Summary and Analysis of Comments on the Notice of Proposed Rulemaking for Emission Standards and Test Procedures for Natural Gas-Fueled and Liquefied Petroleum Gas-Fueled Vehicles and Engines, and Certification Procedures for Aftermarket Conversion Systems

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on the
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I. Introduction

On November 5, 1992 EPA published a Notice of Proposed Rulemaking (NPRM) which put forth proposed emission standards and test procedures for natural gas-fueled and liquefied petroleum gas-fueled motor vehicles and engines. In that notice the Agency proposed that the emission standards for these vehicles, collectively referred to as gaseous-fueled vehicles, be largely the same as emission standards which apply to other, currently regulated vehicles. These standards were proposed at the request of industry in order to remove the potential barrier that the lack of such standards may present to the widespread introduction of gaseous-fueled vehicles into the marketplace

In addition to emissions standards and test procedures for new gaseous-fueled vehicles, the proposal also contained procedures by which one can secure an exemption from the Clean Air Act tampering prohibition for an aftermarket conversion (*i e.*, a vehicle modification which allows the vehicle to operate on a fuel other the fuel it was designed and certified to operate on). These procedures, based on the current new vehicle certification procedures, were intended to clarify how one can avoid application of the EPA tampering policy on a conversion by providing a method of demonstrating that a vehicle will continue to meet applicable emission standards after the conversion.

EPA held a public hearing on the NPRM in Ann Arbor, Michigan on December 3, 1992. At that hearing oral comments to the NPRM were received and recorded. A written comment period remained open following the hearing until January 15, 1993. A complete list of organizations which provided comments on the NPRM is contained in Table 1. Common abbreviations for the organization names are also listed.

All of the significant comments to the NPRM are addressed in the preamble to the final rule. This summary and analysis of comments document is intended to address several areas in more detail than in the preamble. The interested reader is urged to consult the preamble to this rule for a discussion of all issues raised by commenters.

Table 1

List of Commenters
to the NPRM

Commenter	Abbreviation
Mountain Fuel Supply Company	-
LP Gas Clean Fuels Coalition	-
Engine Manufacturers Association	EMA
Detroit Diesel Corporation	DDC
Cummins Engine Company	-
IMPCO	-
Mesa Technologies	-
American Gas Association and Natural Gas Vehicle Coalition	AGA/ NGVC
American Automobile Manufacturers Association	AAMA
Chrysler Corporation	-
National Propane Gas Association	NPGA
Stewart & Stevenson Power Company	-
Southern California Gas Company	SoCal Gas
Sherex Industries	-
San Luis Butane	-
Federal Express Corporation	-
American Methanol Institute	AMI

Table 1 - continued

List of Commenters
to the NPRM

Commenter	Abbreviation
National Association of Fleet Administrators	NAFA
Manufacturers of Emission Controls Association	MECA
Navistar International Transportation Corporation	-
New York City Department of Environmental Protection	NYCDEP
U S Small Business Administration	SBA
Beacon Power Systems Incorporated	-
Econogas Fleet Systems	-
Caterpillar Incorporated	-
Carburetion and Turbo Systems Incorporated	-
Baltimore Gas and Electric Company	BG&E
Specialty Equipment Marketers Association	SEMA
General Motors Corporation	GM
Colorado Department of Health	CDH
Amoco Corporation	-
Montana-Dakota Utilities Company	-
Columbia Gas Distribution Companies	-
California Energy Commission	CEC

Table 1 - continued

List of Commenters
to the NPRM

Commenter	Abbreviation
Phillips 66 Company	-
Southwest Research Institute	SwRI

II. Natural Gas Fuel Specifications

Summary of the proposal: It is the Agency's belief that certification test fuels should resemble the fuels that a vehicle is likely to encounter in-use. Given the wide range of natural gas compositions currently available throughout the United States, the Agency proposed very broad specifications for natural gas certification fuel. These specifications included a range for methane content of 74 to 98.5 percent, as well as broad ranges for several other parameters. The proposed specifications were based on a Gas Research Institute (GRI) report on the variability of natural gas composition throughout the United States.[1] The 74 to 98.5 percent methane specification encompassed all natural gas surveyed, excluding the small amounts of propane-air peakshaving gases.

Summary of the comments: Although the Agency received some comments in support of its proposed natural gas certification fuel specifications, in general commenters believed that the proposed specifications were much too broad. The comments in favor of tighter specifications fell into two general categories. First, several commenters stated that they agreed with EPA's general approach of a broadly defined specification in order that certification fuel be representative of in-use fuel. These commenters, however, felt that the proposed fuel specification was much too broad and encompassed fuels which could not be considered representative of most natural gas. Other commenters felt that, in order to be able to meaningfully compare results from different tests, a very narrowly defined test fuel specification is needed. Most of these commenters recommended that EPA adopt the California Air Resources Board (CARB) certification fuel (90% methane, ± 1%, among other requirements) as the federal certification fuel, pointing out the cost savings associated with having only one certification fuel for both federal and California certification testing. AGA/NGVC and AAMA suggested that EPA adopt a narrower range of specifications based on the CARB specifications. Such an approach would use the lower methane limit (89%) of the CARB certification fuel in conjunction with CARB's upper limits on all of the other components (ethane, C_3+, etc.).

EPA response to comments: The Agency both understands and sees the merits in the arguments for tighter natural gas certification fuel specifications. However, as was previously stated, EPA also believes it is important that certification fuel be representative of in-use fuel. Thus, in developing today's final rule the Agency has attempted to find a middle ground between these seemingly conflicting needs. The Agency believes the approach suggested by AGA/NGVC and AAMA strikes a good balance between the need for a tightly defined certification fuel and the conflicting desire that the certification fuel represent the variability of in-use fuel. The approach suggested by AGA/NGVC and AAMA yields the specifications shown in the following table.

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[1] "Variability of Natural Gas Composition in Select Major Metropolitan Areas of the United States", GRI-92/0123, Gas Research Institute, March, 1992.

Natural Gas Certification Fuel Specifications

Item		ASTM test method No.	Value
Methane	min. mole pct.	D1945	89.0
Ethane	max. mole pct.	D1945	4.5
C_3 and higher	max. mole pct.	D1945	2.3
C_6 and higher	max. mole pct.	D1945	0.2
Oxygen	max. mole pct.	D1945	0.6
Inert gases: Sum of CO_2 and N_2	max. mole pct.	D1945	4.0
Odorant*			

* The natural gas at ambient conditions must have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 (one-fifth) of the lower limit of flammability.

The Agency believes these natural gas certification fuel specifications are fairly representative of in-use natural gas. Based on the GRI report, the minimum 89% methane specification encompasses over 90% of in-use natural gas. Although there are many measures of natural gas quality, the methane content is a parameter which is generally used to describe natural gas quality. It is assumed that lower methane content signifies lower quality natural gas due to the higher nonmethane content. However, in low altitude areas the methane content seldom goes two to three percent below the 89 percent level in the certification fuel specification.

Almost all of the gas not covered by this specification (*i.e.*, gas with a methane content below 89 percent) is sold in high altitude areas where some gas contains higher levels of inert gases than that sold at low altitudes. Thus, while the natural gas in high altitude areas can have lower methane content than in low altitude areas (down to 74 percent, as in the NPRM), it does not have a significantly higher methane to nonmethane HC ratio. The Agency believes that excluding high altitude gas from the test fuel specifications should not present a problem for vehicles which are certified using the 89 percent minimum methane certification fuel but are operated at high altitudes because, in general, vehicles which will be certified under the provisions of today's rule are expected to utilize electronic feedback control systems for proper management of the fuel/air ratio. The Agency believes that these systems will be able to account for any differences in fuel composition between high altitude natural gas and natural gas in the rest of the country.

It should be noted that, while the natural gas certification fuel specifications contained in today's rule are much broader than CARB's, CARB certification fuel does fall within the federal specifications, and thus could be used for federal certification testing.

III. Lead Time

Summary of the proposal: As was stated in the NPRM, the Agency believes that the standards are not technology-forcing, and that they could be met largely through currently available technology. Thus, the only lead time requirement for meeting the proposed standards would be that of actually going through the certification process itself, including the required durability showing. The Agency, therefore, proposed that the new vehicle emission standards be effective with the 1994 model year, and that the aftermarket conversions take effect on January 1, 1994. Additionally, the Agency proposed that manufacturers have the option of complying with these standards prior to the effective date in order to participate in any applicable emissions averaging, trading and banking programs, as well as the CAFE program in the case of natural gas-fueled light-duty vehicles and light-duty trucks.

Summary of the comments: In general, the comments received in response to the issue of lead time supported EPA's assessment that these standards are not technology-forcing in the sense that fundamentally new technology must be developed. However, a number of commenters raised concerns that, although the basic technology required to meet these standards has been demonstrated at low mileage, the durability of this technology in many cases remains to be proven. Additionally, one commenter pointed out that there are several mandated requirements taking effect in the next few years for new vehicles, including Tier 1 and cold CO standards, on-board diagnostics, and revised evaporative procedures, and that mandating gaseous-fueled vehicle certification with little lead time may seriously impair the introduction of these vehicles into the marketplace. Most commenters suggested that, given the need for technology refinement and durability work, these requirements should not take effect until the 1996 or 1997 model year. In addition, the heavy-duty engine manufacturers asserted that, under section 202(a)(3)(C) of the Clean Air Act, EPA is required to provide four years lead time in the case of any new emission standards. In most cases commenters stated that, regardless of what effective date EPA finalizes, they support the option of being able to certify prior to the effective date.

EPA response to comments: The Agency agrees that, while current gaseous-fueled vehicle technology is generally capable of meeting the emission standards contained in today's rule, work remains in some cases to meet the durability requirements. While the Agency believes that some current gaseous-fueled engine technologies are capable of demonstrating the required emissions durability, it does not believe this is the case with some of the newest technologies being developed Given that each engine family must demonstrate durability during the new vehicle certification process, the Agency believes that not providing adequate lead time may hinder the further development of new gaseous-fueled vehicle technology in the short term, which is contrary to the stated intent of this rule. Thus, today's requirements for new vehicles and engines

will take effect with the 1997 model year as requested by some commenters. Manufacturers will have the option to comply with these provisions prior to the 1997 model year if they choose

The Agency does not believe that this amount of lead time will be a problem from an environmental standpoint for two reasons. First, the volume of new gaseous-fueled vehicles produced prior to the 1997 model year is not expected to be that large, given the relatively young nature of the new gaseous-fueled vehicle market Second, the Agency expects that any new vehicle or engine family which might be sold in any significant volume prior to the 1997 model year would be certified and in the process have demonstrated adequate durability. Since there is much incentive for early compliance in the form of CAFE credits and the emissions banking and trading program, the Agency would expect the manufacturers of these vehicles to certify them in order to take advantage of these credits.

Additionally, the Agency does not believe that section 202(a)(3)(C) requires EPA to provide four years lead time for emissions standards applicable to gaseous-fueled heavy-duty engines.[2] These standards are being promulgated under EPA's general section 202(a)(1) authority to establish emission standards for any new class of new motor vehicles or new motor vehicle engines. EPA at no time relied upon section 202(a)(3) for authority to establish these standards. When operating under the section 202(a)(1) general authority, EPA believes that lead time considerations are governed by section 202(a)(2), which provides that lead time is to be allowed as "necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."

In this context, the four years specified in section 202(a)(3)(C) might serve as a relevant starting point for determining the appropriate lead time where engine manufacturers must make changes to their current engine designs in order to comply with new standards for alternative-fueled engines (as in the case of the gaseous-fueled engine crankcase emission standard). EPA does not, however, believe that the provisions of section 202(a)(3) constrain EPA's discretion in establishing emission standards otherwise consistent with section 202(a)(1) and (2). Rather, EPA believes that the provisions of section 202(a)(3), including the lead time provisions of section 202(a)(3)(C), apply only to standards for gasoline and diesel engines.

Indeed, if section 202(a)(3) were to apply to all standards adopted pursuant to section 202(a)(1), then EPA would be constrained under section 202(a)(3)(A) to adopt standards that "reflect the greatest degree of emission reduction achievable" through the application of available technology, rather than standards which correspond to those applicable to gasoline and diesel-fueled vehicles. EPA does not believe section 202(a)(3)(A) was intended to so constrain EPA in developing emission standards for alternative-fueled vehicles and engines. And section 202(a)(3)(C) is specifically limited to "[a]ny standard promulgated or revised under this

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[2] The Agency recognizes it took a somewhat different position in the application of evaporative emission standards for methanol heavy-duty engines (58 FR 16002, March 24, 1993).

paragraph.. ." the standards for gaseous-fueled engines are not being promulgated under paragraph (3), but rather under the general authority of paragraph (1).

This is consistent with EPA's approach in its rule establishing emission standards for methanol vehicles and standards that correspond with standards already applicable to gasoline and diesel-fueled vehicles and engines.[3] Congress implicitly ratified this prior interpretation in the 1990 Amendments to the Clean Air Act.[4] This approach is also consistent with EPA's conclusion that the Clean Air Act Amendments do not specifically address lead time or phase-in schedule requirements for heavy-duty onboard refueling control requirements.[5]

III. Small Volume Procedures for Aftermarket Conversions

Summary of the proposal: It is the Agency's policy that, based on the tampering provisions of section 203(a)(3) of the Act, aftermarket conversions should not degrade the emissions performance of the vehicle being converted, and that following a conversion a vehicle should still meet the emission standards it was originally certified as meeting on any fuels it is capable of using. Under this policy any conversion which degrades the emissions performance of the vehicle is considered tampering. In order to clarify how compliance with this policy can be demonstrated, the Agency proposed that converters can certify as new vehicle manufacturers using the current new vehicle certification procedures applicable to small volume manufacturers. The Agency requested comment on whether the volume limit of 10,000 units that currently defines a small volume manufacturer should apply to conversions as well, or whether, as proposed, the small volume procedures should apply to all converters, regardless of the conversion sales volume of the company seeking the certification.

Summary of the comments: In general, the comments received on the aftermarket conversion provisions were very supportive, with several commenters expressing the need for such requirements, and none completely opposed. One commenter suggested that these requirements should only apply to conversions in areas which are not in attainment with national ambient air quality standards. Comments were received both in favor of and opposed to applying the 10,000 limit to the use of the small volume procedures for conversions. Other comments received indicated that there was some confusion as to the applicability of the proposed requirements to conversions done before 1994, as well as to conversions of pre-1994 model year vehicles performed after December 31, 1993

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[3] See Notice of Proposed Rulemaking, 51 FR 30983, 30985 (August 29, 1986).

[4] See S. Rep. No 101-228, 101st Cong., 1st Sess (Dec 20. 1989) at 101 (referring to methanol standards).

[5] See Notice of Public Hearing and Reopening of Comment Period, 58 FR 30731, 30733 (May 27, 1993).

EPA response to comments: The Agency agrees with the comment that the production volume limits that currently define a small volume manufacturer also apply to converters seeking to certify as manufacturers under today's program. The Agency expects that the demand for aftermarket conversions will grow dramatically over the next few years in response to a variety of state and federal programs. It seems reasonable to require the larger conversion companies to undergo full new vehicle certification if they choose to get an exemption from the tampering prohibition by certifying as a manufacturer Thus, the volume limits that currently apply to manufacturers seeking to certify under the small volume manufacturers provisions will also apply to converters seeking to certify as manufacturers.

The Agency recognizes that, while the current small volume manufacturers limit as it applies to new vehicles applies to sales for a particular model year, conversions are routinely performed on older vehicles. A conversion company may offer conversion systems for vehicles from several different model years at any given time. Thus, the 10,000 sales volume limit for obtaining an exemption from the tampering prohibition under the small volume manufacturers procedures will apply to calendar year sales for the purposes of aftermarket conversions. All conversions will be included in calculating an aftermarket conversion certifier's total sales for a given calendar year, including conversions under the requirements of 40 CFR part 88 (clean-fuel fleets), 40 CFR part 85, and Mobile Source Memorandum No. 1A. Additionally, if the aftermarket conversion certifier is also a manufacturer of new vehicles, any new vehicles produced during a given calendar year would be included in the 10,000 limit. Finally, the Agency recognizes that, even though an aftermarket conversion certifier could certify a system one year under the small volume manufacturers procedures, during a later year the certifier could exceed the 10,000 volume sales limit for a conversion or conversions which were previously certified under the small volume manufacturers procedures. The Agency would expect to revoke any such certifications under these circumstances.

IV. Refueling Standards

A. Natural Gas

Summary of the proposal: In the NPRM the Agency proposed that, in the case of natural gas refueling facilities, no refueling hoses which need to be vented down prior to disconnect shall be vented to the atmosphere. Rather, as is the case with many current natural gas refueling facilities, EPA expects that such vent-down gases should be routed back to the compressor inlet rather than being vented to the atmosphere. The timing of this requirement was not explicit in the NPRM preamble However, the regulatory text stated that the provisions would take effect with the 1994 model year.

Summary of the comments: In general, the comments received in response to the issue of natural gas refueling hose venting opposed, to some degree, the proposed prohibition on venting

emissions. Some commenters suggested that this requirement is not needed at all given the extremely small contribution to total methane emissions that vent-down gases represent. Several commenters pointed out that the upcoming ANSI/AGA NGV1 standard would address EPA's concerns about refueling emissions from natural gas refueling stations. One commenter pointed out that this proposed requirement could be interpreted as a zero-emission standard and questioned the feasibility of such an approach. Some commenters suggested that more lead time was needed than was proposed. Several commenters pointed out that the cost of controlling these emissions varied quite a bit depending on the inlet pressure of the compressor. In cases where the natural gas supply line is at fairly low pressure (*i e* , 15 psi or less) the gas could be routed directly into the compressor inlet at low cost. However, in cases where the gas supply pressure is higher, additional compression equipment would be needed to compress the vent-down gas in order to route it back into the compressor, raising costs substantially. Also, the cost of such controls would be much higher for existing installations than for new stations because existing stations would likely require excavation for the return line plumbing. Finally, some commenters stated that EPA should not control natural gas refueling emissions since they are primarily methane, and the Agency only proposed NMHC standards for tailpipe emissions.

EPA response to comments: In the NPRM the Agency mentioned that the natural gas industry was moving toward the establishment of standard refueling equipment specifications. That effort, known as the ANSI/AGA NGV1 standard, was recently adopted by the American National Standards Institute (ANSI) as the standard for natural gas vehicle fueling connection devices While in its various draft forms, this standard contained a provision limiting the amount of natural gas that can be vented due to nozzle disconnect. This provision was based on the proposed onboard refueling vapor recovery (ORVR) standard for gasoline-fueled vehicles of 0.05 grams per gallon of dispensed gasoline.[6] As indicated in the draft ANSI standard contained in the public docket for this rule, the venting provision was deleted from the final ANSI standard since, at the time of final balloting on the standard, the ORVR rule had not yet been promulgated. The ORVR final rule was recently promulgated and included a gasoline-fueled vehicle refueling emission standard of 0.20 grams per gallon of dispensed gasoline.[7]

The Agency agrees that a zero-emission standard for natural gas vehicles is not reasonable and believes that, in its draft form, the NGV1 standard addressed EPA's concerns with natural gas vehicle refueling emissions. Thus, the Agency is using methodology similar to that in the draft NGV1 standard to apply the 0.20 gram per gallon refueling standard to natural gas vehicles. Since the mass of natural gas refueling emissions is independent of the fuel tank volume or the amount of fuel dispensed, a nominal fuel tank capacity must be defined in order to apply the 0.20 gram per gallon refueling standard to natural gas vehicles. In the draft NGV1 standard a nominal tank capacity of six gasoline gallons equivalent was used for this purpose, and that number is being used here as well. Using the six gallon equivalent fuel tank capacity in conjunction with

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[6] 52 FR 31162, August 19, 1987.

[7] 59 FR 16262, April 6, 1994.

the 0.20 grams per gallon refueling standard yields a requirement that natural gas refueling stations will be allowed to vent no more than 1.2 grams of natural gas due to nozzle disconnect. This requirement will take effect January 1, 1998 for high volume stations, with a two year extension until January 1, 2000 for small volume stations (those which dispense less than the energy equivalent of 10,000 gallons of gasoline per month based on the AMFA fuel equivalency factor)

In addition to the requirements for natural gas refueling stations, EPA is also requiring natural gas-fueled light-duty vehicles and light-duty trucks be equipped with refueling receptacles which comply with the recently adopted ANSI/AGA NGV1 standard This requirement will be implemented consistent with the timing of the ORVR provisions for other vehicles (three year phase in beginning with the 1998 model year for light-duty vehicles and the 2001 model year for light-duty trucks). The Agency expects, however, that all new natural gas-fueled vehicles will have ANSI/AGA NGV1 nozzles long before this due to the desire for standardized refueling coupling geometry within the industry.

EPA does not believe that the cost of the refueling station controls is prohibitive and believes that today's requirement is both feasible and reasonable. Consistent with this view, most new stations being installed meet this requirement. The Agency agrees that in certain cases, such as those where additional compression equipment is needed, the cost of retrofitting may not be reasonable. Thus, for in-use refueling stations which must be reftrofitted to meet this requirement, the Agency will waive the requirement in situations where the station operator can demonstrate, to the satisfaction of the Administrator, that compliance with this provision would require the use of additional compression equipment, or other similar costs. The impact of such waivers should be minimal given the small number of stations currently operating, and the small percentage of those stations which would not currently meet these requirements.

The lack of exhaust THC standards in today's rule is a function of cost and legal constraints, and the Agency believes that control of methane is appropriate where it is feasible and economically reasonable. Thus, EPA does not believe that the desire to control refueling emissions from natural gas vehicles is inconsistent with the adoption of exhaust NMHC standards

B. Liquefied Petroleum Gas

Summary of the proposal: Since LPG is transferred in a sealed system there is little concern about refueling emissions at the vehicle/pump interface during the actual fuel transfer. Of concern to the Agency, however, are emissions released when the nozzle is disconnected from the vehicle At this point any fuel which is trapped in the dead space between the nozzle and the vehicle receptacle is released In the NPRM the Agency proposed that refueling equipment be designed so as to prevent this escape of fuel, such as through the use of low-loss, no-bleed couplings, although no specific numerical standards were included. As with the natural gas

provisions in the NPRM, the timing of this requirement was not explicit in the NPRM preamble However, the regulatory text stated that the provisions would take effect with the 1994 model year.

Summary of the comments: The Agency received few comments on this particular aspect of the proposed refueling provisions. The comments that addressed this issue tended to agree with the need for control. However, the comments otherwise differed. One commenter suggested that any hardware requirement be performance-based, rather than prescriptive, so as to be consistent with EPA's previous consideration of refueling controls for gasoline vehicles Also, the lack of a numerical standard was interpreted as being a zero-emission standard, which one commenter suggested is infeasible. Another commenter stated that just requiring new refueling nozzles at all current LPG fueling facilities would cost about $30 million, but provided no supporting documentation for that claim.

EPA response to comments: The Agency believes that it is appropriate to minimize the amount of LPG fuel which is vented from the dead space between the refueling nozzle check valve and the vehicle refueling receptacle check valve but also agrees that a zero-emission standard is unreasonable. Both the nozzle and the vehicle receptacle geometries play an integral role in the size of this dead space Thus, any performance specification for vehicle/pump interface refueling emissions would have to address the nozzle and receptacle as a single system. In the case of LPG, there is not a standardized geometry for refueling nozzles, at least in terms of the parameters which would affect this dead space. Thus, it is difficult for the Agency to define a performance specification such as that which has been considered for gasoline vehicles based upon an industry standard nozzle geometry. The Agency is aware that the LPG industry is developing nozzles which dramatically reduce the dead space, especially when used in conjunction with low-bleed inserts in the vehicle receptacle.

For the reasons just mentioned it seems reasonable to use a two-fold approach to refueling emissions for LPG vehicles. First, in order to apply the recently promulgated onboard refueling vapor recovery (ORVR) rule to LPG vehicles, a standard LPG nozzle dead space must be specified. Once the nozzle dead space is specified, the ORVR standard can be applied to LPG vehicles when tested with a nozzle meeting this specification. In order to apply the ORVR standard to LPG vehicles so that both types of vehicles are regulated at the same gram per mile level the standard must be adjusted to account for the difference in energy density between gasoline and LPG. Using an equivalency factor of one gallon of LPG being equivalent to 0 732 gallons of gasoline, which was developed for the National Highway Traffic Safety Administration,[8] the ORVR standard of 0.20 gram per dispensed gallon of gasoline is adjusted to 0.15 gram per dispensed gallon of LPG.

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[8] "Energy Equivalent Values of Three Alternative Fuels. Liquefied Natural Gas, Liquefied Petroleum Gas, and Hydrogen", Prepared for the National Highway Traffic Safety Administration by Abacus Technology Corporation, August 6, 1993

In order to establish a standard for LPG nozzles a nominal fuel tank capacity must be chosen. Given that most LPG fuel tanks have at least 15 gallons capacity, a standard based on a fifteen gallon tank volume would suffice for most LPG vehicles. The ORVR test procedure for gasoline vehicles requires dispensing at least 85 percent of fuel tank volume Since 85 percent of fifteen gallons is 12.75 gallons, a vehicle with a fifteen gallon LPG tank could typically emit no more than 1.91 grams of fuel vapor during the refueling test (12.75 gallons multiplied by 0 15 gram per dispensed gallon). Since commercial propane is approximately 0.5 gram per cm^3, this would equate to approximately 3.8 cm^3 total dead space from which fuel could be vented upon disconnect of the nozzle for the vehicle to meet the ORVR standard. EPA allocated about half of this dead volume to the nozzle (and half to the vehicle), thus the standard allows no more than 2 0 cm^3 dead volume in LPG nozzles. This volume is measured from the nozzle face which seals against the vehicle "O" ring, any dead volume beyond this point would be attributed to the vehicle. A nozzle which meets this specification can then be used to test the vehicle using the ORVR procedure and the LPG refueling standard of 0.15 gram per dispensed gallon of LPG

This approach will ensure that the LPG vehicles will have refueling emissions similar to those of other vehicles meeting the ORVR standards. A certification testing waiver will be available for all classes of LPG vehicles to which this standard applies if the manufacturer can demonstrate, through the use of development or other data, that the vehicle will meet the standard.

This standard for LPG vehicles will apply to the same classes and model years as the ORVR rule (i e., three year phase-in beginning with the 1998 model year for light-duty vehicles and the 2001 model year for light-duty trucks). The requirement for the refueling nozzles will take effect January 1, 1998 for high volume stations, with a two year extension until January 1, 2000 for small volume stations (those which dispense less than the energy equivalent of 10,000 gallons of gasoline per month). This amount of lead time for refueling stations will allow for the replacement or retrofit of LPG nozzles during the normal course of replacement or repair of in-use nozzles due to wear.