

Memo

To: Interested Parties
From: Michael P. Walsh
Date: December 21, 1999
Subject: Final Tier 2 Rule

The US EPA has issued the final Tier 2/low sulfur gasoline regulation which will substantially tighten standards for new light duty vehicles and reduce the sulfur content of gasoline.

1. Highlights of the Tier2/Gasoline Sulfur Program

For cars, and light trucks, and larger passenger vehicles, the program will:

- C Starting in 2004, through a phase-in, apply for the first time the same set of emission standards covering passenger cars, light trucks, and large SUVs and passenger vehicles. These emission levels ("Tier 2 standards") are feasible for these vehicles. The Tier 2 standards are also appropriate because of the increased use of light trucks for personal transportation-- the miles traveled in light trucks is increasing and the emissions from these vehicles are thus an increasing problem.
- C Introduce a new category of vehicles, "medium-duty passenger vehicles," thus bringing larger passenger vans and SUVs into the Tier 2 program.
- C During the phase-in, apply interim fleet emission average standards that match or are more stringent than current federal and California "LEV I" (Low-Emission Vehicle, Phase I) standards.
- C Apply the same standards to vehicles operated on any fuel.
- C Allow auto manufacturers to comply with the very stringent new standards in a flexible way while ensuring that the needed environmental benefits occur.
- C Build on the recent technology improvements resulting from the successful National Low-Emission Vehicles (NLEV) program and improve the performance of these vehicles through lower sulfur gasoline.
- C Set more stringent particulate matter standards.
- C Set more stringent evaporative emission standards.

For commercial gasoline, the program will:

- C Significantly reduce average gasoline sulfur levels nationwide as early as 2000, fully phased in in 2006. Refiners will generally add refining equipment to remove sulfur in their refining processes. Importers of gasoline will be required to import and market only gasoline meeting the sulfur limits.
- C Provide for flexible implementation by refiners through an averaging, banking, and trading program.
- C Encourage early introduction of cleaner fuel into the marketplace through an early sulfur credit and allotment program.
- C Apply temporary gasoline sulfur standards to certain small refiners and gasoline marketed in a limited geographic area in the western U.S.
- C Enable the new Tier 2 vehicles to meet the emission standards by greatly reducing the degradation of vehicle emission control performance from sulfur in gasoline. Lower sulfur gasoline also appears to be necessary for the introduction of advanced technologies that promise higher fuel economy but are very susceptible to sulfur poisoning (for example, gasoline direct injection engines).
- C Reduce emissions from NLEV vehicles and other vehicles already on the road.

2. Detailed Overview

a. Vehicle Requirements

The Rule sets new federal emission standards ("Tier 2 standards") for passenger cars, light trucks, and larger passenger vehicles. The program will also, for the first time, apply the same set of federal standards to all passenger cars, light trucks, and medium-duty passenger vehicles. Light trucks include "light light-duty trucks" (or LLDTs), rated at less than 6000 pounds gross vehicle weight and "heavy light-duty trucks" (or HLDTs), rated at more than 6000 pounds gross vehicle weight).¹ "Medium-duty passenger vehicles" (or MDPVs) form a new class of vehicles introduced by this rule that includes SUVs and passenger vans rated at between 8,500 and 10,000 GVWR. The program thus ensures that essentially all vehicles designed for passenger use in the future will be very clean vehicles.

The Tier 2 standards will reduce new vehicle NO_x levels to an average of 0.07 grams per mile (g/mi). For new passenger cars and light LDTs, these standards will phase in beginning in 2004, with the standards to

¹ A vehicle's "Gross Vehicle Weight Rating," or GVWR, is the curb weight of the vehicle plus its maximum recommended load of passengers and cargo.

be fully phased in by 2007.² For heavy LDTs and MDPVs, the Tier 2 standards will be phased in beginning in 2008, with full compliance in 2009.

During the phase-in period from 2004-2007, all passenger cars and light LDTs not certified to the primary Tier 2 standards will have to meet an interim average standard of 0.30 g/mi NO_x, equivalent to the current NLEV standards for LDVs and more stringent than NLEV for LDT2s (e.g., minivans).³ During the period 2004-2008, heavy LDTs and MDPVs not certified to the final Tier 2 standards will phase in to an interim program with an average standard of 0.20 g/mi NO_x, with those not covered by the phase-in meeting a per-vehicle standard (i.e., an emissions “cap”) of 0.60 g/mi NO_x (for HLDTs) and 0.09 g/mi NO_x (for MDPVs).

The final program is very similar to the proposed program in all major respects including the general structure, stringency, and emissions benefits. And by creating a new category of vehicles subject to the Tier 2 standards, medium-duty passenger vehicles, the final rule will ensure that all passenger vehicles expected to be on the road in the foreseeable future will be very clean.

i. Vehicle Categories

The light-duty category of motor vehicles includes all vehicles and trucks at or below 8500 pounds gross vehicle weight rating, or GVWR (i.e., vehicle weight plus rated cargo capacity). Table A shows the various light-duty categories and also shows the new medium-duty passenger vehicle (MDPV) category.

² By comparison, the NO_x standards for the National Low Emission Vehicle (NLEV) program, which will be in place nationally in 2001, range from 0.30 g/mi for passenger cars to 0.50 g/mi for medium-sized light trucks (larger light trucks are not covered). For further comparison, the standards met by today’s Tier 1 vehicles range from 0.60 g/mi to 1.53 g/mi.

³ There are also NMOG standards associated with both the interim and Tier 2 standards. The NMOG standards vary depending on which of various individual sets of emission standards manufacturers choose to use in complying with the average NO_x standard. This “bin” approach is described more fully in section IV.B. of this preamble.

Table A
Light-Duty Vehicles and Trucks and Medium-Duty Passenger Vehicles; Category Characteristics

	Characteristics
LDV	A passenger car or passenger car derivative seating 12 passengers or less.
Light LDT (LLDT)	Any LDT rated at up through 6,000 lbs GVWR. Includes LDT1 and LDT2.
Heavy LDT (HLDT)	Any LDT rated at greater than 6,000 lbs GVWR. Includes LDT3 and LDT4s.
MDPV	A heavy-duty passenger vehicle rated at less than 10,000 lbs GVWR.

ii. Corporate Average NO_x Standard

The program will ultimately require each manufacturer’s average full life NO_x emissions over all of its Tier 2 vehicles to meet a NO_x standard of 0.07 g/mi each model year. Manufacturers will have the flexibility to certify Tier 2 vehicles to different sets of exhaust standards that we refer to as “bins,” but will have to choose the bins so that their corporate sales weighted average full life NO_x level for their Tier 2 vehicles is no more than the 0.07 g/mi. The manufacturer will be in compliance with the standard if its corporate average NO_x emissions for its Tier 2 vehicles meets or falls below 0.07 g/mi. In years when a manufacturer’s corporate average is below 0.07 g/mi, it can generate credits. It can trade (sell) those credits to other manufacturers or use them in years when its average exceeds the standard (i.e. when the manufacturer runs a deficit).

iii. Tier 2 Exhaust Emission Standard “Bins”

The final Tier 2 bin structure has eight emission standards bins (bins 1-8), each one a set of standards to which manufacturers can certify their vehicles. Table B shows the full useful life standards that will apply for each bin in the final Tier 2 program, i.e. after full phase-in occurs for all LDVs and LDTs. Two additional bins, bins 9 and 10, will be available only during the interim program and will be deleted before final phase-in of the Tier 2 program. An eleventh bin is available but only for MDPVs (see below). Many bins have the same values as bins in the California LEV II program as a means to increase the economic efficiency of the transition to as well as model availability. The two highest of the ten bins shown in Table B are designed to provide flexibility only during the phase-in years and will terminate after the standards are fully phased in, leaving eight bins in place for the duration of the Tier 2 program.

Table B
Tier 2 Light-Duty Full Useful Life Exhaust Emission Standards
(grams per mile)

Bin#	NO_x	NMOG	CO	HCHO	PM	Comments
10	0.6	0.156/0.230	4.2/6.4	0.018/0.027	0.08	a,b,c,d
9	0.3	0.090/0.180	4.2	0.018	0.06	a,b,e
The above temporary bins expire in 2006 (for LDVs and LLDTs) and 2008 (for HLDTs)						
8	0.20	0.125/0.156	4.2	0.018	0.02	b,f
7	0.15	0.090	4.2	0.018	0.02	
6	0.10	0.090	4.2	0.018	0.01	
5	0.07	0.090	4.2	0.018	0.01	
4	0.04	0.070	2.1	0.011	0.01	
3	0.03	0.055	2.1	0.011	0.01	
2	0.02	0.010	2.1	0.004	0.01	
1	0.00	0.000	0.0	0.000	0.00	

NOTES

- a. Bin deleted at end of 2006 model year (2008 for HLDTs).
- b. The higher of the two temporary NMOG, CO and HCHO values apply only to HLDTs.
- c. An additional higher temporary bin restricted to MDPVs is discussed below.
- d. Optional temporary NMOG standard of 0.280 g/mi applies for qualifying LDT4s and MDPVs only.
- e. Optional temporary NMOG standard of 0.130 g/mi applies for qualifying LDT2s only.
- f. Higher temporary NMOG value of 0.156g/mi deleted at end of 2008 model year.

Light-Duty Intermediate Useful Life (50,000 mile) Exhaust Emission Standards
(grams per mile)

Bin Number	NO_x	NMOG	CO	HCHO	PM	Comments
10	0.4	0.125/0.160	3.4/4.4	0.015/0.018	--	a,b,c,d,f,h
9	0.2	0.075/0.140	3.4	0.015	--	a,b,e,h
The above temporary bins expire in 2006 (for LDVs and LLDTs) and 2008 (for HLDTs)						
8	0.14	0.100/0.125	3.4	0.015	--	b,g,h
7	0.11	0.075	3.4	0.015	--	h

6	0.08	0.075	3.4	0.015	--	h
5	0.05	0.075	3.4	0.015	--	h

NOTES

- a. Bin deleted at end of 2006 model year (2008 for HLDTs).
- b. The higher temporary NMOG, CO and HCHO values apply only to HLDTs and expire in 2008.
- c. An additional higher temporary bin restricted to MDPVs is available.
- d. Optional temporary NMOG standard of 0.195 g/mi applies for qualifying LDT4s and MDPVs only.
- e. Optional temporary NMOG standard of 0.100 g/mi applies for qualifying LDT2s only.
- f. Intermediate life standards are optional for diesels certified to bin 10.
- g. Higher temporary NMOG value deleted at end of 2008 model year.
- h. Intermediate life standards are optional for any test group certified to a 150,000 mile useful life (if credits are not claimed).

Any combination of vehicles meeting the 0.07 g/mi average NOx standard will have average NMOG levels below 0.09 g/mi. The actual value will vary by manufacturer depending on the sales mix of the vehicles used to meet the 0.07 g/mi average NOx standard. In addition, there will be overall improvements in NMOG since Tier 2 incorporates HLDTs, which are not covered by the NLEV program. Tier 2 also imposes tighter standards on LDT2s than the NLEV program by making them average with the LDVs and LDT1s. NLEV has separate, higher standards for LDT2s.

iv. Schedules for Implementation

Table C provides a graphical representation of how the phase-in of the Tier 2 program will work for all vehicles.

Table C
TIER 2 AND INTERIM NON-TIER 2 PHASE-IN AND EXHAUST AVERAGING SETS
 (Bold lines around shaded areas indicate averaging sets)

	2001	2002	2003	2004	2005	2006	2007	2008	2009 + later %	NOx STD. (g/mi)
				%	%	%	%	%		
LDV/LLDT (INTERIM)	NLEV	NLEV	NLEV	75 max	50 max	25 max				0.30 avg
LDV/LLDT (TIER 2 +evap)	<i>early banking</i> b b b			25	50	75	100	100	100	0.07 avg
HLDT (TIER 2 +evap)	<i>early banking</i> b b b b b b b							50	100	0.07^d avg

HLDT (INTERIM)	TIER 1 b	TIER 1 b	TIER 1 b								
				25	50	75	100	50			0.20^{a, d} avg
MDPVs (INTERIM)	HDE	HDE	HDE	c,e	e	e	e	max			
MDPVs (TIER 2 + evap)	<i>early banking</i>							50	100		0.07^d avg
	b	b	b	b	b	b	b				

NOTES

- a. 0.60 NOx cap applies to balance of LDT3s/LDT4s, respectively, during the 2004-2006 phase-in years
- b. Alternative phase-in provisions permit manufacturers to deviate from the 25/50/75% 2004-2006 and 50% 2008 phase-in requirements and provide credit for phasing in some vehicles during one or more of these model years..
- c. Required only for manufacturers electing to use optional NMOG values for LDT2s or LDT4s and MDPV flexibilities during the applicable interim program and for vehicles whose model year commences on or after the fourth anniversary date of the signature of this rule.
- d. MDPVs HLDTs and MDPVs must be averaged together.
- e. Diesels may be engine-certified through the 2007 model year.

v. Interim Standards

The interim standards discussed below are a major source of emission reductions in the early years of the vehicle control program. The NOx emission standards for LDT2s and LDT4s, which comprise about 40 percent of the fleet, are more stringent than the corresponding standards in the NLEV and CAL LEV I programs.

The two groups of vehicles (LDV/LLDTs and HLDTs) will be approaching the Tier 2 standards from quite different emission “backgrounds”. LDV/LLDTs will be at NLEV levels, which require NOx emissions of either 0.3 or 0.5g/mi on average,⁴ while HLDTs will be at Tier 1 levels facing NOx standards of either 0.98 or 1.53 g/mi, depending on truck size. These Tier 1 NOx levels for HLDTs are very high (by a factor of 14-22) relative to the 0.07 g/mi Tier 2 NOx average.

(1) Interim Exhaust Emission Standards for LDV/LLDTs.

Beginning with the 2004 model year, all new LDVs, LDT1s and LDT2s not incorporated under the Tier 2 phase-in will be subject to an interim corporate average NOx standard of 0.30 g/mi. This is effectively the

⁴ The NLEV program imposes NMOG average standards that translate into full useful life NOx levels of about 0.3 g/mi for LDV/LDT1s and 0.5 g/mi for LDT2s.

LEV NO_x emission standard for LDVs and LDT1s under the NLEV program.⁵ This interim program will hold LDVs and LLDTs to NLEV levels if they are not yet subject to Tier 2 standards during the phase-in. LDT2s will be held to a 0.3 g/mi NO_x average in contrast to a 0.5 g/mi average in the NLEV program.

The proposal to bring LDT2s into line with the LDVs and LDT1s during the interim program by requiring all LDVs, LDT1s and LDT2s to meet the same average NO_x standard (0.30) g/mi is retained, but EPA is providing an optional NMOG standard of 0.130 for LDT2s certified to bin 9 when the manufacturers of those LDT2s elect to bring all of their 2004 model year HLDTs under the interim program and phase 25% of those HLDTs into the 0.20 g/mi average NO_x standard.

(2) Interim Exhaust Emission Standards for HLDTs.

The interim standards for HLDTs will begin in the 2004 model year similar to the proposal in the NPRM. The Interim Program for HLDTs will require compliance with a corporate average NO_x standard of 0.20 g/mi that will be phased in between 2004 and 2007. The interim HLDT standards, like those for LDV/LLDTs will make use of the bins in Table B.

Due to statutory lead time considerations, EPA was not able to finalize the HLDT standards to be in effect by the time the 2004 model year begins. For this reason, it is providing incentives for HLDTs to comply with the Tier 2 standards for all 2004 model year HLDTs.

vi. Generating, Banking, and Trading NO_x Credits

As proposed in the NPRM and finalized in the Rule, manufacturers will be permitted to average the NO_x emissions of their Tier 2 vehicles and comply with a corporate average NO_x standard. In addition, when a manufacturer's average NO_x emissions fall below the corporate average NO_x standard, it can generate NO_x credits for later use (banking) or to sell to another manufacturer (trading). NO_x credits will be available under the Tier 2 standards, the interim standards for LDVs and LLDTs, and the interim standards for HLDTs.

Banking and trading of NO_x credits under the interim non-Tier 2 standards will be similar to that under the Tier 2 standards, except that a manufacturer must determine its credits based upon the 0.30 or 0.20 gram per mile corporate average NO_x standard applicable to vehicles in the interim programs. As proposed in the NPRM, interim credits from LDVs/LLDTs and interim credits from HLDTs will not be permitted to be used interchangeably due to the differences in the interim corporate average NO_x standards. As proposed in the NPRM, there will be no provisions for early banking under the interim standards and manufacturers will not be allowed to use interim credits to address the Tier 2 NO_x average standard.

⁵ The NLEV program does not impose average NO_x standards, but the NMOG average standards that it does impose will lead to full useful life NO_x levels of about 0.3 g/mi for LDV/LDT1s.

EPA believes it is appropriate to provide inducements to manufacturers to certify vehicles to very low levels and that these inducements may help pave the way for greater and/or more cost effective emission reductions from future vehicles. We believe it is important in a rule of this nature to provide extra incentives to encourage manufacturers to produce and market very clean vehicles. This is especially important in the earliest years of the program when manufacturers must make resource commitments to technologies and vehicle designs that will have multi-year life spans. EPA believes this program provides a strong incentive for manufacturers to maximize their development and introduction of the best available vehicle/engine emission control technology, and this in turn provides a stepping stone to the broader introduction of this technology soon thereafter. Early production of cleaner vehicles enhances the early benefits of the program and vehicles certified to these lowest bins produce not just lower NOx but also lower NMOG, CO and HCHO emissions. If a manufacturer can be induced to certify to a lower bin by the promise of reasonable extra credits, the benefits of that decision to the program may last for many years.

EPA is finalizing provisions to permit manufacturers, at the beginning of the program, to weight LDV/Ts certified to the lowest two bins more heavily when calculating their fleet average NOx emissions. Under this provision, which applies through the 2005 model year, manufacturers may apply a multiplier to the number of LDV/Ts sold that are certified to bins 1 and 2 (ZEVs and SULEVs in California terms). This adjusted number will be used in the calculation of fleet average NOx emissions for a given model year and will allow manufacturers having vehicles certified to these bins to generate additional credits (or use fewer credits) that year.

The multipliers that manufacturers may use are found in Table D below

Table D
Multipliers for Additional Credits for Bin 1 and 2 LDV/Ts

Bin	Model Year	Multiplier
2	2001, 2002, 2003, 2004, 2005	1.5
1	2001, 2002, 2003, 2004, 2005	2.0

vii. Light-Duty Evaporative Emission Standards

More stringent evaporative emission standards are adopted for all Tier 2 light-duty vehicles and light-duty trucks. The standards are shown in Table E and represent, for most vehicles, more than a 50% reduction in diurnal plus hot soak standards from those that will be in effect in the years immediately preceding Tier 2 implementation. The higher standards for HLDTs provide allowance for greater non-fuel emissions related to larger vehicle size.

Table E

**Final Evaporative Emission Standards
(grams per test)**

VEHICLE CLASS	3 DAY DIURNAL +HOT SOAK	SUPPLEMENTAL 2 DAY DIURNAL +HOT SOAK
LDVs and LLDTs	0.95	1.2
HLDTs	1.2	1.5

viii. Passenger Vehicles Above 8,500 pounds GVWR

Historically, all vehicles above 8,500 pounds GVWR have been categorized as heavy-duty vehicles regardless of their application and they have been subject to standards and test procedures designed for vehicles used in heavier work applications⁶. In the Final Rule, EPA is finalizing Tier 2 standards for passenger vehicles above 8,500 pounds GVWR. These vehicles are included in the Tier 2 program beginning in 2004 and are required to meet the final Tier 2 standards in 2009 and later. These vehicles will generally be subject to the same requirements as HLDTs.

The Rule creates a new category of heavy-duty vehicles termed “medium-duty passenger vehicles” (MDPVs). These vehicles will generally be grouped with and treated as HLDTs in the Tier 2 program. The MDPV category is defined as any complete heavy duty vehicle less than 10,000 pounds GVWR designed primarily for the transportation of persons including conversion vans (i.e., vans which are intended to be converted to vans primarily intended for the transportation of persons. The conversion from cargo to passenger use usually includes the installation of rear seating, windows, carpet, and other amenities). EPA is not including any vehicle that (1) has a capacity of more than 12 persons total or, (2) that is designed to accommodate more than 9 persons in seating rearward of the driver’s seat or, (3) has a cargo box (e.g., a pick-up box or bed) of six feet or more in interior length.

As noted above, the MDPVs and HLDTs must meet the final Tier 2 standards by 2009 at the latest. Prior to 2009, HLDTs and MDPVs are required to meet interim standards. The interim standards are based on a corporate average full life NOx standard of 0.20 g/mile which is phased in 25/50/75/100 percent in 2004-2007. MDPVs must be grouped with HLDTs for the interim standards phase-in.

EPA is providing an additional upper bin for MDPVs for the interim program (effective in model years 2004 through 2008). This bin would only be available for MDPVs. The bin, shown in Table F, is equivalent to the California LEV I standards that are applicable to these vehicles prior to 2004. Vehicles certified to this bin must be tested at adjusted loaded vehicle weight (ALVW), consistent with California program testing

⁶ The heavy-duty definition also includes vehicles that weigh over 6000 lbs curb weight regardless of their GVWR. We are not aware that any vehicles currently produced have curb weights above 6,000 lbs, but GVWRs of 8,500 lbs or less. Nevertheless, this discussion and our requirements includes such vehicles.

requirements.⁷ Including this upper bin provides manufacturers with the ability to carry over their California vehicles to the federal program prior to their phase-in to the interim and final Tier 2 standards. Once phased in to the interim standards manufacturers may continue to use the upper bin but the vehicles must be included in the 0.20 g NO_x average. The upper bin is not available to manufacturers for the final Tier 2 program.

Table F
Temporary Interim Exhaust Emission Standards Bin for MDPVs^a

	NO _x	NMOG	CO	HCHO	PM
Full Useful Life (120,000 mile)	0.9	0.280	7.3	0.032	0.12

NOTES

a. Bin expires after model year 2008.

For diesel MDPVs prior to 2008, EPA is allowing manufacturers the option of meeting the heavy-duty engine standards in place for the coinciding model year. Diesels meeting the engine-based standards would be excluded from the interim program averaging pool. In 2008, the manufacturers must chassis certify diesel vehicles and include them either in the interim program or in the final Tier 2 program. In 2009 and later, all MDPVs, including diesels, must be brought into the final Tier 2 program. As with the higher bin of chassis-based standards, the purpose of this diesel provision is to provide the option of carry-over of vehicles until they are brought into the Tier 2 program.

For diesel engines that are engine certified and used in MDPVs, as allowed through model year 2007, EPA is requiring those engines to comprise a separate averaging set under the averaging, banking and trading requirements applicable to heavy-duty diesel engines. EPA is permitting engine-based certification for these diesel vehicles to provide time and flexibility for manufacturers who may have limited experience with chassis certifying vehicles containing such engines. However, EPA believes it is appropriate to constrain the application of credits to these engines.

MDPVs placed in bin 10 may also certify to the higher NMOG level of 0.280 g/mile. This provision provides manufacturers with the incentive of selecting the lower NO_x bin for MDPVs, since the NMOG level is not an obstacle to compliance.

Manufacturers have two options for the start of the program requirements. In Option 1, the program begins with the 2004 model year for 25 percent all vehicles. In Option 2, manufacturers can exempt 2004 model year vehicle test groups whose model years begin on or after the fourth anniversary of this rule's signature. These options are also available for MDPVs. However, the additional 0.9 g bin, the optional higher

⁷ ALVW is the average of curb weight and GVWR. The test weight is sometimes referred to as "half payload".

NMOG standard of 0.280 g/mile for bin 10, and the option of certifying to the engine-based standards for diesels are available only with Option 1.

EPA is requiring all non-diesel MDPVs to be OBDII compliant beginning in 2004. California requires OBDII for their LEV I program and therefore, the new OBD II requirements are consistent with the approach of allowing vehicles to be carried over from California⁸. Diesel vehicles which are carried over from the California program are required to be equipped with the OBD system as the system is certified in California. Diesel vehicles not carried over from California are not required as part of this rulemaking to be equipped with OBDII. However, EPA has proposed OBD II requirements for heavy-duty diesel engines in its heavy-duty engines NPRM; if OBDII requirements are finalized for heavy-duty engines and vehicles as part of that rulemaking the OBD II requirements would likewise apply to diesels in the MDPV category.

EPA is finalizing Cold CO and Certification Short Test requirements for Tier 2 MDPVs. However, they are not finalizing SFTP standards for MDPVs in this Rule. Currently, SFTP standards do not apply to any vehicles above 8,500 pounds GVWR, including those in the California LEV I and LEV II programs.

b. Sulfur Provisions

The other major part of the Rule will significantly reduce average gasoline sulfur levels nationwide. EPA expects these reductions could begin to phase in as early as 2000, with full compliance for most refiners occurring by 2006. Importers of gasoline will be required to import and market only gasoline meeting the sulfur limits. Temporary, less stringent standards will apply to a few small refiners through 2007. In addition, temporary, less stringent standards will apply to a limited geographic area in the western U.S. for the 2004-2006 period.

The program requires that most refiners and importers meet a corporate average gasoline sulfur standard of 120 ppm and a cap of 300 ppm beginning in 2004. By 2006, the cap will be reduced to 80 ppm and most refineries must produce gasoline averaging no more than 30 ppm sulfur. The program includes provisions for trading of sulfur credits.

Table G summarizes the standards for gasoline refiners and importers. There are three standards which refiners and importers must meet. In 2004 and beyond, every gallon of gasoline produced is limited by a per-gallon maximum or "cap." The cap standard becomes effective January 1, 2004 (and January 1 of subsequent years as the cap standard changes). Also, in 2004 and 2005, each refiner must meet an annual-average standard for its entire corporate gasoline pool. Finally, each individual refinery is subject to a refinery average standard, beginning in 2005. Refineries that do not take advantage of the sulfur ABT program will have actual sulfur levels averaging 30 ppm beginning in 2005.

⁸ As with HLDTs, the California OBDII compliance option is available for MDPVs.

Table G
Gasoline Sulfur Standards for Refiners, Importers, and Individual Refineries
(Excluding Small Refiners and GPA Gasoline)

Compliance as of:	2004^a	2005	2006+
Refinery Average, ppm ^b	--	30	30
Corporate Pool Average, ppm ^c	120	90	--
Per-Gallon Cap ^d , ppm	300	300	80

NOTES

^a. We project that the pool averages will actually be below 120 ppm in 2004. For a discussion of how the program gets early sulfur reductions before 2004.

^b. The refinery average standard can be met through the use of sulfur credits or allotments from the sulfur ABT program, as long as the applicable corporate pool average and per-gallon caps are not exceeded.

^c. The corporate pool average standard can be met through the use of corporate allotments obtained from other refiners, if necessary.

^d. In 2004, exceedances up to 50 ppm beyond the 300 ppm cap are allowed. However, in 2005, the cap for all batches will be reduced by the magnitude of the exceedance.

3. Emissions Reductions and Costs

EPA projects a reduction in oxides of nitrogen emissions of at least 856,000 tons per year by 2007 and 1,236,000 by 2010, the time frame when many states will have to demonstrate compliance with air quality standards. Emission reductions will continue increasing for many years, reaching at least 2,220,000 tons per year in 2020 and continuing to rise further in future years. In addition, the program will reduce the contribution of vehicles to other serious public health and environmental problems, including VOC, PM, and regional visibility problems, toxic air pollutants, acid rain, and nitrogen loading of estuaries.

These reductions, and their resulting environmental benefits, will come at an average cost increase of less than \$100 per passenger car, an average cost increase of less than \$200 for light trucks, and an average cost increase of about \$350 for medium-duty passenger vehicles, and an average increase of less than 2 cents per gallon of gasoline (or about \$120 over the life of an average vehicle).