

**APPENDIX X; VOLUNTARY MOBILE EMISSION REDUCTION PROGRAM (VMEP)
Mid-Course Review**

A summary of the expected emission reductions from voluntary programs is shown in the table below. A description of each initiative and the progress to date is outlined in subsequent summaries of each program. Overall, the expected emission reductions from voluntary programs are expected to be 0.8 tpd VOC and 7 tpd NO_x with most of the VOC and half of the NO_x emission reductions from on-road sources through H-GAC administered programs. Attachment 1 to this report presents additional information on existing VMEPs contained in the December 2000 SIP.

Summary of VMEP Measures for Inclusion in HGA SIP Mid-Course Revision

All measures have been recalculated to reflect changes resulting from MOBILE6.

Measure	Description	VOC Reduction in 2007	NO_x Reduction in 2007	Progress to Date and Future Plans
Vehicle Scrappage	Emission reductions through H-GAC administered LIRAP to repair or replace high emitting vehicles.	0.10	0.11	Funding to date: \$1.8 million.
Smoking Vehicle/ Clean Air Action	TCEQ program—marketing and advertising by H-GAC	0.04	0.05	State program to visually identify high emitters
Clean Cities / Vehicle Program	Public and private heavy-duty engine/vehicle replacement/retrofit	0.20	3.0	CMAQ funded over 1,000 truck and bus projects at \$25 million netting reductions of 0.08 tpd VOC and 1.4 tpd NO _x . Additional reductions require more funding at similar levels.
Commute Solutions	Van pools, additional transit, alternative commuting, and other initiatives	0.40	0.30	Reductions increase with added funding (allocated in draft 2004 - 2006 TIP).
Regional Computerized Traffic Signal System	Average speed on local streets increased by 21%	0.03	0.03	Federal CMAQ portion funded.
Locomotives	MOA	0.10	2.0	Depends upon implementation of MOA.
Commercial Marine	Tugs/Tows—MOA Ferries—MOA	0.0	1.1 0.4	Depends upon implementation of MOAs.
Total Emission Reduction		0.8 tpd	7.0 tpd	
Total On-road Emission Reduction		0.6 tpd	3.6 tpd	

Vehicle Scrappage

Summary of Strategy: Sources of emission reductions include the Low Income Repair and Assistance Program (LIRAP). H-GAC is administering LIRAP on behalf of Brazoria, Harris, Fort Bend, Galveston and Montgomery counties. For administering the program, H-GAC claims the emission reductions achieved through the scrapped portion of the LIRAP.

Status: H-GAC has begun administering the program, and the progress to date includes 3,347 repairs and 121 replacement vehicles. The total expenditures to date on this program are \$1.8 million. Based on an estimated reduction of 0.92 g/mile VOC and 1.1 g/mile NO_x (assuming 50% Tier 0 and 50% Tier 1 vehicle repaired and replaced), 10,000 miles per year per vehicle, the total emission reduction for this program to date is estimated at 35 tpy VOC and 41 tpy NO_x.

Continued Implementation: No additional emission reductions are claimed at this time because the LIRAP is still in early stages of implementation. The proportion of vehicles being scrapped is also less than originally anticipated.

Smoking Vehicle Program

Summary of Strategy: The program is based on TCEQ's existing Smoking Vehicle Program (in existence since 1992), which had little advertising or marketing in this region. The local effort is through H-GAC's Clean Air Action program with the goal of increasing program awareness. TCEQ receives an average 39% of reply cards returned from individuals who have repaired their vehicles after notification. From April 2002 through June of 2002 there was a 100% increase in Smoking Vehicle reports originating from the HG NAA. Statewide, 26% of reports came from the eight-county HG NAA.

Status: Approximately 15,000 vehicles statewide were reported as smoking vehicles when summer advertising of the program was initiated.

Continued Implementation: Initiating and continuing marketing/advertisement of the program will be required, but current progress indicates that the number of excess high emitters identified in this program will continue.

Clean Cities / Clean Vehicles Program

Summary of Strategy: H-GAC aggressively pursues participation from public and private fleet owners in implementing low-emission technology introduction into vehicle fleets (primarily heavy-duty trucks and buses) and fueling infrastructure through the Clean Cities/Clean Vehicles program (<http://www.houston-cleancities.org/>). Federal funds (Congestion Mitigation and Air Quality - CMAQ) are available for eligible projects using approved technology to reduce smog-forming emissions from on-road motor vehicles.

Status: Roughly 1.40 tpd of NO_x reductions were purchased for \$25 million.

Continued Implementation: Additional funding (\$30 million) and program participation will be needed to reach the goal of 3 tpd from this measure for public and private fleets, but participation

has been high in the past few months. Program participation should be high as long as CMAQ funding continues.

Commute Solutions

Summary of Strategy: H-GAC’s Commute Solutions program consists of: vanpools, alternative commuting, Commuter and Transit Services Pilot Programs, and the SchoolPool Program. A description of each program and progress to date follows.

Status: H-GAC’s Regional Vanpool Program, in operation since 1996, is funded using Surface Transportation Program (STP) funds, METRO local funds and employer incentives, which provide reduced monthly costs to participating employees. The vanpool program currently (as of January 2004) has 346 vans, with an average of 12.5 riders per van, and an average round trip of 70 miles. The most common van used is the 15-passenger Ford 150. H-GAC plans to expand the program by creating a pilot vanpool program along highway construction corridors using smaller vans. The goal for the first year is to create 50 additional vanpools. Emission reductions of 0.18 tpy VOC and 0.17 tpd NOx were calculated to occur in 2007 if the program continues similar participation rates.

Alternative Commuting was initiated in 2000. H-GAC continues working with companies to promote alternatives to commuting (teleworking, carpools, greater use of public transportation, and walking or biking) among employees. The program provides consultant assistance to human resource managers about teleworking benefits and about developing and implementing site-specific programs. It is expected that this program will increase participation rates with increased marketing.

Commuter and Transit Services Pilot Programs: There are currently pilot commuter and transit projects (Greater Greenspoint, Uptown, Brazos Transit, and TREK) operating within the Houston-Galveston region using CMAQ funds to increase public transit ridership. Ridership in the summary table of progress includes commutes during FY2003.

SchoolPool Program: In FY 2004, H-GAC initiated this new program for area schools. The primary objective of the program is to reduce vehicle trips among parents driving children to and from school. The program has just been initiated.

Commute Solutions Progress to Date (January 2004)

Program	Annual Commutes Affected	Annual Mileage Affected	VOC (tpy)	NOx (tpy)
Vanpools	1,125,000	80,000,000	46	43
Transit Pilot Programs	278,326	20,000,000	12	12
Alternative Commuting	City of Houston and H-GAC only		0.1	0.1
SchoolPool Program	0 to date		0	0
Total			58	55

Continued Implementation: These programs are ongoing and will require continued funding at current levels to maintain the estimated emission reduction. Additional funding will be required to increase participation dramatically.

RCTSS Signal Timing

Summary of Strategy: H-GAC is funding implementing entities: Harris County, City of Houston, TxDOT and METRO.

Status: Most of the federal portion of the funding for project implementation has been committed.

Continued Implementation: Reduced idling and braking from mistimed lights will result in the emission reductions similar to those estimated for the VMEP.

Locomotive Voluntary Reductions

Summary of Strategy: This measure has a 17% reduction (2 tpd NOx) calculated from a base 2007 inventory of 12.1 tpd NOx.

Status: This project is the first Memorandum of Agreement (MOA) signed by the Environmental Protection Agency, the Texas Commission on Environmental Quality, the Houston-Galveston Area Council and private entities—Burlington Northern and Santa Fe Railway Company and Union Pacific Railroad Company—for the Voluntary Mobile Emission Reduction Program. The agreement was signed in December 2000.

Continued Implementation: Union Pacific and BNSF Railroads have prepared plans to reduce emissions from switching and line-haul engines.

Commercial Marine

Summary of Strategy: Texas Waterway Operators (TWO): This measure was intended to generate emission reductions through projects associated with commercial marine measures. H-GAC signed an MOA with the Texas Waterway Operators to reduce emissions from tug and barge traffic. TWO is a coalition of 22 independent entities of tugboat, tank barge or towing vessel operating companies engaged in waterborne transportation within the boundaries of the HGA. TWO expects to satisfy the agreement by replacing or repowering older tugs with engines meeting lower emission standards.

TxDOT Bolivar Ferries. An MOA was also signed with TxDOT to retrofit Bolivar Ferries to reduce NOx emissions from propulsion and auxiliary engines. TxDOT expects to reduce emissions either through engine repower or retrofits. The emission reductions reflected in the summary table are derived using a 30% reduction estimate. A 70% emissions reduction could be achieved depending upon the feasibility of Selective Catalytic Reduction (SCR) retrofits.

Status: Examples of measures under consideration for marine measures include, but are not limited to:

- a) Operating practices and measures, including the application of methods to reduce vessel main engine and barge pump engine idling time;
- b) Modifications to vessel engines and support equipment, including adjustments to engine timing, early integration of new marine diesel engines or the retrofit of existing marine diesel engines;

- c) Early use of regulated fuels as they are made available; and/or
- d) Other maintenance measures consistent with the tug and ferry support operations.

Continued Implementation: Kirby Marine and other TWO members are detailing the retired vessels and increased activity of late model vessels or vessels with new engines. TxDOT is investigating the best emission reduction method for the Bolivar Ferries by instrumenting the vessels in normal operation to determine parameters that vendors of emission control devices can use in preparation for bids. The funding mechanism for the Bolivar Ferry retrofit project was provided using CMAQ dollars.

Background for Emission Reduction Calculations

Average emission rates include expected fleet age distribution and in-use activity, including average speed per link and relative facility type operation. The average emissions rates in Tables A-1 and A-2 were derived by taking the daily emissions divided by the daily vehicle miles traveled (VMT) for the August 30, 2007 episode day emissions predictions. (TCEQ, 2003)

Table A-1. Area-wide average emission rates (g/mile) for light-duty vehicles in HGA in 2007

Vehicle	LDGV	LDGT1	LDGT2	LDGT3	LDGT4	LDDV	LDDT12	LDDT34	MC	LD Avg.
VOC	0.57	0.57	0.60	0.37	0.40	0.31	2.49	0.25	2.92	0.56
NOx	0.52	0.49	0.70	0.55	0.80	0.88	2.90	0.65	1.12	0.56

Table A-2. Area-wide average emission rates (g/mile) for heavy-duty diesel vehicles in 2007

Vehicle	HDDV2b	HDDV3	HDDV4	HDDV5	HDDV6	HDDV7	HDDV8a	HDDV8b	HDDBT	HDDBS
VOC	0.13	0.17	0.20	0.22	0.31	0.39	0.44	0.39	0.35	0.58
NOx	2.84	3.58	4.37	4.63	6.60	8.46	12.79	11.75	17.09	12.03

High emitter light-duty emission rates and repair effects were derived from MOBILE6 documentation (EPA, 2001 and 2002). The percentage reduction was applied to the high emitter rate shown in Table A-3 to estimate the benefit of vehicle repairs.

Table A-3. Light-duty vehicle high emitter emission rates and repair reduction

Vehicle Type	Pollutant	High Emitter	% Reduction from Repair
Tier 0 (1981-1993+)	VOC	~ 2.4 g/mile	41%
	NOx	~ 2.9	51%
Tier 1 (1996+)	VOC	2.08	
	NOx	1.29	

Tier 0 estimates for cars and trucks were very similar.

References

TCEQ (2003), provided by Chris Kite, August 2003.

EPA (2002), "MOBILE6 Inspection / Maintenance Benefits Methodology for 1981 through 1995 Model Year Light Vehicles, Final Report M6.IM.001, Environmental Protection Agency, EPA420-R-02-014, March 2002.

EPA (2001), "Determination of NOx and HC Basic Emission Rates, OBD and I/M Effects for Tier 1 and later LDVs and LDTs," Final Report M6.EXH.007, November 2001.

ATTACHMENT 1

VMEP Programs Revised or Discontinued Since 2001

Commercial Marine

Summary of Revised Estimate for Bolivar Ferries: TxDOT has determined that the most feasible emission reduction plan is to rebuild or repower propulsion and auxiliary engines on the Bolivar ferries, resulting in approximately a 30% NO_x emission reduction below the 70% estimate in the 2001 SIP. The Bolivar Ferry estimates were based on engine replacement (~30% reduction) rather than SCR (~70% reduction).

Ocean-going Vessel Emission Reductions: The Port of Houston aggressively pursued mechanisms to reduce emissions from ocean-going vessels including Coast Guard and other programs, but the fact that most vessels are foreign flagged makes it difficult to commit to emissions reduction programs at this point.

Smart Growth

Summary of Strategy: The primary mechanism is the City of Houston's planned Tax Increment Reinvestment Zones (TIRZ) to reinvigorate the urban area. As of March 2000, there were 26,603 residential dwellings planned and many completed with accompanying retail, commercial, and other development to service the additional residential space. An additional 22,400 residential developments are planned for the Woodlands Town Center from 1999 through 2007.

Status: Additional developments are considered under the TIRZ program.

Feasible Implementation: Current projects cannot generate the emission reduction claimed in the SIP's voluntary emission reduction program, due to a significant reduction in light-duty vehicle emission rates with use of the MOBILE6 model compared with MOBILE5 estimates used in 2001. The VMT reductions claimed from centralized development were difficult to quantify.

Nonroad Demonstration Projects

Summary of Strategy: This measure sought to encourage projects to reduce emissions from nonroad engines. It was conceived as a method to gain voluntary commitments to reduce emissions from nonroad sources.

Status: No projects are expected. TERP was designed to address emission reductions from nonroad engines, so the available TERP funds preclude the ability to gain voluntary participation for these projects.

Feasible Implementation: Because there is no other funding for these projects, no credit can be claimed under the VMEP.

Cool Cities

Summary of Strategy: This strategy sought to reduce ozone levels through code changes and tree cover increases. Local governments would be responsible for administering this program either through direct funding or local regulations.

Status: State funded efforts to examine the effect of this strategy have failed because the meteorological models do not perform sufficiently well to verify the results.

Feasible Implementation: Besides the inability to demonstrate an equivalent emission reduction, this measure was claimed as GAP measure in the SIP. This measure is not feasible as a VMEP control measure.

Local Government

Summary of Strategy: This measure expects voluntary commitments for emission reductions from local governments. This project was intended to assist local governments in selecting and using new emission reduction strategies on a variety of different engines. While this effort overlaps both the Clean Vehicle Program and Commute Solutions, the effort could have included approaches different than those for private entities. The following strategies were included with this measure to achieve additional SIP NOx emissions reductions:

- Public transit use by employees,
- Modifying employee job driving requirements,
- Installing retrofit emission control devices on mobile and stationary emission sources owned by the participating entity, and
- Providing incentives and/or contract requirements for contractors to similarly retrofit their equipment.

Status: Despite continuing effort to gain agreements, no commitments from any local governments have been completed.

Feasible Implementation: No emission reductions are expected from this measure beyond those claimed under the Commute Solutions and Clean Cities / Clean Vehicle Program.

AERCO

Summary of Strategy: The AERCO program was to be expanded to increase the number of trades and retire a portion of the trades for the benefit of air quality. Those retired for the purpose of air quality were to be credited under the VMEP.

Status: TCEQ changed the trading rules, making this program a more costly alternative to the State trading program, so participation in this program has been nonexistent.

Feasible Implementation: Emission reductions are not expected from this program.

VMEP Measures and Emission Reductions in the HGA 2001 SIP

Measure	Description	NOx Reduction Claimed 2000 SIP	Rationale/Commitment
Vehicle Scrappage	7,200 Light-duty (LD) vehicles	0.39	Emission reductions through LIRAP. (Measure also elsewhere in SIP.)
Smoking Vehicle Clean Air Action	A program of the TCEQ, marketing and advertising by H-GAC	0.04	Funding marketing and advertising increases program participation.
Public Fleets Clean Vehicle Program	588 LD SULEV vehicles 6,000 HD vehicles	0.0013 1.02	Year 2000 CMAQ funding (\$2 million annually) net 0.5 tpd. Increased reductions reflected in mid-course revision due to additional available funding..
Private Fleets	1,500 LD SULEV 19,000 HD vehicles	0.003 3.2	See Public Fleets above.
Highway Demonstration	Retrofit 10,000 private HD diesel vehicles	0.84	See Public Fleets above.
Commute Solutions	Assumes 10% of workforce eliminates 1 round-trip work trip per week	1.8	Reductions increase w/ added funding (allocated in draft 2004 - 2006 TIP). Program claimed as a GAP measure.
Regional Computerized Traffic Signal System	Average speed on local streets increased by 21%	0.03	Federal CMAQ portion funded.
Smart Growth	Increase urban residential units by 53,903	0.3	Reductions evaporate due to Mobile6.
Non-road Demonstration Projects	Off-road projects	0.5 to 2.0	No funding available as VMEP. Claimed as TERP.
Locomotives	MOA	2.0	Dependant on MOA
Commercial Marine	Tugs/Tows–MOA Ferries–MOA Ocean-going vessels	1.1 0.8 2.9	Dependant on MOAs. Potential ocean-going vessel MOA now appears unlikely.
Cool Cities	Examine the urban tree canopy	0 to 1.0	Not feasible. Also claimed elsewhere in the SIP
Local Government Initiatives	Public entities reduce emissions, thru commuters, point sources, diesel retrofits, & contract incentives	1.5	See Public Fleets above. Dependant on funding. Has also been claimed elsewhere in the SIP
AERCO Pilot Project		6.0	SIP trading rules issues, EPA not approving any mobile credits nationally. Not feasible.
Totals		SIP = 23 tpd	