox

*Vehicle Related of MOBILE6 includes "DIURNAL" and "RESTGL" for VOC

2005 Montgomery County VOC and NOx Emissions (Daily)

	Mobile6(Network)		All Default		Test 1		Test 2		Test 3		Test 4		Test 5	
	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC	NOx
Start	3.8015	2.0324	6.3665	7.4354	6.2654	7.2257	6.2587	6.9398	6.2587	6.9398	6.2587	6.9398	6.2587	6.9398
Running	8.8443	33.6277	8.3776	50.9432	6.9449	40.5545	6.1431	39.3065	6.3221	40.4516	6.4888	39.9264	7.0863	43.2809
Vehicle Related	2.2796	0.0000	11.6939	0.9249	10.1715	0.0000	9.1096	0.8292	9.2350	0.8534	9.0319	0.5223	9.4511	0.7084
Total	14.9254	35.6601	26.4381	59.3035	23.3817	47.7802	21.5115	47.0756	21.8158	48.2448	21.7795	47.3885	22.7961	50.9291

*Vehicle Related includes "Refueling Spillage Loss" "Refueling Displacement Va" "Evap Fuel Leaks" "Evap Vapor Venting" and "Evap Permeation" for VOC

*Vehicle Related of MOVES includes "Extended Idle Exhaust" "Crankcase Extended Idle E" for Nox

*Vehicle Related of MOBILE6 includes "DIURNAL" and "RESTGL" for VOC

Table 4
 Reductions by Test and Pollutant
 2005 District of Columbia Emission Comparison

	VOC	NOx
Mobile6	-	-
Default	4.4566	11.8720
Test1	-1.6071	-2.4817
Test2	-0.4592	1.4321
Test3	-0.2028	-0.8054
Test4	-0.5424	-1.1629
Test5	0.0436	0.2452

2005 Fairfax County Emission Comparison

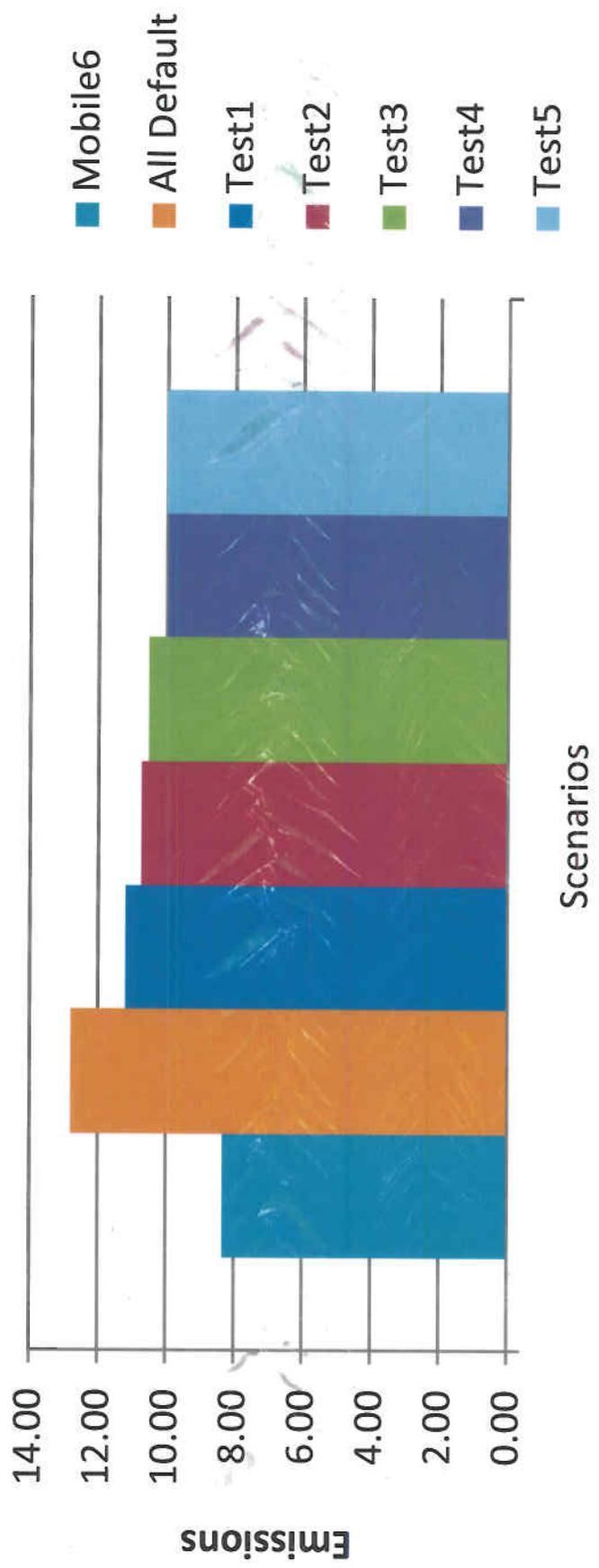
	VOC	NOx
Mobile6	-	-
Default	20.7697	41.0390
Test1	-3.2684	-6.3231
Test2	-5.5995	-6.6716
Test3	-1.8590	-7.2272
Test4	-0.0217	-0.5071
Test5	-0.5416	-0.4603

2005 Montgomery County Emission Comparison

	VOC	NOx
Mobile6	-	-
Default	11.5127	23.6434
Test1	-3.0564	-11.5233
Test2	-1.8702	-0.7046
Test3	0.0000	0.0000
Test4	-0.0364	-0.8563
Test5	1.0166	3.5406

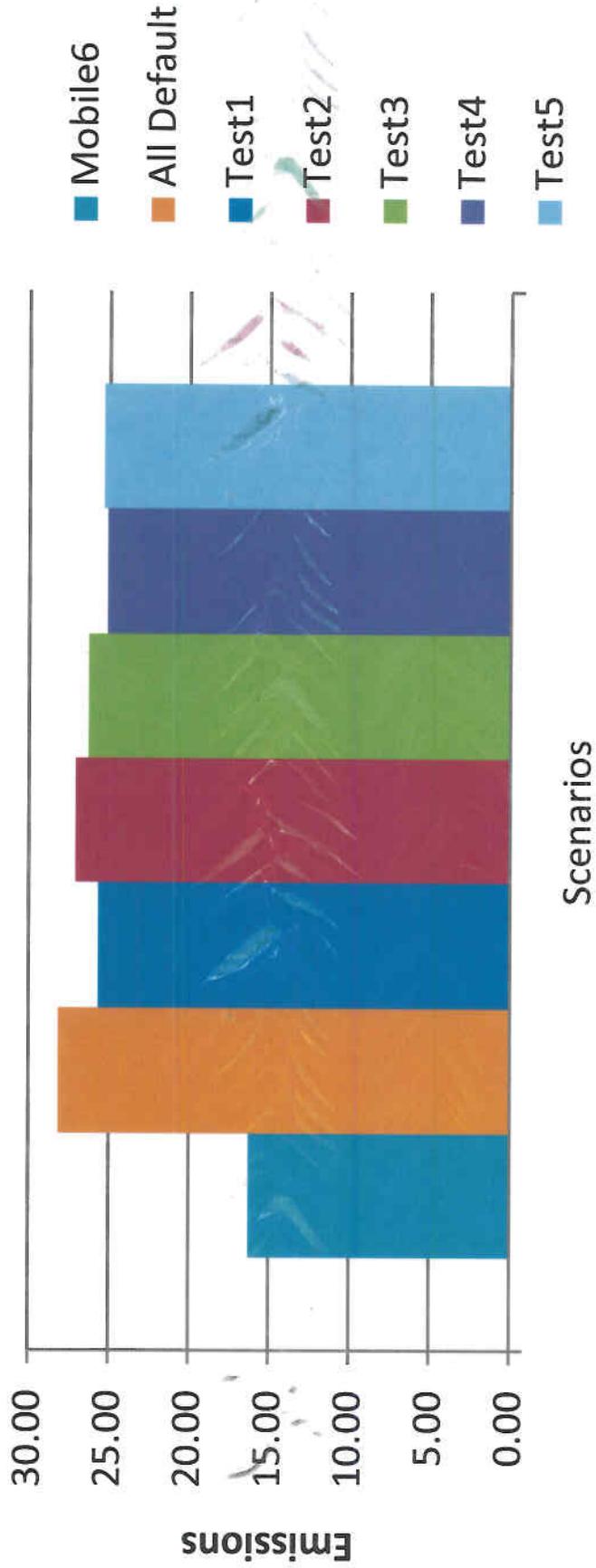
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2005 District of Columbia VOC Scenarios Comparison



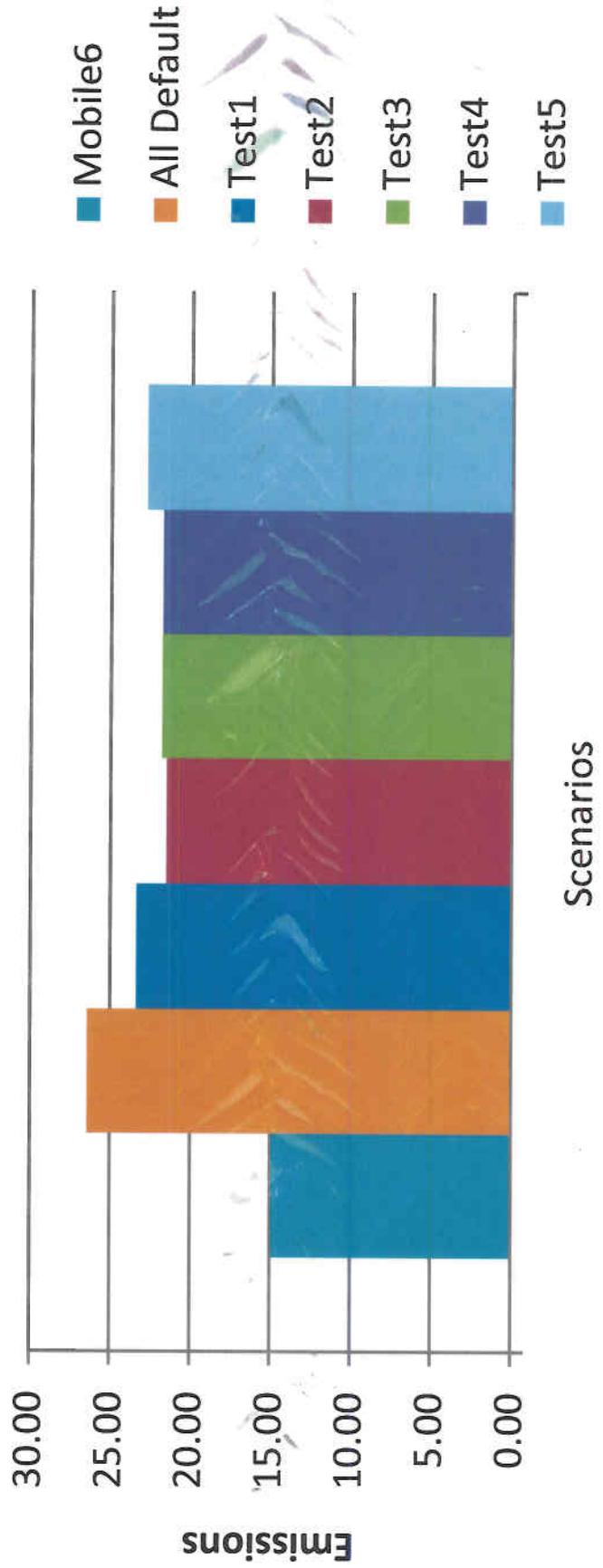
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2005 District of Columbia NOx Scenarios Comparison



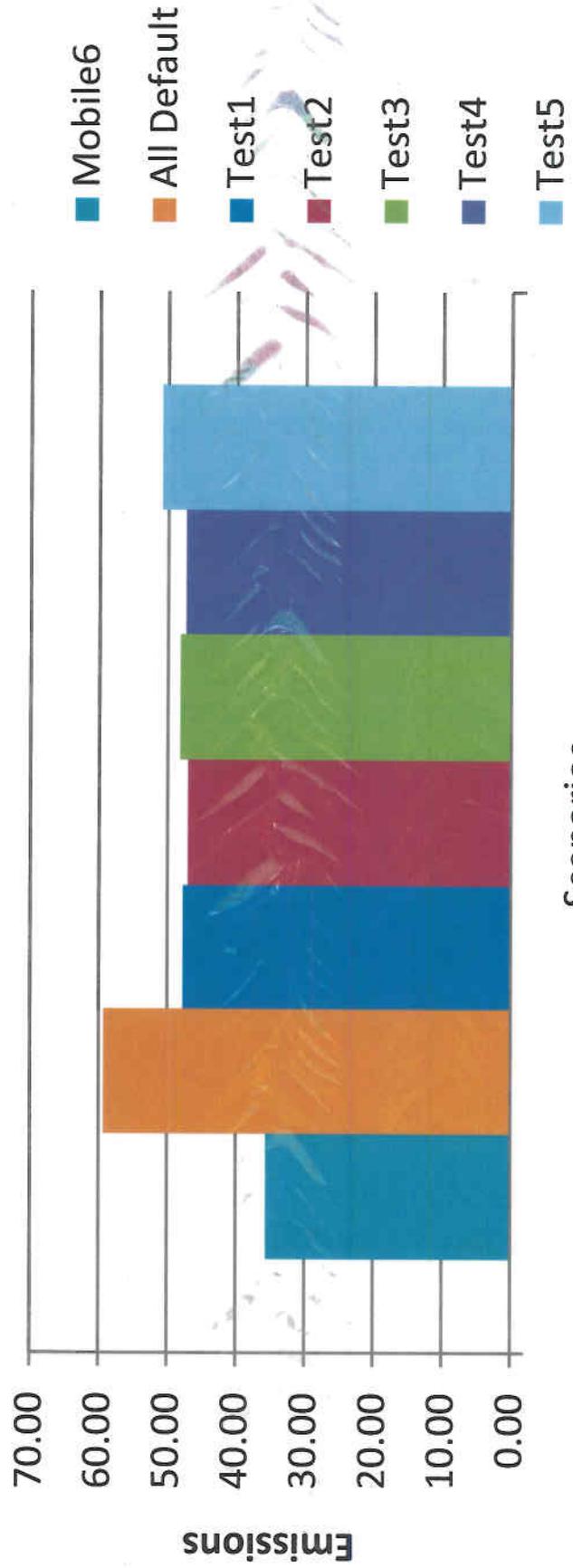
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2005 Montgomery County VOC Scenarios Comparison



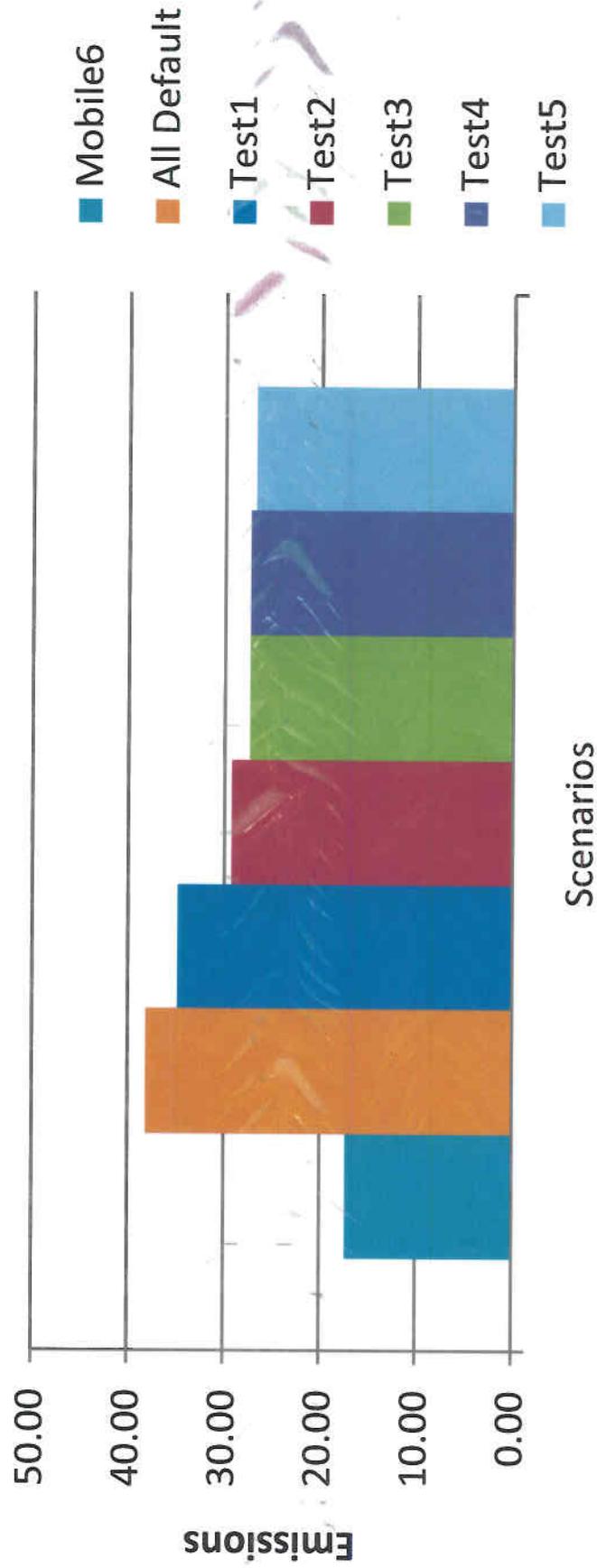
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2005 Montgomery County NOx Scenarios Comparison



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2005 Fairfax County VOC Scenarios Comparison



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2005 Fairfax County NOx Scenarios Comparison

