

Appendix G

Emission Reduction from Transportation Control Measures

**ATTAINMENT SIP FOR METROPOLITAN WASHINGTON REGION
PROPOSED TCMs**

Jurisdiction	VOC tons/day	NOx tons/day
District of Columbia	0.0042	0.0060
Maryland	0.0766	0.1876
Virginia	0.1228	0.3094
WMATA	0.0674	0.1725
Total	0.3	0.7

Attainment SIP - Proposed Mobile Source Budget

	VOC tons/day	NOx tons/day
2005 Mobile Emissions Inventory	98.3	238.1
Proposed TCMs	0.3	0.7
Proposed Budget	98.1	237.4

**ATTAINMENT SIP FOR METROPOLITAN WASHINGTON REGION
 PROPOSED WMATA TCMs**

TCM	VOC tons/day	NOx tons/day
WM-1 Bicycle Racks on Transit Buses (1458 total racks)	0.0074	0.0131
WM-2 Ultra Low Sulfur Diesel Fuel with CRT filters (886 buses)	0.06	
WM-3 Compressed Natural Gas Buses (164 buses)		0.1594
Total	0.0674	0.1725

Measure: Bicycle Racks on WMATA buses in D.C., VA, & MD

Measure Number: WM-1

Measure Name: Bicycle Racks on WMATA buses in D.C., VA, & MD

Description:

This measure would provide external bicycle racks on WMATA buses; 600 buses in D. C, 372 buses in VA, and 486 buses in MD. With bike racks on buses, people can ride their bicycle to a bus stop and have their bicycle with them for the duration of the trip.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0131
Estimated Reductions (tpy)	4.08

VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0074
Estimated Reductions (tpy)	2.30

Assumptions

- Each rack can hold two bicycles and will reduce 2 vehicle trips per day
- 72.5% SOV trips in MD, 82.5% SOV trips in DC and VA
- VMT reduced per trip – 15.5 miles (Methodology adopted from M-70a Regional Bicycle Racks, FY96-01 TIP)

Emission Reductions

VT and VMT reduction - DC: 451 trips and 6620 VMT; MD:323 trips and 4745 VMT; VA: 281 VT and 4115 VMT
 Total VT & VMT Reduced - 1055 trips 15480 VMT
 Total NOx Reduced= (1055 trips * 0.9905 gms/trip + 15480 VMT * 0.6995 gms/mile) / (907,185 g/ton)
 Total NOx Reduced= 0.0131 tpd

 Total VOC Reduced= (1055 trips * 2.3454 gms/trip + 15480 VMT * 0.2717 gms/mile) / (907,185 g/ton)
 Total VOC Reduced= 0.0074 tpd

Cost Effectiveness

N/A

Measure: Clean Diesel Fuel with Filters

Measure Number: WM-2
Measure Name: Clean Diesel Fuel with Filters

Description:
This measure will install Continuously Regenerating Technology (CRT) filters on 886 transit buses and the fuel will be changed to Ultra Low Sulfur Diesel (ULSD) fuel.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	-
Estimated Reductions (tpy)	-

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.06000
Estimated Reductions (tpy)	15.0000

Assumptions

- . Mileage 110 per day per bus
- . Buses will be operational 312 days per year.
- . VOC Emission benefits with ULSD fuel and with filters is 60%

Running Emission Reductions

Daily Reductions (NOx) = N/A

Daily Reductions (NOx) = N/A

Daily Reductions (VOC) = .06 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Compressed Natural Gas Buses

Measure Number: WM-3
Measure Name: 164 CNG buses in WMATA fleet in place of diesel buses

Description: This measure will replace 164 diesel fueled buses with 164 Compressed Natural Gas (CNG) buses. CNG provides reductions in Particulate Matter and Nitrogen Oxide compared to a new diesel bus.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.1594
Estimated Reductions (tpy)	49.7328

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	N/A
Estimated Reductions (tpy)	N/A

Assumptions

- . 164 heavy duty CNG buses replacing 164 diesel buses in operation
- . Mileage 110 per day per bus
- . Buses will be operational 312 days per year.
- . NOx Emission reduction per bus due to use of CNG 8.0158 grams/mile

Running Emission Reductions

Daily Reductions (NOx) = 8.0158 gms/mile * 164 buses * 110 miles/day /907185

Daily Reductions (NOx) = 0.1594 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

**ATTAINMENT SIP FOR METROPOLITAN WASHINGTON REGION
PROPOSED NORTHERN VIRGINIA TCMs**

Table 1 Earlier (9% SIP) TCMs - Continued

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ID	Measure	VOC (tpd)	NOx (tpd)
NV-1	Park-and-Ride spaces Northern Virginia Districtwide	0.0280	0.0800
NV-2	Transit Access Improvements	0.0160	0.0390
NV-3	Purchase of New Transit Buses	0.0250	0.0670
NV-4	Improvements to Pedestrian Facilities	0.0010	0.0020
NV-5	Construction of Bus Shelters	0.0010	0.0000
	Sub-Total	0.0710	0.1880

Table 2 New VDOT TCMs

ID	Measure	VOC (tpd)	NOx (tpd)
NV-6	Park-and-Ride spaces Northern Virginia Districtwide	0.0325	0.0838
NV-7	Bicycle Lanes / Trails in Northern Virginia	0.0051	0.0053
NV-8	Bicycle Lockers in Northern Virginia	0.0004	0.0006
	Sub-Total	0.0380	0.0897

Table 3 NoVA Local Government TCMs

ID	Measure	VOC (tpd)	NOx (tpd)
NV-9	Hybrid Vehicle Purchase	0.0004	0.0009
NV-10	Bicycle Lane/Trail	0.0124	0.0127
NV-11	Sidewalk Improvements	0.0007	0.0007
NV-12	CNG Buses	0.0004	0.0174
	Sub-Total	0.0139	0.0317

TOTAL NORTHERN VIRGINIA TCM REDUCTIONS	0.1228	0.3094
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Measure: Park-And-Ride Spaces Northern Virginia Districtwide

Measure Number: NV -1
Measure Name: Park-and-Ride spaces

Description:
As part of the 9% SIP VDOT proposed constructing 1,872 park-and-ride spaces at various locations in Northern Virginia. VDOT constructed these park-and-ride spaces. Emissions reductions from these facilities are being credited in the SIP.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.08 tons
Estimated Reductions (tpy)	20.00

Issues

None

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.028 tons
Estimated Reductions (tpy)	7.00

Assumptions

- * Reductions in vehicle trips and vehicle miles traveled due to this project were estimated earlier for the 9% SIP. The estimated reductions were for 1999 and based on Mobile 5b factors.
- * The emissions reductions estimated earlier have been updated to reflect Mobile 6 factors and correspond to year 2005.
- * Conversion factor for VOC 0.802 and for NOx 0.771

Emission Reductions

Daily Reductions (NOx) = 0.08 tons

Daily Reductions (VOC) = 0.028 tons

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Transit Access Improvements

Measure Number: NV -2
Measure Name: Improved Transit Access

Description:
As part of the 9% SIP VDOT proposed improving access to commuters at a VRE station by building 200 park-and-ride spaces. VRE constructed 567 park-and-ride spaces and about 75% of these spaces are utilized on a typical day. Emissions reductions from this improvement project are being credited in the SIP.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.039 tons
Estimated Reductions (tpy)	9.75

Issues

None

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.016 tons
Estimated Reductions (tpy)	4.00

Assumptions

- * Reductions in vehicle trips and vehicle miles traveled due to this project were estimated earlier for the 9% SIP. The estimated emissions reductions were for 1999 and based on Mobile 5b factors.
- * The emissions reductions estimated earlier have been updated to reflect Mobile 6 factors and correspond to year 2005.
- * Conversion factor for VOC 0.802 and for NOx 0.771. Also credit for the 225 extra spaces built and being utilized is included.

Emission Reductions

Daily Reductions (NOx) = 0.039 tons

Daily Reductions (VOC) = 0.016 tons

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Purchase Of New Transit Buses

Measure Number: NV - 3
Measure Name: New Transit Buses

Description:
As part of the 9% SIP VDOT proposed purchasing new diesel powered buses to replace older vehicles. The proposal was for WMATA to purchase a total of 52 buses in two separate years. WMATA did purchase these buses and the reduced emissions from these newer buses are being credited in the SIP.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.067 tons
Estimated Reductions (tpy)	16.75

Issues

None

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.025 tons
Estimated Reductions (tpy)	6.25

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Assumptions

- * Reductions in emissions were estimated earlier for the 9% SIP. The estimated reductions were for 1999 and based on Mobile 5b factors.
- * The emissions reductions estimated earlier have been updated to reflect Mobile 6 factors and correspond to year 2005.
- * Conversion factor for VOC 0.802 and for NOx 0.771.

Emission Reductions

Daily Reductions (NOx) = 0.067 tons

Daily Reductions (VOC) = 0.025 tons

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Improvements To Pedestrian Facilities

Measure Number: NV - 4
Measure Name: Improved Pedestrian Access

Description:
 As part of the 9% SIP VDOT proposed making improvements at transit stops and / or stations to facilitate pedestrian access to the transit service. Improvements such as installation of bus shelters, improvements at transit centers, and adding parking spaces have been completed at various locations. Emission reductions from these projects are being credited in the SIP.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.002 tons
Estimated Reductions (tpy)	0.50

Issues

None

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.001 tons
Estimated Reductions (tpy)	0.25

D R A F T

Assumptions

- * Reductions in emissions were estimated earlier for the 9% SIP. The estimated reductions were for 1999 and based on Mobile 5b factors.
- * The emissions reductions estimated earlier have been updated to reflect Mobile 6 factors and correspond to year 2005.
- * Conversion factor for VOC 0.802 and for NOx 0.771.

Emission Reductions

Daily Reductions (NOx) = 0.002 tons

Daily Reductions (VOC) = 0.001 tons

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Construction of Bus Shelters

Measure Number: NV - 5
Measure Name: Construction of Bus shelters.

Description:
As part of the 9% SIP VDOT proposed constructing bus shelters in Northern Virginia. This project has been completed and emission reductions from the projects are being credited in the SIP.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.000 tons
Estimated Reductions (tpy)	0.00

Issues
None

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.001 tons
Estimated Reductions (tpy)	0.25

D R A F T

Assumptions

- * Reductions in emissions were estimated earlier for the 9% SIP. The estimated reductions were for 1999 and based on Mobile 5b factors.
- * The emissions reductions estimated earlier have been updated to reflect Mobile 6 factors and correspond to year 2005.
- * Conversion factor for VOC 0.802 and for NOx 0.771.

Emission Reductions

Daily Reductions (NOx) = 0.000 tons

Daily Reductions (VOC) = 0.001 tons

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Park & Ride Spaces

Measure Number: NV - 6
Measure Name: Park-and-Ride Spaces

Description:
 Construct 3,220 new park-and-ride spaces in Northern Virginia. The measure would facilitate the formation of additional commuter car and van pools.

Issues
 None

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0838
Estimated Reductions (tpy)	20.9489

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0325
Estimated Reductions (tpy)	8.1370

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Assumptions

- . 75% of the spaces will be utilized.
- . Average trip length is 22.5 miles. Average travel speed is 40 mph.
- . Emission factors for NOx (Running) in year 2005: 0.6995 grams per mile
- . Emission factors for VOC (Running) in year 2005: 0.2717 grams per mile

Emission Reductions

Daily Reductions (NOx) = 3,220 spaces * 0.75 utilization * 22.5 miles /trip * 0.6995 gms/mi * 2 trips/day / 907,185
 Daily Reductions (NOx) = 0.08380 tpd VOC

Daily Reductions (VOC) = 3,220 spaces * 0.75 utilization * 22.5 miles /trip * 0.2717 gms/mi * 2 trips/day / 907,185
 Daily Reductions (VOC) = 0.03255 tpd VOC

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Bicycle Lanes/Trails in Northern Virginia

Measure Number: NV - 7
Measure Name: Bicycle lanes / trails

Description:
 Construct 12 miles of bicycle lanes and trails in Northern Virginia. The facilities provide commuters an alternate mode of transportation.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0053
Estimated Reductions (tpy)	1.3127

Issues

None

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0051
Estimated Reductions (tpy)	1.2825

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Assumptions

. Reduction in vehicle trips (VT) and vehicle miles traveled (VMT) due to this project will be similar to those estimated for similar projects (TERM M-102) by the National Capital Region Transportation Planning Board (TPB) and proportional to the mileage of trail/lanes constructed.

In TERM M-102 VT and VMT reduced for 34 miles of bike trail were 4067 VT and 13556 VMT.

Emission Reductions

Daily Reductions (NOx) = (1,430 Veh. Trips * 0.9905 gms/mi + 4,785 VMT * 0.6995 gms/mi) / 907,185

Daily Reductions (NOx) = 0.00525 tpd VOC

Daily Reductions (VOC) = (1,430 Veh. Trips * 2.3454 gms/mi + 4,785 VMT * 0.2717 gms/mi) / 907,185

Daily Reductions (VOC) = 0.00513 tpd VOC

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Bicycle Lockers in Northern Virginia

Measure Number: NV - 8
Measure Name: Bicycle lockers

Description:
 Install 100 bicycle lockers at various park and ride lots and transit stations in Northern Virginia.

Issues
 None

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0006
Estimated Reductions (tpy)	0.1560

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0003
Estimated Reductions (tpy)	0.0865

Assumptions

- . One third of the lockers installed will be used at any one time.
- . Commute trips converted to bicycle trips will reduce vehicle trips and vehicle miles traveled.
- . Average trip length is 15.5 miles.
- . 72.5% of the locker users would have traveled as a SOV prior to the availability of the lockers.

Emission Reductions

Daily Reductions (NOx) = 100 lockers * 0.33 utilization * 0.725 SOV mode * (2*0.9905 gms/mi+15.5 mi *2*0.6995 gms/mi)/907,185
Daily Reductions (NOx) = 0.00062 tpd VOC

Daily Reductions (VOC) = 100 lockers * 0.33 utilization * 0.725 SOV mode * (2*2.3454 gms/mi+15.5 mi *2*0.2717 gms/mi)/907,185
Daily Reductions (VOC) = 0.00035 tpd VOC

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Hybrid Light Duty Vehicle Purchase

Measure Number: NV - 9
Measure Name: Hybrid Light Duty Vehicle Purchase

Description: Light Duty Vehicle Replacement Program. Purchase 25 new hybrid electric light duty vehicles in place of gasoline vehicles in Northern Virginia.

Issues
None

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0009
Estimated Reductions (tpy)	0.2272

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0004
Estimated Reductions (tpy)	0.0927

Assumptions

- . Vehicle mileage 8,413 per vehicle per year
- . Emission reductions will be due to the difference in emissions rates between gasoline and hybrid vehicles
- . Emission factors hybrid vehicle (Running): NOx: 0.02; VOC: 0.01 gms/mile
- . Emission factors gasoline vehicle (Running): NOx:1.0; VOC: 0.41 gms/mile

Emission Reductions

Daily Reductions (NOx) = $(1.0 - 0.02) \text{ gms/mile} * 8413 \text{ miles/year} * 25 \text{ vehicles} / 250 \text{ days}$
 Daily Reductions (NOx) = 0.00091 tpd VOC

Daily Reductions (VOC) = $(0.41 - 0.01) \text{ gms/mile} * 8413 \text{ miles/year} * 25 \text{ vehicles} / 250 \text{ days}$
 Daily Reductions (VOC) = 0.000371 tpd VOC

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Bicycle Trails/Lanes in Northern Virginia

Measure Number: NV - 10
Measure Name: 29 miles of bicycle lanes/trails in Northern Virginia

Description:

The proposed lane / trails will facilitate bicycle riders to commute and provide people an alternate mode of transportation for other trip purposes.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0127
Estimated Reductions (tpy)	3.1742

Issues

None

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VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0124
Estimated Reductions (tpy)	3.1051

Assumptions

. Reduction in vehicle trips (VT) and vehicle miles traveled (VMT) due to this project will be similar to those estimated for similar projects (TERM M-102) by the National Capital Region Transportation Planning Board (TPB) and proportional to the mileage of trail/lanes constructed.

In TERM M-102, VT and VMT reduced for 34 miles of bike trail were 4,067 VT and 13,556 VMT.

Emission Reductions

Total NOx Reduced= (3,465 trips * 0.9905 gms/mi + 11,560VMT * 0.6995 gms/mile) / (907,185 g/ton)

Total NOx Reduced= 0.0127 tpd

Total VOC Reduced= (3,465 trips * 2.3454 gms/trip + 11,560 VMT * 0.2717 gms/mile) / (907,185 g/ton)

Total VOC Reduced= 0.0124 tpd

Cost Effectiveness

N/A

Measure: Sidewalk Improvements in Northern Virginia

Measure Number: NV - 11
Measure Name: 1.5 miles of sidewalk improvements in Northern Virginia

Description:
 The proposed improvements will increase access to nearby transit stations/stops.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0007
Estimated Reductions (tpy)	0.1846

Issues
 None

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VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0007
Estimated Reductions (tpy)	0.1846

Assumptions

. Reduction in vehicle trips and vehicle miles traveled due to this project will be similar to those estimated for similar projects by the National Capital Region Transportation Planning Board (TPB) and proportional to the mileage of sidewalk constructed.

Emission Reductions

Total NOx Reduced= (201 trips * 0.9905 gms/mi + 673 VMT * 0.6995 gms/mile) / (907,185 g/ton)
 Total NOx Reduced= 0.0007 tpd

Total VOC Reduced= (201 trips * 2.3454 gms/trip + 673 VMT * 0.2717 gms/mile) / (907,185 g/ton)
 Total VOC Reduced= 0.0007 tpd

Cost Effectiveness

N/A

Measure: 11 New CNG Buses in place of Old Diesel Buses

Measure Number: NV - 12
Measure Name: 11 New CNG Buses in place of Diesel Buses
Description: The measure would purchase 11 new CNG buses in Northern Virginia in lieu of diesel buses.

Issues
None

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0174
Estimated Reductions (tpy)	5.420

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0003
Estimated Reductions (tpy)	0.1091

Assumptions

- . Vehicle mileage 30,000 per year
- . Emission reductions derived from the difference between Diesel and CNG bus emissions factors.
- . Emission factors CNG Bus: NOx: 8.4; VOC: 0.3 gms/mile
- . Emission factors diesel bus: NOx:23.3; VOC: 0.6 gms/mile

Emission Reductions

$$\text{Daily Reductions (NOx)} = (23.3 - 8.4) \text{ gms/mile} * 30,000 \text{ miles/year} * 11 / (312 \text{ days} * 907,185)$$

Daily Reductions (NOx) = 0.01737 tpd VOC

$$\text{Daily Reductions (VOC)} = (0.6 - 0.3) \text{ gms/mile} * 30,000 \text{ miles/year} * 11 / (312 \text{ days} * 907,185)$$

Daily Reductions (VOC) = 0.000350 tpd VOC

Cost Effectiveness

N/A

Summary Analysis

N/A

**ATTAINMENT SIP FOR METROPOLITAN WASHINGTON REGION
PROPOSED MARYLAND TCMs**

Table 1 Earlier (9% SIP) TCMs - Continued

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ID	Measure	VOC (tpd)	NOx (tpd)
MD-1	MD Suburban Bus Replacements	0.010	0.025
MD-2	Transit Parking Facilities	0.004	0.009
MD-3	MARC Replacement/Expansion Coaches	0.036	0.100
MD-4	Bicycle Facilities	0.008	0.002
MD-5	Park and Ride Facilities	0.006	0.019
	Sub-Total	0.064	0.155

Table 2 New MDOT TCMs

ID	Measure	VOC (tpd)	NOx (tpd)
MD-6	Grosvenor Metro Garage	0.0060	0.0155
MD-7	Park & Ride Lots (Recent Additions)	0.0066	0.0171
	Sub-Total	0.0126	0.0326

TOTAL MARYLAND TCM REDUCTIONS	0.0766	0.1876
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Measure: Park & Ride Spaces

Measure Number: MD-1
Measure Name: MD Suburban Bus Replacements

Description:
The measure replaced suburban transit buses with new diesel transit buses which are cleaner than older buses.

Issues
None

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0250
Estimated Reductions (tpy)	6.2500

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0100
Estimated Reductions (tpy)	2.5000

Assumptions

. Mobile 6 factors used to update Mobile 5b estimates

Emission Reductions

Daily Reductions (NOx) = 0.025 tpd

Daily Reductions (VOC) = 0.01 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Transit Parking Facilities

Measure Number: MD -2
Measure Name: Transit Parking Facilities

Description:
As part of the 9% SIP MDOT proposed constructing park-and-ride spaces at Lake Forest, Tulagi, and Germantown to serve transit.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	.009 tpd
Estimated Reductions (tpy)	20.00

Issues

None

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.004 tpd
Estimated Reductions (tpy)	7.00

Assumptions

- . Mobile 6 factors used to update Mobile 5b estimates
- . The benefit from the Germantown facility was adjusted to reflect 2005 conditions.

Emission Reductions

Daily Reductions (NOx) = .009 tpd

Daily Reductions (VOC) = 0.004 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: MARC Replacement/Expansion Coaches

Measure Number: MD -3
Measure Name: Improved Transit Access

Description:
As part of the 9% SIP MDOT proposed buying new MARC coaches for replacing existing coaches and to increase service.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.1 tpd
Estimated Reductions (tpy)	9.75

Issues

None

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VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	.036 tpd
Estimated Reductions (tpy)	4.00

Assumptions

. Mobile 6 factors used to update Mobile 5b estimates

Emission Reductions

Daily Reductions (NOx) = 0.1 tpd

Daily Reductions (VOC) = .036 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Bicycle Facilities

Measure Number: MD - 4
Measure Name: Bicycle Facilities

Description:
As part of the 9% SIP MDOT proposed new bicycle facilities in suburban Maryland.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0020
Estimated Reductions (tpy)	16.75

Issues

None

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0080
Estimated Reductions (tpy)	6.25

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Assumptions

. Mobile 6 factors used to update Mobile 5b estimates

Emission Reductions

Daily Reductions (NOx) = .002 tpd

Daily Reductions (VOC) = .008 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Park and Ride Facilities

Measure Number: MD-5
Measure Name: Park and Ride Facilities

Description:
As part of the 9% SIP MDOT proposed constructing Park & Ride facilities in suburban Maryland. The locations are MD 5/MD 205, MD 210/ MD 373, and I-270/MD 80.

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0190
Estimated Reductions (tpy)	0.50

Issues

None

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0060
Estimated Reductions (tpy)	0.25

D R A F T

Assumptions

. Mobile 6 factors used to update Mobile 5b estimates

Emission Reductions

Daily Reductions (NOx) = 0.019 tpd

Daily Reductions (VOC) = 0.006 tpd

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: Grosvenor Metro Garage

Measure Number: MD-6
Measure Name: Grosvenor Metro Garage

Description:
1300 park-and-ride spaces are planned for a garage near the Grosvenor Metrorail Station. By 2005 it is assumed 650 spaces would be utilized on a daily basis.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0060
Estimated Reductions (tpy)	1.50

VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0155
Estimated Reductions (tpy)	3.88

Assumptions

- . VT & VMT are as per usage data developed by MDOT
- . Commuters parking in the P&R lot will arrive in single occupant vehicles
- . Average travel speed at which the P&R lot riders would have traveled (if they had not used the P&R lot) is 40 mph
- . Zero emissions benefit for cold and hot soak emissions
- . P & R lots will be in use for 250 working days per year

Emission Reductions

Total NOx Reduced= .006 tpd

Total VOC Reduced= .0171 tpd

Cost Effectiveness

N/A

Measure: Maryland Park-and-Ride Lots (Recent Additions)

Measure Number: MD-7
Measure Name: Maryland Park-and-Ride Lots

Description:
A number of commuter park-and-ride (P&R) lots have been constructed, leased, or are being constructed at MD 210/MD 273, I-270/MD 124, MD 2/MD 4, MD 231/Fairgrounds, MD 117/I-270, MD 2/MD 4 (expansion) in Maryland.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0066
Estimated Reductions (tpy)	1.65

VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0171
Estimated Reductions (tpy)	4.28

Assumptions

- . VT & VMT are as per usage data developed by MDOT
- . Commuters parking in the P&R lots will arrive in single occupant vehicles
- . Average travel speed at which the P&R lot riders would have traveled (if they had not used the P&R lot) is 40 mph
- . Zero emissions benefit for cold and hot soak emissions
- . P & R lots will be in use for 250 working days per year

Emission Reductions

Total NOx Reduced= .0066 tpd

Total VOC Reduced= .0171 tpd

Cost Effectiveness

N/A

**ATTAINMENT SIP FOR METROPOLITAN WASHINGTON REGION
PROPOSED D.C. TCMs**

TCM	VOC tons/day	NOx tons/day
DC-1 Bicycle Lanes (8 miles)	0.0035	0.0035
DC-2 CNG Refuse Haulers (2 vehicles)	0.00005	0.002
DC-3 Bicycle Racks (150 Racks)	0.0006	0.0005
Total	0.00415	0.0060

Measure: 8 Miles Bicycle Lane in D. C.

Measure Number: DC-1
Measure Name: 8 miles of bicycle lane/Trail in DC

Description:

This measure would provide 8 miles of bicycle lanes in the District of Columbia. The proposed lane will facilitate bicycle riders to commute and provide people a link between transportation modes for other activities.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0035
Estimated Reductions (tpy)	0.87

VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0035
Estimated Reductions (tpy)	0.88

Assumptions

• A similar project (TPB analyzed TERM M-102) Vehicle Trips and Vehicle Miles of Travel reduced for 34 miles of bike trail were 4067 VT and 13556 VMT. It is assumed that VT, VMT reductions for this TCM would be proportional to the mileage.

Emission Reductions

Total NOx Reduced= (955 trips * 0.9905 gms/trip + 3190 VMT * 0.6995 gms/mile) / (907,185 g/ton)

Total NOx Reduced= 0.0035 tpd

Total VOC Reduced= (955 trips * 2.3454 gms/trip + 3190 VMT * 0.2717 gms/mile) / (907,185 g/ton)

Total VOC Reduced= 0.0035 tpd

Cost Effectiveness

N/A

Measure: 2 New CNG Powered Trash Trucks

Measure Number: DC-2
Measure Name: New CNG Powered Trash Trucks
Description: New CNG Powered Trash Trucks Replacing Diesel Trucks in the District of Columbia

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0020
Estimated Reductions (tpy)	0.50

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.00005
Estimated Reductions (tpy)	0.0125

Assumptions

- . 2 diesel trucks will be replaced with new *Compressed Natural Gas (CNG)* powered trucks.
- . Mileage accumulation of each trash truck vehicle is greater than 10,000 miles per year, which translates to 40 daily VMT per truck
- . Trucks will be operational 250 days per year.
- . NOx Emission rate for Diesel trucks – 4 gm/bhp (17.2 gm/mile)
- . NOx Emission rate for CNG truck – 1.4 gm/bhp (6.02 gm/mile)
- . Service trash trucks spend lots of time idling, idling emissions savings are estimated
- . VOC Emissions Savings in using a CNG refuse hauler over a diesel is 0.57 gm/mile

Running Emission Reductions

$$\text{Daily Reductions (NOx)} = (17.2 - 6.02) \text{ gms/mile} * 2 \text{ trucks} * 40 \text{ miles/day} / 907185$$

$$\text{Daily Reductions (NOx)} = 0.00099 \text{ tpd NOx}$$

Idling Emission Reductions

$$\text{Daily Reductions (NOx)} = (58 - 2) \text{ gms/mile} * 2 \text{ trucks} * 10 \text{ miles/day}$$

$$\text{Daily Reductions (NOx)} = 0.00123 \text{ tpd NOx}$$

$$\text{Total Reductions (NOx)} = 0.00222 \text{ tpd NOx}$$

$$\text{Annual Reductions (NOx)} = 0.5540 \text{ tpy NOx}$$

$$\text{Daily Reductions (VOC)} = (0.57) \text{ gms/mile} * 2 \text{ trucks} * 10 \text{ miles/day} / 907185$$

$$\text{Daily Reductions (VOC)} = 0.000050 \text{ tpd NOx}$$

$$\text{Annual Reductions (VOC)} = 0.0125$$

Cost Effectiveness

N/A

Summary Analysis

N/A

Measure: 150 Bicycle Racks in D. C.

Measure Number: DC-3
Measure Name: 150 Bicycle Racks in D.C.

Description:
This measure would provide 150 bicycle racks at various locations throughout D. C. These bicycle racks provide people with an additional transportation option.

NOx

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0005
Estimated Reductions (tpy)	0.12

VOC

Estimated Cost (\$/ton)	\$ -
Estimated Reductions (tpd)	0.0006
Estimated Reductions (tpy)	0.15

Assumptions

- Each rack will reduce 2 trips per day
- 63% of total trips will be SOV trips
- VMT reduced per trip – 2 miles (Methodology adopted from M-70a Regional Bicycle Racks, FY96-01 TIP)

Emission Reductions

Total NOx Reduced= (189 trips * 0.9905 gms/trip + 378 VMT * 0.6995 gms/mile) / (907,185 g/ton)
Total NOx Reduced= 0.0005 tpd

Total VOC Reduced= (189 trips * 2.3454 gms/trip + 378 VMT * 0.2717 gms/mile) / (907,185 g/ton)
Total VOC Reduced= 0.0006 tpd

Cost Effectiveness

N/A



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, 23219

J R. GEHR
MISSIONER

K. E. LANTZ, JR.
TRANSPORTATION PLANNING ENGINEER

January 2, 1997

Mr. Stuart A. Freudberg
Director, Department of Environmental Programs
Metropolitan Washington Council of Governments, Suite 300
777 North Capitol Street, N.E.
Washington, DC 20002-4239

Dear Mr. Freudberg:

This letter responds to requests by the Metropolitan Washington Air Quality Committee for the cooperative contribution of emission reductions from certain types of transportation projects. The Virginia Department of Transportation recommends that ten Northern Virginia projects, listed in the attachment, be used as transportation control measures for the 9% State Implementation Plan. These capital improvements have been completed or are nearly completed, and volatile organic compound (VOC) and oxides of nitrogen (NOx) emissions reductions for 1999 have been documented in separate non-network analyses. The reductions from these Virginia projects total 0.074 and 0.214 tons per day of VOC and NOx emissions, respectively.

If you have questions regarding the identification of these projects or the emissions reductions, please contact Sam Curling at (804) 371-6768.

Sincerely,

A handwritten signature in black ink, appearing to read "K. E. Lantz, Jr." with a stylized flourish at the end.

K. E. Lantz, Jr.
Transportation Planning Engineer

Attachment

cc: Mr. L. J. Bevon
Mr. J. Sydnor
Mr. E. T. Robb
Mr. Y. H. Chang
Mr. R. Kirby
Mr. F. Bigdeli
Mr. J. P. Hopkins
Mr. S. F. Curling
Mr. J. E. Orcutt
Ms. S. R. Benkovik

<u>VA SIP TCM Projects</u>	1999 Emissions Reductions (tons per day)	
	<u>VOC</u>	<u>NOx</u>
1. Burke VRE Park & Ride Lot	0.008	0.023
2. Lorton VRE Station Access Road	0.007	0.018
3. WMATA Metro Bus Purchase ('95 TIP)	0.025	0.071
4. City of Fairfax CUE Bus Shelters	0.0	0.001
5. WMATA New Bus Purchases ('96 TIP)	0.006	0.015
6. Lake Ridge Park & Ride Lot (Harbor Dr.)	0.0	0.020
7. Pedestrian Facilities- Metrorail Stas (at 4 locations)	0.001	0.002
8. Tackett's Mill Park & Ride Lot	0.013	0.033
9. Portsmouth Park & Ride Lot	0.008	0.021
10. Homer Rd. Park & Ride Lot (expansion)	0.006	0.010
VA SIP TCM EMISSIONS TOTALS	<u>0.074</u>	<u>0.214</u>



Maryland Department of Transportation

The Secretary's Office

Parris N. Glendening
Governor

David L. Winstead
Secretary

Thomas L. Osborne
Deputy Secretary

January 2, 1997

Mr. Stuart Freudberg
Director, Department of Environmental Programs
Washington Metropolitan Council of Governments
777 North Capitol Street, NE
Suite 300
Washington DC 20002-4201

Dear ~~Mr. Freudberg~~ ^{Stuart}:

This letter concerns inclusion of Transportation Control Measures (TCMs) in the Phase I SIP document. The Technical Advisory Committee (TAC) recently recommended to MWAQC that capital type improvement TCMs which were completed, or near completion, be included in the SIP. MWAQC concurred in this recommendation at its meeting of December 4, 1996.

MDOT staff has developed the attached list of projects and resultant emission benefits based on the TAC guidelines for inclusion in the SIP document. Each project is an off-model, non-network based, emission reduction strategy previously included in recent Washington Region TIPs.

We are recommending that the TCM projects identified herein be included in the Phase I SIP document currently under development. Please contact our office at (410) 865-1296 should you wish to discuss this matter.

Sincerely,

Frederick P. Rappe, Jr., Director
Office of Systems Planning & Evaluation

Attachment

865-1275

My telephone number is (410)-

TTY For the Deaf: (410) 865-1342

Maryland Transportation Control Measures
for Inclusion in the Phase I SIP

1990 EMISSION BENEFITS

	<u>VOC</u>	(T/D)	<u>NOx</u>
Montgomery County Bus Replacement	.007		.020
Lake Forrest Transit Center	.001		.004
Tulagi Place Park-n-Ride	.001		.003
MD 5/MD 205 Park-n-Ride	.005		.017
MARC Replacement/Expansion Coaches	.044		.129
Bicycle Facilities	.003		.002
MD 210/MD 373 Park-n-Ride	.001		.003
Germantown Parking Facility	.007		.019
Prince George's Bus Replacement	.005		.012
Anacostia Bike Trail	.008		.001
I-270/MD 80 Park-n-Ride	<u>.001</u>		<u>.002</u>
TOTAL	.083		.212



May 21, 2003

The Honorable Peter Shapiro
 Chairman
 National Capital Region Transportation Planning Board
 777 North Capitol Street, N.E.
 Suite 300
 Washington, D.C. 20002-4239

Dear Chairman Shapiro:

Item 8 of the May 21, 2003 agenda for the National Capital Region Transportation Planning Board (TPB) seeks the TPB's approval of a letter to Phil Mendelson, Chairman of the Metropolitan Washington Air Quality Committee (MWAQC) concerning the inclusion in the regional air quality plan of revised MOBILE6 – based mobile emissions budgets, as well as additional Transportation Control Measures (TCMs) and vehicle technology-based and fuel-based measures which could reduce emissions from on-road mobile sources. The letter makes reference to attached letters from responsible implementing agencies which provide specific additional TCMs and vehicle-technology and fuel-based measures for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its meeting on May 28, 2003. Following the completion of the public comment period, the responsible implementing agencies will provide written commitments to a final set of measures for reducing mobile source emissions to be included in the updates to the air quality plan scheduled for submission to the Environmental Protection Agency (EPA) in late summer of this year.

The Washington Metropolitan Area Transit Authority (WMATA) recommends the following measures for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its May 28 meeting:

<u>Measure</u>	<u>Emissions Reductions In 2005</u>	
	<u>VOC</u>	<u>NOx</u>
(1) Bicycle racks on transit buses (1,458 total racks)	0.0074	0.0131

**Washington
 Metropolitan Area
 Transit Authority**

600 Fifth Street, NW
 Washington, DC 20001
 202/962-1234

By Metrorail:
 Judiciary Square—Red Line
 Gallery Place-Chinatown—
 Red, Green and
 Yellow Lines
 By Metrobus:
 Routes D1, D3, D6, P6,
 70, 71, 80, X2

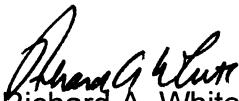
The Honorable Peter Shapiro
Page Two

(2) Ultra Low Sulfur Diesel Fuel with CRT Filters (886)	0.0600	-
(3) CNG buses (164)	-	0.1594
Total Reductions:	<u>0.0674</u>	<u>0.1725</u>

These measures are designed to provide emissions reductions by 2005, and are available for meeting rate-of-progress, attainment, or contingency measure requirements.

Additional information on these measures can be obtained by contacting Ms. Lora Byala at (202) 962-1749.

Sincerely,


Richard A. White
Chief Executive Officer



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

14685 Avion Parkway
Chantilly, VA 20151
(703) 383-VDOT (8368)

PHILIP A. SHUCET
COMMISSIONER

THOMAS F. FARLEY
DISTRICT ADMINISTRATOR

May 23, 2003

The Honorable Peter Shapiro
Chairman
National Capital Region Transportation Planning Board
777 North Capitol Street, N.E.
Suite 300
Washington, D.C. 20002-4239

Dear Chairman Shapiro:

Item 8 of the May 21, 2003 agenda for the National Capital Region Transportation Planning Board (TPB) seeks the TPB's approval of a letter to Phil Mendelson, Chairman of the Metropolitan Washington Air Quality Committee (MWAQC) concerning the inclusion in the regional air quality plan of revised MOBILE6 – based mobile emissions budgets, as well as additional Transportation Control Measures (TCMs) and vehicle technology-based and fuel-based measures which could reduce emissions from on-road mobile sources. The letter makes reference to attached letters from responsible implementing agencies which provide specific additional TCMs and vehicle-technology and fuel-based measures for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its meeting on May 28. Following the completion of the public comment period, the responsible implementing agencies will provide written commitments to a final set of measures for reducing mobile source emissions to be included in the updates to the air quality plan scheduled for submission to the Environmental Protection Agency (EPA) in late summer of this year.

The Virginia Department of Transportation (VDOT) recommends the following measures for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its May 28 meeting:

No.	Project Category	2005 Emissions Reduction	
		VOC (tons/day)	NOx (tons/day)
1	3,200 park and ride spaces	0.033	0.085
2	16 miles of bicycle trails / lanes in Northern Virginia	0.005	0.005
3	100 bicycle lockers in Northern Virginia	0.0003	0.0006
	TOTAL	0.0383	0.0906

The Honorable Peter Shapiro
May 21, 2003
Page Two

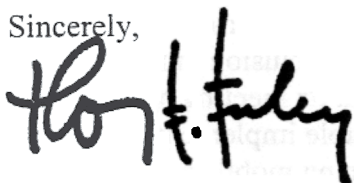
These measures are designed to provide emissions reductions by 2005, and are available for meeting rate-of-progress, attainment, or contingency measure requirements.

Additionally VDOT supports retention of the emissions reductions from an earlier set of TCMs. These projects have been completed and the revised emissions estimate from these projects is listed below. VDOT recommends including these measures and the associated emissions reductions in the draft air quality plan scheduled for release for public comment by MWAQC at its May 28 meeting:

No.	Project Category	2005 Emissions Reduction	
		VOC (tons/day)	NOx (tons/day)
1	Construct park and ride spaces	0.028	0.081
2	Transit access improvements	0.016	0.039
3	Purchase of new transit buses	0.025	0.066
4	Improvement to pedestrian facilities near transit stations	0.001	0.002
5	Construct bus shelters	0.000	0.001
	TOTAL	0.069	0.187

Additional information on these measures can be obtained by contacting Mr. Kanathur Srikanth at (703) 383-2228.

Sincerely,



Thomas F. Farley

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF TRANSPORTATION



Office of the Director

May 23, 2003

The Honorable Peter Shapiro
Chairman
National Capital Region Transportation Planning Board
777 North Capitol Street, N.E.
Suite 300
Washington, D.C. 20002-4239

Dear Chairman Shapiro:

Item No. 8 of the May 21, 2003 agenda for the National Capital Region Transportation Planning Board (TPB) seeks the TPB's approval of a letter to Phil Mendelson, Chairman of the Metropolitan Washington Air Quality Committee (MWAQC) concerning the inclusion in the regional air quality plan of revised MOBILE6 - based mobile emissions budgets, as well as additional Transportation Control Measures (TCMs) and vehicle technology-based and fuel-based measures which could reduce emissions from on-road mobile sources. The letter makes reference to attached letters from responsible implementing agencies which provide specific additional TCMs and vehicle-technology and fuel-based measures for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its meeting on May 28, 2003. Following the completion of the public comment period, the responsible implementing agencies will provide written commitments to a final set of measures for reducing mobile source emissions to be included in the updates to the air quality plan scheduled for submission to the Environmental Protection Agency (EPA) in late summer of this year.

The District of Columbia Department of Transportation (DDOT) recommends the following measures for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its May 28 meeting:

<u>Measure</u>	<u>Emissions Reductions</u>	
	<u>In 2005</u>	
	<u>VOC</u>	<u>NOx</u>
Bicycle Lanes (8 miles)	0.003500	0.0035
CNG Refuse Haulers (2)	0.000050	0.0020
Bicycle Racks (150)	<u>0.000600</u>	<u>0.0005</u>
Total Reductions:	0.004150	0.0065

The Honorable Peter Shapiro

May 19, 2003

Page 2

These measures are designed to provide emissions reductions by 2005, and are available for meeting rate-of-progress, attainment, or contingency measure requirements.

Additional information on these measures can be obtained by contacting Mr. Rick Rybeck at (202) 671-2740.

Sincerely,

A handwritten signature in cursive script that reads "Michelle Pourciau". The signature is written in black ink and is positioned above the printed name.

Michelle Pourciau
Deputy Director



Maryland Department of Transportation
The Secretary's Office

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Robert L. Flanagan
Secretary

Trent M. Kittleman
Deputy Secretary

May 27, 2003

The Honorable Peter Shapiro
Chairman
National Capital Region Transportation Planning Board
777 North Capital Street, N.E., Suite 300
Washington D.C. 20002-4239

Dear Chairman Shapiro:

On May 21, 2003, as part of agenda item 8, the National Capital Region Transportation Planning Board (TPB) approved a letter from TPB to MWAQC backing adoption of additional, region-wide transportation control measures (TCMs) in the severe-area air quality plan currently being prepared by the Metropolitan Washington Air Quality Committee (MWAQC).

Consistent with the intent of item 8, this letter transmits information on certain TCMs that the Maryland Department of Transportation recommends for inclusion in the draft air quality plan scheduled for release for public comment by MWAQC at its May 28th meeting. These TCMs are presented below.

	<u>VOC (tpd)</u>	<u>NOx (tpd)</u>
• Grosvenor Metro Garage (1300 spaces)	0.006	0.0155
• Park and Ride lots	0.0066	0.0171
- MD 210/MD 273 (489 spaces)		
- I-270/MD 124 (517 spaces)		
- MD2/4 @ Ball Rd (31 spaces)		
- MD 231/fairgrounds (20 spaces)		
- MD 117/I-270 (260 spaces)		
- MD 2/4 @ Ball Rd (60 spaces) (expansion)		
TOTAL	<u>0.0126</u>	<u>0.0326</u>

These TCMs are designed to provide emissions reductions by 2005 and would be available for meeting rate of progress, attainment, or contingency measure requirements.

My telephone number is 410-865-1000
Toll Free Number 1-888-713-1414 TTY User Call Via MD Relay
7201 Corporate Center Drive, Hanover, Maryland 21076

Peter Shapiro
Page Two

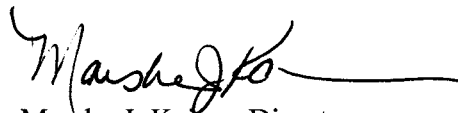
Following public comment on the TCMs presented above, MDOT will provide a written commitment for inclusion in the air quality plan updates scheduled for submission to the Environmental Protection Agency (EPA) later this year.

Additionally, MDOT supports retention of the emissions reduction from an earlier set of TCMS. These projects have been completed and the revised emission benefits are listed below. MDOT recommends including these measures and associated emission reductions in the draft air quality plan scheduled for release for public comment by MWAQC at its May 28th meeting.

PROJECT	2005	
	<u>VOC (tpd)</u>	<u>NOx (tpd)</u>
• MD Suburban Bus Replacements	0.01	0.025
• Transit Parking Facilities	0.004	0.009
• MARC replacement/ expansion coaches	0.036	0.100
• Bicycle Facilities	0.008	0.002
• Park and Ride Facilities	0.006	0.019
TOTAL	<u>0.064</u>	<u>0.115</u>

If you would like any additional information on these measures, you may contact me directly or you may contact Mr. Howard Simons in my office by email at hsimons@mdot.state.md.us or by phone at 410-865-1296.

Sincerely,



Marsha J. Kaiser, Director
Office of Planning and Capital Programming

Beth Lowe

From: Srikanth, Kanathur N. [Kanathur.Srikanth@VirginiaDOT.org]
Sent: Wednesday, May 28, 2003 10:38 AM
To: Ron Kirby
Cc: 'Tom Biesiadny'; 'Alex Verzosa'; 'Ricardo Canizales (E-mail)'; 'Rick Viola'; Sorenson, Jo Anne; Curling, Samuel F.
Subject: Northern Virginia Local Jurisdiction TCMs For the Severe Area Draft SIP

Greetings:

Listed below are the emissions reduction estimates for a few new TCMs proposed to be included in the draft severe area SIP scheduled to be released for public comment by MWAQC at its meeting on May 28, 2003.

These

TCMs are being proposed by local jurisdictions of Northern Virginia with reference to TPB's May 21, 2003 letter to MWAQC concerning inclusion of MOBILE 6 based mobile emissions budgets as well as new TCMs in the draft SIP.

VDOT and TPB staff has worked with representatives of these local jurisdiction in estimating the emissions reductions from these measures.

I

understand that a formal letter requesting the inclusion of these measures

in the draft SIP is forthcoming. In the interim I request you to forward

these measures and the associated emissions reductions to MWAQC for their consideration and action.

Should you have any questions in this regard please feel free to call me.

Sincerely,
Kanti

NoVA Local Government TCMs

D R A F T

ID	Measure	VOC (tpd)	NOx (tpd)
NV-9	Hybrid Vehicle Purchase	0.0009	0.0004
NV-10	Bicycle Lane/Trail	0.0124	0.0127
NV-11	Sidewalk Improvements	0.0007	0.0007
NV-12	CNG Buses	0.0004	0.0174
	Sub-Total	0.0144	0.0312

Appendix H

Severe Area Plan Commitments



COMMONWEALTH

Post-it® Fax Note	7671	Date	4/9/03	# of pages	3
To	Joan Roberts	From	Jim Pontreille		
Co./Dept.	MWCOG	Co.	VA DEQ		
Phone #	3203	Phone #	804 698 4405		
Fax #	202 962 3358	Fax #			

DEPARTMENT OF ENVIRONMENTAL QUALITY
 Street address: 629 East Main Street, Richmond, Virginia 23219
 Mailing address: P.O. Box 10009, Richmond, Virginia 23240
 Fax (804) 698-4500 TDD (804) 698-4021
 www.deq.state.va.us

W. Taylor Murphy, Jr.
 Secretary of Natural Resources

Robert G. Burnley
 Director

(804) 698-4000
 1-800-592-5482

April 8, 2003

Donald S. Welsh, Regional Administrator
 U.S. Environmental Protection Agency
 Region III
 1650 Arch Street
 Philadelphia, Pennsylvania 19103

Dear Mr. Welsh:

On July 2, 2002, the Court of Appeals for the District of Columbia Circuit vacated the United States Environmental Protection Agency's (EPA) approval of the attainment demonstration and 1999 rate-of-progress State Implementation Plans (SIPs) we had submitted for the Washington Metropolitan Area (D.C. Area), and remanded these SIPs to EPA for further action. We also understand that on December 18, 2002, the United States District Court for the District of Columbia ordered EPA to publish proposed rules to approve or disapprove the attainment demonstration and 1999 rate-of-progress SIPs by February 3, 2003, and to publish final rules taking action on these SIPs by April 17, 2003.

Because the D.C. Circuit found that both the attainment demonstration and rate-of-progress SIPs lacked specific contingency measures, as required by the federal Clean Air Act (Act), to be undertaken if the Metropolitan Washington D.C. Area (D.C. Area) failed to make reasonable further progress, or to attain the national primary ambient air quality standard (NAAQS) by the attainment date, we understand that EPA cannot approve either SIP in its current form. Also, with respect to the attainment demonstration, the Court determined that the SIP lacked an appropriate analysis of reasonably available control measures (RACM), as required by the Act.

Therefore, by letter dated January 14, 2003, we made commitments to submit, no later than April 17, 2004, certain revisions to these plans necessary to secure their approval. On February 3, 2003, EPA published a rulemaking notice (68 FR 5246) proposing conditional approval of these plans contingent upon our fulfilling the commitments made in our January 14,

2003, letter no later than April 17, 2004. We understand that there are additional requirements of severe ozone nonattainment areas which are due to EPA by March 1, 2004, as provided in your final rule published on January 24, 2003, (68 FR 3424) which changed the ozone nonattainment area classification for the D.C. Area from serious to severe.

The purpose of this letter is two-fold. First, it is to reaffirm and expand upon the commitments made in our letter of January 14, 2003, and to reaffirm that we shall fulfill those commitments by no later than April 17, 2004. Secondly, this letter is to further commit to fulfill the additional requirements of severe ozone nonattainment areas by no later than April 17, 2004, for purposes of satisfying conditional approval of these plans.

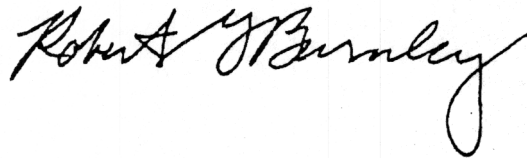
Our commitments are as follows:

- 1) We commit to submit to EPA, not later than April 17, 2004, a contingency plan containing those adopted measures that qualify as contingency measures due to the failure of the D.C. Area to attain the one-hour ozone standard for serious areas by November 15, 1999, and also those adopted measures that qualify as contingency measures to be implemented if EPA notifies the states that the D.C. Area did not achieve the required 9% rate of progress (ROP) reductions by November 15, 1999, and those adopted contingency measures to be implemented if the D.C. Area does not achieve the 9% ROP reductions required for the post-1999 period.
- 2) We also commit to submit to EPA, not later than April 17, 2004, adopted contingency measures to be implemented if the D.C. Area does not attain the one-hour ozone NAAQS by November 15, 2005. Additionally, by April 17, 2004, we commit to submitting to EPA an appropriate RACM analysis for the D.C. Area, along with any revisions to the attainment demonstration SIP necessitated by such analysis, including adopted measures to demonstrate timely attainment and meet RACM requirements, should there be any.
- 3) We also commit to revise, and submit to EPA, not later than April 17, 2004, an updated attainment demonstration SIP that reflects revised MOBILE6-based motor vehicle emissions budgets, including revisions to the attainment modeling and/or weight of evidence demonstration as well as adopted measures as necessary, to demonstrate that the SIP continues to demonstrate attainment by November 15, 2005.
- 4) We also commit to submit to EPA, not later than April 17, 2004, a post-1999 ROP plan, including MOBILE6-based mobile source emission budgets, with adopted measures sufficient to achieve emission reductions of ozone precursors of at least 3 percent per year from November 15, 1999, until the attainment date.
- 5) We also commit to submit to EPA, not later than April 17, 2004, revisions to our SIP regulations to redefine the size threshold for major stationary sources of nitrogen oxides (NOx) to those with the potential to emit 25 tpy or more. This submittal will include a formal declaration that once EPA changed the ozone nonattainment area classification for the D.C. Area to severe, the major source threshold of 25 tpy applies to major stationary sources of volatile organic compounds (VOCs) under currently approved SIP regulations.

- 6) We also commit to submit to EPA, not later than April 17, 2004, additional reasonably available control technology (RACT) rules for sources subject to the new lower major source applicability size threshold, or a formal negative declaration that no such sources exist, and/or a formal declaration that any such sources are already subject to RACT under current SIP-approved regulations.
- 7) We also commit to submit to EPA, not later than April 17, 2004, revisions to our new source review (NSR) regulations to apply the 1.3 to 1 offset requirement to major stationery sources of VOCs and NOx.
- 8) We also commit to submit to EPA, not later than April 17, 2004, a revision that identifies and adopts specific enforceable transportation control strategies and transportation control measures to offset any growth in emissions from growth in vehicle miles traveled or number of vehicle trips and to attain reductions in motor vehicle emissions as necessary, in combination with other emission reduction requirements in the D.C. Area, to comply with the ROP requirements for severe areas. We shall consider measures specified in section 108(f) of the Clean Air Act, and choose from among and implement such measures as necessary to demonstrate attainment.
- 9) We also commit to submit to EPA, not later than April 17, 2004, a regulation to meet the fee requirement of section 185 of the CAA for major stationary sources of VOCs and NOx. This regulation would be implemented should the D.C. Area fail to attain the one-hour ozone NAAQS by November 15, 2005.

If you have any questions or need additional information, please let us know.

Sincerely,



Robert G. Burnley

RGB/JES/RAM

c: Judith Katz, EPA, Region III

**MARYLAND DEPARTMENT OF THE ENVIRONMENT**

1800 Washington Boulevard • Baltimore MD 21230

410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
GovernorMichael S. Steele
Lt. Governor

APR 7 2003

Lynn Y. Buhl
Acting SecretaryKendal P. Philbrick
Deputy SecretaryDonald S. Welsh, Regional Administrator
U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia PA 19103

Dear Mr. Welsh.

On July 2, 2002, the Court of Appeals for the District of Columbia Circuit vacated the United States Environmental Protection Agency's (EPA) approval of the attainment demonstration and 1999 rate-of-progress State Implementation Plans (SIPs) we had submitted for the Washington Metropolitan Area (D.C. Area), and remanded these SIPs to EPA for further action. We also understand that on December 18, 2002, the United States District Court for the District of Columbia ordered EPA to publish proposed rules to approve or disapprove the attainment demonstration and 1999 rate-of-progress SIPs by February 3, 2003, and to publish final rules taking action on these SIPs by April 17, 2003.

Because the D.C. Circuit found that both the attainment demonstration and rate-of-progress SIPs lacked specific contingency measures, as required by the federal Clean Air Act (Act), to be undertaken if the Metropolitan Washington D.C. Area (D.C. Area) failed to make reasonable further progress, or to attain the national primary ambient air quality standard (NAAQS) by the attainment date, we understand that EPA cannot approve either SIP in its current form. Also, with respect to the attainment demonstration, the Court determined that the SIP lacked an appropriate analysis of reasonably available control measures (RACM), as required by the Act.

Therefore, on January 14, 2003 we sent a letter to you in which we made commitments to submit, by no later than April 17, 2004, certain revisions to these plans necessary to secure their approval. On February 3, 2003, EPA published a rulemaking notice (68 FR 5246) proposing conditional approval of these plans contingent upon our fulfilling the commitments made in our January 14, 2003 letter by no later than April 17, 2004. We understand that there are additional requirements of severe ozone nonattainment areas, which are due to EPA by March 1, 2004 as provided in your final rule reclassifying the D.C. area from serious to severe nonattainment published on January 24, 2003 (68 FR 3424).



The purpose of this letter is two-fold. First, it is to reaffirm and expand upon the commitments made in our letter of January 14, 2003 and to reaffirm that we shall fulfill those commitments by no later than April 17, 2004. Secondly, this letter is to further commit to fulfill the additional requirements of severe ozone nonattainment areas by no later than April 17, 2004 for purposes of satisfying conditional approval of these plans.

Our commitments are as follows

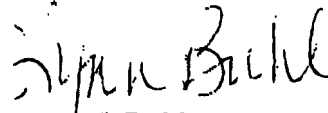
- 1) We commit to submit to EPA, not later than April 17, 2004, a contingency plan containing those adopted measures that qualify as contingency measures due to the failure of the D.C. Area to attain the one-hour ozone standard for serious areas by November 15, 1999 and also those adopted measures that qualify as contingency measures to be implemented if EPA notifies the states that the D.C. Area did not achieve the required 9% rate of progress (ROP) reductions by November 15, 1999 and those adopted contingency measures to be implemented if the area does not achieve the 9% ROP reductions required for the post-1999 period.
- 2) We also commit to submit to EPA, not later than April 17, 2004, adopted contingency measures to be implemented if the D.C. area does not attain the one-hour ozone NAAQS by November 15, 2005. Additionally, by April 17, 2004, we commit to submitting to EPA an appropriate RACM analysis for the D.C. Area, along with any revisions to the attainment demonstration SIP necessitated by such analysis, including adopted measures to demonstrate timely attainment and to meet RACM requirements, should there be any.
- 3) We also commit to revise, and submit to EPA, not later than April 17, 2004, an updated attainment demonstration SIP that reflects revised MOBILE6-based motor vehicle emissions budgets, including revisions to the attainment modeling and/or weight of evidence demonstration as well as adopted measures as necessary, to demonstrate that the SIP continues to demonstrate attainment by November 15, 2005.
- 4) We also commit to submit to EPA, not later than April 17, 2004, a post-1999 ROP plan, including MOBILE6-based mobile source emission budgets, with adopted measures sufficient to achieve emission reductions of ozone precursors of at least 3 percent per year from November 15, 1999 until the attainment date.
- 5) We also commit to submit to EPA, not later than April 17, 2004, revisions to our SIP regulations to redefine the size threshold for major stationary sources of volatile organic compounds (VOCs) and major sources of nitrogen oxides (NOx) to those with the potential to emit 25 tpy or more or a formal declaration that once EPA reclassified the D.C. area to severe ozone nonattainment, the major source threshold of 25 tpy applies to sources of VOC and to sources of NOx under currently approved SIP regulations.
- 6) We also commit to submit to EPA, not later April 17, 2004, additional reasonably available control technology (RACT) rules for sources subject to the new lower major source applicability size threshold, or a formal negative declaration that no such sources exist, and/or a formal declaration that any such sources are already subject to RACT under current SIP-approved regulations.
- 7) We also commit to submit to EPA, not later than April 17, 2004, revisions to our new source review (NSR) regulations to require emission offsets of at least 1.3 to 1 or a formal declaration that once EPA reclassified the D.C. area to severe ozone attainment, the 1.3 to 1 NSR offset requirement applies to major sources of VOC and to sources of NOx under currently approved SIP regulations.

Mr. Donald S. Welsh
Page 3

8) We also commit to submit to EPA, not later than April 17, 2004, a revision that identifies and adopts specific enforceable transportation control strategies and transportation control measures to offset any growth in emissions from growth in vehicle miles traveled or number of vehicle trips and to attain reductions in motor vehicle emissions as necessary, in combination with other emission reduction requirements in the area, to comply with the ROP requirements for severe areas. We shall consider measures specified in section 108(f) of the Clean Air Act, and choose from among and implement such measures as necessary to demonstrate attainment.

9) We also commit to submit to EPA, not later than April 17, 2004, a fee requirement that satisfies Section 185 of the CAA for major stationary sources of VOC and NOx should the area fail to attain by November 15, 2005. Implementation of the fee requirement would be contingent on the continued applicability of the Section 185 requirement to the Metropolitan Washington, D.C. nonattainment area.

Sincerely,

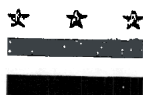


Lynd Y. Buhl
Acting Secretary

cc: Judith Katz

Government of the District of Columbia
Department of Health

Office of the Senior Deputy Director for
Environmental Health Science
and Regulation



April 7, 2003

Donald S. Welsh, Regional Administrator
United States Environmental Protection Agency
Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Mr. Welsh:

On July 2, 2002, the Court of Appeals for the District of Columbia Circuit vacated the United States Environmental Protection Agency's (EPA's) approval of the attainment demonstration and 1999 rate-of-progress (ROP) State Implementation Plans (SIPs) submitted for the Washington Metropolitan Area (D.C. Area), and remanded these SIPs to EPA for further action. On December 18, 2002, the United States District Court for the District of Columbia ordered EPA to publish proposed rules to approve or disapprove the attainment demonstration and 1999 ROP SIPs by February 3, 2003, and to publish final rules taking action on these SIPs by April 17, 2003.

Because the D.C. Circuit Court found that both the attainment demonstration and ROP SIPs lacked specific contingency measures, as required by the federal Clean Air Act (Act), to be undertaken if the Metropolitan Washington D.C. Area (D.C. Area) failed to make reasonable further progress, or to attain the national primary ambient air quality standard (NAAQS) by the attainment date, we understand that EPA will not approve either SIP in its current form. Also, with respect to the attainment demonstration, the Court determined that the SIP lacked an appropriate analysis of reasonably available control measures (RACMs), as required by the Act.

Accordingly, by letter dated January 14, 2003, we committed to submit, by no later than April 17, 2004, certain revisions to these SIPs necessary to secure their approval. On February 3, 2003, EPA published a rulemaking notice (68 FR 5246) proposing conditional approval of these SIPs contingent upon fulfillment of commitments made in our January 14, 2003 letter by no later than April 17, 2004. We understand that there are additional requirements of severe ozone nonattainment areas which are due to EPA by March 1, 2004 as provided in your final rule reclassifying the D.C. area from serious to severe nonattainment published on January 24, 2003 (68 FR 3424).

The purpose of this letter is two-fold. First, it is to reaffirm and expand upon the commitments made in our letter of January 14, 2003 and to reaffirm that we shall fulfill those commitments by no later than April 17, 2004. Secondly, this letter is to further commit to fulfill the additional requirements of severe ozone nonattainment areas by no later than April 17, 2004 for purposes of satisfying conditional approval of these plans. Nothing in these letters should be construed as committing the District of Columbia to anything not required by the Act.

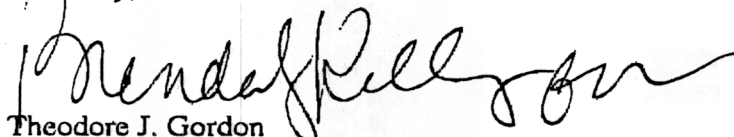
We commit to submit to EPA as SIP revisions, not later than April 17, 2004, the following:

- 1) A contingency plan containing those adopted measures that qualify as contingency measures due to the failure of the D.C. Area to attain the one-hour ozone NAAQS for serious areas by November 15, 1999 and also those adopted measures that qualify as contingency measures to be implemented if EPA notifies the states that the D.C. Area did not achieve the required 9% ROP reductions by November 15, 1999, and those adopted contingency measures to be implemented if the area does not achieve the 9% ROP reductions required for the post-1999 period;
- 2) Adopted contingency measures to be implemented if the D.C. area does not attain the one-hour ozone NAAQS by November 15, 2005 and an appropriate RACM analysis for the D.C. Area, along with any revisions to the attainment demonstration SIP necessitated by such analysis, including adopted measures to demonstrate timely attainment and meet RACM requirements, should there be any; ...
- 3) An updated attainment demonstration SIP that reflects revised MOBILE6-based motor vehicle emissions budgets, including revisions to the attainment modeling and/or weight of evidence demonstration as well as adopted measures as necessary, to demonstrate that the SIP continues to demonstrate attainment by November 15, 2005;
- 4) A post-1999 ROP plan, including MOBILE6-based mobile source emission budgets, with adopted measures sufficient to achieve emission reductions of ozone precursors of at least 3 percent per year from November 15, 1999 until the attainment date;
- 5) Revisions to our SIP regulations to redefine the size threshold for major stationary sources of volatile organic compounds (VOCs) and major sources of nitrogen oxides (NO_x) to those with the potential to emit 25 tons per year (tpy) or more or a formal declaration that once EPA reclassified the D.C. area to severe ozone nonattainment, the major source threshold of 25 tpy applies to sources of VOC and to sources of NO_x under currently approved SIP regulations;
- 6) Additional reasonably available control technology (RACT) rules for sources subject to the new lower major source applicability size threshold, or a formal negative declaration that no such sources exist, and/or a formal declaration that any such sources are already subject to RACT under current SIP-approved regulations;
- 7) Revisions to our new source review (NSR) regulations to require emission offsets of at least 1.3 to 1 or a formal declaration that once EPA reclassified the D.C. area to severe ozone attainment, the 1.3-to-1 NSR offset requirement applies to major sources of VOC and to sources of NO_x under currently approved SIP regulations;

8) A revision that identifies and adopts specific enforceable transportation control strategies and transportation control measures to offset any growth in emissions from growth in vehicle miles traveled or number of vehicle trips and to attain reductions in motor vehicle emissions as necessary, in combination with other emission reduction requirements in the area, to comply with the ROP requirements for severe areas. We shall consider measures specified in section 108(f) of the Act, and choose from among and implement such measures as necessary to demonstrate attainment.

9) Requirements to implement section 185 of the Act.

Sincerely,



Theodore J. Gordon
Senior Deputy Director for
Environmental Health Science and Regulation

cc: Judith Katz, Director, Air Protection Division, EPA Region 3

Appendix I

Contingency Plan Commitments
Emissions Reductions from Phase II RFG Controls
Emissions Reductions from Selected Contingency Measures

1999 Contingency Measure: Emission Benefit Calculations for Phase II RFG

The Reformulated Gasoline (RFG) Program benefits are estimated using MOBILE6 emission factors. These benefits were measured for 2002 projection year by subtracting the emissions calculated with RFG program in place from the emissions calculated without this program.

The Reformulated Gasoline (RFG) Program default RVP values were used in 2002 MOBILE6. Minimum and maximum temperatures of 68.5° and 95° F were used. Emission rates were determined for each jurisdiction with and without RFG program in place and then provided to the Travel Demand Model 2.0 to obtain total emissions in the two cases for each jurisdiction. Difference of the two emissions provided the total RFG benefits for 2002.

2002 Mobile Emissions Inventory

Draft 4/01/03

		VOC				
		Case 2	Case 4	Difference Case 4 - Case 2	Case 5 (Controlled)	Difference Case 5 - Case 4
Network	Start	24.26	22.84	-1.42	22.22	-0.63
	Running	78.69	62.69	-15.99	61.23	-1.46
	Soak	12.84	11.00	-1.84	11.00	0.00
Off-Network	Diurnals	4.34	3.13	-1.21	3.13	0.00
	Resting	12.30	12.31	0.01	12.31	0.00
	Local Roads	12.46	9.68	-2.78	9.48	-0.20
	School Bus	0.43	0.43	0.00	0.43	0.00
	Transit Bus	0.38	0.38	0.00	0.38	0.00
	Auto Access	1.34	1.34	0.00	1.34	0.00
TOTAL		147.04	123.81	-23.23	121.52	-2.29

		NOx				
		Case 2	Case 4	Difference Case 4 - Case 2	Case 5 (Controlled)	Difference Case 5 - Case 4
Network	Start	12.68	12.06	-0.62	12.16	0.10
	Running	254.59	247.04	-7.56	249.76	2.72
	Soak	----	----	----	----	----
Off-Network	Diurnals	----	----	----	----	----
	Resting	----	----	----	----	----
	Local Roads	11.59	11.02	-0.57	11.20	0.18
	School Bus	6.09	6.09	0.00	6.09	0.00
	Transit Bus	6.59	6.59	0.00	6.59	0.00
	Auto Access	1.67	1.67	0.00	1.67	0.00
TOTAL		293.22	284.47	-8.74	287.47	3.00

Measure 12.2.3.6: Locomotive Idling -- Virginia Railway Express

Measure Number:	12.2.3.6	Description:
Measure Name:	Locomotive Idling -- Virginia Railway Express	Sign MOU committing to installation of electrified wayside power units to reduce idling of locomotives

NOx

Estimated Cost (\$/ton)	\$ 7,953
Estimated Reductions (tpd)	0.1

Issues

- VRE will implement this measure for 13 trainsets.

VOC

Estimated Cost (\$/ton)	\$ 79,278
Estimated Reductions (tpd)	0.0

Assumptions

- 13 APUs operate for 95 hours per week (M-F at night, all weekend)
- Locomotives/trainsets would burn 3 gallons/hour at idle
- Without APUs, yard emissions would be:
 - 0.0506 lb VOC/gal
 - 0.5044 lb NOx/gal
- Cost per gallon of diesel fuel: \$0.905 /gal
- Cost of purchasing and installing wayside power unit: \$183,333 per unit
- Cost to provide wayside power: \$3,066 per month per unit
- Periodic testing every 3 years costs \$1,066 per track
- Life of wayside power unit: 20 years

Emission Reductions

Total VOC Reductions = (13 trainsets * 95 hours/wk * 3 gal/hour * 0.0506 lb VOC/gal) / (7 days/wk * 2000 lb/ton)

Total VOC Reductions = 0.0 tons VOC

Total NOx Reductions = (13 trainsets * 95 hours/wk * 3 gal/hour * 0.5044 lb NOx/gal) / (7 days/wk * 2000 lb/ton)

Total NOx Reductions = 0.1 tons NOx

Cost Effectiveness

Annual Cost = (\$183,333/unit * 13 units / 20 year life) + (\$1,066 testing/unit * 13 units / 3 year test) + \$3,066 power cost/unit-month * 13 units * 12 months/yr - (16 units * 95 hours/wk * 3 gal/hour * 52 wks/yr * \$0.905 per gal)

Annual Cost = \$ 387,488

Cost-effectiveness (\$/ton) = \$387,488 / (tons/day * 365 days)

Cost-effectiveness (NOx) = \$ 7,953 per ton NOx

Cost-effectiveness (VOC) = \$ 79,278 per ton VOC

Measure 12.2.3.7: Locomotive Idling -- CSX

Measure Number: 12.2.3.7
Measure Name: Locomotive Idling -- CSX

Description:
 Sign MOU committing to installation of auxiliary power units (APUs) on locomotives to reduce idling emissions from switchyard locomotives

NOx

Estimated Cost (\$/ton)	\$750-\$1,250
Estimated Reductions (tpd)	0.2

Issues

· CSX has 6 locomotives in the District and 16 in the Maryland portion of the Washington nonattainment area that would be candidates for this measure.

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0

Assumptions

- EPA estimates a cost of \$750-1,250 per ton for these reductions
- From information provided by CSX to the District of Columbia Department of Health
 - Installation of APUs on 6 locomotives will reduce 38 tpy NOx and 3 tpy VOC
 - 25% of idling emissions occur during ozone season
- 22 locomotives in the District and Maryland are candidates for this measure

Emission Reductions

Daily Reductions (NOx) = 38 tpy for 6 locomotives * 25% during ozone season * 22/6 locomotive multiplier / 153 days per ozone season

Daily Reductions (NOx) = 0.2 tpd NOx

Daily Reductions (VOC) = 3 tpy for 6 locomotives * 25% during ozone season * 22/6 locomotive multiplier / 153 days per ozone season

Daily Reductions (VOC) = 0.0 tpd VOC

Cost Effectiveness

Cost-effectiveness (NOx) = \$750-\$1,250

Measure 12.2.3.8: Cetane-Enhancing Diesel Additive: Highway Engines

Measure Number:	12.2.3.8	Description:
Measure Name:	Cetane-Enhancing Diesel Additive: Highway Engines	Require on-road diesel vehicles to use cetane-enhanced fuel during ozone season

NOx

Estimated Cost (\$/ton)	\$ 50,930
Estimated Reductions (tpd)	1.59

Issues

- Because Maryland does not permit splash blending, any cetane additive would need to be blended at the terminal
- The region would need to obtain an EPA Fuel Waiver to implement this measure
- Benefits from the additive decrease at idle or very low speed.

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0

Assumptions

- From 2005 controlled inventory, on-road NOx emissions will be 287.5 tpd in 2005
- Analysis of Montgomery County emissions in MOBILE6, diesel vehicles make up 41.1% of NOx emissions at 35 mph
- Use Montgomery County data as proxy for regional average
- Average regional cetane number is 45
- Additive will increase cetane number to 50
- From Ethyl Corp and EPA draft technical report, "Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines"⁸, increasing cetane number from 45 to 50 will reduce on-highway NOx emissions by 1.63% in 2005
- From Ethyl Corp., cost of additive would be \$0.01-\$0.015 per gallon
- Estimate cost of transportation and mixing of additive at additional \$0.045 per gallon (total additive cost \$0.06 per gallon)
- From EIA Petroleum Marketing Monthly, average daily consumption of No. 2 on-road diesel fuel during the 2002 ozone season (May-Sept) was:
 - District: 14,400 gallons per day
 - Maryland: 1,216,480 gallons per day
 - Virginia: 3,068,220 gallons per day
- From US Census Bureau County Population Estimates for 2002, percentage of state population in Metro Washington nonattainment area is:
 - District: 100%
 - Maryland: 39.6%
 - Virginia: 27.7%
- Assume that areas of state use diesel fuel in proportion to percentage of state population

Emission Reductions

Daily Reductions (NOx) = 236.7 tpd * 41.1% from HDD * 1.63% reduction
 Daily Reductions (NOx) = 1.59 tpd NOx

Cost Effectiveness

Daily Expenditure = (14,400 gal DC + 1,216,480 gal * 39.6% MD + 3,068,220 gal * 27.7% VA) * \$0.06 per gallon

Daily Expenditure = \$ 80,761

Cost-effectiveness (\$/ton) = \$80,761 / (tons per day)

Cost-effectiveness (NOx) = \$ 50,930

Cost-effectiveness (VOC) = N/A

References

Energy Information Administration, "Petroleum Marketing Monthly"

US Census Bureau "County Population Estimates"

US EPA, "Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines: Final Technical Report", EPA Report 420-R-03-002, February 2003

Measure 12.2.3.9: Cetane-Enhancing Diesel Additive*: Non-Road Engines

Measure Number:	12.2.3.9	Description:
Measure Name:	Cetane-Enhancing Diesel Additive*: Non-Road Engines	Require non-road diesel vehicles to use cetane-enhanced fuel

NOx

Estimated Cost (\$/ton)	\$ 62,063
Estimated Reductions (tpd)	1.66

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0

Issues

- Because Maryland does not permit splash blending, any cetane additive would need to be blended at the terminal
- The region would need to obtain an EPA Fuel Waiver to implement this measure
- Benefits from the additive decrease at idle or very low speed.

Assumptions

- Average regional cetane number is 45
- Additive will increase cetane number to 50
- From EPA draft technical report, "Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines", increasing cetane number from 45 to 50 will reduce off-road NOx emissions by:
 - 2.11% from all years from 2003-2007
- From controlled 2005 inventory, non-road NOx emissions from diesel equipment will be 78.79 tpd NOx
- From EIA Petroleum Marketing Monthly, average daily consumption of No. 2 distillate during the 2002 ozone season (May-Sept) was:
 - District: 22,700 gallons per day
 - Maryland: 1,582,300 gallons per day
 - Virginia: 3,864,086 gallons per day
- From US Census Bureau County Population Estimates for 2002, percentage of state population in Metro Washington nonattainment area is:
 - District: 100%
 - Maryland: 39.6%
 - Virginia: 27.7%
- Assume that areas of state use diesel fuel in proportion to percentage of state population
- From Ethyl Corp., cost of additive would be \$0.01-\$0.015 per gallon
- Estimate cost of transportation and mixing of additive at additional \$0.045 per gallon (total additive cost \$0.06 per gallon)

Emission Reductions

Daily Reductions (NOx) = 78.79 tpd * 2.11% reduction
 Daily Reductions (NOx) = 1.66 tpd NOx

Cost Effectiveness

Daily Expenditure= (22,700 gal DC + 1,582,300 gal * 39.6% MD + 3,864,086 gal * 27.7% VA) * \$0.06 per gallon
 Daily Expenditure= \$ 103,179

Cost-effectiveness (\$/ton) = \$103,179 / (tons per day)

Cost-effectiveness (NOx) = \$ 62,063
 Cost-effectiveness (VOC) = N/A

Measure 12.2.3.10: Cetane-Enhancing Diesel Additive: Local School Buses

Measure Number:	12.2.3.10	Description:
Measure Name:	Cetane-Enhancing Diesel Additive: Local School Buses	Commit to use cetane-enhanced fuel in local school buses

NOx

Estimated Cost (\$/ton)	\$ 55,719
Estimated Reductions (tpd)	0.1

Issues

- Because Maryland does not permit splash blending, any cetane additive would need to be blended at the terminal
- Benefits from the additive decrease dramatically at idle or very low speed.

VOC

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0

Assumptions

- From 2005 controlled inventory, regional school buses will emit 5.49 tpd NOx in 2005
- Average regional cetane number is 45
- Additive will increase cetane number to 50
- From Ethyl Corp and EPA draft technical report, "Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines"⁸, increasing cetane number from 45 to 50 will reduce on-highway NOx emissions by 1.63% in 2005
- Measure verifies reductions of NOx only
- From Ethyl Corp., cost of additive would be \$0.01-\$0.015 per gallon
- Estimate cost of transportation and mixing of additive at additional \$0.045 per gallon (total additive cost \$0.06 per gallon)
- From MOBILE6 modeling, school buses average 6.19 mpg and will travel 514,400 miles per day in 2005
- From regional data used in MOBILE6 modeling, regional school buses will travel 514,400 miles per day in 2005

Emission Reductions

Daily Reductions (NOx) = 5.49 tpd * 1.63% reduction
Daily Reductions (NOx) = 0.089 tpd NOx

Cost Effectiveness

Daily Expenditure = \$0.06 per gallon * 514,400 miles per day / 6.19 miles per gallon
Daily Expenditure = \$ 4,986

Cost-effectiveness (\$/ton) = \$4,986 / (tons per day)

Cost-effectiveness (NOx) = \$ 55,719

Cost-effectiveness (VOC) = N/A

References

US EPA, "Effect of Cetane Number Increase Due to Additives on NOx Emissions from Heavy-Duty Highway Engines: Final Technical Report", EPA Report 420-R-03-002, February 2003

Appendix J

EPA Voluntary Measures Guidance
Allowable Tonnage from Voluntary Measures
Voluntary Measure Documentation

MEMORANDUM

SUBJECT: Guidance on Incorporating Voluntary Mobile Source Emission Reduction Programs in State Implementation Plans (SIPs).

FROM: Richard D. Wilson,
Acting Assistant Administrator
for Air and Radiation

TO: EPA Regional Administrators, 1 - 10

Introduction

This memorandum provides guidance and sets forth the Environmental Protection Agency's (EPA) policy and interpretation regarding the granting of explicit State Implementation Plan (SIP) credit for Voluntary Mobile Source Emission Reduction Programs (VMEPs) under section 110 of the Clean Air Act. Voluntary mobile source measures have the potential to contribute, in a cost-effective manner, emission reductions needed for progress toward attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). EPA believes that SIP credit is appropriate for voluntary mobile source measures where we have confidence that the measures can achieve emission reductions. This memorandum announces EPA's intent to grant emission reduction credits for VMEPs, the terms and conditions for establishing and implementing VMEPs, and the requirements for approvable VMEP SIP submittals.

The establishment of this policy pertains solely to voluntary mobile source programs and is not intended to establish precedent for other air emissions source categories. Guidance on emission reduction credits for voluntary activities for other source categories may be established through future guidance documents. This policy also does not change existing EPA policy on credits for mobile source measures in the context of emissions trading programs or Economic Incentives Programs.

Policy Summary

The Clean Air Act Amendments of 1990 increased the responsibility of States¹ to demonstrate progress toward attainment of the NAAQS. At the same time, air pollution control programs in the U.S. have had difficulty regulating the emission reduction potential of smaller or unconventional sources. EPA supports innovative methods in achieving air quality goals and wishes to promote the creation of viable voluntary mobile source air quality programs. The desire to recognize the emission reductions from these sources has led the Agency to develop policies to support an increasing variety of innovative approaches. EPA recognizes that emission reduction credit toward SIP air quality demonstrations can be a positive factor for gaining political and institutional support for program development and implementation. The demonstration of air quality benefits is also desirable for program assistance through EPA's section 105 grants and is a requirement for project eligibility under the Department of Transportation's Congestion Mitigation and Air Quality Improvement (CMAQ) program.

This memorandum is intended to clarify the basic framework for ensuring that VMEPs become eligible for SIP credit. Generally, a State would submit a SIP which 1) identifies and describes a VMEP; 2) contains projections of emission reductions attributable to the program, along with relevant technical support documentation; 3) commits to monitor, evaluate, and report the resulting emissions effect of the voluntary measure; and 4) commits to remedy in a timely manner any SIP credit shortfall if the VMEP program does not achieve projected emission reductions.

EPA anticipates that this policy will generate additional interest and resources toward VMEP development and data collection. EPA wishes to ensure that the potential benefits of VMEPs are properly quantified and that these benefits are sustained as successful components of the SIP. As experience and information regarding the effectiveness of VMEPs becomes available, EPA intends to provide further technical guidance and assistance to the States. As States and EPA gain more experience with VMEPs in quantifying emissions benefits, more precise information will be available in determining the effectiveness of a range of programs. The type of information that EPA expects to gain from evaluating VMEPs includes emissions benefits, public response and education, cost of implementation, secondary indicators\benefits, quantification methodologies, and data collection.

¹Throughout this document, the term "State" refers to any state or local government body or agency with the authority to submit SIPs to EPA for approval.

EPA hopes that the effect of this policy will be to generate sufficient information and programmatic experience to warrant a wider application of VMEPs for progress toward attainment under the new NAAQS policy framework. EPA believes that States should benefit from this policy by having a wider range of programmatic options to consider. This policy will ultimately support the creation of new, cost-effective air quality programs and market-based incentives.

Background

Historically, mobile source control strategies have focused primarily on reducing emissions per mile through vehicle and fuel technology improvements. Tremendous strides have been made resulting in new light-duty vehicle emission rates which are 70 to 90 percent less than for the 1970 model year. However, transportation emissions continue to be a significant cause of air pollution due to a doubling of vehicle miles traveled (VMT) from 1970 to 1990, and tripling since 1960. In some quickly developing urban areas, the more recent VMT growth rate is even more dramatic. In San Diego, California, VMT tripled between 1970 and 1990. VMT in Las Vegas, Nevada, increased 160 percent from 1981 to 1991, and nearly doubled in Phoenix, Arizona, during the same time period.

The increasing cost of technological improvements to produce incrementally smaller reductions in grams per mile or grams per kilowatt hour emissions in the entire fleet of vehicles and engines, along with the time it takes for technological improvements to penetrate the existing fleets, suggests that supplemental or alternative approaches for reducing mobile source air pollution are necessary. Mobile source strategies which attempt to complement existing regulatory programs through voluntary, nonregulatory changes in local transportation sector activity levels or changes in in-use vehicle and engine fleet composition are being explored and developed.

A number of such voluntary mobile source and transportation programs have already been initiated at the State and local level in response to increasing interest by the public and business sectors in creating alternatives to traditional emission reduction strategies. Some examples include economic and market-based incentive programs, transportation control measures, trip reduction programs, growth management strategies, ozone action programs, and targeted public outreach. These programs attempt to gain additional emissions reductions beyond mandatory Clean Air Act programs by engaging the public to make changes in activities that will result in reducing mobile source emissions.

Definitions

The following definitions apply to VMEPs as described in this memorandum.

Voluntary Measures: Emission reduction programs that rely on voluntary actions of individuals or other parties for achieving emission reductions.

Seasonal Measures: Emission reduction programs that are in effect only during the season in which the area experiences high pollutant concentrations.

Episodic Measures: Activity-based mobile source programs that are implemented during identified periods of high pollutant concentrations, varying by meteorological conditions. These measures may or may not be continuous in nature depending on program design. The statutory authority for approval of episodic measures in SIPs applies only to activity-based mobile source emission reduction measures as explained below.

Clean Air Act Authority

EPA plans to use its authority under the Clean Air Act to allow SIP credit for new approaches to reducing mobile source emissions. This policy represents a flexible approach regarding the SIP requirements set forth in section 110², and economic incentive provisions in section 182 and 108 of the Act. This policy responds to State and local government interest in gaining SIP credits and funding for VMEP programs which will count toward their State's plan to make progress toward attainment and maintenance of the NAAQS and builds on EPA's history of approving measures that rely to some degree on voluntary compliance, such as provision of mass transit. Recognizing that only a limited amount of implementation experience currently exists, and that information on VMEP effectiveness will be evaluated and reported as a result of this policy, EPA plans to re-evaluate this policy in the future.

Authority to approve of voluntary measures in SIP

EPA believes that it has authority under CAA section 110 to approve voluntary measures in a SIP for emission reduction credit. However, EPA believes that as part of its SIP submittal a State must commit to monitor, evaluate, and report the resulting emissions effect of the voluntary measure, whether

²The requirements regarding emission reductions needed to achieve attainment of the NAAQS.

the measure is implemented directly by the State or another party, and to remedy in a timely manner any credit shortfall.

In light of the increasing incremental cost associated with additional mobile source emission reductions, the lead time required for new technologies to penetrate fleets, and the increasing need to target mobile source use to realize reductions, where voluntary measures meet the requirements of this policy, EPA believes that it is appropriate and consistent with the Act to allow a limited percentage of the total emission reductions needed to satisfy any statutory requirement, as described below, to come from voluntary measures. In the event the voluntary measure does not achieve the projected emission reductions, the State, having previously committed in its SIP to remedying such shortfalls, will pursue appropriate follow-up actions in a timely fashion including, but not limited to: adjusting the voluntary measure, adopting a new measure, or revising the VMEP emission credits to reflect actual emission reductions, provided overall SIP commitments are met. EPA believes that voluntary mobile source measures, in conjunction with the enforceable commitment to monitor emission reductions achieved and rectify any shortfall, meet the SIP control measure requirements of the Act.

Establishment of a cap on SIP credits allowed for VMEPs

Under this policy, in light of the innovative nature of voluntary measures and EPA's inexperience with quantifying their emission reductions, EPA is setting a limit on the amount of emission reductions allowed for VMEPs in a SIP. The limit is set at three percent (3%) of the total projected future year emissions reductions required to attain the appropriate NAAQS. However, the total amount of emissions reductions from voluntary measures shall also not exceed 3% of the statutory requirements of the CAA with respect to any SIP submittal to demonstrate progress toward, attainment of, or, maintenance of the NAAQS³. EPA has analyzed a number of voluntary mobile source programs which could be incorporated into a SIP. The emission reduction potential of these programs is generally a fraction of one ton per day. A three percent limit on emission reductions from VMEPs will allow areas to implement and claim SIP credit for a significant number of voluntary mobile source programs. This

³For example, an ozone area classified as severe needing reductions of 200 tpd of volatile organic compounds (VOC) and 100 tpd of oxides of nitrogen (NO_x) from the projected year 2005 baseline inventory could rely on VMEPs for up to 3% of the required reductions from each pollutant, or 6 tpd of VOC and 3 tpd of NO_x. The area could also use all or a portion of these same reductions for purposes of meeting interim rate-of-progress (ROP) milestones, but again the 3% limit would apply. Thus, if the area needed 25 tpd of creditable VOC reductions to meet the 1999 ROP target, no more than 0.75 tpd of the VOC reduction in the 1999 ROP plan could come from VMEPs.

cap still provides a sufficient incentive for developing and implementing VMEPs, while setting a limit on the extent to which a SIP can rely on innovative programs with which we have had limited experience.

In accordance with the Act language (section 182 (g)(4)(~~A~~)), the EIP applies to incentives and requirements to reduce vehicle emissions and vehicle miles traveled, including TCMs contained in section 108 of the Act. In addition, the EIP defines mobile sources to mean on-road (highway) vehicles (e.g., automobiles, trucks and motorcycles) and non-road vehicles (e.g., trains, airplanes, agricultural equipment, industrial equipment, construction vehicles, off-road motorcycles, and marine vessels). In certain cases, States are required to adopt EIP provisions into their State Implementation Plan (SIP). The EIP also serves as guidance for all other States that choose to adopt EIP provisions into their SIP as non-mandatory EIPs. In 1994, the Agency issued EIP rules and guidance (40 CFR part 51 subpart U), which outlined requirements for establishing these programs.

Relationship to Economic Incentive Programs

The 1990 Amendments statutorily required the Agency to develop Economic Incentive Program (EIP) rules⁴. The EIP provides general SIP guidance for the adoption of incentive and other innovative programs. Some programs that depend on voluntary actions also require either State or local government authorization to implement the program. In these cases, which include certain transportation control measures such as congestion pricing programs, it may be more appropriate to use the EIP authority to incorporate the measure into the SIP. Further, where emissions reductions are expected to exceed the 3% limit, EPA would anticipate the State could use the EIP to incorporate measures. If a State wishes to have a VMEP approved under the EIP program rules, EPA is willing to work with the State to develop such a program.

Approval of Voluntary Measures into the SIP - Key Criteria

This section sets forth minimum criteria for approval of VMEPs into SIPs. These criteria require that the VMEP not interfere with other requirements of the Clean Air Act, be consistent with SIP attainment and Rate of Progress requirements, and that emission reductions be:

1. Quantifiable - VMEP emission reductions must be quantifiable. The level of uncertainty in achieving emission reductions must be quantified, and this uncertainty must be reflected in the projected emission reductions claimed by the VMEP. VMEPs must also contain procedures designed to both evaluate program implementation and to report program results as described in the section A Technical Support for VMEPs@ of this guidance.

2. Surplus - The VMEP emission reductions may not be substituted for mandatory, required emission

⁴In accordance with the Act language (section 182 (g)(4)(A)), the EIP applies to incentives and requirements to reduce vehicle emissions and vehicle miles traveled, including TCMs contained in section 108 of the Act. In addition, the EIP defines mobile sources to mean on-road (highway) vehicles (e.g., automobiles, trucks and motorcycles) and non-road vehicles (e.g., trains, airplanes, agricultural equipment, industrial equipment, construction vehicles, off-road motorcycles, and marine vessels). In certain cases, States are required to adopt EIP provisions into their State Implementation Plan (SIP). The EIP also serves as guidance for all other States that choose to adopt EIP provisions into their SIP as non-mandatory EIPs. In 1994, the Agency issued EIP rules and guidance (40 CFR part 51 subpart U), which outlined requirements for establishing these programs.

reductions. States may submit to EPA for approval any program that will result in emission reductions in addition to those already credited in a relevant attainment or maintenance plan, or used for purposes of SIP demonstrations such as conformity, rate of progress, or emission credit trading programs.

3. Enforceable - A State's obligations with respect to VMEPs must be enforceable at the State and Federal levels. Under this policy, the State is not responsible, necessarily, for implementing a program dependent on voluntary actions. However, the State is obligated to monitor, assess and report on the implementation of voluntary actions and the emission reductions achieved from the voluntary actions and to remedy in a timely manner emission reduction shortfalls should the voluntary measure not achieve projected emission reductions. As stated earlier, EPA anticipates that the State will take the steps it determines to be necessary to assure that the voluntary program is implemented and that emission reductions are achieved so that corrective SIP actions are not required. For example, the State may want to sign a Memorandum Of Understanding (MOU) with the VMEP sponsors.

Any uncertainty in the emission reductions projected to be achieved by the VMEP must be estimated and reflected in the emission reduction credits claimed in the SIP. As part of this submission, the State must commit to conducting program evaluations within an appropriate time-frame. The State must also report the resulting information to EPA within an appropriate time-frame in order to document whether the program is being carried out, and emission reductions are being achieved as described in the SIP submittal. Through the program evaluation provisions contained in this policy EPA anticipates that States will discover any potential emission reduction shortfall in a timely manner and appropriately account for such shortfall either by changing the program to address the shortfall, adopting a new measure, or revising the VMEP's emission credits to reflect actual emission reductions achieved, provided overall SIP commitments are met.

4. Permanent - Emission reductions produced by the VMEP must continue at least for as long as the time period in which they are used by applicable SIP demonstrations. The VMEP need not continue forever to generate permanent emissions reductions, but must specify an appropriate period of implementation in the SIP. Voluntary actions in such a program, and the resulting emission reductions, can be discrete (temporary) or continuous, depending on the nature of the program. For example, an ozone action day program which takes effect over an ozone season, but calls for specific actions on days when exceedences of the ozone standard are likely (i.e., episodic measures) is considered a continuous program producing discrete (temporary) reductions, and therefore the reductions are SIP creditable.

5. Adequately Supported - As with all SIP creditable programs, VMEPs must demonstrate adequate personnel and program resources to implement the program.

Approval of Episodic Measures

EPA has concluded that episodic transportation control measures and other mobile source related market response measures may be approved for SIP credit under the Act. Prior to the 1990 amendments to the Act, EPA believed that section 123 of the Act, which bars the use of dispersion techniques in calculating emission limitations, might apply to all control measures, including transportation and mobile source market controls. However, new language was added to the Act in the 1990 amendments that EPA believes indicates a clear congressional intent to allow and even require the incorporation of episodic transportation and mobile source market response programs in SIPs.

Several new requirements added to the Act in 1990 specifically require adoption of transportation control measures as listed in section 108(f)(1) of the Act under certain circumstances. See, for example, section 182(c)(5) - Transportation Controls and section 182(d)(1) - Vehicle Miles Traveled. Section 108(e) and (f) authorizes EPA to issue guidance on various types of transportation control measures available for selection in the control programs required under section 182. Section 108(f)(1)(B) identifies methods that contribute to reductions in mobile source related pollutants during periods in which a primary NAAQS will be exceeded. Episodic transportation and market response measures designed to operate during periods when ambient pollution levels are anticipated to exceed the NAAQS clearly fall within the scope of these types of programs that Congress has authorized areas to include in their section 182 transportation and vehicle miles traveled programs.

EPA therefore concludes that any implication that section 123 may have applied to transportation and mobile source market response programs under the Act as amended in 1977 has been clarified by the Act as more recently amended in 1990 by the addition of the specific authorization for adoption of any program identified in section 108(f) under the transportation control programs required under section 182.

Technical Support for VMEPs

A State may take credit in its SIP for VMEPs only if they are quantifiable. VMEPs which are thought to be directionally sound, but for which quantification is not possible cannot be granted credit. EPA believes that carefully designed and implemented VMEPs are quantifiable to the extent necessary to grant SIP credit.

All VMEP submittals must include documentation which clearly states how the sources from which the reductions are occurring, are currently, or will be addressed in the emissions inventory, ROP plan, and attainment or maintenance plan, as applicable. This documentation should include a description of the assumptions used in estimating and tracking emissions and emissions reductions from affected sources.

The following sections are intended to provide general guidance on the elements of emission reduction calculation and evaluation procedures that must be addressed in a VMEP SIP submittal.

Emission Reduction Calculation

To receive SIP credit for a VMEP, the SIP submittal must contain a good faith estimate of emission reductions, including technical support documentation for the conclusion that the measure will produce the anticipated emission reductions. VMEP emission reduction calculations must account for and be adjusted to reflect uncertainties in the program. The calculations must be adjusted to account for two types of uncertainty:

compliance uncertainty - the extent to which the responsible party (a public or private entity) will fully implement the VMEP program, and

programmatic uncertainty - the extent to which voluntary responses actually occur and/or the inherent uncertainties of program design.

The State must adjust the VMEP calculation for compliance and programmatic uncertainty, based on program design elements, and on the predictive quality of the information, data, and analytic methodology used by the State to develop the projected emission reductions. The State must justify the appropriateness of the adjustments in its VMEP SIP submittal, usually as part of the technical support document.

The adjusted emission reduction estimate should be developed and justified by the State by taking into account various elements of the VMEP program design. These elements could include, but not be limited to: the voluntary mechanism upon which the program is based, such as public outreach or reduced fares; the variability in emission rates from affected mobile sources; the extent of uncertainty in the emissions quantification procedure; and the frequency and type of program evaluation, monitoring, record keeping and reporting.

Evaluation Reporting Procedures

States which use VMEPs in their SIP must describe how they plan to evaluate program implementation and report on program results in terms of actual emissions reductions. Program evaluation provisions for VMEPs must be accompanied by procedures designed to compare projected emission reductions with actual emissions reductions achieved. The timing of the evaluations must be specified in the VMEP SIP submittal. The States and program sponsors will benefit from accurate and complete evaluation reports. EPA expects that program evaluations and experience gained over time will result in VMEP modifications to increase effectiveness.

The State must provide timely post-evaluation reports to the EPA relevant to the SIP time-frame in which the emission reductions are being used. These reports may be used by EPA for the

purpose of reviewing subsequent SIP submissions required by the CAA, including but not limited to: periodic inventories, rate of progress (milestone compliance demonstrations), attainment demonstrations, and maintenance demonstrations.

EPA is working with State and local government representatives to develop methodologies which would provide sufficient technical support for VMEP SIP submissions. As results become available, EPA will provide technical guidance to assist in the development of VMEP emission reduction estimates and program evaluation procedures. However, EPA's policy is to recognize the experience of State and local voluntary programs in quantifying emission reductions and evaluating program results. Acceptable methodologies and procedures will not be limited to those developed by EPA, and programs are encouraged to discuss technically sound alternative methods with EPA Regional Office staff.

VMEP Emission Reduction Use

As explained above, under Title I of the Clean Air Act, EPA is permitting a limited amount of voluntary mobile source measures to be included in SIPs and FIPs and to be adopted for any criteria pollutant in both nonattainment and attainment areas. VMEP emission reductions shall be limited in use as determined by existing applicable SIP policy including offsets, Rate of Progress, attainment demonstrations, baseline determinations, redesignation and maintenance demonstrations.

Future Guidance and Regional Coordination

It is incumbent upon EPA Regional Offices and Headquarters to coordinate the implementation of this policy through consultation and exchange of information. It will be necessary to determine the appropriateness of individual VMEPs, applicability of emission reductions, development of methodologies to estimate emission reductions (including the appropriateness of uncertainty adjustments), peer review, and standardization of policy. To the extent that issues cannot be resolved through ongoing coordination efforts between Regional and Headquarter offices, issues may be ultimately raised through the SIP consistency process. EPA encourages early consultation between project sponsors, planners, and EPA's Regional offices during the development of VMEPs.

For further information on EPA's policy on VMEPs or the guidance set forth in this memorandum, contact Michael Ball of the Office of Mobile Sources, at 313-741-7897.

Attachments

Examples of Voluntary Mobile Source Emission Reduction Programs

The following are some examples which are representative of voluntary mobile source emission reduction programs (VMEPs) that could be implemented and credited with emission reductions for SIP related purposes. These programs can and have been designed to be implemented on an episodic, seasonal, or a continual basis. More program examples and ideas may be found on the following websites:

EPA Office of Mobile Source Smart Travel Resources Center web site
(www.epa.gov/omswww/strc.htm)

Market Incentive Resource Center (www.epa.gov/omswww/market.htm)

Episodic Measures Database (www.epa.gov/omswww/reports/episodic/study/htm)

Employer Based Transportation Management Programs

Various programs implemented by employers to manage the commute and travel behavior of employees, such as: van pooling, car pooling, subscription buses, walking, shuttle services, guaranteed rides home, alternative work schedules, financial incentives (transit passes and subsidies) and on-site TDM support.

Work Schedule Changes

Changes in work schedules to provide flexibility to employees to commute outside of peak travel periods, such as: telecommuting, flextime, compressed work weeks, staggered work hours.

Area-wide Rideshare Incentives

Promotional assistance aimed at encouraging commuters to use alternatives to single occupant vehicles, such as: marketing of ridesharing services, transit station shuttles, computerized carpool matching, vanpool matching, program implementation assistance.

Parking Management

Management of parking supply and demand, such as: preferential parking locations for carpools and vanpools, preferential parking prices for carpools and vanpools, fee structures that discourage commuter parking, reduced parking for new developments.

Special Event Travel Demand Management

Special plans to manage travel demand in effect during special events, defined as destinations for a large number of vehicle trips which occur on a one-time, infrequent, or scheduled basis (such as athletic events, festivals, and major entertainment performances). These measures could include parking management, remote parking connecting with transit or shuttle services, efficient traffic routing efforts, public information and communications systems.

Vehicle Use Limitations/Restrictions

Techniques to limit vehicle activity in a given geographic area or specified time period, such as: auto restricted zones, pedestrian malls, traffic calming, no-drive days, commercial truck restrictions on parking and idling.

Reduced Vehicle Idling

Measures to reduce the amount of time which vehicles spend in idle modes as part of their overall operation, such as: reduced operations of drive-thru facilities such as banks and fast-food restaurants, reduced construction of drive-thru facilities, programs that facilitate reducing idling at truck stops, transfer facilities and loading docks at commercial developments.

Small Engine and Recreational Vehicle Programs

Measures targeted at reducing the frequency and duration of small engine and recreational vehicle use. Other programs aim to shift the time period in which emissions producing activities, such as lawn and landscape maintenance, take place so that the negative impact on air quality is reduced. These measures are usually associated with episodic or seasonal control programs with a significant component of public education and outreach to encourage the voluntary change in activities.

Example of a Voluntary Program

Program scenario: A State air quality agency is approached by a public utility to begin a lawn mower buy back program. The State would like to take credit for the emissions reductions from this private sector activity in its 15% plan.

Up-front credit: The State would like to take credit predicting the effect of the program in reducing emissions associated with replacing uncontrolled lawnmower emissions with electric -- non polluting lawnmowers.

SIP Submittal

General Process

- C State notifies EPA of its intent to take credit for voluntary lawnmower program. Includes program information and technical support documentation and commitment to remedy any emission reduction shortfall in a timely manner.
- C Regional Office reviews and approves up-front credit after comments.
- C Activity is conducted by the public utility.
- C State verifies that the program achieved the predicted benefits and generates information for EPA review.
- C Regional Office reviews the State SIP submission and determines that the credits have been achieved as predicted. Also approved under milestone compliance.

Program Identification: State submits to EPA its intent to conduct or take credit for the voluntary lawn mower buy back program in the SIP. The State will describe how the program or activity will work in practice. In the submission, the State will describe the following program elements.

Program participants

How the program works

Activity effects

Emission effects

State commitment for evaluation, reporting, remedying emission credit shortfall

Technical support documentation

Program Participants The State will identify the sponsors of the program. In this case the public utility.

How the Program Works As part of the submittal the State will include a description of the basic program, predicted effect of the program on a given NAAQS criteria pollutant and a commitment to evaluate the program over the desired period of implementation and remedy any emission reduction shortfall in a timely manner.

In the submittal, the State describes the basic program including how the utility intends to facilitate the activity-- buy back of lawn mowers. On three consecutive Saturdays, the utility customers and employees are able to bring in their gasoline powered lawnmowers and receive a voucher toward the purchase of any new electric lawnmower.

Activity Effects The State will submit predicted and observed activity effects. Data will be generated and analyzed which examines the predicted and actual effect of the program.

In this case, using information provided by the utility, the State estimates that 2000 lawnmowers would be replaced by non-polluting electric mowers.

Emission Effects Activity effects ultimately are translated into emissions benefit calculations (usually in tons per day\per year).

The State would be given up-front credit for emission reductions in terms of HC, CO and other NAAQS criteria pollutants for 2000 mowers being replaced by electric mowers.

State Commitment for Evaluation, Reporting, and Addressing Credit Shortfall The State will be responsible for ensuring that data will be collected regarding participation and the effectiveness of the program. In addition, the State must commit to remedy any SIP credit shortfall in a timely manner if the voluntary measure does not achieve projected emission reductions.

The State, as part of the evaluation and reporting commitment, submits to EPA a comparison of the predicted effect of the program with the actual observed levels. In this example the utility finds that 2000 mowers were replaced. Thus, the predicted reductions were achieved.

Technical Support Documentation The State will submit Technical Support Documents describing the program and the methodology for predicting emissions benefits. Where possible the State should identify data collection methodologies and information necessary for describing implementation, compliance, effectiveness and other relevant information. This information should account for the following:

Programmatic Uncertainty- Because the program will be voluntary in nature, the State will be responsible for submitting to EPA the predicted and, eventually, the actual participation levels.

Analytic Methodology- The State will describe how they estimated participation levels and the effect of the activity on emissions

MEMORANDUM

May 28, 2003

To: Severe SIP File

From: Beth Lowe, MWCOG/DEP

Subject: Maximum Allowable Reductions Under EPA Voluntary Measures Policy

EPA's Voluntary Measures policy states non-attainment areas can use voluntary measure to fulfill up to 3% of the VOC and NO_x reductions required for a rate-of-progress demonstration. Tables 1 and 2 display the calculations of the maximum voluntary reductions allowable in the 2002 and 2005 rate-of-progress plans, respectively.

Table 1
Calculation of Maximum Reductions from Voluntary Measures
in 1999-2002 Rate-of-Progress Plan

Description	VOC (tons/day)	NO_x (tons/day)
2002 Uncontrolled Emissions	521.7	877.7
2002 Target Level	347.4	626.1
1990-2002 Reductions Required, Excluding Growth	72.7	130.5
1990-2002 Emissions Growth	106.9	124.8
Total 1990-2002 Reductions Required, Including Growth	179.6	255.3
3% of Total Required Reductions	5.4	7.7

Table 2
Calculation of Maximum Reductions from Voluntary Measures
in 2002-2005 Rate-of-Progress Plan

Description	VOC (tons/day)	NO_x (tons/day)
2005 Uncontrolled Emissions	533.0	875.4
2005 Target Level	339.0	538.8
1990-2005 Reductions Required, Excluding Growth	72.7	196.6
1990-2005 Emissions Growth	128.3	144.1
Total 1990-2005 Reductions Required, Including Growth	201.0	340.7
3% of Total Required Reductions	6.0	10.2

Table 1 shows that there is a limit of 5.3 tpd VOC and 7.5 tpd NO_x from voluntary measures for the Washington region's 1999-2002 rate-of-progress plan. Similarly, Table 2 shows a limit of 6.0 tpd VOC and 10.2 tpd NO_x in the 2002-2005 rate-of-progress plan.

Reference:

Memorandum from Richard D. Wilson, Acting Assistant Administrator for Air and Radiation to EPA Regional Administrators 1-10, "Guidance on Incorporating Voluntary Mobile Source Emission Reduction Programs in State Implementation Plans (SIPs)".

Measure 7.4.15.1: "Cash for Clunkers" Gas Can Program

Measure Number:	7.4.15.1	Description:
Measure Name:	"Cash for Clunkers" Gas Can Program	Offer cash for consumers to turn in old gas cans and purchase new ones

NOx

Estimated Cost (\$/ton)	N/A
Estimated Reductions (tpd)	0.0

Issues

· Program would provide one free new gas can of comparable size for every old gas can traded in

· OTC gas can measure assumes turnover of 10% per year without incentives. This measure aims for 12.5% turnover per year, an increase of 2.5%

· Only program of this type demonstrated in the Washington region was run by Montgomery County. Montgomery program was much smaller scale.

VOC

Estimated Cost (\$/ton)	\$ 1,426
Estimated Reductions (tpd)	0.4

Assumptions

- From E.H. Pechan analysis, each year the PFC rule is in effect will result in additional 10% gas can turnover
- From E.H. Pechan, 10% turnover results in 1.7 tpd VOC reductions (see Measure 7.4.11)
- Aim for 2.5% additional turnover per year due to program = additional 25% of typical annual turnover
- Pechan estimates 2,282,330 gas cans sold in OTR annually
- Pechan estimates additional 39 tpd benefit in entire OTC region from rule from 2005-2007.
- Regional benefit estimate for the period 2005-2007 is 3.4 tpd = 8.7% of total OTR benefit.
- Therefore assume region sells 8.7% of all OTR gas cans = 199,000 cans per year = 10% of total regional cans
- From Montgomery County gas can replacement program, gas cans can be purchased in bulk for an average of \$4.25 per can
- Assume \$200,000 annually for staff time and advertising to run this program.

Emission Reductions

Daily Reductions (VOC) = 1.7 tpd annual turnover * 25% increase
 Daily Reductions (VOC) = 0.4 tpd VOC

Cost Effectiveness

Annual Expenditure= \$4.25 per can * 199,000 cans annually * 25% increase / 10 year life + \$200,000 implementation
 Annual Expenditure= \$ 221,144

Cost-effectiveness (\$/ton) = \$221,144 / (tons per day * 365 days)

Cost-effectiveness (NOx) = N/A
 Cost-effectiveness (VOC) = \$ 1,426

References

E.H. Pechan, "Control Measure Development Support Analysis for the Ozone Transport Commission Model Rules", March 31, 2001.

Measure 7.4.15.2: "Cash for Clunkers" Lawn & Garden program

Measure Number:	7.4.15.2	Description:
Measure Name:	"Cash for Clunkers" Lawn & Garden program	Offer cash for consumers to turn in lawnmowers and purchase electric or push mowers

NOx

Estimated Cost (\$/ton)	\$231,965 - \$1,584,463
Estimated Reductions (tpd)	0.0

VOC

Estimated Cost (\$/ton)	\$7,404 - \$64,435
Estimated Reductions (tpd)	0.1

Issues

- No program of this type has been demonstrated in the northeast on a large scale
- Participation rates are extremely difficult to estimate
- Estimate of benefits is very dependent upon number of 2-stroke lawnmowers turned in. 2-stroke lawnmowers deliver far greater reductions than 4-stroke mowers.
- Consumers are unlikely to know which type of mower they have

Assumptions

- Only residential users will participate in the measure, because electric and push mowers do not fulfill the needs of most commercial lawn care services
- From EPA NONROAD model, there were approximately 782,000 residential mowers in the Washington region in 1997.
- Measure would have 0.25% participation rate, or approximately 1,950 mowers
- Assume half of mowers are 2-stroke and half are 4-stroke

- From EPA Nonroad Engine study:
 - Average 2-stroke lawnmower operates 27-73 hours per year (assume 50 hrs) at 36% load
 - Average 4-stroke lawnmower operates 33-91 hours per year (assume 60 hrs) at 50% load
- Assume average lawnmower has a 4 hp engine = 3 kW

- From EPA Report NR-003:
 - 12 4-stroke lawnmowers tested with engines <= 5.5 hp averaged
 - 36.0 g/kW-hr HC
 - 2.5 g/kW-hr NOx
 - 2-stroke engine averaged
 - 183.6 g/kW-hr HC
 - 2.44 g/kW-hr NOx
- Program costs would be \$75 per mower, plus a monitoring and enforcement program at \$200,000 per year
- Assume 100% emission reduction for each mower turned in

- New mowers have 10 year useful life
- Mowers operate April - October = 214 days per year

Emission Reductions: 2-Stroke Engines

$$\text{Annual Reductions (VOC)} = 183.6 \text{ g/kW-hr HC} * 3 \text{ kW} * 50 \text{ hours} * 36\% \text{ load} * 1,950 \text{ engines} * 50\% \text{ 2-stroke} / 907,185 \text{ g/ton}$$

$$\text{Annual Reductions (VOC)} = 10.7 \text{ tpy VOC}$$

$$\text{Daily Reductions (VOC)} = 10.7 \text{ tons per yr} / 214 \text{ days of operation per year}$$

$$\text{Daily Reductions (VOC)} = 0.05 \text{ tpd VOC}$$

$$\text{Annual Reductions (NOx)} = 2.44 \text{ g/kW-hr NOx} * 3 \text{ kW} * 50 \text{ hours} * 36\% \text{ load} * 1,950 \text{ engines} * 50\% \text{ 2-stroke} / 907,185 \text{ g/ton}$$

Annual Reductions (NOx) = 0.1 tpy NOx

Daily Reductions (NOx) = 0.1 tons per yr / 214 days of operation per year

Daily Reductions (NOx) = 0.00 tpd NOx

Emission Reductions: 4-Stroke Engines

Annual Reductions (VOC) = 36.0 g/kW-hr HC * 3 kW * 60 hours * 50% load * 1,950 engines * 50% 4-stroke/ 907,185 g/ton

Annual Reductions (VOC) = 3.5 tpy VOC

Daily Reductions (VOC) = 3.5 tons per yr / 214 days of operation per year

Daily Reductions (VOC) = 0.02 tpd VOC

Annual Reductions (NOx) = 2.5 g/kW-hr NOx * 3 kW * 60 hours * 50% load * 1,950 engines * 50% 4-stroke/ 907,185 g/ton

Annual Reductions (NOx) = 1.0 tpy NOx

Daily Reductions (NOx) = 1.0 tons per yr / 214 days of operation per year

Daily Reductions (NOx) = 0.00 tpd NOx

Emission Reductions: Overall

Daily Reductions (VOC) = 0.1 tpd VOC

Daily Reductions (NOx) = 0.0 tpd NOx

Cost Effectiveness: 2-Stroke Engines

Annual Expenditure= ((\$75 per mower * 1,950 mowers)/6 year lifespan) + \$200,000

Annual Expenditure= \$ 224,375

Cost-effectiveness (\$/ton) = \$224,375 / (tons per day * 214 days per year)

Cost-effectiveness (NOx) = \$ 1,584,463

Cost-effectiveness (VOC) = \$ 7,404

Cost Effectiveness: 4-Stroke Engines

Cost-effectiveness (NOx) = \$ 231,965

Cost-effectiveness (VOC) = \$ 64,435

References

US EPA Office of Mobile Sources, Assessment and Modeling Division, "Exhaust Emission Effects of Fuel Sulfur and Oxygen on Gasoline Nonroad Engines", Report No. NR-003, November 24, 1997.

US EPA, Office of Air and Radiation, "Nonroad Engine and Vehicle Emission Study -- Report", EPA 460/3-91-02, November 1991.

US EPA, Draft NONROAD Model, June 2000.

Appendix K

Information Related to Public Hearings, Hearing Notices,
Comments Received and Response to Comments