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40 CFR Parts 59, 80, 85 and 86

Control of Hazardous Air Pollutants From Mobile Sources; Proposed Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 59, 80, 85 and 86

[EPA–HQ–OAR–2005–0036; FRL–8041–2]

RIN 2060–AK70

Control of Hazardous Air Pollutants From Mobile Sources

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule.

SUMMARY: Today EPA is proposing controls on gasoline, passenger vehicles, and portable gasoline containers (gas cans) that would significantly reduce emissions of benzene and other hazardous air pollutants (''mobile source air toxics''). Benzene is a known human carcinogen, and mobile sources are responsible for the majority of benzene emissions. The other mobile source air toxics are known or suspected to cause cancer or other serious health effects.

We are proposing to limit the benzene content of gasoline to an annual average of 0.62% by volume, beginning in 2011. We are also proposing to limit exhaust emissions of hydrocarbons from passenger vehicles when they are operated at cold temperatures. This standard would be phased in from 2010 to 2015. For passenger vehicles we also propose evaporative emissions standards that are equivalent to those in California. Finally, we are proposing a hydrocarbon emissions standard for gas cans beginning in 2009, which would reduce evaporation and spillage of gasoline from these containers.

These controls would significantly reduce emissions of benzene and other mobile source air toxics such as 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and naphthalene. This proposal would result in additional substantial benefits to public health and welfare by significantly reducing emissions of particulate matter from passenger vehicles.

We project annual nationwide benzene reductions of 35,000 tons in 2015, increasing to 65,000 tons by 2030. Total reductions in mobile source air toxics would be 147,000 tons in 2015 and over 350,000 tons in 2030. Passenger vehicles in 2030 would emit 45% less benzene. Gas cans meeting the new standards would emit almost 80% less benzene. Gasoline would have 37% less benzene overall. We estimate that these reductions would have an average cost of less than 1 cent per gallon of gasoline and less than $1 per vehicle. The average cost for gas cans would be less than $2 per can. The reduced evaporation from gas cans would result in significant fuel savings, which would more than offset the increased cost for the gas can.

DATES: Comments must be received on or before May 30, 2006. Under the Paperwork Reduction Act, comments on the information collection provisions must be received by OMB on or before April 28, 2006.

Hearing: We will hold a public hearing on April 12, 2006. The hearing will start at 10 a.m. local time and continue until everyone has had a chance to speak. If you want to testify at the hearing, notify the contact person listed under **FOR FURTHER INFORMATION CONTACT** by April 3, 2006.

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ–OAR–2005–0036, by one of the following methods:

- *http://www.regulations.gov*: Follow the on-line instructions for submitting comments.
- Fax your comments to: (202) 566–1741.
- Mail: Air Docket, Environmental Protection Agency, Mailcode: 6102T, 1200 Pennsylvania Ave., NW., Washington, DC 20460. In addition, please mail a copy of your comments on the information collection provisions to the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), Attn: Desk Officer for EPA, 725 17th St. NW., Washington, DC 20503.
- Hand Delivery: EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC 20004. Such deliveries are only accepted during the Docket's normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to Docket ID No. EPA–HQ–OAR–2005–0036. EPA's policy is that all comments received will be included in the public docket without change and may be made available online at *www.regulations.gov*, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *www.regulations.gov* or e-mail. The *www.regulations.gov* website is an ''anonymous access'' system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through *www.regulations.gov* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket visit the EPA Docket Center homepage at *http://www.epa.gov/epahome/dockets.htm*. For additional instructions on submitting comments, go to section XI, Public Participation, of the **SUPPLEMENTARY INFORMATION** section of this document.

Docket: All documents in the docket are listed in the *www.regulations.gov index*. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at the Air Docket, EPA/DC, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Air Docket is (202) 566–1742.

Hearing: The public hearing will be held at Sheraton Crystal City Hotel, 1800 Jefferson Davis Highway, Arlington, Virginia 22202, Telephone: (703) 486–1111. See section XI, Public Participation, for more information about public hearings.

FOR FURTHER INFORMATION CONTACT: Mr. Chris Lieske, U.S. EPA, Office of Transportation and Air Quality, Assessment and Standards Division (ASD), Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; telephone number: (734) 214–4584; fax number: (734) 214–4816; email address: *lieske.christopher@epa.gov*, or Assessment and Standards Division

Hotline; telephone number: (734) 214–4636; e-mail address: *asdinfo@epa.gov*.

SUPPLEMENTARY INFORMATION:

General Information

A. Does this Action Apply to Me?

Entities potentially affected by this action are those that produce new motor vehicles, alter individual imported motor vehicles to address U.S. regulation, or convert motor vehicles to use alternative fuels. It would also affect you if you produce gasoline motor fuel or manufacture portable gasoline containers. Regulated categories include:

Category	NAICS codes [a]	SIC codes [b]	Examples of potentially affected entities
Industry	336111	3711	Motor vehicle manufacturers.
Industry	335312	3621	Alternative fuel vehicle converters.
	424720	5172	
	811198	7539	
		7549	
Industry	811111	7538	Independent commercial importers.
	811112	7533	
	811198	7549	
Industry	324110	2911	Gasoline fuel refiners.
Industry	326199	3089	Portable fuel container manufacturers.
	332431	3411	

[a] North American Industry Classification System (NAICS).
[b] Standard Industrial Classification (SIC) system code.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your activities are regulated by this action, you should carefully examine the applicability criteria in 40 CFR parts 59, 80, 85, and 86. If you have any questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

B. What Should I Consider as I Prepare My Comments for EPA?

1. Submitting CBI

Do not submit this information to EPA through www.regulations.gov or e-mail. Clearly mark the part or all of the information that you claim to be confidential business information (CBI). For CBI information in a disk or CD ROM that you mail to EPA, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is claimed as CBI. In addition to one complete version of the comment that includes information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

2. Tips for Preparing Your Comments

When submitting comments, remember to:

- Explain your views as clearly as possible.
- Describe any assumptions that you used.
- Provide any technical information and/or data you used that support your views.
- If you estimate potential burden or costs, explain how you arrived at your estimate.
- Provide specific examples to illustrate your concerns.
- Offer alternatives.
- Make sure to submit your comments by the comment period deadline identified.
- To ensure proper receipt by EPA, identify the appropriate docket identification number in the subject line on the first page of your response. It would also be helpful if you provided the name, date, and **Federal Register** citation related to your comments.

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I. Introduction

A. Summary

Mobile sources emit air toxics that can cause cancer and other serious health effects. Section III of this preamble and Chapter 1 of the

Regulatory Impact Analysis (RIA) for this rule describe these compounds and their health effects. Mobile sources contribute significantly to the nationwide risk from breathing outdoor sources of air toxics. Mobile sources were responsible for about 44% of outdoor toxic emissions, almost 50% of the cancer risk, and 74% of the noncancer risk according to EPA's National-Scale Air Toxics Assessment (NATA) for 1999. In addition, people who live or work near major roads or live in homes with attached garages are likely to have higher exposures and risk, which are not reflected in NATA. Sections II.A and IV of this preamble and Chapter 3 of the RIA provide more detail about NATA, as well as our analysis of exposures near roadways.

According to NATA for 1999, there are a few mobile source air toxics that pose the greatest risk based on current information about ambient levels and exposure. These include benzene, 1,3-butadiene, formaldehyde, acrolein, naphthalene, and polycyclic organic matter (POM). All of these compounds are hydrocarbons except POM. Benzene is the most significant contributor to cancer risk from all outdoor air toxics, according to NATA for 1999. NATA does not include a quantitative estimate of cancer risk for diesel exhaust, but it concludes that diesel exhaust (specifically, diesel particulate matter and diesel exhaust organic gases) is one of the pollutants that pose the greatest relative cancer risk. Although we expect significant reductions in mobile source air toxics in the future, cancer and noncancer health risks will remain a public health concern, and exposure to benzene will remain the largest contributor to this risk.

As discussed in detail in Section V of this preamble and Chapter 2 of the RIA, this proposal would significantly reduce emissions of the many air toxics that are hydrocarbons, including benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, and naphthalene. The proposed fuel benzene standard and hydrocarbon standards for vehicles and gas cans would together reduce total emissions of mobile source air toxics by 350,000 tons in 2030, including 65,000 tons of benzene. Mobile sources were responsible for 68% of benzene emissions in 1999. As a result of this proposal, in 2030 passenger vehicles would emit 45% less benzene, gas cans would emit 78% less benzene, and the gasoline would have 37% less benzene overall.

In addition, EPA has already taken significant steps to reduce diesel emissions from mobile sources, which will result in a 70% reduction between 1999 and 2020. We have adopted stringent standards for diesel trucks and buses, and nonroad diesel engines (engines used, for example, in construction, agricultural, and industrial applications). We also have additional programs underway to reduce diesel emissions, including voluntary programs and a proposal that is being developed to reduce emissions from diesel locomotives and marine engines.

The proposed reductions in mobile source air toxics emissions would reduce exposure and predicted risk of cancer and noncancer health effects, including in environments where exposure and risk may be highest, such as near roads, in vehicles, and in homes with attached garages. In addition, the hydrocarbon reductions from the vehicle and gas can standards would reduce VOC emissions (which are a precursor to ozone and $PM_{2.5}$) by over 1 million tons in 2030. The proposed vehicle standards would reduce direct $PM_{2.5}$ emissions by 20,000 tons in 2030 and would also reduce secondary formation of $PM_{2.5}$. Although ozone and $PM_{2.5}$ are considered criteria pollutants rather than ''air toxics,'' reductions in ozone and $PM_{2.5}$ are important co-benefits of this proposal. More details on emissions, cancer risks, and adverse health and welfare effects associated with ozone and PM are found in sections II.A, IV and V of this preamble and Chapters 2 and 3 of the RIA.

Section II.B of this preamble provides an overview of the regulatory program that EPA is proposing for passenger vehicles, gasoline, and gas cans. We are proposing standards to limit the exhaust hydrocarbons from passenger vehicles during cold temperature operation. We are also proposing evaporative hydrocarbon emissions standards for passenger vehicles. We are proposing to limit the average annual benzene content of gasoline. Finally, we are proposing hydrocarbon emissions standards for gas cans that would reduce evaporation, permeation, and spillage from these containers. Detailed discussion of each of these programs is in sections VI, VII, and VIII of the preamble and Chapters 5, 6, and 7 of the RIA.

We estimate that the benefits of this proposal would be about $6 billion in 2030, based on the direct $PM_{2.5}$ reductions from the vehicle standards, plus unquantified benefits from reductions in mobile source air toxics and VOC. We estimate that the annual net social costs of this proposal would be about $200 million in 2030 (expressed in 2003 dollars). These net social costs include the value of fuel savings from the proposed gas can standards, which would be worth $82 million in 2030.

The proposed reductions would have an average cost of 0.13 cents per gallon of gasoline, less than $1 per vehicle, and less than $2 per gas can. The reduced evaporation from gas cans would result in fuel savings that would more than offset the increased cost for the gas can. In 2030, the long-term cost per ton of the proposed standards (in combination, and including fuel savings) would be $450 per ton of total mobile source air toxics reduced; $2,400 per ton of benzene reduced; and no cost for the hydrocarbon and PM reductions (because the vehicle standards would have no cost in 2020 and beyond). Section IX of the preamble and Chapters 8–13 of the RIA provide more details on the costs, benefits, and economic impacts of the proposed standards. The impacts on small entities and the flexibilities we are proposing are discussed in section XII.C of this preamble and Chapter 14 of the RIA.

B. What Background Information is Helpful to Understand this Proposal?

1. What Are Air Toxics and Related Health Effects?

Air toxics, which are also known in the Clean Air Act as ''hazardous air pollutants,'' are those pollutants known or suspected to cause cancer or other serious health or environmental effects. For example, some of these pollutants are known to have negative effects on people's respiratory, cardiovascular, neurological, immune, reproductive, or other organ systems, and they may also have developmental effects. They may pose particular hazards to more susceptible and sensitive populations, such as children, the elderly, or people with pre-existing illnesses.

Mobile source air toxics (MSATs) are those toxics emitted by motor vehicles, nonroad engines (such as lawn and garden equipment, farming and construction equipment, aircraft, locomotives, and ships), and their fuels. Toxics are also emitted by stationary sources such as power plants, factories, oil refineries, dry cleaners, gas stations, and small manufacturers. They can also be produced by combustion of wood and other organic materials. There are also indoor sources of air toxics, such as solvent evaporation and outgassing from furniture and building materials.

Some MSATs of particular concern include benzene, 1,3-butadiene, formaldehyde, acrolein, naphthalene, and diesel particulate matter and diesel exhaust organic gases. Benzene and 1,3-butadiene are both known human

carcinogens. Section III of this preamble provides more detail on the health effects of each of these pollutants.

MSATs are emitted as a result of various processes. Some MSATs are present in fuel or fuel additives and are emitted to the air when the fuel evaporates or passes through the engine. Some MSATs are formed through engine combustion processes. Some compounds, like formaldehyde and acetaldehyde, are also formed through a secondary process when other mobile source pollutants undergo chemical reactions in the atmosphere. Finally, some air toxics, such as metals, result from engine wear or from impurities in oil or fuel.

2. What is the Statutory Authority for Today's Proposal?

a. Clean Air Act Section 202(l)

Section 202(l)(2) of the Clean Air Act requires EPA to set standards to control hazardous air pollutants from motor vehicles, motor vehicle fuels, or both. These standards must reflect the greatest degree of emission reduction achievable through the application of technology which will be available, taking into consideration the motor vehicle standards established under section 202(a) of the Act, the availability and cost of the technology, and noise, energy and safety factors, and lead time. The standards are to be set under Clean Air Act sections 202(a)(1) or 211(c)(1), and they are to apply, at a minimum, to benzene and formaldehyde emissions.

Section 202(a)(1) of the Clean Air Act directs EPA to set standards for new motor vehicles or new motor vehicle engines which EPA judges to cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare. We are proposing a cold-temperature hydrocarbon emission standard for passenger vehicles under this authority.

Section 211(c)(1)(A) of the Clean Air Act authorizes EPA (among other things) to control the manufacture of fuel if any emission product of such fuel causes or contributes to air pollution which may reasonably be anticipated to endanger public health or welfare. We are proposing a benzene standard for gasoline under this authority.

Clean Air Act section 202(l)(2) requires EPA to ''from time to time revise'' its regulations controlling hazardous air pollutants from motor vehicles and fuels. As described in more detail in section I.F. below, EPA has previously set standards under section 202(l), and we committed in that rule to engage in further rulemaking to implement section 202(l). This proposal fulfills that commitment.

b. Clean Air Act Section 183(e)

Clean Air Act section 183(e)(3) requires EPA to list categories of consumer or commercial products that the Administrator determines, based on an EPA study of VOC emissions from such products, contribute at least 80 percent of the VOC emissions from such products in areas violating the national ambient air quality standard for ozone. EPA promulgated this list at 60 FR 15264 (March 23, 1995). EPA plans to publish a **Federal Register** notice announcing that EPA has added portable gasoline containers to the list of consumer products to be regulated. This action must be taken by EPA prior to issuing a final rule for gas cans. EPA is required to develop rules reflecting ''best available controls'' to reduce VOC emissions from the listed products. ''Best available controls'' are defined in section 183(e)(1)(A) as follows:

> The term ''best available controls'' means the degree of emissions reduction that the Administrator determines, on the basis of technological and economic feasibility, health, environmental, and energy impacts, is achievable through the application of the most effective equipment, measures, processes, methods, systems, or techniques, including chemical reformulation, product or feedstock substitution, repackaging, and directions for use, consumption, storage, or disposal.''

Section 183(e)(4) also allows these standards to be implemented by means of ''any system or systems of regulation as the Administrator may deem appropriate, including requirements for registration and labeling, self-monitoring and reporting * * * concerning the manufacture, processing, distribution, use, consumption, or disposal of the product.'' We are proposing a hydrocarbon standard for gas cans under the authority of section 183(e).

c. Energy Policy Act

Section 1504(b) of the Energy Policy Act of 2005 requires EPA to adjust the toxics emissions baselines for reformulated gasoline to reflect 2001–2002 fuel qualities. However, the Act provides that this action becomes unnecessary if EPA takes action which results in greater overall reductions of toxics emissions from vehicles in areas with reformulated gasoline. As described in section VII of this preamble, we believe today's proposed action would in fact result in greater reductions than would be achieved by adjusting the baselines under the Energy Policy Act. Accordingly, under the provisions of the Energy Policy Act, this proposed action would obviate the need for readjusting emissions baselines for reformulated gasoline.

3. What Other Actions Has EPA Taken Under Clean Air Act Section 202(l)?

a. 2001 Mobile Source Air Toxics Rule

EPA published a final rule under Clean Air Act section 202(l) on March 29, 2001, entitled, ''Control of Emissions of Hazardous Air Pollutants from Mobile Sources'' (66 FR 17230). This rule established toxics emissions performance standards for gasoline refiners. These standards were designed to ensure that the over compliance to the standard seen in the in-use fuels produced in the years of 1998–2000 would continue in the future.

EPA adopted this anti-backsliding requirement as a near-term control that could be implemented and take effect within a year or two. We did not adopt long-term controls, those controls that require a longer lead time to implement, because we lacked information to address the costs and benefits of potential fuel controls in the context of the fuel sulfur controls that we had finalized in February 2000. However, the March 2001 rule did commit to additional rulemaking that would evaluate the need for and feasibility of additional controls.[1] Today's proposal fulfills that commitment, and represents the second step of the two-step approach originally envisioned in the 2001 rule.

The 2001 rule did not set additional air toxics controls for motor vehicles, because the technology-forcing Tier 2 light-duty vehicle standards and 2007 heavy-duty engine and vehicle standards had just been promulgated. We found that those standards represented the greatest degree of toxics control achievable at that time under section 202(l).[2]

b. Technical Analysis Plan

The 2001 rulemaking also included a Technical Analysis Plan that described toxics-related research and activities that would inform our future rulemaking to evaluate the need for and appropriateness of additional mobile source air toxic controls. Specifically, we identified four critical areas where there were data gaps requiring long-term efforts:

- Developing better air toxics emission factors for nonroad sources;
- Improving estimation of air toxics exposures in microenvironments;

[1] *See Sierra Club* v. *EPA,* 325 F. 3d 374, 380 (D.C. Cir. 2003), which upholds this approach.

[2] 66 FR 17241–17245 (March 29, 2001).

• Improving consideration of the range of total public exposures to air toxics; and

• Increasing our understanding of the effectiveness and costs of vehicle, fuel and nonroad controls for air toxics.

EPA and other outside researchers have conducted significant research in these areas since 2001. The findings of this research are described in more detail in other sections of this preamble and in the regulatory impact analysis for this proposal. Following are some highlights of our activities.

Nonroad emissions testing. EPA has tested emissions of nonroad diesel engines for a comprehensive suite of hydrocarbons and inorganic compounds. These emissions tests employed steady-state as well as transient test cycles, using typical nonroad diesel fuel and low-sulfur nonroad diesel fuel. In addition, EPA tested small gasoline-powered engines such as lawnmowers, leaf blowers, chainsaws and string trimmers.

Improved estimation of exposures in microenvironments and consideration of the range of public exposures. EPA and other researchers have conducted a substantial amount of research and analysis in these areas, which is discussed in section IV of this preamble and in the regulatory impact analysis. This research has involved monitoring as well as the development and application of enhanced modeling tools. For example, personal exposure monitoring and ambient monitoring has been conducted at homes and schools near roadways; in vehicles; in homes with attached garages; and in occupational settings involving both diesel and gasoline nonroad equipment. We have also applied dispersion modeling techniques with greater spatial refinement to estimate gradients of toxic pollutants near roadways. A variety of improvements to our emissions, dispersion, and exposure modeling tools are improving our ability to consider the range of exposure people experience. These include the MOBILE6 emissions model, improved spatial and temporal allocation of emissions, development of the Community Multiscale Air Quality (CMAQ) model, and updates to the HAPEM exposure model. Many of these improvements were applied in EPA's National-Scale Air Toxics Assessment for 1999 and other analyses EPA performed to support this proposal. In fact, EPA developed a modification of the HAPEM exposure model to account for higher pollutant concentrations near major roads.

Research in these areas is continuing both inside and outside EPA, including work under the auspices of the Health Effects Institute and the Mickey Leland National Urban Air Toxics Research Center.

Costs and effectiveness of vehicle, fuel, and nonroad controls for air toxics. EPA's analysis of the costs and effectiveness of vehicle and fuel controls is described in section IX of this preamble and in the regulatory impact analysis. In addition, as described in section V, EPA is currently developing rules that will examine controls of small gasoline engines and diesel locomotive and marine engines.

II. Overview of Proposal

A. Why Is EPA Making This Proposal?

People experience elevated risk of cancer and other noncancer health effects from exposure to air toxics. Mobile sources are responsible for a significant portion of this risk. For example, benzene is the most significant contributor to cancer risk from all outdoor air toxics,[3] and most of the nation's benzene emissions come from mobile sources. These risks vary depending on where people live and work and the kinds of activities in which they engage. People who live or work near major roads, or people that spend a large amount of time in vehicles, are likely to have higher exposures and higher risks. Although we expect significant reductions in mobile source air toxics in the future, predicted cancer and noncancer health risks will remain a public health concern. Benzene will remain the largest contributor to this risk. In addition, some mobile source air toxics contribute to the formation of ozone and $PM_{2.5}$, which contribute to serious public health problems, which are discussed further in section II.A.4.

Sections II.A.1–3 discuss the risks posed by outdoor toxics now and in the future, based on national-scale estimates such as EPA's National-Scale Air Toxics Assessment (NATA). EPA's NATA for 1999 provides some perspective on the average risk of cancer and noncancer health effects resulting from breathing air toxics from outdoor sources, and the contribution of mobile sources to these risks.[4] [5] This assessment did not include indoor sources of air toxics. Also, it estimates average concentrations within a census tract, and therefore does not reflect elevated concentrations and exposures near roadways within a census tract. Nevertheless, its findings are useful in providing a perspective on the magnitude of risks posed by outdoor sources of air toxics generally, and in identifying what pollutants and sources are important contributors to these health risks.

EPA also performed a national-scale assessment for future years, using the same modeling tools and approach as the 1999 NATA. Finally, we also performed national-scale exposure modeling that accounts for the higher toxics concentrations near roads. This latter modeling provides a perspective on the mobile source contribution to risk from air toxics that is not reflected in our other national-scale assessments.

1. National Cancer Risk from Air Toxics

According to NATA, the average national cancer risk in 1999 from all outdoor sources of air toxics was 42 in a million. That is, 42 out of one million people would be expected to contract cancer from a lifetime of breathing air toxics at 1999 levels. Mobile sources were responsible for 44% of outdoor toxic emissions and almost 50% of the cancer risk. Considering only the subset of compounds emitted by mobile sources (see Table IV.C–2), the national average cancer risk in 1999, including the stationary source contribution to these pollutants, was 23 in a million.

Benzene is the largest contributor to cancer risk of all 133 pollutants quantitatively assessed in the 1999 NATA. The national average cancer risk from benzene alone was 11 in a million. Over 120 million people in 1999 were exposed to a risk level above 10 in a million due to chronic inhalation exposure to benzene. Mobile sources were responsible for 68% of benzene emissions in 1999.

Although air toxics emissions are projected to decline in the future as a result of standards EPA has previously adopted, cancer risk will continue to be a public health concern. The predicted national average cancer risk from MSATs in 2030 will be 18 in a million, according to EPA analysis (described in more detail in section IV of this preamble and Chapter 3 of the Regulatory Impact Analysis). In fact, in 2030 there will be more people exposed to the highest levels of risk. The number of Americans above the 10 in a million cancer risk level from exposure to MSATs is projected to increase from 214 million in 1999 to 240 million in 2030. Mobile sources will continue to be a significant contributor to risk in the future, accounting for 22% of total air

[3] Based on quantitative estimates of risk, which do not include diesel particular matter and diesel exhaust organic gases.

[4] *http://www.epa.gov/ttn/atw/nata 1999.*

[5] NATA does not include a quantitative estimate of cancer risk for diesel particulate matter and diesel exhaust organic gases. EPA has concluded that while diesel exhaust is likely to be a human carcinogen, available data are not sufficient to develop a confidential estimate of cancer unit risk.

toxic emissions in 2020, and 44% of benzene emissions.

2. Noncancer Health Effects

According to the NATA for 1999, nearly the entire U.S. population was exposed to an average level of air toxics that has the potential for adverse respiratory health effects (noncancer).[6] This will continue to be the case in 2030, even though toxics levels will be lower.

Mobile sources were responsible for 74% of the noncancer (respiratory) risk from outdoor air toxics in 1999. The majority of this risk was from acrolein, and formaldehyde also contributed to the risk of respiratory health effects. Mobile sources will continue to be responsible for the majority of noncancer risk from outdoor air toxics in 2030.

Although not included in NATA's estimates of noncancer risk, PM from gasoline and diesel mobile sources contribute significantly to the health effects associated with ambient PM, for which EPA has established a National Ambient Air Quality Standard. There is extensive human data showing a wide spectrum of adverse health effects associated with exposure to ambient PM.

3. Exposure Near Roads and From Attached Garages

The national-scale risks described above do not account for higher exposures experienced by people who live near major roadways, or people who live in homes with attached garages. A substantial number of studies show elevated concentrations of multiple MSATs in close proximity to major roads. We also conducted an exposure modeling study for three geographically distinct states (Colorado, New York, and Georgia) and found that when the elevated concentrations near roadways are accounted for, the distribution of benzene exposure is broader, with a larger fraction of the population exposed to higher concentrations. The largest effect on personal exposure occurs for the population living near major roads. A U.S. Census survey of housing found that in 2003 12.6% of U.S. housing units were within 300 feet of a major transportation source.[7] The potential population exposed to elevated concentrations near major roadways is therefore large. In addition, our analysis indicates that benzene exposure experienced by people living in homes with attached garages may be twice the national average benzene exposure estimated by NATA for 1999. More details on exposure near roads and from attached garages can be found in section IV of this preamble.

4. Ozone and Particulate Matter

Many MSATs are part of a larger category of mobile source emissions known as volatile organic compounds (VOC), which contribute to the formation of ozone and particulate matter (PM). In addition, some MSATs are emitted directly as PM rather than being formed through secondary processes. Thus, MSATs contribute to adverse health effects both as individual pollutants, and as precursors to ozone and PM. Mobile sources contribute significantly to national emissions of VOC and PM. In addition, gas cans are a source of both VOC and benzene emissions.

Both ozone and PM contribute to serious public health problems, including premature mortality, aggravation of respiratory and cardiovascular disease (as indicated by increased hospital admissions and emergency room visits, school absences, work loss days, and restricted activity days), changes in lung function and increased respiratory symptoms, changes to lung tissues and structures, altered respiratory defense mechanisms, chronic bronchitis, and decreased lung function.

In addition, ozone and PM cause significant harm to public welfare. Specifically, ozone causes damage to vegetation, which leads to crop and forestry economic losses, as well as harm to national parks, wilderness areas, and other natural systems. PM contributes to the substantial impairment of visibility in many parts of the U.S., including national parks and wilderness areas. The deposition of airborne particles can also reduce the aesthetic appeal of buildings and culturally important articles through soiling, and can contribute directly (or in conjunction with other pollutants) to structural damage by means of corrosion or erosion.

Finally, atmospheric deposition and runoff of polycyclic organic matter (POM), metals, and other mobile-source-related compounds contribute to the contamination of water bodies such as the Great Lakes and coastal waters (*e.g.*, the Chesapeake Bay).

B. What Is EPA Proposing?

1. Light-Duty Vehicle Emission Standards

As described in more detail in section VI, we are proposing new standards for both exhaust and evaporative emissions from passenger vehicles. The new exhaust emissions standards would significantly reduce non-methane hydrocarbon (NMHC) emissions from passenger vehicles at cold temperatures. These hydrocarbons include many mobile source air toxics (including benzene), as well as VOC.

Current vehicle emission standards require that the certification testing of NMHC is performed at 75 °F. Recent research and analysis indicates that these standards are not resulting in robust control of NMHC at lower temperatures. We believe that cold temperature NMHC control can be substantially improved using the same technological approaches that are generally already being used in the Tier 2 vehicle fleet to meet the stringent standards at 75 °F. These cold-temperature NMHC controls would also result in lower direct PM emissions at cold temperatures.

Accordingly, we are proposing that light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles would be subject to a new non-methane hydrocarbon (NMHC) exhaust emissions standard at 20 °F. Vehicles at or below 6,000 pounds gross vehicle weight rating (GVWR) would be subject to a sales-weighted fleet average NMHC level of 0.3 grams/mile. Vehicles between 6,000 and 8,500 pounds GVWR and medium-duty passenger vehicles would be subject to a sales-weighted fleet average NMHC level of 0.5 grams/mile. For lighter vehicles, the standard would phase in between 2010 and 2013. For heavier vehicles, the new standards would phase in between 2012 and 2015. We are also proposing a credit program and other provisions designed to provide flexibility to manufacturers, especially during the phase-in periods. These provisions are designed to allow the earliest possible phase-in of standards and help minimize costs and ease the transition to new standards.

We are also proposing a set of nominally more stringent evaporative emission standards for all light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles. The proposed standards are equivalent to California's Low Emission Vehicle II (LEV II) standards, and they reflect the evaporative emissions levels that are already being achieved nationwide. The standards we are proposing today would codify the approach that most

[6] That is, the respiratory hazard index exceeded 1. See section III.D of this preamble for more information.

[7] United States Census Bureau. (2004) American Housing Survey web page. [Online at *http://www.cenus.gov/hhes/www/housing/ahs/ahs03/ahs03.html*] Table IA–6.

manufacturers are already taking for 50-state evaporative systems, and the standards would thus prevent backsliding in the future. We are proposing to implement the evaporative emission standards in 2009 for lighter vehicles and in 2010 for the heavier vehicles.

Section VI provides details on the proposed exhaust and evaporative standards and their implementation, and our rationale for proposing them.

2. Gasoline Fuel Standards

As described in more detail in section VII, we are proposing to limit the benzene content of all gasoline, both reformulated and conventional. We propose that beginning January 1, 2011, refiners would meet an average gasoline benzene content standard of 0.62% by volume on all their gasoline. We are not proposing a standard for California, however, because it is already covered by a similar state program.

This proposed fuel standard would result in air toxics emissions reductions that are greater than required under all existing gasoline toxics programs. As a result, EPA is proposing that upon full implementation in 2011, the regulatory provisions for the benzene control program would become the single regulatory mechanism used to implement the RFG and Anti-dumping annual average toxics requirements. The current RFG and Anti-dumping annual average provisions thus would be replaced by the proposed benzene control program. The MSAT2 benzene control program would also replace the MSAT1 requirements. In addition, the program would satisfy certain fuel MSAT conditions of the Energy Policy Act of 2005 and obviate the need to revise toxics baselines for reformulated gasoline otherwise required by the Energy Policy Act. In all of these ways, we would significantly consolidate and simplify the existing national fuel-related MSAT regulatory program.

We also propose that refiners could generate benzene credits and use or transfer them as a part of a nationwide averaging, banking, and trading (ABT) program. From 2007–2010 refiners could generate benzene credits by taking early steps to reduce gasoline benzene levels. Beginning in 2011 and continuing indefinitely, refiners could generate credits by producing gasoline with benzene levels below the 0.62% average standard. Refiners could apply the credits towards company compliance, ''bank'' the credits for later use, or transfer (''trade'') them to other refiners nationwide (outside of California) under the proposed program. Under this program, refiners could use credits to achieve compliance with the benzene content standard.

This proposed ABT program would allow us to set a more stringent benzene standard than would otherwise be possible, and it would allow implementation to occur earlier. Under this proposed benzene content standard and ABT program, gasoline in all areas of the country would have lower benzene levels than they have today. Overall benzene levels would be 37% lower. This would reduce benzene emissions and exposure nationwide.

Finally, we propose hardship provisions. Refiners approved as ''small refiners'' would be eligible for certain temporary relief provisions. In addition, any refiner facing extreme unforeseen circumstances or extreme hardship circumstances could apply for similar temporary relief.

Section VII of this preamble provides a detailed explanation and rationale for the proposed fuel program and its implementation. It also discusses and seeks comment on a variety of alternatives that we considered.

3. Portable Gasoline Container (Gas Can) Controls

Portable gasoline containers, or gas cans, are consumer products used to refuel a wide variety of gasoline-powered equipment, including lawn and garden equipment, recreational equipment, and passenger vehicles that have run out of gas. As described in section VIII, we are proposing standards that would reduce hydrocarbon emissions from evaporation, permeation, and spillage. These standards would significantly reduce benzene and other toxics, as well as VOC more generally. VOC is an ozone precursor.

We propose a performance-based standard of 0.3 grams per gallon per day of hydrocarbons, based on the emissions from the can over a diurnal test cycle. The standard would apply to gas cans manufactured on or after January 1, 2009. We also propose test procedures and a certification and compliance program, in order to ensure that gas cans would meet the emission standard over a range of in-use conditions. The proposed standards would result in the use of best available control technologies, such as durable permeation barriers, automatically closing spouts, and cans that are well-sealed.

California implemented an emissions control program for gas cans in 2001, and since then, several other states have adopted the program. Last year, California adopted a revised program, which will take effect July 1, 2007. The revised California program is very similar to the program we are proposing. Although a few aspects of the program we are proposing are different, we believe manufacturers would be able to meet both EPA and California requirements with the same gas can designs.

III. What Are Mobile Source Air Toxics (MSATs) and Their Health Effects?

A. What Are MSATs?

Section 202(l) refers to ''hazardous air pollutants from motor vehicles and motor vehicle fuels.'' We use the term ''mobile source air toxics (MSATs)'' to refer to compounds that are emitted by mobile sources and have the potential for serious adverse health effects. There are a variety of ways in which to identify compounds that have the potential for serious adverse health effects. For example, EPA's Integrated Risk Information System (IRIS) is EPA's database containing information on human health effects that may result from exposure to various chemicals in the environment. In addition, Clean Air Act section 112(b) contains a list of hazardous air pollutants that EPA is required to control through regulatory standards; other agencies or programs such as the Agency for Toxic Substances and Disease Registry and the California EPA have developed health benchmark values for various compounds; and the International Agency for Research on Cancer and the National Toxicology Program have assembled evidence of substances that cause cancer in humans and issue judgments on the strength of the evidence. Each source of information has its own strengths and limitations. For example, there are inherent limitations on the number of compounds that have been investigated sufficiently for EPA to conduct an IRIS assessment. There are some compounds that are not listed in IRIS but are considered to be hazardous air pollutants under Clean Air Act section 112(b) and are regulated by the Agency (*e.g.*, propionaldehyde, 2,2,4-trimethylpentane).

B. Compounds Emitted by Mobile Sources and Identified in IRIS

In its 2001 MSAT rule, EPA identified a list of 21 MSATs. We listed a compound as an MSAT if it was emitted from mobile sources, and if the Agency had concluded in IRIS that the compound posed a potential cancer hazard and/or if IRIS contained an inhalation reference concentration or ingestion reference dose for the compound. Since 2001, EPA has conducted an extensive review of the

literature to produce a list of the compounds identified in the exhaust or evaporative emissions from onroad and nonroad equipment, using baseline as well as alternative fuels (*e.g.*, biodiesel, compressed natural gas). This list, the Master List of Compounds Emitted by Mobile Sources (''Master List''), currently includes approximately 1,000 compounds. It is available in the public docket for this rule and on the web (www.epa.gov/otaq/toxics.htm). Table III.B–1 lists those compounds from the Master List that currently meet those 2001 MSAT criteria, based on the current IRIS.

Table III.B–1 identifies all of the compounds from the Master List that are present in IRIS with (a) a cancer hazard identification of known, probable, or possible human carcinogens (under the 1986 EPA cancer guidelines) or carcinogenic to humans, likely to be carcinogenic to humans, or suggestive evidence of carcinogenic potential (under the 2005 EPA cancer guidelines); and/or (b) an inhalation reference concentration or an ingestion reference dose. Although all these compounds have been detected in emissions from mobile sources, many are emitted in trace amounts and data are not adequate to develop an inventory. Those compounds for which we have developed an emissions inventory are summarized in Table IV.C–2. There are several compounds for which IRIS assessments are underway and therefore are not included in Table III.B–1. These compounds are: Cerium, copper, ethanol, ethyl tertiary butyl ether (ETBE), platinum, propionaldehyde, and 2,2,4-trimethylpentane.

The fact that a compound is listed in Table III.B–1 does not imply a risk to public health or welfare at current levels, or that it is appropriate to adopt controls to limit the emissions of such a compound from motor vehicles or their fuels. In conducting any such further evaluation, pursuant to sections 202(a) or 211(c) of the Act, EPA would consider whether emissions of the compound from motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.

TABLE III.B–1.—COMPOUNDS EMITTED BY MOBILE SOURCES THAT ARE LISTED IN IRIS*

1,1,1,2-Tetrafluoroethane	Cadmium	Manganese.
1,1,1-Trichloroethane	Carbon disulfide	Mercury, elemental.
1,1-Biphenyl	Carbon tetrachloride	Methanol.
1,2-Dibromoethane	Chlorine	Methyl chloride.
1,2-Dichlorobenzene	Chlorobenzene	Methyl ethyl ketone (MEK).
1,3-Butadiene	Chloroform	Methyl isobutyl ketone (MIBK).
2,4-Dinitrophenol	Chromium III	Methyl tert-butyl ether (MTBE).
2-Methylnaphthalene	Chromium VI	Molybdenum.
2-Methylphenol	Chrysene	Naphthalene.
4-Methylphenol	Crotonaldehyde	Nickel.
Acenaphthene	Cumene (isopropyl benzene)	Nitrate.
Acetaldehyde	Cyclohexane	N-Nitrosodiethylamine.
Acetone	Cyclohexanone	N-Nitrosodimethylamine.
Acetophenone	Di(2-ethylhexyl)phthalate	N-Nitroso-di-n-butylamine.
Acrolein (2-propenal)	Dibenz[a,h]anthracene	N-Nitrosodi-N-propylamine.
Ammonia	Dibutyl phthalate	N-Nitrosopyrrolidine.
Anthracene	Dichloromethane	Pentachlorophenol.
Antimony	Diesel PM and Diesel exhaust organic gases	Phenol.
Arsenic, inorganic	Diethyl phthalate	Phosphorus.
Barium and compounds	Ethylbenzene	Phthalic anhydride.
Benz[a]anthracene	Ethylene glycol monobutyl ether	Pyrene.
Benzaldehyde	Fluoranthene	Selenium and compounds.
Benzene	Fluorene	Silver.
Benzo[a]pyrene (BaP)	Formaldehyde	Strontium.
Benzo[b]fluoranthene	Furfural	Styrene.
Benzo[k]fluoranthene	Hexachlorodibenzo-p-dioxin, mixture (dioxin/furans).	Tetrachloroethylene.
Benzoic acid	n-Hexane	Toluene.
Beryllium and compounds	Hydrogen cyanide	Trichlorofluoromethane.
Boron (Boron and Borates only)	Hydrogen sulfide	Vanadium.
Bromomethane	Indeno[1,2,3-cd]pyrene	Xylenes.
Butyl benzyl phthalate	Lead and compounds (inorganic)	Zinc and compounds.

*Compounds listed in IRIS as known, probable, or possible human carcinogens and/or pollutants for which the Agency has calculated a reference concentration or reference dose.

C. Which Mobile Source Emissions Pose the Greatest Health Risk at Current Levels?

The 1999 National-Scale Air Toxics Assessment (NATA) provides some perspective on which mobile source emissions pose the greatest risk at current estimated ambient levels.[8] We also conducted a national-scale assessment for future years, which is discussed more fully in section IV of this preamble and Chapters 2 and 3 of the RIA. Our understanding of what emissions pose the greatest risk will evolve over time, based on our understanding of the ambient levels and health effects associated with the compounds.[9]

1. National and Regional Risk Drivers in 1999 National-Scale Air Toxics Assessment

The 1999 NATA evaluates 177 hazardous air pollutants currently listed under CAA section 112(b), as well as

[8] It is, of course, not necessary for EPA to show that a compound is a national or regional risk driver to show that its emission from motor vehicles may reasonably cause or contribute to endangerment of public health or welfare. A showing that motor vehicles contribute some non-trivial percentage of the inventory of a compound known to be associated with adverse health effects would normally be sufficient. Cf. *Bluewater Network* v. *EPA*, 370 F. 3d 1, 15 (D.C. Cir. 2004).

[9] The discussion here considers risks other than those attributed to ambient levels of criteria pollutants.

diesel PM.[10] NATA is described in greater detail in Chapters 2 and 3 of the Regulatory Impact Analysis for this proposed rule. Additional information can also be obtained from the NATA website (*http://www.epa.gov/ttn/atw/nata1999*). Based on the assessment of inhalation exposures associated with outdoor sources of these hazardous air pollutants, NATA has identified cancer and noncancer risk drivers on a national and regional scale (Table III.C–1). A cancer risk driver on a national scale is a hazardous air pollutant for which at least 25 million people are exposed to risk greater than ten in one million. Benzene is the only compound identified in the 1999 NATA as a national cancer risk driver. A cancer risk driver on a regional scale is a hazardous air pollutant for which at least one million people are exposed to risk greater than ten in one million or at least 10,000 people are exposed to risk greater than 100 in one million. Twelve compounds (or groups of compounds in the case of POM) were identified as regional cancer risk drivers. The 1999 NATA concludes that diesel particulate matter is among the substances that pose the greatest relative risk, although the cancer risk cannot be quantified.

A noncancer risk driver at the national scale is a hazardous air pollutant for which at least 25 million people are exposed at a concentration greater than the inhalation reference concentration. The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime. Acrolein is the only compound identified in the 1999 NATA as a national noncancer risk driver. A noncancer risk driver on a regional scale is defined as a hazardous air pollutant for which at least 10,000 people are exposed to an ambient concentration greater than the inhalation reference concentration. Sixteen regional-scale noncancer risk drivers were identified in the 1999 NATA (see Table III.C–1.).

TABLE III.C–1.—NATIONAL AND REGIONAL CANCER AND NONCANCER RISK DRIVERS IN 1999 NATA

Cancer [1]	Noncancer
National drivers [2]	National drivers [4]
Benzene	Acrolein
Regional drivers [3]	Regional drivers [5]
Arsenic compounds	Antimony
Benzidine	Arsenic compounds
1,3-Butadiene	1,3-Butadiene
Cadmium compounds	Cadmium compounds
Carbon tetrachloride	Chlorine
Chromium VI	Chromium VI
Coke oven	Diesel PM
Ethylene oxide	Formaldehyde
Hydrazine	Hexamethylene 1–6-diisocyanate
Naphthalene	Hydrazine
Perchloroethylene	Hydrochloric acid
Polycyclic organic matter.	Maleic anhydride
	Manganese compounds
	Nickel compounds
	2,4-Toluene diisocyanate
	Triethylamine

[1] The list of cancer risk drivers does not include diesel particulate matter. However, the 1999 NATA concluded that it was one of the pollutants that posed the greatest relative cancer risk.
[2] At least 25 million people exposed to risk >10 in 1 million.
[3] At least 1 million people exposed to risk >10 in 1 million or at least 10,000 people exposed to risk >100 in 1 million.
[4] At least 25 million people exposed to a hazard quotient > 1.0.
[5] At least 10,000 people exposed to a hazard quotient > 1.

2. 1999 NATA Risk Drivers with Significant Mobile Source Contribution

Among the national and regional-scale cancer and noncancer risk drivers identified in the 1999 NATA, seven compounds have significant contributions from mobile sources: benzene, 1,3-butadiene, formaldehyde, acrolein, polycyclic organic matter (POM), naphthalene, and diesel particulate matter and diesel exhaust organic gases (Table III.C–2.). For example, mobile sources contribute 68% of the national benzene inventory, with 49% from on-road sources and 19% from nonroad sources.

TABLE III.C–2.—MOBILE SOURCE CONTRIBUTION TO 1999 NATA RISK DRIVERS

1999 NATA risk drivers	Percent contribution from all mobile sources (percent)	Percent contribution from on-road mobile sources (percent)
Benzene	68	49
1,3–Butadiene	58	41
Formaldehyde	47	27
Acrolein	25	14
Polycyclic organic matter *	6	3
Naphthalene	27	21
Diesel PM and Diesel exhaust organic gases	100	38

* This POM inventory includes the 15 POM compounds: benzo[b]fluoranthene, benz[a]anthracene, indeno(1,2,3-c,d)pyrene, benzo[k]fluoranthene, chrysene, benzo[a]pyrene, dibenz(a,h)anthracene, anthracene, pyrene, benzo(g,h,i)perylene, fluoranthene, acenaphthylene, phenanthrene, fluorene, and acenaphthene.

[10] NATA does not include a quantitative estimate of cancer risk for diesel particulate matter and diesel exhaust organic gases.

D. What Are the Health Effects of Air Toxics?

1. Overview of Potential Cancer and Noncancer Health Effects

Air toxics can cause a variety of cancer and noncancer health effects. A number of the mobile source air toxic pollutants described in section III are known or likely to pose a cancer hazard in humans. Many of these compounds also cause adverse noncancer health effects resulting from chronic,[11] subchronic,[12] or acute [13] inhalation exposures. These include neurological, cardiovascular, liver, kidney, and respiratory effects as well as effects on the immune and reproductive systems. Section III.D.2 discusses the health effects of air toxic compounds listed in Table III.C–2, as well as acetaldehyde. The compounds in Table III.C–2 were all identified as national and regional-scale cancer and noncancer risk drivers in the 1999 National-Scale Air Toxics Assessment (NATA), and have significant inventory contributions from mobile sources. Acetaldehyde is included because it is a likely human carcinogen, has a significant inventory contribution from mobile sources, and was identified as a risk driver in the 1996 NATA. We are also including diesel particulate matter and diesel exhaust organic gases in this discussion. Although 1999 NATA did not quantify cancer risks associated with exposure to this pollutant, EPA has concluded that diesel exhaust ranks with the other substances that the national-scale assessment suggests pose the greatest relative risk.[14]

Inhalation cancer risks are usually estimated by EPA as ''unit risks,'' which represent the excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air. Some air toxics are known to be carcinogenic in animals but lack data in humans. These have been assumed to be human carcinogens. Also, relationships between exposure and probability of cancer are assumed to be linear. In addition, these unit risks are typically upper bound estimates. Upper bound estimates are more likely to overestimate than underestimate risk. Where there are strong epidemiological data, a maximum likelihood (MLE) estimate may be developed. An MLE is a best scientific estimate of risk. The benzene unit risk is an MLE. A discussion of the confidence in a quantitative cancer risk estimate is provided in the IRIS file for each compound. The discussion of the confidence in the cancer risk estimate includes an assessment of the source of the data (human or animal), uncertainties in dose estimates, choice of the model used to fit the exposure and response data and how uncertainties and potential confounders are handled.

Potential noncancer chronic inhalation health risks are quantified using reference concentrations (RfCs) and noncancer chronic ingestion health risks are quantified using reference doses (RfDs). The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime. Sources of uncertainty in the development of the RfCs and RfDs include intraspecies extrapolation (animal to human) and interspecies extrapolation (average human to sensitive human). Additional sources of uncertainty can be using a lowest observed adverse effect level in place of a no observed adverse effect level, and other data deficiencies. A statement regarding the confidence in the RfC and/or RfD is developed to reflect the confidence in the principal study or studies on which the RfC or RfD are based and the confidence in the underlying database. Factors that affect the confidence in the principal study include how well the study was designed, conducted and reported. Factors that affect the confidence in the database include an assessment of the availability of information regarding identification of the critical effect, potentially susceptible populations and exposure scenarios relevant to assessment of risk.

The RfC may be used to estimate a hazard quotient, which is the environmental exposure to a substance divided by its RfC. A hazard quotient greater than one indicates adverse health effects are possible. The hazard quotient cannot be translated to a probability that adverse health effects will occur, and is unlikely to be proportional to risk. It is especially important to note that a hazard quotient exceeding one does not necessarily mean that adverse effects will occur. In NATA, hazard quotients for different respiratory irritants were also combined into a hazard index (HI). A hazard index is the sum of hazard quotients for substances that affect the same target organ or organ system. Because different pollutants may cause similar adverse health effects, it is often appropriate to combine hazard quotients associated with different substances. However, the HI is only an approximation of a combined effect because substances may affect a target organ in different ways.

2. Health Effects of Key MSATs

a. Benzene

The EPA's IRIS database lists benzene, an aromatic hydrocarbon, as a known human carcinogen (causing leukemia) by all routes of exposure.[15] A number of adverse noncancer health effects including blood disorders and immunotoxicity have also been associated with long-term occupational exposure to benzene.

Inhalation is the major source of human exposure to benzene in the occupational and non-occupational setting. Long-term inhalation occupational exposure to benzene has been shown to cause cancer of the hematopoetic (blood cell) system in adults. Among these are acute nonlymphocytic leukemia [16] and chronic lymphocytic leukemia.[17] [18]

[11] Chronic exposure is defined in the glossary of the Integrated Risk Information (IRIS) database (*www.epa.gov/iris*) as repeated exposure by the oral, dermal, or inhalation route for more than approximately 10 of the life span in humans (more than approximately 90 days to 2 years in typically used laboratory animal species).

[12] Defined in the IRIS database as exposure to a substance spanning approximately 10 of the lifetime of an organism.

[13] Defined in the IRIS database as exposure by the oral, dermal, or inhalation route for 24 hours or less.

[14] *http://www.epa.gov/ttn/atw/nata1999.*

[15] U.S. EPA (2000). Integrated Risk Information System File for Benzene. This material is available electronically at *http://www.epa.gov/iris/subst/0276.htm.*

[16] Leukemia is a blood disease in which the white blood cells are abnormal in type or number. Leukemia may be divided into nonlymphocytic (granulocytic) leukemias and lymphocytic leukemias. Nonlymphocytic leukemia generally involves the types of white blood cells (leukocytes) that are involved in engulfing, killing, and digesting bacteria and other parasites (phagocytosis) as well as releasing chemicals involved in allergic and immune responses. This type of leukemia may also involve erythroblastic cell types (immature red blood cells). Lymphocytic leukemia involves the lymphocyte type of white blood cells that are responsible for the immune responses. Both nonlymphocytic and lymphocytic leukemia may, in turn, be separated into acute (rapid and fatal) and chronic (lingering, lasting) forms. For example; in acute myeloid leukemia there is diminished production of normal red blood cells (erythrocytes), granulocytes, and platelets (control clotting), which leads to death by anemia, infection, or hemorrhage. These events can be rapid. In chronic myeloid leukemia (CML) the leukemic cells retain the ability to differentiate (*i.e.*, be responsive to stimulatory factors) and perform function; later there is a loss of the ability to respond.

[17] U.S. EPA (1985) Environmental Protection Agency, Interim quantitative cancer unit risk estimates due to inhalation of benzene, prepared by the Office of Health and Environmental Assessment, Carcinogen Assessment Group, Washington, DC, for the Office of Air Quality Planning and Standards, Washington, DC, 1985.

[18] U.S. EPA. (1993). Motor Vehicle-Related Air Toxics Study. Office of Mobile Sources, Ann Arbor, MI. *http://www.epa.gov/otaq/regs/toxics/tox_archive.htm.*

Leukemias, lymphomas, and other tumor types have been observed in experimental animals exposed to benzene by inhalation or oral administration. Exposure to benzene and/or its metabolites has also been linked with chromosomal changes in humans and animals [19 20] and increased proliferation of mouse bone marrow cells.[21 22]

The latest assessment by EPA places the excess risk of developing acute nonlymphocytic leukemia from inhalation exposure to benzene at 2.2×10^{-6} to 7.8×10^{-6} per μg/m^3. In other words, there is a risk of about two to eight excess leukemia cases in one million people exposed to 1 μg/m^3 of benzene over a lifetime.[23] This range of unit risks are the MLEs calculated from different exposure assumptions and dose-response models that are linear at low doses. At present, the true cancer risk from exposure to benzene cannot be ascertained, even though dose-response data are used in the quantitative cancer risk analysis, because of uncertainties in the low-dose exposure scenarios and lack of clear understanding of the mode of action. A range of estimates of risk is recommended, each having equal scientific plausibility. There are confidence intervals associated with the MLE range that reflect random variation of the observed data. For the upper end of the MLE range, the 5th and 95th percentile values are about a factor of 5 lower and higher than the best fit value. The upper end of the MLE range was used in NATA.

It should be noted that not enough information is known to determine the slope of the dose-response curve at environmental levels of exposure and to provide a sound scientific basis to choose any particular extrapolation/exposure model to estimate human cancer risk at low doses. EPA risk assessment guidelines suggest using an assumption of linearity of dose response when (1) there is an absence of sufficient information on modes of action or (2) the mode of action information indicates that the dose-response curve at low dose is or is expected to be linear.[24] Since the mode of action for benzene carcinogenicity is unknown, the current cancer unit risk estimate assumes linearity of the low-dose response. Data that were considered by EPA in its carcinogenic update suggested that the dose-response relationship at doses below those examined in the studies reviewed in EPA's most recent benzene assessment may be supralinear. They support the inference that cancer risks are as high or are higher than the estimates provided in the existing EPA assessment.[25] Data discussed in the EPA IRIS assessment suggest that genetic abnormalities occur at low exposure in humans, and the formation of toxic metabolites plateaus above 25 ppm (80,000 μg/m^3).[26] More recent data on benzene adducts in humans, published after the most recent IRIS assessment, suggest that the enzymes involved in benzene metabolism start to saturate at exposure levels as low as 1 ppm.[27] Because there is a transition from linear to saturable metabolism below 1 ppm, the assumption of low-dose linearity extrapolated from much higher exposures could lead to substantial underestimation of leukemia risks. This is consistent with recent epidemiological data which also suggest a supralinear exposure-response relationship and which ''[extend] evidence for hematopoietic cancer risks to levels substantially lower than had previously been established.'' [28 29] These data are from the largest cohort study done to date with individual worker exposure estimates. However, these data have not yet been formally evaluated by EPA as part of the IRIS review process, and it is not clear whether these data provide sufficient evidence to reject a linear dose-response curve. A better understanding of the biological mechanism of benzene-induced leukemia is needed.

Children may represent a subpopulation at increased risk from benzene exposure, due to factors that could increase their susceptibility. Children may have a higher unit body weight exposure because of their heightened activity patterns which can increase their exposures, as well as different ventilation tidal volumes and frequencies, factors that influence uptake. This could entail a greater risk of leukemia and other toxic effects to children if they are exposed to benzene at similar levels as adults. There is limited information from two studies regarding an increased risk to children whose parents have been occupationally exposed to benzene.[30 31] Data from animal studies have shown benzene exposures result in damage to the hematopoietic (blood cell formation) system during development.[32 33 34] Also, key changes related to the development of childhood leukemia occur in the developing fetus.[35] Several studies have reported that genetic changes related to eventual leukemia development occur before birth. For example, there is one study of genetic changes in twins who developed T cell leukemia at 9 years of

[19] International Agency for Research on Cancer (IARC) (1982) IARC monographs on the evaluation of carcinogenic risk of chemicals to humans, Volume 29, Some industrial chemicals and dyestuffs, International Agency for Research on Cancer, World Health Organization, Lyon, France, p. 345–389.

[20] U.S. EPA (1998) Environmental Protection Agency, Carcinogenic Effects of Benzene: An Update, National Center for Environmental Assessment, Washington, DC. EPA600–P–97–001F. *http://www.epa.gov/ncepihom/Catalog/EPA600P97001F.html.*

[21] Irons, R.D., W.S. Stillman, D.B. Colagiovanni, and V.A. Henry (1992) Synergistic action of the benzene metabolite hydroquinone on myelopoietic stimulating activity of granulocyte/macrophage colony-stimulating factor in vitro, Proc. Natl. Acad. Sci. 89:3691–3695.

[22] U.S. EPA (1998) Environmental Protection Agency, Carcinogenic Effects of Benzene: An Update, National Center for Environmental Assessment, Washington, DC. EPA600–P–97–001F. *http://www.epa.gov/ncepihom/Catalog/EPA600P97001F.html.*

[23] U.S. EPA (1998). Environmental Protection Agency, Carcinogenic Effects of Benzene: An Update, National Center for Environmental Assessment, Washington, DC. EPA600–P–97–001F. *http://www.epa.gov/ncepihom/Catalog/EPA600P97001F.html.*

[24] U.S. EPA (2005) Guidelines for Carcinogen Risk Assessment. Report No. EPA/630/P–03/001F. *http://cfpub.epa.gov/ncea/raf/recordisplay.cfm?deid=116283.*

[25] U.S. EPA (1998) Carcinogenic Effects of Benzene: An Update. EPA/600/P–97/001F.

[26] Rothman, N; Li, GL; Dosemeci, M; *et al.* (1996) Hematotoxicity among Chinese workers heavily exposed to benzene. Am. J. Indust. Med. 29:236–246.

[27] Rappaport, S.M.; Waidyanatha, S.; Qu, Q.; Shore, R.; Jin, X.; Cohen, B.; Chen, L.; Melikian, A.; Li, G.; Yin, S.; Yan, H.; Xu, B.; Mu, R.; Li, Y.; Zhang, X.; and Li, K. (2002) Albumin adducts of benzene oxide and 1,4-benzoquinone as measures of human benzene metabolism. Cancer Research 62:1330–1337.

[28] Hayes, R.B.; Yin, S.; Dosemeci, M.; Li, G.; Wacholder, S.; Travis, L.B.; Li, C.; Rothman, N.; Hoover, R.N.; and Linet, M.S. (1997) Benzene and the dose-related incidence of hematologic neoplasms in China. J. Nat. Cancer Inst. 89:1065–1071.

[29] Hayes, R.B.; Songnian, Y.; Dosemeci, M.; and Linet, M. (2001) Benzene and lymphohematopoietic malignancies in humans. Am. J. Indust. Med. 40:117–126.

[30] Shu, X.O,; Gao, Y.T.; Brinton, L.A.; *et al.* (1988) A population-based case-control study of childhood leukemia in Shanghai. Cancer 62:635–644.

[31] McKinney, P.A.; Alexander, F.E.; Cartwright, R.A.; *et al.* (1991) Parental occupations of children with leukemia in west Cumbria, north Humberside, and Gateshead, Br. Med. J. 302:681–686.

[32] Keller, KA; Snyder, CA. (1986) Mice exposed in utero to low concentrations of benzene exhibit enduring changes in their colony forming hematopoietic cells. Toxicology 42:171–181.

[33] Keller, KA; Snyder, CA. (1988) Mice exposed in utero to 20 ppm benzene exhibit altered numbers of recognizable hematopoietic cells up to seven weeks after exposure. Fundam. Appl. Toxicol. 10:224–232.

[34] Corti, M; Snyder, CA. (1996) Influences of gender, development, pregnancy and ethanol consumption on the hematotoxicity of inhaled 10 ppm benzene. Arch. Toxicol. 70:209–217.

[35] U.S. EPA. (2002). Toxicological Review of Benzene (Noncancer Effects). National Center for Environmental Assessment, Washington, DC. Report No. EPA/635/R–02/001F. *http://www.epa.gov/iris/toxreviews/0276-tr[1].pdf.*

age.[36] An association between traffic volume, residential proximity to busy roads and occurrence of childhood leukemia has also been identified in some studies, although some studies show no association.

A number of adverse noncancer health effects, including blood disorders such as preleukemia and aplastic anemia, have also been associated with long-term exposure to benzene.[37 38] People with long-term occupational exposure to benzene have experienced harmful effects on the blood-forming tissues, especially in bone marrow. These effects can disrupt normal blood production and suppress the production of important blood components, such as red and white blood cells and blood platelets, leading to anemia (a reduction in the number of red blood cells), leukopenia (a reduction in the number of white blood cells), or thrombocytopenia (a reduction in the number of blood platelets, thus reducing the ability of blood to clot). Chronic inhalation exposure to benzene in humans and animals results in pancytopenia,[39] a condition characterized by decreased numbers of circulating erythrocytes (red blood cells), leukocytes (white blood cells), and thrombocytes (blood platelets).[40 41] Individuals that develop pancytopenia and have continued exposure to benzene may develop aplastic anemia, whereas others exhibit both pancytopenia and bone marrow hyperplasia (excessive cell formation), a condition that may indicate a preleukemic state.[42 43] The most sensitive noncancer effect observed in humans, based on current data, is the depression of the absolute lymphocyte count in blood.[44 45]

EPA's inhalation reference concentration (RfC) for benzene is 30 μg/m^3, based on suppressed absolute lymphocyte counts as seen in humans under occupational exposure conditions. The overall confidence in this RfC is medium. Since development of this RfC, there have appeared human reports of benzene's hematotoxic effects in the literature that provides data suggesting a wide range of hematological endpoints that are affected at occupational exposures of less than 5 ppm (about 16 mg/m^3) [46] and even at air levels of 1 ppm (about 3 mg/m^3) or less among genetically susceptible populations.[47] One recent study found benzene metabolites in mouse liver and bone marrow at environmental doses, indicating that even concentrations in urban air can elicit a biochemical response in rodents that indicates toxicity.[48] EPA has not formally evaluated these recent studies as part of the IRIS review process to determine whether or not they will lead to a change in the current RfC. EPA does not currently have an acute reference concentration for benzene. The Agency for Toxic Substances and Disease Registry Minimal Risk Level for acute exposure to benzene is 160 μg/m^3 for 1–14 days exposure.

b. 1,3-Butadiene

EPA has characterized 1,3-butadiene, a hydrocarbon, as a leukemogen, carcinogenic to humans by inhalation.[49 50] The specific mechanisms of 1,3-butadiene-induced carcinogenesis are unknown; however, it is virtually certain that the carcinogenic effects are mediated by genotoxic metabolites of 1,3-butadiene. Animal data suggest that females may be more sensitive than males for cancer effects; nevertheless, there are insufficient data from which to draw any conclusions on potentially sensitive subpopulations. The upper bound cancer unit risk estimate is 0.08 per ppm or 3×10^{-5} per μg/m^3 (based primarily on linear modeling and extrapolation of human data). In other words, it is estimated that approximately 30 persons in one million exposed to 1 μg/m^3 of 1,3-butadiene continuously for their lifetime would develop cancer as a result of this exposure. The human incremental lifetime unit cancer risk estimate is based on extrapolation from leukemias observed in an occupational epidemiologic study.[51] This estimate includes a two-fold adjustment to the epidemiologic-based unit cancer risk applied to reflect evidence from the rodent bioassays suggesting that the epidemiologic-based estimate (from males) may underestimate total cancer risk from 1,3-butadiene exposure in the general population, particularly for breast cancer in females. Confidence in the excess cancer risk estimate of 0.08 per ppm is moderate.

1,3-Butadiene also causes a variety of reproductive and developmental effects in mice; no human data on these effects are available. The most sensitive effect was ovarian atrophy observed in a lifetime bioassay of female mice.[52] Based on this critical effect and the benchmark concentration methodology, an RfC was calculated. This RfC for chronic health effects is 0.9 ppb, or about 2 μg/m^3. Confidence in the inhalation RfC is medium.

c. Formaldehyde

Since 1987, EPA has classified formaldehyde, a hydrocarbon, as a

[36] Ford, AM; Pombo-de-Oliveira, MS; McCarthy, KP; MacLean, JM; Carrico, KC; Vincent, RF; Greaves, M. (1997) Monoclonal origin of concordant T-cell malignancy in identical twins. Blood 89:281–285.

[37] Aksoy, M. (1989) Hematotoxicity and carcinogenicity of benzene. Environ. Health Perspect. 82:193–197.

[38] Goldstein, B.D. (1988) Benzene toxicity. Occupational medicine. State of the Art Reviews 3: 541–554.

[39] Pancytopenia is the reduction in the number of all three major types of blood cells (erythrocytes, or red blood cells, thrombocytes, or platelets, and leukocytes, or white blood cells). In adults, all three major types of blood cells are produced in the bone marrow of the vertebra, sternum, ribs, and pelvis. The bone marrow contains immature cells, known as multipotent myeloid stem cells, that later differentiate into the various mature blood cells. Pancytopenia results from a reduction in the ability of the red bone marrow to produce adequate numbers of these mature blood cells.

[40] Aksoy, M. (1991) Hematotoxicity, leukemogenicity and carcinogenicity of chronic exposure to benzene. In: Arinc, E.; Schenkman, J.B.; Hodgson, E., Eds. Molecular Aspects of Monooxygenases and Bioactivation of Toxic Compounds. New York: Plenum Press, pp. 415–434.

[41] Goldstein, B.D. (1988) Benzene toxicity. Occupational medicine. State of the Art Reviews 3: 541–554.

[42] Aksoy, M., S. Erdem, and G. Dincol. (1974) Leukemia in shoe-workers exposed chronically to benzene. Blood 44:837.

[43] Aksoy, M. and K. Erdem. (1978) A follow-up study on the mortality and the development of leukemia in 44 pancytopenic patients associated with long-term exposure to benzene. Blood 52: 285–292.

[44] Rothman, N., G.L. Li, M. Dosemeci, W.E. Bechtold, G.E. Marti, Y.Z. Wang, M. Linet, L.Q. Xi, W. Lu, M.T. Smith, N. Titenko-Holland, L.P. Zhang, W. Blot, S.N. Yin, and R.B. Hayes (1996) Hematotoxicity among Chinese workers heavily exposed to benzene. Am. J. Ind. Med. 29: 236–246.

[45] EPA 2005 ''Full IRIS Summary for Benzene (CASRN 71–43–2)'' Environmental Protection Agency, Integrated Risk Information System (IRIS), Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH *http://www.epa.gov/iris/subst/0276.htm.*

[46] Qu, Q., R. Shore, G. Li, X. Jin, L.C. Chen, B. Cohen, *et al.* (2002). Hematological changes among Chinese workers with a broad range of benzene exposures. Am. J. Industr. Med. 42: 275–285.

[47] Lan, Qing, Zhang, L., Li, G., Vermeulen, R., *et al.* (2004). Hematotoxically in Workers Exposed to Low Levels of Benzene. Science 306: 1774–1776.

[48] Turtletaub, K.W. and Mani, C. (2003). Benzene metabolism in rodents at doses relevant to human exposure from Urban Air. Res Rep Health Effect Inst 113.

[49] U.S. EPA. (2002). Health Assessment of 1,3-Butadiene. Office of Research and Development, National Center for Environmental Assessment, Washington Office, Washington, DC. Report No. EPA600–P–98–001F. *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=54499.*

[50] U.S. EPA (1998). A Science Advisory Board Report: Review of the Health Risk Assessment of 1,3-Butadiene. EPA–SAB–EHC–98.

[51] Delzell, E, N. Sathiakumar, M. Macaluso, *et al.* (1995). A follow-up study of synthetic rubber workers. Submitted to the International Institute of Synthetic Rubber Producers. University of Alabama at Birmingham. October 2, 1995.

[52] Bevan, C.; Stadler, J.C.; Elliot, G.S.; *et al.* (1996) Subchronic toxicity of 4-vinylcyclohexene in rats and mice by inhalation. Fundam. Appl. Toxicol. 32:1–10.

probable human carcinogen based on evidence in humans and in rats, mice, hamsters, and monkeys.[53] Recently released research conducted by the National Cancer Institute (NCI) found an increased risk of nasopharyngeal cancer among workers exposed to formaldehyde.[54 55] A recent National Institute of Occupational Safety and Health (NIOSH) study of garment workers also found increased risk of death due to leukemia among workers exposed to formaldehyde.[56] In 2004, the working group of the International Agency for Research on Cancer concluded that formaldehyde is carcinogenic to humans (Group 1 classification), on the basis of sufficient evidence in humans and sufficient evidence in experimental animals—a higher classification than previous IARC evaluations. In addition, the National Institute of Environmental Health Sciences recently nominated formaldehyde for reconsideration as a known human carcinogen under the National Toxicology Program. Since 1981 it has been listed as a ''reasonably anticipated human carcinogen.''

In the past 15 years there has been substantial research on the inhalation dosimetry for formaldehyde in rodents and primates by the CIIT Centers for Health Research, with a focus on use of rodent data for refinement of the quantitative cancer dose-response assessment.[57 58 59] CIIT's risk assessment of formaldehyde incorporated mechanistic and dosimetric information on formaldehyde. The risk assessment analyzed carcinogenic risk from inhaled formaldehyde using approaches that are consistent with EPA's draft guidelines for carcinogenic risk assessment. In 2001, Environment Canada relied on this cancer dose-response assessment in their assessment of formaldehyde.[60] In 2004, EPA also relied on this cancer unit risk estimate during the development of the plywood and composite wood products national emissions standards for hazardous air pollutants (NESHAPs).[61] In these rules, EPA concluded that the CIIT work represented the best available application of the available mechanistic and dosimetric science on the dose-response for portal of entry cancers due to formaldehyde exposures. EPA is reviewing the recent work cited above from the NCI and NIOSH, as well as the analysis by the CIIT Centers for Health Research and other studies, as part of a reassessment of the human hazard and dose-response associated with formaldehyde.

Noncancer effects of formaldehyde have been observed in humans and several animal species and include irritation to eye, nose and throat tissues in conjunction with increased mucous secretions.

d. Acetaldehyde

Acetaldehyde, a hydrocarbon, is classified in EPA's IRIS database as a probable human carcinogen and is considered moderately toxic by inhalation.[62] Based on nasal tumors in rodents, the upper confidence limit estimate of a lifetime extra cancer risk from continuous acetaldehyde exposure is about 2.2×10^{-6} per $\mu g/m^3$. In other words, it is estimated that about 2 persons in one million exposed to 1 $\mu g/m^3$ acetaldehyde continuously for their lifetime (70 years) would develop cancer as a result of their exposure, although the risk could be as low as zero. In short-term (4 week) rat studies, compound-related histopathological changes were observed only in the respiratory system at various concentration levels of exposure.[63 64] Data from these studies showing degeneration of the olfactory epithelium were found to be sufficient for EPA to develop an RfC for acetaldehyde of 9 $\mu g/m^3$. Confidence in the principal study is medium and confidence in the database is low, due to the lack of chronic data establishing a no observed adverse effect level and due to the lack of reproductive and developmental toxicity data. Therefore, there is low confidence in the RfC. The agency is currently conducting a reassessment of risk from inhalation exposure to acetaldehyde.

The primary acute effect of exposure to acetaldehyde vapors is irritation of the eyes, skin, and respiratory tract.[65] Some asthmatics have been shown to be a sensitive subpopulation to decrements in functional expiratory volume (FEV1 test) and bronchoconstriction upon acetaldehyde inhalation.[66]

e. Acrolein

Acrolein, a hydrocarbon, is intensely irritating to humans when inhaled, with acute exposure resulting in upper respiratory tract irritation and congestion. The Agency has developed an RfC for acrolein of 0.02 $\mu g/m^3$.[67] The overall confidence in the RfC assessment is judged to be medium. The Agency is also currently in the process of conducting an assessment of acute health effects for acrolein. EPA determined in 2003 using the 1999 draft cancer guidelines that the human carcinogenic potential of acrolein could not be determined because the available data were inadequate. No information was available on the carcinogenic effects of acrolein in humans and the animal data provided inadequate evidence of carcinogenicity.

f. Polycyclic Organic Matter (POM)

POM is generally defined as a large class of organic compounds which have multiple benzene rings and a boiling point greater than 100 degrees Celsius. Many of the compounds included in the class of compounds known as POM are classified by EPA as probable human carcinogens based on animal data. One

[53] U.S. EPA (1987). Assessment of Health Risks to Garment Workers and Certain Home Residents from Exposure to Formaldehyde, Office of Pesticides and Toxic Substances, April 1987.

[54] Hauptmann, M.; Lubin, J. H.; Stewart, P. A.; Hayes, R. B.; Blair, A. 2003. Mortality from lymphohematopoetic malignancies among workers in formaldehyde industries. Journal of the National Cancer Institute 95: 1615–1623.

[55] Hauptmann, M.; Lubin, J. H.; Stewart, P. A.; Hayes, R. B.; Blair, A. 2004. Mortality from solid cancers among workers in formaldehyde industries. American Journal of Epidemiology 159: 1117–1130.

[56] Pinkerton, L. E. 2004. Mortality among a cohort of garment workers exposed to formaldehyde: an update. Occup. Environ. Med. 61: 193–200.

[57] Conolly, RB, JS Kimbell, D Janszen, PM Schlosser, D Kalisak, J Preston, and FJ Miller. 2003. Biologically motivated computational modeling of formaldehyde carcinogenicity in the F344 rat. Tox. Sci. 75: 432–447.

[58] Conolly, RB, JS Kimbell, D Janszen, PM Schlosser, D Kalisak, J Preston, and FJ Miller. 2004. Human respiratory tract cancer risks of inhaled formaldehyde: Dose-response predictions derived from biologically-motivated computational modeling of a combined rodent and human dataset. Tox. Sci. 82: 279–296.

[59] Chemical Industry Institute of Toxicology (CIIT). 1999. Formaldehyde: Hazard characterization and dose-response assessment for carcinogenicity by the route of inhalation. CIIT, September 28, 1999. Research Triangle Park, NC.

[60] Health Canada. 2001. Priority Substances List Assessment Report. Formaldehyde. Environment Canada, Health Canada, February 2001.

[61] U.S. EPA. 2004. National Emission Standards for Hazardous Air Pollutants for Plywood and Composite Wood Products Manufacture: Final Rule. (69 FR 45943, 7/30/04).

[62] U.S. EPA. 1988. Integrated Risk Information System File of Acetaldehyde. This material is available electronically at *http://www.epa.gov/iris/subst/0290.htm*.

[63] Appleman, L. M., R. A. Woutersen, V. J. Feron, R. N. Hooftman, and W. R. F. Notten. (1986). Effects of the variable versus fixed exposure levels on the toxicity of acetaldehyde in rats. J. Appl. Toxicol. 6: 331–336.

[64] Appleman, L.M., R.A. Woutersen, and V.J. Feron. (1982). Inhalation toxicity of acetaldehyde in rats. I. Acute and subacute studies. Toxicology. 23: 293–297.

[65] U.S. EPA (1988). Integrated Risk Information System File of Acetaldehyde. This material is available electronically at *http://www.epa.gov/iris/subst/0290.htm*.

[66] Myou, S.; Fujimura, M.; Nishi K.; Ohka, T.; and Matsuda, T. (1993) Aerosolized acetaldehyde induces histamine-mediated bronchoconstriction in asthmatics. Am. Rev. Respir.Dis.148(4 Pt 1): 940–3.

[67] U.S. Environmental Protection Agency (2003) Integrated Risk Information System (IRIS) on Acrolein. National Center for Environmental Assessment, Office of Research and Development, Washington, D.C. 2003. This material is available electronically at *http://www.epa.gov/iris/subst/0364.htm*.

of these compounds, naphthalene, is discussed separately below.

Polycyclic aromatic hydrocarbons (PAHs) are a chemical subset of POM. In particular, EPA frequently obtains data on 16 of these POM compounds. Recent studies have found that maternal exposures to PAHs in a population of pregnant women were associated with several adverse birth outcomes, including low birth weight and reduced length at birth.[68] These studies are discussed in the Regulatory Impact Analysis.

g. Naphthalene

Naphthalene is a PAH compound consisting of two benzene rings fused together with two adjacent carbon atoms common to both rings. In 2004, EPA released an external review draft (External Review Draft, IRIS Reassessment of the Inhalation Carcinogenicity of Naphthalene, U.S. EPA. *http://www.epa.gov/iris*) of a reassessment of the inhalation carcinogenicity of naphthalene.[69] The draft reassessment completed external peer review in 2004 by Oak Ridge Institute for Science and Education.[70] Based on external comments, additional analyses are being considered. California EPA has also released a new risk assessment for naphthalene with a cancer unit risk estimate of 3×10^{-5} per $\mu g/m^3$.[71] The California EPA value was used in the 1999 NATA and in the analyses done for this rule. In addition, IARC has reevaluated naphthalene and re-classified it as Group 2B: possibly carcinogenic to humans.[72] The cancer data form the basis of an inhalation RfC of 3 $\mu g/m^3$.[73] A low to medium confidence rating was given to this RfC, in part because it cannot be said with certainty that this RfC will be protective for hemolytic anemia and cataracts, the more well-known human effects from naphthalene exposure.

h. Diesel Particulate Matter and Diesel Exhaust Organic Gases

In EPA's Diesel Health Assessment Document (HAD),[74] diesel exhaust was classified as likely to be carcinogenic to humans by inhalation at environmental exposures, in accordance with the revised draft 1996/1999 EPA cancer guidelines. A number of other agencies (National Institute for Occupational Safety and Health, the International Agency for Research on Cancer, the World Health Organization, California EPA, and the U.S. Department of Health and Human Services) have made similar classifications. EPA concluded in the Diesel HAD that it is not possible currently to calculate a cancer unit risk for diesel exhaust due to a variety of factors that limit the current studies, such as limited quantitative exposure histories in occupational groups investigated for lung cancer.

However, in the absence of a cancer unit risk, the EPA Diesel HAD sought to provide additional insight into the significance of the cancer hazard by estimating possible ranges of risk that might be present in the population. The possible risk range analysis was developed by comparing a typical environmental exposure level for highway diesel sources to a selected range of occupational exposure levels. The occupationally observed risks were then proportionally scaled according to the exposure ratios to obtain an estimate of the possible environmental risk. A number of calculations are needed to accomplish this, and these can be seen in the EPA Diesel HAD. The outcome was that environmental risks from diesel exhaust exposure could range from a low of 10^{-4} to 10^{-5} to as high as 10^{-3}, reflecting the range of occupational exposures that could be associated with the relative and absolute risk levels observed in the occupational studies. Because of uncertainties, the analysis acknowledged that the risks could be lower than 10^{-4} or 10^{-5}, and a zero risk from diesel exhaust exposure was not ruled out.

The acute and chronic exposure-related effects of diesel exhaust emissions are also of concern to the Agency. EPA derived an RfC from consideration of four well-conducted chronic rat inhalation studies showing adverse pulmonary effects.[75] [76] [77] [78] The RfC is 5 $\mu g/m^3$ for diesel exhaust as measured by diesel PM. This RfC does not consider allergenic effects such as those associated with asthma or immunologic effects. There is growing evidence, discussed in the Diesel HAD, that diesel exhaust can exacerbate these effects, but the exposure-response data are presently lacking to derive an RfC.

The Diesel HAD also briefly summarizes health effects associated with ambient PM and the EPA's annual National Ambient Air Quality Standard (NAAQS) of 15 $\mu g/m^3$. There is a much more extensive body of human data showing a wide spectrum of adverse health effects associated with exposure to ambient PM, of which diesel exhaust is an important component. The RfC is not meant to say that 5 $\mu g/m^3$ provides adequate public health protection for ambient $PM_{2.5}$. In fact, there may be benefits to reducing diesel PM below 5 $\mu g/m^3$ since diesel PM is a major contributor to ambient $PM_{2.5}$.

E. Gasoline PM

Beyond the specific areas of quantifiable risk discussed above in section III.C, EPA is also currently investigating gasoline PM. Gasoline exhaust is a complex mixture that has not been evaluated in EPA's IRIS, in contrast to diesel exhaust, which has been evaluated in IRIS. However, there is evidence for the mutagenicity and cytotoxicity of gasoline exhaust and gasoline PM. Seagrave *et al.* investigated the combined particulate and semivolatile organic fractions of gasoline engine emissions.[79] Their results demonstrate that emissions from gasoline engines are mutagenic and can induce inflammation and have cytotoxic effects. Gasoline exhaust is a ubiquitous

[68] Perara, F.P.; Rauh, V.; Tsai, W–Y.; et al. (2002) Effect of transplacental exposure to environmental pollutants on birth outcomes in a multiethnic population. Environ Health Perspect. 111: 201–205.

[69] U.S. EPA. (2004) External Review Draft, IRIS Reassessment of the Inhalation Carcinogenicity of Naphthalene. *http://www.epa.gov/iris*

[70] Oak Ridge Institute for Science and Education. (2004) External Peer Review for the IRIS Reassessment of the Inhalation Carcinogenicity of Naphthalene. August 2004. *http://cfpub2.epa.gov/ncea/cfm/recordisplay.cfm?deid=86019*

[71] California EPA. (2004) Long Term Health Effects of Exposure to Naphthalene. Office of Environmental Health Hazard Assessment. *http://www.oehha.ca.gov/air/toxic_contaminants/draftnaphth.html*

[72] International Agency for Research on Cancer (IARC). (2002) Monographs on the Evaluation of the Carcinogenic Risk of Chemicals for Humans. Vol. 82. Lyon, France.

[73] EPA 2005 ''Full IRIS Summary for Naphthalene (CASRN 91–20–3)'' Environmental Protection Agency, Integrated Risk Information System (IRIS), Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH *http://www.epa.gov/iris/subst/0436.htm.*

[74] U.S. EPA (2002) Health Assessment Document for Diesel Engine Exhaust. EPA/600/8–90/057F Office of Research and Development, Washington DC. This document is available electronically at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060.*

[75] Ishinishi, N; Kuwabara, N; Takaki, Y; et al. (1988) Long-term inhalation experiments on diesel exhaust. In: Diesel exhaust and health risks. Results of the HERP studies. Ibaraki, Japan: Research Committee for HERP Studies; pp. 11–84.

[76] Heinrich, U; Fuhst, R; Rittinghausen, S; *et al.* (1995) Chronic inhalation exposure of Wistar rats and two different strains of mice to diesel engine exhaust, carbon black, and titanium dioxide. Inhal. Toxicol. 7:553–556.

[77] Mauderly, JL; Jones, RK; Griffith, WC; *et al.* (1987) Diesel exhaust is a pulmonary carcinogen in rats exposed chronically by inhalation. Fundam. Appl. Toxicol. 9:208–221.

[78] Nikula, KJ; Snipes, MB; Barr, EB; *et al.* (1995) Comparative pulmonary toxicities and carcinogenicities of chronically inhaled diesel exhaust and carbon black in F344 rats. Fundam. Appl. Toxicol. 25:80–94.

[79] Seagrave, J.; McDonald, J.D.; Gigliotti, A.P.; Nikula, K.J.; Seilkop, S.K.; Gurevich, M. and Mauderly, J.L. (2002) Mutagenicity and in Vivo Toxicity of Combined Particulate and Semivolatile Organic Fractions of Gasoline and Diesel Engine Emissions. Toxicological Sciences 70:212–226.

source of particulate matter, contributing to the health effects observed for ambient PM which is discussed extensively in the EPA Particulate Matter Criteria Document.[80] The PM Criteria Document notes that the PM components of gasoline and diesel engine exhaust are hypothesized, important contributors to the observed increases in lung cancer incidence and mortality associated with ambient $PM_{2.5}$.[81] Gasoline PM is also a component of near-roadway emissions that may be contributing to the health effects observed in people who live near roadways (see section III.F).

EPA is working to improve the understanding of PM emissions from gasoline engines, including the potential range of emissions and factors that influence emissions. EPA led a cooperative test program that recently completed testing approximately 500 randomly procured vehicles in the Kansas City metropolitan area. The purpose of this study was to determine the distribution of gasoline PM emissions from the in-use light-duty fleet. Results from this study are expected to be available in 2006. Some source apportionment studies show gasoline and diesel PM can result in larger contributions to ambient PM than predicted by EPA emission inventories.[82] [83] These source apportionment studies were one impetus behind the Kansas City study.

Another issue related to gasoline PM is the effect of gasoline vehicles and engines on ambient PM, especially secondary PM. Ambient PM is composed of primary PM emitted directly into the atmosphere and secondary PM that is formed from chemical reactions in the atmosphere. The issue of secondary organic aerosol formation from aromatic precursors is an important one to which EPA and others are paying significant attention. This is discussed in more detail in Section 1.4.1 of the RIA.

[80] U.S. Environmental Protection Agency (2004) Air Quality Criteria for Particulate Matter. Research Triangle Park, NC: National Center for Environmental Assessment—RTP Office; Report No. EPA/600/P–99/002aF (PM Criteria Document).

[81] PM Criteria Document, p. 8–318.

[82] Fujita, E.; Watson, M.J.; Chow, M.C.; *et al.* (1998) Northern Front Range Air Quality Study, Volume C: Source apportionment and simulation methods and evaluation. Prepared for Colorado State University, Cooperative Institute for Research in the Atmosphere, by Desert Research Institute, Reno, NV.

[83] Schauer, J.J.; Rogge, W.F.; Hildemann, L.M.; *et al.* (1996) Source apportionment of airborne particulate matter using organic compounds as tracers. Atmos. Environ. 30(22):3837–3855.

F. Near-Roadway Health Effects

Over the years there have been a large number of studies that have examined associations between living near major roads and different adverse health endpoints. These studies generally examine people living near heavily-trafficked roadways, typically within several hundred meters, where fresh emissions from motor vehicles are not yet fully diluted with background air.

Several studies have measured elevated concentrations of pollutants emitted directly by motor vehicles near road as compared to overall urban background levels. These elevated concentrations generally occur within approximately 200 meters of the road, although the distance may vary depending on traffic and environmental conditions. Pollutants measured with elevated concentrations include benzene, polycyclic aromatic hydrocarbons, carbon monoxide, nitrogen dioxide, black carbon, and coarse, fine, and ultrafine particulate matter. In addition, concentrations of road dust, and wear particles from tire and brake use also show concentration increases in proximity of major roadways.

The near-roadway health studies provide stronger evidence for some health endpoints than others. Evidence of adverse responses to traffic-related pollution is strongest for non-allergic respiratory symptoms, cardiovascular effects, premature adult mortality, and adverse birth outcomes, including low birth weight and size. Some evidence for new onset asthma is available, but not all studies have significant orrelations. Lastly, among studies of childhood cancer, in particular childhood leukemia, evidence is inconsistent. Several small studies report positive associations, though such effects have not been observed in two larger studies. As described above, benzene and 1,3-butadiene are both known human leukemogens in adults. As previously mentioned, there is evidence of increased risk of leukemia among children whose parents have been occupationally exposed to benzene. Though the near-roadway studies are equivocal, taken together with the laboratory studies and other exposure environments, the data suggest a potentially serious children's health concern could exist. Additional research is needed to determine the significance of this potential concern.

Significant scientific uncertainties remain in our understanding of the relationship between adverse health effects and near-road exposure, including the exposures of greatest concern, the importance of chronic versus acute exposures, the role of fuel type (e.g. diesel or gasoline) and composition (e.g., % aromatics), relevant traffic patterns, the role of co-stressors including noise and socioeconomic status, and the role of differential susceptibility within the ''exposed'' populations. For a more detailed discussion, see Chapter 3 of the Regulatory Impact Analysis.

These studies provide qualitative evidence that reducing emissions from on-road mobile sources will provide public health benefits beyond those that can be quantified using currently available information.

G. How Would This Proposal Reduce Emissions of MSATs?

The benzene and hydrocarbon standards proposed in this action would reduce benzene, 1,3-butadiene, formaldehyde, acrolein, polycyclic organic matter, and naphthalene, as well as many other hydrocarbon compounds that are emitted by motor vehicles, including those that are listed in Table III.B–1 and discussed in more detail in Chapter 1 of the RIA. The emission reductions expected from today's controls are reported in section V.E of this preamble and Chapter 2 of the RIA.

EPA believes that the emission reductions from the standards proposed today for motor vehicles and their fuels, combined with the standards currently in place, represent the maximum achievable reductions of emissions from motor vehicles through the application of technology that will be available, considering costs and the other factors listed in section 202(l)(2). This conclusion applies whether you consider just the compounds listed in Table III.B–1, or consider all of the compounds on the Master List of emissions, given the breadth of EPA's current and proposed control programs and the broad groups of emissions that many of the control technologies reduce.

EPA has already taken significant steps to reduce diesel emissions from mobile sources. We have adopted stringent standards for on-highway diesel trucks and buses, and nonroad diesel engines (engines used, for example, in construction, agricultural, and industrial applications). We also have additional programs underway to reduce diesel emissions, including voluntary programs and a proposal that is being developed to reduce emissions from diesel locomotives and marine engines.

Emissions from motor vehicles can be chemically categorized as hydrocarbons, trace elements (including metals) and a

few additional compounds containing carbon, nitrogen and/or halogens (*e.g.*, chlorine). For the hydrocarbons, which are the vast majority of these compounds, we believe that with the controls proposed today, we would control the emissions of these compounds from motor vehicles to the maximum amount currently feasible or currently identifiable with available information. Section VI of this preamble provides more details about why the proposed and existing standards represent maximum achievable reduction of hydrocarbons from motor vehicles. There are not motor vehicle controls to reduce individual hydrocarbons selectively; instead, the maximum emission reductions are achieved by controls on hydrocarbons as a group. There are fuel controls that could selectively reduce individual air toxics (*e.g.*, formaldehyde, acetaldehyde, 1,3-butadiene), as well as controls that reduce hydrocarbons more generally. Section VII of this preamble describes why the standards we are proposing today represent the maximum emission reductions achievable through fuel controls, considering the factors required by Clean Air Act section 202(l).

Motor vehicle emissions also contain trace elements, including metals, which originate primarily from engine wear and impurities in engine oil and gasoline or diesel fuel. EPA does not have authority to regulate engine oil, and there are no feasible motor vehicle controls to directly prevent engine wear. Nevertheless, oil consumption and engine wear have decreased over the years, decreasing emission of metals from these sources. Metals associated with particulate matter will be captured in emission control systems employing a particulate matter trap, such as heavy-duty vehicles meeting the 2007 standards. We believe that currently, particulate matter traps, in combination with engine-out control, represent the maximum feasible reduction of both motor vehicle particulate matter and toxic metals present as a component of the particulate matter.

The mobile source contribution to the national inventory for metal compounds is generally small. In fact, the emission rate for most metals from motor vehicles is small enough that quantitative measurement requires state-of-the art analytical techniques that are only recently being applied to this source category. We have efforts underway to gather information regarding trace metal emissions, including mercury emissions, from motor vehicles (see Chapter 1 of the RIA for more details).

A few metals and other elements are used as fuel additives. These additives are designed to reduce the emission of regulated pollutants either in combination with or without an emission control device (*e.g.*, a passive particulate matter trap). Clean Air Act section 211 provides EPA with various authorities to regulate fuel additives in order to reduce the risk to public health from exposure to their emissions. It is under this section that EPA requires manufacturers to register additives before their introduction into commerce. Registration involves certain data requirements that enable EPA to identify products whose emissions may pose an unreasonable risk to public health. In addition, section 211 provides EPA with authority to require health effects testing to fill any gaps in the data that would prevent a determination regarding the potential for risk to the public. Clean Air Act section 211(c) provides the primary mechanism by which EPA would take actions necessary to minimize exposure to metals or other additives to diesel and gasoline. It is under section 211 that EPA is currently generating the information needed to update an assessment of the potential human health risks related to having manganese in the national fuel supply.

Existing regulations limit sulfur in gasoline and diesel fuel to the maximum amount feasible and will reduce emissions of all sulfur-containing compounds (*e.g.*, hydrogen sulfide, carbon disulfide) to the greatest degree achievable.[84] [85] [86] For the remaining compounds (*e.g.*, chlorinated compounds), we currently have very little information regarding emission rates and conditions that impact emissions. This information would be necessary in order to evaluate potential controls under section 202(l). Emissions of hydrocarbons containing chlorine (*e.g.*, dioxins/furans) would likely be reduced with control measures that reduce total hydrocarbons, just as these emissions were reduced with the use of catalytic controls that lowered exhaust hydrocarbons.

IV. What Are the Air Quality and Health Impacts of Air Toxics, and How Do Mobile Sources Contribute?

A. What Is the Health Risk to the U.S. Population from Inhalation Exposure to Ambient Sources of Air Toxics, and How Would It be Reduced by the Proposed Controls?

EPA's National-Scale Air Toxics Assessment (NATA) assesses human health impacts from chronic inhalation exposures to outdoor sources of air toxics. It assesses lifetime risks assuming continuous exposure to levels of air toxics estimated for a particular point in time. The most recent NATA was done for the year 1999.[87]

The NATA modeling framework has a number of limitations, but it remains very useful in identifying air toxic pollutants and sources of greatest concern. Among the significant limitations of the framework, which are discussed in more detail in the regulatory impact analysis, is that it cannot be used to reliably identify ''hot spots,'' such as areas in immediate proximity to major roads, where the air concentration, exposure and/or risk might be significantly higher within a census tract[88] or county. These ''hot spots'' are discussed in more detail in section IV.B.2. The framework also does not account for risk from sources of air toxics originating indoors, such as stoves, out-gassing from building materials, or evaporative benzene emissions from cars in attached garages. There are also limitations associated with the dose-response values used to quantify risk; these are discussed in Section I of the preamble. Importantly, it should be noted that the 1999 NATA does not include default adjustments for early life exposures recently recommended in the Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens.[89] These adjustments would be applied to compounds which act through a mutagenic mode of action. EPA will determine as part of the IRIS assessment process which substances meet the criteria for making adjustments, and future assessments will reflect them. If warranted, incorporation of such adjustments would lead to higher estimates of risk assuming constant lifetime exposure.

Because of its limitations, EPA notes that the NATA assessment should not be used as the basis for developing risk reduction plans or regulations to control specific sources or pollutants. Additionally, this assessment should not be used for estimating risk at the local level, for quantifying benefits of reduced air toxic emissions, or for identifying localized hotspots. In this

[84] 65 FR 6697, February 10, 2000.

[85] 66 FR 5001, January 18, 2001.

[86] 69 FR 38958, June 29, 2004.

[87] *www.epa.gov/ttn/atw/nata1999.*

[88] A census tract is a subdivision of a county that typically contains roughly 4000 people. In urban areas, these tracts can be very small, on the order of a city block, whereas in rural areas, they can be large.

[89] U. S. EPA. (2005) Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. Report No. EPA/630/R–03/003F. Available electronically at *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=116283.*

rule, we have evaluated air quality, exposure, and risk impacts of mobile source air toxics using the 1999 NATA, as well as projections of risk to future years using the same tools as 1999 NATA. In addition, we also evaluate more refined local scale modeling, measured ambient concentrations, personal exposure measurements, and other data. This information is discussed below, as well as in Chapter 3 of the RIA. It serves as a perspective on the possible risk-related implications of the rule.

Overall, the average nationwide lifetime population cancer risk in 1999 NATA was 42 in a million, assuming continuous exposure to 1999 levels. The average noncancer respiratory hazard index was 6.4.[90] Highway vehicles and nonroad equipment account for almost 50% of the average population cancer risk, and 74% of the noncancer risk These estimates are based on the contribution of sources within 50 kilometers of a given emission point and do not include the contribution to ambient concentrations from transport beyond 50 kilometers. Ambient concentrations from transport beyond 50 kilometers, referred to as ''background'' in NATA, are responsible for almost 50% of the average cancer risk in NATA.

Section III.C.1 discusses the pollutants that the 1999 National-Scale Air Toxics Assessment identifies as national and regional risk drivers. As summarized in Table III.C–1, benzene is the only pollutant described as a national cancer risk driver. Twenty-four percent of the total cancer risk in the 1999 National-Scale Air Toxics Assessment was due to benzene. In 1999, 68% of nationwide benzene emissions were attributable to mobile sources. 1,3-Butadiene and naphthalene are regional cancer risk drivers that have a large mobile source contribution. As presented in Table III.C–2, 58% of nationwide 1,3-butadiene emissions in 1999 came from mobile sources. Twenty-seven percent of nationwide naphthalene emissions in 1999 came from mobile sources.

One compound, acrolein, was identified as a national risk driver for noncancer health effects, and 25% of primary acrolein emissions were attributable to mobile sources. Over 70% of the average ambient concentration of acrolein is attributable to mobile sources. This is due to the large contribution from mobile source 1,3-butadiene, which is transformed to acrolein in the atmosphere.

Table III.C–2 provides additional information on the mobile source contribution to emissions of national and regional risk drivers. The standards proposed in this rule will reduce emissions of all these pollutants.

In addition to the 1999 NATA, we have estimated future-year risks for those pollutants included in the 1999 NATA whose emissions inventories include a mobile source contribution (see Table IV.B–1). This analysis indicates that cancer and noncancer risk will continue to be a public health concern due to exposure to mobile-source-related pollutants.

Figure IV.A–1 summarizes changes in average population inhalation cancer risk for the MSATs in Table IV.A–1. Despite significant reductions in risk from these pollutants, average inhalation cancer risks are expected to remain well above 1 in 100,000. In addition, because of population growth (using projected populations from the U.S. Bureau of Census), the number of Americans above the 1 in 100,000 cancer risk level from exposure to these mobile source air toxics is projected to increase from about 214 million in 1999 to 240 million in 2030. Benzene continues to account for a large fraction of the total inhalation cancer risk from mobile source air toxics, decreasing slightly from 45% of the risk in 1999 to 37% in 2030. Similarly, although the average noncancer respiratory hazard index for MSATs decreases from over 6 in 1999 to 3.2 in 2030, the population with a hazard index above one increases from 250 million in 1999 to 273 million in 2030. That is, in 2030 nearly the entire U.S. population will still be exposed to levels of these pollutants that have the potential to cause adverse respiratory health effects (other than cancer).

These projected risks were estimated using the same tools and methods as the 1999 NATA, but with future-year projected inventories. More detailed information on the methods used to do these projections, and associated limitations and uncertainties, can be found in Chapter 3 of the RIA for this rule. Projected risks assumed 1999 ''background'' levels. For MSATs, ''background'' accounts for slightly less than 20% of the average cancer risk in 1999, increasing to 24% in 2030. However, background levels should decrease along with emissions. A sensitivity analysis of this assumption is presented in Chapter 3 of the RIA. It should also be noted that the projected inventories used for this modeling do not include some more recent revisions, such as higher emissions of hydrocarbons, including gaseous air toxics, at cold temperatures. These revisions are discussed in section V and increase the overall magnitude of the inventory.

[90] A hazard index above 1 indicates the potential for adverse health effects. It cannot be translated into a probability that an adverse effect will occur, and is not likely to be proportional to risk. A hazard index greater than one can be best described as only indicating that a potential may exist for adverse health effects.

Figure IV.A-1. Trends in Nationwide Average Population Cancer Risk from Inhalation Exposure to Outdoor Sources of Mobile Source Air Toxics, 1999 to 2030

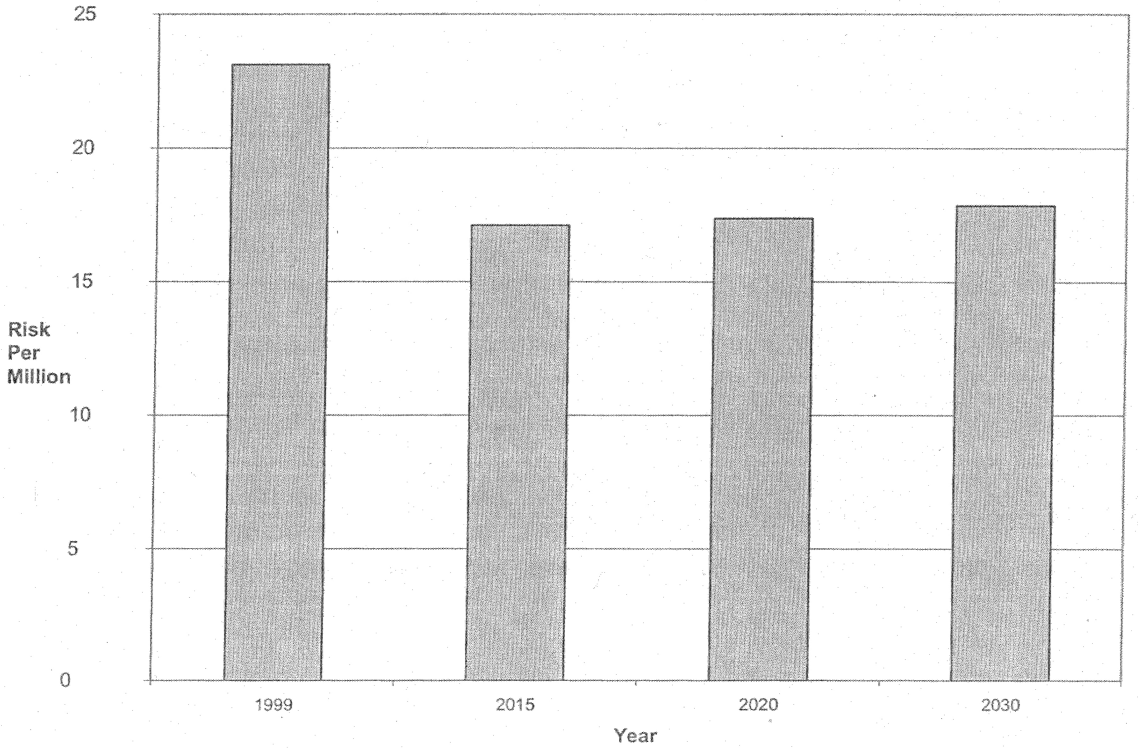


TABLE IV.A–1.—POLLUTANTS INCLUDED IN RISK MODELING FOR PROJECTION YEARS *

1,3-Butadiene	Ethyl Benzene
2,2,4-Trimethylpentane	Fluoranthene **
Acenaphthene **	Fluorene **
Acenaphthylene **	Formaldehyde
Acetaldehyde	Hexane
Acrolein	Indeno(1,2,3,c,d)-pyrene **
Anthracene **	Manganese
Benzene	Methyl tert-butyl ether (MTBE)
Benz(a)anthracene **	Naphthalene
Benzo(a)pyrene **	Nickel
Benzo(b)fluoranthene **	Phenanthrene **
Benzo(g,h,i)perylene **	Propionaldehyde
Benzo(k)fluoranthene **	Pyrene **
Chromium (includes Chromium III, Chromium VI, and non-speciated Chromium).	Styrene
Chrysene **	Toluene

TABLE IV.A–1.—POLLUTANTS INCLUDED IN RISK MODELING FOR PROJECTION YEARS *—Continued

Dibenzo(a,h)anthracene **	Xylenes

* This list includes compounds from the 1999 National-Scale Air Toxics Assessment with a mobile source emissions contribution, for which data were sufficient to develop an emissions inventory.

** POM compound as discussed in Section III.

B. What Is the Distribution of Exposure and Risk?

1. Distribution of National-Scale Estimates of Risk From Air Toxics

National-scale modeling indicates that 95th percentile average cancer risk from exposure to mobile source air toxics is more than three times higher than median risk. In addition, the 95th percentile cancer risk is more than 10 times higher than the 5th percentile risk. This is true for all years modeled, from 1999 to 2030. Table IV.B–1 gives the median and 5th and 95th percentile cancer risk distributions for mobile source air toxics. As previously mentioned, the tools used in this assessment are inadequate for identifying ''hot spots'' and do not account for significant sources of inhalation exposure, such as benzene emissions within attached garages from vehicles, equipment, and portable fuel containers. If these hot spots and additional sources of exposure were accounted for, a larger percentage of the population would be exposed to higher risk levels. (Sections IV.B.2–4 provides more details on ''hot spots'' and the implications for distribution of risk.) In addition, the modeling underestimates the contribution of hydrocarbon and particulate matter emissions at cold temperatures. These modeling results are discussed in more detail in Chapter 3 of the RIA.

TABLE IV.B—1.—MEDIAN AND 5TH AND 95TH PERCENTILE LIFETIME INHALATION CANCER RISK DISTRIBUTIONS FOR INHALATION EXPOSURE TO OUTDOOR SOURCES OF MOBILE SOURCE AIR TOXICS

[Based on modeled average census tract risks]

Pollutant	1999			2020		
	5th	Median	95th	5th	Median	95th
All MSATs	4.0×10^{-6}	1.9×10^{-5}	5.9×10^{-5}	3.6×10^{-6}	1.3×10^{-5}	4.4×10^{-5}
Benzene	2.4×10^{-6}	8.9×10^{-6}	2.5×10^{-5}	2.1×10^{-6}	5.6×10^{-6}	1.4×10^{-5}
1,3-Butadiene	1.6×10^{-7}	3.1×10^{-6}	1.2×10^{-5}	7.5×10^{-8}	2.0×10^{-6}	7.5×10^{-6}
Acetaldehyde	1.0×10^{-6}	2.5×10^{-6}	6.9×10^{-6}	9.3×10^{-7}	1.6×10^{-6}	3.6×10^{-6}
Naphthalene	1.1×10^{-7}	1.4×10^{-6}	7.6×10^{-6}	1.0×10^{-7}	1.4×10^{-6}	8.5×10^{-6}

2. Elevated Concentrations and Exposure in Mobile Source-Impacted Areas

Air quality measurements near roads often identify elevated concentrations of air toxic pollutants at these locations. The concentrations of air toxic pollutants near heavily trafficked roads, as well as the pollutant composition and characteristics, differ from those measured distant from heavily trafficked roads. Exposures for populations residing, working, or going to school near major roads are likely higher than for other populations. The vehicle and fuel standards proposed in this rule will reduce those elevated exposures. Following is an overview of concentrations of air toxics and exposure to air toxics in areas heavily impacted by mobile source emissions.

a. Concentrations Near Major Roadways

The 1999 NATA estimates average concentrations within a census tract, but it does not differentiate between locations near roadways and those further away (within the same tract). Local-scale modeling can better characterize distributions of concentrations, using more refined allocation of highway vehicle emissions. Urban-scale assessments done in Houston, TX and Portland, OR illustrated steep gradients of air toxic concentrations along major roadways, as well as better agreement with monitor data.[91–92] [93] Results of the Portland study show average concentrations of motor vehicle-related pollutants are ten times higher at 50 meters from a road than they are at greater than 400 meters a road. These findings are consistent with pollutant dispersion theory, which predicts that pollutants emitted along roadways will show highest concentrations nearest a road, and concentrations exponentially decrease with increasing distance downwind. These near-road pollutant gradients have been confirmed by measurements of both criteria pollutants and air toxics, and they are discussed in detail in Chapter 3 of the RIA.

Air quality monitoring is another means of evaluating pollutant concentrations at locations near sources such as roadways. It is also used to evaluate model performance at a given point and, given adequate data quality, can be statistically analyzed to determine associations with different source types. EPA has been deploying fixed-site ambient monitors that monitor concentrations of multiple air toxics, including benzene, over time. Several studies have found that concentrations of benzene and other mobile source air toxics are significantly elevated near busy roads compared to ''urban background'' concentrations measured at a fixed site. These studies are discussed in detail in Chapter 3 of the RIA.

Ambient VOC concentrations were measured around residences in Elizabeth, NJ, as part of the Relationship among Indoor, Outdoor, and Personal Air (RIOPA) study. Data from that study was analyzed to assess how concentrations are influenced by proximity to known ambient emission sources.[94] [95] The ambient concentrations of benzene, toluene, ethylbenzene, and xylene isomers (BTEX) were found to be inversely associated with distances to interstate highways and major urban roads, and with distance to gasoline stations. The data indicate that BTEX concentrations around homes within 200 meters of roadways and gas stations are 1.5 to 4 times higher than urban background levels.

b. Exposures Near Major Roadways

The modeling assessments and air quality monitoring studies discussed above have increased our understanding of ambient concentrations of mobile source air toxics and potential population exposures. Results from the following exposure studies reveal that populations spending time near major roadways likely experience elevated personal exposures to motor vehicle related pollutants. In addition, these populations may experience exposures to differing physical and chemical compositions of certain air toxic pollutants depending on the amount of time spent in close proximity to motor vehicle emissions. Following is a detailed discussion on exposed populations near major roadways.

i. Vehicles

Several studies suggest that significant exposures may be experienced while driving in vehicles. A recent in-vehicle monitoring study was conducted by EPA and consisted of in-vehicle air sampling throughout work shifts within ten police patrol cars used by the North Carolina State Highway Patrol (smoking not permitted inside the vehicles).[96] Troopers operated their vehicles in typical patterns, including highway and city driving and refueling. In-vehicle benzene concentrations averaged 12.8 $\mu g/m^3$, while concentrations measured at an ''ambient'' site located outside a nearby state environmental office averaged 0.32 $\mu g/m^3$. The study also found that the benzene concentrations were closely

[91–92] Kinnee, E.J.; Touma, J.S.; Mason, R.; Thurman, J.; Beidler, A., Bailey, C.; Cook, R. (2004) Allocation of onroad mobile emissions to road segments for air toxics modeling in an urban area. Transport. Res. Part D 9: 139–150.

[93] Cohen, J.; Cook, R.; Bailey, C.R.; Carr, E. (2005) Relationship between motor vehicle emissions of hazardous pollutants, roadway proximity, and ambient concentrations in Portland, Oregon. Environ. Modelling & Software 20: 7–12.

[94] Kwon, J. (2005) Development of a RIOPA database and evaluation of the effect of proximity on the potential residential exposure to VOCs from ambient sources. Rutgers, the State University of New Jersey and University of Medicine and Dentistry of New Jersey. PhD dissertation. This document is available in Docket EPA–HQ–OAR–2005–0036.

[95] Weisel, C.P. (2004) Assessment of the contribution to personal exposures of air toxics from mobile sources. Final report. Submitted to EPA Office of Transportation and Air Quality. Environmental & Occupational Health Sciences Institute, Piscataway, NJ. This document is available in Docket EPA–HQ–OAR–2005–0036.

[96] Riediker, M.; Williams, R.; Devlin, R.; et al. (2003) Exposure to particulate matter, volatile organic compounds, and other air pollutants inside patrol cars. Environ Sci. Technol. 37: 2084–2093.

associated with other fuel-related VOCs measured.

In Boston, the exposure of commuters to VOCs during various commuting modes was examined.[97] For commuters driving a car, the mean time-weighted concentrations of benzene, toluene, and xylenes in-vehicle were measured at 17.0, 33.1, and 28.2 μg/m^3, respectively.

The American Petroleum Institute funded a screening study of high-end exposure microenvironments as required by section 211(b) of the Clean Air Act.[98] The study included vehicle chase measurements and measurements in several vehicle-related microenvironments in several cities for benzene and other air toxics. In-vehicle microenvironments (average benzene concentrations in parentheses) included the vehicle cabin tested on congested freeways (17.5 μg/m^3), in parking garages above-ground (155 μg/m^3) and below-ground (61.7 μg/m^3), in urban street canyons (7.54 μg/m^3), and during refueling (46.0 μg/m^3).

In 1998, the California Air Resources Board published an extensive study of concentrations of in-vehicle air toxics in Los Angeles and Sacramento, CA.[99] The data set is large and included a variety of sampling conditions. On urban freeways, benzene in-vehicle concentrations ranged from 3 to 15 μg/m^3 in Sacramento and 10 to 22 μg/m^3 in Los Angeles. In comparison, ambient benzene concentrations ranged from 1 to 3 μg/m^3 in Sacramento and 3 to 7 μg/m^3 in Los Angeles.

Similar findings of elevated concentrations of pollutants have also been found in studies done in diesel buses.[100 101 102]

Overall, these studies show that concentrations experienced by commuters and other roadway users are substantially higher than those measured in typical urban air. As a result, the time a person spends in a vehicle will significantly affect their overall exposure.

ii. Homes and Schools

The proximity of schools to major roads may result in elevated exposures for children due to potentially increased concentrations indoors and increased exposures during outdoor activities. Here we discuss international studies in addition to the limited number of U.S. studies, because while fleets and fuels outside the U.S. can differ significantly, the spatial distribution of concentrations is relevant.

In the Fresno Asthmatic Children's Environment Study (FACES), traffic-related pollutants were measured on selected days from July 2002 to February 2003 at a central site, and inside and outside of homes and outdoors at schools of asthmatic children.[103] Preliminary data indicate that PAH concentrations are higher at elementary schools located near primary roads than at elementary schools distant from primary roads (or located near primary roads with limited access). PAH concentrations also appear to increase with increase in annual average daily traffic on nearest major collector. Remaining results regarding the variance in traffic pollutant concentrations at schools in relation to proximity to roadways and traffic density will be available in 2006.

The East Bay Children's Respiratory Health Study studied traffic-related air pollution outside of schools near busy roads in the San Francisco Bay Area in 2001.[104] Concentrations of the traffic pollutants PM_{10}, $PM_{2.5}$, black carbon, total NO_X, and NO_2 were measured at 10 school sites in neighborhoods that spanned a busy traffic corridor during the spring and fall seasons. The school sites were selected to represent a range of locations upwind and downwind of major roads. Differences were observed in concentrations between schools nearby (< 300 m) versus those more distant (or upwind) from major roads. Investigators found spatial variability in exposure to black carbon, NO_X, NO, and (to a lesser extent) NO_2, due specifically to roads with heavy traffic within a relatively small geographic area.

A study to assess children's exposure to traffic-related air pollution while attending schools near motorways was performed in the Netherlands.[105] Investigators measured $PM_{2.5}$, NO_2 and benzene inside and outside of 24 schools located within 400 m of motorways. The indoor average benzene concentration was 3.2 μg/m^3 with a range of 0.6–8.1 μg/m^3. The outdoor average benzene concentration was 2.2 μg/m^3 with a range of 0.3–5.0 μg/m^3. Overall results indicate that indoor pollutant concentrations are significantly correlated with traffic density and composition, percentage of time downwind, and distance from major roadways.

The Toxic Exposure Assessment—Columbia/Harvard (TEACH) study measured the concentrations of VOCs, $PM_{2.5}$, black carbon, and metals outside the homes of high school students in New York City.[106] The study was conducted during winter and summer of 1999 on 46 students and their homes. Average winter (and summer) indoor concentrations exceeded outdoor concentrations by a factor of 2.3 (1.3). In addition, analyses of spatial and temporal patterns of MTBE concentrations were consistent with traffic patterns. MTBE is a tracer for motor vehicle pollution.

Children are exposed to elevated levels of air toxics not only in their homes, classrooms, and outside on school grounds, but also during their commute to school. See the discussion of in-vehicle concentrations of air toxics above and in Chapter 3 of the RIA.

iii. Pedestrians and Bicyclists

Researchers have noted that pedestrians and cyclists along major roads experience elevated exposures to motor vehicle related pollutants. Although commuting near roadways leads to higher levels of exposure to traffic pollutants, the general consensus is that exposure levels of those commuting by walking or biking is lower than for those who travel by car or bus, (see discussion on in-vehicle exposure in previous section above). These studies are discussed in Chapter 3 of the RIA for this rule.

[97] Chan C.-C., Spengler J. D., Ozkaynak H., and Lefkopoulou M. (1991) Commuter Exposures to VOCs in Boston, Massachusetts. J. Air Waste Manage. Assoc. 41: 1594–1600.

[98] Zielinska, B.; Fujita, E.M.; Sagebiel, J.C.; et al. (2002) Interim data report for Section 211(B) Tier 2 high end exposure screening study of baseline and oxygenated gasoline. Prepared for American Petroleum Institute. November 19, 2002. This document is available in Docket EPA–HQ–OAR–2005–0036.

[99] Rodes, C.; Sheldon, L.; Whitaker, D.; et al. (1998) Measuring concentrations of selected air pollutants inside California vehicles. Final report to California Air Resources Board. Contract No. 95–339.

[100] Fitz, D.R.; Winer, A.M.; Colome, S.; et al. (2003) Characterizing the Range of Children's Pollutant Exposure During School Bus Commutes. Prepared for the California Resources Board.

[101] Sabin, L.D.; Behrentz, E.; Winer, A.M.; et al. (2005) Characterizing the range of children's air pollutant exposure during school bus commutes. J. Expos. Anal. Environ. Epidemiol. 15: 377–387.

[102] Batterman, S.A.; Peng, C.Y.; and Braun, J. (2002) Levels and composition of volatile organic compounds on commuting routes in Detroit, Michigan. Atmos. Environ. 36: 6015–6030.

[103] Personal communication with FACES Investigators Fred Lurmann, Paul Roberts, and Katharine Hammond. Data is currently being prepared for publication.

[104] Kim J.J.; Smorodinsky S.; Lipsett M.; et al. (2004) Traffic-related air pollution near busy roads. Am. J. Respir. Crit. Care Med. 170: 520–526.

[105] Janssen, N.A.H.; van Vliet, P.H.N.; Aarts, F.; et al. (2001) Assessment of exposure to traffic related air pollution of children attending schools near motorways. Atmos. Environ. 35: 3875–3884.

[106] Kinney, P.L.; Chillrud, S.N.; Ramstrom, S.; et al. (2002) Exposures to multiple air toxics in New York City. Environ Health Perspect. 110 (Suppl 4): 539–546.

c. Exposure and Concentrations in Homes with Attached Garages

People living in homes with attached garages are potentially exposed to substantially higher concentrations of benzene, toluene, and other VOCs indoors. Homes with attached garages present a special concern related to infiltration of components of fuel, exhaust, and other materials stored in garages (including gasoline in gas cans). A study from the early 1980's found that approximately 30% of an average nonsmoker's benzene exposure originated from sources in attached garages.[107]

Concentrations within garages are often substantially higher than those found outdoors or indoors. A recently-completed study in Michigan found that average concentrations in residential garages were 36.6 μg/m^3, compared to 0.4 μg/m^3 outdoors.[108] A recent study in Alaska, where fuel benzene concentrations are higher, cold start emissions are higher, and homes are more tightly sealed than in most of the U.S., found average garage concentrations of 101 μg/m^3.[109] Air passing from these high-benzene locations can cause increased concentrations indoors.

Measurement studies have found that homes with attached garages can have significantly higher concentrations of benzene and other VOCs. One study from Alaska found that in homes without attached garages, average benzene concentrations were 8.6 μg/m^3, while homes with attached garages had average concentrations of 70.8 μg/m^3.[110] Another showed that indoor CO and total hydrocarbon (THC) concentrations rose sharply following a cold vehicle starting and pulling out of the attached garage, persisting for an hour or more.[111] The study also showed that cold start emissions accounted for 13–85% of indoor non-methane hydrocarbons (NMHC), while hot soak emissions accounted for 9–71% of indoor NMHC. Numerous other studies have shown associations between VOCs in indoor air and the presence of attached garages. These studies are discussed in Chapter 3 of the RIA.

EPA has conducted a modeling analysis to examine the influence of attached garages on personal exposure to benzene.[112] The analysis modeled the air flow between the outdoor environment, indoor environment, and the garage, and accounted for the fraction of home air intake from the garage. Compared to national average exposure concentrations of 1.36 μg/m^3 modeled for 1999 in the National-Scale Air Toxics Assessment, which do not account for emissions originating in attached garages, average exposure concentrations for people with attached garages could more than double. For additional details, see Chapter 3 of the RIA.

Overall, emissions of VOCs within attached garages result in substantially higher concentrations of benzene and other pollutants indoors. Proposed reductions in fuel benzene content, new standards for cold temperature exhaust emissions during vehicle starts, and reduced emissions from gas cans are all expected to significantly reduce this major source of exposure.

d. Occupational Exposure

Occupational settings can be considered a microenvironment in which exposure to benzene and other air toxics can occur. Occupational exposures to benzene from mobile sources or fuels can be several orders of magnitude greater than typical exposures in the non-occupationally exposed population. Several key occupational groups include workers in fuel distribution, storage, and tank remediation; handheld and non-handheld equipment operators; and workers who operate gasoline-powered engines such as snowmobiles and ATV's. Exposures in these occupational settings are discussed in Chapter 3 of the RIA.

In addition, some occupations require that workers spend considerable time in vehicles, which increases the time they spend in a higher-concentration microenvironment. In-vehicle concentrations are discussed in a previous section above.

3. What Are the Size and Characteristics of Highly Exposed Populations?

A study of the populations in three states (Colorado, Georgia, and New York) indicated that more than half of the population lives within 200 meters of a major road.[113] In addition, analysis of data from the Census Bureau's American Housing Survey suggests that approximately 37 million people live within 300 feet of a 4- or more lane highway, railroad, or airport. American Housing Survey statistics, as well as epidemiology studies, indicate that those houses sited near major transportation sources are more likely to be lower in income or have minority residents than houses not located near major transportation sources. These data are discussed in detail in Chapter 3 of the RIA.

Other population studies also indicate that a significant fraction of the population resides in locations near major roads. At present, the available studies use different indicators of ''major road'' and of ''proximity,'' but the estimates range from 12.4% of student enrollment in California attending schools within 150 meters of roads with 25,000 vehicles per day or more, to 13% of Massachusetts veterans living within 50 meters of a road with at least 10,000 vehicles per day.[114] [115] Using a more general definition of a ''major road,'' between 22% and 51% of different study populations live near such roads.

4. What Are the Implications for Distribution of Individual Risk?

We have made revisions to HAPEM5, which is the exposure model used in our national-scale modeling, in order to account for near-road impacts. The effect of the updated model is best understood as widening the distribution of exposure, with a larger fraction of the population being exposed to higher benzene concentrations. Including the effects of residence locations near roads can result in exposures to some individuals that are up to 50% higher than those predicted by HAPEM5.

The revised model, HAPEM6, was run for three states representing different parts of the country. These areas are intended to represent different

[107] Wallace, L. (1996) Environmental exposure to benzene: an update. Environ Health Perspect. 104 (Suppl 6): 1129–1136.

[108] Batterman, S.; Hatzivasilis, G.; Jia, C. (2006) Concentrations and emissions of gasoline and other vapors from residential vehicle garages. Atmos. Environ. 30: 1828–1844.

[109] George, M.; Kaluza, P.; Maxwell, B.; Moore, G.; Wisdom, S. (2002) Indoor air quality & ventilation strategies in new homes in Alaska. Alaska Building Science Network. *www.cchrc.org.* This document is available in Docket EPA–HQ–OAR–2005–0036.

[110] Schlapia, A.; Morris, S. (1998) Architectural, behavioral, and environmental factors associated with VOCs in Anchorage homes. Proceedings of the Air & Waste Management Associations 94th Annual Conference. Paper 98–A504.

[111] Graham, L.A.; Noseworthy, L.; Fugler, D.; O'Leary, K.; Karman, D.; Grande, C. (2004) Contribution of vehicle emissions from an attached garage to residential indoor air pollution levels. J. Air & Waste Manage. Assoc. 54: 563–584.

[112] Bailey, C. (2005) Additional contribution to benzene exposure from attached garages. Memorandum to the Docket. This document is available in Docket EPA–HQ–OAR–2005–0036.

[113] Major roads are defined as those roads defined by the U.S. Census as one of the following: ''limited access highway,'' ''highway,'' ''major road,'' or ''ramp.''

[114] Green, R.S.; Smorodinsky, S.; Kim, J.J.; McLaughlin, R.; Ostro, B. (2004) Proximity of California public schools to busy roads. Environ. Health Perspect. 112: 61–66.

[115] Garshick, E.; Laden, F.; Hart, J.E.; Caron, A. (2003) Residence near a major road and respiratory symptoms in U.S. veterans. Epidemiol. 14: 728–736.

geographies, development patterns, and housing densities. The states modeled include Georgia, Colorado, and New York. Overall, these study results indicate that proximity to major roads can significantly increase personal exposure for populations living near major roads. These modeling tools will be extended to a national scale for the final rulemaking.

For details on the modeling study with HAPEM6, refer to Chapter 3.2 of the RIA. We used geographic information systems to estimate the population within each U.S. census tract living at various distances from a major road (within 75 meters; between 75 and 200 meters; or beyond 200 meters). An exposure gradient was determined for people living in each zone, based on dispersion modeling.[116] These gradients were confirmed with monitoring studies funded by EPA.[117] The HAPEM5 model was updated to account for elevated concentrations within these defined distances from roadways and the population living in these areas.

C. Ozone

While the focus of this rule is on air toxics, the proposed vehicle and gas can standards will also help reduce volatile organic compounds (VOCs), which are precursors to ozone.

1. Background

Ground-level ozone, the main ingredient in smog, is formed by the reaction of VOCs and nitrogen oxides (NO_X) in the atmosphere in the presence of heat and sunlight. These pollutants, often referred to as ozone precursors, are emitted by many types of pollution sources, such as highway and nonroad motor vehicles and engines, power plants, chemical plants, refineries, makers of consumer and commercial products, industrial facilities, and smaller ''area'' sources. VOCs can also be emitted by natural sources such as vegetation. The gas can controls proposed in this action would help reduce VOC emissions by reducing evaporation, permeation and spillage from gas cans. The proposed vehicle controls will also reduce VOC emissions; however, because these reductions will occur at cold temperatures the ozone benefits will be limited.

The science of ozone formation, transport, and accumulation is complex.[118] Ground-level ozone is produced and destroyed in a cyclical set of chemical reactions, many of which are sensitive to temperature and sunlight. When ambient temperatures and sunlight levels remain high for several days and the air is relatively stagnant, ozone and its precursors can build up and result in more ozone than typically would occur on a single high-temperature day. Further complicating matters, ozone also can be transported into an area from pollution sources found hundreds of miles upwind, resulting in elevated ozone levels even in areas with low VOC or NO_X emissions. As a result, differences in VOC and NO_X emissions contribute to daily, seasonal, and yearly differences in ozone concentrations across different locations.

The current ozone National Ambient Air Quality Standards (NAAQS) has an 8-hour averaging time. The 8-hour ozone NAAQS, established by EPA in 1997, is based on well-documented science demonstrating that more people were experiencing adverse health effects at lower levels of exertion, over longer periods, and at lower ozone concentrations than addressed by the previous one-hour ozone NAAQS. It addresses ozone exposures of concern for the general population and populations most at risk, including children active outdoors, outdoor workers, and individuals with pre-existing respiratory disease, such as asthma. The 8-hour ozone NAAQS is met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration over three years is less than or equal to 0.084 ppm.

2. Health Effects of Ozone

The health and welfare effects of ozone are well documented and are critically assessed in the EPA ozone criteria document (CD) and EPA staff paper.[119] [120] In August 2005, the EPA released the second external review draft of a new ozone CD which is scheduled to be released in final form in February 2006.[121] This document summarizes the findings of the 1996 ozone criteria document and critically assesses relevant new scientific information which has emerged in the past decade. Additional information on health and welfare effects of ozone can also be found in the draft RIA for this proposal.

Ozone can irritate the respiratory system, causing coughing, throat irritation, and/or uncomfortable sensation in the chest. Ozone can reduce lung function and make it more difficult to breathe deeply, and breathing may become more rapid and shallow than normal, thereby limiting a person's normal activity. Ozone can also aggravate asthma, leading to more asthma attacks that require a doctor's attention and/or the use of additional medication. In addition, ozone can inflame and damage the lining of the lungs, which may lead to permanent changes in lung tissue, irreversible reductions in lung function, and a lower quality of life if the inflammation occurs repeatedly over a long time period. People who are of particular concern with respect to ozone exposures include children and adults who are active outdoors. Those people particularly susceptible to ozone effects are people with respiratory disease (*e.g.*, asthma), people with unusual sensitivity to ozone, and children.

There has been new research that suggests additional serious health effects beyond those that had been known when the 1996 ozone CD was published. Since then, over 1,700 new ozone-related health and welfare studies have been published in peer-reviewed journals.[122] Many of these studies have investigated the impact of ozone exposure on such health effects as changes in lung structure and biochemistry, inflammation of the lungs, exacerbation and causation of asthma, respiratory illness-related school absence, hospital and emergency room visits for asthma and other respiratory causes, and premature

[116] Cohen, J.; Cook, R.; Bailey, C.R.; Carr, E. (2005) Relationship between motor vehicle emissions of hazardous pollutants, roadway proximity, and ambient concentrations in Portland, Oregon. Environ Modelling & Software 20: 7–12.

[117] Kwon, J. (2005) Development of a RIOPA database and evaluation of the effect of proximity on the potential residential exposure to VOCs from ambient sources. PhD Dissertation. Rutgers, The State University of New Jersey and University of Medicine and Dentistry of New Jersey. Written under direction of Dr. Clifford Weisel. This document is available in Docket EPA–HQ–OAR–2005–0036.

[118] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA600–P–93–004aF. This document is available in Docket EPA–HQ–OAR–2005–0036.

[119] U.S. EPA (1996). Air Quality Criteria for Ozone and Related Photochemical Oxidants, EPA600–P–93–004aF. This document is available in Docket EPA–HQ–OAR–2005–0036.

[120] U.S. EPA (1996) Review of National Ambient Air Quality Standards for Ozone, Assessment of Scientific and Technical Information, OAQPS Staff Paper, EPA–452/R–96–007. This document is available in Docket EPA–HQ–OAR–2005–0036.

[121] U.S. EPA (2005) Air Quality Criteria for Ozone and Related Photochemical Oxidants (Second External Review Draft). This document is available in Docket EPA–HQ–OAR–2005–0036.

[122] New Ozone Health and Environmental Effects References, Published Since Completion of the Previous Ozone AQCD, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711 (7/2002). This document is available in Docket EPA–HQ–OAR–2005–0036.

mortality. EPA is currently in the process of evaluating these and other studies as part of the ongoing review of the air quality criteria document and NAAQS for ozone. Key new health information falls into four general areas: development of new-onset asthma, hospital admissions for young children, school absence rate, and premature mortality.

Aggravation of existing asthma resulting from short-term ambient ozone exposure was reported prior to the 1997 NAAQS standard and has been observed in studies published subsequently.[123] [124] In addition, a relationship between long-term ambient ozone concentrations and the incidence of new-onset asthma in adult males (but not in females) was reported by McDonnell et al. (1999).[125] Subsequently, an additional study suggests that incidence of new diagnoses of asthma in children is associated with heavy exercise in communities with high concentrations (*i.e.*, mean 8-hour concentration of 59.6 parts per billion (ppb) or greater) of ozone.[126] This relationship was documented in children who played 3 or more sports and thus spent more time outdoors. It was not documented in those children who played one or two sports.

Previous studies have shown relationships between ozone and hospital admissions in the general population. A study in Toronto reported a significant relationship between 1-hour maximum ozone concentrations and respiratory hospital admissions in children under the age of two.[127] Given the relative vulnerability of children in this age category, there is particular concern about these findings.

Increased rates of illness-related school absenteeism have been associated with 1-hour daily maximum and 8-hour average ozone concentrations in studies conducted in Nevada [128] in kindergarten to 6th grade and in Southern California in grades four through six.[129] These studies suggest that higher ambient ozone levels may result in increased school absenteeism.

The air pollutant most clearly associated with premature mortality is PM, with many studies reporting such an association. However, recent analyses provide evidence that short term ozone exposure is associated with increased premature mortality. Bell et al. (2004) published new analyses of the 95 cities in the National Morbidity, Mortality, and Air Pollution Study (NMMAPS) data sets, showing associations between daily mortality and the previous week's ozone concentrations which were robust to adjustment for particulate matter, weather, seasonality, and long-term trends.[130] Although earlier analyses undertaken as part of the NMMAPS did not report an effect of ozone on total mortality across the full year, in those earlier studies the NMMAPS investigators did observe an effect after limiting the analysis to summer, when ozone levels are highest.[131] [132] Another recent study from 23 cities throughout Europe (APHEA2) also found an association between ambient ozone and daily mortality.[133] Similarly, other studies have shown associations between ozone and mortality.[134] [135] Specifically, Toulomi et al. (1997) found that 1-hour maximum ozone levels were associated with daily numbers of deaths in four cities (London, Athens, Barcelona, and Paris), and a quantitatively similar effect was found in a group of four additional cities (Amsterdam, Basel, Geneva, and Zurich).

In all, the new studies that have become available since the 8-hour ozone standard was adopted in 1997 continue to demonstrate the harmful effects of ozone on public health, and the need to attain and maintain the ozone NAAQS.

3. Current and Projected 8-Hour Ozone Levels

Currently, ozone concentrations exceeding the level of the 8-hour ozone NAAQS occur over wide geographic areas, including most of the nation's major population centers.[136] As of September 2005 there are approximately 159 million people living in 126 areas designated as not in attainment with the 8-hour ozone NAAQS. There are 474 full or partial counties that make up the 8-hour ozone nonattainment areas.

EPA has already adopted many emission control programs that are expected to reduce ambient ozone levels. These control programs include the Clean Air Interstate Rule (70 FR 25162, May 12, 2005), as well as many mobile source rules (many of which are described in section V.D). As a result of these programs, the number of areas that fail to achieve the 8-hour ozone NAAQS is expected to decrease.

Based on the recent ozone modeling performed for the CAIR analysis [137], barring additional local ozone precursor controls, we estimate 37 Eastern counties (where 24 million people are projected to live) will exceed the 8-hour ozone NAAQS in 2010. An additional 148 Eastern counties (where 61 million people are projected to live) are expected to be within 10 percent of violating the 8-hour ozone NAAQS in 2010.

States with 8-hour ozone nonattainment areas will be required to

[123] Thurston, G.D.; Lippman, M.L.; Scott, M.B.; Fine, J.M. (1997) Summertime Haze Air Pollution and Children with Asthma. *American Journal of Respiratory Critical Care Medicine* 155: 654–660.

[124] Ostro, B.; Lipsett, M.; Mann, J.; Braxton-Owens, H.; White, M. (2001) Air pollution and exacerbation of asthma in African-American children in Los Angeles. *Epidemiology* 12(2): 200–208.

[125] McDonnell, W.F.; Abbey, D.E.; Nishino, N.; Lebowitz, M.D. (1999) ''Long-term ambient ozone concentration and the incidence of asthma in nonsmoking adults: the AHSMOG study.'' *Environmental Research* 80(2 Pt 1): 110–121.

[126] McConnell, R.; Berhane, K.; Gilliland, F.; London, S.J.; Islam, T.; Gauderman, W.J.; Avol, E.; Margolis, H.G.; Peters, J.M. (2002) Asthma in exercising children exposed to ozone: a cohort study. *Lancet* 359: 386–391.

[127] Burnett, R.T.; Smith-Doiron, M.; Stieb, D.; Raizenne, M.E.; Brook, J.R.; Dales, R.E.; Leech, J.A.; Cakmak, S.; Krewski, D. (2001) Association between ozone and hospitalization for acute respiratory diseases in children less than 2 years of age. Am. J. Epidemiol. 153: 444–452.

[128] Chen, L.; Jennison, B.L.; Yang, W.; Omaye, S.T. (2000) Elementary school absenteeism and air pollution. Inhalation Toxicol. 12: 997–1016.

[129] Gilliland, F.D.; Berhane, K.; Rappaport, E.B.; Thomas, D.C.; Avol, E.; Gauderman, W.J.; London, S.J.; Margolis, H.G.; McConnell, R.; Islam, K.T.; Peters, J.M. (2001) The effects of ambient air pollution on school absenteeism due to respiratory illnesses. Epidemiology 12:43–54.

[130] Bell, M.L.; McDermott, A.; Zeger, S.L.; Samet, J.M.; Dominici, F. Ozone and short-term mortality in 95 U.S. urban communities, 1987–2000. JAMA 292(19): 2372–2378.

[131] Samet, J.M.; Zeger, S.L.; Dominici, F.; Curriero, F.; Coursac, I.; Dockery, D.W.; Schwartz, J.; Zanobetti, A. (2000) The National Morbidity, Mortality and Air Pollution Study: Part II: Morbidity, Mortality and Air Pollution in the United States. Research Report No. 94, Part II. Health Effects Institute, Cambridge, MA, June 2000. This document is available in Docket EPA–HQ–OAR–2005–0036.

[132] Samet, J.M.; Zeger, S.L.; Dominici, F.; Curriero, F.; Coursac, I.; Zeger, S. (2000) Fine Particulate Air Pollution and Mortality in 20 U.S. Cities, 1987–1994. The New England Journal of Medicine 343(24): 1742–1749.

[133] Gryparis, A.; Forsberg, B.; Katsouyanni, K.; Analitis, A.; Touloumi, G.; Schwartz, J.; Samoli, E.; Medina, S.; Anderson, H.R.; Niciu, E.M.; Wichmann, H.E.; Kriz, B.; Kosnik, M.; Skorkovsky, J.; Vonk, J.M.; Dortbudak, Z. (2004) Acute effects of ozone on mortality from the ''Air Pollution and Health: A European Approach'' project. Am. J. Respir. Crit. Care Med. 170: 1080–1087.

[134] Thurston, G.D.; Ito, K. (2001) Epidemiological studies of acute ozone exposures and mortality. J. Exposure Anal. Environ. Epidemiol. 11: 286–294.

[135] Touloumi, G.; Katsouyanni, K.; Zmirou, D.; Schwartz, J.; Spix, C.; Ponce de Leon, A.; Tobias, A.; Quennel, P.; Rabczenko, D.; Bacharova, L.; Bisanti, L.; Vonk, J.M.; Ponka, A. (1997) Short-term effects of ambient oxidant exposure on mortality: A combined analysis within the APHEA project. Am. J. Epidemiol. 146: 177–185.

[136] A map of the 8-hour ozone nonattainment areas is included in the RIA for this proposed rule.

[137] Technical Support Document for the Final Clean Air Interstate Rule Air Quality Modeling. This document is available in Docket EPA–HQ–OAR–2005–0036.

take action to bring those areas into compliance in the future. Based on the final rule designating and classifying 8-hour ozone nonattainment areas (69 FR 23951, April 30, 2004), most 8-hour ozone nonattainment areas will be required to attain the 8-hour ozone NAAQS in the 2007 to 2013 time frame and then be required to maintain the 8-hour ozone NAAQS thereafter.[138] We also expect many of the 8-hour ozone nonattainment areas to adopt additional emission reduction programs, but we are unable to quantify or rely upon future reductions from additional state and local programs that have not yet been adopted. The expected ozone inventory reductions from the standards proposed in this action may be useful to states in attaining or maintaining the 8-hour ozone NAAQS.

A metamodeling tool developed at EPA, the ozone response surface metamodel, was used to estimate the effects of the proposed emission reductions. The ozone response surface metamodel was created using multiple runs of the Comprehensive Air Quality Model with Extensions (CAMx). Base and proposed control CAMx metamodeling was completed for two future years (2020, 2030) over a modeling domain that includes all or part of 37 Eastern U.S. states. For more information on the response surface metamodel, please see the RIA for this proposal or the Air Quality Modeling Technical Support Document (TSD).

We have made estimates using the ozone response surface metamodel to illustrate the types of change in future ozone levels that we would expect to result from this proposed rule, as described in Chapter 3 of the draft RIA. The proposed gas can controls are projected to result in a very small net improvement in future ozone, after weighting for population. Although the net future ozone improvement is small, some VOC-limited areas in the Eastern U.S. are projected to have non-negligible improvements in projected 8-hour ozone design values due to the proposed gas can controls. As stated in Section VII.E.3, we view these improvements as useful in meeting the 8-hour ozone NAAQS. These net ozone improvements are in addition to reductions in levels of benzene due to the proposed gas can controls.

D. Particulate Matter

The cold temperature vehicle controls proposed here will result in reductions of primary PM being emitted by vehicles. In addition, both the proposed vehicle controls and the proposed gas can controls will reduce VOCs that react in the atmosphere to form secondary $PM_{2.5}$, namely organic carbonaceous $PM_{2.5}$.

1. Background

Particulate matter (PM) represents a broad class of chemically and physically diverse substances. It can be principally characterized as discrete particles that exist in the condensed (liquid or solid) phase spanning several orders of magnitude in size. PM is further described by breaking it down into size fractions. PM_{10} refers to particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (μm). $PM_{2.5}$ refers to fine particles, those particles with an aerodynamic diameter less than or equal to a nominal 2.5 μm. Coarse fraction particles refer to those particles with an aerodynamic diameter less than or equal to a nominal 10 μm. Inhalable (or ''thoracic'') coarse particles refer to those particles with an aerodynamic diameter greater than 2.5 μm but less than or equal to 10 μm. Ultrafine PM refers to particles with diameters of less than 100 nanometers (0.1 μm). Larger particles (>10 μm) tend to be removed by the respiratory clearance mechanisms, whereas smaller particles are deposited deeper in the lungs. Ambient fine particles are a complex mixture including sulfates, nitrates, chlorides, organic carbonaceous material, elemental carbon, geological material, and metals. Fine particles can remain in the atmosphere for days to weeks and travel through the atmosphere hundreds to thousands of kilometers, while coarse particles generally tend to deposit to the earth within minutes to hours and within tens of kilometers from the emission source.

EPA has NAAQS for both $PM_{2.5}$ and PM_{10}. Both the $PM_{2.5}$ and PM_{10} NAAQS consist of a short-term (24-hour) and a long-term (annual) standard. The 24-hour $PM_{2.5}$ NAAQS is set at a level of 65 μg/m³ based on the 98th percentile concentration averaged over three years. The annual $PM_{2.5}$ NAAQS specifies an expected annual arithmetic mean not to exceed 15 μg/m³ averaged over three years. The 24-hour PM_{10} NAAQS is set at a level of 150 μg/m³ not to be exceeded more than once per year. The annual PM_{10} NAAQS specifies an expected annual arithmetic mean not to exceed 50 μg/m³.

EPA has recently proposed to amend the PM NAAQS.[139] The proposal includes lowering the level of the primary 24-hour fine particle standard from the current level of 65 micrograms per cubic meter (μg/m³) to 35 μg/m³, retaining the level of the annual fine standard at 15 μg/m³, and setting a new primary 24-hour standard for certain inhalable coarse particles (the indicator is qualified so as to include any ambient mix of $PM_{10-2.5}$ that is dominated by resuspended dust from high-density traffic on paved roads and PM generated by industrial and construction sources, and excludes any ambient mix of $PM_{10-2.5}$ dominated by rural windblown dust and soils and PM generated by agricultural and mining sources) at 70 μg/m³. The Agency is also requesting comment on various other standards for fine and inhalable coarse PM (71 FR 2620, Jan. 17, 2006).

2. Health Effects of PM

Scientific studies show ambient PM is associated with a series of adverse health effects. These health effects are discussed in detail in the 1997 PM criteria document, the recent 2004 EPA Criteria Document for PM as well as the 2005 PM Staff Paper.[140] [141] [142] Further discussion of health effects associated with PM can also be found in the draft RIA for this proposal.

As described in the documents listed above, health effects associated with short-term variation (e.g. hours to days) in ambient $PM_{2.5}$ include premature mortality, hospital admissions, heart and lung diseases, increased cough, lower-respiratory symptoms, decrements in lung function and changes in heart rate rhythm and other cardiac effects. Studies examining populations exposed to different levels of air pollution over a number of years, including the Harvard Six Cities Study and the American Cancer Society Study, show associations between long-term exposure to ambient $PM_{2.5}$ and premature mortality, including deaths attributed to cardiovascular changes and lung cancer.

[138] The Los Angeles South Coast Air Basin 8-hour ozone nonattainment area will have to attain before June 15, 2021.

[139] U.S. EPA, National Ambient Air Quality Standards for Particulate Matter (71 FR 2620, Jan. 17, 2006). This document is also available on the web at: *http://www.epa.gov/air/particlepollution/actions.html*

[140] U.S.EPA (1996) Air Quality Criteria for Particulate Matter, EPA 600–P–95–001aF, EPA 600–P–95–001bF. This document is available in Docket EPA–HQ–OAR–2005–0036.

[141] U.S. EPA (2004) Air Quality Criteria for Particulate Matter (Oct 2004), Volume I Document No. EPA600/P–99/002aF and Volume II Document No. EPA600/P–99/002bF. This document is available in Docket EPA–HQ–OAR–2005–0036.

[142] U.S. EPA (2005) Review of the National Ambient Air Quality Standard for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA–452/R–05–005. This document is available in Docket EPA–HQ–OAR–2005–0036.

Recently, several studies have highlighted the adverse effects of PM specifically from mobile sources.[143] [144] Studies have also focused on health effects due to PM exposures on or near roadways.[145] Although these studies include all air pollution sources, including both spark-ignition (gasoline) and diesel powered vehicles, they indicate that exposure to PM emissions near roadways, thus dominated by mobile sources, are associated with health effects. The proposed vehicle controls may help to reduce exposures to mobile source related $PM_{2.5}$. Additional information on near roadway health effects can be found in Section III of this preamble.

3. Current and Projected $PM_{2.5}$ Levels

EPA has recently finalized $PM_{2.5}$ nonattainment designations (70 FR 943, Jan 5. 2005).[146] As can be seen from the designations, ambient $PM_{2.5}$ levels exceeding the level of the $PM_{2.5}$ NAAQS are widespread throughout the country. There are approximately 88 million people living in 39 areas (which include all or part of 208 counties) designated as not in attainment with the $PM_{2.5}$ NAAQS.

EPA has already adopted many emission control programs that are expected to reduce ambient PM levels. These rules include the Clean Air Interstate Rule (70 FR 25162, May 12, 2005), as well as many mobile source rules. Section V.D details many of these mobile source rules.[147] As a result of these programs, the number of areas that fail to achieve the 1997 $PM_{2.5}$ NAAQS is expected to decrease. Based on modeling performed for the CAIR analysis, we estimate that 28 Eastern counties (where 19 million people are projected to live) will exceed the $PM_{2.5}$ standard in 2010.[148] In addition, 56 Eastern counties (where 24 million people are projected to live) are expected to be within 10 percent of violating the $PM_{2.5}$ in 2010.

While the final implementation process for bringing the nation's air into attainment with the 1997 $PM_{2.5}$ NAAQS is still being completed in a separate rulemaking action, we expect that most areas will need to attain the 1997 $PM_{2.5}$ NAAQS in the 2009 to 2014 time frame, and then be required to maintain the NAAQS thereafter. The expected PM and VOC inventory reductions from the standards proposed in this action will be useful to states in attaining or maintaining the $PM_{2.5}$ NAAQS.

4. Current PM_{10} Levels

Air quality monitoring data indicates that as of September 2005 approximately 29 million people live in 55 designated PM_{10} nonattainment areas, which include all or part of 54 counties. The RIA for this proposed rule lists the PM_{10} nonattainment areas and their populations.

Based on section 188 of the Act, we expect that most areas will attain the PM_{10} NAAQS no later than December 31, 2006, depending on an area's classification and other factors, and then be required to maintain the PM_{10} NAAQS thereafter. The expected PM and VOC inventory reductions from the standards proposed in this action could be useful to states in maintaining the PM_{10} NAAQS.[149]

E. Other Environmental Effects

1. Visibility

a. Background

Visibility can be defined as the degree to which the atmosphere is transparent to visible light.[150] Visibility is important because it has direct significance to people's enjoyment of daily activities in all parts of the country. Individuals value good visibility for the well-being it provides them directly, where they live and work, and in places where they enjoy recreational opportunities. Visibility is also highly valued in significant natural areas such as national parks and wilderness areas, because of the special emphasis given to protecting these lands now and for future generations. For more information on visibility see the recent 2004 EPA Criteria Document for PM as well as the 2005 PM Staff Paper.[151] [152]

To address the welfare effects of PM on visibility, EPA set secondary $PM_{2.5}$ standards in 1997 which would act in conjunction with the establishment of a regional haze program. EPA concluded that $PM_{2.5}$ causes adverse effects on visibility in various locations, depending on PM concentrations and factors such as chemical composition and average relative humidity and the secondary (welfare-based) $PM_{2.5}$ NAAQS was established as equal to the suite of primary (health-based) NAAQS (62 FR 38669, July 18, 1997). Furthermore, Section 169 of the Act provides additional authorities to remedy existing visibility impairment and prevent future visibility impairment in the 156 national parks, forests and wilderness areas categorized as mandatory Federal class I areas (62 FR 38680–81, July 18, 1997).[153] In July 1999 the regional haze rule (64 FR 35714) was put in place to protect the visibility in mandatory Federal class I areas. Visibility can be said to be impaired in both $PM_{2.5}$ nonattainment areas and mandatory Federal class I areas.[154]

[143] Laden, F.; Neas, L.M.; Dockery, D.W.; Schwartz, J. (2000) Association of Fine Particulate Matter from Different Sources with Daily Mortality in Six U.S. Cities. Environmental Health Perspectives 108: 941–947.

[144] Janssen, N.A.H.; Schwartz, J.; Zanobetti, A.; Suh, H.H. (2002) Air Conditioning and Source-Specific Particles as Modifiers of the Effect of PM_{10} on Hospital Admissions for Heart and Lung Disease. Environmental Health Perspectives 110: 43–49.

[145] Riekider, M.; Cascio, W.E.; Griggs, T.R.; Herbst, M.C.; Bromberg, P.A.; Neas, L.; Williams, R.W.; Devlin, R.B. (2003) Particulate Matter Exposures in Cars is Associated with Cardiovascular Effects in Healthy Young Men. Am. J. Respir. Crit. Care Med. 169: 934–940.

[146] US EPA, Air Quality Designations and Classifications for the Fine Particles ($PM_{2.5}$) National Ambient Air Quality Standards, December 17, 2004. (70 FR 943, Jan 5, 2005) This document is also available on the web at: *http://www.epa.gov/pmdesignations/*.

[147] The Clean Air Interstate Rule (CAIR) will reduce emissions of SO_2 and NO_X from power plants in the Eastern 37 states, reducing interstate transport of nitrogen oxides and sulfur dioxide and helping cities and states in the East meet the ozone and PM NAAQS. (70 FR 25162) (May 12, 2005).

[148] Technical Support Document for the Final Clean Air Interstate Rule Air Quality Modeling. This document is available in Docket EPA–HQ–OAR–2005–0036.

[149] As mentioned above, the EPA has recently proposed to amend the PM NAAQS, by establishing a new indicator for certain inhalable coarse particles, and a new primary 24-hour standard for coarse particles described by that indicator. EPA also proposed to revoke the current 24-hour PM_{10} standard in all areas of the country except in those areas with a population of at least 100,000 people and which contain at least one monitor violating the 24-hour PM_{10} standard, based on the most recent 3 years of air quality data. In addition, EPA proposed to revoke upon promulgation of this rule the current annual PM_{10} standard if EPA finalizes the proposed primary standard for $PM_{10-2.5}$ (71 FR 2620, Jan. 17, 2006).

[150] National Research Council, 1993. Protecting Visibility in National Parks and Wilderness Areas. National Academy of Sciences Committee on Haze in National Parks and Wilderness Areas. National Academy Press, Washington, DC. This document is available in Docket EPA–HQ–OAR–2005–0036. This book can be viewed on the National Academy Press Website at *http://www.nap.edu/books/0309048443/html/*.

[151] U.S. EPA (2004) Air Quality Criteria for Particulate Matter (Oct 2004), Volume I Document No. EPA600/P–99/002aF and Volume II Document No. EPA600/P–99/002bF. This document is available in Docket EPA–HQ–OAR–2005–0036.

[152] U.S. EPA (2005) Review of the National Ambient Air Quality Standard for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA–452/R–05–005. This document is available in Docket EPA–HQ–OAR–2005–0036.

[153] These areas are defined in section 162 of the Act as those national parks exceeding 6,000 acres, wilderness areas and memorial parks exceeding 5,000 acres, and all international parks which were in existence on August 7, 1977.

[154] As mentioned above, the EPA has recently proposed to amend the PM NAAQS (71 FR 2620, Jan. 17, 2006). The proposal would set the secondary NAAQS equal to the primary standards for both $PM_{2.5}$ and $PM_{10-2.5}$. EPA also is taking comment on whether to set a separate $PM_{2.5}$ standard, designed to address visibility (principally in urban areas), on potential levels for that standard

b. Current Visibility Impairment

Data showing $PM_{2.5}$ nonattainment areas, and visibility levels above background at the Mandatory Class I Federal Areas demonstrate that unacceptable visibility impairment is experienced throughout the U.S., in multi-state regions, urban areas, and remote mandatory Federal class I areas.[155] [156] The mandatory federal class I areas are listed in Chapter 3 of the draft RIA for this action. The areas that have design values above the $PM_{2.5}$ NAAQS are also listed in Chapter 3 of the draft RIA for this action.

c. Future Visibility Impairment

Recent modeling for the Clean Air Interstate Rule (CAIR) was used to project visibility conditions in mandatory Federal class I areas across the country in 2015. The results for the mandatory Federal Class I areas suggest that these areas are predicted to continue to have annual average deciview levels above background in the future.[157] Modeling done for the CAIR also projected $PM_{2.5}$ levels in the Eastern U.S. in 2010. These projections include all sources of $PM_{2.5}$, including the engines covered in this proposal, and suggest that $PM_{2.5}$ levels above the 1997 NAAQS will persist into the future.[158]

The vehicles that would be subject to the proposed standards contribute to visibility concerns in these areas through both their primary PM emissions and their VOC emissions, which contribute to the formation of secondary $PM_{2.5}$. The gas cans that would be subject to the proposed standards also contribute to visibility concerns through their VOC emissions. Reductions in these direct PM and VOC emissions will help to improve visibility across the nation, including mandatory Federal class I areas.

2. Plant Damage From Ozone

Ozone contributes to many environmental effects, with damage to plants and ecosystems being of most concern. Plant damage affects crop yields, forestry production, and ornamentals. The adverse effect of ozone on forests and other natural vegetation can in turn cause damage to associated ecosystems, with additional resulting economic losses. Prolonged ozone concentrations of 100 ppb can be phytotoxic to a large number of plant species, and can produce acute injury and reduced crop yield and biomass production. Ozone concentrations within the range of 50 to 100 ppb have the potential over a longer duration to create chronic stress on vegetation that can result in reduced plant growth and yield, shifts in competitive advantages in mixed populations, decreased vigor, and injury. Ozone effects on vegetation are presented in more detail in the 1996 Criteria Document and the 2005 draft Criteria Document.

3. Atmospheric Deposition

Wet and dry deposition of ambient particulate matter delivers a complex mixture of metals (*e.g.*, mercury, zinc, lead, nickel, aluminum, cadmium), organic compounds (*e.g.*, POM, dioxins, furans) and inorganic compounds (*e.g.,* nitrate, sulfate) to terrestrial and aquatic ecosystems. EPA's Great Waters Program has identified 15 pollutants whose deposition to water bodies has contributed to the overall contamination loadings to these Great Waters. These 15 compounds include several heavy metals and a group known as polycyclic organic matter (POM). Within POM are the polycyclic aromatic hydrocarbons (PAHs). PAHs in the environment may be present in the gas or particle phase, although the bulk will be adsorbed onto airborne particulate matter. In most cases, human-made sources of PAHs account for the majority of PAHs released to the environment. The PAHs are usually the POMs of concern as many PAHs are probable human carcinogens.[159] For some watersheds, atmospheric deposition represents a significant input to the total surface water PAH burden.[160] [161] Emissions from mobile sources have been found to account for a percentage of the atmospheric deposition of PAHs. For instance, recent studies have identified gasoline and diesel vehicles as the major contributors in the atmospheric deposition of PAHs to Chesapeake Bay, Massachusetts Bay and Casco Bay.[162] [163] The vehicle controls being proposed may help to reduce deposition of heavy metals and POM.

4. Materials Damage and Soiling

The deposition of airborne particles can also reduce the aesthetic appeal of buildings and culturally important articles through soiling, and can contribute directly (or in conjunction with other pollutants) to structural damage by means of corrosion or erosion.[164] Particles affect materials principally by promoting and accelerating the corrosion of metals, by degrading paints, and by deteriorating building materials such as concrete and limestone. Particles contribute to these effects because of their electrolytic, hygroscopic, and acidic properties, and their ability to sorb corrosive gases (principally sulfur dioxide). The rate of metal corrosion depends on a number of factors, including the deposition rate and nature of the pollutant; the influence of the metal protective corrosion film; the amount of moisture present; variability in the electrochemical reactions; the presence and concentration of other surface electrolytes; and the orientation of the metal surface.

V. What Are Mobile Source Emissions Over Time and How Would This Proposal Reduce Emissions, Exposure and Associated Health Effects?

A. Mobile Source Contribution to Air Toxics Emissions

In 1999, based on the National Emissions Inventory (NEI), mobile sources accounted for 44% of total

within a range of 20 to 30 μg/m³, and on averaging times for the standard within a range of four to eight daylight hours.

[155] US EPA, Air Quality Designations and Classifications for the Fine Particles ($PM_{2.5}$) National Ambient Air Quality Standards, December 17, 2004. (70 FR 943, Jan 5. 2005) This document is also available on the web at: *http://www.epa.gov/pmdesignations/*.

[156] US EPA. Regional Haze Regulations, July 1, 1999. (64 FR 35714, July 1, 1999).

[157] The deciview metric describes perceived visual changes in a linear fashion over its entire range, analogous to the decibel scale for sound. A deciview of 0 represents pristine conditions. The higher the deciview value, the worse the visibility, and an improvement in visibility is a decrease in deciview value.

[158] EPA recently proposed to revise the current secondary PM NAAQS standards by making them identical to the suite of proposed primary standards for fine and coarse particles (71 FR 2620, Jan. 17, 2006).

[159] Deposition of Air Pollutants to the Great Waters-Third Report to Congress, Office of Air Quality Planning and Standards, June 2000, EPA453–R–00–005. This document is available in Docket EPA–HQ–OAR–2005–0036.

[160] Simcik, M.F.; Eisenrich, S.J.; Golden, K.A.; Liu, S.; Lipiatou, E.; Swackhamer, D.L.; and Long, D.T. (1996) Atmospheric Loading of Polycyclic Aromatic Hydrocarbons to Lake Michigan as Recorded in the Sediments. Environ. Sci. Technol. 30:3039–3046.

[161] Simcik, M.F.; Eisenrich, S.J.; and Lioy, P.J. (1999) Source Apportionment and Source/Sink Relationships of PAHs in the Coastal Atmosphere of Chicago and Lake Michigan. Atmospheric Environment 33: 5071–5079.

[162] Dickhut, R.M.; Canuel, E.A.; Gustafson, K.E.; Liu, K.; Arzayus, K.M.; Walker, S.E.; Edgecombe, G.; Gaylor, M.O.; and McDonald, E.H. (2000) Automotive Sources of Carcinogenic Polycyclic Aromatic Hydrocarbons Associated with Particulate Matter in the Chesapeake Bay Region. Environ. Sci. Technol. 34: 4635–4640.

[163] Golomb, D.; Barry, E.; Fisher, G.; Varanusupakul, P.; Koleda, M.; amd Rooney, T. (2001) Atmospheric Deposition of Polycyclic Aromatic Hydrocarbons near New England Coastal Waters. Atmospheric Environment 35: 6245–6258.

[164] U.S. EPA (2005) Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. This document is available in Docket EPA–HQ–OAR–2005–0036.

emissions of 188 hazardous air pollutants (on the Clean Air Act section 112(b) list of hazardous air pollutants). Diesel particulate matter (PM) is not included in this list of 188 pollutants. Sixty-five percent of the mobile source tons in this inventory were attributable to highway mobile sources, and the remainder to nonroad sources. Furthermore, over 90% of mobile source emissions of air toxics (not including diesel PM) are attributable to gasoline vehicles and equipment.

Recently, EPA projected trends in air toxic emissions (not including diesel PM) to 2020, using the 1999 National Emissions Inventory (NEI) as a baseline.[165] Overall, air toxic emissions are projected to decrease from 5,030,000 tons in 1999 to 4,010,000 tons in 2020, as a result of emission controls on major, area, and mobile sources. In the absence of Clean Air Act emission controls currently in place, EPA estimates air toxic emissions would total 11,590,000 tons in 2020.

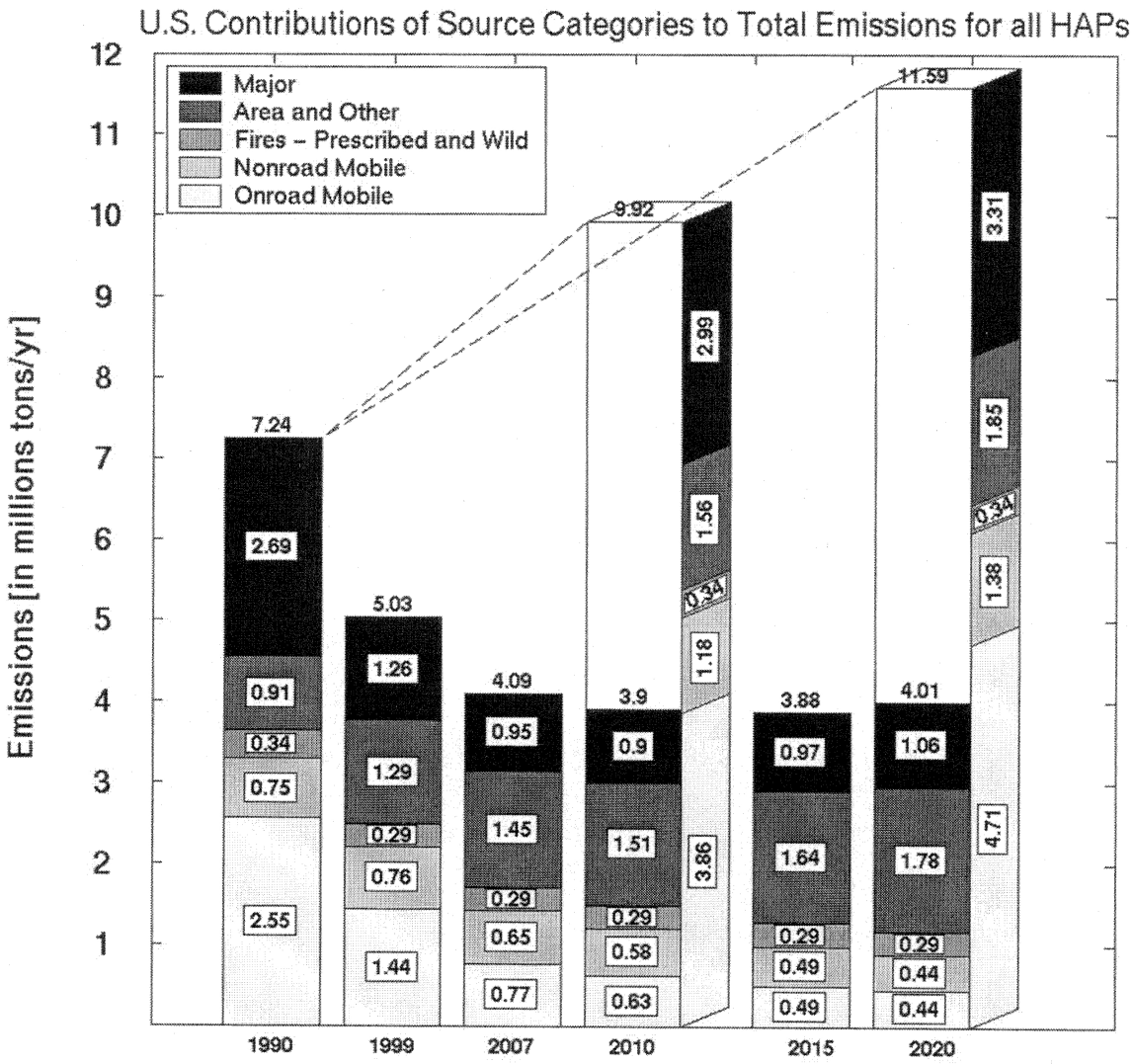
Figure V.A–1 depicts the contributions of source categories to air toxic emissions between 1990 and 2020.[166] As indicated in Figure V.A–1, mobile source air toxic emissions will be reduced 60% between 1999 and 2020, from 2.2 million to 880,000 tons. This reduction will occur despite a projected 57% increase in vehicle miles traveled, and a projected 63% increase in nonroad activity, based on units of work called horsepower-hours. It should be noted, however, that EPA anticipates mobile source air toxic emissions will begin to increase after 2020, from about 880,000 tons in 2020 to 920,000 tons in 2030. This is because, after 2020, reductions from control programs will be outpaced by increases in activity.

In 1999, 29% of air toxic emissions were from highway vehicles and 15% from nonroad equipment. Moreover, 54% of air toxic emissions from highway vehicles were emitted by light-duty gasoline vehicles (LDGVs) and 37% by light-duty trucks (LDGTs) (see Table V.A–1). EPA projects that in 2020, only 27% of highway vehicle toxic emissions will be from LDGVs and 63% will be from LDGTs. Air toxic emissions from nonroad equipment are dominated by lawn and garden equipment, recreational equipment, and pleasure craft, which collectively accounted for almost 80% of nonroad toxic emissions in 1999 and 2020 (see Table V.A–2).

Figure V.A–1Contribution of Source Categories to Air Toxic Emissions, 1990 to 2020 (not including diesel particulate matter). **Note:** Dashed line represents projected emissions without Clean Air Act controls.

[165] Strum, M., R. Cook, J. Thurman, D. Ensley, A. Pope, T. Palma, R. Mason, H. Michaels, and S. Shedd. 2005. Projection of Hazardous Air Pollutant Emissions to Future Years. Science of the Total Environment, in press.

[166] It should be noted that after 2010, stationary source emissions are based only on economic growth, and do not account for reductions from ongoing toxics programs such as the urban air toxics program, residual risk standards and area source program, which are expected to further reduce toxics.



If diesel PM emissions were added to the mobile source total, mobile sources would account for 48% of a total 5,398,000 tons in 1999. Figure V.A.–2 summarizes the trend in diesel PM between 1999 and 2020, by source category. Diesel PM emissions will be reduced from 368,000 tons in 1999 to 114,000 tons in 2020, a decrease of 70%. As controls on highway diesel engines and nonroad diesel engines phase in, diesel-powered locomotives and commercial marine vessels increase from 11% of the inventory in 1999 to 27% in 2020.

Subsequent to the development of these projected inventories for mobile source air toxics, a number of inventory revisions have occurred. Data EPA has collected indicate that the MOBILE6.2 emission factor model is under predicting hydrocarbon emissions (including air toxics) and PM emissions at lower temperatures, from light-duty vehicles meeting National Low Emission Vehicle (NLEV) and Tier 2 tailpipe standards. The inventories presented in sections V.B, V.C., and V.E. reflect these enhancements.

TABLE V.A–1.—PERCENT CONTRIBUTION OF VEHICLE CLASSES TO HIGHWAY VEHICLE AIR TOXIC EMISSIONS, 1999 TO 2020

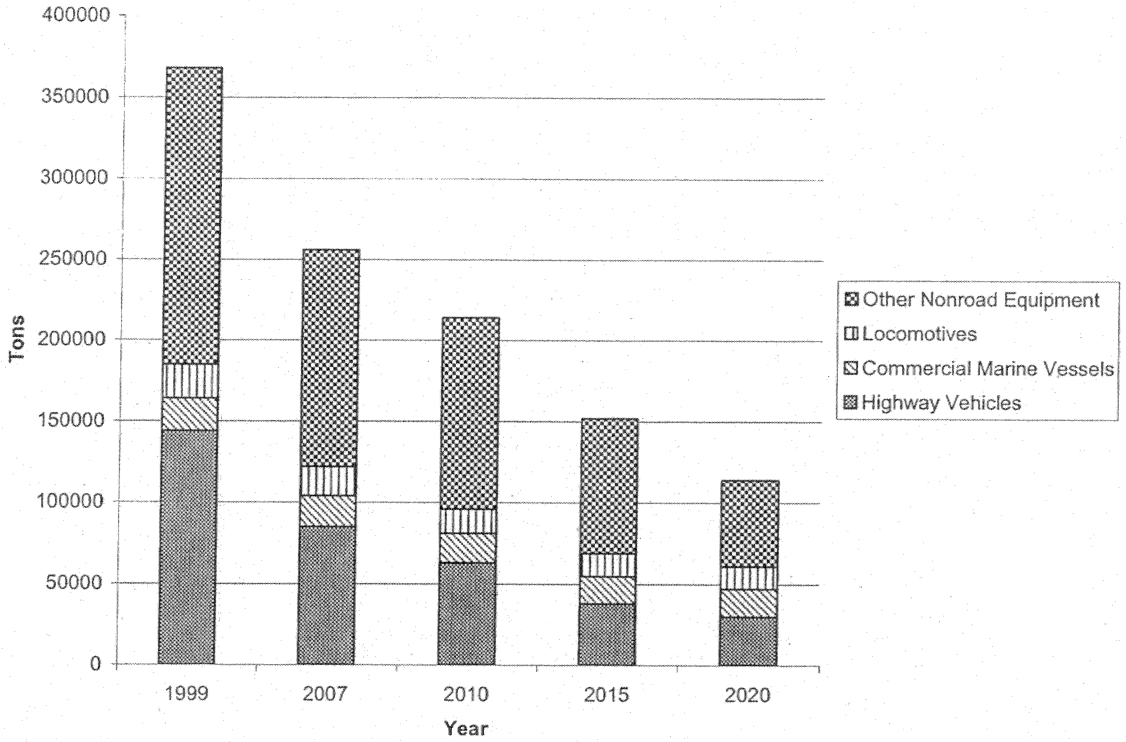
[Not including diesel particulate matter]

Vehicle	1999 (%)	2007 (%)	2010 (%)	2015 (%)	2020 (%)
Light-Duty Gasoline Vehicles	54	41	37	31	27
Light-Duty Gasoline Trucks	37	49	53	59	63
Heavy-Duty Gasoline Vehicles	6	5	4	4	3
Heavy-Duty Diesel Vehicles	3	4	4	4	5
Other (motorcycles and light-duty diesel vehicles and trucks)	1	1	1	2	2

TABLE V.A–2.—CONTRIBUTION OF EQUIPMENT TYPES TO NONROAD AIR TOXIC EMISSIONS, 1999 TO 2020

Equipment type	1999 (%)	2007 (%)	2010 (%)	2015 (%)	2020 (%)
Lawn and Garden	26	18	17	21	25
Pleasure Craft	34	27	25	25	25
Recreational	19	38	40	35	29
All Others	21	17	18	19	21

Figure V.A-2. Contribution of Mobile Source Categories to Diesel Particulate Matter Emissions, 1999 to 2020



B. VOC Emissions From Mobile Sources

Table V.B–1 presents 48-State VOC emissions from key mobile source sectors in 1999, 2010, 2015, and 2020, not including the effects of this proposed rule. The 1999 inventory estimates for nonroad equipment were obtained from the National Emissions Inventory, and the 2010 and later year estimates were obtained from the inventories developed for the Clean Air Interstate Air Quality Rule (CAIR). The table provides emissions for nonroad equipment such as commercial marine vessels, locomotives, aircraft, lawn and garden equipment, recreational vehicles and boats, industrial equipment, and construction equipment. The estimates for highway vehicle classes were developed for this rule. The estimates for light-duty gasoline vehicles reflect revised estimates of hydrocarbon emissions at low temperatures.

TABLE V.B–1.—48-STATE VOC EMISSIONS (TONS) FROM KEY MOBILE SOURCE SECTORS IN 1999, 2010, 2015, AND 2020

[Without this proposed rule]

Category	1999	2010	2015	2020
Light Duty Gasoline Vehicles and Trucks	4,873,000	2,896,000	2,566,000	2,486,000

TABLE V.B–1.—48-STATE VOC EMISSIONS (TONS) FROM KEY MOBILE SOURCE SECTORS IN 1999, 2010, 2015, AND 2020—Continued

[Without this proposed rule]

Category	1999	2010	2015	2020
Heavy Duty and Other Highway Vehicles	672,000	255,000	212,000	200,000
Nonroad Equipment	2,785,000	1,739,000	1,500,000	1,387,000

VOC emissions from highway vehicles are about twice those from nonroad equipment in 1999. Emissions from both highway vehicles and nonroad equipment decline substantially between 1999 and 2020 as a result of EPA control programs that are already adopted. The VOC emission reductions associated with this proposed rule are presented in section V.E, below.

C. PM Emissions From Mobile Sources

Table V.C–1 presents 48-State $PM_{2.5}$ [167] emissions from key mobile source sectors in 1999, 2010, 2015, and 2020, not including the effects of this proposed rule. The estimates in Table V.C–1 come from the same sources as the VOC estimates in section V.B. EPA is considering revisions to estimates of the PM emissions inventory for motor vehicles. Recent data suggest PM emissions are significantly higher than currently estimated in the MOBILE6 emissions model. In addition, testing done for this rule demonstrates that PM emissions are elevated at cold temperatures. The estimates in Table V.C–1 do not account for the effects of cold temperature.

TABLE V.C–1—48-STATE $PM_{2.5}$ EMISSIONS (TONS) FROM KEY MOBILE SOURCE SECTORS IN 1999, 2010, 2015, AND 2020

[Without this proposed rule]

Category	1999	2010	2015	2020
Light-Duty Gasoline Vehicles and Trucks	48,000	33,000	36,000	39,000
Heavy-Duty and Other Highway Vehicles	136,000	51,000	28,000	20,000
Nonroad Equipment	332,000	232,000	201,000	178,000

Section V.E, below, presents estimates of PM emission reductions associated with the proposed cold-temperature vehicle standards.

D. Description of Current Mobile Source Emissions Control Programs That Reduce MSATs

As described in section V.A, existing mobile source control programs will reduce MSAT emissions (not including diesel PM) by 60% between 1999 and 2020. Diesel PM from mobile sources will be reduced by 70% between 1999 and 2020. The mobile source programs include controls on fuels, highway vehicles, and nonroad equipment. These programs are also reducing hydrocarbons and PM more generally, as well as oxides of nitrogen. The sections immediately below provide general descriptions of these programs, as well as voluntary programs to reduce mobile source emissions, such as the National Clean Diesel Campaign and Best Workplaces for Commuters. A more detailed description of mobile source programs is provided in Chapter 2 of the RIA.

1. Fuels Programs

Several federal fuel programs reduce MSAT emissions. Some of these programs directly control air toxics, such as the reformulated gasoline (RFG) program's benzene content limit and required reduction in total toxics emissions, and the anti-backsliding requirements of the anti-dumping and current MSAT programs, which require that gasoline cannot get dirtier with respect to toxics emissions. Others, such as the gasoline sulfur program, control toxics indirectly by reducing hydrocarbon and related toxics emissions.

a. RFG

The RFG program contains two direct toxics control requirements. The first is a fuel benzene standard, requiring RFG to average no greater than 0.95 volume percent benzene annually (on a refinery or importer basis). The RFG benzene requirement includes a per-gallon cap on fuel benzene level of 1.3 volume percent. In 1990, when the Clean Air Act was amended to require reformulated gasoline, fuel benzene averaged 1.60 volume percent. For a variety of reasons, including other regulations, chemical product prices and refining efficiencies, most refiners and importers have achieved significantly greater reductions in benzene than required by the program. In 2003, RFG benzene content averaged 0.62 percent. The RFG benzene requirement includes a per-gallon cap on fuel benzene level of 1.3 volume percent.

The second RFG toxics control requires that RFG achieve a specific level of toxics emissions reduction. The requirement has increased in stringency since the RFG program began in 1995, when the requirement was that RFG annually achieve a 16.5% reduction in total (exhaust plus evaporative) air toxics emissions. Currently, a 21.5% reduction is required. These reductions are determined using the Complex Model. As mentioned above, for a variety of reasons most regulated parties have overcomplied with the required toxics emissions reductions. During 1998–2000, RFG achieved, on average, a 27.5% reduction in toxics emissions.

b. Anti-Dumping

The anti-dumping regulations were intended to prevent the dumping of ''dirty'' gasoline components, which

[167] $PM_{2.5}$ is particulate matter under 2.5 microns in diameter. Over 85% of the mass of PM from mobile sources is $PM_{2.5}$.

were removed to produce RFG, into conventional gasoline (CG). Since the dumping of ''dirty'' gasoline components, for example, benzene or benzene-containing blending streams, would show up as increases in toxics emissions, the anti-dumping regulations require that a refiner's or importer's CG be no more polluting with respect to toxics emissions than the refiner's or importer's 1990 gasoline. The anti-dumping program considers only exhaust toxics emissions and does not include evaporative emissions.[168] Refiners and importers have either a unique individual anti-dumping baseline or they have the statutory anti-dumping baseline if they did not fulfill the minimum requirements for developing a unique individual baseline. In 1990, average exhaust toxics emissions (as estimated by the Complex Model) were 104.5 mg/mile;[169] in 2004, CG exhaust toxics emissions averaged 90.7 mg/mile. Although CG has no benzene limit, benzene levels have declined significantly from the 1990 level of 1.6 volume percent to 1.1 volume percent for CG in 2004.

c. 2001 Mobile Source Air Toxics Rule (MSAT1)

As discussed above, both RFG and CG have, on average, exceeded their respective toxics control requirements. In 2001, EPA issued a mobile source air toxics rule (MSAT1, for the purposes of this second proposal), as discussed in section I.D. The intent of MSAT1 is to prevent refiners and importers from backsliding from the toxics performance that was being achieved by RFG and CG. In order to lock in superior levels of control, the rule requires that the annual average toxics performance of gasoline must be at least as clean as the average performance of the gasoline produced or imported during the three-year period 1998–2000. The period 1998–2000 is called the baseline period. Toxics performance is determined separately for RFG and CG, in the same manner as the toxics determinations required by the RFG[170] and anti-dumping rules.

Like the anti-dumping provisions, MSAT1 utilizes an individual baseline against which compliance is determined. The average 1998–2000 toxics performance level, or baseline, is determined separately for each refinery and importer.[171] To establish a unique individual MSAT1 baseline, EPA requires each refiner and importer to submit documentation supporting the determination of the baseline. Most refiners and many importers in business during the baseline period had sufficient data to establish an individual baseline. An MSAT1 baseline volume is associated with each unique individual baseline value. The MSAT1 baseline volume reflects the average annual volume of such gasoline produced or imported during the baseline period. Refiners and importers who did not have sufficient refinery production or imports during 1998–2000 to establish a unique individual MSAT1 baseline must use the default baseline provided in the rule.

The MSAT1 program began with the annual averaging period beginning January 1, 2002. Since then, the toxics performance for RFG has improved from a baseline period average of 27.5% reduction to 29.5% reduction in 2003. Likewise, CG toxics emissions have decreased from an average of 95 mg/mile during 1998–2000 to 90.7 mg/mile in 2003.

d. Gasoline Sulfur

EPA's gasoline sulfur program[172] requires, beginning in 2006, that sulfur levels in gasoline can be no higher in any one batch than 80 ppm, and must average 30 ppm annually. When fully effective, gasoline will have 90 percent less sulfur than before the program. Reduced sulfur levels are necessary to ensure that vehicle emission control systems are not impaired. These systems effectively reduce non-methane organic gas (NMOG) emissions, of which some are air toxics. With lower sulfur levels, emission control technologies can work longer and more efficiently. Both new and older vehicles benefit from reduced gasoline sulfur levels.

e. Gasoline Volatility

A fuel's volatility defines its evaporation characteristics. A gasoline's volatility is commonly referred to as its Reid vapor pressure, or RVP. Gasoline summertime RVP ranges from about 6–9 psi, and wintertime RVP ranges from about 9–14 psi, when additional vapor is required for starting in cold temperatures. Gasoline vapors contain a subset of the liquid gasoline components, and thus can contain toxics compounds such as benzene. EPA has controlled summertime gasoline RVP since 1989 primarily as a VOC and ozone precursor control, which also results in some toxics pollutant reductions.

f. Diesel Fuel

In early 2001, EPA issued rules requiring that diesel fuel for use in highway vehicles contain no more than 15 ppm sulfur beginning June 1, 2006.[173] This program contains averaging, banking and trading provisions, as well as other compliance flexibilities. In June 2004, EPA issued rules governing the sulfur content of diesel fuel used in nonroad diesel engines.[174] In the nonroad rule, sulfur levels are limited to a maximum of 500 ppm sulfur beginning in 2007 (current levels are approximately 3000 ppm). In 2010, nonroad diesel sulfur levels must not exceed 15 ppm.

EPA's diesel fuel requirements are part of a comprehensive program to combine engine and fuel controls to achieve the greatest emission reductions. The diesel fuel provisions enable the use of advanced emission-control technologies on diesel vehicles and engines. The diesel fuel requirements will also provide immediate public health benefits by reducing PM emissions from current diesel vehicles and engines.

g. Phase-Out of Lead in Gasoline

One of the first programs to control toxic emissions from motor vehicles was the removal of lead from gasoline. Beginning in the mid-1970s, unleaded gasoline was phased in to replace leaded gasoline. The phase-out of leaded gasoline was completed January 1, 1996, when lead was banned from motor vehicle gasoline. The removal of lead from gasoline has essentially eliminated on-highway mobile source emissions of this highly toxic substance.

2. Highway Vehicle and Engine Programs

The 1990 Clean Air Act Amendments set specific emission standards for hydrocarbons and for PM. Air toxics are present in both of these pollutant categories. As vehicle manufacturers develop technologies to comply with the hydrocarbon (HC) and particulate standards (*e.g.*, more efficient catalytic converters), air toxics are reduced as well. Since 1990, we have developed a number of programs to address exhaust and evaporative hydrocarbon emissions and PM emissions.

Two of our recent initiatives to control emissions from motor vehicles

[168] See RFG rule for why evaporative emissions are not included in the anti-dumping toxics determination.

[169] Phase II.

[170] 40 CFR Part 80, Subpart D.

[171] Except for those who comply with the anti-dumping requirements for conventional gasoline on an aggregate basis, in which case the MSAT1 requirements for conventional gasoline must be met on the same aggregate basis (40 CFR Part 80, Subpart E).

[172] 65 FR 6822 (February 10, 2000).

[173] 66 FR 5002 (January 18, 2001) *http://www.epa.gov/otaq/diesel.html*.

[174] 69 FR 38958 (June 29, 2004).

and their fuels are the Tier 2 control program for light-duty vehicles and the 2007 heavy-duty engine rule. Together these two initiatives define a set of comprehensive standards for light-duty and heavy-duty motor vehicles and their fuels. In both of these initiatives, we treat vehicles and fuels as a system. The Tier 2 control program establishes stringent tailpipe and evaporative emission standards for light-duty vehicles and a reduction in sulfur levels in gasoline fuel beginning in 2004.[175] The 2007 heavy-duty engine rule establishes stringent exhaust emission standards for new heavy-duty engines and vehicles for the 2007 model year as well as reductions in diesel fuel sulfur levels starting in 2006.[176] Both of these programs will provide substantial emissions reductions through the application of advanced technologies. We expect 90% reductions in PM from new diesel engines compared to engines under current standards.

Some of the key earlier programs controlling highway vehicle and engine emissions are the Tier 1 and NLEV standards for light-duty vehicles and trucks; enhanced evaporative emissions standards; the supplemental federal test procedures (SFTP); urban bus standards; and heavy-duty diesel and gasoline standards for the 2004/2005 time frame.

3. Nonroad Engine Programs

There are various categories of nonroad engines, including land-based diesel engines (*e.g.*, farm and construction equipment), small land-based spark-ignition (SI) engines (*e.g.*, lawn and garden equipment, string trimmers), large land-based SI engines (*e.g.*, forklifts, airport ground service equipment), marine engines (including diesel and SI, propulsion and auxiliary, commercial and recreational), locomotives, aircraft, and recreational vehicles (off-road motorcycles, ''all terrain'' vehicles and snowmobiles). Chapter 2 of the RIA provides more information about these programs. As with highway vehicles, the VOC standards we have established for nonroad engines will also significantly reduce VOC-based toxics from nonroad engines. In addition, the standards for diesel engines (in combination with the stringent sulfur controls on nonroad diesel fuel) will significantly reduce diesel PM and exhaust organic gases, which are mobile source air toxics.

In addition to the engine-based emission control programs described below, fuel controls will also reduce emissions of air toxics from nonroad engines. For example, restrictions on gasoline formulation (the removal of lead, limits on gasoline volatility and RFG) are projected to reduce nonroad MSAT emissions because most gasoline-fueled nonroad vehicles are fueled with the same gasoline used in on-highway vehicles. An exception to this is lead in aviation gasoline. Aviation gasoline, used in general (as opposed to commercial) aviation, is a high octane fuel used in a relatively small number of aircraft (those with piston engines). Such aircraft are generally used for personal transportation, sightseeing, crop dusting, and similar activities.

4. Voluntary Programs

In addition to the fuel and engine control programs described above, we are actively promoting several voluntary programs to reduce emissions from mobile sources, such as the National Clean Diesel Campaign, anti-idling measures, and Best Workplaces for Commuters. While the stringent emissions standards described above apply to new highway and nonroad diesel engines, it is also important to reduce emissions from the existing fleet of about 11 million diesel engines. EPA has launched a comprehensive initiative called the National Clean Diesel Campaign, one component of which is to promote the reduction of emissions in the existing fleet of engines through a variety of cost-effective and innovative strategies. The goal of the Campaign is to reduce emissions from the 11 million existing engines by 2014. Emission reduction strategies include switching to cleaner fuels, retrofitting engines through the addition of emission control devices, and engine replacement. For example, installing a diesel particulate filter achieves diesel particulate matter reductions of approximately 90 percent (when combined with the use of ultra low sulfur diesel fuel). The Energy Policy Act of 2005 includes grant authorizations and other incentives to help facilitate voluntary clean diesel actions nationwide.

The National Clean Diesel Campaign is focused on leveraging local, state, and federal resources to retrofit or replace diesel engines, adopt best practices, and track and report results. The Campaign targets five key sectors: School buses, ports, construction, freight, and agriculture.

Reducing vehicle idling provides important environmental benefits. As a part of their daily routine, truck drivers often keep their vehicles at idle during stops to provide power, heat and air conditioning. EPA's SmartWay Transport Partnership is helping the freight industry to adopt innovative idle reduction technologies and take advantage of proven systems that provide drivers with basic necessities without using the engine. To date, there are 50 stationary anti-idling projects, and mobile technology has been installed on nearly 20,000 trucks. The SmartWay Transport Partnership also works with the freight industry to reduce fuel use (with a concomitant reduction in emissions) by promoting a wide range of new technologies such as advanced aerodynamics, single-wide tires, weight reduction speed control and intermodal shipping.

Daily commuting represents another significant source of emissions from motor vehicles. EPA's Best Workplaces for Commuters℠ program is working with employers across the country to reverse the trend of longer, single-occupancy vehicle commuting. OTAQ has created a national list of the Best Workplaces for Commuters to formally recognize employers that offer superior commuter benefits such as free transit passes, subsidized vanpools/carpools, and flexi-place, or work-from-home, programs. More than 1,300 employers representing 2.8 million U.S. workers have been designated Best Workplaces for Commuters.

Much of the growth in the Best Workplaces for Commuters program has been through metro area-wide campaigns. Since 2002, EPA has worked with coalitions in 14 major metropolitan areas to increase the penetration of commuter benefits in the marketplace and the visibility of the companies that have received the BWC designation. Another significant path by which the program has grown is through Commuter Districts including corporate and industrial business parks, shopping malls, business improvement districts and downtown commercial areas. To date EPA has granted the Best Workplaces for Commuters ''District'' designation to twenty locations across the country including downtown Denver, Houston, Minneapolis and Tampa.

E. Emission Reductions From Proposed Controls

1. Proposed Vehicle Controls

We are proposing a hydrocarbon standard for gasoline passenger vehicles at cold temperatures. This standard will reduce VOC at temperatures below 75 °F, including air toxics such as benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein and naphthalene, and will also reduce emissions of direct and secondary PM. We are also proposing new evaporative emissions standards for Tier 2 vehicles starting in

[175] 65 FR 6697, February 10, 2000.

[176] 66 FR 5001, January 18, 2001.

2009. These new evaporative standards reflect the emissions levels already being achieved by manufacturers.

a. Volatile Organic Compounds (VOC)

Table V.E–1 shows the VOC exhaust emission reductions from light-duty gasoline vehicles and trucks that would result from our proposed standards. The proposed standards would reduce VOC emissions in 2030 by 32%. Overall VOC exhaust emissions from these vehicles would be reduced by 81% between 1999 and 2030 (including the effects of the proposed standards as well as standards already in place, such as Tier 2).

TABLE V.E–1.—ESTIMATED NATIONAL REDUCTIONS IN EXHAUST VOC EMISSIONS FROM LIGHT-DUTY GASOLINE VEHICLES AND TRUCKS, 1999 TO 2030

	1999	2015	2020	2030
VOC Without Rule (tons)	4,899,891	2,625,076	2,556,751	2,899,269
VOC With Proposed Vehicle Standards (tons)	N.A	2,305,202	2,020,267	1,985,830
VOC Reductions from Proposed Vehicle Standards (tons)	N.A	319,874	536,484	913,439
Percentage Reduction	N.A	12	21	32

b. Toxics

In 2030, we estimate that the proposed vehicle standards would result in a 38% reduction in benzene emissions and 37% reduction in total emissions of the MSATs [177] from light-duty vehicles and trucks (see Tables V.E–2 and V.E–3).

TABLE V.E–2.—ESTIMATED NATIONAL REDUCTIONS IN BENZENE EXHAUST EMISSIONS FROM LIGHT-DUTY GASOLINE VEHICLES AND TRUCKS, 1999 TO 2030

	1999	2015	2020	2030
Benzene Without Rule (tons)	171,154	101,355	106,071	124,897
Benzene With Proposed Vehicle Standards (tons)	N.A.	84,496	77,966	77,208
Benzene Reductions from Proposed Vehicle Standards (tons)	N.A.	16,859	28,105	47,689
Percentage Reduction	N.A.	17	26	38

TABLE V.E–3.—ESTIMATED NATIONAL REDUCTIONS IN EXHAUST MSAT EMISSIONS FROM LIGHT-DUTY GASOLINE VEHICLES AND TRUCKS, 1999 TO 2030

	1999	2015	2020	2030
MSATs Without Rule (tons)	1,341,572	707,877	724,840	844,366
MSATs With Proposed Vehicle Standards (tons)	N.A.	599,492	543,332	535,479
MSAT Reductions from Proposed Vehicle Standards (tons)	N.A.	108,385	181,509	308,887
Percentage Reduction	N.A.	15	25	37

c. $PM_{2.5}$

EPA expects that the proposed cold-temperature vehicle standards would reduce exhaust emissions of direct $PM_{2.5}$ by over 20,000 tons in 2030 nationwide (see Table V.E–4 below). Our analysis of the data from vehicles meeting Tier 2 emission standards indicate that PM emissions follow a monotonic relationship with temperature, with lower temperatures corresponding to higher vehicle emissions. Additionally, the analysis shows the ratio of PM to total non-methane hydrocarbons (NMHC) to be independent of temperature.[178] Our testing indicates that strategies which reduce NMHC start emissions at cold temperatures also reduce direct PM emissions. Based on these findings, direct PM emissions at cold temperatures were estimated using a constant PM to NMHC ratio. PM emission reductions were estimated by assuming that NMHC reductions will result in proportional reductions in PM. This assumption is supported by test data. For more detail, see Chapter 2.1 of the RIA.

TABLE V.E–4.—ESTIMATED NATIONAL REDUCTIONS IN DIRECT $PM_{2.5}$ EXHAUST EMISSIONS FROM LIGHT-DUTY GASOLINE VEHICLES AND TRUCKS, 2015 TO 2030

	2015	2020	2030
$PM_{2.5}$ Reductions from Proposed Vehicle Standards (tons)	7,037	11,803	20,096

2. Proposed Fuel Benzene Controls

The proposed fuel benzene controls would reduce benzene exhaust and evaporative emissions from both on-road and nonroad mobile sources that are fueled by gasoline. In addition, the proposed fuel benzene standard would reduce evaporative emissions from gasoline distribution and gas cans.

[177] Table IV.A–1 lists the MSATs included in this analysis.

[178] U.S. EPA. 2005. Cold-temperature exhaust particulate matter emissions. Memorandum from Chad Bailey to docket EPA–HQ–OAR–2005–0036.

Impacts on 1,3-butadiene, formaldehyde, and acetaldehyde emissions are not significant, but are presented in Chapter 2 of the RIA. We do not expect the fuel benzene standard to have quantifiable impacts on any other air toxics, total VOCs, or PM.

Table V.E–5 shows national estimates of total benzene emissions from these source sectors with and without the proposed fuel benzene standard. These estimates do not include effects of the proposed vehicle or gas can standards (see section V.E.4 for the combined effects of the controls). The proposed fuel benzene standard would reduce total benzene emissions from on-road and nonroad gasoline mobile sources, gas cans, and gasoline distribution by 12% in 2015.

TABLE V.E–5.—ESTIMATED REDUCTIONS IN BENZENE EMISSIONS FROM PROPOSED GASOLINE STANDARD BY SECTOR IN 2015

	Gasoline on-road mobile sources	Gasoline nonroad mobile sources	Gas cans	Gasoline distribution	Total
Benzene Without Rule (tons)	103,797	37,747	2,262	5,999	149,805
Benzene With Proposed Gasoline Standard (tons)	92,513	33,247	1,359	4,054	131,173
Benzene Reductions from Proposed Gasoline Standard (tons)	11,284	4,500	903	1,945	18,632
Percentage Reduction	11	12	40	32	12

3. Proposed Gas Can Standards

a. VOC

Table V.E–6 shows the reductions in VOC emissions that we expect from the proposed gas can standard. In 2015, VOC emissions from gas cans would be reduced by 60% because of reduced permeation, spillage, and evaporative losses. These estimates do not include the effects of a fuel benzene standard (see section V.E.4 for the combined effects of the proposed controls).

TABLE V.E–6.—ESTIMATED NATIONAL REDUCTIONS IN VOC EMISSIONS FROM GAS CANS, 2010 TO 2030

	1999	2010	2015	2020	2030
VOC Without Rule (tons)	318,596	279,374	296,927	318,384	362,715
VOC With Proposed Gas Can Standard (tons)	N.A.	250,990	116,431	125,702	144,634
VOC Reductions from Proposed Gas Can Standard (tons)	N.A.	28,384	180,496	192,683	218,080
Percentage Reduction	N.A.	10	61	61	60

b. Toxics

The proposed gas can standard would reduce emissions of benzene, naphthalene, toluene, xylenes, ethylbenzene, n-hexane, 2,2,4-trimethylpentane, and MTBE. We estimate that benzene emissions from gas cans would be reduced by 65% (see Table V.E–7) and, more broadly, air toxic emissions by 61% (see Table V.E–8) in year 2015. These reductions do not include effects of the proposed fuel benzene standard (see section V.E.4 for the combined effects of the proposed controls). Chapter 2 of the RIA provides details on the emission reductions of the other toxics.

TABLE V.E–7.—ESTIMATED NATIONAL REDUCTIONS IN BENZENE EMISSIONS FROM GAS CANS, 2010 TO 2030

	1999	2010	2015	2020	2030
Benzene Without Rule (tons)	2,229	2,118	2,262	2,423	2,757
Benzene With Proposed Gas Can Standard (tons)	N.A.	1,885	794	856	985
Benzene Reductions from Proposed Gas Can Standard (tons)	N.A.	233	1,468	1,567	1,772
Percentage Reduction	N.A.	11	65	65	64

TABLE V.E–8.—ESTIMATED NATIONAL REDUCTIONS IN TOTAL MSAT EMISSIONS FROM GAS CANS, 2010 TO 2030

	1999	2010	2015	2020	2030
MSATs Without Rule (tons)	39,581	34,873	37,076	39,751	45,284
MSATs With Proposed Gas Can Standard (tons)	N.A.	31,312	14,445	15,593	17,942
MSAT Reductions from Proposed Gas Can Standard (tons)	N.A.	3,561	22,631	24,158	27,342
Percentage Reduction	N.A.	10	61	61	60

Chapter 2 of the RIA describes how we estimated emissions from gas cans, including the key assumptions used and uncertainties in the analysis. We request comments on the emissions inventory methodology used by EPA and we encourage commenters to provide relevant data where possible.

4. Total Emission Reductions From Proposed Controls

Sections V.E.1 through V.E.3 present the emissions impacts of each of the

proposed controls individually. This section presents the combined emissions impacts of the proposed controls.

a. Toxics

Air toxic emissions from light-duty vehicles depend on both fuel benzene content and vehicle hydrocarbon emission controls. Similarly, the air toxic emissions from gas cans depend on both fuel benzene content and the gas can emission controls. Tables V.E–9 and V.E–10 below summarize the expected reductions in benzene and MSAT emissions, respectively, from our proposed vehicle, fuel, and gas can controls. In 2030, annual benzene emissions from gasoline on-road mobile sources would be 44% lower as a result of this proposal (see Figure V.E–1). Annual benzene emissions from gasoline light-duty vehicles would be 45% lower in 2030 as a result of this proposal. Likewise, this proposal would reduce annual emissions of benzene from gas cans by 78% in 2030 (see Figure V.E–2). For MSATs from on-road mobile sources, Figure V.E–3 below shows a 33% reduction in MSAT emissions in 2030.

TABLE V.E–9.—ESTIMATED REDUCTIONS IN BENZENE EMISSIONS FROM PROPOSED CONTROL MEASURES BY SECTOR, 2015 TO 2030

Benzene	1999	2015			2020			2030		
		Without rule (tons)	With rule (tons)	Reductions (tons)	Without rule (tons)	With rule (tons)	Reductions (tons)	Without rule (tons)	With rule (tons)	Reductions (tons)
Gasoline On-road Mobile Sources	178,465	103,798	77,155	26,643	108,256	71,326	36,930	127,058	70,682	56,376
Gasoline Nonroad Mobile Sources	58,710	37,747	33,247	4,500	36,440	32,018	4,422	39,162	34,400	4,762
Gas Cans	2,229	2,262	492	1,770	2,423	531	1,892	2,757	610	2,147
Gasoline Distribution	5,502	5,999	4,054	1,945	6,207	4,210	1,997	6,207	4,210	1,997
Total	244,905	149,806	114,948	34,858	153,326	108,085	45,241	175,184	109,902	65,282

Figure V.E-1. Benzene Emissions from Gasoline On-Road Mobile Sources

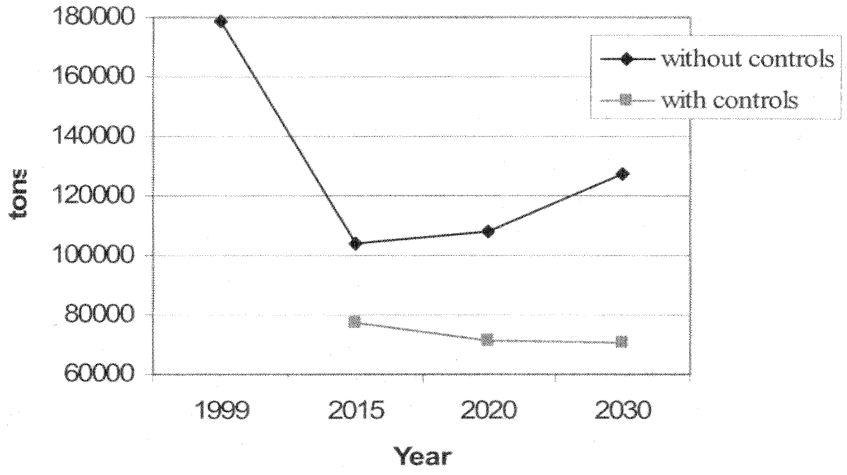


Figure V.E-2. Benzene Emissions from Gas Cans

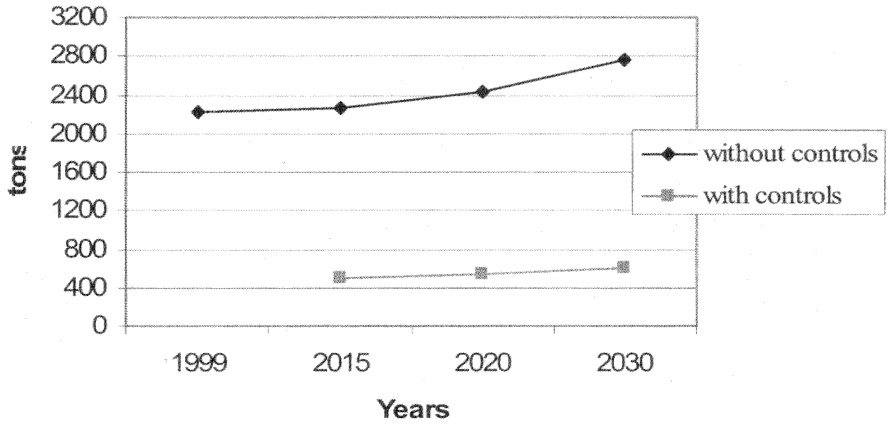
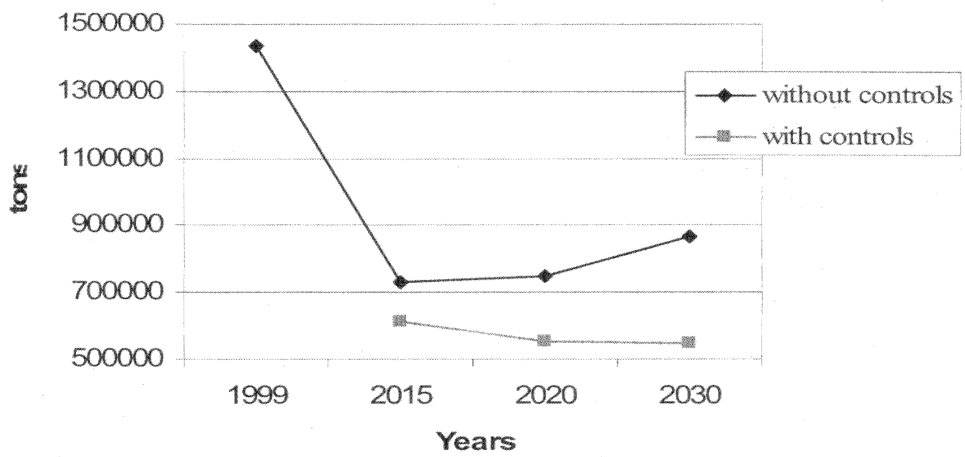


TABLE V.E–10.—ESTIMATED REDUCTIONS IN MSAT EMISSIONS FROM PROPOSED CONTROL MEASURES BY SECTOR, 2015 TO 2030

MSAT	1999	2015			2020			2030		
		Without rule (tons)	With rule (tons)	Reductions (tons)	Without rule (tons)	With rule (tons)	Reductions (tons)	Without rule (tons)	With rule (tons)	Reductions (tons)
Gasoline On-road Mobile Sources	1,415,502	731,283	613,227	118,056	745,769	555,541	190,228	865,767	548,298	317,469
Gasoline Nonroad Mobile Sources	673,922	432,953	428,506	4,447	390,468	386,095	4,373	405,119	400,408	4,711
Gas Cans	39,581	37,076	14,143	22,933	39,751	15,268	24,483	45,284	17,567	27,717
Gasoline Distribution	50,625	62,804	60,859	1,945	64,933	62,936	1,997	64,933	62,936	1,997
Total	2,179,630	1,264,116	1,116,735	147,381	1,240,921	1,019,840	221,081	1,381,103	1,029,209	351,894

Figure V.E-3. MSAT Emissions from Gasoline On-Road Mobile Sources



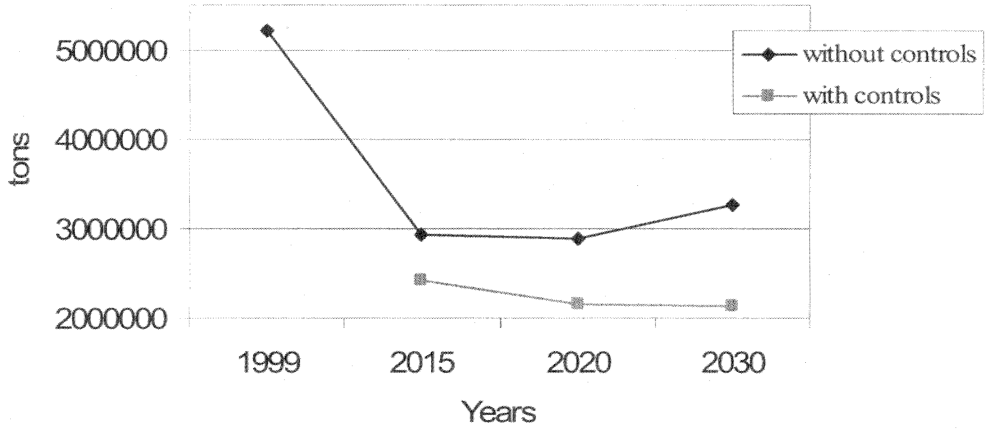
b. VOC

VOC emissions would be reduced by the hydrocarbon emission standards for both light-duty vehicles and gas cans. As seen in the table and accompanying figure below, annual VOC emission reductions from both of these sources would be 35% lower in 2030 because of proposed control measures.

TABLE V.E–11.—ESTIMATED REDUCTIONS IN VOC EMISSIONS FROM LIGHT-DUTY GASOLINE VEHICLES AND GAS CANS, 2015 TO 2030

	2015	2020	2030
VOC Without Rule (tons)	2,922,003	2,875,135	3,261,984
VOC With Proposed Vehicle and Gas Can Standards (tons)	2,421,633	2,145,969	2,130,464
VOC Reduction (tons)	500,370	729,168	1,131,520

Figure V.E-4. VOC Emissions from Proposed Light-Duty Vehicles and Gas Cans



c. $PM_{2.5}$

We expect that only the proposed vehicle control would reduce emissions of direct $PM_{2.5}$. As shown in Table V.E–4, we expect this control to reduce direct $PM_{2.5}$ emissions by about 20,000 tons in 2030. In addition, the VOC reductions from the proposed vehicle and gas can standards would also reduce secondary formation of $PM_{2.5}$.

F. How Would This Proposal Reduce Exposure to Mobile Source Air Toxics and Associated Health Effects?

The proposed benzene standard for gasoline would reduce both evaporative and exhaust emissions from motor vehicles and nonroad equipment. It would also reduce emissions from gas cans and stationary source emissions associated with gasoline distribution. Therefore, it would reduce exposure to benzene for the general population, and also for people near roadways, in

vehicles, in homes with attached garages, operating nonroad equipment, and living or working near sources of gasoline distribution emissions (such as bulk terminals, bulk plants, tankers, marine vessels, and service stations). Section IV.B.2 of this preamble provides more details on these types of exposures.

We performed national-scale air quality, exposure, and risk modeling in order to quantitatively assess the impacts of the proposed fuel benzene standard. However, in addition to the limitations of the national-scale modeling tools (discussed in section IV.A), this modeling did not account for the elevated hydrocarbon emissions from motor vehicles at cold temperatures, which we recently discovered and are further described in section VI and the RIA. The modeling also examined the gasoline benzene standard alone, without the proposed vehicle or gas can standards. Nevertheless, the modeling is useful as a preliminary assessment of the impacts of the fuel standard.

The fuel benzene standard being proposed in this rule would reduce both the number of people above the 1 in 100,000 increased cancer risk level, and the average population cancer risk, by reducing exposures to benzene from mobile sources. The number of people above the 1 in 100,000 cancer risk level due to exposure to all mobile source air toxics from all sources would decrease by over 3 million in 2020 and by about 3.5 million in 2030, based on average census tract risks. The number of people above the 1 in 100,000 increased cancer risk level from exposure to benzene from all sources would decrease by over 4 million in 2020 and 5 million in 2030. It should be noted that if it were possible to estimate impacts of the proposed standard on ''background'' concentrations, the estimated overall risk reductions would be even larger. The proposed standard would have little impact on the number of people above various respiratory hazard index levels, since this potential non-cancer risk is dominated by exposure to acrolein.

Table V.F–1 depicts the impact on the mobile source contribution to nationwide average population cancer risk from benzene in 2020. Nationwide, the cancer risk attributable to mobile source benzene would be reduced by over 8%. Reductions in areas not subject to reformulated gasoline controls are almost 13 percent relative to risks without the proposed control; and in some states with high fuel benzene levels, such as Minnesota and Washington, the risk reduction would exceed 17 percent. In Alaska, which has the highest fuel benzene levels in the country, reductions would exceed 30%. Reductions for other modeled years are similar. The methods and assumptions used to model the impact of the proposed control are described in more detail in the Regulatory Impact Analysis. Although not quantified in the risk analyses for this rule, controls proposed for portable fuel containers will also reduce exposures and risk from benzene, and cold temperature hydrocarbon standards for exhaust emissions will reduce cancer and noncancer risks for all gaseous mobile source air toxics. These reductions will vary geographically since reductions from vehicle control are higher at colder temperatures, and reductions from gas can controls are higher at higher temperatures.

TABLE V.F–1.—IMPACT OF PROPOSED FUEL BENZENE CONTROL ON THE MOBILE SOURCE CONTRIBUTION TO NATIONWIDE AVERAGE POPULATION CANCER RISK IN 2020

	U.S.	RFG areas	Non-RFG areas
Without Proposal	2.57×10^{-6}	3.64×10^{-6}	1.96×10^{-6}
0.62% Benzene Standard	2.35×10^{-6}	3.51×10^{-6}	1.72×10^{-6}
% Reduction	8.6	3.6	12.2

Table V.F–2 summarizes the change in median and 95th percentile benzene inhalation cancer risk from all outdoor sources in 2015, 2020, and 2030, with the fuel benzene controls proposed in this rule. The reductions in risk would be larger if the modeling fully accounted for a number of factors, including: benzene emissions at cold temperature; exposure to benzene emissions from vehicles, equipment, and gas cans in attached garages; near-road exposures; and the impacts of the control program on ''background'' levels attributable to transport.

TABLE V.F–2.—CHANGE IN MEDIAN AND 95TH PERCENTILE BENZENE INHALATION CANCER RISK FROM OUTDOOR SOURCES IN 2015, 2020, AND 2030 WITH THE FUEL BENZENE CONTROLS PROPOSED IN THIS RULE

	2015		2020		2030	
	median	95th	median	95th	median	95th
Current Controls	5.73×10^{-6}	1.38×10^{-5}	5.61×10^{-6}	1.35×10^{-5}	5.75×10^{-6}	1.41×10^{-5}
Proposed Benzene Standard	5.49×10^{-6}	1.32×10^{-5}	5.39×10^{-6}	1.29×10^{-5}	5.51×10^{-6}	1.35×10^{-5}
Percent Change	4.2	4.3	3.9	4.4	4.2	4.3

We did not model the air quality, exposure, and risk impacts of the proposed vehicle and gas can standards. However, the proposed vehicle standards would reduce exposure to several MSATs, including benzene. Like the proposed fuel standard, the vehicle standards would reduce the general population's exposure to MSATs, as well as people near roadways and in vehicles. Since motor vehicle emissions are ubiquitous across the U.S. and widely dispersed, reductions in exposure and risk will be approximately proportional to reductions in emissions.

The gas can standard will reduce evaporative emissions of several MSATs, including benzene. We expect that these standards would significantly reduce concentrations of benzene and other MSATs in attached garages and inside homes with attached garages. Accordingly, exposure to benzene and other MSATs would be significantly reduced. As discussed in section IV.B.2, exposures to emissions occurring in attached garages can be quite high.

The proposed vehicle and gas can standards would also reduce precursors to ozone and PM. We have modeled the ozone impacts of the proposed gas can standard and the PM health benefits that would be associated with the direct PM reductions from the proposed vehicle standards. These results are discussed in sections IV.D and IX, respectively.

G. Additional Programs Under Development That Will Reduce MSATs

1. On-Board Diagnostics for Heavy-Duty Vehicles Over 14,000 Pounds

We are planning to propose on-board diagnostics (OBD) requirements for heavy-duty vehicles over 14,000 pounds. In general, OBD systems monitor the operation of key emissions controls to detect major failures that would lead to emissions well above the standards during the life of the vehicle. Given the nature of the heavy-duty trucking industry, 50-state harmonization of emissions requirement is an important consideration. In order to work towards this goal, the Agency signed a Memorandum of Agreement in 2004 with the California Air Resources Board which expresses both agencies' interest in working towards a single, nationwide program for heavy-duty OBD. Since that time, California has established their heavy-duty OBD program, which will begin implementation in 2010. We expect the Agency's program will also begin in the 2010 time frame. These requirements would help ensure that the emission reductions we projected in the 2007 rulemaking for heavy-duty engines occur in-use.

2. Standards for Small SI Engines

We are developing a proposal for Small SI engines (those typically used in lawn and garden equipment) and recreational marine engines. This proposal is being developed in response to Section 428 of the Omnibus Appropriations Bill for 2004, which requires EPA to propose regulations under Clean Air Act section 213 for new nonroad spark-ignition engines under 50 horsepower. We plan to propose standards that would further reduce the emissions for these nonroad categories, and we anticipate that the new standards would provide significant further reductions in HC (and VOC-based toxics) emissions.

3. Standards for Locomotive and Marine Engines

In addition, we are planning to propose more stringent standards for large diesel engines used in locomotive and marine applications, as discussed in a recent Advance Notice of Proposed Rulemaking.[179] New standards for marine diesel engines would apply to engines less than 30 liters per cylinder in displacement (all engine except for Category 3). We are considering standards modeled after our Tier 4 nonroad diesel engine program, which achieve substantial reductions in PM, HC, and NO_X emissions. These standards would be based on the use of high efficiency catalyst aftertreatment and would also require fuel sulfur control. As discussed in our recent ANPRM, we are considering implementation as early as 2011.

VI. Proposed New Light-Duty Vehicle Standards

A. Why Are We Proposing New Standards?

1. The Clean Air Act and Air Quality

As described in section V of this preamble, the U.S. has made significant progress in reducing emissions from passenger cars and light trucks since the passage of the 1990 Clean Air Act Amendments. Many emission control programs adopted to implement the 1990 Clean Air Act Amendments are reducing and will continue to reduce air toxics from light-duty vehicles. These include our reformulated gasoline (RFG) program, our Supplemental Federal Test Procedure (SFTP) standards, our national low emission vehicle program (NLEV), and, most recently, our Tier 2 motor vehicle emissions standards and gasoline sulfur control requirements.[180] While these vehicle programs were put in place primarily to reduce ambient concentrations of criteria pollutants and their precursors (NO_X, VOC, CO, and PM), they have reduced and will continue to significantly reduce light-duty vehicle emissions of air toxics. For example, there are numerous chemicals that make up total VOC emissions, including several gaseous toxics (e.g., benzene, formaldehyde, 1,3-butadiene, and acetaldehyde). These toxics are all reduced by VOC emissions standards. It is the stringent control of hydrocarbons in particular that results in stringent control of gaseous toxics. There are no vehicle-based technologies of which we are aware that reduce these air toxics individually.

At the time of our 2001 MSAT rule, we had recently finalized the Tier 2 emissions standards and gasoline sulfur control requirements (described in more detail below in section V.D). As explained earlier, we concluded then under section 202(l) that the Tier 2 standards represented the greatest degree of emissions control achievable for those vehicles. However, we also committed to continue to consider the feasibility of additional vehicle-based MSAT controls in the future.

2. Technology Opportunities for Light-Duty Vehicles

Since the 2001 MSAT rule, we have identified potential situations where further reductions of light-duty vehicle hydrocarbon emissions—and, therefore, mobile source air toxics—are technically feasible, cost-effective, and do not have adverse energy or safety implications. First, recent research and analytical work shows that the Tier 2 exhaust emission standards for hydrocarbons (which are typically tested at 75° F) do not, in the case of many vehicles, result in robust control of hydrocarbon emissions at lower temperatures. We believe that cold temperature hydrocarbon control can be substantially improved using the same technological approaches generally already in use in the Tier 2 vehicle fleet to meet the stringent standards at 75° F. Second, we believe that harmonization of evaporative emission standards with California would prevent backsliding by codifying current industry practices. Sections VI.B.1 and VI.B.2, below, provide our rationale for proposing new cold temperature and evaporative controls and describe the detailed provisions of our proposal. We request comment on all aspects of these proposals and encourage commenters to provide detailed rationales and supporting data where possible.

Aside from these proposed standards, we continue to believe that the remaining Tier 2 exhaust emission standards (i.e., those that apply over the standard Federal Test Procedure at temperatures between 68° F and 86° F) represent the greatest emissions reductions achievable as required under Clean Air Act section 202(l). We therefore are not proposing further emission reductions from these vehicles. (Please see section VI.D for further discussion.)

3. Cold Temperature Effects on Emission Levels

a. How Does Temperature Affect Emissions?

With the possible exception of high-load operation, Tier 2 gasoline-powered vehicles emit the overwhelming

[179] 69 FR 39276, June 29, 2004.

[180] Unless otherwise noted, we use ''light-duty vehicles'' or ''vehicles'' to generally refer to passenger vehicles, light-duty trucks such as sport utility vehicles (SUVs) and pick-ups, and medium-duty passenger vehicles (MDPVs) which includes larger SUVs and passenger vans up to 10,000 pounds Gross Vehicle Weight Rating.

majority of hydrocarbon emissions in the first few minutes of operation following a cold start (i.e., starting the vehicles after the engine has stabilized to the ambient temperatures, such as overnight). This is true at all cold start temperatures, and the general trend is that hydrocarbon emissions progressively increase as engine start temperatures decrease. The level of hydrocarbon emissions produced by the engine will vary with start temperature, engine hardware design and most importantly, engine management control strategies. Furthermore, due to the heavy dependence on the aftertreatment system to perform the main emission reducing functions, any delayed or non-use of emission controls (hardware or software) will further increase the amount of hydrocarbon emissions emitted from the vehicle following the cold start.

Elevated hydrocarbon levels at cold temperatures, specifically, the non-methane hydrocarbons (NMHC) portion of total hydrocarbons (THC), also indicate higher emissions of gaseous air toxics. A detailed description of the relationship between NMHC and air toxics can be found in Chapter 2 of the RIA. Recent EPA research studies [181] on Tier 2 gasoline vehicles, and past EPA studies [182] on older generation gasoline vehicles, demonstrate that many air toxics (e.g., benzene) are a relatively constant fraction of NMHC. This relationship is observed regardless of vehicle type, NMHC emissions level, or temperature. The relationship remains relatively constant for different vehicles with different levels of NMHC emissions, and for the same vehicle at colder temperatures. Therefore, it can be concluded that reductions in NMHC will result in proportional reductions in gaseous air toxics which are components of HC. These observations and findings indicate that controlling NMHC is an effective approach to reducing toxics which are a component of NMHC, including benzene emissions.

In addition to control of air toxics, another benefit of regulating NMHC at cold temperatures is reductions in particulate matter (PM). PM is a criteria pollutant and for gasoline-fueled vehicles is an emerging area of interest on which we are continuing to collect data (see sections III.E and IV.F for more details on PM). We have limited data indicating that PM emissions can be significantly higher at cold temperatures compared to emissions at the 68–86° F testing temperatures used in the FTP. Data also indicate that HC and direct PM emissions correlate fairly well as temperature changes and that some direct PM emissions reductions can be expected when VOCs are reduced. Also, from a technological standpoint, we can expect reductions in PM as manufacturers reduce over-fueling at cold temperatures for NMHC control. Although section 202(l) deals with control of air toxics, and not criteria pollutants like PM, this co-benefit of cold temperature control is significant.

b. What Are the Current Emissions Control Requirements?

There are several requirements currently in place that have resulted in significant NMHC reductions and provided experience with control strategies that apply across a broad range of in-use driving conditions, including cold temperatures. These requirements include the Tier 2 standards, the Supplemental Federal Test Procedure (SFTP) standards, the cold temperature carbon monoxide (CO) standard, and the California 50° F hydrocarbon standard.

The Tier 2 program (and, before that, the NLEV program) contains stringent new standards for light-duty vehicles that have resulted in significant hydrocarbon reductions. To meet these standards, vehicle manufacturers have responded with emissions control hardware and control strategies that have very effectively minimized emissions, particularly immediately following the vehicle start-up. In addition, the SFTP rule (effective beginning in model year 2001) significantly expanded the area of operation where stringent emission control was required, by adding a high load/speed cycle (US06) and an air conditioning cycle (SC03). Vehicle manufacturers responded with additional control strategies across a broader range of in-use driving conditions to successfully meet SFTP requirements.

We also have cold temperature carbon monoxide (CO) standards which began in model year 1994 for light-duty vehicles (LDVs) and light-duty trucks (LDTs).[183] This program requires manufacturers to comply with a 20° F CO standard. The 20° F cold CO test replicates the 75° F FTP drive cycle, but at the colder temperature. While the recent Tier 2 program is primarily designed to reduce ozone, the cold CO requirement was enacted to address exceedances of the national ambient air quality standards (NAAQS) for CO, which were mostly occurring during the cold weather months. While the cold CO standard was considered challenging at its introduction, manufacturers quickly developed emission control strategies and today comply with the standard with generally large compliance margins. This indicates that manufacturers do in fact have experience with emission control strategies at colder temperatures.

Under the Low Emission Vehicle (LEV) programs, California implemented stringent emissions standards for a 50° F FTP test condition in addition to stringent 75° F standards. By creating a unique 50° F standard, California ensures that emission control strategies successfully used at 75° F are also utilized at the slightly cooler temperatures that encompass a larger range of California's expected climates. The 50° F non-methane organic gases (NMOG) standards are directly proportional to the 75° F certification standard; that is, they are two times the 75° F standard. These standards have resulted in proportional emissions improvements at 50° F for vehicles certified to the California standards, as observed in the manufacturer certification data. Manufacturers have met the standards and have successfully obtained these proportional improvements at 50° F by implementing the same emission control strategies developed for 75° F requirements.

c. Opportunities for Additional Control

As emissions standards have become more stringent from Tier 1 to NLEV, and now to Tier 2, manufacturers have concentrated primarily on emissions performance just after the start of the engine in order to further reduce emissions. To comply with stringent hydrocarbon emission standards at 75° F, manufacturers developed new emission control strategies and practices that resulted in significant emissions reductions at that start temperature. For California, the LEV II program contains a standard at 50° F (as just explained), which essentially requires proportional control of hydrocarbon emissions down to that temperature. On the national level, even though there is no explicit requirement, we expected that proportional reductions in hydrocarbon emissions would occur at other colder start temperatures—including the 20° F Cold CO test point—as a result of the more stringent NLEV and Tier 2 standards. We believe that there is no

[181] "VOC/PM Cold Temperature Characterization and Interior Climate Control Emissions/Fuel Economy Impact," Volume I and II, October 2005.

[182] "Characterization of Emissions from Malfunctioning Vehicles fueled with Oxygenated Gasoline-Ethanol (E10) Fuel," Part I, II and III.

[183] 57 FR 31888 "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Cold Temperature Carbon Monoxide Emissions from 1994 and Later Model Year Gasoline-Fueled Light-Duty Vehicles and Light-Duty Trucks", Final Rule, July 17, 1992.

engineering reason why proportional control should not be occurring on a widespread basis.

However, reported annual manufacturer certification results (discussed in the next paragraph) indicate that for many engine families, very little improvement in hydrocarbon emissions was realized at the colder 20° F Cold CO test conditions, despite the improved emission control systems designed for the vehicle under normal 75° F test conditions. Thus although all vehicle manufacturers have been highly successful at reducing emissions at the required FTP start temperature range, in general, they do not appear to be capitalizing on NMHC emission control strategies and technologies at lower temperatures.

Certification reports submitted by manufacturers for recent model years of light duty vehicles in fact show a sharp rise in hydrocarbon [184] emissions at 20° F when compared to the reported 75° F hydrocarbon emission levels. Any rise in hydrocarbon emissions, specifically NMHC, will result in proportional rise in VOC-based air toxics [185]. While some increase in NMHC emissions can be expected simply due to combustion limitations of gasoline engines at colder temperatures, the reported levels of hydrocarbon emissions seem to indicate a significantly diminished use of hydrocarbon emissions controls occurring at colder temperatures. For example, on recent Tier 2 certified vehicles, the reported 20° F hydrocarbon levels on average were 10 to 12 times higher than the equivalent vehicle's measured 75° F hydrocarbon levels. Some vehicles which were certified to more stringent Tier 2 bins (bins 2, 3, and 4) demonstrated 20° F hydrocarbon levels no different than less stringent Tier 2 bins (bins 5, 6, 7, and 8), likewise suggesting no discernable attempt to use the 75° F hydrocarbon controls at the 20° F temperature. On the other hand, in some select cases, individual vehicles did demonstrate proportional improvements in hydrocarbon emission results at 20° F relative to their 75° F results, confirming our belief that proportional control is feasible and indeed is occasionally practiced. One manufacturer's certification results reflected proportional improvements across almost its entire vehicle lines (including vehicles up to 5665 GVWR), further supporting that proportional control is feasible.

B. What Cold Temperature Requirements Are We Proposing?

1. NMHC Exhaust Emissions Standards

We are proposing a set of standards that will achieve proportional NMHC control from the 75° F Tier 2 standards to the 20° F test point. The proposed standard would achieve the greatest degree of hydrocarbon emissions reductions feasible by fully utilizing the substantial existing emission control hardware required to meet Tier 2 standards. We believe these standards would be achievable through calibration and software control strategies on Tier 2 level vehicles without use of additional hardware. The proposed standards are shown in Table VI.B–1.

TABLE VI.B–1.—PROPOSED 20° F FTP EXHAUST EMISSION STANDARDS

Vehicle GVWR and category	NMHC sales-weighted fleet average standard (grams/mile)
≤ 6000 lbs: Light-duty vehicles (LDV) & Light light-duty trucks (LLDT)	0.3
> 6000 lbs: Heavy light-duty trucks (HLDT) up to 8,500 lbs & Medium-duty passenger vehicles (MDPV) up to 10,000 lbs	0.5

We are proposing two separate sales-weighted fleet average NMHC levels: (1) 0.3 g/mile for vehicles at or below 6,000 pounds GVWR and (2) 0.5 g/mile for vehicles over 6,000 pounds, including MDPVs.[186] The new standard would not require additional certification testing beyond what is required today with ''worst case'' model selection of a durability test group.[187] NMHC emissions would be measured during the Cold CO test, which already requires hydrocarbon measurement.[188]

The separate fleet average standards are proposed to address challenges related to vehicle weight. We examined the certification data from interim non-Tier 2 vehicles (i.e., vehicles not yet phased in to the final Tier 2 program, but meeting interim standards established by Tier 2), and we determined that there was a general trend of increasing hydrocarbon levels with heavier GVWR vehicles. Heavier vehicles generally produce higher levels of emissions for several reasons. First, added weight results in additional work required to accelerate the vehicle mass. This generally results in higher emissions, particularly early in the test right after engine start-up. Second, the design of these vehicle emission control systems may incorporate designs for heavy work (i.e., trailer towing) that may put them at some disadvantage at 20° F cold starts. For example, the catalyst may be located further away from the engine so it is protected from high exhaust temperatures. This catalyst placement may delay the warm-up of the catalyst, especially at colder temperatures. Therefore, we believe a standard that is higher than the 0.3 g/mile level proposed for vehicles below 6,000 lbs GVWR, is what is technically feasible for heavier vehicles. The proposed 0.5 g/mile standard would apply for vehicles over 6000 lbs GVWR, which includes both HLDTs (6000 lbs to 8500 lbs) and MDPVs.

We are proposing the sales-weighted fleet average approach because it achieves the greatest degree of emission control feasible for Tier 2 vehicles, while allowing manufacturers flexibility to certify different vehicle groups to different levels and thus providing both lower cost and feasible lead times. We believe this is an appropriate approach because the base Tier 2 program is also based on emissions averaging, and will result in a mix of emissions control strategies across the fleet that would have varying cold temperature capabilities. These capabilities won't be fully understood until manufacturers go through the process of evaluating each Tier 2 package for cold temperature emissions control potential. Also, Tier 2 is still being phased in and some Tier 2 vehicle emissions control packages are still being developed. A fleet average provides manufacturers with flexibility to balance challenging vehicle families with ones that more easily achieve the standards.

[184] Most certification 20° F hydrocarbon levels are reported as THC, but NMHC accounts for approximately 95% of THC as seen in results with both THC and NMHC levels reported. This relationship also is confirmed in EPA test programs supporting this rule-making.

[185] ''VOC/PM Cold Temperature Characterization and Interior Climate Control Emissions/Fuel Economy Impact'', Volume I and II, October 2005.

[186] Tier 2 created the medium-duty passenger vehicle (MDPV) category to include larger complete passenger vehicles, such as SUVs and vans, with a GVWR of 8,501–10,000 pounds GVWR. Large pick-ups above 8,500 pounds are not included in the MDPV category but are included in the heavy-duty vehicle category.

[187] The existing cold FTP test procedures are specified in 40 CFR Subpart C. In the proposed rule for fuel economy labeling, recently signed on January 10, 2006 (71, FR 5426, February 1, 2006), EPA is seeking comment on the issue of requiring manufacturers to run the heater and/or defroster while conducting the cold FTP test. As discussed in the fuel economy labeling proposed rule, we do not believe this requirement would have a significant impact on emissions.

[188] 40 CFR Subpart C, § 86.244–94 requires the measurement of all pollutants measured over the FTP except NO_X.

There are several ways fleet averaging can work. In Tier 2, we established bins of standards to which individual vehicle families were certified. Each bin contains a NO_X standard, and these NO_X standards are then sales-weighted to demonstrate compliance with the corporate average NO_X standard. In other emissions control programs, such as the highway motorcycle program and the highway and nonroad heavy-duty engine programs, we have established a Family Emissions Limit (FEL) structure. In this approach, manufacturers establish individual FELs for each group of vehicles certified. These FELs serve as the standard for each individual group, and the FELs are averaged together on a sales-weighted basis to demonstrate overall compliance with the standards. For the proposed new cold temperature NMHC standards, we are proposing to use the FEL-based approach. We believe the FEL approach adds flexibility and should lead to cost-effective improvements in vehicle emissions performance. The FEL approach is discussed further in Section VI.B.4 below.

We are proposing to apply the new cold temperature NMHC standards to Tier 2 gasoline-fueled vehicles. We are not proposing to apply the standards to diesel vehicles, alternative-fueled vehicles, or heavy-duty vehicles, in general, due to a lack of data on which to base standards. Section VI.B., below, provides a detailed discussion of applicability.

As discussed above, we are expecting PM reductions at cold temperatures as a result of the control strategies we expect manufacturers to meet under the proposed cold temperature NMHC standards. We may consider the need for a separate PM standard under CAA section 202(a), as part of a future rulemaking, to further ensure that PM reductions occur under cold temperature conditions. We also request comments on what testing challenges exist for testing PM under cold conditions. We request that comments be supported by data where possible.

We request comments on the level of the new standards and the averaging approach we are proposing, and we urge commenters to include supporting information and data where possible.

2. Feasibility of the Proposed Standards

We believe the proposed standards are feasible, based on our analysis of the stringency of the standard provided below and the lead time and flexibilities described in section VI.B.3. We believe that the proposed standards could be achieved using a number of the technologies discussed in the following section, but that none of these potential technologies performs markedly better than any other. Moreover, as explained in section VI.D, we do not believe that additional reductions would be feasible without significant changes in Tier 2 technology, and we are not yet in a position to fully evaluate the achievability of standards based on such technologies. We thus are not considering more stringent cold temperature NMHC standards. We request comment on our analysis of the feasibility of the proposed standards.

a. Currently Available Emission Control Technologies

We believe that the cold temperature NMHC standards being proposed today for gasoline-fueled vehicles are challenging but within the reach of Tier 2 level emission control technologies. Our proposed determination of feasibility is based on the emission control hardware and strategies that are already in use today on Tier 2 vehicles. These emission control technologies are successfully used to meet the stringent Tier 2 standards for HC at the FTP temperature range of 68° F to 86° F, but generally are not fully used or activated at colder temperatures. As discussed in section VI.D, we are not proposing standards that would force changes to Tier 2 technology at this time. As discussed above, many current engine families are already achieving emissions levels at or below the proposed emission standards (see RIA Chapter 5), while other engine families are at levels greater than twice the proposed standard. The only apparent reason for the difference is the failure of some vehicles to use the Tier 2 control technologies at cold temperatures. While manufacturers could always choose to use additional hardware to facilitate compliance with the proposed standard, many of the engine families already at levels below the proposed standard do not necessarily contain any unique enabling hardware. These vehicles appear to achieve their results through mainly software and calibration control technologies. Thus, we believe our proposed standards can be met by the application of calibration and software approaches similar to those currently used at 50° F and 75° F, and we have estimated cost of control based on use of calibration and software approaches. Estimated costs are provided in section IX below, and in Chapter 8 of the RIA. As described in section VI.B.2.c, our own feasibility testing of a vehicle over 6000 lbs GVWR achieved NMHC reductions consistent with the proposed standard without the use of new hardware.

In addition, a 20° F cold hydrocarbon requirement has been in place in Europe since approximately the 2002 model year.[189] Many manufacturers currently have common vehicle models offered in Europe and the U.S. market. While the European standard is over a different drive cycle, unique strategies have been developed to comply with this standard. In fact, when the new European cold hydrocarbon standard was implemented in conjunction with a new 75° F standard (Euro4), many manufacturers responded by implementing NLEV level hardware and supplementing this hardware with advanced cold start emission control strategies. Although we are proposing a sales-weighted fleet average standard, the European standard is a fixed standard that cannot be exceeded by any vehicle model. Like the standard we are proposing, Europe also has made distinctions in the level of the standard reflecting that heavier weight vehicles cannot achieve as stringent a standard. Those manufacturers with European models shared with the U.S. market have the opportunity to leverage their European models or divisions in an attempt to transfer the emission control technologies that are used today for 20° F hydrocarbon control.

There are several different approaches or strategies used in the vehicles that are achieving proportional improvements in NMHC emissions at 20° F FTP. Several European models sold in the U.S. market that demonstrate excellent cold hydrocarbon performance are utilizing secondary air systems at the 20° F start temperature. These secondary air systems, sometimes called air pumps, inject ambient air into the exhaust immediately after the cold start. This performs additional combustion of unburned hydrocarbons prior to the catalytic converter and also accelerates the necessary heating of the catalytic converter. In the past and even recently, these systems have been used extensively to improve hydrocarbon performance at 75° F starts. As predicted in the Tier 2 Final Rule, a portion of the Tier 2 fleet is being equipped with secondary air systems in order to comply with Tier 2 standards.

Some manufacturers that currently have these systems available on their vehicles have indicated that they are simply not utilizing them at temperatures below freezing due to past engineering issues. The manufacturers that are using secondary air at 20° F, mainly European manufacturers, have indicated that these engineering

[189] European Union (EU) Type VI Test (−7° C) required for new vehicle model certified as of 1/1/2002.

challenges have been addressed through design changes. The robustness of these systems below freezing has also been confirmed with the manufacturers and with the suppliers of the secondary air components.[190] While not necessarily producing 20° F NMHC emission results better than other available technologies, vehicles equipped with this technology should be able to meet the proposed 20° F standard by capitalizing on this hardware.

Manufacturers have also used several other strategies to successfully produce proportional improvements in hydrocarbon emissions at 20° F. These include lean limit fuel strategies, elevated idle speeds, retarded spark timing, and accelerated closed loop times. Some software design strategies include fuel injection strategies detailed in past Society of Automotive Engineers (SAE) papers [191] that synchronize fuel injection timing with engine intake valve position to provide optimal fuel preparation. Spark delivery strategies have also been entertained that include higher energy levels and even redundant spark delivery to possibly complete additional combustion of unburned hydrocarbons. We expect that software and/or calibration changes, such as previously described, will generally perform as well or better than added hardware. This is because critical hardware such as the catalyst may not be immediately usable directly following the cold start. See RIA Chapter 5 for further discussion.

b. Feasibility Considering Current Certification Levels, Deterioration and Compliance Margin

Of the vehicles that were certified to Tier 2 and demonstrated proportional improvements in hydrocarbon emissions, approximately 20% of vehicles below 6,000 pounds GVWR had certification levels in the range of two to three times the 75° F Tier 2 bin 5 full useful life standard (.18 g/mile to .27 g/mile). These reported hydrocarbon levels are from Cold CO test results for certification test vehicles with typically only 4,000 mile aged systems, without full useful life deterioration applied. Due to rapid advances in emission control hardware technology, deterioration factors used today by manufacturers to demonstrate full useful life compliance are very low and typically even indicate little or no deterioration over the life of the vehicle. The deterioration factors generated today by manufacturers are common across all required test cycles including cold temperature testing. The standards we are proposing will have a full useful life of 120,000 miles, consistent with Tier 2 standards. Additionally, manufacturers typically target certification emission levels that incorporate a 20% to 30% compliance margin primarily to account for in-use issues that may cause emissions variability. The 0.3 g/mile FEL standard would leave adequate flexibility for compliance margins and any emissions deterioration concerns. See RIA Chapter 5 for further discussion and details regarding current certification levels.

Given enough lead time, we believe manufacturers would be able to develop control strategies for each of their widely varying product lines utilizing the approaches outlined above without fundamentally changing the design of the vehicles.

c. Feasibility and Test Programs for Higher Weight Vehicles

While a few of the heavier vehicles achieved a standard similar to the lighter weight class, there were limited certification results available for Tier 2 compliant vehicles over 6000 lbs GVWR (due to the later Tier 2 phase-in schedule for these vehicles). To further support the feasibility of the standard for heavier vehicles, we conducted a feasibility study for Tier 2 vehicles over 6000 lbs GVWR to assess their capabilities with typical Tier 2 hardware. We were able to reduce HC emissions for one vehicle with models above and below 6,000 pounds GVWR by between 60–70 percent, depending on control strategy, from a baseline level of about 1.0 g/mile. The results are well within the 0.5 g/mile standard including compliance margin, and we even achieved a 0.3 g/mile level on some tests. We achieved these reductions through recalibration without the use of new hardware. The findings from the study are provided in detail in the RIA.

We believe the proposed standards are feasible while at the same time providing the greatest degree of emission reduction achievable through the application of available technology. Our feasibility assessment, provided above, is based on our analysis of the stringency of the standard given current emission levels at certification (considering deterioration, compliance margin, and vehicle weight); available emission control techniques; and our own feasibility testing. In addition, sections VI.B.3–6 describe the proposed lead time and flexibility within the program structure, which also contribute to the feasibility of the proposed standards. Chapter 8 of the RIA provides our cost estimations per vehicle and on a nationwide basis, including capital and development costs. We believe the estimated costs are reasonable and the proposal is cost effective, as provided in section IX, below. Given the emission control strategies we expect manufacturers to utilize, we expect feasible implementation of technologies without a significant impact on vehicle noise, energy consumption, or safety factors. Although manufacturers would need to employ new emissions control strategies at cold temperatures, fundamental Tier 2 vehicle hardware and designs are not expected to change. In addition, we are providing necessary lead time for manufacturers to identify and resolve any related issues as part of overall vehicle development. We request comment on our analysis of the feasibility of the proposed standards.

3. Standards Timing and Phase-in

a. Phase-In Schedule

EPA must consider lead time in determining the greatest degree of emission reduction achievable under section 202(l) of the CAA. We are proposing to begin implementing the standard in the 2010 model year (MY) for LDVs/LLDTs and 2012 MY for HLDTs/MDPVs. The proposed implementation schedule, in Table VI.B–2, begins 3 model years after Tier 2 phase-in is complete for both vehicle classes. Manufacturers would demonstrate compliance with phase-in requirements through sales projections, similar to Tier 2. The 3-year period between completion of the Tier 2 phase-in and the start of the new cold NMHC standard should provide vehicle manufacturers sufficient lead time to design their compliance strategies and determine the product development plans necessary to meet the new standards. We believe that this phase-in schedule is needed to allow manufacturers to develop compliant vehicles without significant disruptions in the product development cycles. Also, for vehicles above 6,000 GVWR, section 202(a) of the Act requires that four years of lead time be provided to manufacturers.

We recognize that the new cold temperature standards we are proposing could represent a significant new challenge for manufacturers and development time will be needed. The issue of NMHC control at cold temperatures was not anticipated by

[190] Memo to docket ''Discussions Regarding Secondary Air System Usage at 20° F with European Automotive Manufacturers and Suppliers of Secondary Air Systems,'' December 2005.

[191] Meyer, Robert and John B. Heywood, ''Liquid Fuel Transport Mechanisms into the Cylinder of a Firing Port-Injected SI Engine During Start-up,'' SAE 970865, 1997.

many entities, and research and development to address the issue is consequently at a rudimentary stage. Lead time is therefore necessary before compliance can be demonstrated. While certification will only require one vehicle model of a durability group to be tested, manufacturers must do development on all vehicle combinations to ensure full compliance within the durability test group. We believe a phase-in allows the program to begin sooner than would otherwise be feasible.

TABLE VI.B–2.—PROPOSED PHASE-IN SCHEDULE FOR 20 °F NMHC STANDARD BY MODEL YEAR

Vehicle GVWR (category)	2010	2011	2012	2013	2014	2015
≤ 6000 lbs (LDV/LLDT)	25%	50%	75%	100%	.....	.....
> 6000 lbs HLDT and MDPV	.....	.....	25%	50%	75%	100%

In considering a phase-in period, manufacturers have raised concerns that a rapid phase-in schedule would lead to a significant increase in the demand for their cold testing facilities, which could necessitate substantial capital investment in new cold test facilities to meet development needs. This is because manufacturers would need to use their cold testing facilities not only for certification but also for vehicle development. If vehicle development is compressed into a narrow time window, significant numbers of new facilities would be needed. Manufacturers were further concerned that investment in new test facilities would be stranded at the completion of the initial development and phase-in period.

As stated earlier, durability test groups may be large and diverse and therefore require significant development effort and cold test facility usage for each model. Our proposed phase-in period accommodates test facilities and work load concerns by distributing these fleet phase-in percentage requirements over a 4-year period for each vehicle weight category. The staggered start dates for the phase-in schedule between the two weight categories should further alleviate manufacturers' concerns with needing to construct new test facilities. Some manufacturers may still determine that upgrades to their current cold facility are needed to handle increased workload. Some manufacturers have indicated that they would simply add additional shifts to their facility work schedules that are not in place today. Some manufacturers will already meet the first-year requirement based on current certification reporting, essentially providing an additional year for distributing the anticipated development test burden for the remaining fleet. The 4-year phase-in period provides ample time for vehicle manufacturers to develop a compliance schedule that is coordinated with their future product plans and projected product sales volumes of the different vehicle models.

We request comments on the proposed start date and duration of the phase-in schedule. We also request comment on allowing a volume-based offset during the phase-in period for cases where manufacturers voluntarily certify heavy-duty vehicles above 8,500 pound GVWR to the proposed cold temperature standards. This may provide incentive for voluntary certification of these heavier vehicles.

b. Alternative Phase-In Schedules

Alternative phase-in schedules essentially credit the manufacturer for its early or accelerated efforts and allow the manufacturer greater flexibility in subsequent years during the phase-in. By introducing vehicles earlier than required, manufacturers would earn the flexibility to make offsetting adjustments, on a vehicle-year basis, to the phase-in percentages in later years. Under these alternative schedules, manufacturers would have to introduce vehicles that meet or surpass the NHMC average standards before they are required to do so, or else introduce vehicles that meet or surpass the standard in greater quantities than required.

We are proposing that manufacturers may apply for an alternative phase-in schedule that would still result in 100% phase-in by 2013 and 2015, respectively, for the lighter and heavier weight categories. As with the primary phase-in, manufacturers would base an alternative phase-in on their projected sales estimates. An alternate phase-in schedule submitted by a manufacturer would be subject to EPA approval and would need to provide the same emissions reductions as the primary phase-in schedule. We propose that the alternative phase-in could not be used to delay full implementation past the last year of the primary phase-in schedule (2013 for LDVs/LDTs and 2015 for HLDTs/MDPVs).

An alternative phase-in schedule would be acceptable if it passes a specific mathematical test. We have designed the test to provide manufacturers a benefit from certifying to the standards early, while ensuring that significant numbers of vehicles are introduced during each year of the alternative phase-in schedule. Manufacturers would multiply their percent phase-in by the number of years the vehicles are phased in prior to the second full phase-in year. The sum of the calculation would need to be greater than or equal to 500, which is the sum from the primary phase-in schedule (4*25 + 3*50 + 2*75 + 1*100=500). For example, the equation for LDVs/LLDTs would be as follows:

$$(6\times API_{2008}) + (5\times API_{2009}) + (4\times API_{2010}) + (3\times API_{2011}) + (2\times API_{2012}) + (1\times API_{2013}) \geq 500\%,$$

Where:

API is the anticipated phase-in percentage for the referenced model year.

California used this approach to an alternative phase-in for the LEVII program.[192] It provides alternative phase-in credit for both the number of vehicles phased in early and the number of years the early phase-in occurs.

As described above, the final sum of percentages for both LDVs/LDTs and HLDTs/MDPVs must equal or exceed 500—the sum that results from a 25/50/75/100 percent phase-in. For example, a 10/25/50/55/100 percent phase-in for LDVs/LDTs that begins in 2009 will have a sum of 510 percent and is acceptable. A 10/20/40/70/100 percent phase-in that begins the same year has a sum of 490 percent and is not acceptable.

To ensure that significant numbers of LDVs/LDTs are introduced in the 2010 time frame (2012 for HLDTs/MDPVs), manufacturers would not be permitted to use alternative phase-in schedules that delay the implementation of the requirements, even if the sum of the phase-in percentages ultimately meets or exceeds 500. Such a situation could occur if a manufacturer delayed implementation of its compliant production until 2011 and began an 80/85/100 percent phase-in that year for

[192] Title 13, California Code of Regulations, Section 1961(b)(2).

LDVs/LDTs. To protect against this possibility, we are proposing that for any alternative phase-in schedule, a manufacturer's phase-in percentages*years factor from the 2010 and earlier model years sum to at least 100 (2012 and earlier for HLDTs/MDPVs). The early phase-in also encourages the early introduction of vehicles meeting the new standard or the introduction of such vehicles in greater quantity than required. This would achieve early emissions reductions and provide an opportunity to gain experience in meeting the standards.

Phase-in schedules, in general, add little flexibility for manufacturers with limited product offerings because a manufacturer with only one or two test groups cannot take full advantage of a 25/50/75/100 percent or similar phase-in. Therefore, consistent with the recommendations of the Small Advocacy Review Panel (SBAR Panel), which we discuss in more detail later in section VI.E, manufacturers meeting EPA's definition of ''small volume manufacturer'' would be exempt from the phase-in schedules and would be required to simply comply with the final 100% compliance requirement. This provision would only apply to small volume manufacturers and not to small test groups of larger manufacturers.

4. Certification Levels

Manufacturers typically certify groupings of vehicles called durability groups and test groups, and they have some discretion on what vehicle models are placed in each group. A durability group is the basic classification used by manufacturers to group vehicles to demonstrate durability and predict deterioration. A test group is a basic classification within a durability group used to demonstrate compliance with FTP 75° F standards.[193] For Cold CO, manufacturers certify on a durability group basis, whereas for 75° F FTP testing, manufacturers certify on a test group basis. In keeping with the current cold CO standards, we are proposing to require testing on a durability group basis for the cold temperature NMHC standard. We also propose to allow manufacturers the option of certifying on the smaller test group basis, as is allowed under current cold CO standards. Testing on a test group basis would require more tests to be run by manufacturers but may provide them with more flexibility within the averaging program. In either case, the worst case vehicle within the group from an NMHC emissions standpoint would be tested for certification.

For the new standard, manufacturers would declare a family emission limit (FEL) for each group either at, above, or below the fleet averaging standard. The FEL would be based on the certification NMHC level, including deterioration factor, plus the compliance margin manufacturers feel is needed to ensure in-use compliance. The FEL becomes the standard for each group, and each group could have a different FEL so long as the projected sales-weighted average level met the fleet average standard at time of certification. Like the standard, the certification resolution for the FEL would be one decimal point. This FEL approach would be similar to having bins in 0.1 g/mile intervals, with no upper limit. Similar to a bin approach, manufacturers would compute a sales-weighted average for the NMHC emissions at the end of the model year and then determine credits generated or needed based on how much the average is above or below the standard.

5. Credit Program

As described above, we are proposing that manufacturers average the NMHC emissions of their vehicles and comply with a corporate average NMHC standard. In addition, we are proposing that when a manufacturer's average NMHC emissions of vehicles certified and sold falls below the corporate average standard, it could generate credits that it could save for later use (banking) or sell to another manufacturer (trading). Manufacturers would consume any credits if their corporate average NMHC emissions were above the applicable standard for the weight class.

EPA views the proposed averaging, banking, and trading (ABT) provisions as an important element in setting emission standards reflecting the greatest degree of emission reduction achievable, considering factors including cost and lead time. If there are vehicles that will be particularly costly or have a particularly hard time coming into compliance with the standard, a manufacturer can adjust the compliance schedule accordingly, without special delays or exceptions having to be written into the rule. This is an important flexibility especially given the current uncertainty regarding optimal technology strategies for any given vehicle line. In addition, ABT allows us to consider a more stringent emission standard than might otherwise be achievable under the CAA, since ABT reduces the cost and improves the technological feasibility of achieving the standard. By enhancing the technological feasibility and cost effectiveness of the proposed standard, ABT allows the standard to be attainable earlier than might otherwise be possible.

Credits may be generated prior to, during, and after the phase-in period. Manufacturers could certify LDVs/LLDTs to standards as early as the 2008 model year (2010 for HLDTs/MDPVs) and receive early NMHC credits for their efforts. They could use credits generated under these ''early banking'' provisions after the phase-in begins in 2010 (2012 for HLDTs/MDPVs).

a. How Credits Are Calculated

The corporate average for each weight class would be calculated by computing a sales-weighted average of the NMHC levels to which each FEL was certified. As discussed above, manufacturers group vehicles into durability groups or test groups and establish an FEL for each group. This FEL becomes the standard for that group. Consistent with FEL practices in other programs, manufacturers may opt to select an FEL above the test level. The FEL would be used in calculating credits. The number of credits or debits would then be determined using the following equation:

$$\text{Credits or Debits} = (\text{Standard} - \text{Sales weighted average of FELs to nearest tenth}) \times \text{Actual Sales}$$

If a manufacturer's average was below the 0.3 g/mi corporate average standard for LDVs/LDTs, credits would be generated (below 0.5 g/mi for HLDTs/MDPVs). These credits could then be used in a future model year when its average NMHC might exceed the 0.3 or the 0.5 standard. Conversely, if the manufacturer's fleet average was above the corporate average standard, banked credits could offset the difference, or credits could be purchased from another manufacturer.

b. Credits Earned Prior to Primary Phase-in Schedule

We propose that manufacturers could earn early emissions credits if they introduce vehicles that comply with the new standards early and the corporate average of those vehicles is below the applicable standard. Early credits could be earned starting in 2008 for vehicles meeting the 0.3 g/mile standard and in 2010 for vehicles meeting the 0.5 g/mile standard. These emissions credits generated prior to the start of the phase-in could be used both during and after the phase-in period and have all the same properties as credits generated by vehicles subject to the primary phase-in schedule. As previously mentioned, we are also proposing that manufacturers

[193] 40 CFR 86.1803–01.

may apply for an alternative phase-in schedule for vehicles that are introduced early. The alternative phase-in and early credits provisions would operate independent of one another.

c. How Credits Can Be Used

A manufacturer could use credits in any future year when its corporate average was above the standard, or it could trade (sell) the credits to other manufacturers. Because of separate sets of standards for the different weight categories, we are proposing that manufacturers compute their corporate NMHC averages separately for LDV/LLDTs and HLDTs/MDPVs. Credit exchanges between LDVs/LLDTs and HLDTs/MDPVs would be allowed. This will provide added flexibility for fuller-line manufacturers who may have the greatest challenge in meeting the new standards due to their wide disparity of vehicle types/weights and emissions levels.

d. Discounting and Unlimited Life

Credits would allow manufacturers a way to address unexpected shifts in their sales mix. The NMHC emission standards in this proposed program are quite stringent and do not present easy opportunities to generate credits. Therefore, we are not proposing to discount unused credits. Further, the degree to which manufacturers invest the resources to achieve extra NMHC reductions provides true value to the manufacturer and the environment. We do not want to take measures to reduce the incentive for manufacturers to bank credits, nor do we want to take measures to encourage unnecessary credit use. Consequently we are not proposing that the NMHC credits would have a credit life limit. However, we are proposing that they only be used to offset deficits accrued with respect to the proposed 0.3/0.5 g/mile cold temperature standards. We request comment on the need for discounting of credits or credit life limits and what those discount rates or limits, if any, should be.

e. Deficits Could Be Carried Forward

When a manufacturer has an NMHC deficit at the end of a model year—that is, its corporate average NMHC level is above the required corporate average NMHC standard—we are proposing that the manufacturer be allowed to carry that deficit forward into the next model year. Such a carry-forward could only occur after the manufacturer used any banked credits. If the deficit still existed and the manufacturer chose not to, or was unable to, purchase credits, the deficit could be carried over. At the end of that next model year, the deficit would need to be covered with an appropriate number of credits that the manufacturer generated or purchased. Any remaining deficit would be subject to an enforcement action.

To prevent deficits from being carried forward indefinitely, we propose that manufacturers would not be permitted to run a deficit for two years in a row. We believe that it is reasonable to provide this flexibility to carry a deficit for one year given the uncertainties that manufacturers face with changing market forces and consumer preferences, especially during the introduction of new technologies. These uncertainties can make it hard for manufacturers to accurately predict sales trends of different vehicle models.

f. Voluntary Heavy-Duty Vehicle Credit Program

In addition to MDPV requirements in Tier 2, we also currently have chassis-based emissions standards for other complete heavy-duty vehicles (e.g., large pick-ups and cargo vans) above 8,500 pound GVWR. However, these standards do not include cold temperature CO standards. As noted below in section VI.B.6.a, we are not proposing to apply cold temperature NMHC standards to heavy-duty gasoline vehicles due to a current lack of emissions data on which to base such standards. We plan to revisit the need for and feasibility of standards as data become available.

During discussions with manufacturers, we discussed a voluntary program for chassis-certified complete heavy-duty vehicles. We believe that there may be opportunities within the framework of a cold temperature NMHC program to allow for emissions credits from chassis-certified heavy-duty vehicles above 8,500 pounds GVWR to be used to meet the proposed standards. It is possible that some control strategies developed for meeting cold NMHC emissions standards could also be applied to these vehicles above 8,500 pounds GVWR.

One approach would be to allow manufacturers to certify heavy-duty vehicles voluntarily to the 0.5 g/mile cold NMHC standards proposed for HLDTs/MDPVs. To the extent that heavy-duty vehicles achieve FELs below the 0.5 g/mile standard, manufacturers could earn credits which could be applied to any vehicle subject to the proposed standard. It is unclear, however, if this approach would provide a meaningful opportunity for credit generation, given the stringency of the standard. We would expect that most heavy-duty vehicles would have emissions well above the 0.5 g/mile level, based on the additional weight of the vehicle. We request comment on this approach, as well as others for voluntary certification and credit generation.

It may be possible to establish a voluntary standard above 0.5 g/mile for purposes of generating credits, but we would need data on which to base this level of the standard. Suggestions on an appropriate level of a voluntary standard are welcomed, as well as any data that support such a recommendation. Comments on testing protocols, such as use of the vehicle's adjusted loaded vehicle weight (ALVW) or loaded vehicle weight (LVW), are also encouraged. We believe such a voluntary program could provide significant data that would help us evaluate the feasibility of a future standard for these vehicles.

6. Additional Vehicle Cold Temperature Standard Provisions

We request comments on all of the following proposed provisions.

a. Applicability

We are proposing to apply the new cold temperature standards to all gasoline-fueled light-duty vehicles and MDPVs sold nationwide. While we have significant amounts of data on which to base our proposals for gasoline-fueled light-duty vehicles, we have very little data for light-duty diesels. For 75° F FTP standards, the same set of standards apply, but in the 20° F context we know very little about diesel emissions due to a lack of data. Currently, diesel vehicles are not subject to the cold CO standard, so there are no requirements to test diesel vehicles at cold temperatures. There are sound engineering reasons, however, to expect cold NMHC emissions for diesel vehicles to be as low as or even lower than the proposed standards. This is because diesel engines operate under leaner air-fuel mixtures compared to gasoline engines, and therefore have fewer engine-out NMHC emissions due to the abundance of oxygen and more complete combustion. A very limited amount of confidential manufacturer-furnished information is consistent with this engineering hypothesis. A comprehensive assessment of appropriate standards for diesel vehicles would require a significant amount of investigation and analysis of issues such as feasibility and costs. This effort would be better suited to a future rulemaking. Therefore, at this time, we are not proposing to apply the cold NMHC standards to light-duty diesel vehicles. We will continue to evaluate

data for these vehicles as they enter the fleet and will reconsider the need for standards if data indicate that there may be instances of high NMHC emissions from diesels at cold temperatures. We have proposed cold temperature FTP testing for diesels as part of the Fuel Economy Labeling rulemaking, including NMHC measurement.[194] This testing data would allow us to assess NMHC certification type data over time. However, this wouldn't include development testing manufacturers would need to do in order to meet a new diesel cold temperature standard.

In addition, there currently is no cold CO testing requirement for alternative fuel vehicles. There are little data upon which to evaluate NMHC emissions when operating on alternative fuels at cold temperatures. For fuels such as ethanol, it is difficult to develop a reasonable proposal due to a lack of fuel specifications, testing protocols, and current test data. Other fuels such as methanol and natural gas pose similar uncertainty. Therefore, we are not proposing a cold NMHC testing requirement for alternative fuel vehicles. We will continue to investigate these other technologies and request comment on standards for vehicles operating on fuels other than gasoline.

We are proposing that flex-fuel vehicles would still require certification to the applicable cold NMHC standard, though only when operated on gasoline. For multi-fuel vehicles, manufacturers would need to submit a statement at the time of certification that either confirms the same control strategies used with gasoline would be used when operating on ethanol, or that identifies any differences as an Auxiliary Emission Control Device (AECD). Again, dedicated alternative-fueled vehicles, including E–85 vehicles, would not be covered.

For heavy-duty gasoline-fueled vehicles, we have no data, but we would expect a range of emissions performance similar to that of lighter gasoline-fueled trucks. Due to the lack of test data on which to base feasibility and cost analyses, we are not proposing cold temperature NMHC standards for these vehicles at this time. We request comments and data on these vehicles and plan to revisit this issue when sufficient data is available.

b. Useful Life

The ''useful life'' of a vehicle means the period of use or time during which an emission standard applies to light-duty vehicles and light-duty trucks.[195] Consistent with the current definition of useful life in the Tier 2 regulations, for all LDVs/LDTs and HLDTs/MDPVs, we are proposing new full useful life standards for cold temperature NMHC standards. Given that we expect that manufacturers will make calibration or software changes to existing Tier 2 technologies, it is reasonable for there to be the same useful life as for the Tier 2 standards themselves. For LDV/LLDT, the full useful life values would be 120,000 miles or 10 years, whichever comes first, and for HLDT/MDPV, full useful life is 120,000 miles or 11 years, whichever comes first.[196]

c. High Altitude

We do not expect emissions to be significantly different at high altitude due to the use of common emissions control calibrations. Limited data submitted by a manufacturer suggest that FTP emissions performance at high altitude generally follows sea level performance. Furthermore, there are very limited cold temperature testing facilities at high altitudes. Therefore, under normal circumstances, manufacturers would not be required to submit vehicle test data for high altitude. Instead, manufacturers would be required to submit an engineering evaluation indicating that common calibration approaches are utilized at high altitude. Any deviation from sea level in emissions control practices would be required to be included in the auxiliary emission control device (AECD) descriptions submitted by manufacturers at certification. Additionally, any AECD specific to high altitude would require engineering emission data for EPA evaluation to quantify any emission impact and validity of the AECD.

d. In-Use Standards for Vehicles Produced During Phase-In

As we have indicated, the standards we are proposing would be more challenging for some vehicles than for others. With any new technology, or even with new calibrations of existing technology, there are risks of in-use compliance problems that may not appear in the certification process. In-use compliance concerns may discourage manufacturers from applying new calibrations or technologies. Thus, it may be appropriate for the first few years, for those vehicles most likely to require the greatest applications of effort, to provide assurance to the manufacturers that they will not face recall if they exceed standards in use by a specified amount. Therefore, similar to the approach used in Tier 2, we are proposing an in-use standard that is 0.1 g/mile higher than the certification FEL for any given test group for a limited number of model years.[197] For example, a test group with a 0.2 g/mile FEL would have an in-use standard of 0.3 g/mile. This would not change the FEL or averaging approaches and would only apply in cases where EPA tests vehicles in-use to ensure emissions compliance.

We propose that the in-use standards be available for the first few model years of sales after a test group meeting the new standards is introduced, according to a schedule that provides more years for test groups introduced earlier in the phase-in. This schedule provides manufacturers with time to determine the in-use performance of vehicles and learn from the earliest years of the program to help ensure that vehicles introduced after the phase-in period meet the final standards in-use. It also assumes that once a test group is certified to the new standards, it will be carried over to future model years. The tables below provide the proposed schedule for the availability of the in-use standards.

TABLE VI.B–3.—SCHEDULE FOR IN-USE STANDARDS FOR LDVS/LLDTS

Model year of introduction	2008	2009	2010	2011	2012	2013
Models years that the in-use standard is available for carry-over test groups	2008 2009 2010 2011	2009 2010 2011 2012	2010 2011 2012 2013	2011 2012 2013	2012 2013 2014	2013 2014

[194] ''Fuel Economy Labeling of Motor Vehicles; Revisions to Improve Calculation of Fuel Economy Estimates,'' Proposed Rule, 71, FR 5426, February 1, 2006.

[195] 40 CFR 86.1803–01.

[196] 40 CFR 86.1805–04.

[197] ''Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements'', Final Rule, 65 FR 6796, February 10, 2000.

TABLE VI.B–4.—SCHEDULE FOR IN-USE STANDARDS FOR HLDVS/MDPVS

Model year of introduction	2010	2011	2012	2013	2014	2015
Models years that the in-use standard is available for carry-over test groups.	2010 2011 2012 2013	2011 2012 2013 2014	2012 2013 2014 2015	2013 2014 2015	2014 2015 2016	2015 2016

7. Monitoring and Enforcement

Under the proposed programs, manufacturers could either report that they met the relevant corporate average standard in their annual reports to the Agency, or they could show via the use of credits that they have offset any exceedance of the corporate average standard. Manufacturers would also report their credit balances or deficits. EPA would monitor the program.

As in Tier 2, the averaging, banking and trading program would be enforced through the certificate of conformity that manufacturers must obtain in order to introduce any regulated vehicles into commerce.[198] The certificate for each test group would require all vehicles to meet the emissions level to which the vehicles were certified, and would be conditioned upon the manufacturer meeting the corporate average standard within the required time frame. If a manufacturer failed to meet this condition, the vehicles causing the corporate average exceedance would be considered to be not covered by the certificate of conformity for that engine family. A manufacturer would be subject to penalties on an individual vehicle basis for sale of vehicles not covered by a certificate.

EPA would review the manufacturer's sales to designate the vehicles that caused the exceedance of the corporate average standard. We would designate as nonconforming those vehicles in those test groups with the highest certification emission values first, continuing until a number of vehicles equal to the calculated number of noncomplying vehicles as determined above is reached. In a test group where only a portion of vehicles would be deemed nonconforming, we would determine the actual nonconforming vehicles by counting backwards from the last vehicle produced in that test group. Manufacturers would be liable for penalties for each vehicle sold that is not covered by a certificate.

We are proposing to condition certificates to enforce the requirements that manufacturers not sell credits that they have not generated. A manufacturer that transferred credits it did not have would create an equivalent number of debits that it would be required to offset by the reporting deadline for the same model year. Failure to cover these debits with credits by the reporting deadline would be a violation of the conditions under which EPA issued the certificate of conformity, and nonconforming vehicles would not be covered by the certificate. EPA would identify the nonconforming vehicles in the same manner described above.

In the case of a trade that resulted in a negative credit balance that a manufacturer could not cover by the reporting deadline for the model year in which the trade occurred, we propose to hold both the buyer and the seller liable. We believe that holding both parties liable will induce the buyer to exercise diligence in assuring that the seller has or will be able to generate appropriate credits and will help to ensure that inappropriate trades do not occur.

We are not proposing any new compliance monitoring activities or programs for vehicles. These vehicles would be subject to the certification testing provisions of the CAP2000 rule. We are not proposing to require manufacturer in-use testing to verify compliance. There is no cold CO manufacturer in-use testing requirement today (similarly, we do not require manufacturer in-use testing for SCO3 standards under the SFTP program). As noted earlier, manufacturers have limited cold temperature testing capabilities and we believe these facilities will be needed for product development and certification testing. However, we have the authority to conduct our own in-use testing program for exhaust emissions to ensure that vehicles meet standards over their full useful life. We will pursue remedial actions when substantial numbers of properly maintained and used vehicles fail any standard in-use. We also retain the right to conduct Selective Enforcement Auditing of new vehicles at manufacturers' facilities.

The use of credits would not be permitted to address Selective Enforcement Auditing or in-use testing failures. The enforcement of the averaging standard would occur through the vehicle's certificate of conformity. A manufacturer's certificate of conformity would be conditioned upon compliance with the averaging provisions. The certificate would be void ab initio if a manufacturer failed to meet the corporate average standard and did not obtain appropriate credits to cover their shortfalls in that model year or in the subsequent model year (see proposed deficit carryforward provision in section VI.B.5.e.). Manufacturers would need to track their certification levels and sales unless they produced only vehicles certified to NMHC levels below the standard and did not plan to bank credits.

We request comments on the above approach for compliance monitoring and enforcement.

C. What Evaporative Emissions Standards Are We Proposing?

We are proposing to adopt a set of numerically more stringent evaporative emission standards for all light-duty vehicles, light-trucks, and medium-duty passenger vehicles. The proposed standards are equivalent to California's LEV II standards, and these proposed standards are shown in Table VI.C–1. The proposed standards would represent about a 20 to 50 percent reduction (depending on vehicle weight class and type of test) in diurnal plus hot soak standards from the Tier 2 standards that will be in effect in the years immediately preceding the implementation of today's proposed standards.[199] As with the current Tier 2 evaporative emission standards, the proposed standards vary by vehicle weight class. The increasingly higher standards for heavier weight class vehicles account for larger vehicle sizes

[198] "Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements", Final Rule, 65 FR 6797, February 10, 2000.

[199] Diurnal emissions (or diurnal breathing losses) means evaporative emissions as a result of daily temperature cycles or fluctuations for successive days of parking in hot weather. Hot soak emissions (or hot soak losses) are the evaporative emissions from a parked vehicle immediately after turning off the hot engine. For the evaporative emissions test procedure, diurnal and hot soak emissions are measured in an enclosure commonly called the SHED (Sealed Housing for Evaporative Determination).

and fuel tanks (non-fuel and fuel emissions).[200]

TABLE VI.C–1.—PROPOSED EVAPORATIVE EMISSION STANDARDS

[Grams of hydrocarbons per test]

Vehicle class	3-day diurnal plus hot soak	Supplemental 2-day diurnal plus hot soak
LDVs	0.50	0.65
LLDTs	0.65	0.85
HLDTs	0.90	1.15
MDPVs	1.00	1.25

1. Current Controls and Feasibility of the Proposed Standards

Evaporative emissions from light-duty vehicles and trucks will represent about 35 percent of the light-duty VOC inventory and about 4 percent of the benzene inventory in 2020. As described earlier, we are proposing to reduce the level of the evaporative emission standards applicable to diurnal and hot soak emissions from these vehicles by about 20 to 50 percent. These proposed standards are meant to be effectively the same as the evaporative emission standards in the California LEV II program. Although the California program contains evaporative emissions standards that appear more stringent than EPA Tier 2 standards if one looks only at the level of the standard, we believe they are essentially equivalent because of differences in testing requirements. For these same reasons, some manufacturers likewise view the programs as similar in stringency. (See section VI.C.5 below for further discussion of such test differences, *e.g.*, test temperatures and fuel volatilities.) Thus, some manufacturers have indicated that they will produce 50-state evaporative systems that meet both sets of standards (manufacturers sent letters indicating this to EPA in 2000).[201] [202] [203] In addition, a review of recent model year certification results indicates that essentially all manufacturers certify 50-state systems, except for a few limited cases where manufacturers have not yet needed to certify a LEVII vehicle in California due to the phase-in schedule. Also, in recent discussions, manufacturers have restated that they plan to continue producing 50-state evaporative systems in the future. Based on this understanding, we do not project additional VOC or air toxics reductions from the evaporative standards we are proposing today.[204] Also, we do not expect additional costs since we expect that manufacturers will continue to produce 50-state evaporative systems. Therefore, harmonizing with California's LEV–II evaporative emission standards would be an ''anti-backsliding'' measure—that is, it would prevent potential future backsliding as manufacturers pursue cost reductions.[205] It would thus codify (*i.e.*, lock in) the approach manufacturers have already indicated they are taking for 50-state evaporative systems.

We believe this proposed action would be an important step to ensure that the federal standards reflect the lowest possible evaporative emissions, and it also would provide states with certainty that the emissions reductions we project to occur due to 50-state compliance strategies will in fact occur. In addition, the proposed standards will assure that manufacturers continue to capture the abilities of available fuel system materials to minimize evaporative emissions.

We also considered the possibility of whether it is feasible to achieve further evaporative emission reductions from motor vehicles. In this regard, it is important to note that California's LEV II program includes partial zero-emission vehicle (ZEV) credits for vehicles that achieve near zero emissions (*e.g.*, LDV evaporative emission standards for both the 2-day and 3-day diurnal plus hot soak tests are 0.35 grams/test, which are more stringent than proposed standards).[206] The credits would include full ZEV credit for a stored hydrogen fuel cell vehicle and 0.2 credits for (among other categories for partial credit) a partial zero emission vehicle (PZEV).[207] Currently, only a fraction of California's certified vehicles (gasoline powered, hybrid, and compressed natural gas vehicles) meet California's optional PZEV standards, but this number is expected to increase in coming years.[208] [209] These limited PZEV vehicles require additional evaporative emissions technology or hardware (*e.g.*, modifications to fuel tank and secondary canister) than we expect to be needed for vehicles meeting the proposed standards. At this time, we need to better understand the evaporative system modifications (*i.e.*, technology, costs, lead time, etc.) potentially needed for other vehicles in the fleet to meet PZEV-level standards before we can rationally evaluate whether to adopt more stringent standards. For example, at this point we cannot even determine whether the PZEV technologies could be used fleetwide or on only a limited set of vehicles. Thus, in the near term, we lack any of the information necessary to determine if further reductions are feasible, and if they could be achievable considering cost, energy and safety issues. However, we intend to consider

[200] Larger vehicles may have greater non-fuel evaporative emissions, probably due to an increased amount of interior trim, vehicle body surface area, and larger tires.

[201] DaimlerChrysler, Letter from Reginald R. Modlin to Margo Oge of U.S. EPA, May 30, 2000. A copy of this letter can be found in Docket No. EPA–HQ–OAR–2005–0036.

[202] Ford, Letter from Kelly M. Brown to Margo Oge of U.S. EPA, May 26, 2000. A copy of this letter can be found in Docket No. EPA–HQ–OAR–2005–0036.

[203] General Motors, Letter from Samuel A. Leonard to Margo Oge of U.S. EPA, May 30, 2000. A copy of this letter can be found in Docket No. EPA–HQ–OAR–2005–0036.

[204] U.S. EPA, Office of Air and Radiation, Update to the Accounting for the Tier 2 and Heavy-Duty 2005/2007 Requirements in MOBILE6, EPA420–R–03–012, September 2003.

[205] Anti-backsliding provisions can satisfy the requirement in section 202 (l) (2) that emission reductions of hazardous air pollutants be the greatest achievable. *Sierra Club* v. *EPA*, 325 F. 3d at 477.

[206] California Air Resources Board, Fact Sheet, LEV–II Amendments to California's Low-Emission Vehicle Regulations, February 1999

[207] PZEV meets California super ultra low emission vehicle exhaust emission standards and have near zero evaporative emissions. California Air Resources Board, News Release, ARB Modifies Zero Emission Vehicle Regulation, April 24, 2003.

[208] California Air Resources Board, Fact Sheet, California Vehicle Emissions, April 8, 2004.

[209] California Air Resources Board, Consumer Information: 2006 California Certified Vehicles, November 7, 2005.

more stringent evaporative emission standards in the future, and revisiting this issue in a future rulemaking will allow us time to obtain the important necessary additional information for such standards.

2. Evaporative Standards Timing

We are proposing to implement today's evaporative emission standards in model year 2009 for LDVs/LLDTs and model year 2010 for HLDTs/MDPVs. Today's proposed rule is not expected to be finalized until February 2007, at which time many manufacturers already will have begun or completed model year 2008 certification. Thus, model year 2009 is the earliest practical start date of new standards for LDVs/LLDTs. For HLDTs/MDPVs, the phase-in of the existing Tier 2 evaporative emission standards ends in model year 2009. Thus, the model year 2010 is the earliest start date possible for HLDTs/MDPVs. Since the proposed standards are an anti-backsliding measure and we believe that manufacturers already meet these standards, there is no need for additional lead time beyond the implementation dates proposed. We request comment on this proposed schedule.

3. Timing for Multi-Fueled Vehicles

As discussed earlier in this section, manufacturers appear to view the Tier 2 and LEV II evaporative emission programs as similar in stringency, and thus, they have indicated that they will produce 50-state evaporative systems that meet both sets of standards. For multi-fueled vehicles capable of operating on alternative fuel (e.g., E85 vehicles—fuel is 85% ethanol and 15% gasoline) and conventional fuel (e.g., gasoline),[210] this commitment for 50-state systems would still apply. However, a few multi-fueled vehicles were certified only on the conventional fuel (gasoline) for the California LEV II program even though they had 50-state evaporative emission systems. For such cases, manufacturers did not intend to sell these vehicles for operation on the alternative fuel (e.g. E85) in California (only for operation on conventional fuel in California), but they did certify and plan to sell these vehicles in the federal Tier 2 program for operation on the alternative and conventional fuels.[211] For these few types of multi-fueled vehicles, manufacturers are potentially at risk of not complying with the proposed new evaporative emission certification standards (which are equivalent to California LEV II certification standards) when operating on the alternative fuel.

For such multi-fueled vehicles or evaporative emission systems, manufacturers would need a few additional years of lead time to adjust their evaporative systems to comply with the proposed evaporative emission certification standards when operating on the alternative fuel. Thus, to reduce the compliance risk for these types of multi-fueled vehicles (or evaporative families) when they first certify to the more stringent evaporative standards, the proposed evaporative emission certification standards would apply to the non-gasoline portion of multi-fueled vehicles beginning in the fourth year of the program—2012 for LDVs/LLDTs and 2013 for HLDTs/MDPVs. The proposed evaporative emission certification standards would be implemented in 2009 for LDVs/LLDTs and 2010 for HLDTs/MDPVs for the gasoline portion of multi-fueled vehicles and vehicles that are not multi-fueled. We believe this additional three years of lead time would provide sufficient time for manufacturers to make adjustments to their new evaporative systems for multi-fueled vehicles, which are limited product lines.

The provisions for in-use evaporative emission standards described below in section VI.C.4 would not change for multi-fueled vehicles. We believe that three additional years to prepare vehicles (or evaporative families) to meet the certification standards, and to simultaneously make vehicle adjustments from the federal in-use experience of other vehicles (other vehicles that are not multi-fueled) is sufficient to resolve any issues for multi-fueled vehicles. Therefore, the proposed evaporative emission standards would apply both for certification and in-use beginning in 2012 for LDVs/LLDTs and 2013 for HLDTs/MDPVs.

4. In-Use Evaporative Emission Standards

As described earlier in this section, we are proposing to adopt evaporative emission standards that are equivalent to California's LEV II standards for all light duty vehicles, light trucks, and medium duty passenger vehicles. Currently, the Tier 2 evaporative emission standards are the same for certification and in-use vehicles. However, the California LEV II program permits manufacturers to meet less stringent standards in-use for a short time period in order to account for potential variability in-use during the initial years of the program when technical issues are most likely to arise.[212] The LEV II program specifies that in-use evaporative emission standards of 1.75 times the certification standards will apply for the first three model years after an evaporative family is first certified to the LEV II standards (only for vehicles introduced prior to model year 2007, the year after 100 percent phase-in).[213] [214] An interim three-year period was considered sufficient to accommodate any technical issues that may arise.

Federal in-use conditions may raise unique issues (e.g., salt/ice exposure) for evaporative systems certified to the new proposed standards (which are equivalent to the LEV II standards), and thus, we propose to adopt a similar, interim in-use compliance provision for federal vehicles. As with the LEV II program, this provision would enable manufacturers to make adjustments for unforeseen problems that may occur in-use during the first three years of a new evaporative family. Like California, we believe that a three-year period is enough time to resolve these problems, because it allows manufacturers to gain real world experience and make adjustments to a vehicle within a typical product cycle.

Depending on the vehicle weight class and type of test, the Tier 2 certification standards are 1.3 to 1.9 times the LEV II certification standards. On average the Tier 2 standards are 1.51 times the LEV II certification standards. Thus, to maintain the same level of stringency for the in-use evaporative emission standards provided by the Tier 2 program, we propose to apply the Tier 2 standards in-use for only the first three model years after an evaporative family is first certified under today's proposed standards instead of the 1.75 multiplier implemented in the California LEV II program. Since the proposed evaporative emission certification standards (equivalent to LEV II standards) would be implemented in model year 2009 for LDVs/LLDTs and model year 2010 for HLDTs/MDPVs, these same certification

[210] 40 CFR 86.1803–01 defines multi-fuel as capable of operating on two or more different fuel types, either separately or simultaneously.

[211] For the Tier 2 program, multi-tier vehicles must meet the same standards on conventional and alternative fuel.

[212] California Air Resources Board, ''LEV II'' and ''CAP 2000'' Amendments to the California Exhaust and Evaporative Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles, and to the Evaporative Emission Requirements for Heavy-Duty Vehicles, Final Statement of Reasons, September 1999.

[213] 1.75 times the 3-day diurnal plus hot soak and 2-day diurnal plus hot soak standards.

[214] For example, evaporative families first certified to LEV II standards in the 2005 model year shall meet in-use standards of 1.75 times the evaporative certification standards for 2005, 2006, and 2007 model year vehicles.

standards would apply in-use beginning in model year 2012 for LDVs/LLDTs and model year 2013 for HLDTs/MDPVs.[215]

5. Existing Differences Between California and Federal Evaporative Emission Test Procedures

As described above, the California LEV II evaporative emission standards are numerically more stringent than EPA's Tier 2 standards, but due to differences in California and EPA evaporative test requirements, EPA and most manufacturers view the programs as similar in stringency. The Tier 2 evaporative program requires manufacturers to certify the durability of their evaporative emission systems using a fuel containing the maximum allowable concentration of alcohols (highest alcohol level allowed by EPA in the fuel on which the vehicle is intended to operate, i.e., a ''worst case'' test fuel). Under current requirements, this fuel would be about 10 percent ethanol by volume.[216] (We are retaining these Tier 2 durability requirements for the proposed evaporative emissions program.) California does not require this provision. To compensate for the increased vulnerability of system components to alcohol fuel, manufacturers have indicated that they will produce a more durable evaporative emission system than the Tier 2 numerical standards would imply, using the same low permeability hoses and low loss connections and seals planned for California LEV II vehicles.

As shown in Table VI.C–2, combined with the maximum alcohol fuel content for durability testing, the other key differences between the federal and California test requirements are fuel volatilities, diurnal temperature cycles, and running loss test temperatures.[217] The EPA fuel volatility requirement is 2 psi greater than that of California. The high end of EPA's diurnal temperature range, is 9° F lower than that of California. Also, EPA's running loss temperature is 10° F lower than California's.

TABLE VI.C–2.—DIFFERENCES IN TIER 2 AND LEV II EVAPORATIVE EMISSION TEST REQUIREMENTS

Test requirement	EPA tier 2	California LEV II
Fuel volatility (Reid Vapor Pressure in psi)	9	7.
Diurnal temperature cycle (degrees F)	72 to 96	65 to 105.
Running loss test temperature (degrees F)	95	105.

Currently, California accepts evaporative emission results generated on the federal test procedure (using federal test fuel), because available data indicates the federal procedure to be a ''worst case'' procedure. In addition, manufacturers can obtain federal evaporative certification based upon California results (meeting LEV II standards under California fuels and test conditions), if they obtain advance approval from EPA.[218]

D. Opportunities for Additional Exhaust Control Under Normal Conditions

In addition to the cold temperature NMHC and evaporative emission standards we are proposing, we evaluated an additional option for reducing hydrocarbons from light-duty vehicles. This option would further align the federal light-duty exhaust emissions control program with that of California. We are not proposing this option today for the reasons described below. It is possible that a future evaluation could result in EPA reconsidering the option of harmonizing the Tier 2 program with California's LEV–II program or otherwise seeking emission reductions beyond those of the Tier 2 program and those being proposed today.[219]

As explained earlier, section 202(l)(2) requires EPA to adopt regulations that contain standards which reflect the greatest degree of emissions reductions achievable through the application of technology that will be available, taking into consideration existing motor vehicle standards, the availability and costs of the technology, and noise, energy and safety factors. The cold temperature NMHC program proposed today is appropriate under section 202(l)(2) as a near-term control: That is, a control that can be implemented relatively soon and without disruption to other existing vehicle emissions control program. We are not proposing long-term (i.e., controls that require longer lead time to implement) at this time because we lack the information necessary to assess appropriate long-term controls. We believe it will be important to address the appropriateness of further MSAT controls in the context of compliance with other significant vehicle emissions regulations (discussed below).

In the late 1990's both the EPA and the California Air Resources Board finalized new and technologically challenging light-duty vehicle/truck emission control programs. The EPA program, known as Tier 2, focused on reducing NO_X emissions from the light-duty fleet. The California program, which is the second generation of their low emission vehicle (LEV) program and is known as LEV–II, focuses primarily on reducing hydrocarbons by tightening the light-duty NMOG standards. Both programs are expected to present the manufacturers with significant challenges, and will require the use of hardware and emission control strategies not used in the fleet under previously existing programs. Both programs will achieve significant reductions in emissions. Taken as a whole, the Tier 2 program presents the manufacturers with significant challenges in the coming years. Bringing essentially all passenger vehicles under the same emission control program regardless of their size, weight, and application is a major engineering challenge. The Tier 2 program represents a comprehensive, integrated package of exhaust, evaporative, and fuel quality standards which will achieve significant reductions in

[215] For example, evaporative families first certified to the proposed LDV/LLDT evaporative emission standards in the 2011 model year would be required to meet the Tier 2 LDV/LLDT evaporative emission standards in-use for 2011, 2012, and 2013 model year vehicles (applying Tier 2 standards in-use would be limited to the first three years after introduction of a vehicle), and 2014 and later model year vehicles of such evaporative families would be required to meet the proposed LDV/LLDT evaporative emission standards in-use.

[216] Manufacturers are required to develop deterioration factors using a fuel that contains the highest legal quantity of ethanol available in the U.S.

[217] Running loss emissions means evaporative emissions as a result of sustained vehicle operation (average trip in an urban area) on a hot day. The running loss test requirement is part of the 3-day diurnal plus hot soak test sequence.

[218] EPA may require comparative data from both federal and California tests.

[219] See *Sierra Club* v. *EPA,* 325 F.3d at 480 (EPA can reasonably determine that no further reductions in MSATs are presently achievable due to uncertainties created by other recently promulgated regulatory provisions applicable to the same vehicles).

NMHC, NO_X, and PM emissions from all light-duty vehicles in the program. These reductions will include significant reductions in MSATs. Emission control in the Tier 2 program will be based on the widespread implementation of advanced catalyst and related control system technology. The standards are very stringent and will require manufacturers to make full use of nearly all available emission control technologies.

Today the Tier 2 program remains early in its phase-in. Cars and lighter trucks will be fully phased into the program with the 2007 model year, and the heavier trucks won't be fully entered into the program until the 2009 model year. Even though the lighter vehicles will be fully phased in by 2007, we expect the characteristics of this segment of the fleet to remain in a state of transition at least through 2009, because manufacturers will be making adjustments to their fleets as the larger trucks phase in. The Tier 2 program is designed to enable vehicles certified to the LEV–II program to cross over to the federal Tier 2 program. At this point in time, however, it is difficult to predict the degree to which this will occur. The fleetwide NMOG levels of the Tier 2 program will ultimately be affected by the manner in which LEV–II vehicles are certified within the Tier 2 bin structure, and vice versa. We intend to carefully assess these two programs as they evolve and periodically evaluate the relative emission reductions and the integration of the two programs.

Today's proposal addresses toxics emissions from vehicles operating at cold temperatures. The technology to achieve this is already available and we project that compliance will not be costly. However, we do not believe that we could reasonably propose further controls at this time. There is enough uncertainty regarding the interaction of the Tier 2 and LEV–II programs to make it difficult to evaluate today what might be achievable in the future. Depending on the assumptions one makes, the LEV–II and Tier 2 programs may or may not achieve very similar NMOG emission levels. Therefore, the eventual Tier 2 baseline technologies and emissions upon which new standards would necessarily be based are not known today. Additionally, we believe it is important for manufacturers to focus in the near term on developing and implementing robust technological responses to the Tier 2 program without the distraction or disruption that could result from changing the program in the midst of its phase-in. We believe that it may be feasible in the longer term to seek additional emission reductions from the base Tier 2 program, and the next several years will allow an evaluation based on facts rather than assumptions. For these reasons, we are deferring a decision on seeking additional NMOG reductions from the base Tier 2 program.

E. Vehicle Provisions for Small Volume Manufacturers

Prior to issuing a proposal for this proposed rulemaking, we analyzed the potential impacts of these regulations on small entities. As a part of this analysis, we convened a Small Business Advocacy Review Panel (SBAR Panel, or the Panel). During the Panel process, we gathered information and recommendations from Small Entity Representatives (SERs) on how to reduce the impact of the rule on small entities, and those comments are detailed in the Final Panel Report which is located in the public record for this rulemaking (Docket EPA–HQ–OAR–2005–0036). Based upon these comments, we propose to include lead time transition and hardship provisions that would be applicable to small volume manufacturers as described below in section VI.E.1 and VI.E.2. For further discussion of the Panel process, see section XII.C of this proposed rule and/or the Final Panel Report.

As discussed in more detail in section XII.C in addition to the major vehicle manufacturers, three distinct categories of businesses relating to highway light-duty vehicles would be covered by the new vehicle standards: Small volume manufacturers (SVMs), independent commercial importers (ICIs),[220] and alternative fuel vehicle converters.[221] We define small volume manufacturers as those with total U.S. sales less than 15,000 vehicles per year, and this status allows vehicle models to be certified under a slightly simpler certification process. For certification purposes, SVMs include ICIs and alternative fuel vehicle converters since they sell less than 15,000 vehicles per year.

About 34 out of 50 entities that certify vehicles are SVMs, and the Panel identified 21 of these 34 SVMs that are small businesses as defined by the Small Business Administration criteria (5 manufacturers, 10 ICIs, and 6 converters). Since a majority of the SVMs are small businesses and all SVMs have similar characteristics as described below in section VI.E.1, the Panel recommended that we apply the lead time transition and hardship provisions to all SVMs. These manufacturers represent just a fraction of one percent of the light-duty vehicle and light-duty truck sales. Our proposal today is consistent with the Panel's recommendation.

1. Lead Time Transition Provisions

In these types of vehicle businesses, predicting sales is difficult and it is often necessary to rely on other entities for technology (see earlier discussions in section VI on technology needed to meet the proposed standards).[222] [223] Moreover, percentage phase-in requirements pose a dilemma for an entity such as a SVM that has a limited product line. For example, it is challenging for a SVM to address percentage phase-in requirements if the manufacturer makes vehicles in only one or two test groups. Because of its very limited product lines, a SVM could be required to certify all their vehicles to the new standards in the first year of the phase-in period, whereas a full-line manufacturer (or major manufacturer) could utilize all four years of the phase-in. Thus, similar to the flexibility provisions implemented in the Tier 2 rule, the Panel recommended that we allow SVMs, manufacturers with sales less than 15,000 vehicles per year (includes all vehicle small entities that would be affected by this rule, which are the majority of SVMs) the following flexibility options for meeting cold temperature NMHC standards and evaporative emission standards as an element of determining appropriate lead time for these entities to comply with the standards.

For cold NMHC standards, the Panel recommended that SVMs simply comply with the standards with 100 percent of their vehicles during the last year of the 4 year phase-in period. Since these entities could need additional lead time flexibility and proposed standards for light-duty vehicles and light light-duty trucks would begin in model year 2010 and would end in model year 2013 (25%, 50%, 75%, 100% phase-in over 4

[220] ICIs are companies that hold a Certificate (or certificates) of Conformity permitting them to import nonconforming vehicles and to modify these vehicles to meet U.S. emission standards.

[221] Alternative fuel vehicle converters are businesses that convert gasoline or diesel vehicles to operate on alternative fuel (e.g., compressed natural gas), and converters must seek a certificate for all of their vehicle models.

[222] For example, as described later in section VI.E.3, ICIs may not be able to predict their sales because they are dependent upon vehicles brought to them by individuals attempting to import uncertified vehicles.

[223] SMVs (those with sales less than 15,000 vehicles per year) include ICIs, alternative fuel vehicle converters, companies that produce specialty vehicles by modifying vehicles produced by others, and companies that produce small quantities of their own vehicles, but rely on major manufacturers for engines and other vital emission related components.

years), we propose that the SVM provision would be 100 percent in model year 2013. Also, since the proposed standard for heavy light-duty trucks and medium-duty passenger vehicles would start in 2012 (25%, 50%, 75%, 100% phase-in over 4 years), we propose that the SVM provision would be 100 percent in model year 2015.

In regard to evaporative emission standards, the Panel recommended that since the proposed evaporative emissions standards would not have phase-in years, we allow SVMs to simply comply with standards during the third year of the program (we have implemented similar provisions in past rulemakings). Given the additional challenges that SVMs face, as noted above, we believe that this recommendation is reasonable. Therefore, for a 2009 model year start date for light-duty vehicles and light light-duty trucks, we propose that SVMs meet the evaporative emission standards in model year 2011. For a model year 2010 implementation date for heavy light-duty trucks and medium-duty passenger vehicles, we propose that SVMs comply in model year 2012.

2. Hardship Provisions

In addition, the Panel recommended that hardship provisions be extended to SVMs for the cold temperature NMHC and evaporative emission standards as an aspect of determining the greatest emission reductions feasible. These entities could, on a case-by-case basis, face hardship more than major manufacturers (manufacturers with sales of 15,000 vehicles or more per year), and we are proposing this provision to provide what could prove to be a needed safety valve for these entities. SVMs would be allowed to apply for up to an additional 2 years to meet the 100 percent phase-in requirements for cold NMHC and the delayed requirement for evaporative emissions. As with hardship provisions for the Tier 2 rule, we propose that appeals for such hardship relief must be made in writing, must be submitted before the earliest date of noncompliance, must include evidence that the noncompliance will occur despite the manufacturer's best efforts to comply, and must include evidence that severe economic hardship will be faced by the company if the relief is not granted.

We would work with the applicant to ensure that all other remedies available under this rule are exhausted before granting additional relief. To avoid the very existence of the hardship provision prompting SVMs to delay development, acquisition and application of new technology, we want to make clear that we would expect this provision to be rarely used. Our proposed rule contains numerous flexibilities for all manufacturers and it delays implementation dates for SVMs, which effectively provides them more time. We would expect small volume manufacturers to prepare for the applicable implementation dates in today's proposed rule.

3. Special Provisions for Independent Commercial Importers (ICIs)

Although the SBAR panel did not specifically recommend it, we are proposing to allow ICIs to participate in the averaging, banking, and trading program for cold temperature NMHC fleet average standards (as described in Table IV.B.–1), but with appropriate constraints to ensure that fleet averages will be met. The existing regulations for ICIs specifically bar ICIs from participating in emission related averaging, banking, and trading programs unless specific exceptions are provided (see 40 CFR 85.1515(d)). The concern is that they may not be able to predict their sales and control their fleet average emissions because they are dependent upon vehicles brought to them by individuals attempting to import uncertified vehicles. However, an exception for ICIs to participate in an averaging, banking, and trading program was made for the Tier 2 NO_X fleet average standards, and today we propose to apply a similar exception for the cold temperature NMHC fleet average standards.

If an ICI is able to purchase credits or to certify a test group to a family emission level (FEL) below the applicable cold temperature NMHC fleet average standard, we would permit the ICI to bank credits for future use. Where an ICI desires to certify a test group to a FEL above the applicable fleet average standard, we would permit them to do so if they have adequate and appropriate credits. Where an ICI desires to certify to an FEL above the fleet average standard and does not have adequate or appropriate credits to offset the vehicles, we would permit the manufacturer to obtain a certificate for vehicles using such a FEL, but would condition the certificate such that the manufacturer can only produce vehicles if it first obtains credits from other manufacturers or from other vehicles certified to a FEL lower than the fleet average standard during that model year.

Our experience over the years through certification indicates that the nature of the ICI business is such that these companies cannot predict or estimate their sales of various vehicles well. Therefore, we do not have confidence in their ability to certify compliance under a program that would allow them leeway to produce some vehicles to a higher FEL now but sell vehicles with lower FELs later, such that they were able to comply with the fleet average standard. We also cannot reasonably assume that an ICI that certifies and produces vehicles one year, would certify or even be in business the next. Consequently, we propose that ICIs not be allowed to utilize the deficit carryforward provisions of the proposed ABT program.

VII. Proposed Gasoline Benzene Control Program

A. Overview of Today's Proposed Fuel Control Program

As discussed in sections I, IV, and V above, people experience elevated risk of cancer and other health effects as a result of inhalation of air toxics. Mobile sources are responsible for a significant portion of this risk. As required by section 202(l) of the Clean Air Act, EPA has evaluated options to reduce MSAT emissions by setting standards for motor vehicle fuel. We have determined that there are fuel-related technologies available to feasibly reduce MSAT emissions and that these reductions are achievable, considering cost, energy, and other factors. These feasible reductions would be in addition to those resulting from actions taken by the industry in response to the earlier fuel-related MSAT programs described in section V above. Accordingly, we believe a fuel control program is necessary and appropriate to reduce air toxics emissions from motor vehicles to the greatest extent achievable (in addition to the programs proposed elsewhere in this notice to reduce MSAT emissions by changes to gasoline-powered motor vehicles and gas cans). This section of the preamble describes our proposed fuel control program.

The section begins with a detailed description of today's proposed program. In summary, we propose that beginning January 1, 2011, refiners would meet an average gasoline benzene content standard of 0.62% by volume on all their gasoline (reformulated and conventional) nationwide.[224] We also propose that refiners could generate benzene credits and use or sell them as a part of a nationwide averaging, banking, and trading (ABT) program.

[224] The State of California has a similar benzene standard and gasoline sold there is not covered by this proposal. For more information, see California Code of Regulations, Title 13 Section 2262.

We believe that the proposed benzene standard, combined with the proposed ABT program, would result in the largest feasible overall reductions in benzene emissions of any potential fuel-based MSAT control program. Finally, as an aspect of achieving the greatest emission reductions, we also propose special compliance flexibility for approved small refiners.

This section then describes in detail how we arrived at the proposed program. We discuss a range of potential approaches to reducing MSATs through changes in fuel, concluding that benzene emissions would be significantly more responsive to fuel changes than emissions of any other fuel-related MSAT. This is followed by discussion of alternate methods of reducing benzene emissions, resulting in the proposed approach of directly controlling benzene content. We also discuss how we arrived at the proposed level of 0.62 volume percent (vol%) for the benzene standard. We discuss why we believe that incorporating the proposed ABT program would be crucial for the effectiveness of the overall benzene control program and describe how the system would work. Finally, we review the recommendations of the special panel that was convened to assess the potential for disproportionate impacts of the proposed program on small refiners, and present our reasoning for the special small refiner provisions we are proposing today.

Today's proposed action would fulfill several statutory and regulatory goals for gasoline-related MSAT emissions, which are discussed in more detail in this section. The program would meet our commitment in the MSAT1 program to consider further MSAT control. The program would also allow EPA to streamline the regulatory provisions for the air toxics performance requirements of the reformulated gasoline (RFG) and Anti-dumping programs. The expected levels of benzene control by individual refiners under this proposal, combined with other gasoline controls such as sulfur, RVP, and VOC controls, mean that compliance with these provisions is expected to lead to compliance with the annual average requirements for benzene and toxics performance for RFG and the annual average Anti-dumping toxics performance for conventional gasoline. EPA is therefore proposing that upon full implementation in 2011, the regulatory provisions for the benzene control program would become the single regulatory mechanism used to implement these RFG and Anti-dumping annual average toxics requirements, replacing the current RFG and Anti-dumping annual average provisions (although the 1.3 vol% benzene cap would still apply for RFG). The proposed benzene control program would also replace the MSAT1 requirements. In addition, the program would satisfy certain fuel MSAT conditions of the Energy Policy Act of 2005. By consciously designing this proposed program to address these separate but related goals, we would significantly consolidate and simplify the existing national fuel-related MSAT regulatory program.

Finally, this section concludes with a detailed summary of our assessment of the technological feasibility for different types of refineries, and the refining industry as a whole, to meet the program as proposed. We request general and specific comment on all aspects of the proposed program, and we request that comments include supporting data whenever possible.

B. Description of the Proposed Fuel Control Program

Today's proposed program has three main components, the development of each of which is further described later in this section:

—*A gasoline benzene content standard.* We propose that an annual average gasoline benzene standard of 0.62 vol% be implemented beginning January 1, 2011. This single standard would apply to all gasoline, both reformulated (RFG) and conventional (CG) nationwide (except for gasoline sold in California, which is already covered by a similar state program).

—*An averaging, banking, and trading (ABT) program.* From 2007–2010 refiners could generate benzene credits by taking early steps to reduce gasoline benzene levels. Beginning in 2011 and continuing indefinitely, refiners could generate credits by producing gasoline with benzene levels below the 0.62% average standard. Refiners could apply the credits towards company compliance, ''bank'' the credits for later use, or transfer (''trade'') them to other refiners nationwide (outside of California) under the proposed program. Under this program, refiners could use credits to achieve compliance with the benzene content standard, regardless of their actual gasoline benzene levels.[225]

—Hardship provisions. Refiners approved as ''small refiners'' would have access to special temporary relief provisions. In addition, any refiner facing extreme unforeseen circumstances or extreme hardship circumstances could apply for similar temporary relief.

C. Development of the Proposed Gasoline Benzene Standard

EPA believes that benzene control is by far the most effective fuel-based means of achieving MSAT emissions control, as described in this section. There are other options that can target individual MSATs or reduce overall VOCs and thereby reduce MSATs as well. We have evaluated these other options, as discussed below, and our analysis indicates that the potential MSAT reductions would be considerably smaller and more expensive.

1. Why Are We Focusing on Controlling Benzene Emissions?

We considered controlling emissions of several MSATs through changes to fuel parameters. There are only a limited number of MSATs that are affected through fuel changes, each of which we discuss below. For several reasons, we have concluded that the most effective and appropriate means of reducing fuel-related MSATs is to reduce the benzene emissions attributable to gasoline.

Benzene emissions can be reduced much more significantly through fuel changes than can emissions of other MSATs. Relatively small changes in gasoline can result in very significant reductions in benzene emissions. This relative responsiveness of benzene emissions to fuel controls (specifically to control of gasoline benzene content, as discussed in the next section) is coupled with little negative impact on other important characteristics of gasoline or refining processes. A related and critical advantage of fuel control of benzene emissions, as compared to fuel control of emissions of other MSATs as discussed below, is that controlling benzene emissions does not significantly increase emissions of other MSATs.[226]

In determining an appropriate approach to fuel-related MSAT control, a key consideration was octane value.

[225] However, the per-gallon benzene cap (1.3 vol%) in the RFG program would continue to apply separately.

[226] A key tool in evaluating the potential for fuel changes to affect MSAT emissions is EPA's Complex Model. This model relates changes in gasoline parameters with emissions of specific MSATs and was developed for refiners and EPA to assess compliance with the RFG, Anti-dumping, and MSAT1 programs. (See section V.D.1 above.) Given a set of gasoline parameters, it estimates the emissions of an average vehicle based on a large set of fuel effects data. We further discuss the Complex Model, as well as other sources of information the relationships between fuel changes and MSAT emissions, in chapter 6 of the RIA.

Among potential approaches to fuel-related MSAT emission reduction, only benzene emission reduction can avoid major losses in octane value and the negative cost and environmental consequences discussed below of replacing that lost octane value. Finished gasoline must meet minimum specifications for octane value; these specifications are tied to the operational needs of motor vehicles. Thus, refiners must be keenly aware of how any changes in gasoline production might reduce the octane value of their fuel, what approaches to restore the octane value might be available, and the costs in material and operational changes of any selected approach.

There are a limited number of approaches refiners have at their disposal to restore gasoline octane value lost through control of MSAT emissions. These approaches vary in their economics and effectiveness, and their availability may be limited by the specific configuration of a given refinery. However, all methods of replacing octane value have cost implications, and as shown in the next paragraph, air toxics implications as well.

In the case of changes in gasoline production that are intended to reduce MSAT emissions, it is also important to consider whether restoring any lost octane might itself significantly increase other MSAT emissions. Some methods of replacing octane value can increase other MSATs. For example, increasing aromatics would increase benzene emissions; adding MTBE would increase formaldehyde emissions; and adding ethanol would increase acetaldehyde emissions. Given the very large MSAT emission reduction associated with benzene control, these impacts on other MSATs are relatively insignificant. However, in the case of changes in other fuel qualities (e.g., aromatics control), the relative impacts on other MSATs would be greater.

We encourage comment on our decision to propose a program that directly controls gasoline benzene content, including comments on each of the alternate approaches to MSAT control discussed in the following paragraphs.

a. Other MSAT Emissions

As alternatives to the proposed program focusing on benzene emission reductions, we considered other MSATs that are responsive to fuel-based emission control. Each of these is discussed next.

Polycyclic Organic Matter, or POM, is composed of a number of combustion products of gasoline. According to the Complex Model, POM emissions are a function of exhaust VOC. Several fuel parameters including volatility and sulfur content affect VOC emissions. As discussed below, little data exists about the potential impacts of changes in gasoline volatility and sulfur content on VOC, and thus POM, emissions from new Tier 2-compliant vehicles. In any event, because POM is only a tiny fraction of vehicle VOC emissions, we expect that further changes in these fuel parameters would have only small effects on POM. As a result, we are not proposing fuel controls to address POM emissions in today's action.

Emissions of the compound 1,3-butadiene can be reduced by reducing the olefin content of gasoline. However, olefin reduction yields relatively small reductions in 1,3-butadiene and can increase VOC emissions. In addition, olefin reduction significantly affects octane, with the negative cost and MSAT emissions consequences of octane replacement. We are thus not proposing to address 1,3-butadiene emissions through fuel changes.

Emissions of the compound formaldehyde can only be effectively reduced by reducing use of the octane enhancer methyl tertiary butyl ether (MTBE). This is because formaldehyde increases significantly as a combustion product when MTBE is added to gasoline. Formaldehyde also increases to a lesser extent when ethanol is added to gasoline, as described below. For a number of years, MTBE has been used as a cost-effective way to meet mandated fuel oxygenate requirements and to boost octane. In recent years, many states have banned the use of MTBE because it has leaked from storage tanks and caused significant groundwater contamination. More recently, in the wake of the removal of the oxygenate requirement in the Energy Policy Act of 2005, many refiners are taking action to remove MTBE from their gasoline as soon as possible. As a result, MTBE use and the resulting formaldehyde emissions are expected to continue to decline, and no additional federal action appears warranted at this time.

The compound acetaldehyde is a combustion product of gasoline when ethanol is added. Controlling acetaldehyde would require reductions in the use of ethanol as a gasoline additive. However, the Energy Policy Act of 2005 (section 1501) includes a renewable fuels program that will increase use of ethanol in gasoline nationwide. That Act requires a study of the Act's impacts on public health, air quality, and water resources. We accordingly intend to defer further evaluation of acetaldehyde emissions to the analyses associated with the Energy Policy Act.

b. MSAT Emission Reductions Through Lowering Gasoline Volatility or Sulfur Content

We also considered two approaches to fuel-related MSAT control that would involve increasing the stringency of two existing emission control programs. Both were originally promulgated primarily to address ozone but also have the effect of reducing some MSAT emissions by virtue of their control of VOC emissions. As explained in section V, the Tier 2 program included the pairing of lower vehicle emissions standards with large reductions in gasoline sulfur levels. The low sulfur fuel helped enable development of more advanced catalytic aftertreatment systems needed to meet the stringent tailpipe standards. These actions will result in large reductions of VOC, NO_X, and air toxics emissions. In development of today's proposal, we considered whether further reductions in fuel sulfur would bring significant additional reductions in MSAT emissions.

The second program considered for additional stringency was the gasoline volatility program, which was implemented in 1989 to address evaporative VOC emissions from gasoline vehicles. Reducing the volatility of gasoline can reduce evaporative VOC emissions as well as exhaust emissions. Evaporative VOC emissions include benzene. As a result, in developing this proposal we have considered whether further reductions in gasoline volatility may be effective in further reducing MSAT emissions.

In the cases of both further reductions in RVP and sulfur reductions below the current 30 ppm standard, the available data is not sufficient to conclude that additional control of either would be a valuable MSAT emission reduction strategy. Historic data suggest that reducing both RVP and sulfur content would reduce overall VOC emissions from vehicles, in turn reducing both MSATs and ozone formation. However, vehicles complying with the stringent new Tier 2 emission standards have dramatically lower VOC emissions than earlier vehicles. Furthermore, it is likely that VOC emissions for these vehicles would react differently to RVP and sulfur control than older vehicles, as new catalysts and control systems may have more or less sensitivity to these variables. Since the dominant effect on MSAT emissions of changing these fuel parameters is through their impact on total VOC mass, it is not possible to

properly assess the impact of changes in these fuel parameters on MSAT emissions without additional data. We have begun collecting data on some of these new vehicles, but more work will be required before we can draw conclusions about the effectiveness of these fuel controls in reducing MSAT emissions. Therefore, we are not proposing additional control of gasoline volatility or sulfur at this time, but will continue to evaluate them for possible future action. We request comments on these potential fuel controls as emission reduction strategies, in particular for MSAT emissions, including any data that does or does not support the effectiveness of such controls.

i. Gasoline Sulfur Content

In general, reducing gasoline sulfur levels increases the effectiveness of the catalytic converter at destroying unburned fuel and other VOCs in vehicle exhaust. Catalytic converters contain a variety of physical and chemical structures that act as reaction sites for conversion of raw exhaust gases into less harmful ones before they are emitted into the atmosphere. Over time, sulfur compounds in the exhaust gases interfere with these processes, making the catalyst less effective under normal driving conditions.[227] Since many air toxics are part of the exhaust VOCs, reduction of fuel sulfur would be expected to reduce air toxics emissions. As with the Tier 2 program, however, desulfurizing gasoline further would reduce gasoline octane. Most options for recovering this lost octane (e.g., increasing aromatics) would result in some offsetting MSAT emissions increases.

EPA primarily uses two computer models for examining emissions impacts when considering changes in fuel properties: the Complex Model and the MOBILE model. The Complex Model (CM) was developed as a compliance tool that refiners use to ensure their gasoline meets its baseline requirements under the RFG, Anti-dumping, and MSAT1 programs. Given a set of fuel parameters, it estimates the emissions of an average vehicle using regression relationships drawn from a large set of fuel effects data. The CM contains data on test fuels with sulfur levels as low as 5 ppm, but is based on the Auto/Oil research programs of the early 1990s, and reflects performance of vehicles on the road during that time period. With a sulfur reduction from 30 ppm to 10 ppm applied to average 2003 conventional gasoline, the CM projects a decrease of approximately 1% for exhaust benzene, NO_X and CO.

MOBILE was developed to estimate aggregate emissions on a county, state, or national scale. It uses a fuel effects dataset that includes the CM dataset with some updates, along with driving data, to predict emissions inventories of pollutants for a specified time period and area of the country. MOBILE6.2 contains updates from a small number of LEV and ULEV vehicles in addition to the CM dataset, but applies a lower limit of 30 ppm to fuel sulfur content being modeled to avoid extrapolation beyond the range of available emissions data.

Based primarily on the above models, the analyses done for the Tier 2 rulemaking suggested benzene emission reductions on the order of 9% could be expected in 2020 as a result of the fuel sulfur reduction expected from that program alone (the final Tier 2 program included low sulfur gasoline as well as tightened vehicle standards).[228] A recent study done on vehicles meeting LEV, TLEV, and ULEV standards indicates that sulfur reductions from 30 to 5 ppm may reduce NMHC by more than 10%, bringing similar reductions in air toxics.[229] Additional analyses done by EPA on sulfur reductions in this range suggest VOC emission reductions on the order of 5% may be expected, with refining costs estimated at about a half cent per gallon. Given these analyses using available data, using sulfur reductions as air toxics control alone would not be as cost-effective as other options in this proposal. Further discussion of the feasibility and costs are available in Chapters 6 and 9, respectively, of the RIA.

Since our models do not reflect the significant improvements in emissions control technology over the past decade, more fuel effects studies are necessary on newest-technology vehicles before going forward with sulfur control. A small cooperative test program is currently underway between EPA and the Alliance of Automobile Manufacturers to evaluate the effects of reducing sulfur below 10 ppm on Tier 2 Bin 5 compliant vehicles.

In addition to potential air toxics reductions from adjustment of gasoline sulfur to 10 ppm, reducing sulfur may also provide significant VOC and NO_X emission reductions. These emission reductions may be important for states in complying with the National Ambient Air Quality Standards (NAAQS) for ozone. Since the implementation of the RFG program, several states and localities have made their own unique fuel property requirements in an effort to further improve air quality.[230] As a result, by summer 2004 the gasoline distribution and marketing system in the U.S. had to differentiate between more than 12 different fuel specifications, when storing and shipping fuels between refineries, pipelines, terminals, and retail locations. These unique fuels decrease nationwide fungibility of gasoline, which can lead to local supply problems and amplify price fluctuations.[231, 232] In addition to the existing state fuel programs, we are aware of a number of other states considering new programs (although in the context of the recently enacted Energy Policy Act it is unclear what will occur). While the timeline for state action on new fuel formulations could be prior to any nationwide ultra-low sulfur standard, implementation of such a standard could help diminish issues related to small-market fuel programs in the long term.

From the perspective of gasoline production, reducing sulfur to ultra-low levels does not happen completely independently of other fuel parameters. The emissions benefits of further sulfur reduction gained in vehicle aftertreatment may be offset by unintended changes in other gasoline properties. The refining process modifications required to bring sulfur to ultra-low levels begin to have a stronger effect on other components of gasoline, such as olefins (the effect of which is discussed in the previous section). These impacts must be further evaluated before moving forward with a proposal of additional sulfur reductions for the purpose of air toxics reduction. These issues are also discussed in more detail in Chapter 6 of the RIA.

Refiners with whom we have met have generally expressed disapproval of further sulfur control. The Tier 2 gasoline sulfur program requires refiners to meet an average standard of 30 ppm. In response many have invested in and brought online desulfurization units, which would not have the capacity to

[227] For further discussion on sulfur effects on emissions, see the Tier 2 Regulatory Impact Analysis, EPA 420–R–99–023.

[228] Tier 2 Regulatory Impact Analysis, EPA 420–R–99–023

[229] AAM-Honda fuel effects study, 2000

[230] These changes have focused almost exclusively on additional RVP control, with just one program also controlling sulfur to 30 ppm earlier than required by EPA.

[231] EPA, Study of Unique Gasoline Fuel Blends (''Boutique Fuels''), Effects on Fuel Supply and Distribution and Potential Improvements, EPA420–P–01–004

[232] GAO, Special Gasoline Blends Reduce Emissions and Improve Air Quality, but Complicate Supply and Contribute to Higher Prices, GAO–05–421

reach a new, lower standard of 10 ppm in many cases. Modifications would have to be made to units that have recently been installed to comply with the current gasoline sulfur requirements. In some cases these units might have to be replaced with new units. EPA requests comments on the magnitude of the impact of a new, lower sulfur standard, including the potential effect on refiners that have recently installed desulfurization units.

On the automotive side, sulfur reduction may encourage further development of lean-burn or direct-injection gasoline technology. Leaner combustion of gasoline results in greater fuel economy and less VOC and carbon dioxide emissions, but generally produces more engine-out nitrogen oxides. Reducing fuel sulfur to 10 ppm would improve feasibility and reduce cost of next-generation aftertreatment designed to control these higher levels of nitrogen oxides. EPA will continue to evaluate further gasoline sulfur reductions, and seeks comment on it, especially with data supporting or opposing such action.

ii. Gasoline Vapor Pressure

According to the Complex Model and the MOBILE model, reducing fuel vapor pressure reduces evaporative as well as exhaust VOC emissions. Reducing VOC emissions in turn reduces MSAT emissions. A portion of this MSAT emission decrease through VOC control would likely be offset through an increase in the relative concentration of MSAT emissions. As volatility is decreased, non-aromatic compounds are removed from the gasoline, increasing the concentration of aromatics. Furthermore, these non-aromatic compounds are higher in octane, which would have to be offset—perhaps with still further increases in aromatics. Such increases in aromatics would lead to an increase in the relative concentration of benzene in VOC emissions. However, since changing vapor pressure has an effect on evaporative emissions, reducing vapor pressure can also reduce evaporative benzene from stationary sources related to gasoline distribution and marketing. Moreover, reducing overall VOC emissions reduces ground level ozone in urban areas, which itself has a significant impact on health and welfare.

Currently, in reformulated gasoline (RFG) areas, fuel is limited to roughly 7.0 psi Reid vapor pressure (RVP) in the summer season in order to meet the VOC performance standard. Additional vapor pressure controls considered for this proposal would regulate RVP levels to 7.0 or 7.8 in some conventional gasoline (CG) ozone nonattainment areas, resulting in an impacted volume of gasoline equal to about 50% of that of current federal RFG. Further details of these analyses are covered in Chapter 6 of the RIA.

As with the sulfur analyses above, EPA also uses the Complex Model and MOBILE to estimate emissions impacts of changes in gasoline vapor pressure. In terms of the fuel parameter itself, this process is somewhat simpler than modeling sulfur effects since the range of vapor pressures useful in conventional vehicles has been well-defined for a number of years and is not expected to change. However, parallel to the arguments made above for sulfur, data on the effects of RVP changes on air toxics in these models is dated and does not represent newest technology. Since our models do not reflect improvements in emissions control technology for the Tier 2 program, more fuel effects studies must be carried out before making decisions on further gasoline vapor pressure controls. The cooperative test program between EPA and the Alliance of Automobile Manufacturers described above is also examining some of the effects of changes in RVP.

Looking beyond emissions benefits, more stringent national vapor pressure standards could also help avoid additional small market (''boutique'') fuels. Several states and localities have adopted their own seasonal requirements for vapor pressure in an effort to improve air quality, contributing to constraints on gasoline supply and potential for price volatility.[233] [234]

Feedback from refiners on further volatility control has highlighted concerns with the summer-winter butane balance and resulting potentially adverse supply implications. Currently, refiners who produce large quantities of RFG must remove a significant amount of the light-end components from their fuel in the summer to meet the vapor pressure specifications. These light components, primarily butanes, are often stored and then blended back into gasoline in the winter when higher fuel vapor pressures are needed for drivability reasons. Several refiners have indicated that a new rule adding a number of reduced RVP areas would cause the amount of butanes removed in summer to exceed what is useable in winter, resulting in a net loss of volume from the annual pool and a need to make up supply at additional expense. EPA will continue to evaluate further gasoline volatility reductions, and seeks comment on it, especially with data supporting or opposing such action.

c. Toxics Performance Standard

While we are not proposing it, we considered and are seeking comment on the merits of expressing the standard as an air toxics performance standard rather than as a benzene content standard. Such a standard would be analogous to the current MSAT1 standard, but more stringent and with an ABT component. In theory, a toxics performance standard could provide broader environmental benefits by addressing other toxics in addition to benzene. However, because controlling benzene is more cost-effective than controlling emissions of other MSATs, refiners are unlikely to reduce emissions of other MSATs whether or not the standard is in the form of a toxics performance standard or a benzene content standard. Setting a toxics performance standard at an appropriate level also requires us to predict future changes in fuel properties in addition to benzene, and to be able to establish as precisely as possible the effects of those fuel properties on emissions of several MSATs. In addition, a toxics emission performance standard is more complex to implement and enforce than a benzene content standard. For all of these reasons, as discussed more fully below, we believe a benzene content standard offers more certain environmental results and less complexity. However, we seek comment on the overall merits of an air toxics performance standard, including comments specifically on the tradeoff between the complexity of complying with a performance standard and the additional environmental benefits it could provide.

Based on our analysis for this proposal, fuel benzene control is by far the most effective and cost-effective means of achieving MSAT emission reductions. This is consistent with our experience with the MSAT1 and other air toxics control programs, which have shown that even when refiners have the flexibility to choose among different fuel changes to achieve MSAT control, reduction in benzene content is the predominant choice. Only when other fuel changes that impact MSAT emission performance are mandated (e.g., sulfur control, oxygenate use) have refiners made fuel changes other than benzene content to control MSAT

[233] EPA, Study of Unique Gasoline Fuel Blends (''Boutique Fuels''), Effects on Fuel Supply and Distribution and Potential Improvement, EPA420–P–01–004.

[234] GAO, Special Gasoline Blends Reduce Emissions and Improve Air Quality, but Complicate Supply and Contribute to Higher Prices, GAO–05–421.

emissions. As a result, even if we were to express the proposed standard as an air toxics performance standard rather than a benzene content standard, we would expect the outcome to be the same—benzene content control with corresponding benzene emission reductions and no changes in other MSAT emissions. Our analysis of the feasibility and cost of the program would be identical as well. If future fuel parameters are significantly different than we have projected in this analysis such that emissions of other MSATs decrease, then a toxic performance standard would result in less benzene control than would be achieved by the benzene content standard we propose today, with a corresponding overall reduction in cost. If future fuel parameters are significantly different such that emissions of other MSATs increase, then refiners would need to reduce benzene content to levels that are not feasible considering cost, but overall toxics performance would be maintained.

If we were to set an air toxics performance standard, the accuracy of the model used in estimating the real world effects of the many different fuel parameters on MSAT emissions also becomes of critical importance. To the extent fuel changes are projected to result in air toxics emission reductions that are not in fact borne out in-use, then the standard will have less benefit. There was a great deal of work done in the early 1990's to develop the Complex Model for the reformulated gasoline program. It estimates VOC, NO_X, and certain MSAT emissions (benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and POM) as a function of eight fuel properties (RVP, oxygen, aromatics, benzene, olefins, sulfur, E200, and E300) for 1990 technology vehicles. However, a similar set of comprehensive data does not yet exist for new Tier 2 vehicles. Some of the fuel effects that were found to be statistically significant in the Complex Model may not be significant for Tier 2 vehicles (e.g., distillation properties). Others that impacted MSAT emissions primarily through their impact on VOC emissions may be of much less importance, due to the much lower VOC emissions of Tier 2 vehicles.[235] To the extent that the Complex Model gives air toxics credit for fuel changes that are later found to be much smaller or not valid at all, a toxics performance standard could result in less fuel benzene control and less in-use MSAT control. Of all the fuel changes from past modeling, we would have the greatest confidence that the benzene relationships are unlikely to change significantly. This is due to the direct relationship between benzene fuel content and benzene evaporative and exhaust emissions, and due to the magnitude of these impacts. Thus, we would have the greatest confidence that the MSAT emission reductions projected from a fuel benzene content standard will be realized in-use.

In addition, if we were to set an air toxics performance standard, it would be important to have a clear understanding of the changes in fuel properties anticipated in the future independent of today's proposal. Significant changes in the composition of gasoline are anticipated over the next several years as a result of the Energy Policy Act of 2005 (EPAct). MTBE is being removed from gasoline, ethanol use is increasing dramatically, and the oxygenate mandate for RFG is being eliminated. To the extent that these changes would result in reductions in modeled MSAT emission performance automatically, then refiners could comply with an air toxics performance standard with less benzene control than would be achieved under today's proposed benzene standard, and with lower overall costs. Conversely, to the extent that these changes would result in increases in modeled MSAT emission performance, an air toxics performance standard would require refiners to take additional measures to maintain overall MSAT performance, but these measures may not be cost-effective.

Although a toxics performance standard could theoretically give refiners more flexibility than a program focusing only on benzene emissions, we do not believe that such flexibility would be meaningful in actual practice. As discussed above, in order to comply with a new total MSAT standard, we expect that refiners would rely almost exclusively on benzene control. However, if their emission performance for other MSATs changed in the future (due to such factors as changes in oxygenate use, octane needs, or crude oil quality), refiners could find themselves unable to maintain overall MSAT performance using cost-effective controls.

For all these reasons, we are not proposing to address fuel-related MSAT emissions with a toxics performance standard, but we seek comment on this option.[236] We also seek comment on the merits of applying an air toxics performance standard in addition to a fuel benzene content standard, and how such a dual standard could be implemented. From a theoretical standpoint, this dual standard might serve as a backstop to ensure overall toxics performance is maintained. However, it is not clear how such an approach could be realistically implemented, especially in the context of ABT programs that apply to both.

d. Diesel Fuel Changes

We are also not proposing today to reduce MSATs by changing diesel fuel. The existing major diesel fuel sulfur programs being implemented in the next few years for highway and nonroad diesel fuel will have a very large impact on reducing MSAT emissions " specifically diesel particulate matter and exhaust organic gases. We have found in the on-highway diesel engine rulemaking that these are the greatest reductions achievable and reiterate that finding here. (See also section V.D.1.f above.) We are not aware of other changes to diesel fuel that could have a significant effect on emissions of any other MSATs. We welcome comment on our decision to focus this proposed program exclusively on changes to gasoline.

2. Why Are We Proposing To Control Benzene Emissions By Controlling Gasoline Benzene Content?

In the previous section, we describe how we decided to focus today's proposed fuel program on gasoline benzene emissions. This section describes our decision to propose to reduce benzene emissions through a gasoline benzene content standard. We also describe our consideration of two other potential approaches to reducing benzene emissions, both of which would indirectly reduce gasoline benzene content: a standard to control the gasoline content of all aromatic compounds; and a standard to control benzene emissions.

a. Benzene Content Standard

For several reasons we have decided that a benzene content standard would be the most cost-effective and most certain way to reduce gasoline benzene emissions (and thereby MSAT emissions in general). First, a small change in gasoline benzene content results in large reductions in benzene emissions " benzene typically

[235] This is one reason why the Energy Policy Act of 2005 requires EPA to create an updated gasoline emissions model by 2009.

[236] As explained further in section VII.C.5 below, based on the use of the currently available models, the proposed rule would result in greater overall reduction of air toxics from all gasoline than the current MSAT 1 program, and (consistent with section 1504(b)(2) of the EPact) greater overall reductions of air toxics from reformulated gasoline than would be obtained under amended section 211(k)(1)(B) as well.

represents around 1 percent of gasoline, but this contributes about 25 percent of benzene exhaust and evaporative emissions.[237] Second, we have high confidence in the benzene emission reductions that would result from fuel benzene control. Historical data across a range of vehicles and engine types continues to support the relationship between fuel benzene content and benzene emissions. Even if Tier 2 vehicles react differently, the relationship is unlikely to change significantly. Third, because a relatively small change in gasoline properties is needed to achieve the desired result, reducing benzene content does not have a large impact on octane value. Benzene itself does contribute to the octane value of gasoline, but the small loss of octane from reducing benzene content is much less than the octane loss from reducing other aromatics for the same benzene emission effect, as discussed below, and the consequences of refiners having to replace that octane value are also much less. (This is why, as noted earlier, we anticipate that refiners would seek to comply with any toxics standard by reducing benzene levels in any case.) Fourth, we believe that a direct benzene content standard would best ensure real benzene emission reductions, including both exhaust and evaporative benzene emissions. We discuss this conclusion below, in the context of the potential alternative of a benzene emission standard.

b. Gasoline Aromatics Content Standard

Because benzene emissions are formed from benzene and other aromatics that are present in gasoline, we considered a standard that would limit the aromatics content of gasoline. However, we believe that reducing benzene emissions through a more general reduction in gasoline aromatics content would be much less cost-effective than direct benzene reduction. Non-benzene aromatics account for on average about 30 percent of gasoline (typically ranging between about 20 percent and 40 percent), and this fraction contributes about 30 percent of benzene emissions. In contrast, benzene only makes up about 1 percent of gasoline but is responsible for about 25 percent of benzene emissions. The remaining benzene emissions are formed from other compounds. Based on the Complex Model, it would require about a 20 percent reduction in non-benzene aromatics to achieve the same benzene emission reductions as the proposed benzene content standard. As we discussed earlier, a major consequence of removing a significant amount of the aromatics in gasoline is the need to replace the large loss in octane value. As a result, it is much more costly for refiners to reduce benzene emissions through aromatics control than through benzene control. We have not evaluated the cost of aromatics control recently, but when we did so for the RFG rule in the early 1990s, the cost was about 5 times more to achieve the same benzene reduction through aromatics control than through benzene control.[238] In recent years a variety of factors have reduced the use of MTBE as an octane booster; we expect that this trend will raise the relative cost of aromatics control even further.

In addition, aromatics reductions would have to be offset with other high-octane compounds, such as ethanol and ethers (e.g., ETBE and MTBE). Increasing other high-octane compounds tends to significantly increase other air toxics emissions (like acetaldehyde or formaldehyde). Consequently, the benzene emission reductions would be substantially offset by increases in other toxics. For these reasons, aromatics control has historically only been cost-effective for refiners when other requirements are placed on them, such as state or federal oxygenate mandates that also serve to boost octane value. For this same reason, we anticipate that further aromatics reductions will occur as a result of the near doubling of the use of ethanol in gasoline due to the renewable fuels standard contained in the EPAct. Given a mandate for ethanol use and the cost associated with it, refiners can reduce their refining costs by further reducing aromatics.

Aromatics control would also affect other recent fuel control programs. For example, many refineries depend on the reforming process that produces aromatics to also supply much or all of the hydrogen needed for gasoline and diesel desulfurization processes. Reducing aromatics thus would indirectly reduce hydrogen supply, which would then likely require refiners to either purchase hydrogen or build hydrogen production facilities.

At the same time, although it would not be constrained, we do not believe that in the absence of aromatics control, refiners would be likely to increase gasoline aromatics content in the future. Aromatics are a relatively valuable gasoline component, and refiners are generally careful not to make changes that would increase aromatics content more than is needed for octane purposes. In addition, as mentioned previously, the Renewable Fuel Standard that will be promulgated under the new Energy Policy Act will, by boosting ethanol use, increase the octane of the gasoline pool. We expect that this, in turn, will prompt refiners to reduce their use of aromatics for octane enhancement. Also, higher gasoline prices recently have reduced the demand for premium grade gasoline, which generally has higher aromatics levels. To the extent that this trend continues, we expect that it will tend to further reduce the levels of aromatics in the overall gasoline pool.

For all of these reasons, we believe that reducing benzene emissions through a benzene content standard would be much superior to doing so through an aromatics content standard. However, there may be other benefits associated with aromatics control in addition to benzene emissions. EPA is working to improve its understanding of the effect of mobile source emissions on ambient PM, especially secondary PM. For example, there is limited data that suggest that aromatic compounds (toluene, xylene, and benzene) react photochemically in the atmosphere to form secondary particulate matter (in the form of secondary organic aerosol (SOA)), although our current modeling tools do not fully reflect this. One caveat regarding this work is that a large number of gaseous hydrocarbons emitted into the atmosphere having the potential to form SOA have not yet been studied in this way. It is possible that hydrocarbons which have not yet been studied produce some of the SOA species which are being used as tracers for other gaseous hydrocarbons. This means that the current interpretation of the available studies may over-estimate the amount of SOA formation in the atmosphere. We seek comment on the potential benefits, costs, and other implications of aromatics control for consideration in the future.

c. Benzene Emission Standard

In addition to the benzene or aromatics fuel content standards discussed above, we have considered reducing benzene emissions through a benzene emission standard. The primary argument for such an approach is that it would focus on the environmental outcome we are interested in " reduced benzene emissions " while providing refiners some flexibility in how that goal was met.

In order to fully discuss this option, it is useful to clarify how such a

[237] Based on the Complex Model.

[238] Final Regulatory Impact Analysis for Reformulated Gasoline, AEPA420–R–93–017, December 1993.

benzene emission standard would be implemented. Instead of directly measuring gasoline content to determine compliance, as would be the case with a benzene (or aromatics) content standard, compliance would be determined using EPA's Complex Model or an updated version of it. Several parameters of a refiner's gasoline (including benzene and aromatics content) would be used as inputs into the model. Based on these and other assumed properties of the gasoline, the model would estimate the expected level of benzene emissions from that gasoline formulation.

As compared to a program based on the direct measurement of benzene content in gasoline, we believe that one relying on modeled estimates of benzene emissions would be difficult to set today. As with the toxics performance standard we considered above, gasoline parameters and their effects on MSAT emissions will be changing in the future due to the Energy Policy Act, changes in crude oil supplies, and perhaps other unknown factors. In addition, the effects of fuel changes on MSAT emissions from the new Tier 2 vehicles now entering the light-duty fleet are poorly represented in our modeling. Thus, it would be difficult to accurately predict future gasoline parameters and set an appropriate benzene emission standard that ensured the greatest emission reduction achievable, especially a standard that could remain stable for a number of years. As benzene content has been and is sure to remain by far the most important fuel parameter in estimating benzene emissions, a benzene content standard provides greater assurance of actual benzene emission reduction in-use.

Even if it were practical to set a long-term benzene emission standard, such an approach would be problematic for other reasons. As we have stated, the only significant option for reducing benzene emissions other than reducing benzene content is reducing aromatics content. Since we do not believe that requiring control of gasoline aromatics is appropriate at this time, a benzene emission standard would not result in appreciably different emission reductions than would result from a benzene content standard. However, given that aromatics control is a less effective means of reducing benzene emissions and has a more disruptive effect on octane values (as just discussed), requiring more aromatics control could dramatically increase the cost of compliance. Finally, although a benzene emission standard might be assumed to offer additional flexibility to refiners, we do not believe that such flexibility would actually exist. Faced with a dependence on aromatics to meet octane requirements, and in some cases to provide hydrogen supply for desulfurization of gasoline and diesel fuel, we believe that refiners would choose benzene content reduction over aromatics reductions even when they theoretically had the choice to do otherwise. Experience with the MSAT1 emissions performance standard has confirmed this. However, as mentioned previously, gasoline parameters do change, octane requirements can decrease, ethanol will supply additional octane, and therefore aromatic reductions may occur in the future regardless. Were this to occur, a benzene emission standard set today could allow benzene content to increase in the future. Given the additional complexity and uncertainty associated with a benzene emission standard, we have therefore elected to propose a benzene content standard exclusively. We request comment on this approach and on a benzene emission standard.

3. How Did We Select the Level of the Proposed Gasoline Benzene Content Standard?

a. Current Gasoline Benzene Levels

In selecting an appropriate level for the proposed benzene content standard, we began by evaluating the current status of the industry regarding gasoline benzene. Benzene content varies widely among refineries, depending on such factors as refinery configuration and proximity to benzene markets. The national average benzene level was 1.6 vol% in 1990. Due to the 0.95 vol% requirement of the 1995 RFG program, the introduction of gasoline oxygenate requirements, and other factors, benzene levels have since declined. By 2003, RFG averaged 0.62 vol% benzene. (See section V.D.1 above.)

Benzene levels have also declined for CG over the same period, to an average of 1.14 vol%. This is in part because when faced with investing in new processes to comply with the RFG benzene standard, some refiners found it economical to install more benzene extraction capacity than was needed to meet the standard. As a result, in many cases, these refiners have also controlled benzene from CG.

b. The Need for an Average Benzene Standard

Even before considering the level of the benzene content standard, we first needed to consider the standard's potential form. A standard for this purpose could be expressed as a per-gallon benzene limit, which would ensure that no gasoline exceeded a specified benzene level. In contrast, a benzene content standard could be expressed as a flexible average level, allowing some of the existing variability in current benzene levels to remain while reducing overall benzene levels. For several reasons, it became clear that an average standard was the most appropriate for this program.

As mentioned above, there is a great diversity in the benzene content of gasoline currently produced at refineries across the country. In 2003, the annual average benzene content of refineries ranged nationally from under 0.5 vol% to above 3.5 vol%. This variation among refineries is also reflected in large regional differences in average gasoline benzene content, as illustrated below (Tables VII.C–2 and VII.F–1).

In addition to average benzene levels varying widely across refineries and regions, per-gallon benzene levels for individual batches produced by a refinery also vary dramatically depending on the crude oil supply and the refinery streams used to produce a particular batch. This variation occurs as a result of a wide range of day-to-day decisions necessary in producing marketable gasoline within a refinery on a continuous basis. We reviewed actual batch data for a typical refinery producing both RFG and CG with an average benzene content of 1.6 vol% for all its gasoline, and batch benzene levels ranged from under 0.1 to 3.0 vol% for CG. The range for RFG is typically narrower due to the existing 1.3 vol% per gallon cap, but still shows significant batch to batch fluctuations. Batches that refiners produce with benzene higher than 1.3 vol% are marketed as CG.

We considered controlling benzene emissions with a fixed, per-gallon benzene content standard to be met at all refineries. By capping gasoline benzene content in this way, the program would ensure that all gasoline nationwide would have benzene levels below the selected upper limit. However, as we developed the rule, it became clear that with the large variation in benzene levels among refineries and regions (reflecting the variation in the economics of reducing benzene), a per-gallon standard would have to be so high (to account for maximum, legitimate potential variability) as to leave most refineries with little or no need to reduce benzene. Moreover, the burden of the national control program would fall almost entirely on the refineries where the challenges of control would be greatest, and where the most lead time would be

required for compliance. With many refineries able to comply without making any changes, we do not believe such a program would represent the greatest reduction feasible, as the Clean Air Act requires.

The typical fluctuations in benzene content among batches at individual refineries, as discussed above, also indicate the need for refiners to have a degree of flexibility in producing gasoline, as would be provided by an average benzene standard. Restrictions on day-to-day fluctuations would not significantly affect average benzene levels, but would certainly increase costs as refiners invested in avoiding occasionally higher benzene batches. We believe that allowing refiners to average batches with fluctuating benzene over a year's time, as we propose, would result in a more cost-effective program.

Most importantly, it is clear that with the incorporation of a carefully-designed benzene credit averaging, banking, and trading (ABT) program, a more stringent benzene standard would be feasible, and implementation could occur earlier. Thus, we are proposing a 0.62 vol% annual average standard to begin in 2011. Under the proposed ABT program, refiners could generate early credits by making early reduction efforts prior to 2011. Refiners would have an incentive to do so, because the credits generated could be used to postpone more expensive final investments in benzene control technology. In this way, the ABT program would allow the economic burden of the benzene standard to be more efficiently distributed among refiners and over time. The proposed ABT program would result in lower benzene levels in all areas of the country compared to today's levels, as described in more detail below in section VII.D.

c. Potential Levels for the Average Benzene Standard

We evaluated a range of potential standards on a national refinery annual average basis from 0.52 to 0.95 vol% benzene.[239] Our refinery-by-refinery model incorporates data on individual refineries whenever possible and estimates the likely technological approaches that refiners would choose for each refinery to comply with each potential standard at the least cost. The model chooses among several technological options that are the most common and effective methods available to refiners to reduce gasoline benzene content. (Section VII.F below and Chapter 6 of the RIA have more detailed discussions of benzene reduction technologies).

All of the methods that we considered focus on reducing benzene content in the reformate stream, which is the product of the reformer unit. The role of the reformer unit is to increase gasoline octane, which it does by generating aromatic compounds from simpler hydrocarbons. Benzene is one of the aromatic compounds produced by the reformer. Reformate accounts for 30–40% of gasoline volume and can contain as much as 12% benzene. As a result, reformate contributes the majority of the total benzene content of gasoline. For these reasons, treatment of reformate is usually the most effective and economical means of reducing benzene content. Several proven and commercially available technologies exist for reducing benzene creation in the reformer and removing it from the reformate product.

The least stringent standard we evaluated, a national average of 0.95 vol% benzene, would not require any changes at most refineries. For the refineries where action would be needed, we project that most could be brought into compliance by reducing creation of benzene in the reformer using the simplest and least costly of the technology options evaluated. We do not believe that a standard at this level would meet the statutory requirements of section 202(l) of the Clean Air Act to achieve the greatest reductions achievable considering cost and other factors since, as discussed below, greater reductions are feasible at reasonable cost, and without adverse energy or safety implications.

As the most stringent case, we evaluated a national average benzene content standard of 0.52 vol%. Our analysis indicates that a standard at this level would require all refiners to invest in the most effective technologies used today that remove the benzene from their reformate product streams (benzene saturation and benzene extraction, as discussed below). If the ABT program were fully utilized (all credits generated were used), we believe all refiners might comply with this average standard. Because of the almost universal need for refineries to use the most expensive reformate-based benzene control technologies, we believe a standard of 0.52 vol% would be very challenging economically for many refineries, and we believe that such a standard would not be achievable taking costs into consideration, as we are required to do under section 202(l). In addition, if, as appears likely, ''perfect'' credit trading did not occur, some refiners would have to use additional, more extreme approaches that would be even more costly and would require more difficult compromises in the operation of the refineries. (We discuss these technological and operational approaches to benzene reduction in more detail in section VII.F below and in Chapter 6 of the RIA.)

In 2003, the average benzene level in RFG was 0.62 vol%.[240] We believe an annual average benzene standard of 0.62 vol% applied to all gasoline (both CG and RFG) would be feasible considering cost and other factors. Furthermore, implementing an average benzene standard of 0.62 vol% would achieve several other important program goals. At this level, the same benzene standard could be applied to both RFG and CG nationwide, and our analysis shows that the RFG benzene reductions already achieved by the industry to date would not be lost. We expect that refiners currently producing RFG with benzene levels below 0.62 vol% would continue to be committed to producing low-benzene gasoline based on prior investment in benzene extraction equipment or ABT credit incentives. Additionally, as discussed below in VII.C.5, a gasoline benzene standard of 0.62 vol% would achieve sufficient mobile source air toxic reductions allowing this program to supersede the additional MSAT requirements under EPAct. Finally, an average benzene standard applied to both CG and RFG, would allow for a uniform nationwide ABT program providing additional flexibility and reduced compliance costs to refiners, resulting in the greatest achievable reductions within the meaning of section 202(l).

At a national average standard of 0.62 vol%, we estimate that a number of refiners would produce gasoline with significantly lower fuel benzene levels, creating enough benzene credits to allow refiners in less economically favorable positions to purchase these credits on an on-going basis and use them for compliance purposes. We project that further reductions would occur not only in CG, but also in RFG, despite the fact that RFG is already averaging 0.62 vol%. As discussed in section IX below and in Chapter 9 of the RIA, as the stringency is pushed below 0.62 vol%, the overall program costs would begin to rise more steeply. This is because in meeting a lower average standard, there would be fewer

[239] For this evaluation we used both refinery linear programming (LP) models and a refinery-by-refinery model developed specifically for this rule.

[240] Volume-weighted average benzene level based on January 1, 2003 to December 31, 2004 RFG batch reports.

refineries able to comply at low cost, resulting in fewer credits being generated. This in turn would require more investment among refiners with higher costs of compliance.

We also considered a program that would apply separate benzene content standards to RFG and CG. In the context of any nationwide ABT program that allowed trading across both RFG and CG, separate standards for these two gasoline pools would not be fundamentally different from the proposed unified standard. The only impact would be to somewhat change which refiners generated credits and which used credits, and to what degree. For separate RFG and CG standards to have a meaningful impact in comparison to today's proposed program, separate trading programs for each of the two gasoline pools would be required. Our modeling shows that without the credits generated by RFG producers in a nationwide trading program, it would not be possible to set as stringent a standard for CG. The higher-benzene refineries that would most need credits to meet a stringent average standard are a subset of refineries that produce CG. As a result, in a program with separate RFG and CG pools, we would expect to set a slightly more stringent standard for RFG alone, but we would need to set a substantially relaxed standard for CG. The net result would be, at best, the same nationwide average benzene reductions in the RFG and CG pools that would be expected under a unified standard. However, there would be a clear risk that the reduced generation of credits by lower-cost refineries would lead to either a significant increase in the cost of the program (because higher-cost refineries would need to make refinery changes earlier) or the potential for fewer reductions through the process of setting the levels for the separate CG and RFG standards. Conversely, with a unified standard and nationwide ABT, we believe that the program would achieve the maximum economical reduction in all areas and greater overall benzene reduction over the CG and RFG pools.

In addition, we considered a somewhat less stringent national average standard than the proposed 0.62 vol% (e.g., 0.65 or 0.70 vol%). Such standards would still achieve significant benzene emission reductions. However, we are concerned that a less stringent standard would not satisfy our statutory obligation for the most stringent standard feasible considering cost and other factors. Furthermore, such standards would not allow us to accomplish several important programmatic objectives. Given that the average benzene content of RFG in 2003 was already 0.62 vol%, such higher standards would not provide the certainty that the air toxics performance of RFG would decline in the future. This would then trigger the provisions in the 2005 EPAct to adjust the MSAT1 baseline for RFG. The only way of avoiding this situation would be to maintain separate standards for RFG and CG where the RFG standard was still more stringent than 0.62 vol% and credits could not be used from CG to comply. As discussed above, having separate standards with separate ABT programs raises additional cost and feasibility issues.

For all of the above reasons, we believe that a refinery annual average benzene content standard of 0.62 vol% applying to all gasoline nationwide (excluding California), in conjunction with an appropriately-designed ABT system, would maximize benzene emission reductions considering cost and other factors.

Section 202(l)(2) also requires that we consider lead time in determining the greatest reductions achievable. We are proposing that the standard of 0.62 vol% become effective on January 1, 2011. Because the final rule will be completed in early 2007, this would allow about 4 years for refiners to plan and execute the necessary capital projects and operational changes needed to meet the program requirements. We discuss our assessment of necessary lead time in section VII.F below. We believe that this proposed level for the standard, the proposed ABT program, and the proposed implementation date together meet the statutory requirement that the program results in the greatest emission reduction achievable considering costs and other factors.

We encourage comment on our selection of this level for the standard, especially with data and analysis that support the comments.

d. Comparison of Other Benzene Regulatory Programs

In addition to the benzene content standard of the RFG program, California and several countries have regulatory limits on the benzene content of gasoline. Table VII.C–1 shows the basic provisions of each of these programs.

Canada has limits similar to those covering U.S. RFG. In Canada, producers may either comply with a 1.0 vol% flat limit or an averaging standard of 0.95 vol%, with a per-gallon cap of 1.5 vol%. The European Union regulates fuel to the same level in all its member countries, currently a per-gallon cap of 1.0 vol%. Japan has the same limit as the E.U., while South Korea will be moving from a cap of 1.5 to 1.0 vol% in 2006.

California is the only state that has implemented a benzene standard, and it is similar to the standard we are proposing today. California's average standard is 0.7 vol%, with a per-gallon cap of 1.1 vol%. Together, these standards result in an average 0.62 vol% in-use gasoline benzene level.

TABLE VII.C–1.—OTHER GASOLINE BENZENE CONTROL PROGRAMS

	Federal RFG	California phase 3 RFG	Canada	South Korea	Japan	European Union
Average Std (vol%)	0.95 [a]	0.7	0.95	.....	.....	.....
Per-gallon Cap (vol%)	1.3	1.1	1.5	1.5 [b]	1.0	1.0

[a] Producers may also comply with a per-gallon cap of 1.0.
[b] Limit to be lowered to 1.0 in 2006.

4. How Do We Address Variations in Refinery Benzene Levels?

a. Overall Reduction in Benzene Level and Variation

As explained above, there is currently a wide variation in gasoline benzene levels across the country. According to summer 2003 batch data (proposed baseline [241]), average benzene content ranged from 0.41 to 3.81 vol%, including both RFG and CG. The current

[241] For the purpose of our analyses, we selected 2003 to represent current (baseline) conditions because it reflected the most recent batch data available. The refinery-by-refinery model used to predict refinery behavior (discussed later in section IX) is based on inputs from the linear programming (LP) model, which is set up to only model the summer season. As a result, we have used summer 2003 as our baseline period.

variation in benzene levels is primarily attributable to differences in crude oil quality, different refinery configurations, and differences in refinery operations. Our analysis of the proposed program, summarized below, concludes that average benzene levels would be reduced in all areas of the country (PADDs [242]) and variation among refineries would also be reduced. We believe that under the proposed rule, virtually all refineries would reduce their benzene levels and that no refineries would increase their benzene levels.

Upon implementation of the proposed 0.62 vol% benzene standard in 2011, we believe that some refiners would reduce benzene levels to below the standard while others would reduce benzene levels but would need to rely partially or largely on credits generated and traded under the proposed ABT program, as described below. Refiners' compliance strategies would ultimately be driven by economics. For many it would be economical to reduce gasoline benzene levels to 0.62 vol% or below. For others it would be economical to make some reduction in gasoline benzene levels and rely partially upon credits. For some refineries already below the standard, no benzene reduction efforts would be necessary. For the limited number of remaining technologically-challenged refineries it would be most economical to rely wholly upon credits. Regardless of the compliance strategies selected, under the proposed program, benzene levels and variation would be reduced nationwide.

TABLE VII.C–2.—BENZENE LEVELS IN GASOLINE PRODUCED CURRENTLY AND UNDER THE PROPOSED PROGRAM

	Number of refineries by gasoline benzene level (vol%)						Benezene level (vol%) *			
	<0.5	0.5–<1.0	1.0–<1.5	1.5–<2.0	2.0–<2.5	>=2.5	Min	Max	Range **	Avg ***
Starting Gasoline Benzene Levels* **										
PADD 1	4	3	3	0	2	0	0.41	2.19	1.77	0.62
PADD 2	0	5	8	11	1	1	0.60	2.85	2.25	1.32
PADD 3	4	18	10	7	0	2	0.41	3.10	2.69	0.86
PADD 4	0	1	4	6	3	2	0.60	3.56	2.96	1.60
PADD 5 ****	0	0	1	3	2	2	1.36	3.81	2.44	2.06
Total	8	27	26	27	8	7	0.41	3.81	3.39	0.97
Benzene Levels After Program Implementation										
PADD 1	4	5	1	2	0	0	0.41	1.96	1.54	0.51
PADD 2	1	22	1	2	0	0	0.49	1.95	1.46	0.73
PADD 3	10	27	3	0	1	0	0.36	2.07	1.71	0.55
PADD 4	0	8	7	1	0	0	0.53	1.94	1.40	0.95
PADD 5 ***	0	4	2	2	0	0	0.54	1.84	1.30	1.04
Total	15	66	14	7	1	0	0.36	2.07	1.71	0.62

* Starting benzene levels based on summer 2003 batch data.
** Range in benzene level (MIN–MAX).
*** Average volume-weighted benzene level.
**** PADD 5 excluding California.

As shown in Table VII.C–2, average benzene levels would be reduced by 36%, from 0.97 vol% (baseline) to 0.62 vol% once the program is fully implemented. Variation in benzene level, measured in terms of range, would be reduced by 50% (from 3.39 vol% to 1.71 vol%). In addition the areas with the highest starting benzene levels and variation (PADDs 2, 3, 4 and 5) would experience the greatest reductions.

In conclusion, we project that under the proposed program all areas of the country would see reductions in average benzene level and variation among refineries would also be reduced. Refiners would have several motivations for making the benzene reductions projected by our analysis. First, reducing actual benzene levels could be the most economically-favorable compliance strategy. Secondly, reducing benzene levels would help reduce or eliminate the uncertainty associated with relying on credits. Finally, reducing benzene levels could generate credits that would be valuable to the refining industry.

b. Consideration of an Upper Limit Standard

We believe that the proposed program would provide significant benefits in all areas of the nation. Nevertheless, we recognize that some commenters are likely to be concerned that under a flexible ABT program it is possible that some refiners could maintain their current benzene levels or even increase them and comply through the use of credits. If such a refinery dominated a particular market, then even though nationally there would be significant benzene reductions, they might not occur in that market. While our analysis does not lead us to believe that such an outcome would happen, we have nevertheless considered whether an upper limit on benzene (in addition to the average standard) would be valuable to prevent that outcome from happening.[243] We considered two different forms of an upper benzene limit to complement the average standard: a per-gallon cap standard and a maximum average standard.

i. Per-Gallon Cap Standard

A cap would require that each gallon (or batch) of gasoline produced or imported not contain more than a specified concentration of benzene. Such a standard would force those refineries with the highest benzene levels to make physical changes to their gasoline instead of having the option of relying exclusively on credits. In addition to formally limiting the maximum benzene content sold anywhere in the country, such a cap would also be straightforward to enforce

[242] The Department of Energy divides the United States into five Petroleum Administration for Defense Districts, or PADDs. The states included in each PADD are defined at 40 CFR 80.41.

[243] Upper limits on benzene are a part of comparable programs in California and in other countries.

at any point in the distribution system. Note that we are proposing that the existing per-gallon cap of 1.3 vol% benzene would remain in effect for RFG under this rule. EPA invites comment on whether the RFG benzene cap should be retained.

The primary disadvantage of adding a rigid cap is that it would not allow for occasional, short-term fluctuations in benzene content. Refiners are faced with a range of unexpected or planned circumstances that could cause temporary spikes in benzene content, including equipment malfunctions and periodic maintenance. Although the 1.3 vol% cap would remain for RFG, to apply a cap in this range to CG would eliminate a necessary market for higher benzene batches.[244] With no ability to market the gasoline, the refiner would be forced to suspend gasoline production. This could in turn force the shutdown of the entire refinery, sacrificing supply of all products. To attempt to avoid this situation, refiners would need to invest more heavily in benzene control than needed to meet the average standard, simply to provide back-up control to protect against short-term fluctuations. For some higher-benzene refineries, a cap could make complying with the program prohibitively expensive.

Consequently, we concluded that if we were to impose a per-gallon cap, it would have to be high enough to allow most refineries to continue to operate even in such upset situations (in order to account for legitimate maximum potential daily variability), thereby providing little overall benefit.[245] Alternatively, we would have to allow exceptions to the per-gallon cap for such upset situations, which would be burdensome to implement and also result in little overall benefit.

If refiners with higher-benzene refineries need to invest in greater benzene control in order to protect against unpredictable upsets, their costs would be even higher relative to those of lower-benzene refineries. As in the case of a program with no ABT at all, the statutory requirement to balance the degree of feasible emission reduction with cost (and other factors) would have the counterproductive effect of requiring a less stringent overall program.

At the same time, the per-gallon cap would appear to provide no overall additional reduction in benzene levels. Despite the increased costs, particularly for higher-benzene refiners, our analysis indicates that little additional emission reduction would result (primarily because the higher-benzene refineries represent a relatively small fraction of nationwide gasoline production). Instead, as discussed below, emission reductions are expected to simply shift from one region of the country to another, with no change in the overall emission reductions. Because of this, and due to the potential deleterious cost impacts, we are not proposing a per-gallon cap benzene standard.

ii. Maximum Average Standard

Another means of ensuring some reduction by those refiners with the highest benzene concentrations would be to impose a maximum average standard. An annual maximum average standard for each refinery would limit the average benzene content of its actual production over the course of the year, regardless of the extent to which credits may have been used for compliance. While slightly less restrictive than a per-gallon cap standard in that some shorter-term fluctuations in benzene levels could occur, a maximum average standard would still limit the flexibility otherwise available through the ABT program. Our modeling shows that a number of refiners would need to invest substantially more to ensure compliance with both the average and maximum average standards. With the addition of a maximum average standard, we expect emission reductions to simply shift from one region of the country to another with no net change in overall emission reductions. For example, when analyzing a 1.3 vol% maximum average standard, benzene levels were lowered in two PADDs and raised in three PADDs compared to our proposed program yet the overall emission reductions remained the same.[246] Since we believe that a maximum average standard would increase costs but not achieve any greater emission reduction, we are not proposing such a standard.

We believe that the proposed ABT program, in combination with the proposed 0.62 vol% benzene standard without a cap or maximum average limit, would result in the maximum feasible reduction in benzene emissions, considering costs, energy, and safety issues. The proposed ABT program would provide refiners with compliance flexibility while ensuring that the national program achieves significant overall benzene emission reductions.

We invite comment on our conclusions about having an upper limit in addition to an average standard.

5. How Would the Proposed Program Meet or Exceed Related Statutory and Regulatory Requirements?

Three fuels programs (RFG, Anti-dumping and MSAT1) currently contain direct controls on the toxics performance of gasoline.[247] Based on our analyses of the proposed program, including the proposed ABT program, we expect that meeting the proposed fuel benzene content standard combined with other fuel controls would also lead to compliance with the toxics requirements of all these programs.

The RFG program, implemented in 1995, contains a fuel benzene standard that requires a refinery's or importer's RFG to average no greater than 0.95 vol% benzene annually.[248] In addition, RFG has a per-gallon benzene cap of 1.3 vol%. Each refinery's or importer's RFG must also achieve at least a 21.5% annual average reduction in total toxics emissions compared to 1990 baseline gasoline.[249] The Anti-dumping regulations require that a refinery's or importer's CG produce no more exhaust toxics emissions on an annual average basis than its 1990 gasoline.[250] This program keeps refiners from shifting fuel components responsible for elevated toxic emissions into CG as a way to comply with the RFG standards. Section V.D.1 above describes these programs in more detail.

The MSAT1 program, implemented in 2002, was overlaid on the RFG and Anti-dumping programs.[251] As explained in section V.D above, it was not designed to further reduce MSAT emissions, but to lock in overcompliance on toxics performance that was being achieved in RFG and CG under the RFG and Anti-dumping programs. The MSAT1 rule requires the annual average toxics performance of a refinery's or importer's gasoline to be at least as clean as the average performance of its gasoline during the three-year baseline period 1998–

[244] As explained in section VII.C.5 below, CG provides a limited safety valve for occasional batches of high-benzene RFG due to the Anti-dumping provisions.

[245] In California and other countries with benzene control programs, the refining industry tends to be more homogeneous than in the U.S. as a whole and face different market situations, resulting in different considerations regarding upper limits.

[246] This program comparison is discussed further in Chapter 9 of the RIA (Table 9.6–7).

[247] Other gasoline fuel controls, such as sulfur, RVP or VOC performance standards, indirectly control toxics performance by reducing overall emissions of VOCs.

[248] 40 CFR 80 Subpart D. Refiners also have the option of meeting a per gallon limit of 1.0 vol%.

[249] Emissions determined using the Complex Model, as defined in 40 CFR 80.45.

[250] CFR 80 Subpart E, emissions determined using the Complex Model.

[251] 40 CFR 80 Subpart J.

2000.[252] Compliance with MSAT1 is determined separately for each refinery's or importer's RFG and CG.

Today's proposed 0.62 vol% benzene content standard would apply to all of a refinery's or importer's gasoline '' that is, the total of its RFG and CG production or imports. This level of benzene control would far surpass the RFG standard of 0.95 vol%, and would put in place a benzene content standard for CG for the first time.[253] As described further in Chapter 6 of the RIA, we analyzed the expected overall toxics performance under today's proposed program of benzene and vehicle standards using currently-available models and compared it to toxics performance under the pre-existing standards.[254] When RFG and CG toxics emissions are evaluated at this new level of benzene control, it is clear that the benzene standard proposed today would result in the MSAT1 toxics emissions performance requirements being surpassed (i.e., bettered) not only on average nationwide, but for every PADD.[255]

To address compliance with statutory requirements currently in effect through the RFG and Anti-dumping programs, we carried out a refinery-by-refinery analysis of toxics emissions performance using the Complex Model (the same model used for determining compliance with these programs). We used 2003 exhaust toxics performance for CG and 2003 total toxics performance for RFG as benchmarks, which are at least as stringent as the relevant toxics performance baselines. We applied changes to each refiner's fuel parameters for today's proposed standards and the gasoline sulfur standard phased in this year (30 ppm average, 80 ppm max). The results indicate that all refineries maintained or reduced their emissions of toxics over 2003. We expect large reductions in sulfur for almost all refineries under the gasoline sulfur program, and large reductions in CG benzene levels along with modest reductions in RFG benzene levels. We do not expect backsliding in sulfur levels by the few refiners previously below 30 ppm because they had been producing ultra-low sulfur gasoline for reasons related to refinery configuration. Furthermore, because of its petrochemical value and the credit market, we do not expect any refiners to increase benzene content in their gasoline.

In addition, we expect significant changes in oxygenate blending over the next several years, but these are very difficult predict on a refinery-by-refinery basis. Regardless of how individual refineries choose to blend oxygenates in the future, we believe their gasoline will continue to comply with baseline requirements. This is because all RFG is currently overcomplying with the statutory requirement of 21.5% annual average toxics reductions by a significant margin. Similarly, most CG is overcomplying with its 1990 baselines by a significant margin. Furthermore, we believe most refiners currently blending oxygenates will continue to do so at the same or greater level into the future.

EPA is thus proposing that upon full implementation in 2011 the regulatory provisions for the benzene control program would become the single regulatory mechanism used to implement these RFG and Anti-dumping annual average toxics requirements, replacing the current RFG and Anti-dumping annual average provisions. However, the 1.3 vol% maximum benzene cap would remain in place for RFG under 40 CFR 80.41; we are requesting comment on the need to retain this requirement for RFG. The proposed benzene control program would also replace the MSAT1 requirements.

Section 1504(b) of the Energy Policy Act of 2005 (EPAct) requires that the MSAT1 toxics emissions baselines for RFG be adjusted to reflect 2001–2002 fuel qualities, which would make them slightly more stringent than the 1998–2000 baselines originally used in the MSAT1 program. However, as provided for in the Act, this action becomes unnecessary and can be avoided if today's proposed program achieves greater overall reductions of toxics emissions from RFG (i.e., PADDs 1 and 3) than would be achieved by this baseline year adjustment. Therefore, in addition to comparing the proposed standard to the current MSAT1 program, we also compared it to the program as the standards would be modified by the EPAct.

We performed an analysis of aggregate toxics emissions for the relevant baseline periods as well as for future years with and without the proposed program. This analysis was carried out using MOBILE6.2 because that model accounts for changes in the vehicle fleet, which is important when modeling future years. Results are shown in Table VII.C–3. Since this modeling approach was intended to compare emissions from different fuels and fleet year mixes, the emissions figures generated here are different from those used for gasoline compliance determination.

The first row shows mg/mi air toxics emissions in 2002 under the MSAT1 refinery-specific baseline requirements. The second row shows how these would change by updating the RFG baselines to 2001–02 as specified in EPAct. Since significant changes are expected in the gasoline pool between 2002 and the proposed implementation time of the fuel standard, such as gasoline sulfur reductions and oxygenate changes, we decided to model a ''future baseline'' to allow comparison with the proposed standard at the time it would become effective in 2011. As a result, the third row shows the projected mg/mi emissions in 2011 under the EPAct baseline adjustments, but without today's proposed program. The large reductions in air toxics emissions between the EPAct baseline and this 2011 baseline are primarily due to nationwide reduction in gasoline sulfur content to 30 ppm average and significant phase-in of Tier 2 vehicles into the national fleet.

An important comparison is made between rows three and four, where the estimated toxics emissions under the proposed fuel standard only are compared to the projected emissions without the proposed standard. The fourth row shows small reductions for RFG and more significant reductions for CG with the introduction of the proposed benzene standard in 2011. We also evaluated the effects of the vehicle standard also proposed today on toxics emissions at two points in time, shown in the last two rows of the table.

[252] Emissions determined using the Complex Model, as defined in 40 CFR 80.45.

[253] Proposed program retains the 1.3 vol% maximum benzene cap for RFG required by 40 CFR 80.41.

[254] As discussed previously, the existing models contain limited data on the impacts of fuel changes on 2004 and later technology vehicles, making such projections difficult. However, we do not believe the conclusions would change for these reasons: (1) The fuel effect changes modeled here related to benzene, for which we expect data for new technology vehicles to show similar trends as those for older vehicles; (2) much of the projected change in future emissions are due to changes in vehicles technology, not fuel changes; and (3) for this analysis we need only look at the relative changes, and given the magnitude of the projected effects we do not expect that the direction of the result would change even if significantly different values for absolute emissions were submitted.

[255] The analysis shows an even greater benefit in overall toxics reductions when the combined effect of the benzene standard and the vehicle standards are considered.

TABLE VII.C–3.—ESTIMATED ANNUAL AVERAGE TOTAL TOXICS PERFORMANCE OF LIGHT DUTY VEHICLES IN MG/MI UNDER CURRENT AND PROPOSED PROGRAMS [a]

Regulatory scenario	Fleet	RFG by PADD			CG by PADD				
	Year	I	II	III	I	II	III	IV	V
MSAT1 Baseline [b] (1998–2000)	2002	108	124	89	104	135	96	137	152
EPAct Baseline [b] (RFG: 2001–2002)	2002	103	121	85	104	135	96	137	152
EPAct Baseline, 2011 [c]	2011	67	79	51	62	79	54	77	96
Proposed program, 2011 [c] (Fuel standard only)	2011	66	78	50	59	74	51	71	85
Proposed program, 2011 [c] (Fuel + vehicle standards)	2011	63	76	47	55	72	47	67	81
Proposed program, 2025 [c] (Fuel + vehicle standards)	2025	39	46	30	35	44	31	42	50

[a] Total toxics performance for this analysis includes overall emissions of 1,3-butadiene, acetaldehyde, acrolein, benzene and formaldehyde as calculated by MOBILE6.2. Although POM appears in the Complex Model, it is not included here. However, it contributes a small and relatively constant mass to the total toxics figure (4%), and therefore doesn't make a significant difference in the comparisons.

[b] Baseline figures generated in this analysis were calculated differently from the regulatory baselines determined as part of the MSAT1 program, and are only intended to be a point of comparison for future year cases.

[c] Future year scenarios include (in addition to the controls proposed today, where stated) effects of the Tier 2 vehicle and gasoline sulfur standards and vehicle fleet turnover with time, as well as rough estimates of the renewable fuels standard and the phase-out of ether blending.

Based on these analyses, we believe the fuel program proposed in this notice, as well as the combined fuel and vehicle program, would also achieve greater overall toxics reductions than would be achieved under the EPAct were the RFG baseline period updated to 2001–2002.

In summary, today's proposed action for fuels would fulfill several statutory and regulatory goals related to control of gasoline mobile source air toxics emissions. The proposed program (in conjunction with the proposed vehicle standards) would meet our commitment in the MSAT1 rulemaking to consider further MSAT control. It would also result in air toxics emission reductions greater than required under all pre-existing gasoline toxics programs, as well as under the baseline adjustments specified by the Energy Policy Act. By designing this program to address these separate but related goals, we would be able to achieve a benefit in addition to the emissions reductions: A significant consolidation and simplification of regulation of gasoline MSATs.

As part of today's action, in addition to the streamlining of toxics requirements, we propose that the gasoline sulfur program become the sole regulatory mechanism used to implement gasoline NO_X requirements. Gasoline producers are required to show reductions from their RFG relative to the 1990 Clean Air Act baseline gasoline NO_X emissions, as determined using the Complex Model. Conventional gasoline must comply with Anti-dumping individual NO_X baselines for each refinery, similar to the Anti-dumping toxics standards. A refinery-by-refinery NO_X analysis parallel to that described above indicated that with the final implementation of the gasoline sulfur program (January 1, 2006), all gasoline will continue to meet or exceed the NO_X requirements of the RFG and Anti-dumping programs.

As discussed elsewhere in this preamble, we believe that today's proposed nationwide program would achieve significant reductions in gasoline-related benzene emissions. The program would also have the effect of preempting states from regulating gasoline benzene content. The program is proposed under Clean Air Act section 211(c), which includes preemption of state fuel programs in section 211(c)(4).[256] The existing RFG benzene program, also authorized under section 211(c)(1), preempts states in RFG areas from regulating benzene. Today's nationwide program expands this preemption to all states except California, which is exempt from this preemption.

D. Description of the Proposed Averaging, Banking, and Trading (ABT) Program

1. Overview

As mentioned earlier, we are proposing a specially-designed ABT program to allow EPA to set a more stringent nationwide gasoline benzene standard than otherwise possible. The proposed ABT program would allow refiners and importers to use benzene credits generated or obtained under the provisions of the ABT program to comply with the 0.62 vol% refinery average standard in 2011 and indefinitely thereafter. Benzene credits could be generated by refineries that make qualifying early baseline reductions prior to 2011 and by refineries and importers that overcomply with the 0.62 vol% standard in 2011 and beyond. All credits generated could be used internally towards company compliance (''averaged''), ''banked'' for future use, and/or transferred (''traded'') to another refiner or importer.

The majority of the ABT credit provisions we are proposing are similar to those offered in the gasoline sulfur program, with a few exceptions. The major difference is that in the proposed program, credit use would not be restricted by an upper limit (discussed in VII.C.4.b above) and in fact would be encouraged by extended credit life and nationwide credit trading provisions. We are able to propose a flexible ABT program and a gradual phase-in of the 0.62 vol% benzene because there is no corresponding vehicle standard being proposed that is dependent on gasoline benzene content. A program with fewer restrictions would help ensure that the overall proposed benzene control program would result in the greatest achievable benzene reductions, considering cost and other factors.

Because of the wide variation in current benzene levels among refineries, we recognize that some refiners would be better situated than others, technologically and financially, to respond to the proposed benzene standard. As we discuss below, we believe that the credit trading provisions of the ABT program would be well suited to moderate the financial impacts that could otherwise occur with the proposed benzene control program.

However, in other air quality programs, we have used other trading

[256] See discussion of statutory authority in section I.C. of this preamble.

mechanisms to address the varying impacts of such programs on different regulated entities. For example, in EPA's Acid Rain program a limited number of ''emissions allowances'' are allocated among entities, which can then be banked and traded. We invite comment on this and other alternative credit approaches that might be appropriate to gasoline benzene control.

The following paragraphs provide more details on our proposed benzene ABT program. We encourage comments on the design elements we have proposed for the program. If you believe that alternative approaches would make the program more effective, please share your specific comments and recommendations with us.

2. Standard Credit Generation (2011 and Beyond)

We are proposing that standard benzene credits could be generated by any refinery or importer that overcomplies with the 0.62 vol% gasoline benzene standard on an annual volume-weighted basis in 2011 and beyond. For example, if in 2011 a refinery's annual average benzene level was 0.52, its standard benzene credits would be determined based on the margin of overcompliance with the standard (0.62 − 0.52 = 0.10 vol%) divided by 100 and multiplied by the gallons of gasoline produced during the 2011 calendar year. The credits would be expressed as gallons of benzene. Likewise, if in 2012 the same refinery produced the same amount of gasoline with the same benzene content they would earn the same amount of credits. The standard credit generation opportunities for overcomplying with the standard would continue indefinitely.

The refinery cost model discussed further in section IX.A, predicts which refineries would reduce benzene levels in an order of precedence based on cost until the 0.62 vol% refinery average standard is achieved. The model also predicts which refineries would overcomply with the standard in 2011 and beyond and in turn generate standard credits.[257] Credits would be generated by two main sources.

First, standard credits would be generated by refineries whose current gasoline benzene levels are already below the 0.62 vol% standard. According to the model, 19 refineries are predicted to maintain current gasoline benzene levels and overcomply with the standard without making any additional process improvements. These refineries would generate approximately 42 million gallons of benzene credits per year without making any investment in technology. Additionally, the model predicts that 5 other refineries would reduce gasoline benzene levels even further below 0.62 vol% resulting in deeper overcompliance and an additional 6 million gallons of benzene credits per year.

Second, standard credits would be generated by refineries whose current gasoline benzene levels are above 0.62 vol% but are predicted by the model to overcomply with the standard based on existing refinery technology, access to capital markets, and/or proximity to the benzene chemical market. The model predicts that 34 refineries with gasoline benzene levels above 0.62 vol% would make process improvements to reduce benzene levels below the standard and in turn generate approximately 40 million gallons of benzene credits per year.

For the refineries which the model predicts to make process changes to overcomply with the standard, the incremental cost to overcomply is relatively small or even profitable in some cases of benzene extraction.[258] As expected, refineries with the lowest compliance costs would have the greatest incentive to overcomply based on the value of the credits to the refining industry.

3. Credit Use

We are proposing that refiners and importers could use benzene credits generated or obtained under the provisions of the ABT program to comply with the 0.62 vol% gasoline benzene standard in 2011 and indefinitely thereafter. Refineries and importers could use credits to comply on a one-for-one basis, applying each benzene gallon credit to offset the same volume of benzene produced in gasoline above the standard. For example, if in 2011 a refinery's annual average benzene level was 0.72, the number of benzene credits needed to comply would be determined based on the margin of under-compliance with the standard (0.72 − 0.62 = 0.10 vol%) divided by 100 and multiplied by the gallons of gasoline produced during the 2011 calendar year. The credits needed would be expressed in gallons of benzene.

We believe that individual refineries would rely differently upon credits, depending on their unique refinery situations. As mentioned earlier, the current range in gasoline refinery technologies and starting benzene levels would make it significantly more expensive for some refineries to comply with the standard based on actual reduced benzene levels than others. As such, some technologically-challenged refiners may choose to rely largely or entirely upon credits because it would be much more economical than making process improvements to reduce benzene levels. Other refiners may choose to make incremental process improvements to reduce refinery benzene levels and then rely partially on credits to fully comply. Still others may choose to reduce benzene levels to at or around 0.62 vol% and maintain an ''emergency supply'' of credits to address short-term spikes in benzene levels due to refinery malfunctions. Overall, the proposed credit trading program would encourage low-cost refineries to comply or overcomply with the standard while allowing high-cost refineries to rely upon credits to comply. This would reduce the total economic burden to the refining industry.

a. Credit Trading Area

We are proposing a nationwide credit trading program with no geographic restrictions on trading. In other words, a refiner or importer could obtain benzene credits and use them towards compliance regardless of where the credits were generated. We believe that restricting credit trading could reduce refiners' incentive to generate credits and hinder trading essential to this program. As explained in Chapter 6 of the RIA, if PADD restrictions were placed on credit trading, there would be an imbalance between the supply and demand of credits.

In other fuel standard ABT programs (e.g., the highway diesel sulfur program), credit trading restrictions were necessary to ensure there was adequate low-sulfur fuel available in each geographic area to meet the corresponding vehicle standard. Since there is no vehicle emission standard being proposed that is dependent on gasoline benzene content, we do not believe there is a need for geographic trading restrictions. As mentioned above, we project that under the proposed ABT program, all areas of the country (i.e., all PADDs) would

[257] The refinery cost model assumes that all credits generated are used each year. To the extent that this does not occur, more refiners would have to invest in technology to comply, increasing the cost of the program.

[258] Despite the low costs of benzene extraction, without a benzene control standard refiners are reluctant to invest in capital-intensive processes such as extraction. This is because many other projects involving capital investments that they may be considering typically have a better or more certain payout (past price volatility in the benzene chemical market can discourage future investment). Thus, refiners tend to postpone capital projects such as extraction even if they may appear to be profitable today.

experience a large reduction in gasoline benzene levels as a result of the standard.

As discussed earlier, California gasoline would not be subject to the proposed benzene standards. However, California refiners that produce gasoline that is used outside of California would be able to generate credits on that gasoline (and use credits to achieve compliance on their non-California gasoline if necessary). Likewise, as proposed, refiners outside of California that produce gasoline that is used in California would not be allowed to use that gasoline as the basis for any credit generation, or compliance with the proposed benzene standard. However, we request comment on whether and how credits could be allowed to be generated on California gasoline benzene reductions and applied to the benzene compliance for non-California gasoline.

EPA seeks comment on the proposed nationwide trading provision, its effect on incentives for refiners to generate credits, and environmental impacts.

b. Credit Life

We are proposing limited credit life to enable proper enforcement of the program and to encourage trading of credits. Since the proposed standard is a refinery gate standard (i.e., enforced as the fuel leaves the refinery) with no enforceable downstream standard, it is critical that EPA be able to conduct enforcement at the refinery. A reasonable limitation on credit life would allow EPA to verify the validity of credits through record retention. Credit information must be independently verifiable such that, in the event of violations involving credits, the liable party is identifiable and accountable. EPA enforcement activities are limited by the five-year statute of limitations in the Clean Air Act. As a consequence, credit life greater than five years creates potentially serious enforcement difficulties. This is particularly important given the ongoing changes in business relationships, ownership, and merger practices that are characteristic of the refining industry. In addition, since credit trading plays an essential role in moderating program costs, it is important that refiners have an incentive to trade credits rather than hoard them. Instituting a credit expiration date would promote trading because refiners would be forced to ''use it or lose it.'' In summary, we believe the proposed credit life provisions, described in more detail below, are limited enough to satisfy enforcement and trading concerns yet sufficiently long to provide program flexibility.

We are proposing that standard credits generated in 2011 and beyond would have to be used within five years of the year in which they were generated. For example, credits generated based on 2011 gasoline production would have to be used towards compliance with the 2016 calendar year or earlier, otherwise they would expire. Standard credits traded to another party would still have to be used during the same five-year period because credit life is tied to the date of generation, not the date of transfer.

We are proposing that early credits generated prior to 2011 (discussed in the paragraphs to follow) would have a three-year credit life from the start of the program. In other words, early credits would have to be applied to the 2011, 2012, and/or 2013 compliance years or they would expire.

These proposed credit life provisions are similar to those finalized in the gasoline sulfur program, except the early credit life is three years instead of two. We are proposing a three-year early credit life because it corresponds with the number of early credits projected to be generated according to our refinery cost model.[259] Additionally, we predict that three years would be more than sufficient time for all early credits generated to be utilized. We believe that this certainty that all credits could be utilized would strengthen refiners' incentive to generate early credits and subsequently establish a more reliable credit market for trading.

In addition to the above-mentioned provisions, we are proposing that credit life may be extended by two years for early credits and/or standard credits generated by or traded to approved small refiners. We are offering this provision as a mechanism to encourage more credit trading to small refiners. Small refiners often face special technological challenges, so they would tend to have more of a need to rely on credits. At the same time, they often have fewer business affiliations than other refiners, so they could have difficulty obtaining credits. We believe this provision would be equally beneficial to refiners generating credits. This additional credit life for credits traded to small refiners would give refiners generating credits a greater opportunity to fully utilize the credits before they expire. For example, a refiner who was holding on to credits for emergency purposes or other reasons later found to be unnecessary, could trade these credits at the end of their life to small refiners who could utilize them for two more years. However, EPA is concerned that extending credit life beyond the five-year statute of limitations in the Clean Air Act (net 7-year credit life for standard credits generated by or traded to small refiners) could create significant enforceability problems. Consequently, EPA seeks comment on provisions that could be included in the regulations that would address this enforceability concern regarding the extended credit life for small refiner standard credits.

As discussed in Section X.A, we are also seeking comment on different ways of structuring the program that may be able to allow for unlimited credit life since, unlike in the gasoline sulfur program, there is no vehicle standard being proposed that is dependent on fuel quality. We considered that unlimited credit life could further promote credit generation and allow refiners to maintain an ongoing supply of credits in the event of an emergency. However, for several reasons we have elected to propose a limited credit life based on the context of the rest of the proposed program. If unlimited credit life were to discourage trading of credits, this could force refineries with more expensive benzene control technologies to comply and thus increase the total cost of the program. In addition, unlimited credit life would make it more difficult to verify compliance with the standard. One way of addressing this concern would be to require refiners to retain credit records indefinitely. Even then, given the fluid nature of refiner and importer ownership in recent years, in many cases it would still be difficult to verify the validity of historical credit generation and use. Since the proposed benzene standard would be enforced solely at the refinery, it is critical that such enforcement be as simple and straightforward as possible. Nonetheless, as discussed in Section X.A, it may be possible to design the overall program in such a way to address these concerns and still allow for infinite credit life.

In conclusion, we are proposing a reasonably limited credit life for both early and standard benzene credits. We seek comment on unlimited credit life. Please share with us any additional ideas you may have on how unlimited credit life could be beneficial to this program and/or how associated recordkeeping and enforcement issues could be mitigated.

[259] Derivation of three-year early credit lag is found in Chapter 6 of the RIA (section 6.5.3.1).

4. Early Credit Generation (2007–2010)

To encourage early application of and innovation in benzene control technology, we are proposing that refiners could generate early benzene credits from June 1, 2007 to December 31, 2010 by making qualifying reductions from their pre-determined refinery baselines. A discussion of how refinery baselines are established and what constitutes a qualifying benzene reduction is found in the subsections to follow. The early credits generated under this program would be interchangeable with the standard credits generated in 2011 and beyond and would follow the above-mentioned credit use provisions.

The early reductions we are projecting to occur would be the initial steps of each refinery's ultimate benzene control strategy, but completed earlier than required. We project that from mid-2007 to 2010, refiners could implement operational changes and/or make small capital investments to reduce gasoline benzene. These actions would create a two-step phase down in gasoline benzene prior to 2011 as shown in Figure VII.D–1.

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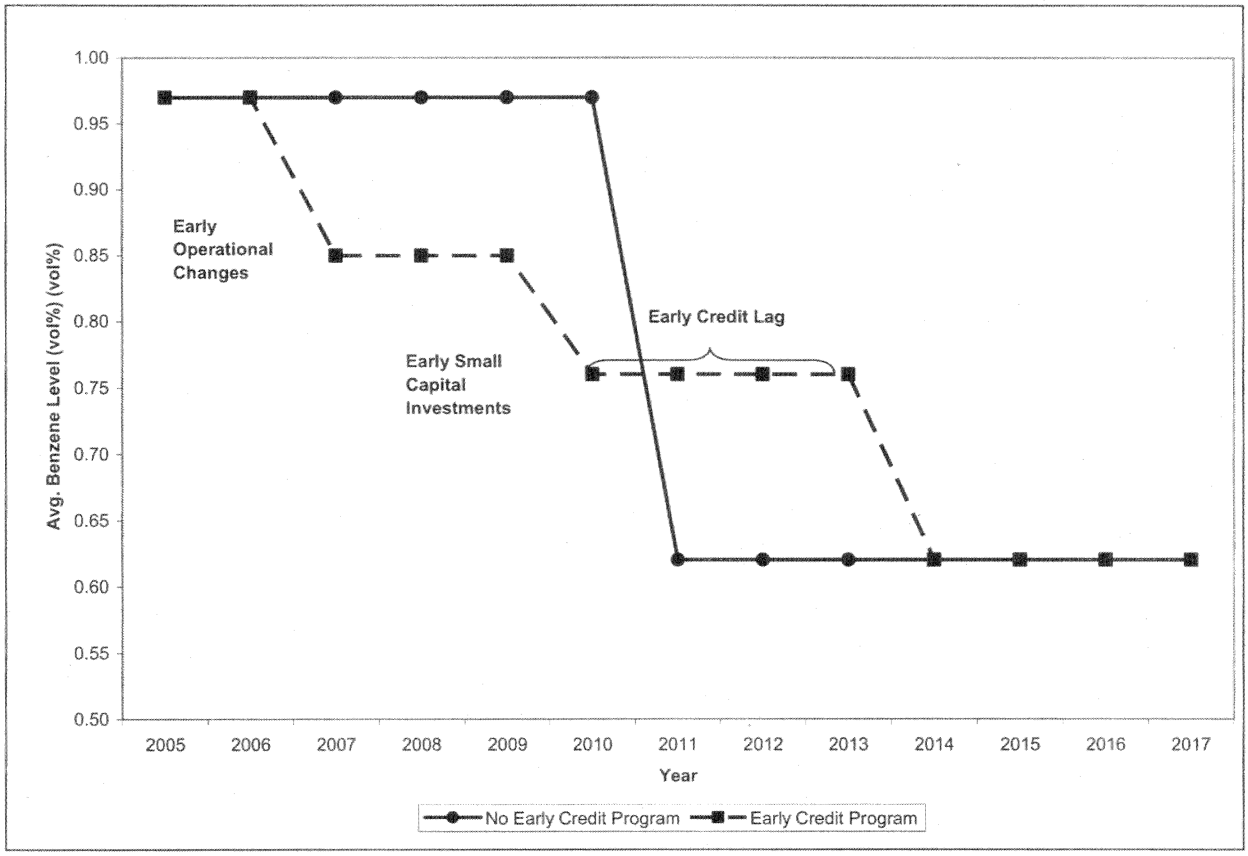
Figure VII.D-1

Average Gasoline Benzene Level vs. Year



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The credits generated under the early credit program could be used to provide refiners with additional lead time to make their investments. If properly implemented, we project that the delay could be as much as three years as described in Chapter 6 of the RIA. Accordingly, we are proposing a three-year early credit life, as discussed earlier. The additional lead time would allow the refining industry to spread out demand for design, engineering, construction and other related services, reducing overall compliance costs.

Importers would not be permitted to generate early credits, for several reasons.[260] First, unlike refineries, importers would not need additional lead time to comply with the standard, since they would not be investing in benzene control technology. Additionally, because importer operations are more variable than refinery operations, importers could potentially redistribute the importation of foreign gasoline based on benzene level to generate early credits without making a net reduction in gasoline benzene. This type of scheme could result in a large number of early credits being generated with no net benzene emission reduction value. This is not expected to occur for refineries because they are already operating at high capacity and do not have the flexibility

[260] As discussed in section VII.I.1 below, foreign refiners may generate early credits under the proposed 40 CFR 80.1420 provisions.

to quickly increase, decrease, or shift production volumes. Additionally, under the proposed program, refineries are prohibited from moving benzene-rich blendstocks around to generate early credits as described below.

We believe that refiners would have several motivations for making early benzene reductions. For refiners who have a series of technology improvements to make, early innovative improvements would help the refiner get one step closer to compliance. Early reductions would also generate credits which could be used to postpone subsequent investments. For refiners capable of making early advancements to reduce their benzene levels below 0.62 vol%, the early credits generated would not be needed for their own future use. For these refiners, trading early credits to other refiners may be a way to offset the cost of their early capital investment(s).

a. Establishing Early Credit Baselines

We are proposing that any refiner planning on generating early credits would have to obtain an individual refinery benzene baseline in order to provide a starting point for calculating early credits.

Refinery benzene baselines would be defined as the annualized volume-weighted benzene content of gasoline produced at a refinery from January 1, 2004 to December 31, 2005. We are proposing a two-year baseline period to account for normal operational fluctuations in benzene level. We propose using the 2004 and 2005 calendar years because we believe this would represent the most current batch gasoline data available prior to today's proposal.

We would require refiners to submit individual baselines for each refinery that is planning to generate early benzene credits. Refinery benzene baselines would be calculated using the 2004–2005 batch data submitted to us under the RFG and Anti-dumping requirements.[261] We propose that joint ventures, in which two or more refiners collectively own and operate one or more refineries, be treated as separate refining entities for early credit generation purposes.

Refiners would be required to submit their refinery baselines in writing to EPA. We propose that refiners could begin applying for 2004–05 benzene baselines as early as March 1, 2007. There would be no single cut-off date for applying for a baseline; however, a refiner planning on generating early credits would need to submit a baseline application at least 60 days prior to beginning credit generation. We are proposing a shorter notification period for this rule (past rules were 120 days) to accommodate our proposed early credit generation start date of June 1, 2007. EPA would review all baseline applications and notify the refiner of any discrepancies found with the data submitted. If we did not respond within 60 days, the baseline would be considered to be approved, subject to later review by EPA.

Under the proposed program, refiners would be prohibited from moving gasoline and gasoline blendstock streams from one refinery to another in order to generate early credits. This type of transaction would result in artificial credits with no associated emission reduction value. If traded and used towards compliance, these artificial credits could negatively impact the benefits of the program. We considered basing credit generation for multi-refinery refiners on corporate benzene baselines instead of individual refinery baselines, but determined that this could hinder credit generation. If a valid reduction was made at one refinery and an unrelated expansion occurred at another facility during this time, the credits earned based on a corporate baseline could be reduced to zero. Instead, we propose to validate early credits based on existing reporting requirements (e.g., batch reports and pre-compliance reporting data). We seek comment on this approach.

b. Early Credit Reduction Criteria (Trigger Points)

We are proposing that to generate early credits, refiners would first need to reduce gasoline benzene levels to 0.90 times their refinery benzene baseline during a given averaging period. The purpose of setting an early credit generation trigger point is to ensure that changes in benzene level are representative of real process improvements. Without a trigger point, refineries could generate ''windfall'' early credits based on normal year to year fluctuations in benzene level associated with MSAT1. These artificial credits would compromise the environmental benefits of an ABT program because they would have no real associated benzene emission reduction value.

In designing the early credit generation program, we considered a variety of different types of trigger points. We performed sensitivity analyses around absolute level trigger points (refineries must reduce gasoline benzene levels to a certain concentration), fixed reduction trigger points (refineries must reduce gasoline benzene levels by a certain concentration), and percent reduction trigger points (refineries must reduce gasoline benzene by a percentage). Based on our analysis found in Chapter 6 of the RIA, we found absolute level trigger points to be too restrictive for high benzene level refineries that could benefit from reductions the most. We also found fixed reduction trigger points to be too restrictive to low benzene level refineries which would be penalized for already being ''cleaner.'' Percent reduction trigger points were found to be consistently limiting towards all refineries, regardless of starting benzene level. As such, we propose to conclude that a percent reduction trigger point would be the most appropriate early credit validation tool to address the wide range in starting benzene levels.

To determine an appropriate value for the percent reduction trigger point, we considered a range of reductions from 5–40% and examined the resulting early credit generation outcomes. We found that as the value of the percent reduction trigger point increased, the potential for windfall credit generation decreased, but unfortunately so did the number of early credits generated from legitimate refinery modifications. To address this competing relationship between windfall and early credit generation, we are proposing a 10% reduction trigger point. We believe that this trigger point is restrictive enough to prevent most windfall credit generation, but not too restrictive to discourage refineries from making early benzene reductions. The proposed 10% reduction trigger point roughly coincides with the average fluctuation in benzene level in 2004 as discussed in Chapter 6 of the RIA. A 10% reduction trigger point for early credits was also finalized in the gasoline sulfur rulemaking, which also affected the entire gasoline pool and had to encompass a variety of unique refinery situations.[262] EPA requests comments on the proposed trigger point and seeks alternate recommendations for validating early credits.

c. Calculating Early Credits

We are proposing that once the 10% reduction trigger point was met, refineries could generate early credits based on the entire reduction. In terms of benzene levels, a refinery would first have to reduce its average benzene level to 0.90 times its original baseline benzene level during a given averaging period in order to generate credits. For

[261] RFG, 40 CFR 80.75; Anti-dumping, 40 CFR 80.105.

[262] 40 CFR 80.305.

example, if in 2008 a refinery reduced its annual benzene level from a baseline of 2.00 vol% to 1.50 vol% (below the trigger of $0.90 \times 2.00 = 1.80$ vol%), its benzene credits would be determined based on the difference in annual benzene content ($2.00 - 1.50 = 0.50$ vol%) divided by 100 and multiplied by the gallons of gasoline produced in 2008. The credits would be expressed in gallons of benzene.

5. Additional Credit Provisions

a. Credit Trading

The potential exists for credits to be generated by one party, subsequently transferred or used in good faith by another, and later found to have been calculated or created improperly or otherwise determined to be invalid. As in past programs, we propose that should this occur both the seller and purchaser would have to adjust their benzene calculations to reflect the proper credits and either party (or both) could be determined to be in violation of the standards and other requirements if the adjusted calculations demonstrate noncompliance with the 0.62 vol% standard. This would allow the credit market to properly allocate any such risk.

As with ABT programs in other rules, we are proposing that credits should be transferred directly from the refiner or importer that generated them to the party that would use them for compliance purposes. This would ensure that the parties purchasing them would be better able to assess the likelihood that the credits were valid, and would aid in compliance monitoring. An exception would exist where a credit generator transferred credits to a refiner or importer who could not use all the credits, in which event that transferee could transfer the credits to another refiner or importer. However, based on the increased difficulty in assuring the validity of credits as the credits change hands more than once, we are proposing that credits could only be transferred a limited number of times. We are requesting comment on the maximum number of allowable trades, in the range of 2 to 4 trades. After the maximum number of trades, such credits would have be used or terminated.

We propose no prohibitions against brokers facilitating the transfer of credits from one party to another. Any person could act as a credit broker, whether or not such person was a refiner or importer, so long as the title to the credits was transferred directly from the generator to the user. Further discussion of these credit trading provisions and alternative options is found in section X.A below.

b. Pre-Compliance Reporting Requirements

In order to provide an early indication of the credit market for refiners planning on relying upon benzene credits as a compliance strategy in 2011 and beyond, we are requesting that refiners submit pre-compliance reports to us in 2008, 2009, and 2010. EPA would then summarize this information (in such a way as to protect confidential business information) in a report available to the industry. This is similar to the way pre-compliance reports are used for the ultra-low sulfur diesel program. In addition, we are proposing that refiners provide us with a final summary pre-compliance report in 2011, to allow for a complete account of early credit generation.[263] The reports would be due annually by June 1st and would contain refiners' most up-to-date implementation plans for complying with the 0.62 vol% benzene standard. More specifically, we would require refiners to annually submit to us engineering and construction plans and the following data:

—Actual/projected gasoline production volume and average benzene level for the June 1, 2007 through December 31, 2007 annual averaging period, and for the 2008–2015 annual averaging periods.

—Actual/projected early credits generated during the June 1, 2007 through December 31, 2007 annual averaging period, and for the 2008–2010 annual averaging periods (June 1 through December 31, 2007 and 2008–2014 for small refiners).

—Standard credits projected to be generated during the 2011–2015 annual averaging periods (2015 for small refiners).

—Credits projected to be needed for compliance during 2011–2015 annual averaging periods (2015 for small refiners).

Pre-compliance reporting has proven to be an indispensable mechanism in implementing the gasoline and diesel sulfur programs, and we expect this to be the case in today's proposed program. A detailed understanding of how individual refiners and the industry at large are progressing toward final implementation of the proposed standards would help identify early concerns and allow timely action if necessary to prevent the development of major problems.

6. Special ABT Provisions for Small Refiners

Approved small refiners would follow all the above-mentioned ABT provisions with the exception of special credit generation provisions which accommodate their 2015 compliance start date. Early credits could be generated by small refiners from June 1, 2007 to December 31, 2014 for refineries that reduce their average gasoline benzene level to 0.90 times their original 2004–2005 baseline level. Standard credits could also be generated by small refiners beginning January 1, 2015 and continuing indefinitely for refineries that overcomply with the standard by producing gasoline with an annual average benzene content below 0.62 vol%. Additionally, all credits generated by or traded to approved small refiners would have an additional two-year credit life as described above in VII.D.3.b.

E. Regulatory Flexibility Provisions for Qualifying Refiners

1. Hardship Provisions for Qualifying Small Refiners

In developing our proposed MSAT program, we evaluated the need and the ability of refiners to meet the proposed benzene standards as expeditiously as possible. We believe it is feasible and necessary for the vast majority of the program to be implemented in the proposed time frame to achieve the air quality benefits as soon as possible. However, based on information available from small refiners, we believe that refineries owned by small businesses generally face unique hardship circumstances, compared to larger refiners. Thus, we are proposing several special provisions for refiners that qualify as ''small refiners'' to reduce the disproportionate burden that the proposed standards would have on these refiners. These provisions are discussed in detail below.

a. Qualifying Small Refiners

EPA is proposing several special provisions that would be available to companies that are approved as small refiners. Small refiners generally lack the resources available to larger companies that help large companies, including those large companies that own small-capacity refineries, to raise capital for investing in benzene control equipment. These resources include shifting internal funds, securing financing, or selling assets. Small refiners are also likely to have more

[263] Based on their proposed January 1, 2015 compliance date, small refiners would be required to submit annual pre-compliance reports to us in 2008 through 2014 with a final summary pre-compliance report in 2015.

difficulty in competing for engineering resources and completing construction of the needed benzene control equipment (and any necessary octane recovery) equipment in time to meet the standards proposed today. Therefore, we are proposing small refiner relief provisions in today's action as an aspect of realizing the greatest emission reductions achievable.

Since small refiners are more likely to face hardship circumstances than larger refiners, we are proposing temporary provisions that would provide additional time to meet the benzene standards for refineries owned by small businesses. This approach would allow the overall program to begin as early as possible, while still addressing the ability of small refiners to comply.

i. Regulatory Flexibility for Small Refiners

As explained in the discussion of our compliance with the Regulatory Flexibility Act below in section XII.C and in the Initial Regulatory Flexibility Analysis in Chapter 14 of the RIA, we considered the impacts of today's proposed regulations on small businesses. Most of our analysis of small business impacts was performed as a part of the work of the Small Business Advocacy Review (SBAR) Panel convened by EPA, pursuant to the Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA). The final report of the Panel is available in the docket for this proposed rule.

For the SBREFA process, EPA conducted outreach, fact-finding, and analysis of the potential impacts of our regulations on small businesses. Based on these discussions and analyses by all Panel members, the Panel concluded that small refiners in general would likely experience a significant and disproportionate financial hardship in reaching the objectives of today's proposed program.

One indication of this disproportionate hardship for small refiners is the higher per-gallon capital costs projected for the removal of benzene from gasoline under the proposed program. Refinery modeling of refineries owned by refiners likely to qualify as small refiners, and of non-small refineries, indicates that small refiners could have significantly higher costs to apply some technologies. For two of the technologies that we believe that refiners would use to reduce their benzene levels, routing the six carbon hydrocarbon compounds around the reformer and isomerizing these compounds, we anticipate that small refiners' costs would likely be similar to non-small refiners, as very little capital investment would need to be made for these technologies. However, for technologies such as benzene saturation and benzene extraction, we anticipate that the costs to small refiners would be higher. Due to the poorer economies of scale, benzene saturation is expected to cost small refiners about 2.2 cents per gallon (while it is projected that benzene saturation would cost a non-small refinery about 1.3 cents per gallon).[264] Likewise, benzene extraction is estimated to cost those refineries able to use this technology about 0.1 cents per gallon; however, for small refiners benzene extraction is expected to cost about 0.5 cents per gallon.

The Panel also noted that the burden imposed on the small refiners by the proposed benzene standard could vary from refiner to refiner. Thus, the Panel recommended that more than one type of burden reduction be offered so that most, if not all, small refiners could benefit. We have continued to consider the issues that were raised during the SBREFA process and have decided to propose the provisions recommended by the Panel.

ii. Rationale for Small Refiner Provisions

Generally, we structured these proposed provisions to reduce the burden on small refiners while still achieving the air quality benefits that this program would provide. We believe that the proposed regulatory flexibility provisions for small refiners are a necessary aspect of standards reflecting the greatest achievable emission reductions considering costs and lead time, because they would appropriately adjust potential costs and lead time for the dissimilarly situated small refiner industry segment, and at the same time allow EPA to propose a uniform benzene standard for all refineries.

First, the proposed compliance schedule for this program, combined with flexibility for small refiners, would achieve the air quality benefits of the program as soon as possible, while still ensuring that small refiners that choose to comply by raising capital for benzene reduction technologies would have adequate time to do so. As noted above, most small refiners have limited additional sources of income or capital beyond refinery earnings for financing and typically do not have the financial backing that larger and generally more integrated companies have. Therefore, they could benefit from additional time to accumulate capital internally or to secure capital financing from lenders.

Second, providing small refiners more time to comply would increase the availability of engineering and construction resources to them. Some refiners would need to install additional processing equipment to meet the proposed benzene standard. We anticipate that there could be increased competition for technology services, engineering resources, and construction management and labor. In addition, vendors would be more likely to contract with the larger refiners first, as their projects would offer larger profits for the vendors. Temporarily delaying compliance for small refiners would spread out the demand for these resources and probably reduce any cost premiums caused by limited supply.

Third, we are anticipating that many small refiners may choose to comply with the proposed benzene standard by purchasing credits. Having additional lead time (which could also result in additional time to generate credits for some small refiners) could help to ensure that there would be sufficient credits available and that there would be a robust credit trading market. Furthermore, offering two years of additional credit life for credits traded to small refiners, as discussed in section VII.D.3.b, would improve credit availability.

Lastly, we recognize that while the proposed benzene standard may be achieved using the four technologies suggested above, new technologies may also be developed that may reduce the capital and/or operational costs. Thus, we believe that allowing small refiners some additional time for newer technologies to be proven out by other refiners would have the added benefit of reducing the risks faced by small refiners. The added time would likely allow for small refiners to benefit from the lower costs of these technologies. This would help to offset the potentially disproportionate financial burden facing small refiners.

We discuss below the provisions that we are proposing to help mitigate the effects on small refiners. Small refiners that chose to make use of the small refiner delayed provision would also delay, to some extent, the benzene emission reductions that would otherwise have been achieved. However, the overall impact of these postponed reductions would be

[264] Smaller refineries are less likely to be able to take advantage of economies of scale. For example, a portion of the capital costs invested for a benzene control unit is fixed (i.e., engineering design costs) resulting in similar costs for each investment project. However, when amortized over the volume of fuel processed by a small versus large unit, the per-gallon capital costs are higher for the smaller unit, resulting in poorer economies of scale.

reasonable, for several reasons. Small refiners represent a relatively small fraction of national gasoline production. Our current estimates (of refiners that we expect would qualify as small refiners) indicate that these refiners produce about 2.5 percent of the total gasoline pool. In addition, these small refiners are generally dispersed geographically across the country and the gasoline that they produce is sometimes transported to other areas, so the limited loss in benzene emissions reduction would also be dispersed. Finally, absent small refiner flexibility, EPA would likely have to consider setting a less stringent benzene standard or delaying the overall program (until the burden of the program on many small refiners was diminished), which would serve to reduce and delay the air quality benefits of the overall program. By providing temporary relief to small refiners, we are able to adopt a program that would reduce benzene emissions in a timely and feasible manner for the industry as a whole.

The proposed small refiner provisions should be viewed as a subset of the hardship provisions described in section VII.E.2.b. Rather than dealing with many refineries on a case-by-case basis through the general hardship provisions (described later), we limit the number by proposing to provide predetermined types of relief to a subset of refineries based on criteria designed to identify refineries most likely to be in need of such automatic relief.

b. How Do We Propose To Define Small Refiners for the Purpose of the Hardship Provisions?

The definition of small refiner for this proposed program is in most ways the same as our small refiner definitions in the Gasoline Sulfur and Highway and Nonroad Diesel rules. These definitions, in turn, were based on the criteria use by the Small Business Administration. However, we are proposing to clarify some ambiguities about the definition that have existed in the past.

A small refiner would need to demonstrate that it met all of the following criteria:

Produced gasoline from crude during calendar year 2005.

Small refiner provisions would be limited to refiners of gasoline from crude because they would be the ones that bore the investment burden and therefore the inherent economic hardship. Therefore, blenders and importers would not be eligible, nor would be additive component producers.

Small refiner status would be limited to refiners that owned and operated the refinery during the period from January 1, 2005 through December 31, 2005. New owners that purchased a refinery after that date would do so with full knowledge of the proposed regulations, and should have planned to comply along with their purchase decisions. As with the earlier fuel rules, we are proposing that a refiner that restarts a refinery in the future may be eligible for small refiner status. Thus, a refiner restarting a refinery that was shut down or non-operational between January 1, 2005 and January 1, 2006 could apply for small refiner status. In such cases, we would judge eligibility under the employment and crude oil capacity criteria based on the most recent 12 consecutive months prior to the application, unless we conclude from data provided by the refiner that another period of time is more appropriate. However, unlike past fuel rules, we propose to limit this to a company that owned the refinery at the time that it was shut down. New purchasers would not be eligible for small refiner status for the same reasons described above. Companies with refineries built after January 1, 2005 would also not be eligible for the small refiner hardship provisions.

—Had no more than 1,500 employees, based on the average number of employees for all pay periods from January 1, 2005 to January 1, 2006; and,

—Had a crude oil capacity less than or equal to 155,000 barrels per calendar day (bpcd) for 2005.

In determining its total number of employees and crude oil capacity, a refiner would need to include the number of employees and crude oil capacity of any subsidiary companies, any parent companies, any subsidiaries of the parent companies, and any joint venture partners. There has been some confusion in past rules regarding how these provisions were interpreted, and as a result, we are proposing to clarify (and, in some cases, modify) them here. For example, in previous rules we defined a subsidiary to be a company in which the refiner or its parent(s) has a 50 percent or greater interest. We realize that it is possible for a parent to have controlling ownership interest in a subsidiary despite having less than 50 percent ownership. Similarly, we realize that it is also possible for multiple parents to each have less than 50 percent ownership interest but still maintain a controlling ownership interest. Therefore, in order to clarify our rules, we are proposing to define a parent company as any company (or companies) with controlling interest, and to define a subsidiary of a company to mean any company in which the refiner or its parent(s) has a controlling ownership interest. In many cases, there are likely to be multiple layers of parent companies, with the ultimate parent being the one for which no one else has controlling interest. The employees and crude capacity of all parent companies, and all subsidiaries of all parent companies, would thus be taken into consideration when evaluating compliance with these criteria.

As with our earlier fuel sulfur regulations, we are also proposing today that refiners owned and controlled by an Alaska Regional or Village Corporation organized under the Alaska Native Claims Settlement Act, would also be eligible for small refiner status, based only on the refiner's employees and crude oil capacity.[265]

c. What Options Would Be Available For Small Refiners?

We are proposing several provisions today to help reduce the burdens on small refiners, as discussed above. In addition, these provisions would also allow for incentives for small refiners that make reductions to their benzene levels.

i. Delay in Standards

We propose that small refiners be allowed to postpone compliance with the proposed benzene standard until January 1, 2015, which is four years after the general program would begin. While all refiners would be allowed some lead time before the general proposed program began, we believe that in general small refiners would still face disproportionate challenges. The proposed four-year delay for small refiners would help mitigate these challenges. Further, previous EPA fuel programs have included two to four year delays in the start date of the effective standards for small refiners, consistent with the lead time we believe appropriate here.

Small refiners have indicated to us that an extension of available lead time would allow them to more efficiently carry out necessary capital projects with less direct competition with non-small refiners for financing and for contractor to carry out capital improvements. There appears to be merit in this position, and we propose that approved small refiners have four years of additional lead time. This would provide three years after the 2012 review of the program, which we believe would be enough time for such

[265] 43 U.S.C. 1626.

refiners to complete necessary capital projects if they chose to pursue them.

ii. ABT Credit Generation Opportunities

While we have anticipated that many small refiners would likely find it more economical to purchase credits for compliance, some have indicated they would make reductions to their gasoline benzene levels to meet the proposed benzene standard. Further, a few small refiners indicated that they would likely do so earlier than would be required by the January 1, 2015 proposed small refiner start date. Therefore, we are proposing that early credit generation be allowed for small refiners that take steps to meet the benzene requirement prior to their effective date. Small refiner credit generation would be governed by the same rules as the general program, described above in section VII.D, the only difference being that small refiners would have an extended early credit generation period of up to seven years. Early credits could be generated by small refiners making qualifying reductions from June 1, 2007 to December 31, 2014, after which credits could be generated indefinitely for those that overcomplied with the standard.

iii. Extended Credit Life

As discussed previously, in order to encourage the trading of credits to small refiners, we are proposing that the useful life of credits be extended by 2 years if they are generated by or traded to small refiners. This is meant to directly address concerns expressed by small refiners that they would be unable to rely on the credit market to avoid large capital costs for benzene control.

iv. ABT Program Review

As previously stated, we are anticipating that it may be more economically sound for some refiners to purchase and use credits. During discussions with small refiners, all of the small refiners voiced their concerns about reliance on a credit market for compliance with the benzene standard. Specifically, small refiners feared that: (1) there could be a shortage of credits, (2) that larger refiners would not trade credits with smaller refiners, and (3) that the cost of credits could be so high that the option to purchase credits for compliance would not be a viable option. Due to these concerns it was suggested that EPA perform a review of the ABT program (and thus, the small refiner flexibility options) by 2012, one year after the general program begins.

Such a review would take into account the number of early credits generated, as well as the number of credits generated and transferred during the first year of the overall benzene control program. Further, requiring the submission of pre-compliance reports from all refiners, similar to the highway and nonroad diesel programs, would aid in assessing the ABT program prior to performing the review. A small refiner delay option of four years after the compliance date for other refiners, coupled with a review after the first year of the overall program, would still provide small refiners with roughly three years that we believe would be needed to obtain financing and perform engineering and construction. We are proposing to perform a review within the first year of the overall program (i.e., by 2012). To aid the review, we are also proposing the requirement that all refiners submit refinery pre-compliance reports annually beginning June 1, 2008. Refiners' 2011 annual compliance reports will be similar to the pre-compliance reports, but the annual compliance reports will also contain information such as credits generated, credits used, credits banked, credit balance, cost of credits purchased. EPA would aggregate the data (to protect individual refiners' confidentiality) and make the results available to the industry. When combined with the four-year delay option, this would provide small refiners (and others) with the knowledge of the credit trading market's status before they would need to make a decision to either purchase credits or to obtain financing to invest in capital equipment.

Further, we are requesting comment on elements to be included in the ABT program review, and suggested actions that could be taken following such a review. Such elements could include:

—Revisiting the small refiner provisions if it is found that the credit trading market did not exist to a sufficient degree to allow them to purchase credits, or that credits were only available at a cost-prohibitive price.
—Options to either help the credit market, or help small refiners gain access to credits.

With respect to the first element, the SBAR Panel recommended that EPA consider establishing an additional hardship provision to assist any small refiners that were unable to comply with the benzene standard even with a viable credit market. Such a hardship provision would address the case of a small refiner for which compliance would be feasible only through the purchase of credits, but it was not economically feasible for the refiner to do so. This hardship would be provided to a small refiner on a case-by-case basis following the review and based on a summary, by the refiner, of technical or financial infeasibility (or some other type of similar situation that would render its compliance with the standard difficult). This hardship provision might include further delays and/or a slightly relaxed standard on an individual refinery basis for up to two years. Following the two-year relief, a small refiner would be allowed to request multiple extensions of the hardship until the refinery's material situation changed. We are proposing the inclusion of such a hardship provision which could be applied for following, and based on the results of, the ABT program review.

With respect to the second element, the Panel recommended that EPA develop options to help the credit market if it is found (following the review) that there is not an ample supply of credits or that small refiners are having difficulty obtaining credits. These options could include the ''creation'' of credits by EPA that would be introduced into the credit market to ensure that there are additional credits available for small refiners. Another option the Panel discussed to assist the credit market was to impose additional requirements to encourage trading with small refiners. These could include a requirement that a percentage of all credits sold be set aside and only made available for small refiners. Similarly, we could require that credits sold, or a certain percentage of credits sold, be made available to small refiners before they are allowed to be sold to any other refiners. Options such as these would help to ensure that small refiners were able to purchase credits. One such recommendation by the Panel, to extend credit life for small refiners, is included in today's proposal and described above.

We welcome comment on additional measures that could be taken following the review if it was found that there was a shortage of credits or that credits were not available to small refiners.

d. How Would Refiners Apply for Small Refiner Status?

A refiner applying for status as a small refiner would be required to apply and provide EPA with several types of information by December 31, 2007. (The detailed application requirements are summarized below.) All refiners seeking small refiner status under this program would need to apply for small refiner status, regardless of whether or not the refiner had been approved for small refiner status under another fuel program. As with applications for relief under other rules, applications for small refiner status under this proposed rule

that were later found to contain false or inaccurate information would be void ab initio.

Requirements for small refiner status applications:

—The total crude oil capacity as reported to the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) for the most recent 12 months of operation. This would include the capacity of all refineries controlled by a refiner and by all subsidiaries and parent companies and their subsidiaries. We would presume that the information submitted to EIA is correct. (In cases where a company disagreed with this information, the company could petition EPA with appropriate data to correct the record when the company submitted its application for small refiner status. EPA could accept such alternate data at its discretion.)

—The name and address of each location where employees worked during the 12 months preceding January 1, 2006; and the average number of employees at each location during this time period. This would include the employees of the refiner and all subsidiaries and parent companies and their subsidiaries.

—In the case of a refiner who reactivated a refinery that was shutdown or non-operational between January 1, 2005, and January 1, 2006, the name and address of each location where employees worked since the refiner reactivated the refinery and the average number of employees at each location for each calendar year since the refiner reactivated the refinery.

—The type of business activities carried out at each location.

—An indication of the small refiner option(s) the refiner intends to use (for each refinery).

—Contact information for a corporate contact person, including: name, mailing address, phone and fax numbers, e-mail address.

—A letter signed by the president, chief operating officer, or chief executive officer of the company (or a designee) stating that the information contained in the application was true to the best of his/her knowledge and that the company owned the refinery as of January 1, 2007.

e. The Effect of Financial and Other Transactions on Small Refiner Status and Small Refiner Relief Provisions

In situations where a small refiner loses its small refiner status due to merger with a non-small refiner, acquisition of another refiner, or acquisition by another refiner, we are proposing provisions which are similar to those finalized in the nonroad diesel final rule to allow for an additional 30 months of lead time. A complete discussion of this provision is located in the preamble to the final nonroad diesel rule.

2. General Hardship Provisions

Unlike previous fuel programs, today's program includes inherent flexibility because there is a nationwide credit trading program. Refiners would have the ability to avoid or minimize capital investments indefinitely by purchasing credits, and we expect that many refiners would utilize this option. We also expect that refiners and importers who normally would produce or import gasoline that met the proposed standard would periodically rely on credits in order to achieve compliance. As discussed in section VII.D, we expect that sufficient credits would be available on an annual basis to accommodate the needs of the regulated industry, and we expect that these credits would be available at prices that are comparable to the alternative cost of making the capital investment necessary to produce compliant gasoline. We are proposing to require that refiners submit pre-compliance reports beginning in 2008. These reports would indicate how the refinery plans to achieve compliance with the 0.62 vol% standard as well as the amount of credits expected to be generated or expected to be needed. The information provided in these reports would enable an assessment of the robustness of the credit market and the ability of refiners to rely on credits as the program began.

Although we expect credits to be available at competitive prices to those who need them, we are proposing hardship provisions to accommodate an inability to comply with the proposed standard at the start of the program, and to deal with unforeseen circumstances. These provisions would be available to all refiners, small and non-small, though relief would be granted on a case-by-case basis following a showing of certain requirements, primarily that compliance through the use of credits was not feasible. We are proposing that any hardship waiver would not be a total waiver of compliance. Rather, such a waiver would allow the refiner to have an extended period of deficit carryover. Under regular circumstances, our proposed deficit carryover provision would allow an entity to be in deficit with the proposed benzene standard for one year, provided that they made up the deficit and were in compliance the next year. The proposed hardship provisions would allow a deficit to be carried over for an extended, but limited, time period. EPA would determine an appropriate extended deficit carryover time period based on the nature and degree of the hardship, as presented by the refiner in their hardship application, and on our assessment of the credit market. Note that any waivers granted under this proposed rule would be separate and apart from EPA's authority under the Energy Policy Act to issue temporary waivers for extreme and unusual supply circumstances, under section 211(c)(4).

a. Temporary Waivers Based on Unforeseen Circumstances

We are proposing a provision which, at our discretion, would permit any refiner to seek a temporary waiver from the MSAT benzene standard under certain rare circumstances. This waiver provision is similar to provisions in prior fuel regulations. It is intended to provide refiners relief in unanticipated circumstances—such as a refinery fire or a natural disaster—that cannot be reasonably foreseen now or in the near future.

Under this provision, a refiner could seek permission to extend the deficit carryover provisions of the proposal for more than the one year already allowed if it could demonstrate that the magnitude of the impact was so severe as to require such an extension. We are proposing that the refiner would be required to show that: (1) The waiver would be in the public interest; (2) the refiner was not able to avoid the nonconformity; (3) it would meet the proposed benzene standard as expeditiously as possible; (4) it would make up the air quality detriment associated with the nonconforming gasoline, where practicable; and (5) it would pay to the U.S. Treasury an amount equal to the economic benefit of the nonconformity less the amount expended to make up the air quality detriment. These conditions are similar to those in the RFG, Tier 2 gasoline sulfur, and the highway and nonroad diesel regulations, and are necessary and appropriate to ensure that any waivers that were granted would be limited in scope.

As discussed, such a request would be based on the refiner's inability to produce compliant gasoline at the affected facility due to extreme and unusual circumstances outside the refiner's control that could not have been avoided through the exercise of due diligence. The hardship request would also need to show that other avenues for mitigating the problem,

such as the purchase of credits toward compliance under the proposed credit provisions, had been pursued and yet were insufficient or unavailable. Especially in light of the credit flexibilities built into the proposed overall program, we expect that the need for additional relief would be rare.

b. Temporary Waivers Based on Extreme Hardship Circumstances

In addition to the provision for short-term relief in extreme unforeseen circumstances, we are also proposing a hardship provision where a refiner could receive an extension of the deficit carryover provisions based on extreme hardship circumstances. Such hardship could exist based on severe economic or physical lead time limitations of the refinery to comply with the benzene standard at the start of the program, and if they were unable to procure sufficient credits. A refiner seeking such hardship relief under this proposed rule would have to demonstrate that these criteria were met. In addition to showing that unusual circumstances exist that impose extreme hardship in meeting the proposed standard, the refiner would have to show (1) best efforts to comply, including through the purchase of credits, (2) the relief granted under this provision would be in the public interest, (3) that the environmental impact would be acceptable, and (4) that it has active plans to meet the requirements as expeditiously as possible. Because such a demonstration could not be made prior to the development of the credit market, EPA would not begin to consider such hardship requests until August 1, 2010, that is, until after the final pre-compliance reports are submitted. Consequently, requests for such hardship relief would have to be received prior to January 1, 2011.

If hardship relief under these circumstances was approved, we would expect to impose appropriate conditions to ensure that the refiner was making best efforts to achieve compliance offsetting any loss of emission control from the program through the deficit carryforward provisions. We believe that providing short-term relief to those refiners that need additional time due to hardship circumstances would help to facilitate the adoption of the overall MSAT program for the majority of the industry. However, we do not intend for hardship waiver provisions to encourage refiners to delay planning and investments they would otherwise make. Again, because of the flexibilities of the proposed overall program, we expect that the need for additional relief would be rare.

c. Early Compliance With the Proposed Benzene Standard

We are also requesting comment on a means for allowing refineries, under certain conditions, to meet the proposed benzene standard early in lieu of MSAT1. In order to meet the proposed benzene standard early, refiners would need to meet several criteria similar to those used in the past when EPA has adjusted refinery baselines under the MSAT1 program. Specifically, the eligibility for such provisions would be limited to refiners that have historically had better than average toxics performance, lower than average benzene and sulfur levels, and a significant volume of gasoline impacted by the phase-out of MTBE as an oxygenate. The result of not allowing such early compliance could be less supply of their cleaner fuel and more supply of fuel with higher toxics emissions, with a worsening of overall environmental performance under MSAT1. A refiner opting into such provisions would not be allowed to generate benzene credits on the affected fuel prior to 2011, since an ability to reduce benzene further would presumably negate the need for an early compliance option.

F. Technological Feasibility of Gasoline Benzene Reduction

This section summarizes our assessment of the feasibility for the refining industry to reduce benzene levels in gasoline to an average of 0.62 vol% starting January 1, 2011. Based on this assessment, we believe that it is technologically feasible for refiners to meet the benzene standard by the start date using technologies that are currently available.

We begin this section by describing where benzene comes from and the current levels found in gasoline. Next we discuss the benzene reduction technologies available to refiners today and how they are expected to be used to meet the proposed benzene standard. Then we provide our analysis of the lead time necessary for complying with the benzene standard. All of these issues are discussed in more detail in Chapters 6 and 9 of the Regulatory Impact Analysis.

1. Benzene Levels in Gasoline

EPA receives information on gasoline quality, including benzene levels, from each refinery and importer in the U.S. under the reporting requirements of the RFG and CG programs. As discussed earlier in this section, benzene levels averaged 0.94 vol% for gasoline produced in and imported into the U.S. in 2003, which is the most recent year for which complete data is available. However, for individual refineries, daily batch gasoline benzene levels and annual average levels can vary significantly from the national average. As indicated earlier in describing our decision-making process for the type and level of gasoline benzene standard, it is very important to understand how current benzene levels vary by individual refinery, by region, as well as day-to-day by batch.

The variability in 2003 average annual gasoline benzene levels by individual refinery is shown in Figure VII.F–1. This figure contains a summary of annual average gasoline benzene levels by individual refinery for CG and RFG versus the cumulative volume of gasoline produced.

Figure VII.F-1.

Benzene Levels in U.S. Gasoline Produced and Imported in 2003 (Excluding California).

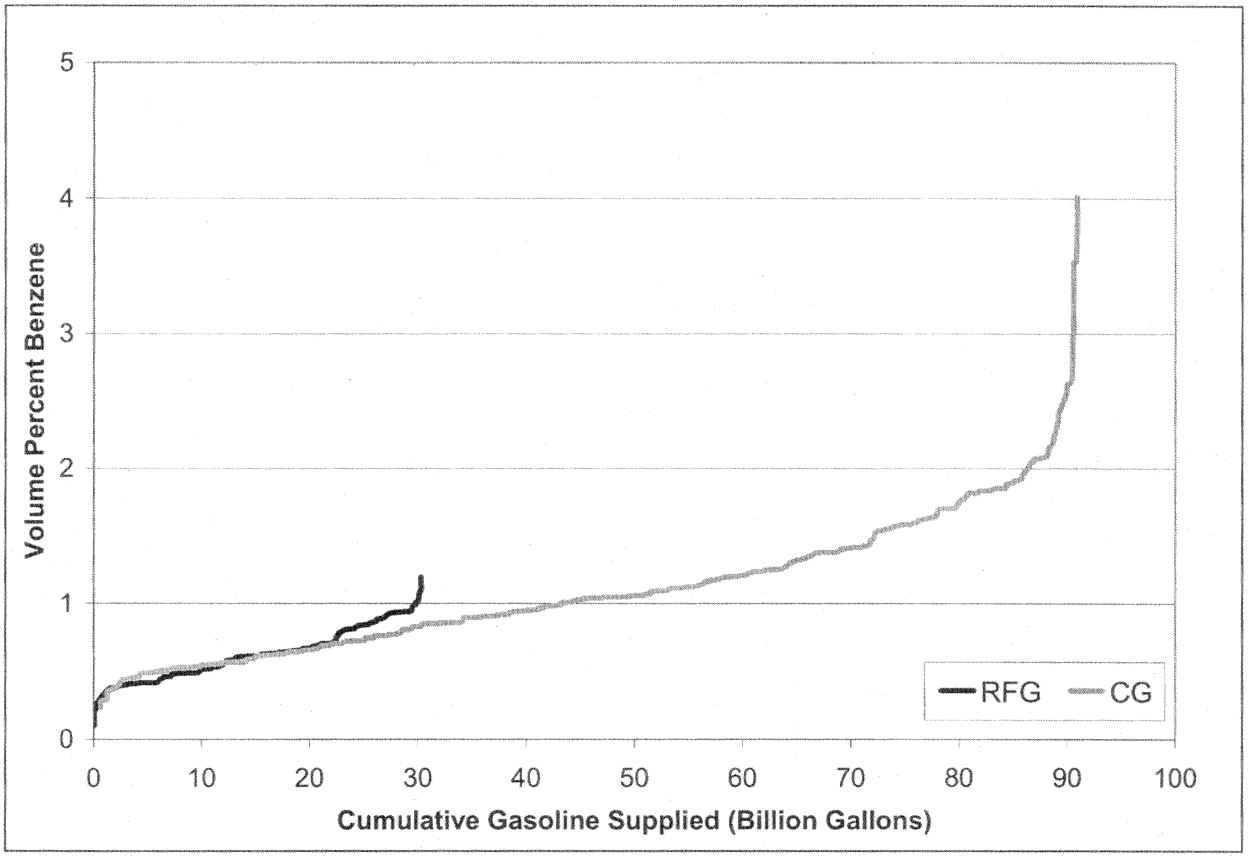

Figure VII.F–1 shows that the annual average benzene levels of CG as produced by individual refineries varies from 0.29 to 4.01 vol%. Based on the data in the figure, the volume-weighted average benzene content for U.S. CG is 1.10 vol%. As expected, the annual average benzene levels of RFG as produced by individual refineries are lower, ranging from 0.10 to 1.09 vol%. The volume-weighted average benzene content for U.S. RFG (not including California) is 0.62 vol%.

The information presented for annual average gasoline benzene levels does not illustrate the very large day-to-day variability in gasoline batches produced by each refinery. We evaluated the batch-by-batch gasoline benzene levels for several refineries that produce both RFG and CG, using information submitted to EPA as part of the reporting requirements for the RFG and CG Anti-dumping Programs. One refinery had no particular trend for its CG benzene levels, with benzene levels that varied from 0.1 to 3 vol%. That same refinery's RFG averaged around 0.95 vol% benzene, ranging from 0.05 to 1.1 vol%. The second refinery had RFG benzene levels that averaged around 0.4 vol% ranging from 0.1 to 1.0 vol%. Its CG benzene levels averaged about 0.6 vol% with batches that ranged from 0.1 to 1.2 vol%. The batches for both RFG and CG varied on a day-to-day basis and, overall, by over an order of magnitude. It is clear from our review of batch-by-batch data submitted to EPA that benzene variability is typical of refineries nationwide.

There are several contributing factors to the variability in refinery gasoline benzene levels across all the refineries. We will review these factors and describe how each impacts batch-by-batch and annual average gasoline benzene levels.

The first factor contributing to the variability in gasoline benzene levels is crude oil quality. Each refinery processes a particular crude oil slate, which tends to be fairly constant except for seasonal changes that reflect changes in product demand. Crude oil varies greatly in aromatics content. Since benzene is an aromatic compound, its level tends to vary with the aromatics content of crude oil. For example, Alaskan North Slope crude oil contains a high percentage of aromatics. Refiners processing this crude oil in their refineries shared with us that their straight run naphtha contains on the order of 3 vol% benzene (the production of naphtha is discussed further below). This is one reason why the gasoline in PADD 5 outside of California is high in benzene. Conversely, refiners that process very paraffinic crude oils (low in aromatics) usually have a low amount of benzene in their straight run naphtha. Because crude oil supplies tend to be constant over periods of months, crude oil quality is not a major contributor to day-to-day variations in benzene among gasoline batches. However, because crude oil supplies often vary from refinery to refinery, differences in crude quality are an important factor in the variability among refineries.

The second factor contributing to the variability in benzene levels is differences in the types of processing units and gasoline blendstocks among refineries. If a refinery is operated to rely on its reformer for virtually all of

its octane needs—especially the type that operates at higher pressures and temperatures and thus tends to produce more benzene—it will likely have a high benzene level in its gasoline. Refineries with a reformer and without a fluidized catalytic cracking (FCC) unit are particularly prone to higher benzene levels, since they rely heavily on the product of the reformer (reformate) to meet octane needs. However, refineries that can rely on other means for boosting their gasoline octane can usually rely less on the reformer and can run this unit at a lower severity, resulting in less benzene in their gasoline pool. Examples of such other octane-boosting refinery units include the alkylation unit, the isomerization unit and units that produce oxygenates. Refiners may have these units in their refineries, or in many cases, they can purchase the gasoline blendstocks produced by these units from other refineries or third-party producers. The blending of the products of these processes—alkylate, isomerate, and oxygenates—into the gasoline pool provides a significant octane contribution, which can allow refiners to rely less on the octane from reformate. Since refiners make individual decisions about producing or purchasing different blendstocks for each refinery, this variation is another important contributor to differences in gasoline benzene content among refineries. In addition, the variation in gasoline blendstocks used to produce different batches of gasoline is by far the most important factor in the drastically differing benzene levels among batches of gasoline at any given refinery.

This practice by refiners of producing or purchasing different blendstocks and blending them in different ways to produce gasoline is an integral and essential aspect of the refining business. Thus, in designing an effective benzene control program, it is critical that benzene levels be reduced while refiners retain the ability to change blendstocks (and crude supplies) as needed from batch to batch and refinery to refinery. We believe that the proposed program accomplishes these goals.

A third important source of variability in existing benzene levels in gasoline is the fact that many refiners are already operating their refineries today to intentionally reduce benzene levels in their gasoline, while others are not. For example, refiners that are currently producing RFG must ensure their RFG averages 0.95 vol% or less and is always under the 1.3 vol% cap (see discussion of the current toxics program in section VII.C.5 above). Similarly, refiners producing gasoline to comply the California RFG program need to produce gasoline with reduced benzene. These refiners are generally using benzene control technologies to actively produce gasoline with lower benzene levels. If they are producing CG along with the RFG, their CG is usually lower in benzene as well compared with the CG produced by other refiners, since the benzene control technology often affects some of the streams used to blend CG. In addition, some refiners add specific refinery units such as benzene extraction to intentionally produce chemical-grade benzene. Benzene commands a much higher price on the chemical market compared to the price of gasoline. For these refiners, the profit from the sale of benzene pays for the equipment upgrades needed to greatly reduce the levels of benzene in their gasoline. In most cases, refineries with extraction units are marketing their low-benzene gasoline in the RFG areas.

The use of these benzene control technologies by some refiners contributes to the variability in gasoline benzene levels among refineries. The use of these technologies can also contribute to the batch-to-batch variability in benzene levels. This is because, as with different blendstocks, refiners need to be able to change the operating characteristics of these technologies to meet varying needs in gasoline quality. In addition, planned or unexpected shut-downs of benzene control equipment may result in temporarily high batch benzene levels relative to the normally low gasoline levels when the unit is operating.

The variations in gasoline benzene levels among refineries also lead to variations in benzene levels among regions of the country. Table VII.F–1 shows the average gasoline benzene levels for all gasoline produced in (and imported into) the U.S. by PADD for 2003. The information is presented for both CG and RFG.

TABLE VII.F–1.—BENZENE LEVELS BY GASOLINE TYPE PRODUCED IN OR IMPORTED INTO EACH PADD IN 2003

	PADD 1	PADD 2	PADD 3	PADD 4	PADD 5	CA	U.S.
Conventional Gasoline	0.84	1.39	0.94	1.54	1.79	0.63	1.11
Reformulated Gasoline	0.60	0.82	0.56	n/a	n/a	0.62	0.62
Gasoline Average	0.70	1.28	0.87	1.54	1.79	0.62	0.94

Table VII.F–1 shows that benzene levels vary fairly widely across different regions of the country. PADD 1 and 3 benzene levels are lower because the refineries in these regions produce a high percentage of RFG for both the Northeast and Gulf Coast. Also, a number of refineries in these two regions are extracting benzene for sale into the chemicals market, contributing to the much lower benzene level in these PADDs. It is interesting to note that, in addition to RFG, CG benzene levels are low in PADDs 1 and 3. There are two reasons for this. First, some RFG produced by refineries ends up being sold as CG. Second, as mentioned above, refiners that are reducing the benzene levels in their RFG generally also impact the benzene levels in their CG. In contrast, other parts of the U.S. with little to no RFG production and little extraction have much higher benzene levels.

2. Technologies for Reducing Gasoline Benzene Levels

a. Why Is Benzene Found in Gasoline?

To discuss benzene reduction technologies, it is helpful to first review some of the basics of refinery operations. Refineries process crude oil into usable products such as gasoline, diesel fuel and jet fuel. For a typical crude oil, about 50 percent of the crude oil falls within the boiling range of gasoline, jet fuel and diesel fuel. The rest of crude oil boils at too high a temperature to be blended directly into these products and therefore must be cracked into lighter compounds. Material that boils within the gasoline boiling range is called naphtha. There are two principal sources of naphtha. The first is ''straight run'' naphtha, which comes directly off of the crude oil atmospheric distillation column. Another principle source of naphtha is that generated from the cracking reactions. Each type of naphtha contributes to benzene in gasoline.

Typically, little of the benzene in gasoline comes from benzene naturally

occurring in crude oil. Straight run naphtha, which comes directly from the distillation of crude oil, thus tends to have a low benzene content, although it can contain anywhere from 0.3 to 3 vol% benzene. While straight run naphtha is in the correct distillation range to be usable as gasoline, its octane value is too low for blending directly into gasoline. Thus, the octane value of this material must be increased to enable it to be used as a gasoline blendstock.

The primary means for increasing the octane value of naphtha (whether straight run or from cracking processes) is reforming. Reforming reacts the heavier portion of straight run naphtha (six-carbon material and heavier) over a precious metal catalyst at a high temperature. The reforming process converts many of the naphtha compounds to aromatic compounds, which raises the octane of this reformate stream to over 90 octane numbers. (''Octane number'' is the unit of octane value.) Since benzene is an aromatic compound, it is produced along with toluene and xylene, the other primary aromatic compounds found in gasoline. The reforming process increases the benzene content of the straight run naphtha stream from 0.3 to 3 vol% to 3 to 11 vol%.

There are two ways that benzene levels increase in the reformer above the benzene levels occurring naturally in crude oil—the conversion of non-aromatic six-carbon hydrocarbons into benzene, and the cracking of heavier aromatic hydrocarbon compounds into benzene.[266] In the discussion below about how benzene in the reformate stream can be reduced, we elaborate further about the opportunities that refiners have to manage both of these benzene-producing processes.

Three factors contribute to the wide range in benzene levels in the reformate stream, and these factors are important in the decisions refiners would make in response to the proposed benzene control program. First, different feedstocks contain different amounts of benzene and different levels of benzene precursors that are more or less capable of being converted to benzene by the reformer. Second, the type of reformer being used affects how much benzene is produced during the reforming process. For example, refineries with the older, higher pressure reformers tend to form more benzene by cracking heavier aromatics than refineries with newer, lower pressure units. Third, the severity with which the reformer is being operated also affects benzene levels in reformate. The greater the severity at which the reformer is operated, the greater the conversion of feedstocks to aromatics (and the more hydrogen is produced). However, more severe operation shortens the time between the catalyst regeneration events that the reformer must periodically undergo. Greater severity also lowers the gasoline yield from this unit. Because refiners balance these operation and production factors individually at each refinery in deciding on how severely to operate the reformer, these decisions contribute to the range of benzene levels found in reformate from refinery to refinery.

In addition to benzene occurring in the reformate stream, another source of benzene in gasoline is naphtha produced from cracking processes. There are three primary cracking processes in the refinery—the FCC unit, the hydrocracker, and the coker. The naphthas produced by these cracking processes contain anywhere from 0.5 to 5 vol% benzene. The benzene in these streams is typically formed from the cracking of heavier aromatic compounds into lighter compounds that can then be blended into gasoline. The benzene content of cracked streams is therefore largely a function of the aromatics content of the crude oil feedstocks and the need of a particular refinery to produce gasoline from heavier feedstocks. As we discuss later, we do not expect that benzene reductions from these cracked naphthas would be a major avenue for compliance with the proposed benzene control program for most refiners.

Finally, there are other intermediate streams that contribute to benzene in gasoline but that have such low benzene content or are found in such low volumes in gasoline that they are of very limited importance in reducing benzene levels. Examples of these are light straight run naphtha and the oxygenates MTBE and ethanol.

Table VII.F–2 summarizes the typical ranges in benzene content and average percentages of gasoline of the various intermediate streams that are blended to produce gasoline.

TABLE VII.F–2.—BENZENE CONTENT AND TYPICAL GASOLINE FRACTION OF VARIOUS GASOLINE BLENDSTOCKS

Process or blendstock name	Typical benzene level (vol%)	Average volume in gasoline (percent)
Reformate	3–11	30
FCC Naphtha	0.5–2	36
Alkylate	0	12
Isomerate	0	4
Hydrocrackate	1–5	3
Butane	0	4
Light Straight Run	0.3–3	4
MTBE/Ethanol	0.05	3
Natural Gasoline	0.3–3	3
Coker Naphtha	3	1

Table VII.F–2 shows that the principal contributor of benzene to gasoline is reformate. This is due both to its high benzene content and the relatively large gasoline fraction that reformate comprises of the gasoline pool. The product stream from the reformer, reformate, accounts for between 15 and 50 percent of the content of gasoline, depending on the refinery (typically about 35 percent.) For this reason and as discussed below, reducing the benzene in reformate is the primary focus of the various benzene reduction technologies available to refiners. Control of benzene from the other streams quickly becomes cost prohibitive due to either the low

[266] In the process of converting the straight run naphtha into aromatics, a significant amount of hydrogen is produced that is critical for the various hydrotreating operations in refineries. As discussed later, the impact on hydrogen production is an important consideration in reducing benzene levels.

depending on the refinery (typically about 35 percent.) For this reason and as discussed below, reducing the benzene in reformate is the primary focus of the various benzene reduction technologies available to refiners. Control of benzene from the other streams quickly becomes cost prohibitive due to either the low concentration of benzene in the stream, the low volume of the stream, or both.

b. Benzene Control Technologies Related to the Reformer

There are several technologies that reduce gasoline benzene by controlling the benzene in the feedstock to and the product stream from the reformer.[267] One approach is to route the intermediate refiner streams that have the greatest tendency to form benzene in a way that bypasses the reformer. This approach is very important in benzene control, but it is limited in its effectiveness because it does not address any of the naturally-occurring benzene and some of the benzene formed in the reformer. For this reason, refiners often use a second category of technologies that remove or destroy benzene, including both the naturally occurring benzene as well as that formed in the reformer. These technologies are isomerization, benzene saturation, and benzene extraction. We discuss each of these approaches to benzene reduction below. The effectiveness of these technologies in reducing the benzene content of reformate varies from approximately 60% to 96%. The actual impact on an individual refinery's finished gasoline benzene content, however, will be a function of many different refinery-specific factors, including the extent to which they are already utilizing one of these technologies.

i. Routing Around the Reformer

The primary compounds that are converted to benzene by the reforming unit are the six-carbon hydrocarbon compounds contained in the straight run naphtha fed to the reformer. These compounds, along with the naturally-occurring benzene in this straight run naphtha stream, can be removed from the feedstock to the reforming unit using the upstream distillation unit, bypassed around the reforming unit, and then blended directly into gasoline. Routing these compounds around the reformer prevents the formation of much of the benzene in the reformer, though it does not reduce the naturally-occurring benzene.

For a typical refinery, the technology to route the six-carbon material around the reformer would likely require only a small capital investment. Compared with a scenario where all of this material goes to the reformer, the combined rerouted and reformate streams would overall have about 60 percent less benzene, and finished gasoline would have about 31 percent less benzene. However, in most cases this would not be sufficient to achieve a 0.62 vol% benzene standard, and some combination of the technologies discussed next would also be needed.

ii. Routing to the Isomerization Unit

A variation of routing around the reformer involves the isomerization of the re-routed benzene precursors. Rather than directly blending the rerouted stream into gasoline, this stream can first be processed in the isomerization unit. This has two main advantages. First, it increases the effectiveness of benzene control, since the isomerization process converts the naturally-occurring benzene in this rerouted stream to another compound. Second, it recovers some of the octane otherwise lost by the conversion of benzene.

The typical role of the isomerization unit is to convert five-carbon hydrocarbons from straight-chain to branched-chain compounds, thus increasing the octane value of this stream. If the isomerization unit at a refinery has sufficient additional capacity to handle the rerouted six-carbon hydrocarbons, that stream can also be sent to this unit, where the benzene present in that stream would be saturated and converted into another compound (cyclohexane). (This benzene saturation process is similar to what occurs in a dedicated benzene saturation unit, as described below.) Compared to a scenario where all this material goes to the reformer, routing the six-carbon compounds to the isomerization unit in this manner can reduce the benzene levels in the combined rerouted and reformate streams by about 80 percent. The option of isomerization is currently available to those refineries with sufficient capacity in an existing isomerization unit to treat all of the six-carbon material.

iii. Benzene Saturation

The function of a benzene saturation unit is to react hydrogen with the benzene in the reformate (that is, to saturate the benzene) in a dedicated reactor, converting the benzene to cyclohexane. Because hydrogen is used in this process, refiners that choose this technology need to ensure that they have a sufficient source of hydrogen. Refiners cannot afford to saturate other aromatic compounds present in their reformate as it would cause too great an octane loss. Thus, it is necessary to separate a six-carbon stream, which contains the benzene, from the rest of reformate, and only feed the six-carbon stream to the benzene saturation unit. This separation is done with a distillation unit called a reformate splitter placed just after the reformer.

There are two vendors that produce benzene saturation units. UOP produces a technology named Bensat. There are at least six Bensat units operating in the U.S. today and many more around the world. CDTech licenses another, somewhat newer technology for this purpose called CDHydro. There are six CDHydro units operating today, mostly outside of the U.S. Benzene saturation can reduce benzene in the reformate by about 96 percent.

iv. Benzene Extraction

Extraction is a technology that chemically removes benzene from reformate. The removed benzene can be sold as a high-value product in the chemicals market. To extract only benzene from the reformate, a reformate splitter is installed just after the reformer to separate a benzene-rich stream from the rest of the reformate. The benzene-rich stream is sent to an extraction unit which separates the benzene from the rest of the hydrocarbons. Since the benzene must be sufficiently concentrated before it can be sold on the chemicals market, a very thorough distillation step is incorporated with the extraction step to concentrate the benzene to the necessary purity. Where it is economical to use, benzene extraction can reduce benzene levels in the reformate by 96 percent.

There are two important considerations refiners have with respect to using benzene extraction. The first is the price of chemical grade benzene. If the price of chemical grade benzene is sufficiently higher than the price of gasoline, benzene extraction can realize an attractive return on capital invested and is often chosen as a technology for achieving benzene reduction. The difference in price between benzene and gasoline has been significantly higher than its historic levels during the last few years. While we expect that this difference will return closer to the lower historic levels by the time the proposed program

[267] The benzene reduction technologies are discussed here in the context of the feasibility for reducing the benzene levels of gasoline to meet a gasoline benzene content standard. However, this discussion applies equally to the feasibility of a total air toxics standard, since we believe that benzene control would be the only means that refiners would choose in order to comply with such a standard.

would be implemented, the difference in prices should still be sufficient to make extraction a very cost-effective technology for reducing gasoline benzene levels. A more detailed discussion about benzene prices is contained later in this preamble (section IX) and in Chapter 9 of the RIA.

The other consideration in using benzene extraction is the distance that a refinery is from the markets where benzene is used as a chemical feedstock. Transportation of chemical grade benzene requires special hazardous-materials precautions, including protection against leaks. Certain precautions are also necessary to preserve the purity of the benzene during shipment. These special precautions are costly for shipping benzene over long distances. Thus if a refinery were located far from the chemical benzene markets, the economics for using extraction would be much less attractive compared to that of refiners located near benzene markets.

The result has been that chemical grade benzene production has been limited to those refineries located near the benzene markets. This includes refineries on the Gulf and on the East Coast and to a limited extent, several refineries in the Midwest. This could change if the very high benzene prices in 2004 and the beginning of 2005 were to continue, instead of returning to lower historical levels. However, even if benzene prices remain high by the time that a benzene control standard would take effect, refineries located away from the benzene markets may be concerned that the higher benzene prices may not be certain enough for the long term to warrant investment in extraction. Our analysis for today's proposal conservatively assumes that only refineries on the Gulf and East coasts would choose to use benzene extraction to lower their gasoline benzene levels. Despite some existing extraction units in the Midwest, the benzene market there is small and no additional benzene extraction is assumed to occur there.

c. Other Benzene Reduction Technologies

We are aware of other, less attractive technologies capable of achieving benzene reductions in gasoline. These technologies tend to have more serious impacts on other important refinery processes or on fuel quality and are generally capable of only modest benzene reductions. We do not currently have sufficient information about how widely these approaches are or could be utilized or their potential costs, and in our modeling we have not assumed that refiners would use them. However, because they may be feasible in some unique situations, we mention these potential gasoline benzene reduction approaches here.

One of these less attractive opportunities for additional benzene reduction would be for refiners to capture more of the reformate benzene in the reformate splitter and send this additional benzene to the saturation unit. Refiners attempt to minimize both the capital and operating costs when splitting a benzene-rich stream out of the reformate stream for treating in a benzene saturation unit. To do this, they optimize the distillation cut between benzene and toluene, thus achieving a benzene reduction of about 96 percent in the reformate while preserving all but about 1 percent of the high-octane toluene. However, if a refiner were to be faced with a dire need for additional benzene reductions, it could change its distillation cut to send the last 4 percent of the benzene to the saturation unit. Since this cut would also bring with it more toluene than the normal optimized scenario, this toluene would also be saturated, resulting in a larger loss in octane and greater hydrogen consumption.

Some refineries with hydrocracking units may have another means of further reducing the gasoline benzene levels. They may be able to reduce the benzene content of one of the products of the hydrocracker, the light hydrocrackate stream. Today, light hydrocrackate is normally blended directly into gasoline. Light hydrocrackate contains a moderate level of benzene, although its contribution to the gasoline benzene levels is significant only in those refineries with hydrocrackers. Light hydrocrackate could be treated by routing this stream to an isomerization unit, similar to how refiners isomerize the six-carbon straight run naphtha as discussed above. Alternatively, refiners could use additional distillation equipment to cut the light hydrocrackate more finely. In this way, more of the benzene could be shifted to the ''medium'' hydrocrackate stream, which in most refineries is sent to the reformer and thus would be treated along with the reformate.

Another way that we believe some refiners could further reduce their benzene levels would be to treat the benzene in natural gasoline. Many refiners, especially in PADDs 3 and 4, blend some light gasoline-like material, which is a by-product of natural gas wells, into their gasoline. In most cases, we believe that this material is blended directly into gasoline. Because the benzene concentration in this stream is not high, it would be costly to treat the stream to reduce benzene. However, there could be other reasons that refiners might find compelling for treating this stream. First, since its octane is fairly low to begin with, it could be fed to the reformer and its benzene would be treated in the reformate, along with the benefit of improving the octane quality of this stream. Second, refiners producing low-sulfur gasoline under the gasoline sulfur program may not be able to easily tolerate the sulfur from this stream if it were blended directly into gasoline. Thus, if they treat this stream in the reformer, it would undergo the hydrotreating (desulfurization) that is necessary for all streams fed to the reformer. Overall, we do not have sufficient information to conclude whether treating natural gasoline might become more attractive in the future.

Another approach to benzene reduction that we believe could be attractive in certain unique circumstances relates to the benzene content in naphtha from the fluidized catalytic cracker, or FCC unit. As shown in Table VII.F–2, FCC naphtha contains less than 1 percent benzene on average. Despite the very low concentration of benzene in FCC naphtha, the large volumetric contribution of this stream to gasoline results in this stream contributing a significant amount of benzene to gasoline as well. There are no proven processes which treat benzene in FCC naphtha. This is because its concentration is so low as well as because FCC naphtha contains a high concentration of olefins. Segregating a benzene-rich stream from FCC naphtha and sending it to a benzene saturation unit would saturate the olefins in the same boiling range, resulting in an unacceptable loss in octane value. Also, some refiners operate their FCC units today more severely to improve octane, an action that also increases benzene content. Conceivably, refiners could redesign their FCC process (change the catalyst and operating characteristics) to reduce the severity and produce slightly less benzene. We do not have sufficient information to know whether many refiners are already operating at high FCC severity and thus have the potential to reduce benzene by reducing that severity.

We request comment on our assessment of benzene reduction approaches, including data related to the current or potential usage and potential effectiveness of each approach.

d. Impacts on Octane and Strategies for Recovering Octane Loss

All these benzene reduction technologies affect the octane of the final gasoline. Regular grade gasoline must comply with a minimum 87 octane (R+M)/2 rating (or a sub-octane rating of 86 for driving in altitude), while premium grade gasoline must comply with an octane rating which ranges from 91 to 93 (R+M)/2. Gasoline must meet these octane ratings to be sold as gasoline at retail. Routing the benzene precursors around the reformer reduces the octane of the six-carbon compound stream, which normally exits the reformer with the rest of the reformate. Without these compounds in the reformate, a loss of octane in the gasoline pool of about 0.14 octane numbers typically occurs. If this rerouted stream can be sent to an isomerization unit, a portion of this lost octane can be recovered, provided that sufficient capacity remains in that unit to continue treating the five-carbon naphtha compounds. Benzene saturation and benzene extraction both affect the octane of reformate and therefore the gasoline pool. Benzene saturation typically reduces the octane of gasoline by 0.24 octane numbers, and benzene extraction typically reduces the octane by 0.14 octane numbers.

Refiners can recover the lost octane in a number of ways. First, the reformer severity can be increased. However, if the refiner is reducing benzene through precursor rerouting or saturation, this strategy can be somewhat counterproductive. This is because increased severity increases the amount of benzene in the reformate and thus increases the cost of saturation and offsets some of the benzene reduction of precursor rerouting. Increasing reformer severity would also decrease the operating cycle life of the reformer, requiring more frequent regeneration. However, where benzene extraction is used, increased reformer severity can improve the economics of extraction because not only is lost octane replaced but the amount of benzene extracted is increased. Again, operating the reformer more severely would have the negative impact of shortening the reformer's operating cycle between regeneration events.

Lost octane can also be recovered by increasing the activity of other octane-producing units at the refinery. As discussed above, saturating benzene in the isomerization unit loses the octane value of that benzene, but octane is increased by the simultaneous formation of branch-chain compounds. Also, many refineries produce a high-octane blendstock called alkylate. Alkylate is produced by reacting normal butane and isobutane with isobutylene over an acid catalyst. Not only is this stream high in octane, but it converts compounds that are too volatile to be blended in large amounts into the gasoline pool into heavier compounds that can be readily blended into gasoline. If the refinery is short of feedstocks for alkylate, then the operations of the FCC unit, which is the principal producer of these feedstocks, can be adjusted to produce more of the feedstocks for the alkylate unit, increasing the availability of this high octane blendstock.

Octane can also be increased by purchasing high-octane blendstocks and blending them into the gasoline pool. For example, some refiners with excess octane production capacity market high octane blendstocks such as alkylate or aromatics such as toluene. Oxygenates, such as ethanol, can also be blended into the gasoline pool. Other oxygenates such as methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), and other ethers are sometimes used. The availability and cost of oxygenates for octane replacement vary according to material prices as well as state and federal policies that either encourage or discourage their use. (For example, the Energy Policy Act of 2005 requires an increase in the volume of renewable fuels, including ethanol, which are blended into gasoline).

e. Experience Using Benzene Control Technologies

All of the benzene reduction technologies and octane generating technologies described above have been demonstrated in refineries in the U.S. and abroad. All four of these technologies have been used for compliance purposes for the federal RFG program, which has required that benzene levels be reduced to an average of 0.95 vol% or lower since 1995.

According to the Oil and Gas Journal's worldwide refining capacity report for 2003, there were 27 refineries in the U.S. with extraction units. Those refineries that chose extraction often reduced their benzene to levels well below 0.95 vol% because of the value of benzene as a chemical feedstock, as discussed above. Once a refiner invests in extraction, they have a strong incentive to maximize benzene production and thus the availability of benzene to sell to the chemical market, often reducing gasoline benzene more than is required by regulation. The RFG program also led to the installation of a small number of benzene saturation units in the Midwest to produce RFG for the markets there. California has its own RFG program which also put into place a stringent benzene standard for the gasoline sold there. The Oil and Gas Journal's Worldwide Refining Report shows that four California refineries have benzene saturation units. If we assume that those RFG and California refineries that do not have extraction or saturation units are routing their precursors around their reformer, then there are 28 refineries using benzene precursor rerouting as their means to reduce benzene levels. Thus, these technologies have been demonstrated in many refineries since the mid-1990s in the U.S. and are considered by the refining community as commercially proven technologies.

Worldwide experience provides further evidence of the commercial viability of these benzene control technologies. A vendor of benzene control technology has shared with us how the refining companies in other countries have controlled the benzene levels of their gasoline in response to the benzene standards put in place there. In Europe, benzene control is typically achieved by routing the benzene precursors around the reformer and feeding that rerouted stream to an isomerization unit. In Japan, much of the benzene is extracted from gasoline and sold to the chemicals market. Finally, in Australia and New Zealand, refiners tend to use benzene saturation to reduce the benzene levels in their gasoline.

f. What Are the Potential Impacts of Benzene Control on Other Fuel Properties?

With the complex nature of modern refinery operations, most changes to fuel properties affect other fuel properties to some degree. In the case of benzene control, the ''ripple effects'' on other fuel properties tends to be limited. However, as discussed above, the reduction in benzene content that we are proposing in this rule, depending on how it is accomplished, would in most cases slightly reduce the overall octane of the resulting gasoline. Refiners would likely compensate by increasing the volume of reformate (other aromatics) blended into the gasoline, requiring a small increase in reformer severity and energy inputs. Some analysis of gasoline property survey data suggests that as benzene is reduced in gasoline, other aromatics may increase somewhat to help compensate.

Another option refiners might consider in response to the proposed rule is match-blending ethanol to make up octane and increase supply volume.

This has been done for several years with MTBE as an economical way to meet toxics performance requirements and octane targets for RFG. Like MTBE, ethanol has a relatively high blending octane, and is already added in many markets to take advantage of tax benefits or to support local suppliers. Since the use of ethanol is being encouraged in the recently-enacted energy legislation, refiners will likely seek to capture the octane benefits as part of their process, which could help offset the octane loss some refiners will see as a result of benzene reduction processes. Furthermore, to the extent that current MTBE production is shifted to production of isooctene, isooctane, and alkylate, these compounds would be available as high-octane, low-benzene gasoline blendstocks.

Finally, refiners may blend in isomerate or alkylate, which are very ''clean'' gasoline blendstocks, thereby reducing the levels of ''dirtier'' gasoline blendstocks, and reducing overall sulfur, olefins, and aromatics. We do not anticipate major changes in other fuel properties due to reductions in benzene. Our modeling of the emissions impacts of the proposed benzene standard does account for the modest changes in other fuel properties. As discussed in section V of this preamble and Chapter 2 of the RIA, this emissions modeling indicates that the proposed benzene standard has negligible impacts on the emissions of other mobile source air toxics.

3. Feasible Level of Benzene Control

A key aspect of our selection of the level of the proposed average benzene standard of 0.62 vol% was our evaluation of the benzene levels achievable by individual refineries. Our modeling analyses, which combine our understanding of technological and economic factors, is summarized in section IX below and discussed in detail in Chapter 9 of the RIA. Later in this section we summarize our conclusions about the overall feasibility of the program in terms of the requirements of the Clean Air Act.

We assessed the benzene levels achievable for each refinery, assuming that each refinery pursued the most stringent form of reformate benzene control available to it—installing either benzene saturation or extraction units. Based on this assessment, we project that the most stringent benzene level achievable on average for all U.S. gasoline would be 0.52 vol% benzene.[268] As discussed above, however, a standard at this level would require significant investment at essentially all refineries—that is, near-universal installation of either benzene saturation or benzene extraction capability. As discussed in section IX below, this would be a very expensive result—costing about three times more than the proposed program—that we do not believe would be reasonable when costs are taken into account.

Furthermore, the model projects that all refineries would use optimal combinations of actual benzene reductions and/or credit purchases and would meet the average standard without going beyond the primary technologies of reformate benzene reduction discussed earlier in this section. To reach this conclusion, our model assumes a fully utilized credit trading program (that is, each refiner is assumed to minimize its average costs and to freely trade credits among companies so that all credits generated are used). Although the assumption of a fully utilized credit trading program is appropriate for our modeling purposes, it is very possible that this would not occur in practice. For example, some refiners might choose to hold onto credits that they generate, saving them for potential ''emergencies'' when unexpected events would otherwise cause noncompliance with the benzene standard.

Given the high cost of control for some refineries and the potential that credit trading would be less-than-fully utilized, we have looked at standards less stringent than 0.52 vol% that might be feasible, considering cost. Based on our modeling, we believe that with the proposed ABT program all gasoline could be produced at the proposed average level of 0.62 vol% without extreme economic consequences. We believe that sufficient credits would be generated such that refineries facing the highest costs of benzene control would have sufficient access to credits and would not need to turn to cost prohibitive technologies.

From a strict feasibility standpoint, we have also assessed whether all refineries could meet the proposed benzene level in cases where sufficient credits were not available to every refinery that might want them. We found that, despite the application of maximum reformate benzene control in the refinery model to all refineries, the analysis concluded that 13 refineries would still have benzene levels that exceeded a 0.62 benzene level, with one refinery as high as 0.77 vol% benzene. We have evaluated how these 13 refineries might use the other, less attractive benzene control technologies discussed above (assuming that an ABT option is not available to them).

The approach of capturing more of the reformate benzene in the reformate splitter and sending this additional benzene to the saturation unit would allow 7 of the 13 challenged refineries to reach the 0.62 vol% level. Then, those refineries with a hydrocracker or a coker could reduce the benzene content of the light hydrocrackate or coker stream. This step would allow 5 more refineries to reach the target level. Finally, the treatment of benzene in natural gasoline would bring the remaining 1 refinery to the 0.62 vol% level or below. (Because of our lack of information about the potential for reducing the severity of the FCC unit, and because we do not believe that reducing the benzene level of FCC naphtha is feasible, we did not consider FCC options in this analysis.) Again, we expect that at the proposed standard level of 0.62 vol% in the context of the proposed ABT program, all refineries would be able to comply. This analysis demonstrates that there are options, although extreme and costly, for challenged refineries even if the ABT program does not fully function as projected.

4. Lead Time

Our proposal for the gasoline benzene standard to begin on January 1, 2011 would allow about four years after we expect the rulemaking to be finalized for refiners to comply with the program's requirements. As discussed below, we believe that four years of lead time would allow refiners sufficient time to install the capital equipment they would need to lower their benzene levels, and would also allow this program to avoid significant conflict with other fuel programs being implemented around the same time. In addition, the ABT program would allow the industry to phase in the program, through the early credit provisions, so that significant benzene reductions would occur earlier than the program start date. The credits earned could allow the investment in higher capital cost and less cost-effective technologies to be delayed relative to the program start date.

In recent years, the implementation of the gasoline sulfur and highway diesel sulfur programs has provided an opportunity to observe the response of the refining industry to major fuel control requirements. Many refiners have demonstrated their ability to make very large, expensive sulfur control modifications to their refineries in less than four years, and in some cases significantly less. It is helpful to

[268] This analysis is within the constraints of our modeling and the refinery-specific information available to us at the time of this proposal.

compare this sulfur control experience with the types of technologies refiners would use to reduce benzene.

Refiners could implement approaches to benzene control that require very little or no capital equipment, including routing of benzene precursors around the reformer and the use of an existing isomerization unit, with very little lead time requirements. We believe that approaches using moderately complex capital equipment, including improving the effectiveness of precursor rerouting and expanding existing extraction capacity, would generally require one to two years of lead time. Projects that involve the installation of new equipment, including benzene saturation and extraction units, require more time, generally two to three years. This includes time for the equipment installation as well as related offsite equipment and any necessary capital equipment for production of hydrogen or high-octane blendstocks. Of all the benzene control approaches, benzene extraction is closest in scope and complexity to the technologies the industry is using for fuel sulfur control. In addition to the time needed for planning and installing the extraction unit and related equipment, extraction also requires time to install additional facilities for storing extracted benzene and for loading it for transport. Thus, as with the earlier programs, we believe the refiners choosing to add a benzene extraction unit could in some cases need as much as four years to complete the project. Overall, we believe that four years of lead time would ensure that all refiners would have sufficient time to comply, regardless of the benzene control technology they select.

Another factor in selecting an appropriate date to begin the program is the timing of the implementation of other large fuel control programs, especially the Nonroad Diesel rule.[269] The 15 ppm sulfur standard mandated by the Nonroad Diesel Fuel program applies to nonroad diesel fuel in 2010 and to locomotive and marine diesel fuel in 2012. Refiners modifying their refineries to produce either ultra low sulfur nonroad or locomotive and marine diesel fuel will do so during the several years prior to 2010 and 2012. For each of those start dates, there is a progression of actions which includes planning, design, construction and start-up all during the four year run-up toward the start date of the program. For example, the engineering and construction (E&C) industry will be busy designing and constructing each of the units that will be installed. Different portions of the E&C industry will be engaged at specific periods of time leading up to the time that the unit is started up. For this reason, staggering the start year of this benzene fuel standard with the start years for the Nonroad Diesel program would help to avoid excessive demand on specific parts of the E&C industry. The staggering of today's proposed program's start date with those of the Nonroad Diesel program may also help refiners that might be seeking to acquire capital through banks or other lending institutions by spreading out the requests.

We believe that the proposed implementation date of January 1, 2011 would minimize overlap and possible interference with the implementation of the Nonroad Diesel rule. Implementation of the proposed benzene standard one year earlier or one year later would overlap directly with one of the two Nonroad Diesel implementation dates. We also believe that the additional year of lead time, compared to a 2010 start date, would make the program more effective. Because we expect that the proposed ABT program would encourage many refiners to reduce benzene levels early whenever possible, we believe that significant benzene reductions would occur prior to 2011. We discuss this expected early benzene reduction further as a part of the description of the proposed ABT program in section VII.D above.

For these reasons, we are proposing that the gasoline benzene standard be implemented beginning January 1, 2011. We request comment on the issue of lead time, including data supporting four years or a different length of time.

5. Issues

a. Small Refiners

Small refiners are technically capable of realizing a similar benzene reduction from their gasoline as large refiners. Because of economies of scale, however, some of the benzene control technologies which would be more affordable for larger refineries would be much more challenging and more expensive for small refiners. This is due to the poorer economies of scale that the small refiners are faced with installing capital into their refineries. Two of the benzene control technologies discussed above would be particularly attractive to small refiners for implementing into their refineries. These are benzene precursor rerouting, and, if the refinery has an isomerization unit, routing the benzene precursors to the isomerization unit. These technologies would be attractive to small refiners because they would require little or no capital investments to implement for reducing their gasoline benzene levels. Therefore, the per-gallon cost of these two technologies is about the same as that for large refineries.

Smaller refineries tend to have fewer process units and blending streams, which generally also means that they will have fewer options for recovering lost octane. For example, these refineries are less likely to have an alkylation unit. An alkylation unit gives refiners short on octane the option to change the operations of their FCC unit to make more olefins and then send the appropriate olefins to their alkylation unit to produce more of that high octane blendstock. This is not an option for several of the small refiners that do not have an alkylation unit. Also, small refineries are more likely to have a higher pressure reforming unit. The higher pressure reformer units tend to produce more benzene from the cracking of heavier aromatic compounds and will tend to do this more as their severity is increased. A higher pressure reformer also has a more difficult regeneration cycle and shorter cycle lengths as it is operated more severely. Thus, while other refiners with lower pressure units may be able to increase the severity of their reformers to make more octane without producing much more benzene and greatly reducing the cycle lengths of their reformers, many of the small refiners may not have as much flexibility in this area. In any event, these greater technological challenges can be offset somewhat where it is economical to purchase high octane blendstocks or oxygenates from other refiners or from the petrochemical industry.

b. Imported Gasoline

Although the majority of petroleum products in the U.S. are made from imported crude oil, only about five percent of the gasoline consumed in this country was imported as finished gasoline in 2003. This imported fuel is approximately half RFG and half CG, and had an average benzene content of 0.8% volume in 2003. No batches of imported gasoline had a benzene level above 2.4%. Over 90% of the imported gasoline was delivered into the East Coast and Florida, with about 5% arriving on the West Coast, and the

[269] The months leading up to January 2010 will also be when several small refiners and refiners that were granted hardship relief will be implementing their gasoline sulfur programs. We believe that any serious interference among implementation projects that individual refiners might demonstrate during this time period could be addressed under the small refiner or general hardship provisions of the proposed rule.

remainder being brought into other regions of the country. The origin of the majority of this gasoline was Canada (40%), Western Europe (31%), and South America (17%).

Since imported finished gasoline is not processed in a domestic refinery, where refiners would be taking steps to meet the proposed benzene standard, importers would be affected in other ways. Importers would most likely either begin to purchase gasoline that is low enough in benzene to meet the standard, or they would continue to import gasoline with benzene at current levels but purchase credits to cover the fuel being above the standard. As shown above, over 70 percent of imported gasoline comes from countries that have already set benzene limits on their gasoline. As a result, we believe that gasoline with some degree of benzene control will be easily available for importers to market. In some cases, we also expect that some foreign refiners may produce for export some fraction of their gasoline to meet our proposed 0.62 vol% average standard benzene. This would provide importers further options in the U.S. gasoline market.

G. How Does the Proposed Fuel Control Program Satisfy the Statutory Requirements?

As discussed earlier in this section, we have concluded that the most effective and appropriate program for MSAT emission reduction from gasoline is a benzene control program. Today's action proposes such a program, with an average benzene content standard of 0.62 vol% and a specially-designed averaging, banking, and trading program. In section VII.F above, we summarize our evaluation of the feasibility of the proposed program, and in section IX.A we summarize our evaluation of the costs of the program. The analyses supporting our conclusions in these sections are discussed in detail in Chapters 6 and 9 of the RIA.

Taking all of this information into account, we believe that a program more stringent than the proposed program would not be feasible, taking into consideration cost. As we have discussed, making the standard more stringent would require more refiners to install the more expensive benzene control equipment, with very little improvement in benzene emissions. Also, we have shown that related costs increase very rapidly as the level of the standard is made more stringent. Conversely, while it would provide significant benzene emission reductions, we are concerned that a somewhat less stringent national average standard than the proposed 0.62 vol% (e.g., 0.65 or 0.70 vol%) would not satisfy our statutory obligation for the most stringent standard feasible considering cost and other factors. Furthermore, such standards would not accomplish several important programmatic objectives as discussed in section VII.C.

We have also considered energy implications of the proposed program, as well as noise and safety, and we believe the proposed program would have very little impact on any of these factors. Analyses supporting these conclusions are also found in Chapter 9 of the RIA. We carefully considered lead time in establishing the stringency and timing of the proposed program (see section VII.F above).

Consequently, we believe that the proposed program would meet the requirements of section 202(l) of the Clean Air Act, reflecting ''the greatest degree of emission reduction achievable through the application of technology which is available, taking into consideration * * * the availability and costs of the technology, and noise, energy, and safety factors, and lead time.''

H. Effect on Energy Supply, Distribution, or Use

This rule is not a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. If promulgated, the gasoline benzene provisions of the proposed rule would shift about 22,000 barrels per day of benzene from the gasoline market to the petrochemical market. This volume represents about 0.2 percent of nationwide gasoline production. The actual impact of the rule on the gasoline market, however, is likely to be less due to offsetting changes in the production of petrochemicals, as well as expected growth in the petrochemical market absent this rule. The major sources of benzene for the petrochemical market other than reformate from gasoline production are also derived from gasoline components or gasoline feedstocks. Consequently, the expected shift toward more benzene production from reformate due to this proposed rule would be offset by less benzene produced from other gasoline feedstocks.

The rule would require refiners to use a small additional amount of energy in processing gasoline to reduce benzene levels, primarily due to the increased energy used for benzene extraction. Our modeling of increased energy use indicates that the process energy used by refiners to produce gasoline would increase by about one percent. Overall, we believe that the proposed rule would result in no significant adverse energy impacts.

The proposed gasoline benzene provisions would not affect the current gasoline distribution practices.

We discuss our analysis of the energy and supply effects of the proposed gasoline benzene standard further in section IX of this preamble and in Chapter 9 of the Regulatory Impact Analysis.

The fuel supply and energy effects described above would be offset substantially by the positive effects on gasoline supply and energy use of the proposed gas can standards also proposed in today's action. These proposed provisions would greatly reduce the gasoline lost to evaporation from gas cans. This would in turn reduce the demand for gasoline, increasing the gasoline supply and reducing the energy used in producing gasoline.

I. How Would the Proposed Gasoline Benzene Standard Be Implemented?

This section discusses the details associated with meeting the proposed 0.62 vol% benzene standard.

1. General Provisions

a. What Are the Implementation Dates for the Proposed Program?

We are proposing that refiners and importers would achieve compliance with the requirements of the proposed benzene program beginning with the annual averaging period beginning January 1, 2011. Refineries with approved benzene baselines could generate early credits from June 1, 2007, through December 31, 2010. Refineries and importers could generate standard credits beginning with the annual averaging period beginning January 1, 2011, provided that the average benzene content of the gasoline they produce or import during the year was less than 0.62 vol% benzene.

Approved small refiners would be allowed to delay compliance with the 0.62 vol% standard until the annual averaging period beginning January 1, 2015. They could, however, generate early credits beginning June 1, 2007 through December 31, 2014, provided that they had an approved benzene baseline. They would be able to generate standard credits beginning January 1, 2015.

b. Which Regulated Parties Would Be Subject to the Proposed Benzene Standards?

Domestic refiners and importers would be subject to the proposed standards. We are proposing that each refinery of a refiner must meet the standard, and all associated requirements, individually. Refinery grouping, or aggregation, as allowed in the Anti-dumping and MSAT1 program for CG, would not be permitted for purposes of complying with the proposed benzene standard (although the ABT provisions provide similar flexibility, and the credit generation and transfer provisions would perform basically the same functions). For an importer, we are proposing that the requirements apply to the entire volume imported during the averaging period regardless of import locations or sources. In addition, where a company has both refinery and import operations, each operation would have to achieve its own compliance with the 0.62 vol% benzene standard. We are proposing that those who only added oxygenate or butane to gasoline or gasoline blending stock would not be subject to the proposed standards for that gasoline unless they also added other blending components to the blend. This would be similar to the current treatment of these entities and their gasoline under the RFG, Anti-dumping and MSAT1 programs, where specialized accounting and calculation procedures are specified. In these cases, the refinery (or importer) that produces gasoline or gasoline blendstock includes the oxygenate in its own compliance determination. We are proposing that this practice would continue under today's program. Transmix processors would not be subject to the proposed requirements for gasoline produced from transmix, but gasoline produced from transmix to which other blendstocks were added would be subject to the proposed benzene standard.

We are proposing that all gasoline produced by foreign refineries for use in the United States would be included in the compliance and credit calculation of the importer of record. Under the Anti-dumping and MSAT1 rules, as well as the gasoline sulfur requirements, additional requirements applicable to foreign refiners who chose to comply with those regulations separately from any importer were included to ensure that enforcement of the regulation at the foreign refinery would not be compromised. We are proposing similar provisions here. Specifically, we are proposing to allow foreign refiners to generate early credits and to apply for temporary hardship relief and small refiner status. See proposed 40 CFR 80.1420. However, under the earlier rules, few foreign refiners have chosen to undertake these additional requirements, and almost all gasoline produced at foreign refineries is included in an importer's compliance determination for the current EPA gasoline programs.[270] We invite comment on the value of extending these provisions to this proposed benzene program.

As mentioned, we are proposing to extend the small refiner provisions to foreign refiners. Our experience in past rules is that they are not taken advantage of for various reasons. Most foreign refineries are state-owned or owned by large multinational companies, and would exceed the employee-count criterion. Others have typically not been interested in fulfilling the enforcement-related requirements that apply to foreign refineries. We request comment on extending the small refiner provisions to foreign refiners.

c. What Gasoline Would Be Subject to the Proposed Benzene Standards?

All finished gasoline produced by a refinery or imported by an importer would be subject to the proposed benzene content standard. In addition, gasoline blending stock which becomes finished gasoline solely upon the addition of oxygenate would also be subject to the proposed standard.[271] Other gasoline blendstocks which are shifted among refiners prior to turning them into finished gasoline would not be subject to the benzene standard. They would be included at the point they are converted or blended to produce finished gasoline.

We are proposing to exclude gasoline produced or imported for use in California from this benzene requirement. Although California's benzene averaging standard is greater than 0.62 vol%, California in-use benzene levels are currently below the level of the proposed standard.[272] We expect this situation will continue. There would be no additional benefit to consumers of California gasoline or to the implementation and benefits of the proposed program by the inclusion of gasoline used in California.

This proposal also would exclude those specialized gasoline applications that have been exempted from other EPA gasoline rules, such as gasoline used to fuel aircraft, or for sanctioned racing events, gasoline that is exported for sale and use outside of the U.S., and gasoline used for research, development or testing purposes, under certain circumstances.

d. How Would Compliance With the Benzene Standard Be Determined?

Compliance with the proposed benzene standard would be on an annual, calendar year basis, similar to almost all other current gasoline controls. A refiner's or importer's compliance (or Compliance Benzene Value, as used in the proposed regulation) would be determined from the annual average benzene content of its gasoline (produced or imported), any credits used for compliance purposes, and any deficit carried over from the previous year, and would have to be 0.62 vol% or lower, on a benzene volume basis. The Compliance Benzene Value would differ from the refiner's or importer's actual annual average benzene concentration because the latter would be solely a volume weighted average of the benzene concentrations of the refinery's or importer's actual gasoline batches.

Credits, in any amount, could be used to achieve compliance. As mentioned, we are also proposing to allow a deficit to be carried forward for one year. Under these circumstances, in the next compliance period, the refinery or importer would have to be in compliance, that is, the refinery or importer would have to, through production or import practices, and/or the use of credits, make up the deficit from the previous year and be in compliance with the proposed benzene standard. This provision could be especially helpful to refiners in the first year of the program, until the availability and need for credits was established.

In the RFG and Anti-dumping programs, and MSAT1, by extension, refiners and importers generally include oxygenate added downstream from the refinery or the import facility in their compliance calculations.[273] Refiners

[270] Often, the importer of record is the foreign reiner. In these instances, the importer/foreign refiner has simply opted to achieve compliance via the applicable importer provisions.

[271] As stated earlier, both blending stock and oxygenate would be included in the refinery's or importer's compliance determination. Conventional gasoline refiners are required to have agreements with downstream oxygenate blenders to ensure that the appropriate type and amount of oxygenate is added to the gasoline blending stock, per 40 CFR 80.10(d). Absent such agreements, the refinery may only include the gasoline blending stock in its compliance determination and the oxygenate is not included in any compliance determination.

[272] California Code of Regulations, Title 13 Section 2262.

[273] As a result, oxygenate blenders would not be subject to the RFG, Anti-dumping or MSAT1

Continued

and importers of RBOB are required to account for the oxygenate in their own compliance. As mentioned earlier, refiners and importers of conventional gasoline can include the oxygenate if they have met the Anti-dumping requirements for ensuring that the amount and type of oxygenate was indeed added. We are not proposing any changes to these provisions for the purposes of compliance with the proposed benzene program. However, average pool benzene levels are expected to decrease as a result of increased ethanol use due to requirements of the Energy Policy Act of 2005, and this would affect both early and standard credit generation, as will be discussed below. However, we request comment on how, if at all, additional oxygenate use should be considered, and perhaps limited, in compliance determinations for the proposed program.

2. Averaging, Banking and Trading Program

a. Early Credit Generation

As discussed, early credit generation could occur as early as the averaging period beginning June 1, 2007, through the averaging period ending December 31, 2010, or ending December 31, 2014, for small refiners. In order to generate early benzene credits, a refinery would first establish a benzene baseline which is its average benzene concentration over the period January 1, 2004, through December 31, 2005. A refinery would be eligible to generate early credits when it reduced its annual average benzene concentration by at least 10% compared to its benzene baseline. Credits would then be calculated based on the entire reduction in benzene below the baseline. Generation of early credits for the first averaging period, June 1, 2007 through December 31, 2007, which is less than a calendar year, would be based on the average benzene level of the gasoline produced only during this period. Gasoline produced before June 1, 2007, would not be included in the credit generation determination.

We are proposing to allow only refiners (and not importers) to generate early benzene credits because it is at the refinery, or production level, where real changes in the production of gasoline can be made. Importers would simply seek out blending streams or gasoline with lower benzene, but would not have to invest or take other action involving the production of the lower benzene gasoline. Furthermore, many importer operations grow in volume, shrink in volume, come into existence and go out of existence on a continual basis, making it difficult to assess the appropriateness of both the baseline and any early credits. Thus, even though an importer may have had regular, consistent import activity during the 2004–2005 baseline period, we are proposing that only refiners would be allowed to apply for a benzene baseline, and if approved, to generate early benzene credits based on reductions in future averaging period gasoline benzene levels.

As discussed above, one of the purposes of allowing the early generation of benzene credits would be to promote reductions in benzene through refinery processing changes. We are concerned that benzene reductions due to increased oxygenate use would result in reduced benzene concentrations. Oxygenate use (in the form of ethanol) in CG is expected to increase as a result of the Energy Policy Act requirements.[274] This additional oxygenate will dilute gasoline benzene levels as well as extend the gasoline pool. As a result, refinery average benzene levels would be likely to be lower during the early credit generation period than during the benzene baseline period (2004–2005) if there is an increase in the amount of CG refiners send for downstream blending with ethanol (CBOB). We are concerned that reductions in fuel benzene levels due to oxygenate addition significantly beyond the average levels of recent years could result in windfall early credit generation for some refineries. We request comment on the likelihood of windfall early credit generation, and if such a situation were to occur, whether it would warrant limiting early benzene credits by consideration of the average oxygenate use during the baseline period compared to the early credit generation period or by adjusting the early credit trigger point. We believe this would be less of an issue during the standard credit generation period beginning in 2011 (2015 for small refiners) because of the more stringent requirements for generating standard credits (getting below the 0.62 vol% standard) compared to the early credit generation requirements (achieving a minimum 10% reduction in baseline benzene levels).

b. How Would Refinery Benzene Baselines Be Determined?

As mentioned above, a refiner would submit a benzene baseline application to EPA for any of its refineries which planned to generate early credits. The benzene baseline would be the volume-weighted average of the benzene levels of the gasoline produced by the refinery during 2004–2005. Note that the gasoline would be the combination of the refinery's RFG and CG, if applicable, and would exclude California gasoline and other fuels exempted from the proposed standard. The benzene values used in the benzene baseline calculation should be the same as used in the RFG, Anti-dumping and MSAT1 compliance determinations. We are not proposing provisions for adjusting these benzene baselines based on circumstances during the baseline years or otherwise.

Though we expect that most refineries that apply for a benzene baseline would have data for both 2004 and 2005, if a refinery was shut down for part of the 2004–2005 period, it could still be able to establish a benzene baseline. Under these circumstances, the refiner would have to provide and justify, using refinery and engineering analyses, an appropriate adjusted value that reflects the likely average benzene concentration for the refinery, had it been fully operational. A refinery that was non-operational for the entire period January 1, 2004 through December 31, 2005 would not be able to establish a benzene baseline and therefore not allowed to generate early credits.

c. Credit Generation Beginning in 2011

Credits could be generated in any annual averaging period beginning January 1, 2011, or for small refiners, beginning January 1, 2015. These credits, also called standard benzene credits, could be generated by a refinery or importer when the refinery's or importer's annual average benzene concentration was less than the proposed standard of 0.62 vol%.

While the proposed benzene standard is a 49-state standard due to the fact that California would maintain its existing benzene standard, we request comment on the appropriateness of allowing California refineries to generate credits that could be used to demonstrate compliance outside of California.

d. How Would Credits Be Used?

We are proposing that all gasoline benzene credits that are properly created may be used equally and interchangeably. That is, once generated, there would be no difference

regulations except for gasoline to which they add other blendstocks in addition to the oxygenate.

[274] Even though the Energy Policy Act of 2005 eliminated the oxygen mandate for RFG, oxygenate use (in the form of ethanol) in RFG is expected to continue.

between early credits and standard credits, except for their credit life, as discussed below. Under this proposal, credits could be transferred to another refiner or importer, or they could be banked by the refinery or importer that created them for use or transfer in a later compliance period.

As in past credit programs, we are proposing some limits on credit use. First, we are proposing to limit the number of times a credit could be transferred. At the end of the allowable number of transfers, the credit would have to be used by the last transferee before its expiration date. Second, we are proposing that credits would have a finite life whether or not transferred. We are proposing that early credits, those generated prior to 2011, would have a three-year credit life from the start of the program in 2011. These credits would have to be used to achieve compliance with the proposed benzene standard in 2011, 2012, and/or 2013, or they would expire. In addition, we are proposing that credits generated in 2011 and beyond (or early credits generated by small refiners during this period) would have to be used within five years of the year in which they were generated. We had considered requiring credits be used in order of their generation date, that is, credits generated earlier would have to be used before credits generated later. However, the finite credit life is likely to ensure this usage, and thus we are not proposing to regulate credit use in this manner. We are also proposing that credit life could be extended by two years for any credits that are generated by or traded to approved small refiners.

Under the proposed regulations, a refiner or importer would have to use all benzene credits in its possession before being allowed to have deficit carryover, and would have to meet its own compliance requirement before transferring any gasoline benzene credits. In the case of invalid credits, or credits improperly created, all parties would have to adjust their credit records, reports, and compliance calculations to reflect proper credit use. The transferor would first correct its own records and ensure its own compliance, and then apply any remaining properly created credits to the transferee before trading or banking those credits. See section X.A below for more discussion of these issues.

3. Hardship and Small Refiner Provisions

a. Hardship

The hardship provisions and requirements are extensively discussed in section VII.E.2, and thus are only briefly addressed here. We are proposing that a refiner for any of its refineries could seek temporary relief from meeting the proposed benzene standard due to unusual circumstances, including those situations, such as a natural disaster, which would clearly be outside the control of the refiner. A refiner would have to apply to EPA for this temporary relief, and EPA could deny the application or approve it for an appropriate period of time. However, given the existence of a flexible ABT program, EPA expects that, prior to requesting hardship relief, the refiner would have made best efforts to obtain credits in order to comply with the proposed benzene standard. In past rulemakings, for example the gasoline sulfur rule, the hurdle for receiving a hardship was very high, with very few granted. While we are proposing these provisions again here, the expectation is that the hurdle would be even higher. Given the existence and flexibility afforded by the ABT program and the more limited cost of the benzene standard, it is our expectation that as long as a viable credit market existed, it would be difficult to justify granting a hardship. Furthermore, the form of any relief we are proposing is in the form of additional time to demonstrate compliance via credits as opposed to any waiver of the standards.

b. Small Refiners

As discussed earlier, we are proposing to allow small refiners to meet the proposed benzene standard beginning with the 2015 averaging period, which is four years later than non-small refiners and importers. Small refiners could also generate both early and standard credits if they can meet the requirements of those programs. A refiner would have to apply to EPA by December 31, 2007 in order to be considered a small refiner under this proposed rule even if the entity was or had been considered a small refiner under other EPA rules. The requirements for small refiners under this rule are detailed in section VII.E.

4. Administrative and Enforcement Related Provisions

a. Sampling/Testing

As under the Tier 2 program where a sulfur concentration must be determined for every batch of gasoline, we are proposing that a benzene concentration value also be determined for every batch of gasoline produced or imported. Thus, as gasoline samples are taken for sulfur measurement, they would also be taken for benzene measurement. The RFG program, which has both a toxics emissions requirement and a per-gallon benzene cap, already requires a benzene value to be determined for every batch of gasoline. The Anti-dumping program, which has only a toxics emissions requirement, allows benzene values to be determined from composite samples. See 40 CFR 80.101(i). Thus, the proposed sampling requirement would be a change from the current sampling methodology allowed under the Anti-dumping provisions but makes it consistent with the ongoing Tier 2 sulfur program. However, unlike the gasoline sulfur requirements, this every batch testing requirement for conventional gasoline benzene would not have to occur prior to the batch leaving the refinery. Additionally, the batch numbering system would be the same as that used for conventional gasoline sulfur.

We are not proposing any changes to the benzene test methodology. See 40 CFR 80.46(e). We are proposing sample retention requirements similar to those in the gasoline sulfur provisions. See 40 CFR 80.335.

b. Recordkeeping/Reporting

We are proposing to require that records be kept for each averaging period in order to accommodate the proposed benzene standard and the accompanying credit trading program. These records would include: the benzene baseline calculation, if applicable; the number of early credits generated, if applicable; the actual average benzene concentration of gasoline produced or imported; the compliance benzene value; any deficit; the number of credits generated; and records of any credit transfers to or from the refinery or importer, including price of the credits and dates of transactions. All of this information, and any other information that EPA may require, such as information similar to that proposed below for inclusion in the pre-compliance reports, would be submitted in a refiner's or importer's annual report to the Agency. Since we are proposing that the regulatory provisions for the benzene control program would become the single regulatory mechanism covering RFG and Anti-dumping annual average toxics requirements once the benzene standard is in effect, and would replace the MSAT1 requirements, we expect to be able to streamline several of the current reporting forms once the proposed program is fully implemented in 2015.

As mentioned, we are also proposing to require that refiners and importers submit pre-compliance reports in order to provide information as to the likely number of benzene credits needed and

available, and how the refiner or importer plans to achieve compliance with the proposed benzene requirements. These reports would be required annually each June 1 from 2001 through 2011 (or through 2015 for small refiners). In addition to information regarding gasoline production and the number of credits expected to be used or produced, the pre-compliance reports would include information regarding the benzene reduction technology expected to be used, any capital commitments, and information on the progress of the installation of the technology. We are also proposing that these reports include price and quantity information for any credits bought or sold. The reports would include updates from the previous year's estimates, and comparison of previous year actual production to the projected values.

c. Attest Engagements, Violations, Penalties

We are proposing to require attest engagements for generation of both early and other credits, credit use, and compliance with the proposed program, using the usual procedures for attest engagements. The violation and penalty provisions applicable to this proposed benzene program would be very similar to the provisions currently in effect in other gasoline programs. We request comment on the need for additional attest engagement, violation or penalty provisions specific to the proposed benzene program.

5. How Would Compliance With the Provisions of the Proposed Benzene Program Affect Compliance With Other Gasoline Toxics Programs?

As discussed above, we expect that virtually all refineries will reduce benzene from their current levels, and no refineries will increase it. This impact on benzene levels, combined with the pre-existing gasoline controls in sulfur, RVP, and VOC performance, means that compliance with the benzene content provisions is also expected to lead to compliance with the annual average requirements on benzene and toxics performance for reformulated gasoline and the annual average Anti-dumping toxics performance for conventional gasoline. EPA is therefore proposing that upon full implementation in 2011 the regulatory provisions for the benzene control program would become the single regulatory mechanism used to implement these RFG and Anti-dumping annual average toxics requirements, replacing the current RFG and Anti-dumping annual average toxics standards as unnecessary. The proposed benzene control program would also replace the MSAT1 requirements. However, we propose the RFG per gallon benzene cap of 1.3 vol% remain in effect; we are requesting comment on the need to retain this requirement for RFG. Note that compliance with the proposed benzene standard would ensure compliance with the aforementioned RFG, Anti-dumping and MSAT1 requirements beginning with the 2011 averaging period, or the 2015 averaging period for small refiners. Thus, during the early credit generation period, 2007 through 2010, all entities would still be required to comply with their applicable RFG, Anti-dumping and MSAT1 requirements. In addition, from 2011 through 2014, small refiners would have to continue to meet their applicable RFG, Anti-dumping and MSAT1 requirements. As discussed earlier in section VII.E.2, we are also requesting comment on the option of allowing some refineries to meet the proposed benzene standard early, thus replacing the current RFG and Anti-dumping annual average toxics provisions and replacing MSAT1 requirements for these refineries.

VIII. Gas Cans

Gas cans are consumer products people use to refuel a wide variety of gasoline-powered equipment. Their most frequent use is for refueling lawn and garden equipment such as lawn mowers, trimmers, and chainsaws. They are also routinely used for recreational equipment such as all-terrain vehicles and snowmobiles, and for passenger vehicles which have run out of gas. The gas cans are red, per ASTM specifications, and about 95 percent of them are made of plastic (high density polyethelene (HDPE)). There are approximately 20 million gas cans sold annually and about 80 million cans are in use nationwide. The average lifetime of a gas can is about 5 years.

California has established an emissions control program for gas cans which began in 2001. Since then, some other states have adopted the California requirements. Last year, California adopted a revised program which is very similar to the one we are proposing in this rulemaking. Manufacturers are required to meet the new requirements in California by July 1, 2007 at the latest. State programs are discussed further in section VIII.A.3., below.

A. Why Are We Proposing an Emissions Control Program for Gas Cans?

1. VOC Emissions

We are proposing standards to control VOCs as an ozone precursor and also to minimize exposure to VOC-based toxics such as benzene and toluene. Gasoline is highly volatile and evaporates easily from containers that are not sealed or closed properly. Although an individual gas can is a relatively modest emission source, the cumulative VOC emissions from gas cans are quite significant. We estimate that containers currently emit about 315,000 tons of VOC annually nationwide, which is equal to about 5 percent of the nationwide mobile source inventory (see section V.A.). Left uncontrolled, a gas can's evaporative emissions are up to 60 times the VOC of a new Tier 2 vehicle evaporative control system. Gas can emissions are primarily of three types: evaporative emissions from unsealed or open containers; permeation emissions from gasoline passing through the walls of the plastic containers; and evaporative emissions from gasoline spillage during use.

As discussed in section IV. above, ozone continues to be a significant air quality concern, and gas cans are currently an uncontrolled source of VOC emissions in many areas of the country. Section 183(e) of the Clean Air Act directs EPA to study, list, and regulate consumer and commercial products that are significant sources of VOC emissions. In 1995, after conducting a study and submitting a Report to Congress on VOC emissions from consumer and commercial products, EPA published an initial list of product categories to be regulated under section 183(e). Based on criteria that we established pursuant to section 183(e)(2)(B), we listed for regulation those consumer and commercial products that we considered at the time to be significant contributors to the ozone nonattainment problem, but we did not include gas can emissions.[275] After analyzing the emissions inventory impacts of gas cans, EPA plans to publish a **Federal Register** notice that would add portable gasoline containers to the list of consumer products to be regulated and explain the rationale for this action in detail. EPA will afford interested persons the opportunity to comment on the data underlying the listing before taking final action on today's proposal. In today's notice, EPA is proposing that the standards for

[275] 60 FR 15264 ''Consumer and Commercial Products: Schedule for Regulation,'' March 23, 1995.

portable gasoline containers represent ''best available controls'' as required by section 183(e)(3)(A). Determination of the ''best available controls'' requires EPA to determine the degree of reduction achievable through use of the most effective control measures (which includes chemical reformulation, and other measures) after considering technological and economic feasibility, as well as health, energy, and environmental impacts.[276]

2. Technological Opportunities to Reduce Emissions From Gas Cans

Gas can manufacturers have already developed and applied emissions controls in response to California requirements. Traditional gas cans typically have a spout for pouring fuel and a vent at the rear of the can to allow air to flow into the cans when in use. About 70 percent of emissions from gas cans are due to evaporative losses from caps being left off one or both of these openings. The primary way to reduce these emissions is to design cans that are not easily left open. To accomplish this, gas can manufacturers have developed spouts that incorporate a spring mechanism to close cans automatically when not in use. Many spout designs are opened by consumers pushing the spout against the equipment fuel tank. Some designs incorporate a button or trigger mechanism that the consumer pushes to start fuel flow and then releases when done refueling. Also, some cans are made without rear vents, incorporating venting into the spouts and thus eliminating one potential emission point. The consumer still must remove the spout to refill the cans but would replace the spout once the can is full in order to prevent spillage during transport.

The auto-closing spouts reduce spillage by giving consumers greater control over the fuel flow. The spouts allow consumers to place the can in position before activating or opening the cans. Once the receiving fuel tank is full, consumers can easily release the mechanism to stop the fuel flow. This reduces spillage during the positioning and removal of the can and reduces overall spillage by about half. Consumers generally appreciate the greater control over the refueling event.

Blow-molding is used to manufacture gas cans. Typically, blow-molding is performed by creating a hollow tube, known as a parison, by pushing high-density polyethylene (HDPE) through an extruder with a screw. The parison is then pinched in a mold and inflated with an inert gas. The HDPE plastics used for gas cans allow gasoline molecules to permeate (i.e., pass through) the walls of the container. This contributes to overall emission losses from the containers. There are several effective permeation barriers that can be incorporated into the can walls. Gas can manufacturers have used several of these methods to meet California program requirements. The technologies were initially developed to meet automotive evaporative emissions standards and are now also being used for other types of fuel tanks. The barriers are either incorporated as part of the manufacturing process of the can (either as a layer or by mixing the barrier materials with the plastics) or are applied to the cans after they are manufactured. These barriers typically achieve reductions of 85 percent or better compared to untreated cans.

Some gas can manufacturers have produced non-permeable plastic gas cans by blow molding a layer of ethylene vinyl alcohol (EVOH) or nylon between two layers of polyethylene. This process is called coextrusion and requires at least five layers: The barrier layer, adhesive layers on either side of the barrier layer, and HDPE as the outside layers which make up most of the thickness of the gas can walls. However, this blow-molding process requires two additional extruder screws, which significantly increases its cost.

An alternative to coextrusion is to blend a low-permeability resin with the HDPE and extrude it with a single screw to create barrier platelets. The trade name typically used for this permeation control strategy is Selar. The low-permeability resin, typically EVOH or nylon, creates non-continuous platelets in the HDPE gas can which reduce permeation by creating long, tortuous pathways that the hydrocarbon molecules must navigate to pass through the gas can walls. Although the barrier is not continuous, this strategy can still achieve greater than a 90-percent reduction in permeation of gasoline. EVOH has much higher permeation resistance to alcohol than nylon; therefore, it would be the preferred material to use for meeting our proposed standard (described at Section B., below), which is based on testing with a 10-percent ethanol fuel.

Another type of low permeation technology for HDPE gas cans is treating the surfaces of plastic gas cans with a barrier layer. Two ways of achieving this are known as fluorination and sulfonation. The fluorination process causes a chemical reaction where exposed hydrogen atoms are replaced by larger fluorine atoms, creating a barrier on the surface of the gas can. In this process, a batch of gas cans is generally processed post production by stacking them in a steel container. The container is then voided of air and flooded with fluorine gas. By pulling a vacuum in the container, the fluorine gas is forced into every crevice in the gas can. As a result of this process, both the inside and outside surfaces of the gas can would be treated. As an alternative, gas cans can be fluorinated on the manufacturing line by exposing the inside surface of the gas can to fluorine during the blow molding process. However, this method may not prove as effective as off-line fluorination, which treats the inside and outside surfaces.

Sulfonation is another surface treatment technology. In this process, sulfur trioxide reacts with the exposed polyethylene to form sulfonic acid groups on the surface. Current practices for sulfonation are to place a gas can on a small assembly line and expose the inner surfaces to sulfur trioxide, then rinse with a neutralizing agent. However, sulfonation can also be performed using a batch method. Either of these processes can be used to reduce gasoline permeation by more than 95 percent.

3. State Experiences Regulating Gas Cans

California established an emissions control program for gas cans that began in 2001.[277] Twelve other states and the District of Columbia have adopted the California program in recent years. These states include Delaware, Maine, Maryland, Pennsylvania, New York, Connecticut, Massachusetts, New Jersey, Rhode Island, Vermont, Virginia, Washington, DC, and Texas.

Last year, California adopted a revised program that is very similar to the one we are proposing in this rulemaking.[278] California's new program goes into effect on July 1, 2007. California addressed several deficiencies they observed in their first program by adding new enhanced diurnal standards, new testing requirements, and new certification requirements, and by removing automatic shut-off requirements that lead to designs that do not work well in the field.

[276] See section 183(e)(1); see also section 183(e)(4) providing broad authority to include ''systems of regulation'' in controlling VOC emissions from consumer products.

[277] Portable Fuel Container Spillage Control Regulations, Final Statement of Reasons, State of California Environmental Protection Agency Air Resources Board, June 2000.

[278] Public Hearing to Consider Amendments to the Regulations for Portable Fuel Containers, Final Statement of Reasons, California Air Resources Board, October 2005.

California's original program contained several design specifications which limited manufacturer flexibility and resulted, in many cases, in products that were difficult for consumers to use. California has removed most of these design specifications from their revised program.

California's original program included an automatic shut-off requirement intended to reduce spillage caused by overfilling the receiving fuel tank. The spouts were required to be designed to stop fuel flow when the fuel reached the tip of the spout, similar to how gas pumps shut off when refueling a vehicle. California specified a test fixture, the height of the fuel in the receiving tank at which point the fuel flow must stop, and the minimum fuel flow rate. The gas cans were designed by manufacturers to work well with the test fixture, but the automatic shut-off failed in use a significant amount of the time. California found that the design of the equipment fuel tank had a big impact on the performance of the automatic shut-off. Due to the wide variety of fuel tank designs, the automatic shut-off worked on a relatively small percentage of equipment. In addition, many of the spout designs were not compatible with passenger vehicles. This is especially critical because the cans are customarily used by consumers when their vehicles run out of gas.

These problems led to many consumer complaints to both the manufacturers and to the California Air Resources Board. It also led to increased spillage in many cases. It was also found that many consumers did not understand how the spouts were supposed to operate. Even in cases where the spouts would have stopped the flow of fuel in time, consumers did not use the cans properly. Consumers are used to actively controlling the flow of fuel. For these reasons, California removed the automatic shut-off requirements from their program for all cans.

B. What Emissions Standard Is EPA Proposing, and Why?

1. Description of Emissions Standard

We are proposing a performance-based standard of 0.3 grams per gallon per day (g/gal/day) of HC to control evaporative and permeation losses. The standard would be measured based on the emissions from the can over a diurnal test cycle. The cans would be tested as a system with their spouts attached. Manufacturers would test the cans by placing them in an environmental chamber which simulates summertime ambient temperature conditions and cycling the cans through the 24-hour temperature profile (72–96° F), as discussed below. The test procedures, which are described in more detail below, would ensure that gas cans meet the emission standard over a range of in-use conditions such as different temperatures, different fuels, and taking into consideration factors affecting durability.

2. Determination of Best Available Control

The 0.3 g/gal/day emissions standard and associated test procedures reflect the performance of the best available control technologies discussed above, including durable permeation barriers, auto-closing spouts, and a can that is well-sealed to reduce evaporative losses. The standard is both economically and technologically feasible. As discussed above, to comply with California's program, gas can manufacturers have developed gas cans with low VOC emissions at a reasonable cost (see section IX. for costs). Testing of cans designed to meet CARB standards has shown the proposed standards to be technologically feasible. When tested over cycles very similar to those we are proposing, emissions from these cans have been in the range of 0.2–0.3 g/gal/day.[279] These cans have been produced with permeation barriers representing a high level of control (over 90 percent reductions) and with auto-closing spouts, which are technologies that represent best available controls for gas cans. Establishing the standard at 0.3 g/gal/day would require the use of best available technologies. We are proposing a level at the upper end of the tested performance range to account for product performance variability. In addition, we believe that any of the current best designs can achieve these levels, so we do not believe that the proposed standard forecloses use of any of the existing performing product designs. Our detailed feasibility analysis is provided in the Regulatory Impact Analysis. We request comment on the level of the standard and on its feasibility. We request that commenters provide detail and data where possible.

In addition to considering technological and economic feasibility, section 183(e)(1)(A) requires us to consider ''health, environmental, and energy impacts'' in assessing best available controls. Environmental and health impacts are discussed in section IV. Moreover, control of spillage from gas cans may reduce fire hazards as well because cans would stay tightly closed if tipped over. We expect the energy impacts of gas can control to be positive, because the standards will reduce evaporative fuel losses.

3. Emissions Performance vs. Design Standard

We are proposing an emissions performance standard rather than mandating that gas cans be of any specified design. Rather than proposing to require that gas cans only have one opening, or other design-based requirements, we believe that it is sufficient to require gas cans to meet an emissions performance standard. A performance standard allows flexibility in can design while ensuring the overall emissions performance of the cans. We are reluctant to specify design standards for consumer products in order not to limit manufacturer (and ultimately consumer) choice. The market will encourage manufacturers to offer products that work well for consumers, and design-based requirements could unnecessarily limit manufacturer design flexibility.

4. Automatic Shut-Off

We are not requiring automatic shut-off as a design-based standard, or considering it to be a ''best available control.'' As described in section VIII.A.3. above, the automatic shut-off has been shown to be problematic for consumers for several reasons, and we believe that including requirements for automatic shut-off would be counterproductive. Automatic shut-off is supposed to stop the flow of fuel when the fuel reaches the top of the receiving tank in order to prevent over-filling. However, due to a wide variety of receiving fuel tank designs, the auto shut off spouts do not work well with a variety of equipment types. In California, this problem led to spillage and consumer dissatisfaction. We want to avoid cases where spills occur even when consumers are using the products properly due to a mismatch between the spout design and the design of the receiving fuel tank being filled. Excessive consumer difficulties in using new cans would likely lead to some consumers defeating the low emissions features of the cans by removing the spouts and using other means such as funnels to refuel equipment. Any additional emissions reductions provided by automatic shut-off in cases where it worked properly would likely be largely or completely offset by increased spillage due to cases where

[279] ''Quantification of Permeation and Evaporative Emissions From Portable Fuel Container'', California Air Resources Board, June 2004.

consumers defeated the designs or the designs failed to work properly. We believe that the automatic closing cans, even without automatic shut-off requirements, will lead to reduced spillage. As discussed above, automatic closure keeps the cans closed when they are not in use and provides more control to the consumer during use.

Some additional reduction in spillage is likely possible in some cases with automatic shut-off, but may not be feasible across the wide array of gas can usage. It is possible to design a spout that works well on some equipment but not for all equipment. It might also be possible to cover more uses by having multiple spouts, but we believe that having multiple spouts would lead to confusion and would also require consumers to have multiple cans depending on the types of equipment that they refuel. We request comment on automatic shut-off requirements and on ways to establish an automatic shut-off requirement that would reduce spillage, be feasible for manufacturers, and be practical for consumers.

5. Consideration of Retrofits of Existing Gas Cans

Clean Air Act section 183(e) provides authority to consider retrofitting gasoline containers as an approach for controlling emissions. We do not believe, however, that requiring the retrofit of existing gas cans would be a feasible approach for controlling gas can emissions, either technically or economically. This would likely entail manufacturers first developing retrofit systems (including spouts for various previous gas can designs), testing them for emissions performance, and certifying them with EPA. Manufacturers would need time to develop and certify systems and also to develop an implementation strategy, considering that there are millions of cans in use. Manufacturers would then likely need to collect gas cans from consumers, recondition the cans, permanently close vents, incorporate permeation barriers, and incorporate new spouts. We believe that this process would lead to costs that far exceed the cost of newly manufactured gas cans. In addition, emissions reductions would depend on consumer participation, which would be highly uncertain given that gas cans are relatively low-cost consumer products. In fact, we believe that consumers who are concerned about emissions would be more likely to discard old gas cans and purchase new cans meeting emissions standards. For all these reasons, we do not believe that a retrofitting approach makes sense for gas cans.

6. Consideration of Diesel, Kerosene and Utility Containers

We are requesting comment on but not proposing applying emissions control requirements to diesel, kerosene, and utility containers. Due to the low volatility of diesel and kerosene, the evaporative losses from diesel and kerosene cans would be minimal when used with the designated fuels. California has included diesel and kerosene cans in their regulations largely due to the concern that they would be purchased as substitutes for gasoline containers. California also included utility containers in their portable fuel container program due to concerns that these containers would be used for gasoline. We believe that manufacturers can minimize this incentive by designing gasoline cans and spouts that are easy to use and beneficial to the consumer. However, storing gasoline in diesel, kerosene, and utility containers would result in a loss of emissions reductions and therefore we are requesting comment on including them in the program. The costs for these containers would be similar to the costs estimated for gasoline containers. We request comment on the potential for diesel, kerosene, and utility containers to be used as a substitute for regulated gas cans, and the cost and other implications of including them in the program.

C. Timing of Standard

As an aspect of considering the proposed standard's technological feasibility, we are proposing to require manufacturers to meet the standard beginning January 1, 2009. Manufacturers have developed the primary technologies to reduce emissions from gas cans but will need a few years of lead time to certify products and ramp up production to a national scale. The certification process would take at least six months due to the required durability demonstrations described below, and manufacturers would need time to procure and install the tooling needed to produce gas cans with permeation barriers for nationwide sales.

The standards would apply to gas cans manufactured on or after the start date of the program and would not affect cans produced before the start date. We propose that as of July 1, 2009, manufacturers and importers must not enter into U.S. commerce any products not meeting the emissions standards. This provides manufacturers with a 6-month period to clear any stocks of gas cans manufactured prior to the January 1, 2009 start of the program, allowing the normal sell through of these cans to the retail level. Retailers would be able to sell their stocks of gas cans through the course of normal business without restriction. Gas cans are currently stamped with their production date, which would allow EPA to determine which cans are required to meet the new standards.

We believe that the 2009 time frame is feasible, but recognize that it could be a challenge for manufacturers with high volume sales to ramp up production. We request comment on the economic feasibility of the proposed timing and also on whether or not a phase-in of the standards would ease the transition to a national program. We encourage commenters to provide detailed rationale and data where possible to support their comments.

D. What Test Procedures Would Be Used?

As part of the proposed system of regulations for gas cans, we are proposing test conditions designed to assure that the intended emission reductions occur over a range of in-use conditions such as operating at different temperatures, with different fuels, and considering factors affecting durability. These proposed test procedures implement section 183(e)(4), which authorizes EPA to develop appropriate standards relating to product use. Emission testing on all gas cans that manufacturers produce is not feasible due to the high volumes of gas cans produced every year and the cost and time involved with emissions testing. Instead, we are proposing that before the gas cans are introduced into commerce, EPA would need to certify gas cans to the emissions standards based on manufacturers' applications for certification. Manufacturers would submit test data on a sample of gas cans that are prototypes of the products manufacturers intend to produce. Manufacturers would also need to certify that their production cans would not deviate in materials or design from the prototype gas cans that are tested. Manufacturers would need to obtain approval of their certification from EPA prior to introducing their products into commerce. The proposed test procedures and certification requirements are described in detail below.

We are proposing that manufacturers would test cans in their most likely storage configuration. The key to reducing evaporative losses from gas cans is to ensure that there are no openings on the cans that could be left open by the consumer. Traditional cans

have vent caps and spout caps that are easily lost or left off cans, which leads to very high evaporative emissions. We expect manufacturers to meet the evaporative standards by using automatic closing spouts and by removing other openings that consumers could leave open. However, if manufacturers choose to design cans with an opening that does not close automatically, we are proposing to require that containers be tested in their open condition. If the gas cans have any openings that consumers could leave open (for example, vents with caps), these openings thus would need to be left open during testing. This would apply to any opening other than where the spout attaches to the can. We believe it is important to take this approach because these openings could be a significant source of in-use emissions and there is a realistic possibility that these openings would be inadvertently left open in use.

We propose that spouts would be in place during testing because this would be the most likely storage configuration for the emissions compliant cans. Spouts would still be removable so that consumers would be able to refill the cans, but we would expect the containers to be resealed by consumers after being refilled in order to prevent spillage during transport. We do not believe that consumers would routinely leave spouts off cans because spouts are integral to the cans' use and it is obvious that they need to be sealed.

1. Diurnal Test

We are proposing a test procedure for diurnal emissions testing where manufacturers (or others conducting the testing) place gas cans in an environmental chamber or a Sealed Housing for Evaporative Determination (SHED), vary the temperature over a prescribed temperature and time profile, and measure the hydrocarbons escaping from the gas can. We are proposing that gas cans would be tested over the same 72–96 °F (22.2–35.6 °C) temperature profile used for automotive applications. This temperature profile represents a hot summer day when ground level ozone emissions (formed from hydrocarbons and oxides of nitrogen) would be highest. We propose that three containers would be tested, each over a three-day test. We are proposing that three cans would be tested for certification in order to address variability in products or test measurements. All three cans would have to individually meet the proposed standard. As noted above, gas cans would be tested in their most likely storage configuration.

The final result would be reported in grams per gallon, where the grams are the mass of hydrocarbons escaping from the gas can over 24 hours and the gallons are the nominal gas can capacity. The daily emissions would then be averaged for each can to demonstrate compliance with the standard. This test would capture hydrocarbons lost through permeation and any other evaporative losses from the gas can as a whole. We are proposing that the grams of hydrocarbons lost would be determined by either weighing the gas can before and after the diurnal test cycle or measuring emissions directly using the SHED instrumentation.

Consistent with the automotive test procedures, we are proposing that the testing take place using 9 pounds per square inch (psi) Reid Vapor Pressure (RVP) certification gasoline, which is the same fuel required by EPA to be used in its other evaporative test programs. We are proposing for this testing to use E10 fuel (10% ethanol blended with the gasoline described above) in this testing to help ensure in-use emission reductions on ethanol-gasoline blends, which tend to have increased evaporative emissions with certain permeation barrier materials. We believe including ethanol in the test fuel will lead to the selection of materials by manufacturers that are consistent with ''best available control'' requirements for all likely contained gasolines, and is clearly appropriate given the expected increase over time of the use of ethanol blends of gasoline under the renewable fuel provisions of the Energy Policy Act of 2005. Diurnal emissions are not only a function of temperature and fuel volatility, but of the size of the vapor space in the container as well. We are proposing that the fill level at the start of the test be 50% of the nominal capacity of the gas can. This would likely be the average fuel level of the gas can in-use. Nominal capacity of the gas cans would be defined as the volume of fuel, specified by the manufacturer, to which the gas can could be filled when sitting on level ground. The vapor space that normally occurs in a gas can, even when ''full,'' would not be considered in the nominal capacity of the gas can. All of these test requirements are proposed to represent typical in-use storage conditions for gas cans, on which EPA can base its emissions standards. These provisions are proposed as a way to implement the standards effectively, which will lead to the use of best available technology at a reasonable cost.

Before testing for certification, the gas cans would be run through the durability tests described below. Within 8 hours of the end of the soak period contained in the durability cycle, the gas cans would be drained and refilled to 50 percent nominal capacity with fresh fuel, and then the spouts re-attached. When the gas can is drained, it would have to be immediately refilled to prevent it from drying out. The timing of these steps is needed to ensure that the stabilized permeation emissions levels are retained. The can will then be weighed and placed in the environmental chamber for the diurnal test. After each diurnal, the can would be re-weighed. In lieu of weighing the gas cans, we propose that manufacturers could opt to measure emissions from the SHED directly. For any in-use testing of gas cans, the durability procedures would not be run prior to testing.

California's test procedures are very similar to those described above. However, the California procedure contains a more severe temperature profile of 65–105 °F. We propose to allow manufacturers to use this temperature profile to test gas cans as long as other parts of the EPA test procedures are followed, including the durability provisions below. We request comment on these test procedures, including ways the procedures may be further streamlined without impacting the overall emissions measurements and performance of the gas cans.

2. Preconditioning To Ensure Durable In-Use Control

a. Durability Cycles

To determine permeation emission deterioration rates, we are specifying three durability aging cycles: Slosh, pressure-vacuum cycling, and ultraviolet exposure. They represent conditions that are likely to occur in-use for gas cans, especially for those cans used for commercial purposes and carried on truck beds or trailers. The purpose of these deterioration cycles is to help ensure that the technology chosen by manufacturers is durable in-use, representing best available control, and the measured emissions are representative of in-use permeation rates. Fuel slosh, pressure cycling, and ultraviolet (UV) exposure each impact the durability of certain permeation barriers, and we believe these cycles are needed to ensure long-term emissions control. Without these durability cycles, manufacturers could choose to use materials that meet the certification standard but have degraded performance in-use, leading to higher emissions. We do not expect these procedures to adversely impact the feasibility of the standards, because

there are permeation barriers available at a reasonable cost that do not deteriorate significantly under these conditions (which permeation barriers are examples of best available controls). As described above, we believe including these cycles as part of the certification test is preferable to a design-based requirement.

For slosh and pressure cycling, we are proposing to use durability tests that are based on draft recommended SAE practice for evaluating permeation barriers.[280] For slosh testing, the gas can would be filled to 40 percent capacity with E10 fuel and rocked for 1 million cycles. The pressure-vacuum testing contains 10,000 cycles from −0.5 to 2.0 psi. The third durability test is intended to assess potential impacts of ultraviolet (UV) sunlight (0.2 μm–0.4 μm) on the durability of a surface treatment. In this test, the gas cans must be exposed to a UV light of at least 0.40 Watt-hour/meter^2 /minute on the gas can surface for 15 hours per day for 30 days. Alternatively, gas cans could be exposed to direct natural sunlight for an equivalent period of time. We have also established these same durability requirements as part of our program to control permeation emissions from recreational vehicle fuel tanks.[281] While there are obvious differences in the use of gas cans compared to the use of recreational vehicle fuel tanks, we believe the test procedures offer assurance that permeation controls used by manufacturers will be robust and will continue to perform as intended when in use. We request comments on the use of these procedures for gas cans to help ensure permeation control in-use.

We also propose to allow manufacturers to do an engineering evaluation, based on data from testing on their permeation barrier, to demonstrate that one or more of these factors (slosh, UV exposure, and pressure cycle) do not impact the permeation rates of their gas cans and therefore that the durability cycles are not needed. Manufacturers would use data collected previously on gas cans or other similar containers made with the same materials and processes to demonstrate that the emissions performance of the materials does not degrade when exposed to slosh, UV, and/or pressure cycling. The test data would have to be collected under equivalent or more severe conditions as those noted above.

b. Preconditioning Fuel Soak

It takes time for fuel to permeate through the walls of containers. Permeation emissions will increase over time as fuel slowly permeates through the container wall, until the permeation finally stabilizes when the saturation point is reached. We want to evaluate emissions performance once permeation emissions have stabilized, to ensure that the emissions standard is met in-use. Therefore, we are proposing that prior to testing the gas cans, the cans would need to be preconditioned by allowing the cans to sit with fuel in them until the hydrocarbon permeation rate has stabilized. Under this step, the gas can would be filled with a 10-percent ethanol blend in gasoline (E10), sealed, and soaked for 20 weeks at a temperature of 28 ± 5° C. As an alternative, we are proposing that the fuel soak could be performed for 10 weeks at 43 ± 5°C to shorten the test time. During this fuel soak, the gas cans would be sealed with the spout attached. This is representative of how the gas cans would be stored in-use. We have established these soak temperatures and durations based on protocols EPA has established to measure permeation from fuel tanks made of HDPE.[282] These soak times should be sufficient to achieve stabilized permeation emission rates. However, if a longer time period is necessary to achieve a stabilized rate for a given gas can, we would expect the manufacturer to use a longer soak period (and/or higher temperature) consistent with good engineering judgment.

Durability testing that is performed with fuel in the gas can may be considered part of the fuel soak provided that the gas can continuously has fuel in it. This approach would shorten the total test time. For example, the length of the UV and slosh tests could be considered as part of the fuel soak provided that the gas can is not drained between these tests and the beginning of the fuel soak.

c. Spout Actuation

In its recently revised program for gas cans, California included a durability demonstration for spouts. We are proposing a durability demonstration consistent with California's procedures. Automatically closing spouts are a key part of the emissions controls expected to be used to meet the proposed standards. If these spouts stick or deteriorate, in-use emissions could remain very high (essentially uncontrolled). We are interested in ways to ensure during the certification procedures that the spouts also remain effective in use. California requires manufacturers to actuate the spouts 200 times prior to the soak period and 200 times near the conclusion of the soak period to simulate spout use. The spouts' internal components would be required to be exposed to fuel by tipping the can between each cycle. Spouts that stick open or leak during these cycles would be considered failed. The total of 400 spout actuations represents about 1.5 actuations per week on average over the average container life of 5 years. In the absence of data, we believe this number of actuations appears to reasonably replicate the number that can occur in-use for high end usage and will help ensure quality spout designs that do not fail in-use. We also believe that proposing requirements consistent with California will help manufacturers to avoid duplicate testing. We request comment on the above approach for demonstrating spout durability.

E. What Certification and In-Use Compliance Provisions Is EPA Proposing?

1. Certification

Section 183(e)(4) authorizes EPA to adopt appropriate systems of regulations to implement the program, including requirements ranging from registration and self-monitoring of products, to prohibitions, limitations, economic incentives and restrictions on product use. We are proposing a certification mechanism pursuant to these authorities. Manufacturers would be required to go through the certification process specified in the proposed regulations before entering their containers into commerce. To certify products, manufacturers would first define their emission families. This is generally based on selecting groups of products that have similar emissions. For example, co-extruded gas cans of various geometries could be grouped together. The manufacturer would select a worst-case configuration for testing, such as the thinnest-walled gas can. These determinations may be made using good engineering judgment and would be subject to EPA review. Testing with those products, as specified above, would need to show compliance with emission standards. The manufacturers would then send us an application for certification. We propose to define the

[280] Draft SAE Information Report J1769, ''Test Protocol for Evaluation of Long Term Permeation Barrier Durability on Non-Metallic Fuel Tanks,'' (Docket A–2000–01, document IV–A–24).

[281] Final Rule, ''Control of Emissions from Nonroad Large Spark-ignition engines, and Recreational Engines (Marine and Land-based)'', 67 FR 68287, November 8, 2002.

[282] Final Rule, ''Control of Emissions from Nonroad Large Spark-ignition engines, and Recreational Engines (Marine and Land-based)'', 67 FR 68287, November 8, 2002.

manufacturer as the entity that is in day-to-day control of the manufacturing process (either directly or through contracts with component suppliers) and responsible for ensuring that components meet emissions-related specifications. Importers would not be considered a manufacturer and thus would not be certifying entities; the manufacturers of the cans they import would have to certify the cans. Importers would only be able to import gas cans that are certified.

After reviewing the information in the application, we would issue a certificate of conformity allowing manufacturers to introduce into commerce the gas cans from the certified emission family. EPA review would typically take about 90 days or less, but could be longer if we have questions regarding the application. The certificate of conformity would be for a production period of up to five years. Manufacturers could carry over certification test data if no changes are made to their products that would affect emissions performance. Changes to the certified products that would affect emissions would require reapplication for certification. Manufacturers wanting to make changes without doing testing would be required to present an engineering evaluation demonstrating that emissions are not affected by the change.

The certifying manufacturer accepts the responsibility for meeting applicable emission standards. While we are proposing no requirement for manufacturers to conduct production-line testing, we may pursue EPA in-use testing of certified products to evaluate compliance with emission standards. If we find that gas cans do not meet emissions standards in use, we would consider the new information during future product certification. Also, we may require certification prior to the end of the five-year production period otherwise allowed between certifications. The details of the proposed certification process are provided in the proposed regulatory text. We request comments on the certification process we are proposing.

2. Emissions Warranty and In-Use Compliance

We are proposing a warranty period of one year to be provided by the manufacturer of the gas can to the consumer. The warranty would cover emissions-related materials defects and breakage under normal use. For example, the warranty would cover failures related to the proper operation of the auto-closing spout or defects with the permeation barriers. We are also proposing to require that manufacturers submit a warranty and defect report documenting successful warranty claims and the reason for the claim to EPA annually so that EPA may monitor the program. Unsuccessful claims would not need to be submitted. We believe that this warranty will encourage designs that work well for consumer and are durable. Although it does not fully cover the average life of the product, it is not typical for very long warranties to be offered with products and therefore we believe a one year warranty is reasonable. Also, the warranty period is more similar to the expected life of gas cans when used in commercial operations, which would need to be considered by the manufacturers in their designs. We request comment on the warranty period.

EPA views this aspect of the proposal as another part of the ''system of regulation'' it is proposing to control VOC emissions from gas cans, which system may include ''requirements for registration and labeling * * * use, or consumption * * * of the product'' pursuant to section 183(e)(4) the Act. A warranty will promote the objective of the proposed rule by assuring that manufacturers will ''stand behind'' their product, thus improving product design and performance. Similarly, the proposed defect reporting requirement will promote product integrity by allowing EPA to readily monitor in-use performance by tracking successful warranty claims.

Gas cans have a typical life of about five years on average before they are scrapped. We are proposing durability provisions as part of certification testing to help ensure containers perform well in use (a system of regulation for ''use'' of the product, pursuant to section 183(e)(4)). Under the proposal, we could test gas cans within their five-year useful life period to monitor in-use performance and take steps to correct in-use failures, including denying certification, for container designs that are consistently failing to meet emissions standards. (This proposed provision thus would work in tandem with the warranty claim reporting provision proposed in the preceding paragraph.)

We are not proposing any recall provisions for gas cans. Manufacturers do not have registration programs for gas cans and implementing such a program for a low-cost consumer product may be overly burdensome, and have a very low participation rate. Also, we would not expect a high participation rate from consumers in a recall, in any event, due to the nature of gas cans as a consumer product. We believe, however, that by having the authority to test products in use, along with the possible repercussions of in-use noncompliance, will encourage manufacturers to develop robust designs.

3. Labeling

Since the requirements will be effective based on the date of manufacture of the gas can, we propose that the date of manufacture must be indelibly marked on the can. This is consistent with current industry practices. This is needed so that we and others can recognize whether a unit is regulated or not. In addition, we propose to require a label providing the manufacturer name and contact information, a statement that the can is EPA certified, citation of EPA regulations, and a statement that it is warranted for one year from the date of purchase. The manufacturer name and contact information is necessary to verify certification. Indicating that a 1 year warranty applies will ensure that consumers have knowledge of the warranty and a way to contact the manufacturer. Enforcement of the warranty is critical to the defect reporting system. In proposing this labeling requirement, we further believe, pursuant to section 183(e)(8), that these labeling requirements would be useful in meeting the NAAQS for ozone. They provide necessary means of implementing the various measures described above which help ensure that VOC emission reductions from the proposed standard will in fact occur in use.

F. How Would State Programs Be Affected by EPA Standards?

As described in section VIII.A.3. above, several states have adopted emissions control programs for gas cans. California implemented an emissions control program for gas cans in 2001. Thirteen other states, mostly in the northeast, have adopted the California program in recent years.[283] Last year, California adopted a revised program, which will go into effect on July 1, 2007. The revised California program is very similar to the program we are proposing. We believe that although a few aspects of the program we are proposing are different, manufacturers will be able to meet both EPA and CARB requirements with the same gas can designs and therefore sell a single product in all 50

[283] Delaware, Maine, Maryland, Pennsylvania, New York, Connecticut, Massachusetts, New Jersey, Rhode Island, Vermont, Virginia, Washington DC, and Texas.

states. In most cases, we believe manufacturers will take this approach. By closely aligning with California where possible, we will allow manufacturers to minimize research and development (R&D) and emissions testing, while potentially achieving better economies of scale. It may also reduce administrative burdens and market logistics from having to track the sale of multiple can designs. We consider these to be important factor under CAA section 183(e) which requires us to consider economic feasibility of controls.

States that have adopted the original California program will likely choose to either adopt the new California program or eliminate their state program in favor of the federal program. Because the programs are similar, we expect that most states will eventually choose the EPA program rather than continue their own program. We expect very little difference in the emissions reductions provided by the EPA and California programs in the long term. In addition, if EPA's program starts in 2009, as discussed above, this would be the same timing states would likely target in their program revisions.

G. Provisions for Small Gas Can Manufacturers

As discussed in previous sections, prior to issuing a proposal for this proposed rulemaking, we analyzed the potential impacts of these regulations on small entities. As a part of this analysis, we convened a Small Business Advocacy Review Panel (SBAR Panel, or ''the Panel''). During the Panel process, we gathered information and recommendations from Small Entity Representatives (SERs) on how to reduce the impact of the rule on small entities, and those comments are detailed in the Final Panel Report which is located in the public record for this rulemaking (Docket EPA–HQ–OAR–2005–0036). Based upon these comments, we propose to include flexibility and hardship provisions for gas can manufacturers. Since nearly all gas can manufacturers (3 of 5 manufacturers as defined by SBA) are small entities and they account for about 60 percent of sales, the Panel recommended to extend the flexibility options and hardship provisions to all gas can manufacturers. (Our proposal today is consistent with that recommendation.) Moreover, implementation of the program would be much simpler by doing so. The flexibility provisions are incorporated into the program requirements described earlier in sections VIII.C through VIII.E. The hardship provisions are described below. For further discussion of the Panel process, see section XII.C of this proposed rule and/or the Final Panel Report.

The Panel recommended that two types of hardship provisions be extended to gas can manufacturers. These entities could, on a case-by-case basis, face hardship, and we are proposing these provisions to provide what could prove to be needed safety valves for these entities. Thus, the propose hardship provisions are as follows:

1. First Type of Hardship Provision

Gas can manufacturers would be able to petition EPA for limited additional lead-time to comply with the standards. A manufacturer would have to demonstrate that it has taken all possible business, technical, and economic steps to comply but the burden of compliance costs or would have a significant adverse effect on the company's solvency. Hardship relief could include requirements for interim emission reductions.

2. Second Type of Hardship Provision

Gas can manufacturers would be permitted to apply for hardship relief if circumstances outside their control cause the failure to comply (*i.e.* supply contract broken by parts supplier), and if failure to sell the subject containers would have a major impact on the company's solvency. The terms and timeframe of the relief would depend on the specific circumstances of the company and the situation involved.

For both types of hardship provisions, the length of the hardship relief would be established during the initial review for not more than one year and would be reviewed annually thereafter as needed. As part of its application, a company would be required to provide a compliance plan detailing when and how it would achieve compliance with the standards.

IX. What Are the Estimated Impacts of the Proposal?

A. Refinery Costs of Gasoline Benzene Reduction

The proposed 0.62 volume percent benzene standard would generally result in many refiners investing in benzene control hardware and changing the operations in their refineries to reduce their gasoline benzene levels. The proposed ABT program would allow refiners to optimize their investments, which we believe would maximize the benzene reductions at the lowest possible cost. We have estimated that the capital and operating costs that we believe would result from the proposed program would average 0.13 cents per gallon of gasoline.

In this section we summarize the methodology used to estimate the costs of benzene control, the scenarios we evaluated, and our estimated costs for the program. We also summarize the results of our analyses of other potential MSAT control programs. A detailed discussion of all of these analyses is found in Chapter 9 of the RIA.

1. Tools and Methodology

a. Linear Programming Cost Model

We considered performing our cost assessments for this proposed program using a linear programming (LP) cost model. LP cost models are based on a set of complex mathematical representations of refineries which, for national analyses, are usually conducted on a regional basis. This type of refining cost model has been used by the government and the refining industry for many years for estimating the cost and other implications of changes to fuel quality.

The design of LP models lends itself to modeling situations where every refinery in a region is expected to use the same control strategy and/or has the same process capabilities. As we began to develop a gasoline benzene control program with an ABT program, it became clear that LP modeling was not well suited for evaluating such a program. Because refiners would be choosing a variety of technologies for controlling benzene, and because the program would be national and would include an ABT program, we initiated development of a more appropriate cost model, as described below. However, the LP model remained important for providing many of the inputs into the new model, and for performing analyses of other potential programs.

b. Refiner-by-Refinery Cost Model

In contrast to LP models, refinery-by-refinery cost models are useful when individual refineries would respond to program requirements in different ways and/or have significantly different process capabilities. Thus, in the case of today's proposed gasoline benzene control program, we needed a model that would accurately simulate the variety of decisions refiners would make at different refineries, especially in the context of a nationwide ABT program. For this and other related reasons, we developed a refinery-by-refinery cost model specifically to evaluate the proposed benzene control program.

Our benzene cost model incorporates the capacities of all the major units in

each refinery in the country, as reported by the Energy Information Administration and in the Oil and Gas Journal. Regarding operational information, we know less about how the various units are used to produce gasoline and such factors as octane and hydrogen costs for individual refineries. We used the LP model to estimate these factors on a regional basis, and we applied the average regional result to each refinery in that region (PADD). We calibrated the model for each individual refinery based on 2003 gasoline volumes and benzene levels, which was the most recent year for which data was available, and found that the model simulated the actual situation well. We also compared cost estimates of similar benzene control cases from both the refinery-by-refinery model and the LP model, and the results were in close agreement.

Refinery-by-refinery cost models have been used in the past by both EPA and the oil industry for such programs as the highway and nonroad diesel fuel sulfur standards, and they are a proven means for estimating the cost of compliance for fuel control programs. For the specific benzene cost model, we have initiated a peer review process, and have received some comments on the design of our model. Although we did not receive these comments in time to respond to them in this proposal, we plan to address all peer review comments in the development of the final rule. (Based on our initial assessment of these comments, we do not believe that the changes suggested would significantly affect the projected costs of the program. See Chapter 9 of the RIA for our initial responses to these peer-review comments.)

Based on our understanding of the primary benzene control technologies (see section VII.F above), the cost model assumes that four technologies would be used, as appropriate, for reducing benzene levels. All of these technologies focus on addressing benzene in the reformate stream. They are (1) routing the benzene precursors around the reformer; (2) routing benzene precursors to an existing isomerization unit, if available; (3) benzene extraction (extractive distillation); and (4) benzene saturation. There are several restrictions on the use of these various technologies (such as the assumption that benzene extraction would only be expanded in areas with strong benzene chemical markets) and these are incorporated into the model.

For the proposed benzene control program, the associated nationwide ABT program is intended to optimize benzene reduction by allowing each refinery to individually choose the most cost-effective means of complying with the program. To model this phenomenon, we first establish an estimated cost for the set of technologies required for each refinery to meet the standard. We then rank the refineries in order from lowest to highest control cost per gallon of gasoline. The model then follows this ranking, starting with the lowest-cost refineries, and adds refineries and their associated control technologies one by one until the projected national average benzene level reaches 0.62 volume percent. This establishes which refineries we expect to apply control technologies to comply, as well as those that would generate credits and those that would use credits in lieu of investing in control. The sum of the costs of the refineries expected to invest in control provides the projected overall cost of the program.

c. Price of Chemical Grade Benzene

The price of chemical grade benzene is critical to the proposed program because it defines the opportunity cost for benzene removed using benzene extraction and sold into the chemicals market. According to 2004 World Benzene Analysis produced by Chemical Market Associates Incorporated (CMAI), during the consecutive five year period ending with 2004, the price of benzene averaged 24 dollars per barrel higher than regular grade gasoline. During the three consecutive year period ending with 2004, the price of benzene averaged 28 dollars per barrel higher than regular grade gasoline. However, during the first part of 2004, the price of benzene relative to gasoline rose steeply, primarily because of high energy prices adding to the cost of extracting benzene. The projected benzene price for 2004 indicated that the benzene price averaged 38 dollars per barrel higher than regular grade gasoline.

For the future, CMAI projects that the price of benzene relative to gasoline will return to more historic levels or lower, in the range of $20 per barrel higher than regular grade gasoline. We have based our modeling on this value. However, we have also examined the sensitivity of the projected overall program costs for a case where the cost of benzene control remains at $38 higher than gasoline into the future.

d. Applying the Cost Model to Special Cases

For the comparative cases we modeled that involve a maximum-average (max-avg) standard in addition to an average benzene standard, modeling the costs requires a different modeling methodology. Refineries that the model estimates would have benzene levels above the max-avg standard are assumed to apply the most cost-effective benzene reduction technologies that the model shows would reduce benzene levels to below the max-avg standard. The benzene reductions associated with meeting the max-avg standard may or may not be sufficient for also meeting the average standard, depending on how stringent the max-avg standard is relative to the average standard. If the model indicates that additional benzene reduction would be necessary, these additional benzene reductions are modeled in the same way as the case of an average standard only, as described above.

We also evaluated a limited number of cases that did not include an ABT program. In such cases, the model assumes that all the refineries with benzene levels below the standard would maintain the same benzene level, while each refinery with benzene levels above the standard would take all the necessary steps to reduce their benzene levels down to the standard. If the model shows that capital investments are needed to achieve the necessary benzene reduction, we assume that the refiner installs a full sized unit to treat the entire stream and then operates the unit only to the extent necessary to meet the standard.

2. Summary of Costs

a. Nationwide Costs of the Proposed Program

We have used the refinery-by-refinery cost model to estimate the costs of the proposed program, with an average gasoline benzene content standard of 0.62 volume percent and the proposed ABT program. In general, the cost model indicates that among the four primary reformate-based technologies, benzene extraction would be the most cost effective. The next most cost effective technologies are benzene precursor rerouting, and rerouting coupled with isomerization. The model indicates that benzene saturation would be the least cost-effective, but only marginally so in the larger refineries.

Our refinery-by-refinery model estimates that 92 refineries of the total 115 gasoline-producing refineries in the U.S. would have to put in new capital equipment or change their refining operations to reduce the benzene levels in their gasoline. Of these refineries 25 would use benzene precursor removal, 32 refineries would use benzene precursor removal coupled with isomerization, 24 would use extraction,

and 11 would use benzene saturation. The analysis projects that 43 refineries would reduce their benzene levels to the proposed benzene standard or lower, while 49 refineries would reduce their benzene levels but still would need to purchase credits to comply with the average benzene standard. Including the refineries with benzene levels currently below 0.62, we project that there would be a total of 62 refineries producing gasoline with benzene levels at 0.62 or lower. The model assumes that those with benzene levels lower than 0.62 volume percent would generate credits for sale to other refineries. Finally, the model projects that there would be 6 refineries that would take no benzene reduction action and comply with the proposed program solely through the use of benzene credits.

The refinery model estimates that the proposed benzene standard would cost 0.13 cents per gallon, averaged over the entire U.S. gasoline pool. (When averaged only over those refineries which are assumed to take steps to reduce their benzene levels, the average cost would be 0.19 cents per gallon.) This per-gallon cost would result from an industry-wide investment in capital equipment of $500 million to reduce gasoline benzene levels. This would amount to an average of $5 million in capital investment in each refinery that adds such equipment.[284]

We also estimated annual aggregate costs associated with the proposed new fuel standard. As shown in Table IX.A–1, these costs are projected to begin at $186 million in 2011 and increase over time as fuel demand increases.

TABLE IX.A–1.—ANNUAL AGGREGATE FUEL COSTS

2011	2013	2015	2017	2019	2020
$185,533,000	$191,873,000	$198,283,000	$204,212,000	$209,875,000	$212,606,000

Several observations can be made from these results from our nationwide analysis. First, significantly reducing gasoline benzene levels to low levels, coupled with the flexibility of an ABT program, will incur fairly modest costs. This is primarily because we expect that refiners would optimize their benzene control strategies, resulting in large benzene reductions at a low overall program cost. With high benzene prices relative to those of gasoline projected to continue (even if they drop from the recent very high levels), extraction would be a very low cost technology—the primary reason why the cost of the overall program is very low. Also, precursor rerouting, either with or without isomerization in an existing unit, is a low-cost technology requiring little or no capital to realize. The model concludes that even the higher-cost benzene saturation technology would be fairly cost-effective overall because larger refineries that install this technology would take advantage of their economies of scale.

b. Regional Distribution of Costs

The benzene reductions estimated by the cost model and associated costs vary significantly by region. Table IX.A–2 summarizes the initial benzene levels and the projected benzene levels after refiners take anticipated steps to reduce the benzene in their gasoline and the estimated per-gallon costs for complying with the proposed benzene standard.

Table IX.A–2 shows that under the proposed program the largest benzene reductions occur in the areas with the highest benzene levels. This is expected as many of these refineries are not doing anything to reduce their gasoline benzene levels today and simple, low-cost technologies can be employed to realize large reductions in their benzene levels. In PADDs 1 and 3, which have significant benzene control today to meet the RFG requirements, a more modest benzene reduction would occur. Many of the refineries producing fuel for sale in PADDs 1 and 3 cannot reduce their benzene levels further because they are already extracting all the benzene that they can. Extraction is the technology most used in PADDs 1 and 3, resulting in a much lower average cost for reducing benzene in these regions.

For comparison, we also modeled a program where the 0.62 vol% average standard was supplemented by a maximum average benzene cap standard, as described in section VII above. We did not propose such a maximum average standard because the main effect would simply be to shift emission reductions from one region of the country to another with no change in overall emission reductions. Table IX.A–2 shows that a maximum average standard would increase costs slightly nationwide, but that PADD 2 benzene levels, already above the standard, would rise while other areas improved.

TABLE IX.A–2.—CURRENT AND PROJECTED BENZENE LEVELS AND COSTS BY PADD

[$2002, 7% ROI before taxes]

	PADD					U.S.
	1	2	3	4	5 (w/o CA)	
Current Benzene Level (vol%)	0.66	1.32	0.86	1.54	1.87	0.97
Projected Benzene Level (vol%)	0.51	0.73	0.55	0.95	1.04	0.62
Cost (c/gal)	0.05	0.25	0.05	0.40	0.72	0.125
Projected Benzene Level (vol%) (With 1.3 vol% Max-Avg Std)	0.50	0.75	0.56	0.90	0.88	0.62
Cost (c/gal)	0.06	0.22	0.03	0.43	1.18	0.130

c. Cost Effects of Different Standards

We also estimated the benzene reduction costs for other benzene reduction levels, as summarized in Table IX.A–3. The cost model estimates that a 0.52 volume percent benzene

[284] The modeling does not separate out capital costs for the recovery of lost octane and supplying additional hydrogen, but rather includes these in the operating cost estimates. Therefore, actual capital costs maybe somewhat greater.

standard with an ABT program [285] is the maximum benzene reduction possible when each refinery employs the maximum appropriate reformate benzene control (that is, benzene extraction whenever possible, and benzene saturation otherwise).

TABLE IX.A–3.—COSTS OF VARIOUS POTENTIAL BENZENE CONTROL STANDARDS

[$2002, 7% ROI before taxes]

Average standard (vol%)	Cost (cents/gallon)
0.62 (Proposed Standard)	0.13
0.65	0.09
0.60	0.15
0.52	0.36

The results in Table IX.A–3 indicate that the cost for reducing benzene levels is not very sensitive to the benzene standard in the range from 0.60 to 0.65 volume percent benzene. This is because we project that standards in this range would not require many of the smaller or otherwise higher-cost refineries to employ benzene saturation, which is the highest cost technology. Also, in this range of potential standards, the ABT program would allow the refining industry to optimize the benzene control technologies they apply. The need for all refineries to use either benzene saturation or benzene extraction to comply with a 0.52 vol% standard explains the much higher cost for a program with a standard that range.

We also examined the effect of the ABT program on cost. Without ABT, we assume that the standard would be met by all refineries. To achieve a national average level of 0.62 vol% benzene without an ABT program would require an absolute standard of 0.73 vol%. We estimate that such a program would result in a nationwide average cost of 0.25 cents per gallon, about double the cost of the program with ABT.

d. Effect on Cost Estimates of Higher Benzene Prices

As described above, we also performed a sensitivity analysis to estimate the costs of the proposed program if the recent very high prices for chemical grade benzene continue into the future. We estimate that at an average benzene price of $38 dollars above that for gasoline, the program would cost 0.08 cents per gallon less on average nationwide.

3. Economic Impacts of MSAT Control Through Gasoline Sulfur and RVP Control and a Total Toxics Standard

As discussed above in section VII, we have considered two approaches to fuel-related MSAT control that would involve increasing the stringency of two existing emission control programs, the gasoline sulfur program and the gasoline volatility program. We estimated the cost of programs that would further reduce the sulfur content and Reid vapor pressure (RVP) of gasoline. For these costs estimates, the LP refinery model was used to estimate the costs for the year 2010, including the fuel economy impacts. We summarize these costs here and provide detailed analyses in Chapter 9 of the RIA.

For sulfur control, we estimated the costs of reducing U.S. gasoline sulfur levels down to 10 ppm from the 30 ppm sulfur level required for Tier 2 sulfur control. The costs are based on revamping current hydrotreaters installed to meet the 30 ppm sulfur standard. We estimate that reducing gasoline sulfur down to 10 ppm would cost 0.51 cents per gallon, taking into account the fuel economy effects. The analysis also estimates that U.S. refiners would invest $1.3 billion in new capital to achieve this sulfur reduction.

We also estimated costs for lowering summertime gasoline RVP down to a maximum of 7.8 or 7.0 RVP from the current average for non-RVP controlled gasoline of 9.0 RVP. The estimated volume of gasoline required to meet an additional low RVP requirement was assumed to be equivalent to half of the volume of the reformulated gasoline sold within the PADD, applied to the conventional gasoline sold within the PADD. This simple means of estimating the volume of gasoline affected by future additional RVP control programs was used because the analysis of possible new low RVP programs established for complying with the 8 hour ozone National Ambient Air Quality Standards (NAAQS) was not completed when the cost analysis was initiated. The per-gallon cost is not expected to vary much by the size of the program. The cost analysis estimates that reducing RVP down to 7.8 RVP would cost 0.23 cents per gallon. The analysis also estimates that U.S. refiners would invest $121 million in new capital to achieve this level of RVP control. The cost analysis estimates that reducing RVP down to 7.0 RVP would cost 0.40 cents per gallon. Meeting a 7.0 RVP standard is projected to cause U.S. refiners to invest $184 million in new capital to achieve this level of RVP control.

We have also evaluated the costs of programs that would control total air toxics. These programs, the analyses of which are also found in Chapter 9 of the RIA, would all be more costly than the proposed program.

B. What Are the Vehicle Cost Impacts?

In assessing the economic impact of setting cold temperature emission standards, we have made a best estimate of the necessary vehicle modifications and their associated costs. In making our estimates we have relied on our own technology assessment, which includes information supplied by individual manufacturers and our own in-house testing. Estimated costs typically include variable costs (for hardware and assembly time) and fixed costs (for research and development, retooling, and certification). All costs are presented in 2003 dollars. Full details of our cost analysis can be found in Chapter 8 of the draft RIA.

As described in section VI, we are not expecting hardware changes to Tier 2 vehicles in response to new cold temperature standards. Tier 2 vehicles are already being equipped with very sophisticated emissions control systems. We expect manufacturers to use these systems to minimize emissions at cold temperatures. We were able to demonstrate significant emissions reductions from a Tier 2 vehicle through recalibration alone. In addition, a standard based on averaging allows some vehicles to be above the numeric standard as long as those excess emissions are offset by vehicles below the standard. Averaging would help manufacturers in cases where they are not able to achieve the numeric standard for a particular vehicle group, thus helping manufacturers avoid costly hardware changes. The phase-in of standards and emissions credits provisions also help manufacturers avoid situations where expensive vehicle modifications would be needed to meet a new cold temperature NMHC standard. Therefore, we are not projecting hardware costs or additional assembly costs associated with meeting new cold temperature NMHC emissions standards.

Manufacturers would incur research and development (R&D) costs associated with a new cold temperature standard, and some likely would need to upgrade testing facilities to handle an increased number of cold tests during vehicle development. We have estimated the

[285] The cost model projects that this standard would require an ABT program because many of the refineries modeled would not be able to achieve this standard. These refineries would have to rely on the purchase of credits from other refineries which are already below this benzene level, or other refineries which could install benzene control technology to get their benzene levels below this standard. This scenario assumes a fully utilized credit program.

fixed costs associated with R&D and test facilities. We project that manufacturers would recover R&D costs over a five-year period and their facilities costs over a ten-year period. Long-term impacts on engine costs are expected to decrease as manufacturers fully amortize their fixed costs. Because manufacturers recoup fixed costs over a large volume of vehicles, average per vehicle costs due to the new cold temperature NMHC standards are expected to be low. We project that the average incremental costs associated with the new cold temperature standards would be less than $1 per vehicle.

We are not anticipating additional costs for the proposed new evaporative emissions standard. As discussed in section VI, we expect that manufacturers will continue to produce 50-state evaporative systems that meet LEV II standards. Therefore, harmonizing with California's LEV–II evaporative emission standards would streamline certification and be an ''anti-backsliding'' measure. It also would codify the approach manufacturers have already indicated they are taking for 50-state evaporative systems.

We also estimated annual aggregate costs associated with the new cold temperature emissions standards. These costs are projected to increase with the phase-in of standards and peak in 2014 at about $13.4 million per year, then decrease as the fixed costs are fully amortized. The projected aggregate costs are summarized below, with annual estimates provided in Chapter 8 of the RIA.

TABLE IX.B–1.—ANNUAL AGGREGATE COSTS

2010	2012	2014	2016	2018	2020
$11,119,000	$12,535,000	$13,406,000	$12,207,000	$10,682,000	$0

C. What Are the Gas Can Cost Impacts?

For gas cans, we have made a best estimate of the necessary technologies and their associated costs. Estimated costs include variable costs (for hardware and assembly time) and fixed costs (for research and development, retooling, and certification). The analysis also considers fuels savings associated with low emissions gas cans. Cost estimates based on the projected technologies represent an expected change in the cost of gas cans as they begin to comply with new emission standards. All costs are presented in 2003 dollars. Full details of our cost analysis, including fuel savings, can be found in Chapter 10 of the Draft RIA.

Table IX.C–1 summarizes the projected near-term and long-term per unit average costs to meet the new emission standards. Long-term impacts on gas cans are expected to decrease as manufacturers fully amortize their fixed costs. We project that manufacturers will generally recover their fixed costs over a five-year period, so these costs disappear from the analysis after the fifth year of production. These estimates are based on the manufacturing cost rather than predicted price increases.[286] The table also shows our projections of average fuel savings over the life of the gas can. Fuel savings can be estimated based on the VOC emissions reductions due to gas can controls.

TABLE IX.C–1.—ESTIMATED AVERAGE GAS CAN COSTS AND LIFETIME FUEL SAVINGS

	Cost
Near-Term Costs	$2.69
Long-Term Costs	1.52
Fuel Savings (NPV)	4.24

With current and projected estimates of gas can sales, we translate these costs into projected direct costs to the nation for the new emission standards in any year. A summary of the annual aggregate costs to manufacturers is presented in Table IX.C–2. The annual cost savings due to fuel savings start slowly, then increase as greater numbers of compliant gas cans enter the market. Table IX.C–2 also presents a summary of the estimated annual fuel savings. Aggregate costs are projected to peak in 2013 at about $51 million and then drop to about $29 million once fixed costs are recovered. The change in numbers beyond 2015 occurs due to projected growth in gas can sales and population.

TABLE IX.C–2.—TOTAL ANNUALIZED COSTS AND FUEL SAVINGS

	2009	2013	2015	2020
Costs	$49,112,000	$51,228,000	$28,772,000	$31,767,000
Fuel Saving	14,381,000	76,037,000	92,686,000	98,861,000

D. Cost Per Ton of Emissions Reduced

We have calculated the cost per ton of HC, benzene, total MSATs, and PM emissions reductions associated with the proposed fuel, vehicle, and gas can programs using the costs described above and the emissions reductions described in section V. More detail on the costs, emissions reductions, and cost per ton estimates can be found in the draft RIA. We have calculated the costs per ton using the net present value of the annualized costs of the program, including gas can fuel savings, from 2009 through 2030 and the net present value of the annual emission reductions through 2030. We have also calculated the cost per ton of emissions reduced in the year 2030 using the annual costs and emissions reductions in that year alone. This number represents the long-term cost per ton of emissions reduced. For fuels, the cost per ton estimates include costs and emission reductions that will occur from all motor vehicles and nonroad engines fueled with gasoline.[287]

[286] These cost numbers may not necessarily reflect actual price increases as manufacturer production costs, perceived product enhancements, and other market impacts will affect actual prices to consumers.

[287] The proposed standards do not apply to nonroad engines, since section 202 (l) authorizes controls only for ''motor vehicles,'' which does not include nonroad vehicles. CAA section 216 (2). However, we are reducing benzene in all gasoline, including that used in nonroad equipment. Therefore, we are including both the costs and the benzene emissions reductions associated with the fuel used in nonroad equipment.

For vehicles and gas cans, we are proposing to establish NMHC and HC standards, respectively, which would also reduce benzene and other VOC-based toxics. For vehicles, we are also expecting direct PM reductions due to the proposed NMHC standard.[288] Section V provides an overview of how we are estimating benzene and PM reductions resulting from the NMHC standards for vehicles and benzene reductions resulting from the HC standard for gas cans. We have not attempted to apportion costs across these various pollutants for purposes of the cost per ton calculations since there is no distinction in the technologies, or associated costs, used to control the pollutants. Instead, we have calculated costs per ton by assigning all costs to each individual pollutant. If we apportioned costs among the pollutants, the costs per ton presented here would be proportionally lowered depending on what portion of costs were assigned to the various pollutants.

The results for HC for vehicles and gas cans are provided in Table IX.D–1 using both a three percent and a seven percent social discount rate. Again, this analysis assumes that all costs are assigned to HC control. The discounted cost per ton of HC reduced for the proposal as a whole would be $0 because the fuel savings from gas cans offsets the costs of gas can and vehicle controls. The table presents these as $0 per ton, rather than calculating a negative value that has no clear meaning. For vehicles in 2030, the cost per ton is $0 because by 2030 all fixed costs have been recovered and there are no variable costs estimated for the proposed vehicle program.[289]

The cost per ton estimates for each individual program are presented separately in the tables below, and are part of the justification for each of the programs. For informational purposes, we also present the cost per ton for the three programs combined.

TABLE IX.D–1.—HC AGGREGATE COST PER TON AND LONG-TERM ANNUAL COST PER TON

[$2003]

	Discounted lifetime cost per ton at 3%	Discounted lifetime cost per ton at 7%	Long-term cost per ton in 2030
Vehicles	$14	$18	$0
Gas Cans (without fuel savings)	230	250	180
Gas Cans (with fuel savings)	0	0	0
Combined (with fuel savings)	0	0	0

The cost per ton of benzene reductions for fuels, vehicles, and gas cans are shown in Table IX.D–2 using the same methodology as noted above for HC. The results are calculated by assigning all costs to benzene control.

TABLE IX.D–2.—BENZENE AGGREGATE COST PER TON AND LONG-TERM ANNUAL COST PER TON

[$2003]

	Discounted lifetime cost per ton at 3%	Discounted lifetime cost per ton at 7%	Long-term cost per ton in 2030
Fuels	$10,900	11,100	11,400
Vehicles	260	340	0
Gas Cans (without fuels savings)	27,800	30,900	21,600
Gas Cans (with fuel savings)	0	0	0
Combined (with fuel savings)	3,400	3,600	2,400

The cost per ton of overall MSAT reductions for fuels, vehicles, and gas cans are shown in Table IX.D–3 using the same methodology as noted above for HC and benzene. The results are calculated by assigning all costs to MSAT control.

TABLE IX.D–3.—MSAT AGGREGATE COST PER TON AND LONG-TERM ANNUAL COST PER TON

[$2003]

	Discounted lifetime cost per ton at 3%	Discounted lifetime cost per ton at 7%	Long-term cost per ton in 2030
Fuels	$10,900	$11,100	$11,400
Vehicles	40	53	0
Gas Cans (without fuel savings)	1,800	2,000	1,400
Gas Cans (with fuel savings)	0	0	0
Combined (with fuel savings)	710	780	450

[288] Again, although gasoline PM is not a mobile source air toxic, the rule will result in emission reductions of gasoline PM which reductions are accounted for in our analysis.

[289] We note that in determining whether the proposed vehicle controls represent the greatest emissions reductions achievable considering costs, we have considered the proposed cold-start standards separately from any other proposed control program. Similarly, in considering whether the proposed controls for gas cans represent the best available control considering economic feasibility, we considered the proposed gas can standards separately from any other proposed control program.

We have also calculated a cost per ton for direct PM reductions for vehicles. Again, this analysis assigns all related costs to direct PM reductions.

TABLE IX.D–4.—DIRECT PM AGGREGATE COST PER TON AND LONG-TERM ANNUAL COST PER TON

($2003)

	Discounted lifetime cost per ton at 3%	Discounted lifetime cost per ton at 7%	Long-term cost per ton in 2030
Vehicles	$620	$820	$0

E. Benefits

This section presents our analysis of the health and environmental benefits that can be expected to occur as a result of the proposed standards throughout the period from initial implementation through 2030. In terms of emission benefits, we expect to see significant reductions in mobile source air toxics (MSATs) from the proposed vehicle, fuel and gas can standards, reductions in VOCs (an ozone precursor) from the proposed cold temperature vehicle and gas can standards, and reductions in direct $PM_{2.5}$ from the proposed cold temperature vehicle standards. When translating emission benefits to health effects and monetized values, however, we only quantify the PM-related benefits associated with the proposed cold temperature vehicle standards.

The reductions in PM from the proposed cold temperature vehicle standards would result in significant reductions in premature deaths and other serious human health effects, as well as other important public health and welfare effects. We estimate that in 2030, the benefits we are able to monetize are expected to be approximately $6.5 billion using a 3 percent discount rate and $5.9 billion using a 7 percent discount rate. Total social costs of the entire proposal for the same year (2030) are $205 million. Details on the costs of each of the proposed controls are in section IX.F. These estimates, and all monetized benefits presented in this section, are in year 2003 dollars.

We demonstrate that the proposed standards would reduce cancer and noncancer risk from reduced exposure to MSATs (as described in Section IV of this preamble). However, we do not translate this risk reduction into benefits. We also do not quantify the benefits related to ambient reductions in ozone due to the VOC emission reductions expected to occur as a result of the proposed standards. The following section describes in more detail why these benefits are not quantified.

1. Unquantified Health and Environmental Benefits

This benefit analysis estimates improvements in health and human welfare that can be expected as a result of the proposed standards, and monetizes those benefits. The benefits would come from reductions in emissions of air toxics (including benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, naphthalene, and other air toxic pollutants discussed in Section III), ambient ozone (as a result of VOC controls), and direct $PM_{2.5}$ emissions.

While there will be benefits associated with air toxic pollutant reductions, notably with regard to reductions in exposure and risk (see Section IV, above), we do not attempt to monetize those benefits. This is primarily because available tools and methods to assess air toxics risk from mobile sources at the national scale are not adequate for extrapolation to incidence estimations or benefits assessment. The best suite of tools and methods currently available for assessment at the national scale are those used in the National Scale Air Toxics Assessment (NATA; these tools are discussed in Section IV.A). The EPA Science Advisory Board specifically commented in their review of the 1996 National Air Toxics Assessment (NATA) that these tools were not yet ready for use in a national-scale benefits analysis, because they did not consider the full distribution of exposure and risk, or address sub-chronic health effects.[290] While EPA has since improved the tools, there remain critical limitations for estimating incidence and assessing benefits of reducing mobile source air toxics. We continue to work to address these limitations, and we are exploring the feasibility of a quantitative benefits assessment for air toxics as part of a case study being done for benzene as part of the ongoing update to the Section 812 retrospective and prospective studies.[291]

We also do not estimate the monetized benefits of VOC controls in this benefits analysis. Though VOCs would be demonstrably reduced as a result of the cold temperature vehicle standards, we assume that these emissions would not have a measurable impact on ozone formation since the standards seek to reduce VOC emissions at cold ambient temperatures and ozone formation is primarily a warm ambient temperature issue. The gas can controls would likely result in ozone benefits, though we do not attempt to monetize those benefits. This is primarily due to the magnitude of, and uncertainty associated with, the estimated changes in ambient ozone associated with the proposed standards. In Section IV.C., we discuss that the ozone modeling conducted for the proposed gas can standards results in a net reduction in the population weighted ozone design value metric measured within the modeled domain (37 Eastern states and the District of Columbia). The net improvement is very small, however, and would likely lead to negligible monetized benefits. Instead, we acknowledge that this analysis may underestimate the benefits associated with reductions in ozone precursor emissions achieved by the various proposed standards. We discuss these benefits qualitatively within the Regulatory Impact Analysis.

Table IX.E–1 lists each of the MSAT and ozone health and welfare effects that remain unquantified because of current limitations in the methods or available data. This table also includes the PM-related health and welfare effects that also remain unquantified due to current method and data limitations. Chapter 12 of the Regulatory Impact Analysis for the proposed standards provides a qualitative description of the health and welfare effects not quantified in this analysis.

[290] Science Advisory Board. 2001. NATA–Evaluating the National-Scale Air Toxics Assessment for 1996—an SAB Advisory. *http://www.epa.gov/ttn/atw/sab/sabrev.html.*

[291] The analytic blueprint for the Section 812 benzene case study can be found at *http://www.epa.gov/air/sect812/appendixi51203.pdf.*

TABLE IX.E–1.—UNQUANTIFIED AND NON-MONETIZED EFFECTS

Pollutant/effects	Effects not included in primary estimates—changes in:
Ozone Health [a]	Premature mortality: short term exposures [b].
	Hospital admissions: respiratory.
	Emergency room visits for asthma.
	Minor restricted-activity days.
	School loss days.
	Asthma attacks.
	Cardiovascular emergency room visits.
	Acute respiratory symptoms.
	Chronic respiratory damage.
	Premature aging of the lungs.
	Non-asthma respiratory emergency room visits.
	Exposure to UVb (+/−) [e].
Ozone Welfare	Decreased outdoor worker productivity.
	Agricultural yields for
	—commercial forests.
	—some fruits and vegetables.
	—non-commercial crops.
	Damage to urban ornamental plants.
	Impacts on recreational demand from damaged forest aesthetics.
	Ecosystem functions.
	Exposure to UVb (+/−) [e].
PM Health [c]	Premature mortality—short term exposures [d].
	Low birth weight.
	Pulmonary function.
	Chronic respiratory diseases other than chronic bronchitis.
	Non-asthma respiratory emergency room visits.
	Exposure to UVb (+/−) [e].
PM Welfare	Visibility in many Class I areas.
	Residential and recreational visibility in non-Class I areas.
	Soiling and materials damage.
	Damage to ecosystem functions.
	Exposure to UVb (+/−) [e].
MSAT Health	Cancer (benzene, 1,3-butadiene, formaldehyde, acetaldehyde, naphthalene).
	Anemia (benzene).
	Disruption of production of blood components (benzene).
	Reduction in the number of blood platelets (benzene).
	Excessive bone marrow formation (benzene).
	Depression of lymphocyte counts (benzene).
	Reproductive and developmental effects (1,3-butadiene).
	Irritation of eyes and mucus membranes (formaldehyde).
	Respiratory irritation (formaldehyde).
	Asthma attacks in asthmatics (formaldehyde).
	Asthma-like symptoms in non-asthmatics (formaldehyde).
	Irritation of the eyes, skin, and respiratory tract (acetaldehyde).
	Upper respiratory tract irritation and congestion (acrolein).
MSAT Welfare	Direct toxic effects to animals.
	Bioaccumulation in the food chain.
	Damage to ecosystem function.
	Odor.

[a] In addition to primary economic endpoints, there are a number of biological responses that have been associated with ozone health effects including increased airway responsiveness to stimuli, inflammation in the lung, acute inflammation and respiratory cell damage, and increased susceptibility to respiratory infection.

[b] EPA sponsored a series of meta-analyses of the ozone mortality epidemiology literature, published in the July 2005 volume of the journal Epidemiology, which found that short-term exposures to ozone may have a significant effect on daily mortality rates, independent of exposure to PM. EPA is currently considering how to include an estimate of ozone mortality in its primary benefits analyses.

[c] In addition to primary economic endpoints, there are a number of biological responses that have been associated with PM health effects including morphological changes and altered host defense mechanisms. The public health impact of these biological responses may be partly represented by our quantified endpoints.

[d] While some of the effects of short term exposures are likely to be captured in the estimates, there may be premature mortality due to short term exposure to PM not captured in the cohort study upon which the primary analysis is based.

[e] May result in benefits or disbenefits.

2. Quantified Human Health and Environmental Effects of the Proposed Cold Temperature Vehicle Standard

In this section we discuss the $PM_{2.5}$ benefits of the proposed cold temperature vehicle standard. To estimate $PM_{2.5}$ benefits, we rely on a benefits transfer technique. The benefits transfer approach uses as its foundation the relationship between emission reductions and ambient $PM_{2.5}$ concentrations modeled across the contiguous 48 states (and DC) for the Clean Air Nonroad Diesel (CAND) proposal.[292] For a given future year, we first calculate the ratio between CAND direct $PM_{2.5}$ emission reductions and direct $PM_{2.5}$ emission reductions associated with the proposed cold temperature vehicle control standard

[292] See 68 FR 28327, May 23, 2003.

(proposed emission reductions/CAND emission reductions). We multiply this ratio by the percent that direct $PM_{2.5}$ contributes towards population-weighted reductions in total $PM_{2.5}$ due to the CAND standards. This calculation results in a ''benefits apportionment factor'' for the relationship between direct PM emissions and primary $PM_{2.5}$, which is then applied to the BenMAP-based incidence and monetized benefits from the CAND proposal. In this way, we apportion the results of the proposed CAND analysis to its underlying direct PM emission reductions and scale the apportioned benefits to reflect differences in emission reductions between the modeled CAND control option and the proposed standards.[293] This benefits transfer method is consistent with the approach used in other recent mobile and stationary source rules.[294]

Table IX.E–2 presents the primary estimates of reduced incidence of PM-related health effects for the years 2020 and 2030 for the proposed cold temperature vehicle control strategies.[295] In 2030, we estimate that PM-related annual benefits would result in approximately 910 fewer premature fatalities, 590 fewer cases of chronic bronchitis, 1,600 fewer non-fatal heart attacks, and 940 fewer hospitalizations (for respiratory and cardiovascular disease combined). In addition, we estimate that the emission controls would reduce days of restricted activity due to respiratory illness by about 620,000 days and reduce work-loss days by about 110,000 days. We also estimate substantial health improvements for children from reduced upper and lower respiratory illness, acute bronchitis, and asthma attacks.

TABLE IX.E–2.—ESTIMATED ANNUAL REDUCTIONS IN INCIDENCE OF HEALTH EFFECTS RELATED TO THE PROPOSED COLD TEMPERATURE VEHICLE STANDARD [a]

Health effect	2020 Annual incidence reduction	2030 Annual incidence reduction
PM-Related Endpoints:		
Premature Mortality [b]		
Adult, age 30+ and Infant, age <1 year	480	910
Chronic bronchitis (adult, age 26 and over)	330	590
Non-fatal myocardial infarction (adult, age 18 and over)	820	1,600
Hospital admissions—respiratory (all ages) [c]	260	540
Hospital admissions—cardiovascular (adults, age >18) [d]	220	400
Emergency room visits for asthma (age 18 years and younger)	360	630
Acute bronchitis, (children, age 8–12)	790	1,400
Lower respiratory symptoms (children, age 7–14)	9,400	17,000
Upper respiratory symptoms (asthmatic children, age 9–18)	7,100	13,000
Asthma exacerbation (asthmatic children, age 6–18)	12,000	21,000
Work Loss Days	63,000	110,000
Minor restricted activity days (adults age 18–65)	370,000	620,000

[a] Incidence is rounded to two significant digits. Estimates represent benefits from the proposed rule nationwide, excluding Alaska and Hawaii.
[b] PM-related adult mortality based upon studies by Pope, et al 2002.[296] PM-related infant mortality based upon studies by Woodruff, Grillo, and Schoendorf,1997.[297]
[c] Respiratory hospital admissions for PM include admissions for chronic obstructive pulmonary disease (COPD), pneumonia and asthma.
[d] Cardiovascular hospital admissions for PM include total cardiovascular and subcategories for ischemic heart disease, dysrhythmias, and heart failure.

PM also has numerous documented effects on environmental quality that affect human welfare. These welfare effects include direct damages to property, either through impacts on material structures or by soiling of surfaces, and indirect economic damages through the loss in value of recreational visibility or the existence value of important resources. Additional information about these welfare effects can be found in Chapter 12 of the Regulatory Impact Analysis prepared for this proposal.

3. Monetized Benefits

Table IX.E–3 presents the estimated monetary value of reductions in the incidence of those health effects we are able to monetize for the proposed cold temperature vehicle standard. Total annual PM-related health benefits are estimated to be approximately $6.5 or $5.9 billion in 2030 (3 percent and 7 percent discount rate, respectively). These estimates account for growth in real gross domestic product (GDP) per capita between the present and 2030.

Table IX.E–3 indicates with a ''B'' those additional health and environmental benefits of the rule that we are unable to quantify or monetize. These effects are additive to the estimate of total benefits, and are related to the following sources:

- There are many human health and welfare effects associated with PM, ozone, and toxic air pollutant reductions that remain unquantified because of current limitations in the methods or available data. A listing of the benefit categories that could not be quantified or monetized in our benefit estimates are provided in Table IX.E–1.

[293] Note that while the proposed regulations also control VOCs, which contribute to PM formation, the benefits transfer scaling approach only scales benefits based on NO_X, SO_2, and direct PM emission reductions. PM benefits will likely be underestimated as a result, though we are unable to estimate the magnitude of the underestimation.

[294] See: Clean Air Nonroad Diesel final rule (69 FR 38958, June 29, 2004); Nonroad Large Spark-Ignition Engines and Recreational Engines standards (67 FR 68241, November 8, 2002); Final Industrial Boilers and Process Heaters NESHAP (69 FR 55217, September 13, 2004); Final Reciprocating Internal Combustion Engines NESHAP (69 FR 33473, June 15, 2004); Final Clean Air Visibility Rule (EPA–452/R–05–004, June 15, 2005); Ozone Implementation Rule (documentation forthcoming).

[295] The ''primary estimate'' refers to the estimate of benefits that reflects the suite of endpoints and assumptions that EPA believes yields the expected value of air quality improvements related to the proposed standards. The impact that alternative endpoints and assumptions have on the benefit estimates are explored in appendixes to the RIA.

[296] Pope, C.A., III, R.T. Burnett, M.J. Thun, E.E. Calle, D. Krewski, K. Ito, and G.D. Thurston. 2002. ''Lung Cancer, Cardiopulmonary Mortality, and Long-term Exposure to Fine Particulate Air Pollution.'' Journal of American Medical Association 287:1132–1141.

[297] Woodruff, T.J., J. Grillo, and K.C. Schoendorf. 1997. ''The Relationship Between Selected Causes of Postneonatal Infant Mortality and Particulate Infant Mortality and Particulate Air Pollution in the United States.'' Environmental Health Perspectives 105(6):608–612.

• The PM benefits scaled transfer approach, derived from the Clean Air Nonroad Diesel rule, does not account for VOCs as precursors to ambient $PM_{2.5}$ formation. To the extent that VOC emission reductions associated with the proposed regulations contribute to reductions in ambient $PM_{2.5}$, this analysis does not capture the related health and environmental benefits of those changes.

• The PM air quality model only captures the benefits of air quality improvements in the 48 states and DC; PM benefits for Alaska and Hawaii are not reflected in the estimate of benefits.

TABLE IX.E–3.—ESTIMATED ANNUAL MONETARY VALUE OF REDUCTIONS IN INCIDENCE OF HEALTH AND WELFARE EFFECTS RELATED TO THE PROPOSED COLD TEMPERATURE VEHICLE STANDARD

[Millions of 2003$] [a] [b]

Health effect	Pollutant	2020 Estimated value of reductions	2030 Estimated value of reductions
PM-Related Premature mortality [c, d]:			
Adult, 30+ years and Infant, <1 year.			
3 percent discount rate	$PM_{2.5}$	$3,100	$6,000
7 percent discount rate		2,800	5,400
Chronic bronchitis (adults, 26 and over)	$PM_{2.5}$	150	270
Non-fatal acute myocardial infarctions:			
3 percent discount rate		80	150
7 percent discount rate	$PM_{2.5}$	77	150
Hospital admissions for respiratory causes	$PM_{2.5}$	4.8	10
Hospital admissions for cardiovascular causes	$PM_{2.5}$	5.1	9.4
Emergency room visits for asthma	$PM_{2.5}$	0.12	0.21
Acute bronchitis (children, age 8–12)	$PM_{2.5}$	0.32	0.58
Lower respiratory symptoms (children, age 7–14)	$PM_{2.5}$	0.17	0.30
Upper respiratory symptoms (asthma, age 9–11)	$PM_{2.5}$	0.20	0.37
Asthma exacerbations	$PM_{2.5}$	0.57	1.0
Work loss days	$PM_{2.5}$	9.2	14
Minor restricted activity days (MRADs)	$PM_{2.5}$	21	36
Monetized Total [e]:			
Base estimate.			
3 percent discount rate	$PM_{2.5}$	3,400+ B	6,500+ B
7 percent discount rate		3,100+ B	5,900+ B

[a] Dollars are rounded to two significant digits. The PM estimates represent benefits from the proposed rule across the contiguous United States.

[b] Monetary benefits adjusted to account for growth in real GDP per capita between 1990 and the analysis year (2020 or 2030).

[c] Valuation of premature mortality based on long-term PM exposure assumes discounting over the SAB recommended 20 year segmented lag structure described in the Regulatory Impact Analysis for the Final Clean Air Interstate Rule (March 2005). Results show 3 percent and 7 percent discount rates consistent with EPA and OMB guidelines for preparing economic analyses (US EPA, 2000 and OMB, 2003).[298]

[d] Adult mortality based upon studies by Pope et al. 2002. Infant mortality based upon studies by Woodruff, Grillo, and Schoendorf, 1997.

[e] B represents the monetary value of health and welfare benefits not monetized. A detailed listing is provided in Table IX.E–1.

4. What Are the Significant Limitations of the Benefit Analysis?

Perhaps the most significant limitation of this analysis is our inability to quantify a number of potentially significant benefit categories associated with improvements in air quality that would result from the proposed standards. Most notably, we are unable to estimate the benefits from reduced air toxics exposures because the available tools and methods to assess mobile source air toxics risk at the national scale are not adequate for extrapolation to incidence estimations or benefits assessment. We also do not quantify ozone benefits due to the magnitude of, and uncertainty associated with, the modeled changes in ambient ozone associated with the proposed gas can standards, despite net benefits, when population weighted, in the ozone design value metric observed across the modeled domain (see Section IV.C).

More generally, every benefit-cost analysis examining the potential effects of a change in environmental protection requirements is limited to some extent by data gaps, limitations in model capabilities (such as geographic coverage), and uncertainties in the underlying scientific and economic studies used to configure the benefit and cost models. Deficiencies in the scientific literature often result in the inability to estimate quantitative changes in health and environmental effects, such as potential increases in premature mortality associated with increased exposure to carbon monoxide. Deficiencies in the economics literature often result in the inability to assign economic values even to those health and environmental outcomes which can be quantified. These general uncertainties in the underlying scientific and economics literature, which can cause the valuations to be higher or lower, are discussed in detail in the RIA and its supporting references. Key uncertainties that have a bearing on the results of the benefit-cost analysis of the proposed standards include the following:

• The exclusion of potentially significant and unquantified benefit categories (such as health, odor, and ecological benefits of reduction in air toxics, ozone, and PM);

• Errors in measurement and projection for variables such as population growth;

• Uncertainties in the estimation of future year emissions inventories and air quality;

• Uncertainties associated with the scaling of the PM results of the modeled

[298] U.S. Environmental Protection Agency, 2000. Guidelines for Preparing Economic Analyses. *www.yosemite1.epa.gov/ee/epa/eed/hsf/pages/Guideline.html.*

Office of Management and Budget, The Executive Office of the President, 2003. Circular A–4. *http://www.whitehouse.gov/omb/circulars.*

benefits analysis to the proposed standards, especially regarding the assumption of similarity in geographic distribution between emissions and human populations and years of analysis;

• Uncertainty in the estimated relationships of health and welfare effects to changes in pollutant concentrations including the shape of the C–R function, the size of the effect estimates, and the relative toxicity of the many components of the PM mixture;

• Uncertainties in exposure estimation; and

• Uncertainties associated with the effect of potential future actions to limit emissions.

Despite these uncertainties, we believe this benefit-cost analysis provides a conservative estimate of the expected economic benefits of the proposed standards for cold temperature vehicle control in future years because of the exclusion of potentially significant benefit categories. Acknowledging benefits omissions and uncertainties, we present a best estimate of the total benefits based on our interpretation of the best available scientific literature and methods supported by EPA's technical peer review panel, the Science Advisory Board's Health Effects Subcommittee (SAB–HES). EPA has also worked to address many of the comments made by the National Academy of Sciences (NAS) in a September 26, 2002 report on its review of the Agency's methodology for analyzing the health benefits of measures taken to reduce air pollution. EPA addressed many of these comments in the analysis of the final CAIR rule.[299] The analysis of the proposed rule incorporates this most recent work.

There is one category where new studies suggest the possibility of significant additional economic benefits. Over the past several years, EPA's SAB has expressed the view that there were not sufficient data to show a separate ozone mortality effect, in essence saying that any ozone benefits are captured in the PM-related mortality benefit estimates. However, in their most recent advice, the SAB recommended that EPA reconsider the evidence on ozone-related mortality based on the publication of several recent analyses that found statistically significant associations between ozone and mortality. Based on these studies and the recommendations from the SAB, EPA sponsored three independent meta-analyses of the ozone-mortality epidemiology literature to inform a determination on including this important health endpoint. The studies were peer-reviewed and printed in the journal Epidemiology in July 2005.[300] [301] [302]

EPA is reviewing the body of literature available on the association of ozone exposure and premature mortality. EPA's second external review draft of the Criteria Document for ozone has concluded that there is strong evidence that exposure to ozone has been associated with premature mortality.[303] We are exploring ways of appropriately characterizing the premature mortality benefits of reducing ozone and included an estimate in recent analyses of the Clear Skies legislation.[304] We plan to include a quantification of ozone mortality benefits in future air pollution rulemakings.

In contrast to the additional benefits of the proposed standards discussed above, it is also possible that this rule will result in disbenefits in some areas of the United States. The effects of ozone and PM on radiative transfer in the atmosphere can lead to effects of uncertain magnitude and direction on the penetration of ultraviolet light and climate. Ground level ozone makes up a small percentage of total atmospheric ozone (including the stratospheric layer) that attenuates penetration of ultraviolet–b (UVb) radiation to the ground. EPA's past evaluation of the information indicates that potential disbenefits would be small, variable, and with too many uncertainties to attempt quantification of relatively small changes in average ozone levels over the course of a year.[305] EPA's most recent provisional assessment of the currently available information indicates that potential but unquantifiable benefits may also arise from ozone-related attenuation of UVb radiation.[306] EPA believes that we are unable to quantify any net climate-related disbenefit or benefit associated with the combined ozone and PM reductions in this rule.

5. How Do the Benefits Compare to the Costs of the Proposed Standards?

This proposed rule provides three separate provisions that reduce air toxics emissions from mobile sources: cold temperature vehicle controls, an emissions control program for gas cans, and a control program limiting benzene in gasoline. A full appreciation of the overall economic consequences of these provisions requires consideration of the benefits and costs expected to result from each standard, not just those that could be expressed here in dollar terms. As noted above, due to limitations in data availability and analytical methods, our benefits analysis only monetizes the $PM_{2.5}$-related benefits from direct PM emission reductions associated with the cold temperature standards. There are a number of health and environmental effects associated with the proposed standards that we were unable to quantify or monetize (see Table IX.E–1).

Table IX.E–4 contains the estimates of monetized benefits of the proposed cold temperature vehicle standards and estimated social welfare costs for each of the proposed control programs.[307] The annual social welfare costs of all provisions of this proposed rule are described more fully in Section IX.F. It should be noted that the estimated social welfare costs for the vehicle program contained in this table are for 2019. The 2019 vehicle program costs are included for comparison purposes only and are therefore not included in the total 2020 social costs. There are no compliance costs associated with the vehicle program after 2019; as explained elsewhere in this preamble, the vehicle compliance costs are primarily R&D and facilities costs that are expected to be recovered by manufacturers over the first ten years of the program.

The results in Table IX.E–4 suggest that the 2020 monetized benefits of the cold temperature vehicle standards are greater than the expected social welfare costs of that program in 2019. Specifically, the annual benefits of the

[299] See Chapter 4 of the Final Clean Air Interstate Rule RIA (*www.epa.gov/cair*) for a discussion of EPA's ongoing efforts to address the NAS recommendations in its regulatory analyses.

[300] Levy, J.I, Chemerynski, S.M., Sarnat, J.A. 2005. Ozone Exposure and Mortality: An Empirical Bayes Meta-Regression Analysis. Epidemiology. 16:458–468.

[301] Bell, M.L., Dominici, F., Samet, J.M. 2005. A Meta-Analysis of Time-Series Studies of Ozone and Mortality with Comparison to the National Morbidity, Mortality, and Air Pollution Study. Epidemiology. 16:436–445.

[302] Ito, K., DeLeon, S.F., Lippmann, M. 2005. Associations Between Ozone and Daily Mortality: Analysis and Meta-Analysis. Epidemiology. 16:446–457.

[303] EPA, 2005. Air Quality Criteria for Ozone and Related Photochemical Oxidants (Second External Review Draft). August. *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=137307*

[304] For technical details about Clear Skies multi-pollutant analysis, see *http://www.epa.gov/airmarkets/mp/bmresults/health_benefits_method.pdf*

[305] EPA, 2005. Air Quality Criteria for Ozone and Related Photochemical Oxidants (First External Review Draft). January. *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=114523*

[306] EPA, 2005. Air Quality Criteria for Ozone and Related Photochemical Oxidants (Second External Review Draft). August. *http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=137307*

[307] Social costs represent the welfare costs of the rule to society. These social costs do not consider transfer payments (such as taxes) that are simply redistributions of wealth.

program would be approximately $3,400 + B million or $3,100 + B million annually in 2020 (using a 3 percent and 7 percent discount rate in the benefits analysis, respectively), compared to estimated social welfare costs of approximately $11 million in the last year of the program (2019). These benefits are expected to increase to $6,500 + B million or $5,900 + B million annually in 2030 (using a 3 percent and 7 percent discount rate in the benefits analysis, respectively), even as the social welfare costs of that program fall to zero. Table IX.E–4 also presents the costs of the other proposed rule provisions: an emissions control program for gas cans and a control program limiting benzene in gasoline. Though we are unable to present the benefits associated with these two programs, we note for informational purposes that the benefits associated with the proposed cold temperature vehicle standards alone exceed the costs of all three proposed rule provisions combined.

TABLE IX.E–4.—SUMMARY OF ANNUAL BENEFITS OF THE PROPOSED COLD TEMPERATURE VEHICLE STANDARDS AND COSTS OF ALL PROVISIONS OF THE PROPOSED STANDARDS [a]

[Millions of 2003 dollars]

Description	2020	2030
Estimated Social Welfare Costs [b]:		
Proposed Cold Temperature Vehicle Standards	$11 [c]	$0
Proposed Gasoline Container Standards	32	39
Proposed Fuel Standards [d]	210	250
Total	240	290
Fuel Savings	−73	−82
Total Social Welfare Costs	170	205
Total $PM_{2.5}$-Related Health Benefits of the Proposed Cold Temperature Vehicle Standards [e]:		
3 percent discount rate	3,400 + B [f]	6,500 + B [f]
7 percent discount rate	3,100 + B [f]	5,900 + B [f]

[a] All estimates are rounded to two significant digits and represent annualized benefits and costs anticipated for the years 2020 and 2030, except where noted. Totals may not sum due to rounding.

[b] Note that costs are the annual total costs of reducing all pollutants associated with each provision of the proposed MSAT control package. Also note that while the cost analysis only utilizes a 7 percent discount rate to calculate annual costs, the benefits analysis uses both a 3 percent and 7 percent discount rate to calculate annual benefits. Benefits reflect only direct PM reductions associated with the cold temperature vehicle standards.

[c] These costs are for 2019; the vehicle program compliance costs terminate after 2019 and are included for illustrative purposes. They are not included in the total social welfare cost sum for 2020.

[d] Our modeling for the total costs of the proposed gasoline benzene program included California gasoline, since it was completed before we decided to propose that California gasoline not be covered by the program. California refineries comprise approximately 1 percent of these 2projected costs. For the final rule, we expect to exclude California refineries from the analysis.

[e] Valuation of premature mortality based on long-term PM exposure assumes discounting over the SAB recommended 20 year segmented lag structure described in the Regulatory Impact Analysis for the Final Clean Air Interstate Rule (March 2005). Annual benefits analysis results reflect the use of a 3 percent and 7 percent discount rate in the valuation of premature mortality and nonfatal myocardial infarctions, consistent with EPA and OMB guidelines for preparing economic analyses (US EPA, 2000 and OMB, 2003).[308]

[f] Not all possible benefits or disbenefits are quantified and monetized in this analysis. B is the sum of all unquantified benefits and disbenefits. Potential benefit categories that have not been quantified and monetized are listed in Table IX.E–1.

F. Economic Impact Analysis

We prepared a draft Economic Impact Analysis (EIA) to estimate the economic impacts of the proposed emission control program on the gas can, gasoline fuel, and light-duty vehicle markets. In this section we briefly describe the Economic Impact Model (EIM) we developed to estimate both the market-level changes in price and outputs for affected markets and the social costs of the program and their distribution across affected economic sectors. We also present the results of our analysis.

We estimate the net social costs of the proposed program to be about $171.5 million in 2020. This estimate reflects the estimated costs associated with the gasoline, gas can, and vehicle controls and the expected fuel savings from better evaporative controls on gas cans. The results of the economic impact modeling performed for the gasoline fuel and gas can control programs suggest that the social costs of those two programs are expected to be about $244.3 million in 2020 with consumers of these products expected to bear about 60 percent of these costs. We estimate fuel savings of about $72.8 million in 2020 that will accrue to consumers. There are no social costs associated with the vehicle program in 2020. These estimates, and all costs presented in this section, are in year 2003 dollars.

With regard to market level impacts in 2020, the maximum price increase for gasoline fuel is expected to be about 0.1 percent (0.2 cents per gallon) for PADD 5. The price of gas cans is expected to increase by about 1.8 percent ($0.20 per can) in areas that already have gas can requirements and about 32.5 percent ($1.52 per can) in areas that do not.

Detailed descriptions of the EIM, the model inputs, modeling results, and several sensitivity analyses can be found in Chapter 13 of the Regulatory Impact Analysis prepared for this proposal.

1. What Is an Economic Impact Analysis?

An Economic Impact Analysis (EIA) is prepared to inform decision makers about the potential economic consequences of a regulatory action. The analysis consists of estimating the social costs of a regulatory program and the distribution of these costs across stakeholders. These estimated social costs can then be compared with estimated social benefits (as presented in Section IX.E). As defined in EPA's Guidelines for Preparing Economic Analyses, social costs are the value of the goods and services lost by society resulting from (a) the use of resources to comply with and implement a regulation and (b) reductions in

[308] U.S. Environmental Protection Agency, 2000. Guidelines for Preparing Economic Analyses. *www.yosemite1.epa.gov/ee/epa/eed/hsf/pages/Guideline.html.*

Office of Management and Budget, The Executive Office of the President, 2003. Circular A–4. *http://www.whitehouse.gov/omb/circulars.*

output.[309] In this analysis, social costs are explored in two steps. In the market analysis, we estimate how prices and quantities of goods affected by the proposed emission control program can be expected to change once the program goes into effect. In the economic welfare analysis, we look at the total social costs associated with the program and their distribution across stakeholders.

2. What Is the Economic Impact Model?

The Economic Impact Model (EIM) is a behavioral model developed for this proposal to estimate price and quantity changes and total social costs associated with the emission controls under consideration. The EIM simulates how producers and consumers of affected products can be expected to respond to an increase in production costs as a result of the proposed emission control program. In this EIM, compliance costs are directly borne by producers of affected goods. Depending on the producers' and consumers' sensitivity to price changes, producers may be able to pass some or all of these compliance costs on to the consumers of these goods in the form of higher prices. Consumers adjust their consumption of affected goods in response to these price changes. This information is passed back to the producers in the form of purchasing decisions. The EIM takes these behavioral responses into account to estimate new market equilibrium quantities and prices for all modeled sectors and the resulting distribution of social costs across these stakeholders (producers and consumers).

3. What Economic Sectors Are Included in This Economic Impact Analysis?

There are three economic sectors affected by the control programs described in this proposal: gas cans, gasoline fuel, and light-duty vehicles. In this Economic Impact Analysis we model only the impacts on the gas can and gasoline fuel markets. We did not model the impacts on the light-duty vehicle market. This is because the compliance costs for the proposed vehicle program are expected to be very small, less than $1 per vehicle and, even if passed on entirely, are unlikely to affect producer or consumer behavior. Therefore, we do not expect these proposed controls to affect the quantity of vehicles produced or their prices. At the same time, however, the light-duty vehicle compliance costs are a cost to society and should be included in the economic welfare analysis. We do this by adding the vehicle program engineering compliance cost estimates to the estimated social costs of the gasoline and gas can programs.

With regard to the gasoline fuel and gas can markets, we consider only the impacts on residential users of these products. This means that we focus the analysis on the use of these products for personal transportation (gasoline fuel) or residential lawns and garden care or recreational uses (gas cans) and do not consider how the costs of complying with the proposed programs may affect the production of goods and services that use gasoline fuel or gas cans as production inputs. We believe this approach is reasonable because the commercial share of the end-user markets for both gasoline fuel and gas cans is relatively small.[310] [311] In addition, for most commercial users the share of the cost of these products to total production costs is also small (*e.g.*, the cost of a gas can is only a very small part of the total production costs for an agricultural or construction firm). Therefore, a price increase of the magnitude anticipated for this control program is not expected to have a noticeable impact on prices or quantities of goods produced using these inputs (*e.g.*, agricultural product or buildings).

With regard to the gasoline fuel analysis, it should be noted that this Economic Impact Analysis does not include California fuels in the market analysis. California fuels are only included, as a separate line item, in the economic welfare analysis. California currently has state-level controls that address air toxics from gasoline. Any actions that refiners may take to comply with the federal program are expected to be small and not affect market prices or quantities in that state. However, because the estimated fuel program compliance costs include a small compliance cost for California, and this cost would be a cost to society, it is necessary to include those costs in the total economic welfare costs of the proposal. This is done by including the estimated engineering compliance costs as a separate line item. Also, consistent with the cost analysis, the economic impact analysis does not distinguish between reformulated and conventional gasoline fuels.

The EIM models the economic impacts on two gas can markets (states that currently have requirements for gas cans and those that do not), and four gasoline fuel markets (PADDs 1+3, PADD 2, PADD 4, PADD 5). The markets included in this EIA are described in more detail in Chapter 13 of the RIA for this proposal.

In the EIM, the gasoline fuel and gas can markets are not linked (there is no feedback mechanism between the gas can and gasoline fuel model segments). This is because these two sectors represent different aspects of fuel consumption (fuel storage and fuel production) and production and consumption of one product is not affected by the other. In other words, an increase in the price of gas cans is not expected to have an impact on the production and supply of gasoline, and vice versa. Production and consumption of each of these products are the result of other factors that have little cross-over impacts (the need for fuel storage; the need for personal transportation).

4. What Are the Key Features of the Economic Impact Model?

A detailed description of the features of the EIM and the data used in the analysis is provided in Chapter 13 of the RIA prepared for this rule. The model methodology is firmly rooted in applied microeconomic theory and was developed following the methodology set out in the OAQPS's Economic Analysis Resource Document.[312]

The EIM is a computer model comprised of a series of spreadsheet modules that simulate the supply and demand characteristics of the markets under consideration. The initial market equilibrium conditions are shocked by applying the compliance costs for the control program to the supply side of the markets (this is done by shifting the relevant supply curves by the amount of the compliance costs). The model equations can be analytically solved for

[309] EPA Guidelines for Preparing Economic Analyses, EPA 240–R–00–003, September 2000, p 113. A copy of this document can be found at *http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html#download*

[310] The U.S Department of Energy estimates that about 92 percent of gasoline used in the United States for transportation is used in light-duty vehicles. About 6 percent is used for commercial or industrial transportation, and the remaining 2 percent is used in recreational marine vessels. See U.S Department of Energy, Energy Information Administration, 2004. ''Annual Energy Outlook 2004 with projections to 2025.'' Last updated June 2, 2004. Table A–2 and Supplemental Table 34. *http://www.eia.doe.gov/oiaf/aeoref_tab.html.*

[311] A recent study by CARB (1999) found that 94 percent of portable fuel containers in California were used by residential households California Environmental Protection Agency, Air Resources Board (CARB) 1999. See ''Hearing Notice and Staff Report, Initial Statement of Reasons for Proposed Rule Making Public Hearing to Consider the Adoption of Portable Fuel Container Spillage Control Regulation.'' Sacrament, CA: California Environmental Protection Agency, Air Resources Board (CARB). A copy of this document is available at *http://www.arb.ca.gov/regact/spillcon/isor.pdf*

[312] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Innovative Strategies and Economics Group, OAQPS Economic Analysis Resource Document, April 1999. A copy of this document can be found at *http://www.epa.gov/ttn/ecas/econdata/Rmanual2/*

equilibrium prices and quantities for the markets with the regulatory program and these new prices and quantities are used to estimate the social costs of the model and how those costs are shared among affected markets.

The EIM is a partial equilibrium, intermediate-run model that assumes perfect competition in the relevant markets. As explained in EPA's Guidelines for Preparing Economic Analyses, ''partial equilibrium'' means that the model considers markets in isolation and that conditions in other markets are assumed either to be unaffected by a policy or unimportant for social cost estimation.[313] The use of the intermediate run means that some factors of production are fixed and some are variable. In very short analyses, all factors of production would be assumed to be fixed, leaving the producers with no means to respond to the increased production costs associated with the regulation (e.g., they cannot adjust labor or capital inputs). Under this time horizon, the costs of the regulation fall entirely on the producer. In the long run, all factors of production are variable and producers can adjust production in response to cost changes imposed by the regulation (e.g., using a different labor/capital mix). In the intermediate run there is some resource immobility which may cause producers to suffer producer surplus losses, but they can also pass some of the compliance costs to consumers.

The perfect competition assumption is widely accepted economic practice for this type of analysis, and only in rare cases are other approaches used.[314] It should be noted that the perfect competition assumption is not primarily about the number of firms in a market. It is about how the market operates: the nature of the competition among firms. Indicators that allow us to assume perfect competition include absence of barriers to entry, absence of strategic behavior among firms in the market, and product differentiation.

With regard to the gasoline fuel market, the Federal Trade Commission (FTC) has developed an approach to ensure competitiveness in gasoline fuel markets. It reviews oil company mergers and frequently requires divestiture of refineries, terminals, and gas stations to maintain a minimum level of competition. This is discussed in more detail in the industry profile prepared for this proposal.[315]

With regard to the gas can market, the small number of firms in the market is offset by several features of this market. Because gas cans are compact and lightweight, they are easy to transport far from their place of manufacture. This means that production is not limited to local producers. Although they vary by size and material, consumers are likely to view all gas cans as good substitutes for one another. Because the products are similar enough to be considered homogeneous (e.g., perfectly substitutable), consumers can shift their purchases from one manufacturer to another. There are only minimal technical barriers to entry that would prevent new firms from freely entering the market, since manufacturing is based on well-known plastic processing methods. In addition, there is significant excess capacity, enabling competitors to respond quickly to changes in price. Excess production capacity in the general container manufacturing market also means that manufacturers could potentially switch their product lines to compete in this segment of the market, often without a significant investment. In addition, there is no evidence of high levels of strategic behavior in the price and quantity decisions of the firms. Finally, it should be noted that contestable market theory asserts that oligopolies and even monopolies will behave very much like firms in a competitive market if manufacturers have extra production capacity and this capacity could allow them to enter the market costlessly (i.e., there are no sunk costs associated with this kind of market entry or exit).[316] As a result of these conditions, producers and consumers in the gas can market take the market price as given when making their production and consumption choices. For all these reasons, the market can be modeled as a competitive market even though the number of producers is small.

5. What Are the Key Model Inputs?

Key model inputs for the EIM are the behavioral parameters, compliance costs estimates, and market equilibrium quantities and prices.

The EIM is a behavioral model. The estimated social costs of this emission control program are a function of the ways in which producers and consumers of the gas cans and gasoline fuel affected by the standards change their behavior in response to the costs incurred in complying with the standards. These behavioral responses are incorporated in the EIM through the price elasticity of supply and demand (reflected in the slope of the supply and demand curves), which measure the price sensitivity of consumers and producers. The price elasticites used in this analysis are described in Chapter 13 of the RIA. The gasoline elasticites were obtained from the literature and are −0.2 for demand and 0.2 for supply. This means that both the quantity supplied and demanded are expected to be fairly insensitive to price changes and that increases in prices are not expected to cause sales to fall or production to increase by very much. Because we were unable to find published supply and demand elasticities for the gas can market, we estimated these parameters using the procedures described in Chapter 13 of the RIA. This approach yielded a demand elasticity of −0.01 and a supply elasticity of 1.5. The estimated demand elasticity is nearly perfectly inelastic (equal to zero), which means that changes in price are expected to have very little effect on the quantity of gas cans demanded. However, supply is fairly elastic, meaning producers are expected to respond to a change in price. Therefore, consumers are expected to bear more of the burden of gas can regulatory control costs than producers.

Initial market equilibrium conditions are simulated using the same current year sales quantities and growth rates used in the engineering cost analysis. The initial equilibrium prices for gas can and gasoline fuel were obtained from industry sources and published government data. The initial equilibrium market conditions are shocked by applying the engineering compliance cost estimates described in earlier in this section. Although both the gas can and gasoline fuel markets are competitive markets, the model is shocked by applying the sum of variable and fixed costs. Two sets of compliance costs are used in the gas can market analysis, reflecting states with existing controls and states without existing controls. The compliance costs used to shock the gasoline fuel market are based on an average total cost (variable + fixed) analysis. An explanation for this

[313] EPA Guidelines for Preparing Economic Analyses, EPA 240–R–00–003, September 2000, p. 125–6.

[314] See, for example, EPA Guidelines for Preparing Economic Analyses, EPA 240–R–00–003, September 2000, p 126.

[315] Section 3 Industry Organization, ''Characterizing Gasoline Markets: a Profile,'' Final Report, prepared for EPA by RTI, August 2005.

[316] A monopoly or firms in oligopoly may not behave as neoclassical economic theories of the firm predict because they may be concerned about new entrants to the market. If super-normal profits are earned, potential competitors may enter the market. To respond to this treat, existing firm(s) in the market will keep prices and output at a level where only normal profits are made, setting price and output levels at or close to the competitive price and output. See Chapter 13 of the RIA for more information, Section 13.2.3.

approach can be found in Section 13.2.4.1 of the RIA prepared for this proposal. These gasoline fuel compliance costs differ across PADDs but are the same across years. Because California already has existing gasoline fuel controls, fuel volumes for that state are not included in the market analysis. However, because it may be necessary for refiners to adjust their production to comply with the new federal standards, California fuel controls are included in the economic welfare analysis.

Additional costs that need to be considered in the EIM are the savings associated with the gas can controls and the costs of the light-duty vehicle controls. The proposed gas can controls are expected to reduce evaporative emissions from fuel storage, leading to fuel savings for users of these containers. These fuel savings are not included in the market analysis for this economic impact analysis because these savings are not expected to affect consumer decisions with respect to the purchase of new containers. Fuel savings are included in the social cost analysis, however, because they are a savings that accrues to society. The estimated fuel savings are added to the estimated social costs as a separate line item. As noted above, the economic impacts of the light-duty vehicle controls are not modeled in the EIM. Instead, the estimated engineering compliance costs are used as a proxy, and are also added into the estimated social costs as a separate line item.

The EIM relies on the estimated compliance costs for the gas can and gasoline fuel programs described elsewhere in this preamble. Thus, the EIM reflects cost savings associated with ABT or other flexibility programs to the extent they are included in the estimated compliance costs.

6. What Are the Results of the Economic Impact Modeling?

Using the model and data described above, we estimated the economic impacts of the proposed emission control program. The results of our analysis are summarized in this section. Detailed results for all years are included in the appendices to Chapter 13 of the RIA. Also included as an appendix to that chapter are sensitivity analyses for several key inputs.

Market Impact Analysis. Market impacts are the estimated changes in the quantity of affected goods produced and their prices. As explained above, we estimated market impacts for only gasoline fuel and gas cans, and California fuel is not included in the market analysis for PADD 5. The estimated market impacts are presented in Table IX.F–1. In this table the market results for gasoline are presented for only 2015 because the compliance costs for the gasoline fuel program are constant for all years and therefore the results of the market analysis are the same for all years.[317] The market results for gas cans are presented for 2009 and 2015, reflecting the changes in estimated compliance costs due to amortization of fixed costs over the first five years of the program. After 2013 the compliance costs remain constant for all future years.[318]

With regard to the gasoline fuel program, the market impacts are expected to be small, on average. The price of gasoline fuel is expected to increase by about 0.15 percent or less, depending on PADD. The expected reduction in quantity of fuel produced is expected to be less than 0.03 percent. The market impacts for the gas can program are expected to be more significant. In 2009, the first year of the gas can program, the model predicts a price increase of about 7 percent for gas cans in states that are currently have regulations for gas cans and about 57 percent for those that do not. Even with these larger price increases, however, the quantity produced is not expected to decrease by very much, less than 0.6 percent. These percent price increases and quantity decreases much smaller after the first five years. In 2015, the estimated gas can price increase is expected to be less than 2 percent for states that currently regulate gas cans and about 32.5 percent for states without such regulations. The quantity produced is expected to decrease by less than 0.4 percent. These changes are expected to remain constant for future years, even though the absolute quantities produced are expected to increase somewhat.

TABLE IX.F–1.—SUMMARY OF MARKET IMPACTS

Market	Engineering cost per unit	Change in price		Change in quantity	
		Absolute	Percent	Absolute	Percent
2009					
Gasoline Fuel:					
PADD 1 & 3.	N/A (gasoline fuel control program begins in 2011)				
PADD 2					
PADD 4.					
PADD 5 (w/out CA).					
	$/can			Thousand Cans	
Gas Cans:					
States with existing programs	$0.77	$0.76	6.9%	−6.8	−0.07%
States without existing programs	$2.70	$2.68	57.4%	−88.5	−0.57%
2015					
	¢/gallon			Million Gallons	
Gasoline Fuel:					
PADD 1 & 3	0.049¢	0.03¢	0.02%	−3.1	−0.004%
PADD 2	0.202¢	0.11¢	0.07%	−6.9	−0.015%

[317] The number of gallons of gasoline fuel produced is expected to decrease in future years, but the percent decrease is expected to remain the same; this is due to the growth in fuel consumption generally.

[318] The number of gas cans produced is expected to decrease in future years, but the percent decrease is expected to remain the same; this is due to the growth in gas can production generally.

TABLE IX.F–1.—SUMMARY OF MARKET IMPACTS—Continued

Market	Engineering cost per unit	Change in price		Change in quantity	
		Absolute	Percent	Absolute	Percent
PADD 4	0.358¢	0.19¢	0.12%	−1.4	−0.025%
PADD 5 (w/out CA)	0.391¢	0.21¢	0.13%	−2.5	−0.026%
	$/can			Thousand Cans	
Gas Cans:					
States with existing programs	$0.21	$0.20	1.9%	−2.1	−0.02%
States without existing programs	$1.53	$1.52	32.5%	−56.4	−0.32%

Economic Welfare Analysis. In the economic welfare analysis we look at the costs to society of the proposed program in terms of losses to consumer and producer surplus. These surplus losses are combined with the estimated vehicle compliance costs, fuel savings, and government revenue losses to estimate the net economic welfare impacts of the proposed program. Estimated annual net social costs for selected years are presented in Table IX–F–2. Initially, the estimated social costs of the program are relatively small and are attributable to the gas can program, which begins in 2009, and the vehicle program, which begins in 2010. For 2009 and 2010 the estimated social costs are less than $40 million. In 2011 the estimated social costs increase to $215 million, reflecting the beginning of the gasoline fuel program. In subsequent years, estimated social costs increase due to growth. However, they decrease in 2014, to $169 million, when the gas can fixed costs are fully recovered and in 2020, to $171.5 million, when the vehicle program compliance costs are terminated.

TABLE IX.F–2.—NET SOCIAL COSTS ESTIMATES FOR THE PROPOSED PROGRAM

[2009 to 2035—2003$, $million]

Year	Total social costs (includes fuel savings)
2009	$38.4
2010	39.2
2011	215.0
2012	208.6
2013	202.2
2014	169.3
2015	171.6
2016	173.6
2017	175.5
2018	177.3
2019	179.7
2020	171.5
2021	174.2
2022	176.9
2023	179.9
2024	183.3
2025	186.8
2026	190.3
2027	193.9
2028	197.6
2029	201.3
2030	205.2
2031	209.1
2032	213.1
2033	217.2
2034	221.4
2035	225.7
NPV at 3%	2,937.3
NPV at 7%	1,633.0

Table IX.F–3 contains more detailed estimated social costs for 2009, when the gas can program begins, 2011, when the gasoline fuel program begins, and 2015, when the gas can fixed costs are fully recovered. The vehicle program applies from 2010 through 2019. According to these results, consumers are expected to bear approximately 99 percent of the cost of the gas can program. This reflects the inelastic price elasticity on the demand side of the market and the elastic price elasticity on the supply side. The burden of the gasoline fuel program is expected to be shared more evenly, with 54.5 percent expected to be borne by consumers and 45.5 percent expected to be borne by producers. In all years, the estimated loss to consumer welfare will be offset somewhat by the fuel savings associated with gas cans. Beginning at about $11 million per year, these savings increase to about $70 million by 2015 as compliant gas cans are phased in. These savings accrue for the life of the gas cans.

TABLE IX.F–3.—SUMMARY OF NET SOCIAL COSTS ESTIMATES ASSOCIATED WITH PRIMARY PROGRAM

[2009, 2011, and 2015—2003$, $million]

Market	Change in consumer surplus	Change in producer surplus	Total
2009			
Gasoline U.S.:			
PADD 1 & 3			
PADD 2	N/A (gasoline fuel control program begins in 2011)		
PADD 4.			
PADD 5 (w/out CA).			
Gas Cans U.S.	-$48.7	-$0.3	-$49.0
	(99.3%)	(0.7%)	
States with existing programs	-$7.5	-$0.1.	

TABLE IX.F–3.—SUMMARY OF NET SOCIAL COSTS ESTIMATES ASSOCIATED WITH PRIMARY PROGRAM—Continued

[2009, 2011, and 2015—2003$, $million]

Market	Change in consumer surplus	Change in producer surplus	Total
States without existing programs	-$41.2	-$0.3.	
Subtotal	-48.7 (99.3%)	-0.3 (1%)	-$49.0
Fuel Savings			$10.6
Vehicle Program			$0
California fuel [a]			$0
Total			-$38.4
2011			
Gasoline U.S.	-$100.3	-$83.6	-$183.9
PADD 1 & 3	-$21.6	-$18.0	
PADD 2	-$49.1	-$40.9	
PADD 4	-$10.2	-$8.5	
PADD 5 9w/out CA)	-$19.4	-$16.2	
Gas Cans U.S.	-$50.7 (99.4%)	-$0.3 (0.7%)	-$51.0
States with existing programs	-$7.8	-$0.1	
States without existing programs	-$42.9	-$0.3.	
Subtotal	-$150.9 (64.3%)	-$83.9 (35.7%)	-$234.8
Fuel Savings			$33.3
Vehicle Program			-$11.8
California fuel [a]			-$1.7
Total			$215.0
2015			
Gasoline U.S.	-$107.1 (54.5%)	-$89.4 (45.5%)	-$196.5
PADD 1 & 3	-$23.1	-$19.3	
PADD 2	-$52.4	-$43.7	
PADD 4	-$10.9	-$9.1	
PADD 5 (w/out CA)	-$20.7	-$17.3	
Gas Cans U.S.	-$28.5 (99.3%)	-$0.2 (0.7%)	-$28.7
States with existing programs	-$2.3	$0.0	
States without existing programs	-$26.3	-$0.2	
Subtotal	-$135.7 (60.3%)	-$89.5 (39.7%)	-$225.2
Fuel Savings			$68.3
Vehicle Program			$12.9
California fuel [a]			-$1.8
Total			$171.6

[a] California fuel costs are considered separately. See Section 13.1.3 of the RIA.

The present value of net social costs (discounted back to 2005) of the proposed standards through 2035, contained in Table IX–F–2, is estimated to be $2.9 billion (2003$). This present value is calculated using a social discount rate of 3 percent and the stream of economic welfare costs from 2009 through 2035. We also performed an analysis using a 7 percent social discount rate.[319] Using that discount rate, the present value of the net social costs through 2035 is estimated to be $1.6 billion (2003$).

X. Alternative Program Options

We considered several options for fuels, vehicles, and gas cans in developing this proposal.

A. Fuels

We considered a wide range of control strategies for gasoline to reduce toxic emissions. Among the options considered are a toxics performance standard, varying levels of benzene control, approaches for controlling other MSATs in addition to benzene, and lower sulfur and RVP for VOC control. The discussion of these options is provided in section VII.

In addition, we request comment on the following specific concepts relating

[319] EPA has historically presented the present value of cost and benefits estimates using both a 3 percent and a 7 percent social discount. The 3 percent rate represents a demand-side approach and reflects the time preference of consumption (the rate at which society is willing to trade current consumption for future consumption). The 7 percent rate is a cost-side approach and reflects the shadow price of capital.

to the proposed ABT and compliance assurance provisions.

1. Alternative Compliance Assurance Provisions

The design of the proposed ABT program is based on other recent fuel programs (primarily gasoline and diesel sulfur), but with fewer restrictions. The proposed program includes nationwide trading, does not include an upper limit on benzene, and combines all fuel into a single pool for credit accounting purposes. The compliance assurance mechanisms for the proposed ABT program are also based on previous recent fuel programs (including reformulated gasoline and gasoline and diesel sulfur) which in turn were developed based on the experiences in enforcing past fuel programs. At the same time there are other programs with different ABT and corresponding compliance assurance provisions that could serve as models for this benzene proposal, such as the Acid Rain Program.

An overarching concern that today's proposal attempts to address, and that any alternative program also would have to address, is that EPA does not have the resources to audit a substantial number of refineries each year, and certainly not every refinery. Thus, we must devise a credit program whose enforcement integrity does not depend on EPA conducting annual audits of many or most refiners to determine the validity of credits generated, transferred, banked and used.

The program as proposed would provide a great deal of flexibility to refiners in complying with the standards, but balances this flexibility with provisions to ensure the standard's enforceability. This program would also provide incentives for refiners and importers to ensure the validity of any credits they obtain, through the provisions that hold the buyer of invalid credits liable for any resulting violation of the standard. We summarize the most important of these provisions here:

- Credit life would be limited to 5 years. This is intended to provide reasonable assurance that EPA will have the opportunity to review the appropriate records to verify compliance, regardless of personnel changes, whether existing refiners and importers are bought, sold, merged, or go out of business, and whether new refiners and importers are created;
- Records would be required to be retained for the life of the credits to allow for EPA to enforce the benzene content standard through random audits;
- We propose that credits be limited in the number of trades that would be allowed and are requesting comment on the range from 2 to 4 trades. (We will establish an appropriate number of permissible trades in the final rule.) Such a limitation would be intended to allow EPA to have a reasonable chance of verifying the validity of credits that are traded;
- Both the buyer and seller of the credits would be potentially liable should credits be found to be invalid, in order to allow EPA to maintain the environmental benefits of the program should the credit seller no longer be in business; and
- Purchasers of credits would need to be potential credit users, and so would be refiners or importers. Our experiences during the gasoline lead phase-down program in the 1980s, where brokers and others were allowed to take title to lead credits, raised enforcement problems severe enough to call the program's validity into question. These problems have not arisen for more recent programs, where credit purchasers must be credit users.

We request comment on these provisions as a whole and individually. In addition, we note that the proposed benzene program is different from the other recent fuel programs in several key respects that may provide opportunities to design the ABT program and corresponding compliance assurance mechanisms differently. For example, the proposed program would not have an upper limit on the per-gallon benzene concentration that would otherwise force all refiners to ultimately comply with the standard through actual physical refinery changes. Since this proposed program would allow some degree of variation in benzene levels to continue indefinitely, additional flexibility in how credits are handled may be desirable. Thus, we specifically request comment on the following alternate ABT program elements.

As mentioned above, EPA could not, with its limited resources, conduct annual audits of all refiners (and possibly other parties, as discussed below). With regard to any potential alternative ABT program elements, including those discussed below, we request detailed ideas about a potential auditing process that would be sufficiently robust to assure the validity of credits generated, used, banked or traded, including how such audits might be self-funded.

Credit Life

EPA notes that a system that limits credit life may, under certain circumstances, depress the market price of credits and create less incentive for benzene reductions early in the program. EPA therefore requests comment on whether the credit life should be limited or whether unlimited banking should be encouraged through having credits with unlimited life or longer life. We also seek comment on how a program with unlimited credit life could be successfully enforced. For example, EPA audits for refinery compliance with fuel standard and credit requirements normally include review of refinery production, testing and business records. EPA seeks comment on whether these audits could be effectively conducted to review the validity of credits that were generated more than five years previously and whether audits could be effectively concluded during the first five years of a credit's life.

EPA also seeks comment on the appropriate consequences if EPA was unable to verify credit validity, the criteria for identifying credits as being invalid, and whether EPA should have the burden of proving credits were invalid or whether the credit generator (or the credit user) should have the burden of proving that credits were valid. See *Hazardous Waste Treatment Council* v. *EPA*, 886 F. 2d 355, 367–68 (D.C. Cir. 1990) (relating to circumstances when the burden of proof may permissibly shift to a regulated entity). EPA also seeks comment on mechanisms that would allow companies to verify the validity of credits they generate without the need for EPA audits. Thus, EPA seeks comment on whether audits conducted by independent auditors could be a reliable indicator of credit validity, and if so, the necessary qualifications of the auditor, the criteria for auditor independence, how these qualifications and independence should be established, whether the audit should review records of all company fuels activities related to credit creation or only a random portion of these records, the appropriate timing requirements for these audits, and the nature and timing of reports. EPA seeks comment on the enforcement implications of the Clean Air Act's five-year statute of limitations if credits with a life longer than five years were allowed.

Record Retention

We also seek comment on whether a program with unlimited credit life would need to require that the associated records be retained indefinitely until a credit was used. (The use of credits for which no records exist could result in their being declared

null and void since credit validity could not be established.) We seek comment as to whether record-keeping and EPA audits involving activities occurring more than five years in the past could create any issues regarding statutes of limitations. Also, in general, we request comment on provisions that could address the fact that the farther back in time an event occurred, the more difficult it becomes for EPA to conduct an effective audit (due to factors such as mergers, acquisitions, and turnover of personnel). EPA seeks comment on whether the Clean Air Act's five-year statute of limitations would adversely impact EPA's ability to enforce a requirement to keep records longer than five years.

Number of Times Credits May Be Traded

As described earlier in this preamble, EPA is requesting comment on allowing credits to be traded between 2 and 4 times. In particular, EPA seeks comment on any specific benefits to regulated parties or to the credit market generally if a number of trades in this range were allowed; on requirements that should be included to ensure the validity of credits that have been transferred multiple times; on procedures for identifying which credits have been transferred if the credit transferor is found to have had in its possession both valid and invalid credits; and on appropriate consequences to the generator and/or transferor of invalid credits. In addition, EPA seeks comment on mechanisms that would allow companies to establish the validity of credits they have purchased without the need for EPA audits. Thus, EPA requests comment on whether companies that obtain credits that have previously been purchased should be required to establish their validity through reports of independent audits of the credit-creation activities of the company that created the credits and of the credit activities of any intermediary entities to which the credits had been transferred.

Case-By-Case Relaxation of Compliance Restrictions

In addition to seeking comment on general modifications discussed above to the proposed provisions, we also request comment on allowing regulated entities to petition for case-by-case relaxation of specific provisions in special cases. For example, such a provision might allow a refiner to petition EPA to allow a specific group of credits to be traded one or more additional times than the final rule ultimately allows. Petitioners might also be allowed to request an extension of the five year limit on credit life. EPA seeks comment on whether and how such an extension might affect the ability to enforce the benzene content standard, including impacts from the statute of limitations. Such an exception might have important implications for enforcement, record-keeping, and emissions, which would have to be adequately addressed. EPA seeks comment on the nature of documentation that would be required in such a petition and criteria that might be used to make a determination regarding approval of such a petition. EPA also seeks comment on the extent to which any such ABT flexibility provisions would be used, and what the benzene content, enforcement, liquidity, and other implications might be.

Ownership of Benzene Credits

The potential modifications of the proposed program on which we request comment may be able to be accomplished relatively easily within the bounds of the proposed program. Another concept, allowing traders and other entities to take title to credits, might best be accomplished by moving to an entirely different type of credit program, since it might require a set of other related changes in order to function effectively. For example, it may be possible to design the benzene trading program and related compliance assurance provisions in a manner that would allow benzene credits to be traded on the open market like many other commodities and not unlike the way SO_2 credits are traded under the Acid Rain Program, or how carbon credits are traded through the voluntary trading program established by the Chicago Climate Exchange. We next discuss such an alternate credit program.

The proposed restriction of benzene credit use to refiners and importers does not provide an opportunity for other entities to participate in this credit market by taking title to credits.[320] The inability of traders to take actual title to credits may reduce the ability of the market to function in certain ways including, for example, to hedge against risk effectively or to aggregate small holdings into larger blocks for sale. This might be avoided if the program provided for benzene credits to be owned, and for entities other than refiners and importers to obtain, hold, and transfer them.

EPA requests comment on any specific benefits to regulated parties or to the credit market generally if non-refiners were allowed to take title to credits. EPA also requests comments on any situations that occurred under other motor vehicle fuels credit programs where the absence of non-refiner credit owners created difficulties or problems in regulated parties being able to transfer or obtain credits. EPA seeks comment on how the benzene credit program could be reliably enforced if non-refiners were allowed to own credits. Thus, EPA seeks comment on the qualifications that should be required for a company to be a non-refiner credit owner, and how these qualifications should be established; on any registration, record keeping, reporting, independent audit and independent attestation requirements that should be imposed on non-refiner owners of credits; and on the nature of liability that should attach to non-refiner owners of credits that were found to have transferred invalid credits.

We expect that such a program would require that all refiners and importers have their credits (and therefore compliance) verified each year. Given the resource needs for EPA to undertake such verifications, we would expect to require refiners to utilize independent auditors, sufficient for the auditor to make a verified audit finding that the company's assertions regarding credit creation are correct. We believe that verification of credits in this manner would require a complete audit of the gasoline production and testing records related to the benzene content and volume of gasoline produced or imported, including reviews and reconciliation of all batch information. The audit also would also have to include sufficient review of records of product sales to verify the completeness of the gasoline production records. The independent auditor performing such an audit would have to be qualified to understand and review the records of gasoline production and testing generated at a refinery, or the importation and testing records associated with imported gasoline. To the extent that gasoline testing was conducted by independent laboratories, the credit audit would have to include the activities of the independent laboratory to make an audit finding of the validity of the laboratory test results. EPA would then continue to have the ability to perform spot audits.

EPA seeks comment on whether the regulations should require that these

[320] In the proposed program non-refiners would be allowed to facilitate, or broker, credit transactions between refiners or importers. Thus, a refiner (or importer) that needed to purchase credits could contract with a broker to identify refiners or importers that have credits to sell.

independent audits must be conducted by an independent audit organization that is funded by an industry consortium, rather than by audit firms individually retained by refiners/importers. The industry consortium would submit to EPA for approval: the consortium organization; the qualifications of the individual auditors; the general audit plans, and any audit plans that are specific to an individual company. The audit organization would submit audit reports to EPA and to the companies that were the subject of their audits.

The refiners and importers would then assign a unique serial number to each credit containing key information including the entity's registration number, the year, and the credit number. These entities would then report this information to EPA as a part of their annual compliance report. Credits properly generated under such a program could then be traded freely until they were used. If an audit determined that some credits were improperly generated, a mechanism would be required to decide which credits were considered to be valid and which invalid.

Given EPA's resource constraints, EPA seeks comment on a mechanism that would allow refiners and importers, and non-refiner owners of credits (if allowed) to conduct this detailed tracking of individual credits, with reconciliation of the reports of all parties transferring, obtaining, or holding credits. Thus, EPA seeks comment on whether the regulations should include an option whereby companies that wish to sell, purchase or hold verified credits would fund an independent organization that would function as the clearinghouse of benzene credits. EPA also seeks comment on how such an independent organization option should be structured: What would be the qualifications of the organization and how would they be established; how would the method of operations of the organization be established and approved by EPA; what reporting by companies to the organization would be required, and what reporting to EPA by the organization would be required; and how would the organization establish the validity of credits that are the subject of reports from companies.

In addition, as in past programs, if credits were later found to be improperly created, the party that generated the invalid credits and the party that used the invalid credits would be subject to EPA enforcement. The party using the invalid credits would be required to remove the invalid credits from its compliance calculations. If this recalculation resulted in a violation of the benzene standard, the party would be subject to an enforcement action for this violation, regardless of whether the invalid credits were purchased in good faith (although the party may be permitted to remedy such violations through the subsequent purchase of valid credits). This is intended to maintain the environmental benefits of the program and to encourage self-policing by the industry of the validity of the credits they use for compliance. However, in this situation EPA would look first to the generator of the invalid credits to remedy the shortfall. If this generator could make up any credit deficit, EPA normally would defer enforcement against the user or intermediary transferor of invalid credits.

2. Alternative ABT Options

EPA seeks comment on whether the regulations should create two options for benzene credits: one that is based on the credit enforcement provisions contained in the proposed fuels program, resulting in credits with more limited credit life that must be transferred from the credit generator to the credit user; and ''verified'' benzene credits that have a longer credit life and that can be owned by companies other than refiners/importers. Under this approach, benzene credits could be ''verified'' if certain conditions are met. First, the credit generator would need to participate in an audit consortium (as described above) and the credits would need to be verified through an audit conducted by this organization. Second, the credit generator and any other company that took title to or used these credits would need to participate in a benzene credit clearing house (as described above). In this way, companies that wished to generate benzene credits with longer life and broader ownership options could do so, but also would bear at least part of the expense associated with establishing the validity and tracking the movements of this class of credits. At the same time, companies that wished to generate and transfer credits in the traditional manner, would not bear these extra expenses.

EPA also seeks comment on an approach that would allow refiners and importers, and non-refiner owners of credits (if allowed), to establish a private clearing house to conduct the detailed tracking of individual credits, with reconciliation of the reports of all parties transferring, obtaining, or holding credits. The Chicago Climate Exchange provides an example of a privately established trading program. The Chicago Climate Exchange provides a trading platform with a registry for credits and clearing facility. The NASD provides market surveillance and verification of emission credits. EPA seeks comment on how such an independent organization could be established; what requirements should EPA establish for the organization; what reporting would be required by companies to the organization; and what reporting would be required by the organization to EPA.

We request comment on the appropriateness of such an alternative ABT program for the proposed benzene control program and how it might work and be enforced.

B. Vehicles

For vehicles, we considered normal temperature standards more stringent than Tier 2 standards, which would likely entail hardware changes to Tier 2 vehicles. This option is discussed in section VI. We did not consider a less stringent standard for cold temperature NMHC control because CAA sections 202(a) and 202(l) require us to establish the most stringent standards achievable considering cost and other factors. We believe that the proposed cold NMHC standards and phase-in for Tier 2 vehicles satisfy these CAA requirements, and a less stringent standard would not.

C. Gas Cans

For gas cans, as discussed in section VIII, we are proposing an emissions performance standard we believe reflects the performance of the best available control technologies. We considered but are not proposing options for design-based requirements, including requirements for automatic shut-off spouts. We also considered but are not proposing retrofit requirements for gas cans. These options are discussed in sections VIII.B.3–VIII.B.5.

XI. Public Participation

We request comment on all aspects of this proposal. This section describes how you can participate in this process.

A. How Do I Submit Comments?

We are opening a formal comment period by publishing this document. We will accept comments during the period indicated under **DATES** above. If you have an interest in the proposed emission control program described in this document, we encourage you to comment on any aspect of this rulemaking. We also request comment on specific topics identified throughout this proposal.

Your comments will be most useful if you include appropriate and detailed supporting rationale, data, and analysis. Commenters are especially encouraged to provide specific suggestions for any changes to any aspect of the regulations that they believe need to be modified or improved. You should send all comments, except those containing proprietary information, to our Air Docket (see **ADDRESSES**) before the end of the comment period.

You may submit comments electronically, by mail, or through hand delivery/courier. To ensure proper receipt by EPA, identify the appropriate docket identification number in the subject line on the first page of your comment. Please ensure that your comments are submitted within the specified comment period. Comments received after the close of the comment period will be marked ''late.'' EPA is not required to consider these late comments. If you wish to submit CBI or information that is otherwise protected by statute, please follow the instructions in section XI.B.

B. How Should I Submit CBI to the Agency?

Do not submit information that you consider to be CBI electronically through the electronic public docket, *www.regulations.gov*, or by e-mail. Send or deliver information identified as CBI only to the following address: U.S. Environmental Protection Agency, Assessment and Standards Division, 2000 Traverwood Drive, Ann Arbor, MI 48105, Attention Docket ID EPA–HQ–OAR–2005–0036. You may claim information that you submit to EPA as CBI by marking any part or all of that information as CBI (if you submit CBI on disk or CD ROM, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR part 2.

In addition to one complete version of the comment that includes any information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket. If you submit the copy that does not contain CBI on disk or CD ROM, mark the outside of the disk or CD ROM clearly that it does not contain CBI. Information not marked as CBI will be included in the public docket without prior notice. If you have any questions about CBI or the procedures for claiming CBI, please consult the person identified in the **FOR FURTHER INFORMATION CONTACT** section.

C. Will There Be a Public Hearing?

We will hold a public hearing on April 12, 2006 at the Sheraton Crystal City Hotel, 1800 Jefferson Davis Highway, Arlington, Virginia 22202, Telephone: (703) 486–1111. The hearing will start at 10 a.m. local time and continue until everyone has had a chance to speak.

If you would like to present testimony at the public hearing, we ask that you notify the contact person listed under **FOR FURTHER INFORMATION CONTACT** at least ten days before the hearing. You should estimate the time you will need for your presentation and identify any needed audio/visual equipment. We suggest that you bring copies of your statement or other material for the EPA panel and the audience. It would also be helpful if you send us a copy of your statement or other materials before the hearing.

We will make a tentative schedule for the order of testimony based on the notifications we receive. This schedule will be available on the morning of the hearing. In addition, we will reserve a block of time for anyone else in the audience who wants to give testimony.

We will conduct the hearing informally, and technical rules of evidence won't apply. We will arrange for a written transcript of the hearing and keep the official record of the hearing open for 30 days to allow you to submit supplementary information. You may make arrangements for copies of the transcript directly with the court reporter.

D. Comment Period

The comment period for this rule will end on May 30, 2006.

E. What Should I Consider as I Prepare My Comments for EPA?

You may find the following suggestions helpful for preparing your comments:

- Explain your views as clearly as possible.
- Describe any assumptions that you used.
- Provide any technical information and/or data you used that support your views.
- If you estimate potential burden or costs, explain how you arrived at your estimate.
- Provide specific examples to illustrate your concerns.
- Offer alternatives.
- Make sure to submit your comments by the comment period deadline identified.
- To ensure proper receipt by EPA, identify the appropriate docket identification number in the subject line on the first page of your response. It would also be helpful if you provided the name, date, and **Federal Register** citation related to your comments.

XII. Statutory and Executive Order Reviews

A. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to Office of Management and Budget (OMB) review and the requirements of the Executive Order. The Executive Order defines a ''significant regulatory action'' as one that is likely to result in a rule that may:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, Local, or Tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action'' because estimated annual costs of this rulemaking are estimated to be over $100 million per year and it raises novel legal or policy issues. A draft Regulatory Impact Analysis has been prepared and is available in the docket for this rulemaking and at the docket internet address listed under **ADDRESSES** above. This action was submitted to the Office of Management and Budget for review under Executive Order 12866. Written comments from OMB and responses from EPA to OMB comments are in the public docket for this rulemaking.

B. Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. The Agency proposes to collect information to ensure compliance with the provisions in this rule. This includes a variety of

requirements, both for vehicle manufacturers, fuel producers, and portable gasoline container manufacturers. Information-collection requirements related to vehicle manufacturers are in EPA ICR #0783.50 (OMB Control Number 2060–0104); requirements related to fuel producers are in EPA ICR #1591.20 (OMB Control Number 2060–0277); requirements related to portable gasoline container manufacturers are in EPA ICR #2213.01. For vehicle and fuel standards, section 208(a) of the Clean Air Act requires that manufacturers provide information the Administrator may reasonably require to determine compliance with the regulations; submission of the information is therefore mandatory. We will consider confidential all information meeting the requirements of section 208(c) of the Clean Air Act. For portable gasoline container standards, recordkeeping and reporting requirements for manufacturers would be pursuant to the authority of sections 183(e) and 111 of the Clean Air Act.

As shown in Table XII.B–1, the total annual burden associated with this proposal is about 24,696 hours and $2,771,309, based on a projection of 225 respondents. The estimated burden for vehicle manufacturers and fuel producers is a total estimate for both new and existing reporting requirements. The portable gasoline container requirements represent our first regulation of gas cans, so those burden estimates reflect only new reporting requirements. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

TABLE XII.B–1.—ESTIMATED BURDEN FOR REPORTING AND RECORDKEEPING REQUIREMENTS

Industry sector	Number of respondents	Annual burden hours	Annual costs
Vehicles	35	770	$80,900
Fuels	185	23,710	2,677,410
Gas Cans	5	216	12,999
Total	225	24,696	2,771,309

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15.

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques, EPA has established a public docket for this rule, which includes this ICR, under Docket ID number EPA–HQ–OAR–2005–0036. Submit any comments related to the ICR for this proposed rule to EPA and OMB. See **ADDRESSES** section at the beginning of this notice for where to submit comments to EPA. Send comments to OMB at the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW., Washington, DC 20503, ''Attention: Desk Office for EPA.'' Include the ICR number in any correspondence. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after March 29, 2006, a comment to OMB is best assured of having its full effect if OMB receives it by April 28, 2006. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

C. Regulatory Flexibility Act (RFA), as Amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.

1. Overview

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business as defined by the Small Business Administration's (SBA) regulations at 13 CFR 121.201 (see table below); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field. The following table provides an overview of the primary SBA small business categories potentially affected by this regulation:

Industry	Defined as small entity by SBA if less than or equal to	NAICS codes [a]
Light-duty vehicles:		
—Vehicle manufacturers (including small volume manufacturers).	1,000 employees	336111
—Independent commercial importers	$6 million annual sales	811111, 811112, 811198
—Alternative fuel vehicle converters	100 employees	424720
	1,000 employees	335312
	$6 million annual sales	811198
Gasoline fuel refiners	1500 employees [b]	324110

Industry	Defined as small entity by SBA if less than or equal to	NAICS codes [a]
Portable fuel container manufacturers:		
—Plastic container manufacturers	500 employees	326199
—Metal gas can manufacturers	1,000 employees	332431

Notes:
[a] North American Industrial Classification System.
[b] EPA has included in past fuels rulemakings a provision that, in order to qualify for EPA's small refiner flexibilities, a refiner must also produce no greater than 155,000 bpcd crude capacity.

2. Background

Mobile sources emit air toxics that can cause cancer and other serious health effects (Section III of this preamble and Chapter 1 of the Regulatory Impact Analysis (RIA) for this rule describe these compounds and their health effects). Mobile sources contribute significantly to the nationwide risk from breathing outdoor sources of air toxics. In today's action we are proposing: standards to limit the exhaust hydrocarbons from passenger vehicles during cold temperature operation; evaporative hydrocarbon emissions standards for passenger vehicles; limiting the average annual benzene content of gasoline; and hydrocarbon emissions standards for gas cans that would reduce evaporation, permeation, and spillage from these containers. (Detailed discussion of each of these programs is in sections VI, VII, and VIII of the preamble and Chapters 5, 6, and 7 of the RIA). We are proposing the standards for vehicles and gasoline under section 202(l)(2) of the Clean Air Act (CAA), which directs EPA to establish requirements to control emissions of mobile source air toxics (MSATs) from new motor vehicles and fuels. Controls for gas cans are being pursued under CAA section 183(e), the provisions applying to consumer and commercial products.

Pursuant to section 603 of the RFA, EPA prepared an initial regulatory flexibility analysis (IRFA) that examines the impact of the proposed rule on small entities along with regulatory alternatives that could reduce that impact. The IRFA, as summarized below, is available for review in the docket and Chapter 14 of the RIA.

As required by section 609(b) of the RFA, as amended by SBREFA, EPA also conducted outreach to small entities and convened a Small Business Advocacy Review Panel to obtain advice and recommendations of representatives of the small entities that potentially would be subject to the rule's requirements.

Consistent with the RFA/SBREFA requirements, the Panel evaluated the assembled materials and small-entity comments on issues related to elements of the IRFA. A copy of the Panel report is included in the docket for this proposed rule, and a summary of the Panel process, and subsequent Panel recommendations, is summarized below.

3. Summary of Regulated Small Entities

The following section discusses the small entities directly regulated by this proposed rule.

a. Highway Light-Duty Vehicles

In addition to the major vehicle manufacturers, three distinct categories of businesses relating to highway light-duty vehicles would be covered by the new vehicle standards: small volume manufacturers (SVMs), independent commercial importers (ICIs), and alternative fuel vehicle converters. SVMs are companies that sell less than 15,000 vehicles per year, as defined in past EPA regulations, and this status allows vehicle models to be certified under a slightly simpler certification process. Independent commercial importers are companies that hold a Certificate (or certificates) of Conformity permitting them to alter imported vehicles to meet U.S emission standards. Alternative fuel vehicle converters are businesses that convert gasoline or diesel vehicles to operate on alternative fuel, and converters must seek a certificate for all of their vehicle models. Based on a preliminary assessment, EPA identified about 14 SVMs, 10 alternative fuel vehicle converters, and 10 ICIs. Of these, EPA believes 5 SVMs, 6 converters, and all 10 ICIs would meet the small-entity criteria as defined by SBA (no major vehicle manufacturers meet the small-entity criteria). EPA estimates that these small entities comprise about 0.02 percent of the total light-duty vehicle sales in the U.S. for the year 2004.

b. Gasoline Refiners

EPA's current assessment is that 15 refiners meet SBA's criterion of having 1,500 employees or less. It should be noted that because of the dynamics in the refining industry (i.e., mergers and acquisitions) and decisions by some refiners to enter or leave the gasoline market, the actual number of refiners that ultimately qualify for small refiner status under an MSAT program could be much different than these initial estimates. Current data further indicates that these refiners produce about 2.5 percent of the total gasoline pool.

c. Portable Gasoline Container Manufacturers

EPA conducted a preliminary industry profile to identify the manufacturers of portable gasoline containers (gas cans)—98 percent are plastic containers and 2 percent are metal gas cans. Using this industry profile, EPA identified 4 domestic manufacturers and 1 foreign manufacturer. Of these 4 U.S. manufacturers, 3 meet the SBA definition of a small entity. One small business accounted for over 50 percent of the U.S. sales in 2002, and the other small entities comprised about 10 percent of U.S. sales.

4. Potential Reporting, Record Keeping, and Compliance

For highway light-duty vehicles, EPA is proposing to continue the reporting, recordkeeping, and compliance requirements prescribed for this category in 40 CFR 86. Key among these requirements are certification requirements and provisions related to reporting of production, emissions information, flexibility use, etc.

For any fuel control program, EPA must have assurance that fuel produced by refiners meets the applicable standard, and that the fuel continues to meet the standard as it passes downstream through the distribution system to the ultimate end user. EPA expects that recordkeeping, reporting and compliance provisions of the proposed rule will be fairly consistent with those in place today for other fuel programs. For example, reporting would likely involve requiring that refiners submit pre-compliance reports updating EPA on their plans to meet the MSAT standards.

For gas cans, there currently are not federal emission control requirements, and thus, EPA is proposing new reporting and record keeping requirements for gas can manufacturers that would be subject to the proposed standards. EPA is proposing

requirements that would be similar to those in the California program, such as submitting emissions testing information, reporting of certification families, and use of transition provisions.

5. Relevant Federal Rules

We are aware of a few other current or proposed Federal rules that are related to the upcoming proposed rule. The primary federal rules that are related to the proposed MSAT rule under consideration are the first MSAT rule (**Federal Register** Vol. 66, p. 17230, March 29, 2001), the Tier 2 Vehicle/Gasoline Sulfur rulemaking (**Federal Register** Vol. 65, p. 6698, February 10, 2000), the fuel sulfur rules for highway diesel (**Federal Register** Vol. 66, p. 5002, January 18, 2001) and nonroad diesel (**Federal Register** Vol. 69, p. 38958, June 29, 2004), and the Cold Temperature Carbon Monoxide Rulemaking (**Federal Register** Vol. 57, p. 31888, July 17, 1992).

In addition, the Evaporative Emissions Streamlining Direct Final Rulemaking was issued on December 8, 2005 (**Federal Register** Vol. 70, p. 72917). For gas cans, OSHA has safety regulations for gasoline containers used in workplace settings. Cans meeting OSHA requirements, commonly called safety cans, are exempt from the California program, and we are planning to exempt them from the EPA program.

Section 1501 of the Energy Policy Act of 2005 requires the Agency to implement a Renewable Fuels Standard (RFS) program. Beginning in 2006, this program will require increasing volumes of renewable fuel to be used in gasoline, until a total of 7.5 billion gallons is required in 2012. The most prevalent renewable fuel is expected to be ethanol. There are a wide variety of potential impacts of ethanol blending on MSAT emissions that will be evaluated as part of the RFS rulemaking process. In general, as ethanol use increases, other sources of octane in gasoline can decrease. Depending on these changes, the impact on benzene emissions will vary. The specific effects of ethanol on benzene will be addressed in the Regulatory Impact Analysis (RIA) to this rule and in future rulemakings, such as the RFS rule.

6. Summary of SBREFA Panel Process and Panel Outreach

a. Significant Panel Findings

The Small Business Advocacy Review Panel (SBAR Panel, or the Panel) considered many regulatory options and flexibilities that would help mitigate potential adverse effects on small businesses as a result of this rule. During the SBREFA Panel process, the Panel sought out and received comments on the regulatory options and flexibilities that were presented to SERs and Panel members. The major flexibilities and hardship relief provisions that were recommended by the Panel are described below and are also located in Section 9 of the SBREFA Final Panel Report which is available in the public docket.

b. Panel Process

As required by section 609(b) of the RFA, as amended by SBREFA, we also conducted outreach to small entities and convened an SBAR Panel to obtain advice and recommendations of representatives of the small entities that potentially would be subject to the rule's requirements.

On September 7, 2005, EPA's Small Business Advocacy Chairperson convened a Panel under Section 609(b) of the RFA. In addition to the Chair, the Panel consisted of the Division Director of the Assessment and Standards Division of EPA's Office of Transportation and Air Quality, the Chief Counsel for Advocacy of the Small Business Administration, and the Administrator of the Office of Information and Regulatory Affairs within the Office of Management and Budget. As part of the SBAR Panel process, we conducted outreach with representatives from the various small entities that would be affected by the proposed rulemaking. We met with these Small Entity Representatives (SERs) to discuss the potential rulemaking approaches and potential options to decrease the impact of the rulemaking on their industries. We distributed outreach materials to the SERs; these materials included background on the rulemaking, possible regulatory approaches, and possible rulemaking alternatives. The Panel met with SERs from the industries that will be directly affected by the MSAT rule on September 27, 2005 (gasoline refiners) and September 29, 2005 (light-duty vehicles and portable gasoline containers) to discuss the outreach materials and receive feedback on the approaches and alternatives detailed in the outreach packet (the Panel also met with SERs on July 19, 2005 for an initial outreach meeting). The Panel received written comments from the SERs following the meeting in response to discussions had at the meeting and the questions posed to the SERs by the Agency. The SERs were specifically asked to provide comment on regulatory alternatives that could help to minimize the rule's impact on small businesses.

In general, SERs representing the gas can manufacturers industry raised concerns on how the MSAT rule's requirements would be coordinated with the California program and other requirements, and that there should be adequate opportunity for sell through at the start of the program. The small volume manufacturer, ICI, and vehicle converter SERs that participated had questions about the form of the new standards for light-duty vehicles, specifically testing and certification requirements. The gasoline refiner SERs generally stated that they believed that small refiners would face challenges in meeting a new standard. More specifically, they raised the concern that the rule could be very costly and dependence on credits may not be a comfortable situation; they were also concerned about the timing of the standards for this rule, given other upcoming fuel standards.

The Panel's findings and discussions were based on the information that was available during the term of the Panel and issues that were raised by the SERs during the outreach meetings and in their comments. It was agreed that EPA should consider the issues raised by the SERs (and discussions had by the Panel itself) and that EPA should consider comments on flexibility alternatives that would help to mitigate any negative impacts on small businesses. Alternatives discussed throughout the Panel process included those offered in previous or current EPA rulemakings, as well as alternatives suggested by SERs and Panel members, and the Panel recommended that all be considered in the development of the rule. Though some of the flexibilities suggested may be appropriate to apply to all entities affected by the rulemaking, the Panel's discussions and recommendations were focused mainly on the impacts, and ways to mitigate adverse impacts, on small businesses. A summary of these recommendations is detailed below, and a full discussion of the regulatory alternatives and hardship provisions discussed and recommended by the Panel can be found in the SBREFA Final Panel Report. A complete discussion of the transition and hardship provisions that we are proposing in today's action can be found in Sections VI.E, VII.E, and VIII (vehicle, fuels, and gas can sections) of this preamble. Also, the Panel Report includes all comments received from SERs (Appendices D and E of the Report) and summaries of the two outreach meetings that were held with the SERs (Appendices B and C). In accordance with the RFA/SBREFA requirements, the Panel evaluated the

aforementioned materials and SER comments on issues related to the Initial Regulatory Flexibility Analysis (IRFA). The following sections describe the Panel recommendations from the SBAR Panel Report.

c. Small Business Flexibilities

The Panel recommended that EPA consider and seek comment on a wide range of regulatory alternatives to mitigate the impacts of the rulemaking on small businesses, including those flexibility options described below. As previously stated, the following discussion is a summary of the SBAR Panel recommendations; our proposals regarding these recommendations are located in earlier sections of this rule preamble.

i. Highway Light-Duty Vehicles

(a) Highway Light-Duty Vehicle Flexibilities

For certification purposes (and for the sake of simplicity for Panel discussions regarding flexibility options), SVMs include ICIs and alternative fuel vehicle converters since they sell less than 15,000 vehicles per year. Similar to the flexibility provisions implemented in the Tier 2 rule, the Panel recommended that we allow SVMs (includes all vehicle small entities that would be affected by this rule, which are the majority of SVMs) the following flexibility options for meeting cold temperature VOC standards and evaporative emission standards:

For cold VOC standards, the Panel recommended that SVMs simply comply with the standards with 100 percent of their vehicles during the last year of the 4 year phase-in period. For example, if the standard for light-duty vehicles and light light-duty trucks (0 to 6,000 pounds GVWR) were to begin in 2010 and end in 2013 (25%, 50%, 75%, 100% phase-in over 4 years), the SVM provision would be 100 percent in 2013. If the standard for heavy light-duty trucks and medium-duty passenger vehicles (greater than 6,000 pounds GVWR) were to start in 2012 (25%, 50%, 75%, 100% phase-in over 4 years), the SVM provision would be 100 percent in 2015.

In regard to evaporative emission standards, the Panel recommended that since the evaporative emissions standards will not have phase-in years, we allow SVMs to simply comply with standards during the third year of the program (we have implemented similar provisions in past rulemakings). For a 2009 start date for light-duty vehicles and light light-duty trucks, SVMs would need to meet the evaporative emission standards in 2011. For a 2010 implementation date for heavy light-duty trucks and medium-duty passenger vehicles, SVMs would need to comply in 2012.

(b) Highway Light-Duty Vehicle Hardships

In addition, the Panel recommended that hardship flexibility provisions be extended to SVMs for the cold temperature VOC and evaporative emission standards. The provisions that the Panel recommended are:

SVMs would be allowed to apply (EPA would need to review and approve application) for up to an additional 2 years to meet the 100 percent phase-in requirements for cold VOC and the delayed requirement for evaporative emissions. Appeals for such hardship relief must be made in writing, must be submitted before the earliest date of noncompliance, must include evidence that the noncompliance will occur despite the manufacturer's best efforts to comply, and must include evidence that severe economic hardship will be faced by the company if the relief is not granted.

ii. Gasoline Refiners

(a) Gasoline Refiner Flexibilities

The Panel recommended that EPA propose certain provisions to encourage early compliance with lower benzene standards. The Panel recommended that EPA propose that small refiners be afforded the following flexibility options to help mitigate the impacts on small refiners:

Delay in Standards—The Panel recommended that a four-year delay period be proposed for small refiners. A four-year delay would be needed in order to allow for a review of the ABT program, as discussed below, to occur one year after implementation but still three years prior to the small refiner compliance deadline. It was noted by the small refiners that three years are generally needed for small refiners to obtain financing and perform engineering and construction. The Panel was also in support of allowing for refinery expansion within the delay option, and recommended that refinery expansion be provided for in the rule.

Early ABT Credits—The Panel recommended that early credit generation be afforded to small refiners that take some steps to meet the benzene requirement prior to the effective date of the standard. Depending on the start date of the program, and coupled with the four-year delay option, a small refiner could have a total credit generation period of five to seven years. The Panel was also in support of allowing refiners (small, as well as non-small, refiners) to generate credits for reductions to their benzene emissions levels, rather than credits only for meeting the benzene standard that is set by the rule.

The Panel recommended a review of the credit trading program and small refiner flexibility options one year after the general program starts. Such a review could take into account the number of early credits generated, as well as the number of credits generated and sold during the first year of the program. Further, a review after the first year of the program would still provide small refiners with the three years that it was suggested would be needed for these refiners to obtain financing and perform engineering and construction for benzene reduction equipment. Should the review conclude that changes to either the program or the small refiner provisions are necessary, the Panel recommended that EPA also consider some of the suggestions provided by the small refiners (their comments are located in Appendix E of the Final Panel Report), such as:

- The general MSAT program should require pre-compliance reporting (similar to EPA's highway and nonroad diesel rules);
- Following the review, EPA should revisit the small refiner provisions if it is found that the credit trading market does not exist, or if credits are only available at a cost that would not allow small refiners to purchase credits for compliance;
- The review should offer ways either to help the credit market, or help small refiners gain access to credits (e.g., EPA could ''create'' credits to introduce to the market, EPA could impose additional requirements to encourage trading with small refiners, etc.).

In addition, the Panel recommended that EPA consider in this rulemaking establishing an additional hardship provision to assist those small refiners that cannot comply with the MSAT with a viable credit market. (This suggested hardship provision was also suggested by the small refiners in their comments, located in Appendix E of the Final Panel Report). This hardship provision could address concerns that, for some small refineries, compliance may be technically feasible only through the purchase of credits and it may not be economically feasible to purchase those credits. This flexibility could be provided to a small refiner on a case-by-case basis following the review and based on a summary, by the refiner, of technical or financial infeasibility (or some other type of similar situation that

would render its compliance with the standard difficult). This hardship provision might include further delays and/or a slightly relaxed standard on an individual refinery basis for a duration of two years; in addition, provision might allow the refinery to request, and EPA grant, multiple extensions of the flexibility until the refinery's material situation changes. The Panel also stated that it understood that EPA may need to modify or rescind this provision, should it be implemented, based on the results of the program review.

(b) Gasoline Refiner Hardships

During the Panel process, we stated that we intended to propose the extreme unforeseen circumstances hardship and extreme hardship provisions (for all gasoline refiners and importers), similar to those in prior fuels programs. A hardship based on extreme unforeseen circumstances is intended to provide short term relief due to unanticipated circumstances beyond the control of the refiner, such as a natural disaster or a refinery fire; an extreme hardship is intended to provide short-term relief based on extreme circumstances (e.g., extreme financial problems, extreme operational or technical problems, etc.) that impose extreme hardship and thus significantly affect a refiner's ability to comply with the program requirements by the applicable dates. The Panel agreed with the proposal of such provisions and recommended that we include them in the MSAT rulemaking.

iii. Portable Gasoline Containers

(a) Portable Gasoline Container Flexibilities

Since nearly all gas can manufacturers are small entities and they account for about 60 percent of sales, the Panel planned to extend the flexibility options to all gas can manufacturers. Moreover, implementation of the program would be much simpler by doing so. The recommended flexibilities are the following:

Design Certification—The Panel recommended that we propose to permit gas can manufacturers to use design certification in lieu of running any or all of the durability aging cycles. Manufacturers could demonstrate the durability of their gas cans based in part on emissions test data from designs using the same permeation barriers and materials. Under a design-based certification program a manufacturer would provide evidence in the application for certification that their container would meet the applicable standards based on its design (e.g., use of a particular permeation barrier). The manufacturer would submit adequate engineering and other information about its individual design such that EPA could determine that the emissions performance of their individual design would not be negatively impacted by slosh, UV exposure, and/or pressure cycling (whichever tests the manufacturer is proposing to not run prior to emissions testing).

Broaden Certification Families—This approach would relax the criteria used to determine what constitutes a certification family. It would allow small businesses to limit their certification families (and therefore their certification testing burden), rather than testing all of the various size containers in a manufacturer's product line. Some small entities may be able to put all of their various size containers into a single certification family. Manufacturers would then certify their containers using the ''worst case'' configuration within the family. To be grouped together, containers would need to be manufactured using the same materials and processes even though they are of different sizes.

Additional Lead-time—Since it may take additional time for the gas can SERs to gather information to fully evaluate whether or not additional lead-time is needed beyond the 2009 start date, the Panel recommended that we discuss lead-time in the proposal and request comments on the need for additional lead-time to allow manufacturers to ramp up to a nationwide program.

Product Sell-through—As with past rulemakings for other source sectors, the Panel recommended that EPA propose to allow normal sell through of gas cans as long as manufacturers do not create stockpiles of noncomplying gas cans prior to the start of the program.

(b) Portable Gasoline Container Hardships

The Panel recommended that EPA propose two types of hardship programs for small gas can manufacturers. These provisions are:

Allow small manufacturers to petition EPA for limited additional lead-time to comply with the standards. A manufacturer would have to make the case that it has taken all possible business, technical, and economic steps to comply but the burden of compliance costs would have a significant adverse effect on the company's solvency. Hardship relief could include requirements for interim emission reductions. The length of the hardship relief would be established during the initial review and would likely need to be reviewed annually thereafter.

Permit small manufacturers to apply for hardship relief if circumstances outside their control cause the failure to comply (*i.e.* supply contract broken by parts supplier) and if failure to sell the subject containers would have a major impact on the company's solvency. The terms and timeframe of the relief would depend on the specific circumstances of the company and the situation involved. As part of its application, a company would be required to provide a compliance plan detailing when and how it would achieve compliance with the standards under both types of hardship relief.

We invite comments on all aspects of the proposal and its impacts on small entities.

D. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant federal intergovernmental mandates, and informing, educating, and advising

small governments on compliance with the regulatory requirements.

This rule contains no federal mandates for state, local, or tribal governments as defined by the provisions of Title II of the UMRA. The rule imposes no enforceable duties on any of these governmental entities. Nothing in the rule would significantly or uniquely affect small governments. EPA has determined that this rule contains federal mandates that may result in expenditures of more than $100 million to the private sector in any single year. EPA believes that the proposal represents the least costly, most cost-effective approach to achieve the statutory requirements of the rule. The costs and benefits associated with the proposal are discussed above and in the Draft Regulatory Impact Analysis, as required by the UMRA.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'' is defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

This proposed rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132.

Although section 6 of Executive Order 13132 does not apply to this rule, EPA did consult with representatives of various State and local governments in developing this rule. EPA has also consulted representatives from STAPPA/ALAPCO, which represents state and local air pollution officials.

In the spirit of Executive Order 13132, and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed rule from State and local officials.

F. Executive Order 13175: Consultation and Coordination With Indian Tribal Governments

Executive Order 13175, entitled ''Consultation and Coordination with Indian Tribal Governments'' (65 FR 67249, November 9, 2000), requires EPA to develop an accountable process to ensure ''meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications.''

This proposed rule does not have tribal implications as specified in Executive Order 13175. This rule will be implemented at the Federal level and impose compliance costs only on vehicle manufacturers (includes alternative fuel vehicle converters and ICIs), fuel producers, and portable gasoline container manufacturers. Tribal governments will be affected only to the extent they purchase and use regulated vehicles, fuels, and portable gasoline containers. Thus, Executive Order 13175 does not apply to this rule. EPA specifically solicits additional comment on this proposed rule from tribal officials.

G. Executive Order 13045: Protection of Children From Environmental Health and Safety Risks

Executive Order 13045, ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that (1) is determined to be ''economically significant'' as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, section 5–501 of the Order directs the Agency to evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This proposed rule is subject to the Executive Order because it is an economically significant regulatory action as defined by Executive Order 12866, and we believe that by addressing the environmental health or safety risk, this action may have a disproportionate beneficial effect on children. Accordingly, we have evaluated the potential environmental health or safety effects of VOC and toxics emissions from gasoline-fueled mobile sources and gas cans on children. The results of this evaluation are described below and contained in section IV.

Exposure to a number of the compounds addressed in this rule may have a disproportionate effect on children. First, exposure to carcinogens that cause cancer through a mutagenic mode of action during childhood development may have an incrementally disproportionate impact. Because of their small size, increased activity, and increased ventilation rates compared to adults, children may have greater exposure to these compounds in the ambient air, on a unit body weight basis. Moreover, for PM, because children's breathing rates are higher, their exposures may be higher and because their respiratory systems are still developing, children may be more susceptible to problems from exposure to respiratory irritants. The public is invited to submit or identify peer-reviewed studies and data, of which EPA may not be aware, that assessed results of early life exposure to the pollutants addressed by this rule.

H. Executive Order 13211: Actions That Significantly Affect Energy Supply, Distribution, or Use

This rule is not a ''significant energy action'' as defined in Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use'' (66 FR 28355 (May 22, 2001)) because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. If promulgated, the gasoline benzene provisions of the proposed rule would shift about 22,000 barrels per day of benzene from the gasoline market to the petrochemical market. This volume represents about 0.2 percent of nationwide gasoline production. The actual impact of the rule on the gasoline market, however, is likely to be less due to offsetting changes in the production of petrochemicals, as well as expected growth in the petrochemical market absent this rule. The major sources of benzene for the petrochemical market other than reformate from gasoline production are also derived from gasoline components or gasoline feedstocks. Consequently, the expected shift toward more benzene production from reformate due to this proposed rule would be offset by less benzene produced from other gasoline feedstocks.

The rule would require refiners to use a small additional amount of energy in processing gasoline to reduce benzene levels, primarily due to the increased energy used for benzene extraction. Our modeling of increased energy use indicates that the process energy used by refiners to produce gasoline would increase by about one percent. Overall,

we believe that the proposed rule would result in no significant adverse energy impacts.

The proposed gasoline benzene provisions would not affect the current gasoline distribution practices.

We discuss our analysis of the energy and supply effects of the proposed gasoline benzene standard further in section IX of this preamble and in Chapter 9 of the Regulatory Impact Analysis.

The fuel supply and energy effects described above would be offset substantially by the positive effects on gasoline supply and energy use of the proposed gas can standards also proposed in today's action. These proposed provisions would greatly reduce the gasoline lost to evaporation from gas cans. This would in turn reduce the demand for gasoline, increasing the gasoline supply and reducing the energy used in producing gasoline.

I. National Technology Transfer Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (''NTTAA''), Public Law No. 104–113, 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies. The NTTAA directs EPA to provide Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

The proposed rulemaking involves technical standards. Therefore, the Agency conducted a search to identify potentially applicable voluntary consensus standards. However, we identified no such standards. Therefore, for the cold temperature NMHC standards, EPA proposes to use the existing EPA cold temperature CO test procedures (manufacturers currently measure hydrocarbon emissions with current cold CO test procedures), which were adopted in a previous EPA rulemaking (1992). The fuel standards referenced in today's proposed rule involve the measurement of gasoline fuel parameters. The measurement standards for gasoline fuel parameters referenced in today's proposal are government-unique standards that were developed by the Agency through previous rulemakings. Both the cold temperature CO test procedures and the measurement standards for gasoline fuel parameters have served the Agency's emissions control goals well since their implementation and have been well accepted by industry. For gas cans, EPA is proposing new procedures for measuring hydrocarbon emissions.

EPA welcomes comments on this aspect of the proposed rulemaking and, specifically, invites the public to identify potentially-applicable voluntary consensus standards and to explain why such standards should be used in this regulation.

J. Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 directs Federal agencies to ''determine whether their programs, policies, and activities have disproportionately high adverse human health or environmental effects on minority populations' (sections 3–301 and 3–302). In developing this proposed rule, EPA assessed environmental justice issues that may be relevant to this proposal (see section IV of this proposed rule and chapter 3 of the Draft Regulatory Impact Analysis).

The proposed rule would reduce VOC and toxics emissions from gasoline-fueled mobile sources (particularly highway light-duty vehicles) and gas cans, and thus, it would decrease the amount of air pollution to which the entire population is exposed. EPA evaluated the population residing close to high traffic density (near roadways), and we found that this population has demographic differences from the general population, including a greater fraction of lower income and minority residents. Since the proposed rule would reduce emissions from roadways, those living nearby (more likely to be lower income and minority residents) are likely to have a disproportionate benefit from the proposed rule. Thus, this proposed rule does not have a disproportionately high adverse human health or environmental effect on minority populations.

XIII. Statutory Provisions and Legal Authority

Statutory authority for the fuels controls proposed in today's document can be found in sections 202 and 211(c) of the Clean Air Act (CAA), as amended, 42 U.S.C. sections 7521 and 7545(c). Additional support for the procedural and enforcement-related aspects of the fuel controls in today's proposal, including the proposed recordkeeping requirements, come from sections 114(a) and 301(a) of the CAA, 42 U.S.C. sections 7414(a) and 7601(a).

Statutory authority for the vehicle controls proposed in this document can be found in sections 202, 206, 207, 208, and 301 of the CAA, 42 U.S.C. sections 7521, 7525, 7541, 7542 and 7601.

Statutory authority for the portable gasoline container controls proposed in today's document can be found in sections 183(e) and 111, 42 U.S.C. sections 7511b(e) and 7411.

List of Subjects

40 CFR Part 59

Environmental protection, Administrative practice and procedure, Confidential business information, Incorporation by reference, Labeling, Consumer or Commercial Products pollution, Penalties, Reporting and recordkeeping requirements.

40 CFR Part 80

Environmental protection, Air pollution control, Fuel additives, Gasoline, Imports, Incorporation by reference, Labeling, Motor vehicle pollution, Penalties, Reporting and recordkeeping requirements.

40 CFR Part 85

Environmental protection, Administrative practice and procedure, Confidential business information, Imports, Labeling, Motor vehicle pollution, Penalties, Reporting and recordkeeping requirements, Research, Warranties.

40 CFR Part 86

Environmental protection, Administrative practice and procedure, Confidential business information, Incorporation by reference, Labeling, Motor vehicle pollution, Penalties, Reporting and recordkeeping requirements.

Dated: February 28, 2006.

Stephen L. Johnson,

Administrator.

For the reasons set forth in the preamble, parts 59, 80, 85 and 86 of title 40 of the Code of Federal Regulations are proposed to be amended as follows:

PART 59—NATIONAL VOLATILE ORGANIC COMPOUND EMISSION STANDARDS FOR CONSUMER AND COMMERCIAL PRODUCTS

1. The authority citation for part 59 continues to read as follows:

Authority: 42 U.S.C. 7414 and 7511b(e).

2. Subpart F is added to part 59 to read as follows:

Subpart F—Control of Evaporative Emissions From New and In-Use Portable Gasoline Containers

Sec.

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Subpart F—Control of Evaporative Emissions From New and In-Use Portable Gasoline Containers

Overview and Applicability

§ 59.600 Does this subpart apply for my products?

(a) Except as provided in § 59.605 and paragraph (b) and (c) of this section, the regulations in this subpart F apply for all portable gasoline containers (defined in § 59.680) beginning January 1, 2009.

(b) See § 59.602(a) and (b) to determine how to apply the provisions of this subpart for containers that were manufactured before January 1, 2009.

§ 59.601 Do the requirements of this subpart apply to me?

(a) Unless specified otherwise in this subpart, the requirements and prohibitions of this subpart apply to all manufacturers and importers of portable gasoline containers. Certain prohibitions in § 59.602 apply to all other persons.

(b) New portable gasoline containers that are subject to the emissions standards of this part must be covered by a certificate of conformity that is issued to the manufacturer of the container. If more than one person meets the definition of manufacturer for a portable gasoline container, see § 59.621 to determine if you are the manufacturer who may apply for and receive a certificate of conformity.

(c) Unless specifically noted otherwise, the term ''you'' means manufacturers, as defined in § 59.680.

§ 59.602 What are the general prohibitions and requirements of this subpart?

(a) *General prohibition for manufacturers and importers.* No manufacturer or importer may sell, offer for sale, introduce or deliver for introduction into commerce in the United States, or import any new portable gasoline container that is subject to the emissions standards of this subpart and is manufactured after December 31, 2008 unless it is covered by a valid certificate of conformity, it is labeled as required, and it complies with all of the applicable requirements of this subpart, including complies with the emissions standards for its useful life. After June 30, 2009, no manufacturer or importer may sell, offer for sale, introduce into commerce in the United States, or import any new portable gasoline container that was manufactured prior to January 1, 2009.

(b) *General prohibition for wholesale distributors.* No wholesale distributor may sell, offer for sale, or distribute any portable gasoline container that is subject to the emissions standards of this subpart and is manufactured after December 31, 2008 unless it is covered by a valid certificate of conformity and is labeled as required. After December 31, 2009, no wholesale distributor may sell, offer for sale, or distribute any portable gasoline container that was manufactured prior to January 1, 2009. After December 31, 2009, all new portable gasoline containers shall be deemed to be manufactured after December 31, 2008 unless they are in retail inventory.

(c) *Reporting and recordkeeping.* (1) You must keep the records and submit the reports specified in § 59.628. Records must be retained for at least 5 years from the date of manufacture or importation and must be supplied to EPA upon request.

(2) No person may alter, destroy, or falsify any record or report required by this subpart.

(d) *Testing and access to facilities.* You may not keep us from entering your facility to test inspect if we are authorized to do so. Also, you must perform the tests we require (or have the tests done for you). Failure to perform this testing is prohibited.

(e) *Warranty.* You may not fail to offer, provide notice of, or honor the emissions warranty required under this subpart.

(f) *Replacement components.* No person may sell, offer for sale, introduce or deliver for introduction into commerce in the United States, import, or install any replacement component for portable gasoline containers subject to the standards of this subpart where the component has the effect of disabling, bypassing, or rendering inoperative the emissions controls of the containers.

(g) *Violations.* If a person violates any prohibition or requirement of this subpart or the Act concerning portable gasoline containers, it shall be considered a separate violation for each portable gasoline container.

(h) *Assessment of penalties and injunctions.* We may assess administrative penalties, bring a civil action to assess and recover civil penalties, bring a civil action to enjoin and restrain violations, or bring criminal action as provided by the Clean Air Act.

§ 59.603 How must manufacturers apply good engineering judgment?

(a) In addition to other requirements and prohibitions set forth in this subpart, you must use good engineering judgment for decisions related to any requirements under this subpart. This

includes your applications for certification, any testing you do to show that your portable gasoline containers comply with requirements that apply to them, and how you select, categorize, determine, and apply these requirements.

(b) Upon request, you must provide EPA a written description of the engineering judgment in question. Such information must be provided within 15 working days unless EPA specifies a different period of time to respond.

(c) We may reject your decision if it is not based on good engineering judgment or is otherwise inconsistent with the requirements that apply, and we may:

(1) Suspend, revoke, or void a certificate of conformity if we determine you used incorrect or incomplete information or failed to consider relevant information, or that your decision was not based on good engineering judgment; or

(2) Notify you that we believe any aspect of your application or other information submission may be incorrect or invalid due to lack of good engineering judgment or other cause. Unless a different period of time is specified, you will have 30 days to respond to our notice and specifically address our concerns. After considering your information, we will notify regarding our finding, which may include the actions provided in paragraph (c)(1) of this section.

(d) If you disagree with our conclusions under paragraph (c) of this section, you may file a request for a hearing with the Designated Compliance Officer as described in § 59.699. In your request, you must specifically state your objections, and include relevant data or supporting analysis. The request must be signed by your authorized representative. If we agree that your request raises a substantial factual issue, we will hold the hearing according to § 59.699.

§ 59.605 What portable gasoline containers are excluded from this subpart's requirements?

This section describes exclusions that apply to certain portable gasoline containers. The prohibitions and requirements of this subpart do not apply for containers excluded under this section. Exclusions under this section are based on inherent characteristics of the containers. See § 59.660 for exemptions that apply based on special circumstances.

(a) Containers approved as safety cans consistent with the requirements of Title 29, part 1926, subpart F, of the Code of Federal Regulations (29 CFR 1926.150 through 1926.152) are excluded. Such cans generally have a flash-arresting screens, spring-closing lids and spout covers and have been approved by a nationally recognized testing laboratory such as Factory Mutual Engineering Corp., Underwriters' Laboratories, Inc., or Federal agencies such as Bureau of Mines, or U.S. Coast Guard.

(b) Containers with a nominal capacity of less than 0.25 gallons or more than 10.0 gallons are excluded.

(c) Containers designed and marketed solely to deliver fuel directly to nonroad engines during engine operation, such as containers with a connection for a fuel line and a reserve fuel area, are considered to be nonroad fuel tanks, and are thus excluded.

§ 59.607 Submission of information.

(a) You are responsible for all statements you make to us related to this subpart F, including information not required during certification. You are required to provide truthful and complete information. This subpart describes the consequences of failing to meet this obligation. The consequences also may include prosecution under 18 U.S.C. 1001 and 42 U.S.C. 7431(c)(2).

(b) We may require an officer or authorized representative of your company with knowledge of the other information contained in the submittal to approve and sign any submission of information to us, and to certify that all of the information submitted is accurate and complete.

Emission Standards and Related Requirements

§ 59.611 What evaporative emission requirements apply under this subpart?

(a) Emissions from portable gasoline containers may not exceed 0.30 grams per gallon per day when measured with the test procedures in §§ 59.650 through 59.653. This procedure measures diurnal venting emissions and permeation emissions.

(b) For the purpose of this section, portable gasoline containers include spouts, caps, gaskets, and other parts provided with the container.

(c) The following general requirements also apply for all portable gasoline containers subject to the standards of this subpart:

(1) *Prohibited controls*. You may not design your emission-control systems so that they cause or contribute to an unreasonable risk to public health, welfare, or safety while operating. You may not design your portable gasoline containers to have adjustable parameters unless the containers will meet all the requirements of this subpart when adjusted anywhere within the physically adjustable range. You may not equip your portable gasoline containers with a defeat device, or intentionally produce your containers to enable the use of a defeat device. A defeat device is an element of design (either original or replacement) that is not approved in advance by EPA and that reduces the effectiveness of emission controls under conditions that the portable gasoline containers may reasonably be expected to encounter during normal use.

(2) *Leaks*. You must design and manufacture your containers to be free of leaks. This requirement applies when your container is upright, partially inverted, or completely inverted.

(3) *Refueling*. You are required to design your portable gasoline containers to minimize spillage during refueling to the extent practical. This requires that you use good engineering judgment to avoid designs that will make it difficult to refuel typical vehicle and equipment designs without spillage.

(d) Portable gasoline containers must meet the standards and requirements specified in this subpart throughout the useful life of the container. The useful life of the container is five years beginning on the date of sale to the ultimate purchaser.

§ 59.612 What emission-related warranty requirements apply to me?

(a) *General requirements*. You must warrant to the ultimate purchaser that the new portable gasoline container, including all parts of its evaporative emission-control system, is:

(1) Designed, built, and equipped so it conforms at the time of sale to the ultimate purchaser with the requirements of this subpart.

(2) Is free from defects in materials and workmanship that may keep it from meeting these requirements.

(b) *Warranty notice and period*. Your emission-related warranty must be valid for a minimum of one year from the date of sale to the ultimate purchaser.

(c) *Notice*. You must provide a warranty notice with each container.

§ 59.613 What operation and maintenance instructions must I give to buyers?

You must provide the ultimate purchaser of the new portable gasoline container written instructions for properly maintaining and using the emission-control system.

§ 59.615 How must I label and identify the portable gasoline containers I produce?

This section describes how you must label your portable gasoline containers.

(a) At the time of manufacture, indelibly mark the month and year of manufacture on each container.

(b) Mold into or affix a legible label identifying each portable gasoline container. The label must be:

(1) Attached so it is not easily removable.

(2) Secured to a part of the container that can be easily viewed when the can is in use, not on the bottom of the container.

(3) Written in English.

(c) The label must include:

(1) The heading ''EMISSION CONTROL INFORMATION''.

(2) Your full corporate name and trademark.

(3) A standardized identifier such as EPA's standardized designation for the emission families, the model number, or the part number.

(4) This statement: ''THIS CONTAINER COMPLIES WITH U.S. EPA EMISSION REGULATIONS FOR PORTABLE GASOLINE CONTAINERS.''.

(d) You may add information to the emission control information label to identify other emission standards that the container meets or does not meet (such as California standards). You may also add other information to ensure that the portable gasoline container will be properly maintained and used.

(e) You may request EPA to approve modified labeling requirements in this subpart F if you show that it is necessary or appropriate. We will approve your request if your alternate label is consistent with the requirements of this subpart.

(f) You may identify the name and trademark of another company instead of their own on your emission control information label, subject to the following provisions:

(1) You must have a contractual agreement with the other company that obligates that company to take the following steps:

(i) Meet the emission warranty requirements that apply under § 59.612. This may involve a separate agreement involving reimbursement of warranty-related expenses.

(ii) Report all warranty-related information to the certificate holder.

(2) In your application for certification, identify the company whose trademark you will use and describe the arrangements you have made to meet your requirements under this section.

(3) You remain responsible for meeting all the requirements of this subpart.

Certifying Emission Families

§ 59.621 Who may apply for a certificate of conformity?

A certificate of conformity may only be issued to the manufacturer that completes the construction of the portable gasoline container. In unusual circumstances, upon a petition by a manufacturer, we may allow another manufacturer of the container to hold the certificate of conformity. However, in order to hold the certificate, the manufacturer must demonstrate day-to-day ability to ensure that containers produced under the certificate will comply with the requirements of this subpart.

§ 59.622 What are the general requirements for obtaining a certificate of conformity and producing portable gasoline containers under it?

(a) You must send us a separate application for a certificate of conformity for each emission family. A certificate of conformity for containers is valid from the indicated effective date until the end of the production period for which it is issued. EPA may require new certification prior to the end of the production period if EPA finds that containers are not meeting the standards in use during their useful life.

(b) The application must be written in English and contain all the information required by this subpart and must not include false or incomplete statements or information (see § 59.629).

(c) We may ask you to include less information than we specify in this subpart, as long as you maintain all the information required by § 59.628.

(d) You must use good engineering judgment for all decisions related to your application (see § 59.603).

(e) An authorized representative of your company must approve and sign the application.

(f) See § 59.629 for provisions describing how we will process your application.

(g) You may ask us to modify specific provisions for demonstrating compliance with the requirements of this subpart if they cannot be met for your portable gasoline container. We may approve your request if we determine that such a change is consistent with the intent of this subpart. We will not approve your request if it might lead to less effective emission control or prevent us from ensuring compliance with the requirements of this subpart. To make a request, describe in writing which provision you are unable to meet, why you are unable to meet it, and how the provision should be modified to address your concern.

(h) If we approve your application, we will issue a certificate that will allow you to produce the containers that you described in your application for a specified production period. Certificates do not allow you to produce containers that were not described in your application, unless we approve the additional containers under § 59.624.

§ 59.623 What must I include in my application?

This section specifies the information that must be in your application, unless we ask you to include less information under § 59.622(c). We may require you to provide additional information to evaluate your application.

(a) Describe the emission family's specifications and other basic parameters of the emission controls. List each distinguishable configuration in the emission family. Include descriptions and part numbers for all detachable components such as spouts and caps.

(b) Describe and explain the method of emission control.

(c) Describe the products you selected for testing and the reasons for selecting them.

(d) Describe the test equipment and procedures that you used, including any special or alternate test procedures you used (see § 59.650).

(e) List the specifications of the test fuel to show that it falls within the required ranges specified in § 59.650 of this subpart.

(f) Include the maintenance and use instructions and warranty information you will give to the ultimate purchaser of each new portable gasoline container (see § 59.613).

(g) Describe your emission control information label (see § 59.615).

(h) State that your product was tested as described in the application (including the test procedures, test parameters, and test fuels) to show you meet the requirements of this subpart.

(i) Present emission data to show your products meet the applicable emission standards. Where applicable, §§ 59.626 and 59.627 may allow you to submit an application in certain cases without new emission data.

(j) Report all test results, including those from invalid tests or from any other tests, whether or not they were conducted according to the test procedures of §§ 59.650 through 59.653. We may ask you to send other information to confirm that your tests were valid under the requirements of this subpart.

(k) Unconditionally certify that all the products in the emission family comply with the requirements of this subpart,

other referenced parts of the CFR, and the Clean Air Act.

(l) Include estimates of U.S.-directed production volumes.

(m) Include the information required by other sections of this subpart.

(n) Include other relevant information, including any additional information requested by EPA.

(o) Name an agent for service of process located in the United States. Service on this agent constitutes service on you or any of your officers or employees for any action by EPA or otherwise by the United States related to the requirements of this subpart.

§ 59.624 How do I amend my application for certification?

Before we issue you a certificate of conformity, you may amend your application to include new or modified configurations, subject to the provisions of this section. After we have issued your certificate of conformity, you may send us an amended application requesting that we include new or modified configurations within the scope of the certificate, subject to the provisions of this section. You must amend your application if any changes occur with respect to any information included in your application.

(a) You must amend your application before you take either of the following actions:

(1) Add a configuration to an emission family. In this case, the configuration added must be consistent with other configurations in the emission family with respect to the criteria listed in § 59.625.

(2) Change a configuration already included in an emission family in a way that may affect emissions, or change any of the components you described in your application for certification. This includes production and design changes that may affect emissions any time during the portable gasoline containers' lifetime.

(b) To amend your application for certification, send the Designated Compliance Officer the following information:

(1) Describe in detail the addition or change in the configuration you intend to make.

(2) Include engineering evaluations or data showing that the amended emission family complies with all applicable requirements. You may do this by showing that the original emission data are still appropriate with respect to showing compliance of the amended family with all applicable requirements.

(3) If the original emission data for the emission family are not appropriate to show compliance for the new or modified configuration, include new test data showing that the new or modified configuration meets the requirements of this subpart.

(c) We may ask for more test data or engineering evaluations. You must give us these within 30 days after we request them.

(d) For emission families already covered by a certificate of conformity, we will determine whether the existing certificate of conformity covers your new or modified configuration. You may ask for a hearing if we deny your request (see § 59.699).

(e) For emission families already covered by a certificate of conformity and you send us a request to amend your application, you may sell and distribute the new or modified configuration before we make a decision under paragraph (d) of this section, subject to the provisions of this paragraph. If we determine that the affected configurations do not meet applicable requirements, we will notify you to cease production of the configurations and any containers from the new or modified configuration will not be considered covered by the certificate. In addition, we may require you to recall any affected containers that you have already distributed, including those sold to the ultimate purchasers. Choosing to produce containers under this paragraph (e) is deemed to be consent to recall all containers that we determine do not meet applicable emission standards or other requirements and to remedy the nonconformity at no expense to the owner. If you do not provide information required under paragraph (c) of this section within 30 days, you must stop producing the new or modified containers.

§ 59.625 How do I select emission families?

(a) Divide your product line into families of portable gasoline containers that are expected to have similar emission characteristics throughout the useful life.

(b) Group containers in the same emission family if they are the same in all the following aspects:

(1) Type of material (including pigments, plasticizers, UV inhibitors, or other additives).

(2) Production method.

(3) Spout design.

(4) Gasket material/design.

(5) Emission control strategy.

(c) You may subdivide a group of containers that is identical under paragraph (b) of this section into different emission families if you show the expected emission characteristics are different.

(d) You may group containers that are not identical with respect to the things listed in paragraph (b) of this section in the same emission family if you show that their emission characteristics will be similar throughout their useful life.

§ 59.626 What emission testing must I perform for my application for a certificate of conformity?

This section describes the emission testing you must perform to show compliance with the emission standards in § 59.611.

(a) Test your products using the procedures and equipment specified in §§ 59.650 through 59.653.

(b) Select an emission-data unit from each emission family for testing. You must test a production sample or a preproduction product that will represent actual production. Select the configuration that is most likely to exceed (or have emissions nearest to) the applicable emission standard. For example, for a family of multilayer portable gasoline containers, test the container with the thinnest barrier layer. Test 3 identical containers.

(c) We may measure emissions from any of your products from the emission family. You must supply your products to us if we choose to perform confirmatory testing.

(d) You may ask to use emission data from a previous production period (carryover) instead of doing new tests, but only if the emission-data from the previous production period remains the appropriate emission-data unit under paragraph (b) of this section. For example, you may not carryover emission data for your family of containers if you have added a thinner-walled container than was tested previously.

(e) We may require you to test a second unit of the same or different configuration in addition to the unit tested under paragraph (b) of this section.

(f) If you use an alternate test procedure under § 59.652 and later testing shows that such testing does not produce results that are equivalent to the procedures specified in this subpart, we may reject data you generated using the alternate procedure and base our compliance determination on the later testing.

§ 59.627 How do I demonstrate that my emission family complies with evaporative emission standards?

(a) For purposes of certification, your emission family is considered in compliance with an evaporative

emission standard in § 59.611(a) if the test results from all portable gasoline containers in the family that have been tested show measured emissions levels that are at or below the applicable standard.

(b) Your emissions family is deemed not to comply if any container representing that family has test results showing an official emission level above the standard.

(c) Round the measured emission level to the same number of decimal places as the emission standard. Compare the rounded emission levels to the emission standard.

§ 59.628 What records must I keep and what reports must I send to EPA?

(a) Organize and maintain the following records:

(1) A copy of all applications and any summary information you send us.

(2) Any of the information we specify in § 59.623 that you were not required to include in your application.

(3) A detailed history of each emission-data unit. For each emission data unit, include all of the following:

(i) The emission-data unit's construction, including its origin and buildup, steps you took to ensure that it represents production containers, any components you built specially for it, and all the components you include in your application for certification.

(ii) All your emission tests, including documentation on routine and standard tests, as specified in §§ 59.650 through 59.653, and the date and purpose of each test.

(iii) All tests to diagnose emission-control performance, giving the date and time of each and the reasons for the test.

(iv) Any other relevant events or information.

(4) Production figures for each emission family divided by assembly plant.

(5) If you identify your portable gasoline containers by lot number or other identification numbers, keep a record of these numbers for all the containers you produce under each certificate of conformity.

(b) Keep data from routine emission tests (such as test cell temperatures and relative humidity readings) for one year after we issue the associated certificate of conformity. Keep all other information specified in paragraph (a) of this section for five years after we issue your certificate.

(c) Store these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them. You must keep these records readily available. We may review them at any time.

(d) Send us copies of any maintenance instructions or explanations if we ask for them.

(e) Send us an annual warranty report summarizing by emissions family successful warranty claims under § 59.612, including the reason for the claim. You must submit the report by July 1 for the preceding calendar year.

§ 59.629 What decisions may EPA make regarding my certificate of conformity?

(a) If we determine your application is complete and shows that the emission family meets all the requirements of this subpart and the Act, we will issue a certificate of conformity for your emission family for the specified production period. We may make the approval subject to additional conditions.

(b) We may deny your application for certification if we determine that your emission family fails to comply with emission standards or other requirements of this subpart or the Act. Our decision may be based on a review of all information available to us. If we deny your application, we will explain why in writing.

(c) In addition, we may deny your application or suspend, revoke, or void your certificate if you do any of the following:

(1) Refuse to comply with any testing or reporting requirements.

(2) Submit false or incomplete information.

(3) Render inaccurate any test data.

(4) Deny us from completing authorized activities despite our presenting a warrant or court order (see § 59.698). This includes a failure to provide reasonable assistance.

(5) Produce portable gasoline containers for importation into the United States at a location where local law prohibits us from carrying out authorized activities.

(6) Fail to supply requested information or amend your application to include all portable gasoline containers being produced.

(7) Take any action that otherwise circumvents the intent of the Act or this subpart.

(d) If we deny your application or suspend, revoke, or void your certificate, you may ask for a hearing (see § 59.699).

§ 59.630 EPA testing.

We may test any portable gasoline container subject to the standards of this subpart.

(a) *Certification and production sample testing.* Upon our request, a manufacturer must supply a prototype container or a reasonable number of production samples to us for verification testing. These samples will generally be tested using the full test procedure of § 59.653.

(b) *In-use testing.* We may test in-use containers using the test procedure of § 59.653 without preconditioning.

§ 59.650 General testing provisions.

(a) The test procedures of this subpart are addressed to you as a manufacturer, but they apply equally to anyone who does testing for you.

(b) Unless we specify otherwise, the terms ''procedures'' and ''test procedures'' in this subpart include all aspects of testing, including the equipment specifications, calibrations, calculations, and other protocols and procedural specifications needed to measure emissions.

(c) The specification for gasoline to be used for testing is given in 40 CFR 1065.210. Use the grade of gasoline specified for general testing. Blend this grade of gasoline with reagent grade ethanol in a volumetric ratio of 90.0 percent gasoline to 10.0 percent ethanol. You may use ethanol that is less pure if you can demonstrate that it will not affect your ability to demonstrate compliance with the applicable emission standards.

(d) Accuracy and precision of all temperature measurements must be ±2.2 °C or better.

(e) Accuracy and precision of mass balances must be sufficient to ensure accuracy and precision of two percent or better for emission measurements for products at the maximum level allowed by the standard. The readability of the display may not be coarser than half of the required accuracy and precision.

§ 59.652 Other procedures.

(a) *Your testing.* The procedures in this subpart apply for all testing you do to show compliance with emission standards, with certain exceptions listed in this section.

(b) *Our testing.* These procedures generally apply for testing that we do to determine if your portable gasoline containers complies with applicable emission standards. We may perform other testing as allowed by the Act.

(c) *Exceptions.* We may allow or require you to use procedures other than those specified in this subpart in the following cases.

(1) You may request to use special procedures if your portable gasoline containers cannot be tested using the specified procedures. We will approve your request if we determine that it would produce emission measurements that represent in-use operation and we determine that it can be used to show

compliance with the requirements of the standard-setting section.

(2) You may ask to use emission data collected using other procedures, such as those of the California Air Resources Board. We will approve this only if you show us that using these other procedures do not affect your ability to show compliance with the applicable emission standards. This generally requires emission levels to be far enough below the applicable emission standards so that any test differences do not affect your ability to state unconditionally that your containers will meet all applicable emission standards when tested using the specified test procedures.

(3) You may request to use alternate procedures that are equivalent to allowed procedures, or more accurate or more precise than allowed procedures.

(d) You may not use other procedures under paragraph (c) of this section until we approve your request.

§ 59.653 How do I test portable gasoline containers?

You must test the portable gasoline container as described in your application, with the applicable spout and cap attached. Tighten fittings in a manner representative of how they would be tightened by a typical user.

(a) *Preconditioning for durability*. Complete the following steps at the start of testing, unless we determine that omission of one or more of these durability steps will not affect the emissions from your container.

(1) *Pressure cycling*. Perform a pressure test by sealing the container and cycling it between +13.8 and −1.7 kPa (+2.0 and −0.5 psig) and back to +13.8 kPa for 10,000 cycles at a rate of 60 seconds per cycle.

(2) *UV exposure*. Perform a sunlight-exposure test by exposing the container to an ultraviolet light of at least 24 W/m^2 (0.40 W-hr/m^2/min) on the container surface for at least 450 hours. Alternatively, the container may be exposed to direct natural sunlight for an equivalent period of time, as long as you ensure that the container is exposed to at least 450 daylight hours.

(3) *Slosh testing.* Perform a slosh test by filling the portable gasoline container to 40 percent of its capacity with the fuel specified in paragraph (e) of this section and rocking it at a rate of 15 cycles per minute until you reach one million total cycles. Use an angle deviation of +15° to −15° from level. This test must be performed at a temperature of 28 °C ± 5°C.

(4) *Spout actuation.* Perform the following spout actuation and inversion steps at the end on the slosh testing, and at the end of the preconditioning soak.

(i) Perform one complete actuation/inversion cycle per day for ten days.

(ii) One actuation/inversion cycle consists of the following steps:

(A) Remove and replace the spout to simulate filling the container.

(B) Slowly invert the container and keep it inverted for at least 5 seconds to ensure that the spout and mechanisms become saturated with fuel. Any fuel leaking from any part of the container will denote a leak and will be reported as part of certification. Once completed, place the container on a flat surface in the upright position.

(C) Actuate the spout by fully opening and closing without dispensing fuel. The spout must return to the closed position without the aid of the operator (e.g., pushing or pulling the spout closed). Repeat for a total of 10 actuations. If at any point the spout fails to return to the closed position, the container fails the test.

(D) Repeat the step contained in paragraph (a)(4)(ii)(B) of this section (i.e., the inversion step).

(E) Repeat the steps contained in paragraph (a)(4)(ii)(C) of this section (i.e., ten actuations).

(b) *Preconditioning fuel soak.* Complete the following steps before a diurnal emission test: (1) Fill the portable gasoline container with the specified fuel to its nominal capacity, seal it using the spout, and allow it to soak at 28 ±5 °C for at least 20 weeks. You are not required to soak the container for more than 20 weeks unless it has been determined that a longer soak period is needed to achieve a stabilized emissions rate. Alternatively, the container may be soaked for a shorter period of time at a higher temperature if you can show that the hydrocarbon permeation rate has stabilized. You may count the time of the slosh testing as part of the 20 weeks.

(2) Pour the fuel out of the container and immediately refill to 50 percent of nominal capacity. Be careful to not spill any fuel on the container. Wipe the outside of the container as needed to remove any liquid fuel that may have spilled on it.

(3) Seal the container using the spout and cap assemblies that will used to seal the openings in a production container. Leave other openings on the container (such as vents) open unless they are automatically closing and unlikely for the user to leave open during typical storage.

(c) *Reference container.* A reference tank is required to correct for buoyancy effects that may occur during testing. Prepare the reference tank as follows:

(1) Obtain a second tank that is identical to the test tank. You may not use a tank that has previously contained fuel or any other contents that might affect the stability of its mass.

(2) Fill the reference tank with enough dry sand (or other inert material) so that the mass of the reference tank is approximately the same as the test tank when filled with fuel. Use good engineering judgment to determine how similar the mass of the reference tank needs to be to the mass of the test tank considering the performance characteristics of your balance.

(3) Ensure that the sand (or other inert material) is dry. This may require heating the tank or applying a vacuum to it.

(4) Seal the tank.

(d) *Diurnal test run.* To run the test, take the steps specified in this paragraph (d) for a portable gasoline container that was preconditioned as specified in paragraph (a) of this section.

(1) Stabilize the fuel temperature within the portable gasoline container at 22.2 °C. Vent the container at this point to relieve any positive or negative pressure that may have developed during stabilization.

(2) Weigh the sealed reference container and record the weight. Place the reference on the balance and tare it so that it reads zero. Place the sealed test portable gasoline container on the balance and record the difference between the test container and the reference container. This value is $M_{initial}$ Take this measurement within 8 hours of filling the test container with fuel as specified in paragraph (b)(2) of this section.

(2) Immediately place the portable gasoline container within a well ventilated, temperature-controlled room or enclosure. Do not spill or add any fuel.

(3) Close the room or enclosure.

(4) Follow the temperature profile in the following table for all portable gasoline containers. Use good engineering judgment to follow this profile as closely as possible. You may use linearly interpolated temperatures or a spline fit for temperatures between the hourly setpoints.

TABLE 1 OF § 59.653.—DIURNAL TEMPERATURE PROFILE FOR PORTABLE GASOLINE CONTAINERS

Time (hours)	Ambient Temperature (C) Profile for Portable Gasoline Containers
0	22.2
1	22.5
2	24.2
3	26.8
4	29.6
5	31.9
6	33.9
7	35.1
8	35.4
9	35.6
10	35.3
11	34.5
12	33.2
13	31.4
14	29.7
15	28.2
16	27.2
17	26.1
18	25.1
19	24.3
20	23.7
21	23.3
22	22.9
23	22.6
24	22.2

(5) At the end of the diurnal period, retare the balance using the reference container and weigh the portable gasoline container. Record the difference in mass between the reference container and the test. This value is M_{final}

(6) Subtract M_{final} from $M_{initial}$; and divide the difference by the nominal capacity of the container (using at least three significant figures) to calculate the g/gallon/day emission rate:

Emission rate = $(M_{initial} - M_{final})$/ (nominal capacity)/(one day)

(7) Round your result to the same number of decimal places as the emission standard.

(8) Instead of determining emissions by weighing the container before and after the diurnal temperature cycle, you may place the container in a SHED meeting the specifications of 40 CFR 86.107–96(a)(1) and measure emissions directly. Immediately following the stabilization in paragraph (d)(1) of this section, purge the SHED and follow the temperature profile from paragraph (d)(4) of this section. Start measuring emissions when you start the temperature profile.

(e) For metal containers, you may demonstrate for certification that your portable gasoline containers comply with the evaporative emission standards without performing the pre-soak or container durability cycles (i.e., the pressure cycling, UV exposure, and slosh testing) specified in this section. For other containers, you may demonstrate compliance without performing the durability cycles specified in this section only if we approve it after you have presented data clearly demonstrating that the cycle or cycles do not negatively impact the permeation rate of the materials used in the containers.

Special Compliance Provisions

§ 59.660 Exemption from the standards.

In certain circumstances, we may exempt portable gasoline containers from the evaporative emission standards and requirements of § 59.611 and the prohibitions and requirements of § 59.602. You do not need an exemption for any containers that you own but do not sell, offer for sale, introduce or deliver for introduction into U.S. commerce, or import into the United States. Submit your request for an exemption to the Designated Compliance Officer.

(a) Portable gasoline containers that are intended for export only and are in fact exported are exempt provided they are clearly labeled as being for export only. Keep records for five years of all portable gasoline containers that you manufacture for export. Any introduction into U.S. commerce for any purpose other than export is considered to be a violation of § 59.602 by the manufacturer. You do not need to request this exemption.

(b) You may ask us to exempt portable gasoline containers that you will purchase, sell, or distribute for the sole purpose of testing them.

(c) You may ask us to exempt portable gasoline containers for the purpose of national security, as long as your request is endorsed by an agency of the federal government responsible for national defense. In your request, explain why you need the exemption.

(d) You may ask us to exempt containers that are designed and marketed solely for rapidly refueling racing applications which are designed to create a leak proof seal with the target tank or are designed to connect with a receiver installed on the target tank. This exemption is generally intended for containers used to rapidly refuel a race car during a pit stop and similar containers. In your request, explain how why these containers are unlikely to be used for nonracing applications. We may limit these exemptions to those applications that are allowed to use gasoline exempted under 40 CFR 80.200.

(e) EPA may impose reasonable conditions on any exemption, including a limit on the number of containers that are covered by an exemption.

§ 59.662 What temporary provisions address hardship due to unusual circumstances?

(a) After considering the circumstances, we may permit you to introduce into commerce exempt you from the evaporative emission standards and requirements of § 59.611 of this subpart and the prohibitions and requirements of § 59.602 for specified portable gasoline containers that do not comply with emission standards if all the following conditions apply:

(1) Unusual circumstances that are clearly outside your control and that could not have been avoided with reasonable discretion prevent you from meeting requirements from this subpart.

(2) You exercised prudent planning and were not able to avoid the violation; you have taken all reasonable steps to minimize the extent of the nonconformity.

(3) Not having the exemption will jeopardize the solvency of your company.

(4) No other allowances are available under the regulations in this chapter to avoid the impending violation.

(b) To apply for an exemption, you must send the Designated Officer a written request as soon as possible before you are in violation. In your request, show that you meet all the conditions and requirements in paragraph (a) of this section.

(c) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(d) You must give us other relevant information if we ask for it.

(e) We may include reasonable additional conditions on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit or paying fees to offset any economic gain resulting from the exemption.

(f) We may approve extensions of up to one year. We may review and revise an extension as reasonable under the circumstances.

(g) Add a legible label, written in block letters in English, to a readily visible part of each container exempted under this section. This label must prominently include at least the following items:

(1) Your corporate name and trademark.

(2) The statement ''EXEMPT UNDER 40 CFR 59.662.''.

§ 59.663 What are the provisions for extending compliance deadlines for manufacturers under hardship?

(a) After considering the circumstances, we may extend the compliance deadline for you to meet new emission standards, as long as you meet all the conditions and requirements in this section.

(b) To apply for an extension, you must send the Designated Compliance Officer a written request. In your request, show that all the following conditions and requirements apply:

(1) You have taken all possible business, technical, and economic steps to comply.

(2) Show that the burden of compliance costs prevents you from meeting the requirements of this subpart by the required compliance date.

(3) Not having the exemption will jeopardize the solvency of your company.

(4) No other allowances are available under the regulations in this subpart to avoid the impending violation.

(c) In describing the steps you have taken to comply under paragraph (b)(1) of this section, include at least the following information:

(1) Describe your business plan, showing the range of projects active or under consideration.

(2) Describe your current and projected financial standing, with and without the burden of complying in full with the applicable regulations in this subpart by the required compliance date.

(3) Describe your efforts to raise capital to comply with regulations in this subpart.

(4) Identify the engineering and technical steps you have taken or plan to take to comply with regulations in this subpart.

(5) Identify the level of compliance you can achieve. For example, you may be able to produce containers that meet a somewhat less stringent emission standard than the regulations in this subpart require.

(d) Include in your request a plan showing how you will meet all the applicable requirements as quickly as possible.

(e) You must give us other relevant information if we ask for it.

(f) An authorized representative of your company must sign the request and include the statement: ''All the information in this request is true and accurate, to the best of my knowledge.''.

(g) Send your request for this extension at least nine months before the relevant deadline.

(h) We may include reasonable requirements on an approval granted under this section, including provisions to recover or otherwise address the lost environmental benefit. For example, we may require that you meet a less stringent emission standard.

(i) We may approve extensions of up to one year. We may review and revise an extension as reasonable under the circumstances.

(j) Add a permanent, legible label, written in block letters in English, to a readily visible part of each container exempted under this section. This label must prominently include at least the following items:

(1) Your corporate name and trademark.

(2) The statement ''EXEMPT UNDER 40 CFR 59.663.''.

§ 59.664 What are the requirements for importing portable gasoline containers into the United States?

As specified in this section, we may require you to post a bond if you import into the U.S. containers that are subject to the standards of this subpart. See paragraph (f) of this section for the requirements related to importing containers that have been certified by someone else.

(a) Prior to importing containers into the U.S., we may require you to post a bond to cover any potential enforcement actions under the Clean Air Act if you cannot demonstrate to us that you have assets of an appropriate liquidity readily available in the United States with a value equal to the retail value of the containers that you will import during the calendar year.

(b) We may set the value of the bond up to five dollars per container.

(c) You may meet the bond requirements of this section by obtaining a bond from a third-party surety that is cited in the U.S. Department of Treasury Circular 570, ''Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies'' (*http://www.fms.treas.gov/c570/c570.html#certified*).

(d) If you forfeit some or all of your bond in an enforcement action, you must post any appropriate bond for continuing importation within 90 days after you forfeit the bond amount.

(e) You will forfeit the proceeds of the bond posted under this section if you need to satisfy any United States administrative final order or judicial judgment against you arising from your conduct in violation of this subpart.

(f) This paragraph (f) applies if you import for resale containers that have been certified by someone else. You and the certificate holder are each responsible for compliance with the requirements of this subpart and the Clean Air Act. No bond is required under this section if either you or the certificate holder meet the conditions in paragraph (a) of this section. Otherwise, the importer must comply with the bond requirements of this section.

Definitions and Other Reference Information

§ 59.680 What definitions apply to this subpart?

The following definitions apply to this subpart. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them. The definitions follow:

Act means the Clean Air Act, as amended, 42 U.S.C. 7401—7671q.

Adjustable parameter means any device, system, or element of design that someone can adjust and that, if adjusted, may affect emissions. You may ask us to exclude a parameter if you show us that it will not be adjusted in use in a way that affects emissions.

Certification means the process of obtaining a certificate of conformity for an emission family that complies with the emission standards and requirements in this subpart.

Certified emission level means the highest official emission level in an emission family.

Configuration means a unique combination of hardware (material, geometry, and size) and calibration within an emission family. Units within a single configuration differ only with respect to normal production variability.

Container means portable gasoline container.

Designated Compliance Officer means the Manager, Engine Programs Group (6405–J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

Designated Enforcement Officer means the Director, Air Enforcement Division (2242A), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW.,Washington, DC 20460.

Emission-control system means any device, system, or element of design that controls or reduces the regulated evaporative emissions from.

Emission-data unit means a portable gasoline container that is tested for certification. This includes components tested by EPA.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emission deterioration.

Emission family has the meaning given in § 59.625.

Evaporative means relating to fuel emissions that result from permeation of fuel through the portable gasoline container materials and from ventilation of the container.

Good engineering judgment means judgments made consistent with generally accepted scientific and engineering principles and all available relevant information. See § 59.603 for the administrative process we use to evaluate good engineering judgment.

Hydrocarbon (HC) means total hydrocarbon (THC).

Manufacture means the physical and engineering process of designing and/or constructing a portable gasoline container.

Manufacturer means any person who manufactures a portable gasoline container for sale in the United States.

Nominal capacity means the expected volumetric working capacity of a container.

Official emission result means the measured emission rate for an emission-data unit.

Portable gasoline container means any reusable container designed and marketed (or otherwise intended) for use by consumers for receiving, transporting, storing, and dispensing gasoline. For the purpose of this subpart, all portable fuel containers that are red in color are deemed to be portable gasoline containers, regardless of how they are labeled or marketed. Portable fuel containers that are not red in color and are clearly and permanently labeled for diesel fuel or kerosene only and not for use with gasoline are not portable gasoline containers.

Production period means the period in which a portable gasoline container will be produced under a certificate of conformity. The maximum production period is five years.

Revoke means to terminate the certificate or an exemption for an emission family. If we revoke a certificate or exemption, you must apply for a new certificate or exemption before continuing to introduce the affected containers into commerce. This does not apply to containers you no longer possess.

Round has the meaning given in 40 CFR 1065.1001.

Sealed means lacking openings that would allow liquid or vapor to escape to the atmosphere under normal operating pressures.

Suspend means to temporarily discontinue the certificate or an exemption for an emission family. If we suspend a certificate, you may not introduce into commerce portable gasoline containers from that emission family unless we reinstate the certificate or approve a new one. If we suspend an exemption, you may not introduce into commerce containers that were previously covered by the exemption unless we reinstate the exemption.

Test sample means the collection of portable gasoline containers selected from the population of an emission family for emission testing. This may include testing for certification, production-line testing, or in-use testing.

Test unit means a portable gasoline container in a test sample.

Total hydrocarbon means the combined mass of organic compounds measured by the specified procedure for measuring total hydrocarbon, expressed as a hydrocarbon with a hydrogen-to-carbon mass ratio of 1.85:1.

Ultimate purchaser means, with respect to any portable gasoline container, the first person who in good faith purchases such a container for purposes other than resale.

Ultraviolet light means electromagnetic radiation with a wavelength between 300 and 400 nanometers.

United States means the States, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, Guam, American Samoa, and the U.S. Virgin Islands.

U.S.-directed production volume means the amount of portable gasoline containers, subject to the requirements of this subpart, produced by a manufacturer for which the manufacturer has a reasonable assurance that sale was or will be made to ultimate purchasers in the United States.

Useful life means the period during which a portable gasoline container is required to comply with all applicable emission standards. See § 59.611.

Void means to invalidate a certificate or an exemption *ab initio* (i.e. retroactively). Portable gasoline containers introduced into U.S. commerce under the voided certificate or exemption is a violation of this subpart, whether or not they were introduced before the certificate or exemption was voided.

We (us, our) means the Administrator of the Environmental Protection Agency and any authorized representatives.

§ 59.685 What symbols, acronyms, and abbreviations does this subpart use?

The following symbols, acronyms, and abbreviations apply to this subpart:

CFR Code of Federal Regulations.
EPA Environmental Protection Agency.
HC hydrocarbon.
NIST National Institute of Standards and Technology.
THC total hydrocarbon.
U.S.C. United States Code.

§ 59.695 What provisions apply to confidential information?

(a) Clearly show what you consider confidential by marking, circling, bracketing, stamping, or some other method.

(b) We will store your confidential information as described in 40 CFR part 2. Also, we will disclose it only as specified in 40 CFR part 2. This applies both to any information you send us and to any information we collect from inspections, audits, or other site visits.

(c) If you send us a second copy without the confidential information, we will assume it contains nothing confidential whenever we need to release information from it.

(d) If you send us information without claiming it is confidential, we may make it available to the public without further notice to you, as described in 40 CFR 2.204.

§ 59.697 State actions.

The provisions in this subpart do not preclude any State or any political subdivision of a State from:

(a) Adopting and enforcing any emission standard or limitation applicable to anyone subject to the provisions of this part; or

(b) Requiring the regulated entity to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of a facility for manufacturing a consumer product.

§ 59.698 May EPA enter my facilities for inspections?

(a) We may inspect your portable gasoline containers, testing, manufacturing processes, storage facilities (including port facilities for imported containers or other relevant facilities), or records, as authorized by the Act, to enforce the provisions of this subpart. Inspectors will have authorizing credentials and will limit inspections to reasonable times—usually, normal operating hours.

(b) If we come to inspect, we may or may not have a warrant or court order.

(1) If we do not have a warrant or court order, you may deny us entry.

(2) If we have a warrant or court order, you must allow us to enter the facility and carry out the activities it describes.

(c) We may seek a warrant or court order authorizing an inspection described in this section, whether or not we first tried to get your permission to inspect.

(d) We may select any facility to do any of the following:

(1) Inspect and monitor any aspect of portable gasoline container manufacturing, assembly, storage, or other procedures, and any facilities where you do them.

(2) Inspect and monitor any aspect of test procedures or test-related activities, including test container selection, preparation, durability cycles, and maintenance and verification of your test equipment's calibration.

(3) Inspect and copy records or documents related to assembling, storing, selecting, and testing a container.

(4) Inspect and photograph any part or aspect of containers or components use for assembly.

(e) You must give us reasonable help without charge during an inspection authorized by the Act. For example, you may need to help us arrange an inspection with the facility's managers, including clerical support, copying, and translation. You may also need to show us how the facility operates and answer other questions. If we ask in writing to see a particular employee at the inspection, you must ensure that he or she is present (legal counsel may accompany the employee).

(f) If you have facilities in other countries, we expect you to locate them in places where local law does not keep us from inspecting as described in this section. We will not try to inspect if we learn that local law prohibits it, but we may suspend your certificate if we are not allowed to inspect.

§ 59.699 How do I request a hearing?

(a) You may request a hearing under certain circumstances, as described elsewhere in this subpart. To do this, you must file a written request with the Designated Compliance Officer, including a description of your objection and any supporting data, within 30 days after we make a decision.

(b) For a hearing you request under the provisions of this subpart, we will approve your request if we find that your request raises a substantial factual issue.

(c) If we agree to hold a hearing, we will use the procedures specified in 40 CFR part 1068, subpart G.

PART 80—REGULATION OF FUELS AND FUEL ADDITIVES

3. The authority citation for part 80 is revised to read as follows:

Authority: 42 U.S.C. 7414, 7521(1), 7545 and 7601(a).

Subpart D—[Amended]

4. Section 80.41 is amended by redesignating paragraph (e) as paragraph (e)(1), redesignating paragraph (f) as paragraph (f)(1), and adding paragraphs (e)(2) and (f)(2) to read as follows:

§ 80.41 Standards and requirements for compliance.

* * * * *

(e) * * *

(2) Beginning January 1, 2011, or January 1, 2015 for approved small refiners under § 80.1340, the toxic air pollutants emissions performance reduction and benzene content specified in paragraph (e)(1) of this section shall apply only to reformulated gasoline that is not subject to the benzene standard of § 80.1230, pursuant to the provisions of § 80.1235. Beginning January 1, 2007, or January 1, 2008 for approved small refiners under § 80.235, the NO_X emissions performance reduction specified in paragraph (e)(1) of this section shall no longer apply.

(f) * * *

(2) Beginning January 1, 2011, or January 1, 2015 for approved small refiners under § 80.1340, the toxic air pollutants emissions performance reduction and benzene content specified in paragraph (f)(1) of this section shall apply only to reformulated gasoline that is not subject to the benzene standard of § 80.1230, pursuant to the provisions of § 80.1235. Beginning January 1, 2007, or January 1, 2008 for approved small refiners under § 80.235, the NO_X emissions performance reduction specified in paragraph (f)(1) of this section shall no longer apply.

* * * * *

Subpart E—[Amended]

5. Section 80.101 is amended by revising paragraph (c)(2) to read as follows:

§ 80.101 Standards applicable to refiners and importers.

* * * * *

(c) * * *

(2) Beginning January 1, 1998, each refiner and importer shall be subject to the Complex Model standards for each averaging period. However beginning January 1, 2011, or January 1, 2015 for approved small refiners under § 80.1340, such annual average exhaust toxics standard shall apply only to conventional gasoline that is not subject to the benzene standard of § 80.1230, pursuant to the provisions of § 80.1235. Beginning January 1, 2007, or January 1, 2008 for approved small refiners under § 80.235, the annual average NO_X emissions standard section shall no longer apply.

* * * * *

Subpart F—[Amended]

6. Section 80.128 is amended by revising paragraph (a) to read as follows:

§ 80.128 Agreed upon procedures for refiners and importers.

* * * * *

(a) Read the refiner's or importer's reports filed with EPA for the previous year as required by §§ 80.75, 80.83(g), 80.105, 80.990 and 80.1354.

* * * * *

Subpart J—[Amended]

7. Section 80.815 is amended by redesignating paragraph (d)(1) as paragraph (d)(1)(i) and adding paragraph (d)(1)(ii) to read as follows:

§ 80.815 What are the gasoline toxics performance requirements for refiners and importers?

* * * * *

(d) * * *

(1) * * *

(ii) Beginning January 1, 2011, or January 1, 2015 for approved small refiners under § 80.1340, the gasoline toxics performance requirements of this subpart shall apply only to gasoline that is not subject to the benzene standard of § 80.1230, pursuant to the provisions of § 80.1235.

* * * * *

8. Section 80.1035 is amended by adding paragraph (h) to read as follows:

§ 80.1035 What are the attest engagement requirements for gasoline toxics compliance applicable to refiners and importers?

* * * * *

(h) Beginning January 1, 2011, or January 1, 2015 for approved small refiners per § 80.1340, the requirements of this section shall apply only to gasoline that is not subject to the benzene standard of § 80.1230, pursuant to the provisions of § 80.1235.

9. Subpart L is added to read as follows:

Subpart L—Gasoline Benzene

Sec.
80.1200—80.1219 [Reserved]

General Information

80.1220 What are the implementation dates for the gasoline benzene program?
80.1225 Who must register with EPA under the gasoline benzene program?

Gasoline Benzene Requirements

80.1230 What are the gasoline benzene requirements for refiners and importers?
80.1235 What gasoline is subject to the benzene requirements of this subpart?

80.1236 What requirements apply to California gasoline?
80.1238 How is a refinery's or importer's annual average benzene concentration determined?
80.1240 How is a refinery's or importer's compliance with the gasoline benzene requirements of this subpart determined?

Averaging, Banking and Trading (ABT) Program

80.1270 Who may generate benzene credits under the ABT program?
80.1275 How are early benzene credits generated?
80.1280 How are refinery benzene baselines calculated?
80.1285 How does a refiner apply for a benzene baseline?
80.1290 How are benzene credits generated in 2011 and beyond?
80.1295 How are gasoline benzene credits used?

Hardship Provisions

80.1335 Can a refiner seek temporary relief from the requirements of this subpart?
80.1336 What if a refiner or importer cannot produce gasoline conforming to the requirements of this subpart?

Small Refiner Provisions

80.1338 What is the definition of a small refiner for the purpose of the gasoline benzene requirements of this subpart?
80.1339 Who is not eligible for the provisions for small refiners?
80.1340 How does a refiner obtain approval as a small refiner?
80.1342 What compliance options are available to small refiners under this subpart?
80.1344 What provisions are available to a large refiner that acquires one or more of a small refiner's refineries?

Sampling, Testing and Retention Requirements

80.1347 What are the sampling and testing requirements for refiners and importers?
80.1348 What gasoline sample retention requirements apply to refiners and importers?

Recordkeeping and Reporting Requirements

80.1350 What records must be kept?
80.1352 What are the pre-compliance reporting requirements for the gasoline benzene program?
80.1354 What are the reporting requirements for the gasoline benzene program?

Attest Engagements

80.1375 What are the attest engagement requirements for gasoline benzene compliance?

Violations and Penalties

80.1400 What acts are prohibited under the gasoline benzene program?
80.1405 What evidence may be used to determine compliance with the prohibitions and requirements of this subpart and liability for violations of this subpart?
80.1410 Who is liable for violations under the gasoline benzene program?
80.1415 What penalties apply under the gasoline benzene program?

Foreign Refiners

80.1420 What are the additional requirements under this subpart for gasoline produced at foreign refineries?

Subpart L—Gasoline Benzene

§§ 80.1200–80.1219 [Reserved]

General Information

§ 80.1220 What are the implementation dates for the gasoline benzene program?

(a) *Benzene standard.* (1) Effective with the annual averaging period beginning January 1, 2011, gasoline produced by a refiner at each refinery, or imported into an import facility, must meet the benzene standard specified in § 80.1230, except as otherwise specifically provided for in this subpart.

(2) Approved small refiners under § 80.1340 may defer meeting the benzene standard specified in § 80.1230 until January 1, 2015 as described in § 80.1342.

(b) *Early credit generation.* (1) Beginning June 1, 2007, each refinery which has an approved benzene baseline per § 80.1285 may generate early benzene credits in accordance with the provisions of § 80.1275.

(2) Early benzene credits may be generated through the end of the averaging period ending December 31, 2010.

(3) Early benzene credits may be generated through the end of the averaging period ending December 31, 2014 for approved small refiners under § 80.1340.

(c) *Standard credit generation.* (1) Effective with the annual averaging period beginning January 1, 2011, a refiner for any of its refineries or an importer for its imported gasoline, may generate benzene credits in accordance with the provisions of § 80.1290.

(2) Effective with the annual averaging period beginning January 1, 2015, an approved small refiner under § 80.1340, for any of its refineries, may generate benzene credits in accordance with the provisions of § 80.1290.

§ 80.1225 Who must register with EPA under the gasoline benzene program?

(a) Refiners and importers that are registered by EPA under § 80.76, § 80.103, § 80.190, or § 80.810 are deemed to be registered for purposes of this subpart.

(b) Refiners and importers subject to the requirements in § 80.1230 that are not registered by EPA under § 80.76, § 80.103, § 80.190 or § 80.810 shall provide to EPA the information required in § 80.76 by September 30, 2010, or not later than three months in advance of the first date that such person produces or imports gasoline, whichever is later.

(c) Refiners that plan to generate early credits under § 80.1275 and that are not registered by EPA under § 80.76, § 80.103, § 80.190, or § 80.810 must provide to EPA the information required in § 80.76 not later than 60 days prior to the end of the first year of credit generation.

Gasoline Benzene Requirements

§ 80.1230 What are the gasoline benzene requirements for refiners and importers?

(a)(1) Except as specified in paragraph (b) of this section, a refinery's or importer's average gasoline benzene concentration in any averaging period shall not exceed 0.62 percent by volume using conventional rounding methodology.

(2) Compliance with the standard specified in paragraph (a)(1) of this section, or creation of a deficit in accordance with paragraph (b) of this section, is determined in accordance with § 80.1240.

(3) The averaging period for achieving compliance with the requirement of paragraph (a)(1) of this section is January 1 through December 31 of each calendar year, beginning January 1, 2011, or beginning January 1, 2015 for approved small refiners under § 80.1340.

(4) Refinery grouping per § 80.101(h) does not apply to compliance with the gasoline benzene requirement specified in this paragraph (a).

(5) Gasoline produced at foreign refineries that is subject to the gasoline benzene requirements per § 80.1235 shall be included in the importer's compliance determination, except as provided in § 80.1420.

(b) *Deficit carry-forward.* (1) A refinery or importer creates a benzene deficit for a given averaging period when its compliance benzene value, per § 80.1240, is greater than the benzene standard specified in paragraph (a) of this section.

(2) A refinery or importer may carry the benzene deficit forward to the calendar year following the year the benzene deficit is created but only if no deficit had been previously carried forward a deficit to the year the deficit is created. If a refinery or importer carries forward, the following provisions apply in the second year:

(i) The refinery or importer must achieve compliance with the benzene standard specified in paragraph (a) of this section.

(ii) The refinery or importer must achieve further reductions in its

gasoline benzene concentrations sufficient to offset the benzene deficit of the previous year.

(iii) Benzene credits may be used, per § 80.1295, to meet the requirements of paragraphs (b)(2)(i) and (ii) of this section.

(3) In the case of an approved hardship under § 80.1335 or § 80.1336, EPA may allow a briefly extended period of deficit carry-forward.

(c) *Oxygenate blenders, butane blenders and refiners that produce gasoline from transmix.* (1)(i) Refiners and oxygenate blenders that only blend butane or oxygenate into gasoline downstream of the refinery that produced the gasoline or the import facility where the gasoline was imported, are not subject to the requirements of § 80.1230 for such gasoline.

(ii) Refiners that produce gasoline by separating gasoline from transmix are not subject to the requirements of § 80.1230 for this gasoline.

(2) Any refiner under paragraph (c)(1) of this section that adds any blendstock or feedstock other than, or in addition to, oxygenate and/or butane into gasoline downstream of the refinery that produced the gasoline or the import facility where the gasoline was imported, or into transmix, or into gasoline produced from transmix, is subject to the requirements of § 80.1230 for this blendstock or feedstock.

§ 80.1235 What gasoline is subject to the benzene requirements of this subpart?

For the purposes of determining compliance with the requirements of § 80.1230, all reformulated gasoline, RBOB, and conventional gasoline or gasoline blending stock per § 80.101(d) are collectively ''gasoline.'' Unless otherwise specified, all of a refinery's or importer's gasoline is subject to the standards and requirements of § 80.1230, with the following exceptions:

(a) Gasoline that is used to fuel aircraft, racing vehicles or racing boats that are used only in sanctioned racing events, provided that:

(1) Product transfer documents associated with such gasoline, and any pump stand from which such gasoline is dispensed, identify the gasoline either as gasoline that is restricted for use in aircraft, or as gasoline that is restricted for use in racing motor vehicles or racing boats that are used only in sanctioned events;

(2) The gasoline is completely segregated from all other gasoline throughout production, distribution and sale to the ultimate consumer; and

(3) The gasoline is not made available for use as motor vehicle gasoline, or dispensed for use in motor vehicles, except for motor vehicles used only in sanctioned racing events.

(b) California gasoline, as defined in § 80.1236.

(c) Gasoline that is exported for sale outside the U.S.

(d) Gasoline used for research, development or testing purposes if it is exempted for these purposes under the reformulated gasoline and anti-dumping programs, as applicable.

(e) Gasoline produced pursuant to § 80.1230(c)(1).

§ 80.1236 What requirements apply to California gasoline?

(a) *Definition.* For purposes of this subpart, California gasoline means any gasoline designated by the refiner or importer as for use only in California and that is actually used in California.

(b) *California gasoline exemption.* California gasoline that complies with all the requirements of this section is exempt from the requirements in § 80.1230.

(c) *Requirements for California gasoline.* The following requirements apply to California gasoline:

(1) Each batch of California gasoline must be designated as such by its refiner or importer.

(2) Designated California gasoline must be kept segregated from gasoline that is not California gasoline at all points in the distribution system.

(3) Designated California gasoline must ultimately be used in the State of California and not used elsewhere in the United States.

(4) In the case of California gasoline produced outside the State of California, the transferors and transferees must meet the product transfer document requirements under § 80.81(g).

(5) Gasoline that is ultimately used in any part of the United States outside of the State of California must comply with the requirements specified in § 80.1230, regardless of any designation as California gasoline.

§ 80.1238 How is a refinery's or importer's annual average benzene concentration determined?

(a) The annual average benzene concentration of gasoline produced at a refinery or imported by an importer for the applicable averaging period is calculated according to the following equation:

$$B_{avg} = \frac{\sum_{i=1}^{n} (V_i \times B_i)}{\sum_{i=1}^{n} V_i}$$

Where:

B_{avg} = Annual average benzene concentration (volume percent benzene).

i = Individual batch of gasoline produced at the refinery or imported.

n = Total number of batches of gasoline produced at the refinery or imported during the applicable annual averaging period.

V_i = Volume of gasoline in batch i (gallons).

B_i = Benzene concentration of batch i (volume percent benzene), per § 80.46(e).

(b) All input batch benzene concentration values used in paragraph (a) of this section shall be expressed to two decimal places.

(c) Annual average benzene concentration values calculated under paragraph (a) of this section shall be expressed to two decimal places using conventional rounding methodology.

(d) A refiner or importer may include the volume of oxygenate added downstream from the refinery or import facility in the calculation specified in paragraph (a) of this section, provided the following requirements are met:

(1) For oxygenate added to conventional gasoline, the refiner or importer must comply with the requirements of § 80.101(d)(4)(ii) and (g)(3).

(2) For oxygenate added to RBOB, the refiner or importer must comply with the requirements of § 80.69(a).

(e) Refiners and importers must exclude from the calculation specified in paragraph (a) of this section all of the following:

(1) Gasoline that was not produced at the refinery or imported by the importer.

(2) Except as provided in paragraph (c) of this section, any blendstocks or unfinished gasoline transferred to others.

(3) Gasoline that has been included in the compliance calculations for another refinery or importer.

(4) Gasoline exempted from the standards under § 80.1235.

§ 80.1240 How is a refinery's or importer's compliance with the gasoline benzene requirements of this subpart determined?

(a)(1) The compliance benzene value for a refinery or importer is:

$$CBV_y = V_y \times \left(\frac{B_{avg}}{100}\right) + D_{y-1} - BC - RC$$

Where:

CBV_y = Compliance benzene value (gallons benzene) for year y.

V_y = Gasoline volume produced or imported in year y (gallons).

B_{avg} = Annual average benzene concentration (volume percent benzene), per § 80.1238.

D_{y-1} = Benzene deficit from the previous reporting period, per § 80.1230(b) (gallons benzene).

BC = Banked benzene credits used to show compliance (gallons benzene).

RC = Benzene credits received by the refinery or importer, per § 80.1295(c), used to show compliance (gallons benzene).

(2) If $CBV_y \leq V_y$ x (0.62)/100, then compliance is achieved for calendar year y.

(b)(1) A deficit is created when $CBV_y > V_y$ x (0.62)/100.

(2) The deficit value to be included in the following year's compliance calculation per paragraph (a) of this section, is calculated as follows:

$$D_{y-1} = V_y \times \left(\frac{0.62}{100}\right) - CBV_y$$

Averaging, Banking and Trading (ABT) Program

§ 80.1270 Who may generate benzene credits under the ABT program?

(a) *Early credits.* (1) Early credits may be generated under § 80.1275 by a refiner for a refinery with an approved benzene baseline under § 80.1285.

(2) Early credits may be generated under § 80.1275 only by refiners that produce gasoline by processing crude oil through refinery processing units.

(3)(i) A refinery that was shut down during the entire 2004–2005 benzene baseline period is not eligible to generate early credits under § 80.1275.

(ii) A refinery not in full production, excluding normal refinery downtime, or not showing consistent or regular gasoline production activity during 2004–2005 may be eligible to generate early benzene credits under § 80.1275 upon petition to and approval by EPA, under § 80.1285.

(b) *Standard Credits.* (1) Standard credits may be generated under § 80.1290 by refineries and importers for gasoline produced or imported for use in the U.S., excluding gasoline exempt from the benzene standard under the provisions of § 80.1235.

(2) Oxygenate blenders, butane blenders, and transmix producers are not eligible to generate standard credits under § 80.1290.

§ 80.1275 How are early benzene credits generated?

(a) Early benzene credits may be generated only if a refinery's annual average gasoline benzene concentration is at least 10% lower than the refinery's approved baseline benzene concentration per § 80.1280.

(b) [Reserved]

(c) The early credit annual averaging periods are as follows:

(1) For 2007, the seven-month period from June 1, 2007, through December 31, 2007, inclusive.

(2) For 2008, 2009 and 2010, the 12-month calendar year.

(3) For 2011, 2012, 2013, and 2014, which apply only to approved small refiners per § 80.1340, the 12-month calendar year.

(d) The number of early benzene credits shall be calculated annually for each applicable averaging period as follows:

(1) Proceed to paragraph (d)(2) of this section under the following condition.

$B_{avg} \leq B_{Base} \times 0.90$

Where:

B_{avg} = Annual average benzene concentration (volume percent benzene) of gasoline produced at the refinery, per § 80.1238.

B_{Base} = Baseline benzene concentration (volume percent benzene) of the refinery, per § 80.1280(b).

(2) Calculate the number of early credits generated by the refinery for the averaging period as follows:

$$EC_y = \left[\frac{B_{Base} - B_{avg}}{100}\right] \times V_e$$

Where:

EC_y = Early credits generated in year y (gallons benzene).

B_{avg} = Annual average benzene concentration (volume percent benzene) of gasoline produced at the refinery, per § 80.1238 that satisfies the condition of paragraph (d)(1) of this section.

V_e = Total volume of gasoline (gallons) produced during the annual averaging period at the refinery.

(e) All input benzene concentration values used in paragraph (d) of this section shall be expressed to two decimal places.

(f) Early benzene credits calculated under paragraph (d) of this section shall be expressed to the nearest gallon using conventional rounding methodology.

(g)(1) Early benzene credits shall be calculated separately for each refinery.

(2) Refiners shall not move gasoline or gasoline blending stocks from one refinery to another for the purpose of generating early credits.

(h) An importer may not generate early credits.

(i) A foreign refiner with an approved baseline may generate early credits subject to the provisions of § 80.1420.

§ 80.1280 How are refinery benzene baselines calculated?

(a) A refinery's benzene baseline is based on the refinery's 2004–2005 average gasoline benzene concentration, calculated according to the following equation:

$$B_{Base} = \frac{\sum_{i=1}^{n}(V_i \times B_i)}{\sum_{i=1}^{n} V_i}$$

Where:

B_{Base} = Benzene baseline concentration (volume percent benzene).

i = Individual batch of gasoline produced at the refinery from January 1, 2004 through December 31, 2005.

n = Total number of batches of gasoline produced at the refinery from January 1, 2004 through December 31, 2005 (or the total number of batches of gasoline pursuant to § 80.1285(d)).

V_i = Volume of gasoline in batch i (gallons).

B_i = Benzene content of batch i (volume percent benzene).

(b) All input batch benzene concentration values used in paragraph (a) of this section shall be expressed to two decimal places.

(c) Baseline benzene concentration values calculated under paragraph (a) of this section shall be expressed to two decimal places using conventional rounding methodology.

(d) Any refiner that, under § 80.69 or § 80.101(d)(4), included oxygenate blended downstream in compliance calculations for RFG or conventional gasoline for calendar years 2004 or 2005 for a refinery must include the volume and benzene concentration of this oxygenate in the baseline calculations for gasoline benzene content for that refinery under paragraph (a) of this section.

§ 80.1285 How does a refiner apply for a benzene baseline?

(a) A refiner must submit an application to EPA which includes the information specified in paragraph (c) of this section at least 60 days before the refinery plans to begin generating early credits.

(b) The benzene baseline application shall be sent to: U.S. EPA, Attn: Early Gasoline Benzene Credits (6406J), 1200 Pennsylvania Ave., NW., Washington, DC 20460. For commercial delivery: U.S. EPA Attn: Early Gasoline Benzene Credits (6406J), 501 3rd Street, NW., Washington, DC 20001.

(c) A benzene baseline application must be submitted for each refinery that plans to generate early credits under § 80.1275 and must include the following information:

(1) A listing of the names and addresses of all refineries owned by the company.

(2) The benzene baseline for gasoline produced in 2004–2005 at the refinery, calculated in accordance with § 80.1280(b).

(3) Copies of the annual reports required under § 80.75 for RFG and § 80.105 for conventional gasoline.

(4) A letter signed by the president, chief operating officer, or chief executive officer, of the company, or his/her designee, stating that the information contained in the benzene baseline determination is true to the best of his/her knowledge.

(5) Name, address, phone number, facsimile number and e-mail address of a corporate contact person.

(d) A refiner, for a refinery that qualifies for generating early credits under § 80.1270(a)(3)(ii) may submit to EPA a benzene baseline application per the requirements of this section. The refiner must also submit information regarding the nature and cause of the inconsistent production, how it affects the baseline and benzene concentration, and whether an alternative calculation to the calculation specified in § 80.1280 produces a more representative benzene baseline value. EPA, upon consideration of the submitted information, may approve a benzene baseline for such a refinery.

(e) Within 60 days of receipt of an application under this section, except for applications submitted in accordance with paragraph (d) of this section, EPA will notify the refiner of approval of the refinery's baseline or any deficiencies in the application.

(f) If at any time the baseline submitted in accordance with the requirements of this section is determined to be incorrect, EPA will notify the refiner of the corrected baseline.

§ 80.1290 How are benzene credits generated in 2011 and beyond?

(a) Gasoline benzene standard credits may be generated by the following parties during any applicable averaging period specified in paragraph (b) of this section:

(1) A refiner, at any of its refineries that produce gasoline for use in the U.S. (excluding gasoline under § 80.1235 that is exempt from the requirements of this subpart). Credits are generated separately by each refinery;

(2) Importers, for all of their imported gasoline (excluding gasoline under § 80.1235 that is exempt from the requirements of this subpart);

(b) The standard credit averaging periods are the calendar years beginning with 2011, or beginning with 2015 for approved small refiners.

(c) [Reserved]

(d)(1) The number of standard credits generated by a refinery or importer shall be calculated annually according to the following equation:

$$SC_y = \left[\frac{0.62 - B_{avg}}{100}\right] \times V_y$$

Where:

SC_y = Standard credits generated in year y (gallons benzene).

B_{avg} = Annual average benzene concentration for year y (volume percent benzene), per § 80.1238.

V_y = Total volume of gasoline produced or imported in year y (gallons).

(2) No credits shall be generated unless the value SCy is positive.

(e) All input benzene concentration values used in paragraph (d) of this section shall be expressed to two decimal places.

(f) Standard benzene credits calculated under paragraph (d) of this section shall be expressed to the nearest gallon using conventional rounding methodology.

(g) Foreign refiners may not generate credits under this section.

§ 80.1295 How are gasoline benzene credits used?

(a) *Credit use.* (1) Gasoline benzene credits generated under §§ 80.1275 and 80.1290 may be used to comply with the gasoline benzene content requirement of § 80.1230 provided that:

(i) The gasoline benzene credits were generated and reported according to the requirements of this subpart; and

(ii) The conditions of this section § 80.1295 are met.

(2) Gasoline benzene credits generated under §§ 80.1275 and 80.1290 may be used by a refiner or importer to comply with the gasoline benzene content standard of § 80.1230, may be banked by a refiner or importer for future use or transfer, may be transferred to another refinery or importer within a company (intracompany), or may be transferred to another refinery or importer outside of the company.

(b) *Credit banking.* Gasoline benzene credits generated by a refinery or importer may be banked for use in a later compliance period, or may be transferred to another refiner, refinery, or importer for use as provided in paragraph (c) of this section.

(c) *Credit transfers.* (1) Gasoline benzene credits obtained from another refinery or importer may be used to comply with the gasoline benzene content requirement of § 80.1230 provided the following conditions are met:

(i) The credits are generated and reported according to the requirements of this subpart, and the transferred credit has not expired, per paragraph (d) of this section.

(ii) Any credit transfer takes place no later than the last day of February following the calendar year averaging period when the credits are used.

(iii) The credit has not been transferred more than twice. The first transfer by the refinery or importer that generated the credit may only be made to a refiner or importer that intends to use the credit; if the transferee cannot use the credit, it may make the second, and final, transfer only to a refinery or importer that intends to use or terminate the credit. In no case may a credit be transferred more than twice before being used or terminated.

(iv) The credit transferor has applied any gasoline benzene credits necessary to meet its own annual compliance requirements (and any deficit carry-forward, if applicable) before transferring any gasoline benzene credits to any other refiner or importer.

(v) The credit transferor would not create a deficit as a result of a credit transfer.

(vi) The transferor supplies to the transferee records indicating the year the gasoline benzene credits were generated, the identity of the refiner (and refinery) or importer that generated the gasoline benzene credits and the identity of the transferring entity if not the same entity that generated the gasoline benzene credits.

(2) In the case of gasoline benzene credits that have been calculated or created improperly, or have otherwise been determined to be invalid, the following provisions apply:

(i) Invalid gasoline benzene credits cannot be used to achieve compliance with the gasoline benzene content requirement of § 80.1230 regardless of the transferee's good faith belief that the gasoline benzene credits were valid.

(ii) The refiner or importer that used the gasoline benzene credits and any

transferor of the gasoline benzene credits must adjust their credit records, reports, and compliance calculations as necessary to reflect the proper gasoline benzene credits.

(iii) Any properly created gasoline benzene credits existing in the transferor's credit balance following the corrections and adjustments specified in paragraph (c)(2)(ii) of this section and after the transferor applies gasoline benzene credits as needed to meet its own compliance requirements at the end of the compliance period, must first be applied to correct the invalid transfers to the transferee, before the transferor uses, trades or banks the gasoline benzene credits.

(d) *Credit life.* (1) Early credits, per § 80.1275, may be used for compliance purposes under § 80.1240 for any calendar year averaging period prior to the 2014 averaging period.

(2) Standard credits, per § 80.1290, shall have a credit life of 5 calendar year averaging periods after the year in which they were generated. Example: Standard credits generated during 2014 may be used to achieve compliance under § 80.1240 for any calendar year averaging period prior to the 2020 averaging period.

(3) Notwithstanding paragraphs (d)(1) and (d)(2) of this section, credits traded to or used by approved small refiners per § 80.1340, have an additional credit life of two calendar year averaging periods.

(e) *General limitations on credit use.* A refiner or importer possessing gasoline benzene credits must use all gasoline benzene credits in its possession prior to applying the credit deficit provisions of § 80.1230(b).

Hardship Provisions

§ 80.1335 Can a refiner seek temporary relief from the requirements of this subpart?

(a) EPA may permit a refinery to have an extended period of deficit carry-forward, for the shortest period practicable, per § 80.1230(b), if the refiner demonstrates that:

(1) Unusual circumstances exist that impose extreme hardship and significantly affect the ability to comply by the applicable date; and

(2) It has made best efforts to comply with the requirements of this subpart, including making all possible efforts to obtain sufficient credits to meet the standard.

(b) Applications must be submitted to EPA by September 1, 2009.

(1) Approval of a hardship under this section shall be in the form an extended period of deficit carry-forward, per § 80.1230(b), for such period of time as EPA determines is appropriate, but shall not extend beyond December 31, 2014.

(2) EPA reserves the right to deny applications for appropriate reasons, including unacceptable environmental impact.

(c)(1) Applications must include a plan demonstrating how the refiner will comply with the requirements of this subpart as expeditiously as possible. The plan shall include a showing that contracts are or will be in place for engineering and construction of benzene reduction technology, a plan for applying for and obtaining any permits necessary for construction, a description of plans to obtain necessary capital, and a detailed estimate of when the requirements of this subpart will be met.

(2) Applications must include a detailed description of the refinery configuration and operations including, at minimum, the following information:

(i) The refinery's total reformer unit throughput capacity;

(ii) The refinery's total crude capacity;

(iii) Total crude capacity of any other refineries owned by the same entity;

(iv) Total volume of gasoline production at the refinery;

(v) Total volume of other refinery products; and

(vi) Geographic location(s) where the refinery's gasoline will be sold.

(3) Applications must include, at a minimum, the following information:

(i) Detailed descriptions of efforts to obtain capital for refinery investments;

(ii) Detailed descriptions of efforts to obtain credits;

(iii) Bond rating of entity that owns the refinery; and

(iv) Estimated capital investment needed to comply with the requirements of this subpart

(4) Applicants must also provide any other relevant information requested by EPA.

(d) EPA may impose any reasonable conditions on waivers granted under this section, including the condition that if more credits are available than was anticipated at the time of the hardship approval, the extended period of deficit carry-forward may be shortened.

§ 80.1336 What if a refiner or importer cannot produce gasoline conforming to the requirements of this subpart?

In extreme and unusual circumstances (e.g., natural disaster or Act of God) which are clearly outside the control of the refiner or importer and which could not have been avoided by the exercise of prudence, diligence, and due care, EPA may permit a refinery or importer to extend the deadline for meeting the deficit carry-forward requirements under § 80.1230(b) for a brief period (e.g., where appropriate, EPA may allow one or more additional weeks after the last day of February to purchase credits), provided the refinery or importer meets all the criteria, requirements and conditions contained in § 80.73(a) through (e).

Small Refiner Provisions

§ 80.1338 What is the definition of a small refiner for the purpose of the gasoline benzene requirements of this subpart?

(a) A small refiner is defined as any person, as defined by 42 U.S.C. 7602(e), that—

(1) Produced gasoline at a refinery by processing crude oil through refinery processing units from January 1, 2005, through December 31, 2005; and

(2) Employed an average of no more than 1,500 people, based on the average number of employees for all pay periods from January 1, 2005 through December 31, 2005; and

(3) Had a corporate average crude oil capacity less than or equal to 155,000 barrels per calendar day (bpcd) for 2005; or

(4) Has been approved by EPA as a small refiner under § 80.1340.

(b) For the purpose of determining the number of employees and the crude oil capacity under paragraph (a) of this section, the following determinations shall be observed:

(1) The refiner shall include the employees and crude oil capacity of any subsidiary companies, any parent company and subsidiaries of the parent company in which the parent has a controlling interest, and any joint venture partners.

(2) For any refiner owned by a governmental entity, the number of employees and total crude oil capacity as specified in paragraph (a) of this section shall include all employees and crude oil production of the government to which the governmental entity is a part.

(3) Any refiner owned and controlled by an Alaska Regional or Village Corporation organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601) is not considered an affiliate of such entity, or with other concerns owned by such entity, solely because of their common ownership.

(c) Notwithstanding the provisions of paragraph (a) of this section, a refiner that reactivates a refinery, which it previously operated, and that was shut down or non-operational for the entire period between January 1, 2005, and December 31, 2005, may apply for small refiner status in accordance with the provisions of § 80.1340.

§ 80.1339 Who is not eligible for the provisions for small refiners?

(a) The following are not eligible for the hardship provisions for small refiners:

(1) Refiners with refineries built after December 31, 2005;

(2) Refiners that exceed the employee or crude oil capacity criteria under § 80.1338 but that meet these criteria after December 31, 2005, regardless of whether the reduction in employees or crude capacity is due to operational changes at the refinery or a company sale or reorganization.

(3) Importers.

(4) Refiners that produce gasoline other than by processing crude oil through refinery processing units.

(b)(1)(i) Refiners that qualify as small under § 80.1338 and subsequently cease production of gasoline from processing crude oil through refinery processing units, employ more than 1,500 people or exceed the 155,000 bpcd crude oil capacity limit after December 31, 2005, as a result of merger with or acquisition of or by another entity, are disqualified as small refiners, except this shall not apply in the case of a merger between two previously approved small refiners. If disqualification occurs, the refiner shall notify EPA in writing no later than 20 days following this disqualifying event.

(ii) Except as provided under paragraph (b)(1)(iii) of this section, any refiner whose status changes under this paragraph (b) shall meet the applicable standards of § 80.1230 within a period of up to 30 months of the disqualifying event for all of its refineries. However, such period shall not extend beyond December 31, 2014.

(iii) A refiner may apply to EPA for an additional six months to comply with the standards of § 80.1230 if more than 30 months will be required for the necessary engineering, permitting, construction, and start-up work to be completed. Such applications must include detailed technical information supporting the need for additional time. EPA will base its decision to approve additional time on the information provided by the refiner and on other relevant information. In no case will EPA extend the compliance date beyond December 31, 2014.

(iv) During the period of time of up to 30 months provided under paragraph (b)(1)(ii) of this section, and any extension provided under paragraph (b)(1)(iii) of this section, the refiner may not generate gasoline benzene credits under § 80.1275 or § 80.1290.

(2) An approved small refiner per § 80.1340 may elect to meet the requirements of § 80.1230 applicable to non-small refiners by notifying EPA in writing no later than November 15 prior to the year that the change will occur. Any refiner whose status changes under this paragraph (b)(2) shall meet the requirements for non-small refiners under § 80.1230 beginning with the first averaging period subsequent to the status change.

§ 80.1340 How does a refiner obtain approval as a small refiner?

(a) Applications for small refiner status must be submitted to EPA by December 31, 2007.

(b) Applications for small refiner status must be sent to: U.S. EPA, Attn: MSAT2 Benzene (6406J), 1200 Pennsylvania Ave., NW., Washington, DC 20460. For commercial delivery: U.S. EPA Attn: MSAT2 Benzene (6406J), 501 3rd Street, NW., Washington, DC 20001.

(c) The small refiner status application must contain the following information for the company seeking small refiner status, and for all subsidiary companies, all parent companies, all subsidiaries of the parent companies, and all joint venture partners:

(1) *Employees.* (i) A listing of the names and addresses of each location where any employee worked during the 12 months preceding January 1, 2006;

(ii) The average number of employees at each location based upon the number of employees for each pay period for the 12 months preceding January 1, 2006; and

(iii) The type of business activities carried out at each location.

(iv) In the case of a refiner that reactivates a refinery that it previously owned and operated and that was shut down or non-operational between January 1, 2005, and January 1, 2006, include the following:

(A) A listing of the name and address of each location where any employee of the refiner worked since the refiner acquired or reactivated the refinery;

(B) The average number of employees at any such reactivated refinery during each calendar year since the refiner reactivated the refinery; and

(C) The type of business activities carried out at each location.

(vi) For joint ventures, the total number of employees includes the combined employee count of all corporate entities in the venture.

(vii) For government-owned refiners, the total employee count includes all government employees.

(2) *Crude oil capacity.* (i) The total corporate crude oil capacity of each refinery as reported to the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE), for the period January 1, 2005, through December 31, 2005.

(ii) The information submitted to EIA is presumed to be correct. In cases where a company disagrees with this information, the company may petition EPA with appropriate data to correct the record when the company submits its application for small refiner status.

(3) The type of business activity carried out at each location.

(4) For each refinery, an indication of the small refiner option(s) intended to be utilized at the refinery.

(5) A letter signed by the president, chief operating or chief executive officer of the company, or his/her designee, stating that the information contained in the application is true to the best of his/her knowledge, and that the company owned the refinery as of January 1, 2006.

(6) Name, address, phone number, facsimile number, and E-mail address of a corporate contact person.

(d) Approval of a small refiner status application will be based on all information submitted under paragraph (c) of this section and any other relevant information.

(e) EPA will notify a refiner of approval or disapproval of small refiner status by letter.

(1) If approved, all refineries of the refiner may defer meeting the standard specified in § 80.1230 until the annual averaging period beginning January 1, 2015.

(2) If disapproved, all refineries of the refiner must meet the standard specified in § 80.1230 beginning with the annual averaging period beginning January 1, 2011.

(f) If EPA finds that a refiner provided false or inaccurate information on its application for small refiner status, upon notice from EPA, the refiner's small refiner status will be void ab initio.

(g) Prior to January 1, 2014, and upon notification to EPA, an approved small refiner per this section may withdraw its status as a small refiner. Effective on January 1 of the year following such notification, the small refiner will become subject to the standards at § 80.1230.

§ 80.1342 What compliance options are available to small refiners under this subpart?

(a) A refiner that has been approved as a small refiner under § 80.1340 may—

(1) Defer meeting the standard specified in section § 80.1230 until the annual averaging period January 1, 2015; or

(2) Meet the standard specified in § 80.1230 beginning January 1 of any of

the following annual averaging periods: 2007, 2008, 2009, 2010, 2011, 2012, 2013, and 2014.

(b) The provisions of paragraph (a) of this section shall apply separately for each of an approved small refiner's refineries.

§ 80.1344 What provisions are available to a large refiner that acquires one or more of a small refiner's refineries?

(a) In the case of a refiner without approved small refiner status that acquires a refinery from an approved small refiner per § 80.1340, the small refiner provisions of the gasoline benzene program of this subpart may continue to apply to the acquired refinery for a period of up to 30 months from the date of acquisition of the refinery. In no case shall this period extend beyond December 31, 2014.

(b) A refiner may apply to EPA for up to an additional six months to comply with the standards of § 80.1230 for the acquired refinery if more than 30 months would be required for the necessary engineering, permitting, construction, and start-up work to be completed. Such applications must include detailed technical information supporting the need for additional time. EPA will base a decision to approve additional time on information provided by the refiner and on other relevant information. In no case shall this period extend beyond December 31, 2014.

(c) A refiner that acquires a refinery from an approved small refiner per § 80.1340 shall notify EPA in writing no later than 20 days following the acquisition.

Sampling, Testing and Retention Requirements

§ 80.1347 What are the sampling and testing requirements for refiners and importers?

(a) *Sample and test each batch of gasoline.* Refiners and importers shall collect a representative sample from each batch of gasoline produced or imported. Each sample shall be tested in accordance the methodology specified at § 80.46(e) to determine its benzene concentration for compliance with the requirements of this subpart.

(b) *Batch numbering.* The batch numbering convention of § 80.365(b)(2) shall apply to batches of conventional gasoline.

(c) The requirements of this section apply to any refiner or importer subject to the requirements of this subpart, including those generating early credits per § 80.1275, all non-small refiners and importers beginning January 1, 2011, and small refiners beginning January 1, 2015.

§ 80.1348 What gasoline sample retention requirements apply to refiners and importers?

The gasoline sample retention requirements specified in subpart H of this part for the gasoline sulfur provisions apply for the purpose of complying with the requirements of this subpart, except that in addition to including the sulfur test result as provided by § 80.335(a)(4)(ii), the refiner, importer, or independent laboratory shall also include with the retained sample the test result for benzene as conducted pursuant to § 80.46(e).

Recordkeeping and Reporting Requirements

§ 80.1350 What records must be kept?

(a) *General requirements.* The recordkeeping requirements specified in § 80.74 and § 80.104, as applicable, apply for the purpose of complying with the requirements of this subpart, however, duplicate records are not required.

(b) *Additional records that refiners and importers shall keep.* Beginning January 1, 2007, any refiner for each of its refineries, and any importer for the gasoline it imports, shall keep records that include the following information (including any supporting calculations as applicable):

(1) Its compliance benzene value per § 80.1240, and the calculations used to obtain that value.

(2) Its benzene baseline value, per § 80.1280, if the refinery or importer submitted a benzene baseline application to EPA per § 80.1285;

(3) The number of early benzene credits generated under § 80.1275, separately by year of generation;

(4) The number of early benzene credits obtained, separately by generating refinery and year of generation;

(5) The number of valid credits in possession of the refinery or importer at the beginning of each averaging period, separately by generating facility and year of generation;

(6) The number of standard credits generated by the refinery or importer under § 80.1290, separately by transferor (if applicable), and by year of generation;

(7) The number of credits used, separately by generating facility and year of generation;

(8) If any credits were obtained from, or transferred to, other parties, for each other party, its name, its EPA refinery or importer registration number, and the number of credits obtained from, or transferred to, the other party;

(9) The number of credits that expired at the end of the averaging period, separately by generating facility and year of generation;

(10) The number of credits that will be carried over into the subsequent averaging period, separately by generating facility and year of generation;

(11) Contracts or other commercial documents that establish each transfer of credits from the transferor to the transferee; and

(12) A copy of all reports submitted to EPA under §§ 80.1352 and 80.1354, however, duplicate records are not required.

(c) *Length of time records shall be kept.* The records required by this section shall be kept for five years from the end of the annual averaging period during which they were created, or seven years for records pertaining to credits traded to a small refiner in accordance with § 80.1295(d)(3), except where longer record retention is required elsewhere in this subpart.

(d) *Make records available to EPA.* On request by EPA, the records specified in this section shall be provided to the Administrator. For records that are electronically generated or maintained, the equipment and software necessary to read the records shall be made available, or upon approval by EPA, electronic records shall be converted to paper documents which shall be provided to the Administrator.

§ 80.1352 What are the pre-compliance reporting requirements for the gasoline benzene program?

(a) Except as provided in paragraph (c) of this section, a refiner for each of its refineries shall submit the following information to EPA beginning June 1, 2008, and annually thereafter through June 1, 2011, or through June 1, 2015, for small refiners:

(1) Changes to the information submitted in the company's registration;

(2) Changes to the information submitted for any refinery or import facility registration;

(3) Gasoline production. (i) An estimate of the average daily volume (in gallons) of gasoline produced at each refinery. This estimate shall include RFG, RBOB, conventional gasoline and conventional gasoline blendstock that becomes finished gasoline solely upon the addition of oxygenate but shall exclude gasoline exempted pursuant to § 80.1235;

(ii) These volume estimates must be provided for the periods of June 1, 2007, through December 31, 2007, and calendar years 2008, 2009 and 2010.

(4) Benzene concentration. An estimate of the average gasoline benzene

concentration corresponding to the time periods specified in paragraph (a)(3) of this section.

(5) ABT Participation. If the refinery is expecting to participate in the credit trading program under § 80.1275 and/or § 80.1290, the actual or estimated, as applicable, numbers of early credits and standard credits expected to be generated and/or used each year through 2015.

(6) Information on any project schedule by quarter of known or projected completion date by the stage of the project, for example, following the five project phases described in EPA's June 2002 Highway Diesel Progress Review report (EPA420–R–02–016, *http://www.epa.gov/otaq/regs/hd2007/420r02016.pdf*): Strategic planning, Planning and front-end engineering, Detailed engineering and permitting, Procurement and Construction, and Commissioning and startup;

(7) Basic information regarding the selected technology pathway for compliance (*e.g.*, precursor re-routing or other technologies, revamp vs. grassroots, etc.);

(8) Whether capital commitments have been made or are projected to be made.

(b) The pre-compliance reports due in 2008 and succeeding years must provide an update of the progress in each of these areas and actual values where available.

(c) The pre-compliance reporting requirements of this section do not apply to refineries exempted under the provisions of § 80.1230(c)(1).

§ 80.1354 What are the reporting requirements for the gasoline benzene program?

(a) Beginning with the 2011 annual averaging period, or the 2015 annual averaging period for small refiners, and continuing for each averaging period thereafter, every refiner, for each of its refineries, and every importer shall submit to EPA the information required in this section, and such other information as EPA may require.

(b) Beginning with the 2007 annual averaging period for refiners generating early credits pursuant to § 80.1275 or § 80.1290(b) for approved small refiners, every refiner for each of its refineries shall submit to EPA the information required in this section, and such other information as EPA may require.

(c) *Refiner and importer annual reports.* Any refiner, for each of its refineries, and any importer for the gasoline it imports, shall submit a Gasoline Benzene Report containing the following information:

(1) Benzene volume percent and volume of any RFG, RBOB, and conventional gasoline, separately by batch, produced by the refinery or imported, and the sum of the volumes and the volume-weighted benzene concentration, in volume percent;

(2) The annual average benzene concentration, per § 80.1240, § 80.1275 or § 80.1290, as applicable;

(3) Any benzene deficit from the previous reporting period, per § 80.1230(b);

(4) The number of banked benzene credits from the previous reporting period;

(5) The number of benzene credits generated under § 80.1275, if applicable;

(6) The number of benzene credits generated under § 80.1290, if applicable;

(7) The number of benzene credits transferred to the refinery or importer, per § 80.1295(c), and the cost of the credits, if applicable;

(8) The number of benzene credits transferred from the refinery or importer, per § 80.1295(c), and the price of the credits, if applicable;

(9) The number of benzene credits terminated or expired;

(10) The compliance benzene value specified in § 80.1240;

(11) The number of banked benzene credits;

(12) Projected credit generation through compliance year 2015; and

(13) Projected credit use through compliance year 2015.

(d) EPA may require submission of additional information to verify compliance with the requirements of this subpart.

(e) The report required by paragraph (a) of this section shall be:

(1) Submitted on forms and following procedures specified by the Administrator of EPA;

(2) Submitted to EPA by the last day of February each year for the prior calendar year averaging period; and

(3) Signed and certified as correct by the owner or a responsible corporate officer of the refiner or importer.

Attest Engagements

§ 80.1375 What are the attest engagement requirements for gasoline benzene compliance?

In addition to the requirements for attest engagements that apply to refiners and importers under §§ 80.125 through 80.130, 80.410, and 80.1030, the attest engagements for refiners and importers must include the following procedures and requirements each year.

(a) *EPA early credit generation baseline years' reports.*

(1) Obtain and read a copy of the refinery's or importer's annual reports and batch reports filed with EPA for 2004 and 2005 which contain gasoline benzene and gasoline volume information.

(2) Agree the yearly volumes of gasoline and benzene concentration, in volume percent and benzene gallons, reported to EPA in the reports specified in paragraph (a)(1) of this section with the inventory reconciliation analysis under § 80.128.

(3) Verify that the information in the refinery's or importer's batch reports filed with EPA under §§ 80.75 and 80.105, and any laboratory test results, agree with the information contained in the reports specified in paragraph (a)(1) of this section.

(4) Calculate the average benzene concentration for all of the refinery's or importer's gasoline volume over 2004 and 2005 and verify that those values agree with the values reported to EPA per § 80.1285.

(b) *Baseline for early credit generation.* For the first attest reporting period following approval of a benzene baseline:

(1) Obtain the EPA benzene baseline approval letter for the refinery to determine the refinery's applicable benzene baseline under § 80.1285.

(2) Obtain a written representation from the company representative stating the benzene value used as the refinery's baseline and agree that number to paragraph (b)(1) of this section and to the reports to EPA.

(c) *Early credit generation.* The following procedures shall be completed for a refinery or importer that generates early benzene credits per § 80.1275:

(1) Obtain the baseline benzene concentration and gasoline volume from paragraph (a)(4) of this section.

(2) Obtain the annual benzene report per § 80.1354.

(3) If the benzene value under paragraph (c)(2) of this section is at least 10 percent less than value in paragraph (c)(1) of this section, compute and report as a finding the difference according to § 80.1275.

(4) Compute and report as a finding the total number of benzene credits generated by multiplying the value calculated in paragraph (c)(3) of this section by the volume of gasoline listed in the report specified in paragraph (c)(2) of this section, and agree this number with the number reported to EPA.

(d) *Standard credit generation.* The following procedures shall be completed for a refinery or importer that generates benzene credits per § 80.1290:

(1) Obtain the annual average benzene value from the annual benzene report per § 80.1285.

(2) If the annual average benzene value under paragraph (d)(1) of this section is less than 0.62 percent by volume, compute and report as a finding the difference according to § 80.1290.

(3) Compute and report as a finding the total number of benzene credits generated by multiplying the value calculated in paragraph (d)(2) of this section by the volume of gasoline listed in the report specified in paragraph (d)(1) of this section, and agree this number with the number reported to EPA.

(e) *Credits required.* The following attest procedures shall be completed for refineries and importers:

(1) Obtain the annual average benzene concentration and volume from the annual benzene report per § 80.1285.

(2) If the value in paragraph (e)(1) of this section is greater than 0.62 percent by volume, compute and report as a finding the difference between 0.62 percent by volume and the value in paragraph (e)(1) of this section.

(3) Compute and report as a finding the total benzene credits required by multiplying the value in paragraph (e)(2) of this section times the volume of gasoline in paragraph (e)(1) of this section, and agree with the report to EPA.

(4) Obtain the refiner's or importer's representation as to the portion of the deficit under paragraph (e)(3) of this section that was resolved with credits, or that was carried forward as a deficit under § 80.1230(b), and agree with the report to EPA.

(f) *Credit purchases and sales.* The following attest procedures shall be completed for a refinery or importer that is a transferor or transferee of credits during an averaging period:

(1) Obtain contracts or other documents for all credits transferred to another refinery or importer during the year being reviewed; compute and report as a finding the number and year of creation of credits represented in these documents as being transferred; and agree with the report to EPA.

(2) Obtain contracts or other documents for all credits received during the year being reviewed; compute and report as a finding the number and year of creation of credits represented in these documents as being received; and agree with the report to EPA.

(g) *Credit reconciliation.* The following attest procedures shall be completed each year credits were in the refiner's or importer's possession at any time during the year:

(1) Obtain the credits remaining or the credit deficit from the previous year from the refiner's or importer's report to EPA for the previous year.

(2) Compute and report as a finding the net credits remaining at the conclusion of the year being reviewed by totaling:

(i) Credits remaining from the previous year; plus

(ii) Credits generated under paragraphs (c) and (d) of this section; plus

(iii) Credits purchased under paragraph (f) of this section; minus

(iv) Credits sold under paragraph (f) of this section; minus

(v) Credits used under paragraphs (e) of this section; minus

(vi) Credits expired; minus

(vii) Credit deficit from the previous year.

(3) Agree the credits remaining or the credit deficit at the conclusion of the year being reviewed with the report to EPA.

(4) If the refinery or importer had a credit deficit for both the previous year and the year being reviewed, report this fact as a finding.

Violations and Penalties

§ 80.1400 What acts are prohibited under the gasoline benzene program?

No person shall:

(a) *Averaging violation.* Produce or import gasoline subject to this subpart that does not comply with the applicable benzene average standard requirement under § 80.1230.

(b) *Causing an averaging violation.* Cause another person to commit an act in violation of paragraph (a) of this section.

(c) Fail to meet the recordkeeping and reporting requirements, or any other requirements of this subpart.

§ 80.1405 What evidence may be used to determine compliance with the prohibitions and requirements of this subpart and liability for violations of this subpart?

(a) Compliance with the benzene standard of this subpart shall be determined based on the benzene concentration of the gasoline, measured using the methodologies specified in § 80.46(e). Any evidence or information, including the exclusive use of such evidence or information, may be used to establish the benzene concentration of the gasoline if the evidence or information is relevant to whether the benzene concentration of the gasoline would have been in compliance with the standard if the appropriate sampling and testing methodologies had been correctly performed. Such evidence may be obtained from any source or location and may include, but is not limited to, test results using methods other than those specified in § 80.46(e), business records and commercial documents.

(b) Determinations of compliance with the requirements of this subpart other than the benzene standard, and determinations of liability for any violation of this subpart, may be based on information from any source or location. Such information may include, but is not limited to, business records and commercial documents.

§ 80.1410 Who is liable for violations under the gasoline benzene program?

(a) Persons liable for violations of prohibited acts.

(1) *Averaging violation.* Any refiner or importer that violates § 80.1400(a) is liable for a violation of § 80.1400(a).

(2) *Causing an averaging violation.* Any person that causes another party to violate § 80.1400(a) is liable for a violation of § 80.1400(b).

(3) *Parent corporation liability.* Any parent corporation is liable for any violations of this subpart that are committed by any of its wholly-owned subsidiaries.

(4) *Joint venture and joint owner liability.* Each partner to a joint venture, or each owner of a facility owned by two or more owners, is jointly and severally liable for any violation of this subpart that occurs at the joint venture facility or facility that is owned by the joint owners, or that is committed by the joint venture operation or any of the joint owners of the facility.

(b) Persons liable for failure to meet other provisions of this subpart.

(1) Any person that fails to meet a provision of this subpart not addressed in paragraph (a) of this section is liable for a violation of that provision.

(2) Any person that caused another person to fail to meet a requirement of this subpart not addressed in paragraph (a) of this section, is liable for causing a violation of that provision.

§ 80.1415 What penalties apply under the gasoline benzene program?

(a) Any person liable for a violation under § 80.1410 is subject to civil penalties as specified in sections 205 and 211(d) of the Clean Air Act for every day of each such violation and the amount of economic benefit or savings resulting from each violation.

(b) Any person liable under § 80.1400(a) for a violation of the applicable benzene average standard or causing another person to violate the requirement during any averaging period, is subject to a separate day of violation for each and every day in the averaging period. Any person liable

under § 80.1410(b) for a failure to fulfill any requirement of credit generation, transfer, use, banking, or deficit carry-forward correction is subject to a separate violation for each and every day in the averaging period in which invalid credits are generated, banked, transferred or used.

(c) Any person liable under § 80.1410(b) for failure to meet, or causing a failure to meet, a provision of this subpart is liable for a separate day of violation for each and every day such provision remains unfulfilled.

Foreign Refiners

§ 80.1420 What are the additional requirements under this subpart for gasoline produced at foreign refineries?

(a) *Definitions.* (1) A *foreign refinery* is a refinery that is located outside the United States, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands (collectively referred to in this section as ''the United States'').

(2) A *foreign refiner* is a person that meets the definition of refiner under § 80.2(i) for a foreign refinery.

(3) *Benzene-FRGAS* means gasoline produced at a foreign refinery that has been assigned an individual refinery benzene baseline under § 80.1285, has been approved as a small refiner under § 80.1340, or has been granted temporary relief under § 80.1335, and that is imported into the United States.

(4) *Non-Benzene-FRGAS* means

(i) Gasoline meeting any of the conditions specified in paragraph (a)(3) of this section that is not imported into the United States.

(ii) Gasoline meeting any of the conditions specified in paragraph (a)(3) of this section during a year when the foreign refiner has opted to not participate in the Benzene-FRGAS program under paragraph (c)(3) of this section.

(iii) Gasoline produced at a foreign refinery that has not been assigned an individual refinery benzene baseline under § 80.1285, or that has not been approved as a small refiner under § 80.1340, or that has not been granted temporary relief under § 80.1335.

(5) *Certified Benzene-FRGAS* means Benzene-FRGAS the foreign refiner intends to include in the foreign refinery's benzene compliance calculations under § 80.1240 or credit calculations under § 80.1275 and does include in these calculations when reported to EPA.

(7) *Non-Certified Benzene-FRGAS* means Benzene-FRGAS that is not Certified Benzene-FRGAS.

(b) *Baseline for early credits.* For any foreign refiner to obtain approval under the benzene foreign refiner program of this subpart for any refinery in order to generate early credits under § 80.1275, it must apply for approval under the applicable provisions of this subpart.

(1) The refiner shall follow the procedures, applicable to volume baselines in §§ 80.91 through 80.93 to establish the volume of gasoline that was produced at the refinery and imported into the United States during the applicable years for purposes of establishing a baseline under § 80.1280 for applicable fuels produced for use in the United States.

(2) In making determinations for foreign refinery baselines EPA will consider all information supplied by a foreign refiner, and in addition may rely on any and all appropriate assumptions necessary to make such determinations.

(3) Where a foreign refiner submits a petition that is incomplete or inadequate to establish an accurate baseline, and the refiner fails to correct this deficiency after a request for more information, EPA will not assign an individual refinery baseline.

(c) *General requirements for Benzene-FRGAS foreign refiners.* A foreign refiner of a refinery that is approved under the benzene foreign refiner program of this subpart must designate each batch of gasoline produced at the foreign refinery that is exported to the United States as either Certified Benzene-FRGAS or as Non-Certified Benzene-FRGAS, except as provided in paragraph (c)(3) of this section.

(1) In the case of Certified Benzene-FRGAS, the foreign refiner must meet all requirements that apply to refiners under this subpart.

(2) In the case of Non-Certified Benzene-FRGAS, the foreign refiner shall meet all the following requirements:

(i) The designation requirements in this section;

(ii) The recordkeeping requirements in this section and in § 80.1350;

(iii) The reporting requirements in this section and in §§ 80.1352 and 80.1354;

(iv) The product transfer document requirements in this section;

(v) The prohibitions in this section and in § 80.1400; and

(vi) The independent audit requirements in this section and in § 80.1375.

(3)(i) Any foreign refiner that generates early benzene credits under § 80.1275 shall designate all Benzene-FRGAS as Certified Benzene-FRGAS for any year that such credits are generated.

(ii) Any foreign refiner that has been approved to produce gasoline subject to the benzene foreign refiner program for a foreign refinery under this subpart may elect to classify no gasoline imported into the United States as Benzene-FRGAS provided the foreign refiner notifies EPA of the election no later than November 1 preceding the beginning of the next compliance period.

(iii) An election under paragraph (c)(3)(ii) of this section shall be for a 12 month compliance period and apply to all gasoline that is produced by the foreign refinery that is imported into the United States, and shall remain in effect for each succeeding year unless and until the foreign refiner notifies EPA of the termination of the election. The change in election shall take effect at the beginning of the next annual compliance period.

(d) *Designation, product transfer documents, and foreign refiner certification.* (1) Any foreign refiner of a foreign refinery that has been approved by EPA to produce gasoline subject to the benzene foreign refiner program must designate each batch of Benzene-FRGAS as such at the time the gasoline is produced, unless the refiner has elected to classify no gasoline exported to the United States as Benzene-FRGAS under paragraph (c)(3) of this section.

(2) On each occasion when any person transfers custody or title to any Benzene-FRGAS prior to its being imported into the United States, it must include the following information as part of the product transfer document information:

(i) Designation of the gasoline as Certified Benzene-FRGAS or as Non-Certified Benzene-FRGAS; and

(ii) The name and EPA refinery registration number of the refinery where the Benzene-FRGAS was produced.

(3) On each occasion when Benzene-FRGAS is loaded onto a vessel or other transportation mode for transport to the United States, the foreign refiner shall prepare a certification for each batch of the Benzene-FRGAS that meets the following requirements.

(i) The certification shall include the report of the independent third party under paragraph (f) of this section, and the following additional information:

(A) The name and EPA registration number of the refinery that produced the Benzene-FRGAS;

(B) The identification of the gasoline as Certified Benzene-FRGAS or Non-Certified Benzene-FRGAS;

(C) The volume of Benzene-FRGAS being transported, in gallons;

(D) In the case of Certified Benzene-FRGAS:

(*1*) The benzene content as determined under paragraph (f) of this section, and the applicable designations stated in paragraph (d)(2)(i) of this section; and

(*2*) A declaration that the Benzene-FRGAS is being included in the applicable compliance calculations required by EPA under this subpart.

(ii) The certification shall be made part of the product transfer documents for the Benzene-FRGAS.

(e) *Transfers of Benzene-FRGAS to non-United States markets.* The foreign refiner is responsible to ensure that all gasoline classified as Benzene-FRGAS is imported into the United States. A foreign refiner may remove the Benzene-FRGAS classification, and the gasoline need not be imported into the United States, but only if:

(1) The foreign refiner excludes:

(i) The volume of gasoline from the refinery's compliance report under § 80.1354; and

(ii) In the case of Certified Benzene-FRGAS, the volume of the gasoline from the compliance report under § 80.1354.

(2) The foreign refiner obtains sufficient evidence in the form of documentation that the gasoline was not imported into the United States.

(f) *Load port independent sampling, testing and refinery identification.* (1) On each occasion that Benzene-FRGAS is loaded onto a vessel for transport to the United States a foreign refiner shall have an independent third party:

(i) Inspect the vessel prior to loading and determine the volume of any tank bottoms;

(ii) Determine the volume of Benzene-FRGAS loaded onto the vessel (exclusive of any tank bottoms before loading);

(iii) Obtain the EPA-assigned registration number of the foreign refinery;

(iv) Determine the name and country of registration of the vessel used to transport the Benzene-FRGAS to the United States; and

(v) Determine the date and time the vessel departs the port serving the foreign refinery.

(2) On each occasion that Certified Benzene-FRGAS is loaded onto a vessel for transport to the United States a foreign refiner shall have an independent third party:

(i) Collect a representative sample of the Certified Benzene-FRGAS from each vessel compartment subsequent to loading on the vessel and prior to departure of the vessel from the port serving the foreign refinery;

(ii) Determine the benzene content value for each compartment using the methodology as specified in § 80.46(e) by one of the following:

(A) The third party analyzing each sample; or

(B) The third party observing the foreign refiner analyze the sample;

(iii) Review original documents that reflect movement and storage of the Certified Benzene-FRGAS from the refinery to the load port, and from this review determine:

(A) The refinery at which the Benzene-FRGAS was produced; and

(B) That the Benzene-FRGAS remained segregated from:

(*1*) Non-Benzene-FRGAS and Non-Certified Benzene-FRGAS; and

(*2*) Other Certified Benzene-FRGAS produced at a different refinery.

(3) The independent third party shall submit a report:

(i) To the foreign refiner containing the information required under paragraphs (f)(1) and (f)(2) of this section, to accompany the product transfer documents for the vessel; and

(ii) To the Administrator containing the information required under paragraphs (f)(1) and (f)(2) of this section, within thirty days following the date of the independent third party's inspection. This report shall include a description of the method used to determine the identity of the refinery at which the gasoline was produced, assurance that the gasoline remained segregated as specified in paragraph (n)(1) of this section, and a description of the gasoline's movement and storage between production at the source refinery and vessel loading.

(4) The independent third party must:

(i) Be approved in advance by EPA, based on a demonstration of ability to perform the procedures required in this paragraph (f);

(ii) Be independent under the criteria specified in § 80.65(e)(2)(iii); and

(iii) Sign a commitment that contains the provisions specified in paragraph (i) of this section with regard to activities, facilities and documents relevant to compliance with the requirements of this paragraph (f).

(g) *Comparison of load port and port of entry testing.* (1)(i) Any foreign refiner and any United States importer of Certified Benzene-FRGAS shall compare the results from the load port testing under paragraph (f) of this section, with the port of entry testing as reported under paragraph (o) of this section, for the volume of gasoline and the benzene content value; except as specified in paragraph (g)(1)(ii) of this section.

(ii) Where a vessel transporting Certified Benzene-FRGAS off loads this gasoline at more than one United States port of entry, and the conditions of paragraph (g)(2)(i) of this section are met at the first United States port of entry, the requirements of paragraph (g)(2) of this section do not apply at subsequent ports of entry if the United States importer obtains a certification from the vessel owner that meets the requirements of paragraph(s) of this section, that the vessel has not loaded any gasoline or blendstock between the first United States port of entry and the subsequent port of entry.

(2)(i) The requirements of this paragraph (g)(2) apply if—

(A) The temperature-corrected volumes determined at the port of entry and at the load port differ by more than one percent; or

(B) The benzene content value determined at the port of entry is higher than the benzene content value determined at the load port, and the amount of this difference is greater than the reproducibility amount specified for the port of entry test result by the American Society of Testing and Materials (ASTM) for the test method specified at § 80.46(e).

(ii) The United States importer and the foreign refiner shall treat the gasoline as Non-Certified Benzene-FRGAS, and the foreign refiner shall exclude the gasoline volume from its gasoline volumes calculations and benzene standard designations under this subpart.

(h) *Attest requirements.* Refiners, for each annual compliance period, must arrange to have an attest engagement performed of the underlying documentation that forms the basis of any report required under this subpart. The attest engagement must comply with the procedures and requirements that apply to refiners under §§ 80.125 through 80.130, or other applicable attest engagement provisions, and must be submitted to the Administrator of EPA by August 31 of each year for the prior annual compliance period. The following additional procedures shall be carried out for any foreign refiner of Benzene-FRGAS.

(1) The inventory reconciliation analysis under § 80.128(b) and the tender analysis under § 80.128(c) shall include Non-Benzene-FRGAS.

(2) Obtain separate listings of all tenders of Certified Benzene-FRGAS and of Non-Certified Benzene-FRGAS, and obtain separate listings of Certified Benzene-FRGAS based on whether it is small refiner gasoline, gasoline produced through the use of credits, or other applicable designation under this subpart. Agree the total volume of tenders from the listings to the gasoline inventory reconciliation analysis in § 80.128(b), and to the volumes

determined by the third party under paragraph (f)(1) of this section.

(3) For each tender under paragraph (h)(2) of this section, where the gasoline is loaded onto a marine vessel, report as a finding the name and country of registration of each vessel, and the volumes of Benzene-FRGAS loaded onto each vessel.

(4) Select a sample from the list of vessels identified in paragraph (h)(3) of this section used to transport Certified Benzene-FRGAS, in accordance with the guidelines in § 80.127, and for each vessel selected perform the following:

(i) Obtain the report of the independent third party, under paragraph (f) of this section, and of the United States importer under paragraph (o) of this section.

(A) Agree the information in these reports with regard to vessel identification, gasoline volumes and benzene content test results.

(B) Identify, and report as a finding, each occasion the load port and port of entry benzene content and volume results differ by more than the amounts allowed in paragraph (g) of this section, and determine whether the foreign refiner adjusted its refinery calculations as required in paragraph (g) of this section.

(ii) Obtain the documents used by the independent third party to determine transportation and storage of the Certified Benzene-FRGAS from the refinery to the load port, under paragraph (f) of this section. Obtain tank activity records for any storage tank where the Certified Benzene-FRGAS is stored, and pipeline activity records for any pipeline used to transport the Certified Benzene-FRGAS, prior to being loaded onto the vessel. Use these records to determine whether the Certified Benzene-FRGAS was produced at the refinery that is the subject of the attest engagement, and whether the Certified Benzene-FRGAS was mixed with any Non-Certified Benzene-FRGAS, Non-Benzene-FRGAS, or any Certified Benzene-FRGAS produced at a different refinery.

(5) Select a sample from the list of vessels identified in paragraph (h)(3) of this section used to transport Certified and Non-Certified Benzene-FRGAS, in accordance with the guidelines in § 80.127, and for each vessel selected perform the following:

(i) Obtain a commercial document of general circulation that lists vessel arrivals and departures, and that includes the port and date of departure of the vessel, and the port of entry and date of arrival of the vessel.

(ii) Agree the vessel's departure and arrival locations and dates from the independent third party and United States importer reports to the information contained in the commercial document.

(6) Obtain separate listings of all tenders of Non-Benzene-FRGAS, and perform the following:

(i) Agree the total volume and benzene content of tenders from the listings to the gasoline inventory reconciliation analysis in § 80.128(b).

(ii) Obtain a separate listing of the tenders under this paragraph (h)(6) where the gasoline is loaded onto a marine vessel. Select a sample from this listing in accordance with the guidelines in § 80.127, and obtain a commercial document of general circulation that lists vessel arrivals and departures, and that includes the port and date of departure and the ports and dates where the gasoline was off loaded for the selected vessels. Determine and report as a finding the country where the gasoline was off loaded for each vessel selected.

(7) In order to complete the requirements of this paragraph (h) an auditor shall:

(i) Be independent of the foreign refiner;

(ii) Be licensed as a Certified Public Accountant in the United States and a citizen of the United States, or be approved in advance by EPA based on a demonstration of ability to perform the procedures required in §§ 80.125 through 80.130 and this paragraph (h); and

(iii) Sign a commitment that contains the provisions specified in paragraph (i) of this section with regard to activities and documents relevant to compliance with the requirements of §§ 80.125 through 80.130 and this paragraph (h).

(i) *Foreign refiner commitments.* Any foreign refiner shall commit to and comply with the provisions contained in this paragraph (i) as a condition to being approved for as a foreign refiner under this subpart.

(1) Any United States Environmental Protection Agency inspector or auditor must be given full, complete and immediate access to conduct inspections and audits of the foreign refinery.

(i) Inspections and audits may be either announced in advance by EPA, or unannounced.

(ii) Access will be provided to any location where:

(A) Gasoline is produced;

(B) Documents related to refinery operations are kept;

(C) Gasoline or blendstock samples are tested or stored; and

(D) Benzene-FRGAS is stored or transported between the foreign refinery and the United States, including storage tanks, vessels and pipelines.

(iii) Inspections and audits may be by EPA employees or contractors to EPA.

(iv) Any documents requested that are related to matters covered by inspections and audits must be provided to an EPA inspector or auditor on request.

(v) Inspections and audits by EPA may include review and copying of any documents related to:

(A) Refinery baseline establishment, if applicable, including the volume and benzene content of gasoline; transfers of title or custody of any gasoline or blendstocks whether Benzene-FRGAS or Non-Benzene-FRGAS, produced at the foreign refinery during the period January 1, 2004 through December 31, 2005, and any work papers related to refinery baseline establishment;

(B) The volume and benzene content of Benzene-FRGAS;

(C) The proper classification of gasoline as being Benzene-FRGAS or as not being Benzene-FRGAS, or as Certified Benzene-FRGAS or as Non-Certified Benzene-FRGAS, and all other relevant designations under this subpart;

(D) Transfers of title or custody to Benzene-FRGAS;

(E) Sampling and testing of Benzene-FRGAS;

(F) Work performed and reports prepared by independent third parties and by independent auditors under the requirements of this section, including work papers; and

(G) Reports prepared for submission to EPA, and any work papers related to such reports.

(vi) Inspections and audits by EPA may include taking samples of gasoline, gasoline additives or blendstock, and interviewing employees.

(vii) Any employee of the foreign refiner must be made available for interview by the EPA inspector or auditor, on request, within a reasonable time period.

(viii) English language translations of any documents must be provided to an EPA inspector or auditor, on request, within 10 working days.

(ix) English language interpreters must be provided to accompany EPA inspectors and auditors, on request.

(2) An agent for service of process located in the District of Columbia shall be named, and service on this agent constitutes service on the foreign refiner or any employee of the foreign refiner for any action by EPA or otherwise by the United States related to the requirements of this subpart.

(3) The forum for any civil or criminal enforcement action related to the

provisions of this section for violations of the Clean Air Act or regulations promulgated thereunder shall be governed by the Clean Air Act, including the EPA administrative forum where allowed under the Clean Air Act.

(4) United States substantive and procedural laws shall apply to any civil or criminal enforcement action against the foreign refiner or any employee of the foreign refiner related to the provisions of this section.

(5) Submitting a petition for participation in the benzene foreign refiner program or producing and exporting gasoline under any such program, and all other actions to comply with the requirements of this subpart relating to participation in any benzene foreign refiner program, or to establish an individual refinery gasoline benzene baseline under this subpart constitute actions or activities covered by and within the meaning of the provisions of 28 U.S.C. 1605(a)(2), but solely with respect to actions instituted against the foreign refiner, its agents and employees in any court or other tribunal in the United States for conduct that violates the requirements applicable to the foreign refiner under this subpart, including conduct that violates the False Statements Accountability Act of 1996 (18 U.S.C. 1001) and section 113(c)(2) of the Clean Air Act (42 U.S.C. 7413).

(6) The foreign refiner, or its agents or employees, will not seek to detain or to impose civil or criminal remedies against EPA inspectors or auditors, whether EPA employees or EPA contractors, for actions performed within the scope of EPA employment related to the provisions of this section.

(7) The commitment required by this paragraph (i) shall be signed by the owner or president of the foreign refiner business.

(8) In any case where Benzene-FRGAS produced at a foreign refinery is stored or transported by another company between the refinery and the vessel that transports the Benzene-FRGAS to the United States, the foreign refiner shall obtain from each such other company a commitment that meets the requirements specified in paragraphs (i)(1) through (7) of this section, and these commitments shall be included in the foreign refiner's petition to participate in any benzene foreign refiner program.

(j) *Sovereign immunity.* By submitting a petition for participation in any benzene foreign refiner program under this subpart (and baseline, if applicable) under this section, or by producing and exporting gasoline to the United States under any such program, the foreign refiner, and its agents and employees, without exception, become subject to the full operation of the administrative and judicial enforcement powers and provisions of the United States without limitation based on sovereign immunity, with respect to actions instituted against the foreign refiner, its agents and employees in any court or other tribunal in the United States for conduct that violates the requirements applicable to the foreign refiner under this subpart, including conduct that violates the False Statements Accountability Act of 1996 (18 U.S.C. 1001) and section 113(c)(2) of the Clean Air Act (42 U.S.C. 7413).

(k) *Bond posting.* Any foreign refiner shall meet the requirements of this paragraph (k) as a condition to approval as benzene foreign refiner under this subpart.

(1) The foreign refiner shall post a bond of the amount calculated using the following equation:

$$\text{Bond} = G \times \$\ 0.01$$

Where:

Bond = amount of the bond in U.S. dollars

G = the largest volume of gasoline produced at the foreign refinery and exported to the United States, in gallons, during a single calendar year among the most recent of the following calendar years, up to a maximum of five calendar years: the calendar year immediately preceding the date the refinery's baseline petition is submitted, the calendar year the baseline petition is submitted, and each succeeding calendar year.

(2) Bonds shall be posted by:

(i) Paying the amount of the bond to the Treasurer of the United States;

(ii) Obtaining a bond in the proper amount from a third party surety agent that is payable to satisfy United States administrative or judicial judgments against the foreign refiner, provided EPA agrees in advance as to the third party and the nature of the surety agreement; or

(iii) An alternative commitment that results in assets of an appropriate liquidity and value being readily available to the United States, provided EPA agrees in advance as to the alternative commitment.

(3) Bonds posted under this paragraph (k) shall—

(i) Be used to satisfy any judicial judgment that results from an administrative or judicial enforcement action for conduct in violation of this subpart, including where such conduct violates the False Statements Accountability Act of 1996 (18 U.S.C. 1001) and section 113(c)(2) of the Clean Air Act (42 U.S.C. 7413);

(ii) Be provided by a corporate surety that is listed in the United States Department of Treasury Circular 570 ''Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds''; and

(iii) Include a commitment that the bond will remain in effect for at least five years following the end of latest annual reporting period that the foreign refiner produces gasoline pursuant to the requirements of this subpart.

(4) On any occasion a foreign refiner bond is used to satisfy any judgment, the foreign refiner shall increase the bond to cover the amount used within 90 days of the date the bond is used.

(5) If the bond amount for a foreign refiner increases, the foreign refiner shall increase the bond to cover the shortfall within 90 days of the date the bond amount changes. If the bond amount decreases, the foreign refiner may reduce the amount of the bond beginning 90 days after the date the bond amount changes.

(l) [Reserved]

(m) *English language reports.* Any report or other document submitted to EPA by a foreign refiner shall be in English language, or shall include an English language translation.

(n) *Prohibitions.* (1) No person may combine Certified Benzene-FRGAS with any Non-Certified Benzene-FRGAS or Non-Benzene-FRGAS, and no person may combine Certified Benzene-FRGAS with any Certified Benzene-FRGAS produced at a different refinery, until the importer has met all the requirements of paragraph (o) of this section, except as provided in paragraph (e) of this section.

(2) No foreign refiner or other person may cause another person to commit an action prohibited in paragraph (n)(1) of this section, or that otherwise violates the requirements of this section.

(o) *United States importer requirements.* Any United States importer shall meet the following requirements:

(1) Each batch of imported gasoline shall be classified by the importer as being Benzene-FRGAS or as Non-Benzene-FRGAS, and each batch classified as Benzene-FRGAS shall be further classified as Certified Benzene-FRGAS or as Non-Certified Benzene-FRGAS.

(2) Gasoline shall be classified as Certified Benzene-FRGAS or as Non-Certified Benzene-FRGAS according to the designation by the foreign refiner if this designation is supported by product transfer documents prepared by the foreign refiner as required in paragraph

(d) of this section, unless the gasoline is classified as Non-Certified Benzene-FRGAS under paragraph (g) of this section. Additionally, the importer shall comply with all requirements of this subpart applicable to importers.

(3) For each gasoline batch classified as Benzene-FRGAS, any United States importer shall perform the following procedures.

(i) In the case of both Certified and Non-Certified Benzene-FRGAS, have an independent third party:

(A) Determine the volume of gasoline in the vessel;

(B) Use the foreign refiner's Benzene-FRGAS certification to determine the name and EPA-assigned registration number of the foreign refinery that produced the Benzene-FRGAS;

(C) Determine the name and country of registration of the vessel used to transport the Benzene-FRGAS to the United States; and

(D) Determine the date and time the vessel arrives at the United States port of entry.

(ii) In the case of Certified Benzene-FRGAS, have an independent third party:

(A) Collect a representative sample from each vessel compartment subsequent to the vessel's arrival at the United States port of entry and prior to off loading any gasoline from the vessel;

(B) Obtain the compartment samples; and

(C) Determine the benzene content value of each compartment sample using the methodology specified at 80.46(e) by the third party analyzing the sample or by the third party observing the importer analyze the sample.

(4) Any importer shall submit reports within 30 days following the date any vessel transporting Benzene-FRGAS arrives at the United States port of entry:

(i) To the Administrator containing the information determined under paragraph (o)(3) of this section; and

(ii) To the foreign refiner containing the information determined under paragraph (o)(3)(ii) of this section, and including identification of the port at which the product was offloaded.

(5) Any United States importer shall meet all other requirements of this subpart, for any imported gasoline that is not classified as Certified Benzene-FRGAS under paragraph (o)(2) of this section.

(p) *Truck imports of Certified Benzene-FRGAS produced at a foreign refinery.* (1) Any refiner whose Certified Benzene-FRGAS is transported into the United States by truck may petition EPA to use alternative procedures to meet the following requirements:

(i) Certification under paragraph (d)(5) of this section;

(ii) Load port and port of entry sampling and testing under paragraphs (f) and (g) of this section;

(iii) Attest under paragraph (h) of this section; and

(iv) Importer testing under paragraph (o)(3) of this section.

(2) These alternative procedures must ensure Certified Benzene-FRGAS remains segregated from Non-Certified Benzene-FRGAS and from Non-Benzene-FRGAS until it is imported into the United States. The petition will be evaluated based on whether it adequately addresses the following:

(i) Provisions for monitoring pipeline shipments, if applicable, from the refinery, that ensure segregation of Certified Benzene-FRGAS from that refinery from all other gasoline;

(ii) Contracts with any terminals and/or pipelines that receive and/or transport Certified Benzene-FRGAS, that prohibit the commingling of Certified Benzene-FRGAS with any of the following:

(A) Other Certified Benzene-FRGAS from other refineries.

(B) All Non-Certified Benzene-FRGAS.

(C) All Non-Benzene-FRGAS;

(iii) Procedures for obtaining and reviewing truck loading records and United States import documents for Certified Benzene-FRGAS to ensure that such gasoline is only loaded into trucks making deliveries to the United States;

(iv) Attest procedures to be conducted annually by an independent third party that review loading records and import documents based on volume reconciliation, or other criteria, to confirm that all Certified Benzene-FRGAS remains segregated throughout the distribution system and is only loaded into trucks for import into the United States.

(3) The petition required by this section must be submitted to EPA along with the application for temporary refiner relief individual refinery benzene standard under this subpart.

(q) *Withdrawal or suspension of foreign refiner status.* EPA may withdraw or suspend a foreign refiner's benzene baseline or standard approval for a foreign refinery where—

(1) A foreign refiner fails to meet any requirement of this section;

(2) A foreign government fails to allow EPA inspections as provided in paragraph (i)(1) of this section;

(3) A foreign refiner asserts a claim of, or a right to claim, sovereign immunity in an action to enforce the requirements in this subpart; or

(4) A foreign refiner fails to pay a civil or criminal penalty that is not satisfied using the foreign refiner bond specified in paragraph (k) of this section.

(r) *Early use of a foreign refiner benzene baseline.* (1) A foreign refiner may begin using an individual refinery benzene baseline under this subpart before EPA has approved the baseline, provided that:

(i) A baseline petition has been submitted as required in paragraph (b) of this section;

(ii) EPA has made a provisional finding that the baseline petition is complete;

(iii) The foreign refiner has made the commitments required in paragraph (i) of this section;

(iv) The persons that will meet the independent third party and independent attest requirements for the foreign refinery have made the commitments required in paragraphs (f)(3)(iii) and (h)(7)(iii) of this section; and

(v) The foreign refiner has met the bond requirements of paragraph (k) of this section.

(2) In any case where a foreign refiner uses an individual refinery baseline before final approval under paragraph (r)(1) of this section, and the foreign refinery baseline values that ultimately are approved by EPA are more stringent than the early baseline values used by the foreign refiner, the foreign refiner shall recalculate its compliance, ab initio, using the baseline values approved by the EPA, and the foreign refiner shall be liable for any resulting violation of the requirements of this subpart.

(s) *Additional requirements for petitions, reports and certificates.* Any petition for approval to produce gasoline subject to the benzene foreign refiner program, any alternative procedures under paragraph (p) of this section, any report or other submission required by paragraph (c), (f)(2), or (i) of this section, and any certification under paragraph (d)(3) of this section shall be—

(1) Submitted in accordance with procedures specified by the Administrator, including use of any forms that may be specified by the Administrator.

(2) Be signed by the president or owner of the foreign refiner company, or by that person's immediate designee, and shall contain the following declaration:

I hereby certify: (1) That I have actual authority to sign on behalf of and to bind [insert name of foreign refiner] with regard to all statements contained herein; (2) that I am aware that the information contained herein is being Certified, or submitted to the United States Environmental Protection Agency, under the requirements of 40 CFR part 80, subpart L, and that the information is

material for determining compliance under these regulations; and (3) that I have read and understand the information being Certified or submitted, and this information is true, complete and correct to the best of my knowledge and belief after I have taken reasonable and appropriate steps to verify the accuracy thereof. I affirm that I have read and understand the provisions of 40 CFR part 80, subpart L, including 40 CFR 80.1420 apply to [insert name of foreign refiner]. Pursuant to Clean Air Act section 113(c) and 18 U.S.C. 1001, the penalty for furnishing false, incomplete or misleading information in this certification or submission is a fine of up to $10,000 U.S., and/or imprisonment for up to five years.

PART 85—CONTROL OF AIR POLLUTION FROM MOBILE SOURCES

10. The authority citation for part 85 continues to read as follows:

Authority: 42 U.S.C. 7401–7671q.

Subpart P—[Amended]

11. Section 85.1515 is amended by adding paragraphs (c)(2)(vii), (c)(2)(viii), and (c)(8) to read as follows.

§ 85.1515 Emission standards and test procedures applicable to imported nonconforming motor vehicles and motor vehicle engines.

* * * * *

(c) * * *

(2) * * *

(vii) Nonconforming LDV/LLDTs originally manufactured in OP years 2009 and later must meet the evaporative emission standards in Table S09–1 in 40 CFR 86.1811–09(e). However, LDV/LLDTs originally manufactured in OP years 2009 and 2010 and imported by ICIs who qualify as small volume manufacturers as defined in 40 CFR 86.1838–01 are exempt from the LDV/LLDT evaporative emission standards in Table S09–1 in 40 CFR 86.1811–09(e), but must comply with the Tier 2 evaporative emission standards in Table S04–3 in 40 CFR 86.1811–04(e).

(viii) Nonconforming HLDTs and MDPVs originally manufactured in OP years 2010 and later must meet the evaporative emission standards in Table S09–1 in 40 CFR 86.1811–09(e). However, HLDTs and MDPVs originally manufactured in OP years 2010 and 2011 and imported by ICIs, who qualify as small volume manufacturers as defined in 40 CFR 86.1838–01, are exempt from the HLDTs and MDPVs evaporative emission standards in Table S09–1 in 40 CFR 86.1811–09(e), but must comply with the Tier 2 evaporative emission standards in Table S04–3 in 40 CFR 86.1811–04(e).

* * * * *

(8)(i) Nonconforming LDV/LLDTs originally manufactured in OP years 2010 and later must meet the cold temperature NHMC emission standards in Table S10–1 in 40 CFR 86.1811–10(g).

(ii) Nonconforming HLDTs and MDPVs originally manufactured in OP years 2012 and later must meet the cold temperature NHMC emission standards in Table S10–1 in 40 CFR 86.1811–10(g).

(iii) ICIs, which qualify as small volume manufacturers, are exempt from the cold temperature NMHC phase-in intermediate percentage requirements described in 40 CFR 86.1811–10(g)(3). See 40 CFR 86.1811–04(k)(5)(vi) and (vii).

(iv) As an alternative to the requirements of paragraphs (c)(8)(i) and (ii) of this section, ICIs may elect to meet a cold temperature NMHC family emission level below the cold temperature NMHC fleet average standards specified in Table S10–1 of 40 CFR 86.1811–10 and bank or sell credits as permitted in 40 CFR 86.1864–10. An ICI may not meet a higher cold temperature NMHC family emission level than the fleet average standards in Table S10–1 of 40 CFR 86.1811–10 as specified in paragraphs (c)(8)(i) and (ii) of this section, unless it demonstrates to the Administrator at the time of certification that it has obtained appropriate and sufficient NMHC credits from another manufacturer, or has generated them in a previous model year or in the current model year and not traded them to another manufacturer or used them to address other vehicles as permitted in 40 CFR 86.1864–10.

(v) Where an ICI desires to obtain a certificate of conformity using a higher cold temperature NMHC family emission level than specified in paragraphs (c)(8)(i) and (ii) of this section, but does not have sufficient credits to cover vehicles imported under such certificate, the Administrator may issue such certificate if the ICI has also obtained a certificate of conformity for vehicles certified using a cold temperature NMHC family emission level lower than that required under paragraphs (c)(8)(i) and (ii) of this section. The ICI may then import vehicles to the higher cold temperature NMHC family emission level only to the extent that it has generated sufficient credits from vehicles certified to a family emission level lower than the cold temperature NMHC fleet average standard during the same model year.

(vi) ICIs using cold temperature NMHC family emission levels higher than the cold temperature NMHC fleet average standards specified in paragraphs (c)(8)(i) and (ii) of this section must monitor their imports so that they do not import more vehicles certified to such family emission levels than their available credits can cover. ICIs must not have a credit deficit at the end of a model year and are not permitted to use the deficit carryforward provisions provided in 40 CFR 86.1864–10.

(vii) The Administrator may condition the certificates of conformity issued to ICIs as necessary to ensure that vehicles subject to this paragraph (c)(8) comply with the applicable cold temperature NMHC fleet average standard for each model year.

* * * * *

PART 86—CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES

12. The authority citation for part 86 continues to read as follows:

Authority: 42 U.S.C. 7401–7671q.

Subpart H—[Amended]

13. Section 86.701–94 is amended by revising paragraph (a) to read as follows:

§ 86.701–94 General applicability.

(a) The provisions of this subpart apply to: 1994 through 2003 model year Otto-cycle and diesel light-duty vehicles; 1994 through 2003 model year Otto-cycle and diesel light-duty trucks; and 1994 and later model year Otto-cycle and diesel heavy-duty engines; and 2001 and later model year Otto-cycle heavy-duty vehicles and engines certified under the provisions of subpart S of this part. The provisions of subpart B of this part apply to this subpart. The provisions of § 86.1811–04(a)(5) and (p) apply to 2004 and later model year light-duty vehicles, light-duty trucks, and medium duty passenger vehicles.

* * * * *

Subpart S—[Amended]

14. Section 86.1803–01 is amended by revising the definition of ''Banking'' and adding the definition for ''Fleet average cold temperature NMHC standard'' to read as follows:

§ 86.1803–01 Definitions.

* * * * *

Banking means one of the following:

(1) The retention of NO_X emission credits for complete heavy-duty vehicles by the manufacturer generating the emission credits, for use in future model year certification programs as permitted by regulation.

(2) The retention of cold temperature non-methane hydrocarbon (NMHC) emission credits for light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles by the manufacturer generating the emission credits, for use in future model year certification programs as permitted by regulation.

* * * * *

Fleet average cold temperature NMHC standard means, for light-duty vehicles, light-duty trucks and medium-duty passenger vehicles, an NMHC cold temperature standard imposed over an individual manufacturer's total 50-State U.S. sales (or a fraction of total U.S. sales during phase-in years), as ''U.S. sales'' is defined to include all national sales, including points-of-first sale in California, of a given model year. Manufacturers determine their compliance with such a standard by averaging, on a sales-weighted basis, the individual NMHC ''Family Emission Limits'' (FEL—as defined in this subpart) to which light-duty vehicles, light-duty trucks and medium-duty passenger vehicles were certified and sold for that model year.

* * * * *

15. Section 86.1805–04 is amended by adding paragraph (g) to read as follows:

§ 86.1805–04 Useful life.

* * * * *

(g) Where cold temperature NMHC standards are applicable, the useful life requirement for compliance with the cold temperature NMHC standard only is as follows:

(1) For LDV/LLDTs, 10 years or 120,000 miles, whichever occurs first.

(2) For HLDT/MDPVs, 11 years or 120,000 miles, whichever occurs first.

16. A new § 86.1809–10 is added to Subpart S to read as follows:

§ 86.1809–10 Prohibition of defeat devices.

(a) No new light-duty vehicle, light-duty truck, medium-duty passenger vehicle, or complete heavy-duty vehicle shall be equipped with a defeat device.

(b) The Administrator may test or require testing on any vehicle at a designated location, using driving cycles and conditions which may reasonably be expected to be encountered in normal operation and use, for the purposes of investigating a potential defeat device.

(c) For cold temperature CO and cold temperature NMHC emission control, the Administrator will use a guideline to determine the appropriateness of the CO and NMHC emission control at ambient temperatures between 25 °F (4 °C) (the upper bound of the cold test range) and 68 °F (20 °C) (the lower bound of the FTP range). The guideline for CO emission congruity across the intermediate temperature range is the linear interpolation between the CO standard applicable at 25 °F (4 °C) and the CO standard applicable at 68 °F (20 °C). The guideline for NMHC emission congruity across the intermediate temperature range is the linear interpolation between the NMHC FEL applicable at 25 °F (4 °C) and the Tier 2 NMOG standard to which the vehicle was certified at 68 °F (20 °C), where the intermediate temperature NMHC level is rounded to the nearest hundredth for comparison to the interpolated line. For vehicles that exceed this CO emissions guideline or this NMHC emissions guideline upon intermediate temperature cold testing:

(1) If the CO emission level is greater than the 20 °F (7 °C) emission standard, the vehicle will automatically be considered to be equipped with a defeat device without further investigation. If the intermediate temperature NMHC emission level, rounded to the nearest hundredth, is greater than the 20 °F (7 °C) FEL, the vehicle will automatically be considered to be equipped with a defeat device without further investigation.

(2) If the CO emission level does not exceed the 20 °F emission standard, the Administrator may investigate the vehicle design for the presence of a defeat device under paragraph (d) of this section. If the intermediate temperature NMHC emission level, rounded to the nearest hundredth, does not exceed the 20 °F FEL, the Administrator may investigate the vehicle design for the presence of a defeat device under paragraph (d) of this section.

(d) For vehicle designs designated by the Administrator to be investigated for possible defeat devices:

(1) The manufacturer must show to the satisfaction of the Administrator that the vehicle design does not incorporate strategies that unnecessarily reduce emission control effectiveness exhibited during the Federal or Supplemental Federal emissions test procedures (FTP or SFTP) when the vehicle is operated under conditions which may reasonably be expected to be encountered in normal operation and use.

(2) The following information requirements apply:

(i) Upon request by the Administrator, the manufacturer will provide an explanation containing detailed information regarding test programs, engineering evaluations, design specifications, calibrations, on-board computer algorithms, and design strategies incorporated for operation both during and outside of the Federal emission test procedure.

(ii) For purposes of investigations of possible cold temperature CO or cold temperature NMHC defeat devices under this paragraph (d), the manufacturer shall provide an explanation which must show, to the satisfaction of the Administrator, that CO emissions and NMHC emissions are reasonably controlled in reference to the linear guideline across the intermediate temperature range.

(e) For each test group of Tier 2 LDV/LLDTs and HLDT/MDPVs and interim non-Tier 2 LDV/LLDTs and HLDT/MDPVs the manufacturer must submit, with the Part II certification application, an engineering evaluation demonstrating to the satisfaction of the Administrator that a discontinuity in emissions of non-methane organic gases, carbon monoxide, oxides of nitrogen and formaldehyde measured on the Federal Test Procedure (subpart B of this part) does not occur in the temperature range of 20 to 86 degrees F. For diesel vehicles, the engineering evaluation must also include particulate emissions.

17. A new § 86.1810–09 is added to Subpart S to read as follows:

§ 86.1810–09 General standards; increase in emissions; unsafe condition; waivers.

Section 86.1810–09 includes text that specifies requirements that differ from § 86.1810–01. Where a paragraph in § 86.1810–01 is identical and applicable to § 86.1810–09, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see § 86.1810–01.'' Where a corresponding paragraph of § 86.1810–01 is not applicable, this is indicated by the statement ''[Reserved].'' This section applies to model year 2009 and later light-duty vehicles and light-duty trucks fueled by gasoline, diesel, methanol, ethanol, natural gas and liquefied petroleum gas fuels. This section also applies to MDPVs and complete heavy-duty vehicles certified according to the provisions of this subpart. Multi-fueled vehicles (including dual-fueled and flexible-fueled vehicles) shall comply with all requirements established for each consumed fuel (or blend of fuels in the case of flexible fueled vehicles). The standards of this subpart apply to both certification and in-use vehicles unless otherwise indicated. This section also applies to hybrid electric vehicles and zero emission vehicles. Unless otherwise specified, requirements and provisions of this subpart applicable to methanol fueled vehicles are also applicable to Tier 2 and interim non-Tier 2 ethanol fueled vehicles.

(a) through (e) [Reserved]. For guidance see § 86.1810–01.

(f) *Altitude requirements.* (1) All emission standards apply at low altitude conditions and at high altitude conditions, except for supplemental exhaust emission standards, cold temperature NMHC emission standards, and the evaporative emission standards as described in § 86.1811–09(e). Supplemental exhaust emission standards, as described in § 86.1811–04(f), apply only at low altitude conditions. Cold temperature NMHC emission standards, as described in § 86.1811–10(g), apply only at low altitude conditions. Tier 2 evaporative emission standards apply at high altitude conditions as specified in § 86.1810–01(f) and (j), and § 86.1811–04(e).

(2) For vehicles that comply with the cold temperature NMHC standards, manufacturers shall submit an engineering evaluation indicating that common calibration approaches are utilized at high altitudes. Any deviation from low altitude emission control practices shall be included in the auxiliary emission control device (AECD) descriptions submitted at certification. Any AECD specific to high altitude shall require engineering emission data for EPA evaluation to quantify any emission impact and validity of the AECD.

(g) through (p) [Reserved]. For guidance see § 86.1810–01.

18. Section 86.1811–04 is amended by adding paragraphs (k)(5)(iv) through (vii) and (q)(1)(vi) through (ix) to read as follows:

§ 86.1811–04 Emission standards for light-duty vehicles, light-duty trucks and medium-duty passenger vehicles.

* * * * *

(k) * * *

(5) * * *

(iv) Vehicles produced by small volume manufacturers, as defined in § 86.1838–01, are exempt from the LDV/LLDT evaporative emissions standards in Table S09–1 of § 86.1811–09(e) for model years 2009 and 2010, but must comply with the Tier 2 evaporative emission standards in Table S04–3 in paragraph (e)(1) of this section for model years 2009 and 2010.

(v) Vehicles produced by small volume manufacturers, as defined in § 86.1838–01, are exempt from the HLDT/MDPV evaporative emissions standards in Table S09–1 of § 86.1811–09(e) for model years 2010 and 2011, but must comply with the Tier 2 evaporative emission standards in Table S04–3 in paragraph (e)(1) of this section for model years 2010 and 2011.

(vi) Small volume manufacturers, as defined in § 86.1838–01, are exempt from the LDV/LLDT cold temperature NMHC phase-in requirements in Table S10–1 of § 86.1811–10(g) for model years 2010, 2011, and 2012, but must comply with the 100% requirement for 2013 and later model years for cold temperature NMHC standards

(vii) Small volume manufacturers, as defined in § 86.1838–01, are exempt from the HLDT/MDPV cold temperature NMHC phase-in requirements in Table S10–1 of § 86.1811–10(g) for model years 2012, 2013, and 2014, but must comply with the 100% requirement for 2015 and later model years for cold temperature NMHC standards.

* * * * *

(q) * * *

(1) * * *

(vi) Defer compliance with the LDV/LLDT evaporative emissions standards in Table S09–1 of § 86.1811–09(e) until 2013, and defer compliance with the LDV/LLDT evaporative emissions standards in Table S09–2 of § 86.1811–09(e) until 2014. (The hardship relief may be extended one additional model year—2 model years total.)

(vii) Defer compliance with the HLDT/MDPV evaporative emissions standards in Table S09–1 of § 86.1811–09(e) until 2014, and defer compliance with the HLDT/MDPV evaporative emissions standards in Table S09–2 of § 86.1811–09(e) until 2015. (The hardship relief may be extended one additional model year—2 model years total.)

(viii) Defer 100% compliance with the LDV/LLDT cold temperature NMHC standards in Table S10–X of § 86.1811–10(g) until 2015. (The hardship relief may be extended one additional model year—2 model years total.)

(ix) Defer 100% compliance with the HLDT/MDPV cold temperature NMHC standards in Table S10–X of § 86.1811–10(g) until 2017. (The hardship relief may be extended one additional model year—2 model years total.)

* * * * *

19. A new § 86.1811–09 is added to Subpart S to read as follows:

§ 86.1811–09 Emission standards for light-duty vehicles, light-duty trucks and medium-duty passenger vehicles.

Section 86.1811–09 includes text that specifies requirements that differ from § 86.1811–04. Where a paragraph in § 86.1811–04 is identical and applicable to § 86.1811–09, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see § 86.1811–04.'' Where a corresponding paragraph of § 86.1811–04 is not applicable, this is indicated by the statement ''[Reserved].''

(a) *Applicability.* (1) This section contains regulations implementing emission standards for all LDVs, LDTs and MDPVs. This section applies to 2009 and later model year LDVs, LDTs and MDPVs fueled by gasoline, diesel, methanol, ethanol, natural gas and liquefied petroleum gas fuels, except as noted. Additionally, this section applies to hybrid electric vehicles (HEVs) and zero emission vehicles (ZEVs). Unless otherwise specified, multi-fueled vehicles must comply with all requirements established for each consumed fuel.

(2) through (4) [Reserved]. For guidance see § 86.1811–04.

(5) The exhaust emission standards and evaporative emission standards of this section apply equally to certification and in-use LDVs, LDTs and MDPVs, unless otherwise specified. See paragraph (t) of this section for interim evaporative emission in-use standards that are different than the certification evaporative emission standards specified in paragraph (e) of this section.

(b) through (d) [Reserved]. For guidance see § 86.1811–04.

(e) *Evaporative emission standards.* Evaporative emissions from gasoline-fueled, natural gas-fueled, liquefied petroleum gas-fueled, ethanol-fueled and methanol-fueled vehicles must not exceed the standards in this paragraph (e). The standards apply equally to certification and in-use vehicles.

(1) *Diurnal-plus-hot soak evaporative hydrocarbon standards.* (i) Hydrocarbons for LDV/LLDTs, HLDTs and MDPVs that are gasoline-fueled, dedicated natural gas-fueled, dedicated liquefied petroleum gas-fueled, dedicated ethanol-fueled, dedicated methanol-fueled and multi-fueled vehicles when operating on gasoline must not exceed the diurnal plus hot soak standards shown in Table S09–1 for the full three diurnal test sequence and for the supplemental two diurnal test sequence. The standards apply equally to certification and in-use vehicles, except as otherwise specified in paragraph (t) of this section. Table S09–1 follows:

TABLE S09–1.—LIGHT-DUTY DIURNAL PLUS HOT SOAK EVAPORATIVE EMISSION STANDARDS

[Grams per test]

Vehicle category	Model year	3 day diurnal+hot soak	Supplemental 2 day diurnal+hot soak
LDVs	2009	0.50	0.65
LLDTs	2009	0.65	0.85
HLDTs	2010	0.90	1.15
MDPVs	2010	1.00	1.25

(ii) Hydrocarbons for LDV/LLDTs, HLDTs and MDPVs that are multi-fueled vehicles operating on non-gasoline fuel must not exceed the diurnal plus hot soak standards shown in Table S09–2 for the full three diurnal test sequence and for the supplemental two diurnal test sequence. The standards apply equally to certification and in-use vehicles except as otherwise specified in paragraph (t) of this section. Table S09–2 follows:

TABLE S09–2.—LIGHT-DUTY DIURNAL PLUS HOT SOAK EVAPORATIVE EMISSION STANDARDS: NON-GASOLINE PORTION OF MULTI-FUELED VEHICLES

[Grams per test]

Vehicle category	Model year	3 day diurnal+hot soak	Supplemental 2 day diurnal+hot soak
LDVs	2012	0.50	0.65
LLDTs	2012	0.65	0.85
HLDTs	2013	0.90	1.15
MDPVs	2013	1.00	1.25

(2) through (6) [Reserved]. For guidance see § 86.1811–04.

(f) through (s) [Reserved]. For guidance see § 86.1811–04.

(t) *Evaporative emission in-use standards.* (1) For LDVs and LLDTs certified prior to the 2012 model year, the Tier 2 LDV/LLDT evaporative emissions standards in Table S04–3 of § 86.1811–04(e) shall apply to in-use vehicles for only the first three model years after an evaporative family is first certified to the LDV/LLDT evaporative emission standards in Table S09–1 of paragraph (e) of this section. For example, evaporative families first certified to the LDV/LLDT standards in Table S09–1 in the 2011 model year shall meet the Tier 2 LDV/LLDT evaporative emission standards (Table S04–3) in-use for 2011, 2012, and 2013 model year vehicles (applying Tier 2 standards in-use is limited to the first three years after introduction of a vehicle).

(2) For HLDTs and MDPVs certified prior to the 2013 model year, the Tier 2 HLDT/MDPV evaporative emissions standards in Table S04–3 of § 86.1811–04(e) shall apply to in-use vehicles for only the first three model years after an evaporative family is first certified to the HLDT/MDPV evaporative emission standards in Table S09–1 of paragraph (e) of this section. For example, evaporative families first certified to the HLDT/MDPV standards in Table S09–1 in the 2012 model year shall meet the Tier 2 HLDT/MDPV evaporative emission standards (Table S04–3) in-use for 2012, 2013, and 2014 model year vehicles (applying Tier 2 standards in-use is limited to the first three years after introduction of a vehicle).

20. A new § 86.1811–10 is added to Subpart S to read as follows:

§ 86.1811–10 Emission standards for light-duty vehicles, light-duty trucks and medium-duty passenger vehicles.

Section 86.1811–10 includes text that specifies requirements that differ from § 86.1811–04 and § 86.1811–09. Where a paragraph in § 86.1811–04 or § 86.1811–09 is identical and applicable to § 86.1811–10, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see § 86.1811–04'' or ''[Reserved]. For guidance see § 86.1811–09.'' Where a corresponding paragraph of § 86.1811–04 or § 86.1811–09 is not applicable, this is indicated by the statement ''[Reserved].''

(a) [Reserved]. For guidance see § 86.1811–09.

(b) through (d) [Reserved]. For guidance see § 86.1811–04.

(e) [Reserved]. For guidance see § 86.1811–09.

(f) [Reserved]. For guidance see § 86.1811–04.

(g) *Cold temperature exhaust emission standards.* (1) Cold temperature CO standards. These cold temperature CO standards are applicable only to gasoline fueled LDV/Ts and MDPVs. For the following cold temperature CO exhaust emission standards, a useful life of 50,000 miles or 5 years (whichever occurs first) applies:

(i) For LDVs and LDT1s, the standard is 10.0 grams per mile CO.

(ii) For LDT2s, LDT3s and LDT4s, and MDPVs the standard is 12.5 grams per mile CO.

(iii) These standards do not apply to interim non-Tier 2 MDPVs.

(2) *Cold temperature NMHC standards.* Full useful life fleet average cold temperature NMHC standards are applicable only to gasoline fueled LDV/LLDTs and HLDT/MDPVs, and apply equally to certification and in-use except as otherwise specified in paragraph (u) of this section for in-use standards for applicable phase-in models. Testing with other fuels such as E85, or testing on diesel vehicles, is not required. Multi-fuel, bi-fuel or dual-fuel vehicles must comply with requirements using gasoline only. For LDV/LLDTs, the useful life is 120,000 miles or 10 years, whichever comes first. For HLDT/MDPVs, the useful life is 120,000 miles or 11 years, whichever comes first. There is not an intermediate

useful life standard for cold temperature NMHC standards.

(i) The standards are shown in Table S10–1, which follows:

TABLE S10–1.—FLEET AVERAGE COLD TEMPERATURE NMHC FULL USEFUL LIFE EXHAUST EMISSION STANDARDS

Vehicle weight category	Cold temperature NMHC sales-weighted fleet average standard (grams/mile)
LDVs & LLDTs (≤ 6,000 lbs GVWR)	0.3
HLDTs (>6,000–8,500 lbs GVWR) &	0.5
MDPVs (>8,500 10,000 lbs GVWR)	

(ii) The manufacturer must calculate its fleet average cold temperature NMHC emission level(s) as described in § 86.1864–10(m).

(iii) During a phase-in year, the manufacturer must comply with the fleet average standards for the required phase-in percentage for that year as specified in paragraph (g)(3) of this section, or for the alternate phase-in percentage as permitted under paragraph (g)(4) of this section.

(iv) For model years prior to 2010 (LDV/LLDTs) and 2012 (HLDT/MDPVs), where the manufacturer desires to bank early NMHC credits as permitted under § 86.1864–10(o)(5), the manufacturer must achieve a fleet average standard below 0.3 grams per mile for LDV/LLDTs and below 0.5 grams per mile for HLDT/MDPVs. Manufacturers must determine compliance with the cold temperature NMHC fleet average standard according to § 86.1864–10(o).

(3) *Phase-in of the cold temperature NMHC standards.* Except as permitted in § 86.1811–04(k)(5)(vi) and (vii) regarding small volume manufacturers, manufacturers must comply with the phase-in requirements in Tables S10–2 and S10–3 of this paragraph. Separate phase-in schedules are provided for LDV/LLDTs and for HLDT/MDPVs. These requirements specify the minimum percentage of the manufacturer's LDV/LLDT and HLDT/MDPV 50-State sales, by model year, that must meet the fleet average cold temperature NMHC standard for their full useful lives. LDVs and LLDTs must be grouped together to determine compliance with these phase-in requirements, and HLDTs and MDPVs must also be grouped together to determine compliance with these phase-in requirements. Tables S10–2 and S10–3 follow:

TABLE S10–2.—PHASE-IN PERCENTAGES FOR LDV/LLDT COLD TEMPERATURE NMHC REQUIREMENTS

Model year	Percentage of LDV/LLDTs that must meet requirement
2010	25
2011	50
2012	75
2013 and subsequent	100

TABLE S10–3.—PHASE-IN PERCENTAGES FOR HLDT/MDPV COLD TEMPERATURE NMHC REQUIREMENTS

Model year	Percentage of HLDT/MDPVs that must meet requirement
2012	25
2013	50
2014	75
2015 and subsequent	100

(4) *Alternate phase-in schedules for cold temperature NMHC standards.* (i) Manufacturers may apply for alternative phase-in schedules that would still result in 100% phase-in by 2013 and 2015, respectively, for LDV/LLDTs and HLDT/MDPVs. An alternate phase-in schedule submitted by a manufacturer is subject to EPA approval. The alternative phase-in will not be used to delay full implementation past the last year of the primary phase-in schedule (2013 for LDV/LLDTs, 2015 for HLDT/MDPVs). An alternative phase-in schedule will be acceptable if it satisfies the following equations:

LDV/LLDTs:

$$(6\times API_{2008}) + (5\times API_{2009}) + (4\times API_{2010}) + (3\times API_{2011}) + (2\times API_{2012}) + (1\times API_{2013}) \geq 500\%$$

HLDT/MDPVs:

$$(6\times API_{2010}) + (5\times API_{2011}) + (4\times API_{2012}) + (3\times API_{2013}) + (2\times API_{2014}) + (1\times API_{2015}) \geq 500\%$$

Where:

API = anticipated phase-in percentage for the referenced model year

(ii) If the sum of products is greater than or equal to 500%, which is the sum of products from the primary phase-in schedule ($4 \times 25\% + 3 \times 50\% + 2 \times 75\% + 1 \times 100\% = 500\%$), then the alternative phase-in schedule is acceptable, except as prohibited in paragraphs (g)(4)(i) and (iii) of this section. In addition, manufacturers electing to use an alternate phase-in schedule for compliance with the cold temperature NMHC exhaust emission standards must ensure that the sum of products is at least 100% for model years 2010 and earlier for LDV/LLDTs, and 2012 and earlier for HLDT/MDPVs. For example, a phase-in schedule for LDV/LLDTs of 5/10/10/45/80/100 that begins in 2008 would calculate as $(6 \times 5\%) + (5 \times 10\%) + (4 \times 10\%) = 120\%$ and would be acceptable for 2008–2010. The full phase-in would calculate as $(6 \times 5\%) + (5 \times 10\%) + (4 \times 10\%) + (3 \times 45\%) + (2 \times 80\%) + (1 \times 100\%) = 515\%$ and would be acceptable for 2008–2013.

(iii) Under an alternate phase-in schedule, the projected phase-in percentage is not binding for a given model year, provided the sums of the actual phase-in percentages that occur meet the appropriate total sums as required in the equations of paragraph (g)(4)(i) of this section, and provided that 100% actual compliance is reached for the appropriate model year, either 2013 for LDV/LLDTs or 2015 for HLDT/MDPVs.

(5) Manufacturers must determine compliance with required phase-in schedules as follows:

(i) Manufacturers must submit information showing compliance with all phase-in requirements of this section with their Part I applications as required by § 86.1844(d)(13).

(ii) A manufacturer electing to use any alternate phase-in schedule permitted under this section must provide in its Application for Certification for the first year in which it intends to use such a schedule, and in each succeeding year during the phase-in, the intended phase-in percentages for that model year and the remaining phase-in years along with the intended final sum of those percentages as described in paragraph (g)(4)(i) of this section. This information may be included with the information required under § 86.1844–01(d)(13). In its year end annual reports, as required under § 86.1844–01(e)(4), the manufacturer must include sufficient information so that the Administrator can verify compliance with the alternative phase-in schedule established under paragraph (g)(4)(i) of this section.

(6)(i) Sales percentages for the purpose of determining compliance with the phase-in of the cold temperature NMHC requirements must be based upon projected 50-State sales of LDV/LLDTs and HLDT/MDPVs of the applicable model year by the manufacturer to the point of first sale. Such sales percentages must be rounded to the nearest one tenth of a percent.

(ii) Alternatively, the manufacturer may petition the Administrator to allow actual volume produced for U.S. sales to be used in lieu of projected U.S. sales for purposes of determining compliance

with the phase-in percentage requirements under this section. The manufacturer must submit its petition within 30 days of the end of the model year to the Compliance and Innovative Strategies Division. For EPA to approve the use of actual volume produced for U.S. sales, the manufacturer must establish to the satisfaction of the Administrator, that actual production volume is functionally equivalent to actual sales volume of LDV/LLDTs and HLDT/MDPVs sold in all 50 U.S. States.

(f) through (s) [Reserved]. For guidance see § 86.1811–04.

(t) [Reserved]. For guidance see § 86.1811–09.

(u) *Cold temperature NMHC exhaust emission in-use standards for applicable phase-in models.* An interim full useful life in-use compliance standard is calculated by adding 0.1 g/mi to the FEL to which each test group is newly certified, and applies to that test group only for the model years shown in Tables S10–4 and S10–5. Otherwise, the in-use standard is the certification standard from paragraph (g)(2) of this section. The standards apply for purposes of in-use testing only and does not apply to certification or Selective Enforcement Auditing. Tables S10–4 and S10–5 follow:

TABLE S10–4.—IN-USE STANDARD FOR APPLICABLE PHASE-IN LDV/LLDTS

Model year of introduction	2008	2009	2010	2011	2012	2013
Models years that the interim in-use standard is available	2008 2009 2010 2011	2009 2010 2011 2012	2010 2011 2012 2013	2011 2012 2013	2012 2013 2014	2013 2014

TABLE S10–5.—IN-USE STANDARDS FOR APPLICABLE PHASE-IN HLDT/MDPVS

Model year of introduction	2010	2011	2012	2013	2014	2015
Models years that the interim in-use standard is available	2010 2011 2012 2013	2011 2012 2013 2014	2012 2013 2014 2015	2013 2014 2015	2014 2015 2016	2015 2016

21. Section 86.1823–01 is amended by revising paragraph (a)(3)(i)(C) to read as follows:

§ 86.1823–01 Durability demonstration procedures for exhaust emissions.

* * * * *

(a) * * *

(3) * * *

(i) * * *

(C) The DF calculated by these procedures will be used for determining compliance with FTP exhaust emission standards, SFTP exhaust emission standards, cold temperature NMHC emission standards, and cold CO emission standards. At the manufacturer's option and using procedures approved by the Administrator, a separate DF may be calculated exclusively using cold CO test data to determine compliance with cold CO emission standards. Similarly, at the manufacturer's option and using procedures approved by the Administrator, a separate DF may be calculated exclusively using cold temperature NMHC test data to determine compliance with cold temperature NMHC emission standards. For determining compliance with full useful life cold NMHC emission standards, the 68–86 degree F 120,000 mile full useful life NMOG DF may be used. Also at the manufacturer's option and using procedures approved by the Administrator, a separate DF may be calculated exclusively using US06 and/or air conditioning (SC03) test data to determine compliance with the SFTP emission standards.

* * * * *

22. Section 86.1827–01 is amended by revising paragraph (a)(5) to read as follows:

§ 86.1827–01 Test group determination.

* * * * *

(a) * * *

(5) Subject to the same emission standards (or FEL in the case of cold temperature NMHC standards), except that a manufacturer may request to group vehicles into the same test group as vehicles subject to more stringent standards, so long as all the vehicles within the test group are certified to the most stringent standards applicable to any vehicle within that test group. Light-duty trucks which are subject to the same emission standards as light-duty vehicles with the exception of the light-duty truck idle CO standard and/or total HC standard may be included in the same test group.

* * * * *

23. A new § 86.1828–10 is added to Subpart S to read as follows:

§ 86.1828–10 Emission data vehicle selection.

Section 86.1828–10 includes text that specifies requirements that differ from § 86.1828–01. Where a paragraph in § 86.1828–01 is identical and applicable to § 86.1828–10, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see § 86.1828–01.'' Where a corresponding paragraph of § 86.1828–01 is not applicable, this is indicated by the statement ''[Reserved].''

(a) through (f) [Reserved]. For guidance see § 86.1828–01.

(g) *Cold temperature NMHC testing.* For cold temperature NMHC exhaust emission compliance for each durability group, the vehicle expected to emit the highest NMHC emissions at 20 degrees F on candidate in-use vehicles shall be selected from the test vehicles specified in § 86.1828–01(a). When the expected worst-case cold temperature NMHC vehicle is also the expected worst-case cold CO vehicle as selected in paragraph (c) of this section, then cold testing is required only for that vehicle; otherwise, testing is required for both the worst-case cold CO vehicle and the worst-case cold temperature NMHC vehicle.

24. Section 86.1829–01 is amended by revising paragraph (b)(3) to read as follows:

§ 86.1829–01 Durability and emission testing requirements; waivers.

* * * * *

(b) * * *

(3) *Cold temperature CO and cold temperature NMHC Testing.* One EDV in each durability group shall be tested for cold temperature CO and cold

temperature NMHC exhaust emission compliance in accordance with the test procedures in subpart C of this part or with alternative procedures requested by the manufacturer and approved in advance by the Administrator. The selection of which EDV and test group within the durability group will be tested for cold temperature CO and cold temperature NMHC compliance will be determined under the provisions of § 86.1828–10(c) and (g).

* * * * *

25. Section 86.1844–01 is amended by revising paragraph (d)(11) to read as follows:

§ 86.1844–01 Information requirements: Application for certification and submittal of information upon request.

* * * * *

(d) * * *

(11) A list of all auxiliary emission control devices (AECD) installed on any applicable vehicles, including a justification for each AECD, the parameters they sense and control, a detailed justification of each AECD which results in a reduction in effectiveness of the emission control system, and rationale for why the AECD is not a defeat device as defined under §§ 86.1809–01 and 86.1809–10. For any AECD uniquely used at high altitudes, EPA may request engineering emission data to quantify any emission impact and validity of the AECD. For any AECD uniquely used on multi-fuel vehicles when operated on fuels other than gasoline, EPA may request engineering emission data to quantify any emission impact and validity of the AECD.

* * * * *

26. A new § 86.1848–10 is added to Subpart S to read as follows:

§ 86.1848–10 Certification.

Section 86.1848–10 includes text that specifies requirements that differ from § 86.1848–01. Where a paragraph in § 86.1848–01 is identical and applicable to § 86.1848–10, this may be indicated by specifying the corresponding paragraph and the statement ''[Reserved]. For guidance see § 86.1848–01.'' Where a corresponding paragraph of § 86.1848–01 is not applicable, this is indicated by the statement ''[Reserved].''

(a) through (b) [Reserved]. For guidance see § 86.1848–01.

(c) All certificates are conditional upon the following conditions being met:

(1) The manufacturer must supply all required information according to the provisions of §§ 86.1843–01 and 86.1844–01.

(2) The manufacturer must comply with all certification and in-use emission standards contained in subparts S and H of this part both during and after model year production.

(3) The manufacturer must comply with all implementation schedules sales percentages as required in § 86.1810 or elsewhere in this part. Failure to meet a required implementation schedule sales percentage will be considered to be a failure to satisfy a condition upon which the certificate was issued and any vehicles or trucks sold in violation of the implementation schedule shall not be covered by the certificate.

(4) For incomplete light-duty trucks and incomplete heavy-duty vehicles, a certificate covers only those new motor vehicles which, when completed by having the primary load-carrying device or container attached, conform to the maximum curb weight and frontal area limitations described in the application for certification as required in § 86.1844–01.

(5) The manufacturer must meet the in-use testing and reporting requirements contained in §§ 86.1845–01, 86.1846–01, and 86.1847–01, as applicable. Failure to meet the in-use testing or reporting requirements shall be considered a failure to satisfy a condition upon which the certificate was issued. A vehicle or truck will be considered to be covered by the certificate only if the manufacturer fulfills this condition upon which the certificate was issued.

(6) Vehicles are covered by a certificate of conformity only if they are in all material respects as described in the manufacturer's application for certification (Part I and Part II).

(7) For Tier 2 and interim non-Tier 2 vehicles, all certificates of conformity issued are conditional upon compliance with all provisions of §§ 86.1811–04, 86.1860–04, 86.1861–04 and 86.1862–04 both during and after model year production.

(i) Failure to meet the fleet average NO_X requirements of 0.07g/mi, 0.30 g/mi or 0.20 g/mi, as applicable, will be considered to be a failure to satisfy the terms and conditions upon which the certificate(s) was (were) issued and the vehicles sold in violation of the fleet average NO_X standard will not be covered by the certificate(s).

(ii) Failure to comply fully with the prohibition against selling credits that it has not generated or that are not available, as specified in § 86.1861–04, will be considered to be a failure to satisfy the terms and conditions upon which the certificate(s) was (were) issued and the vehicles sold in violation of this prohibition will not be covered by the certificate(s).

(iii) Failure to comply fully with the phase-in requirements of § 86.1811–04, will be considered to be a failure to satisfy the terms and conditions upon which the certificate(s) was (were) issued and the vehicles sold which do not comply with Tier 2 or interim non-Tier 2 requirements, up to the number needed to comply, will not be covered by the certificate(s).

(iv) For paragraphs (c)(7)(i) through (iii) of this section:

(A) The manufacturer must bear the burden of establishing to the satisfaction of the Administrator that the terms and conditions upon which the certificate(s) was (were) issued were satisfied.

(B) For recall and warranty purposes, vehicles not covered by a certificate of conformity will continue to be held to the standards stated or referenced in the certificate that otherwise would have applied to the vehicles.

(8) For LDV/LLDTs and HLDT/MDPVs, all certificates of conformity issued are conditional upon compliance with all provisions of §§ 86.1811–10 and 86.1864–10 both during and after model year production.

(i) Failure to meet the fleet average cold temperature NMHC requirements will be considered a failure to satisfy the terms and conditions upon which the certificate(s) was (were) issued and the vehicles sold in violation of the fleet average NMHC standard will not be covered by the certificate(s).

(ii) Failure to comply fully with the prohibition against selling credits that are not generated or that are not available, as specified in § 86.1864–10, will be considered a failure to satisfy the terms and conditions upon which the certificate(s) was (were) issued and the vehicles sold in violation of this prohibition will not be covered by the certificate(s).

(iii) Failure to comply fully with the phase-in requirements of § 86.1811–10 will be considered a failure to satisfy the terms and conditions upon which the certificate(s) was (were) issued and the vehicles sold that do not comply with cold temperature NMHC requirements, up to the number needed to comply, will not be covered by the certificate(s).

(iv) For paragraphs (c)(8)(i) through (iii) of this section:

(A) The manufacturer bears the burden of establishing to the satisfaction of the Administrator that the terms and conditions upon which the certificate(s) was (were) issued were satisfied.

(B) For recall and warranty purposes, vehicles not covered by a certificate of conformity will continue to be held to the standards stated or referenced in the

certificate that otherwise would have applied to the vehicles.

(d) through (i) [Reserved]. For guidance see § 86.1848–01.

27. A new § 86.1864–10 is added to Subpart S to read as follows:

§ 86.1864–10 How to comply with the fleet average cold temperature NMHC standards.

(a) *Applicability.* Cold temperature NMHC exhaust emission standards apply to the following vehicles, subject to the phase-in requirements in § 86.1811–10(g)(3) and (4):

(1) 2010 and later model year LDV/LLDTs.

(2) 2012 and later model year HLDT/MDPVs.

(3) Aftermarket conversion systems as defined in 40 CFR 85.502, including conversion of MDPVs.

(4) Vehicles imported by ICIs as defined in 40 CFR 85.1502.

(b) *Useful life requirements.* Full useful life requirements for cold temperature NMHC standards are defined in § 86.1805–04(g). There is not an intermediate useful life standard for cold temperature NMHC standards.

(c) *Altitude.* Altitude requirements for cold temperature NMHC standards are provided in § 86.1810–09(f).

(d) *Small volume manufacturer certification procedures.* Certification procedures for small volume manufacturers are provided in § 86.1838–01.

(e) *Cold temperature NMHC standards.* Fleet average cold temperature NMHC standards are provided in § 86.1811–10(g)(2).

(f) *Phase-in.* Phase-in of the cold temperature NMHC standards are provided in § 86.1811–10(g)(3) and (4).

(g) *Phase-in flexibilities for small volume manufacturers.* Phase-in flexibilities for small volume manufacturer compliance with the cold temperature NMHC standards are provided in § 86.1811–04(k)(5).

(h) *Hardship provisions for small volume manufacturers.* Hardship provisions for small volume manufacturers related to the cold temperature NMHC standards are provided in § 86.1811–04(q)(1).

(i) *In-use standards for applicable phase-in models.* In-use cold temperature NMHC standards for applicable phase-in models are provided in § 86.1811–10(u).

(j) *Durability procedures and method of determining deterioration factors (DFs).* The durability data vehicle selection procedures of § 86.1822–01 and the durability demonstration procedures of § 86.1823–06 apply for cold NMHC standards. For determining compliance with full useful life cold temperature NMHC emission standards, the 68–86 degree F, 120,000 mile full useful life NMOG DF may be used.

(k) *Vehicle test procedure.* (1) The test procedure for demonstrating compliance with cold temperature NMHC standards is contained in subpart C of this part. With prior EPA approval, alternative testing procedures may be used, as specified in § 86.106–96(a), provided cold temperature NMHC emissions do not decrease as a result of an alternative testing procedure.

(2) Testing of all LDVs, LDTs and MDPVs to determine compliance with cold temperature NMHC exhaust emission standards set forth in this section must be on a loaded vehicle weight (LVW) basis, as defined in § 86.1803–01.

(3) Testing for the purpose of providing certification data is required only at low altitude conditions and only for vehicles that can operate on gasoline, except as requested in §§ 86.1810–09(f) and 86.1844–01(d)(11). If hardware and software emission control strategies used during low altitude condition testing are not used similarly in-use across all altitudes, the manufacturer will include a statement in the application for certification, in accordance with §§ 86.1844–01(d)(11) and § 86.1810–09(f), stating what the different strategies are and why they are used. If hardware and software emission control strategies used during testing with gasoline are not used similarly with all fuels that can be used in multi-fuel vehicles, the manufacturer will include a statement in the application for certification, in accordance with §§ 86.1844–01(d)(11) and 86.1810–09(f), stating what the different strategies are and why they are used. For example, unless a manufacturer states otherwise, air pumps used to control emissions on dedicated gasoline vehicles or multi-fuel vehicles during low altitude conditions must also be used to control emissions at high altitude conditions, and software used to control emissions or closed loop operation must also operate similarly at low and high altitude conditions and similarly when multi-fueled vehicles are operated on gasoline and alternate fuels. These examples are for illustrative purposes only; similar strategies would apply to other currently used emission control technologies and/or emerging or future technologies.

(l) *Emission data vehicle (EDV) selection.* Provisions for selecting the appropriate EDV for the cold temperature NMHC standards are provided in §§ 86.1828–10(g) and 86.1829–01(b)(3).

(m) *Calculating the fleet average cold temperature NMHC standard.* Manufacturers will compute separate sales-weighted fleet average cold temperature NMHC emissions at the end of the model year for LDV/LLDTs and HLDT/MDPVs, using actual sales, and certifying test groups to FELs, as defined in § 86.1803–01. The FEL becomes the standard for each test group, and every test group can have a different FEL. The certification resolution for the FEL will be one decimal point. LDVs and LLDTs must be grouped together when calculating the fleet average, and HLDTs and MDPVs must also be grouped together to determine the fleet average. Manufacturers must compute the sales-weighted cold temperature NMHC fleet averages using the following equation, rounded to the nearest tenth:

Fleet average cold temperature NMHC exhaust emissions =

$\Sigma(N \times FEL) \div$ Total number of vehicles sold of the applicable weight category (*i.e.*, either LDV + LLDTs, or HLDT + MDPVs)

Where:

N = The number of LDVs and LLDTs, or HLDTs and MDPVs, sold within the applicable FEL, based on vehicles counted to the point of first sale.

FEL = Family Emission Limit.

(n) *Certification compliance and enforcement requirements for cold temperature NMHC standards.* (1) In addition to the compliance and enforcement requirements provided throughout § 86.1864–10, additional conditions are included in the provisions of § 86.1848–10(c)(8).

(2) The certificate issued for each test group requires all vehicles within that test group to meet the emission standard or FEL to which the vehicles were certified.

(3) Each manufacturer must comply with the applicable cold temperature NMHC fleet average standard on a sales-weighted average basis, at the end of each model year, using the procedure described in paragraph (m) of this section.

(4) During a phase-in year, the manufacturer must comply with the applicable cold temperature NMHC fleet average standard for the required phase-in percentage for that year as specified in § 86.1811–10(g)(3) or (4).

(5) Manufacturers must compute separate cold temperature NMHC fleet averages for LDV/LLDTs and HLDT/MDPVs. The sales-weighted cold temperature NMHC fleet averages must be compared with the applicable fleet average standard.

(6) Each manufacturer must comply on an annual basis with the fleet average standards as follows:

(i) Manufacturers must report in their annual reports to the Agency that they met the relevant corporate average standard by showing that their sales-weighted average cold temperature NMHC emissions of LDV/LLDTs and HLDT/MDPVs, as applicable, are at or below the applicable fleet average standard;

(ii) If the sales-weighted average is above the applicable fleet average standard, manufacturers must obtain and apply sufficient NMHC credits, as appropriate, and as permitted under paragraph (o)(8) of this section. A manufacturer must show via the use of credits that they have offset any exceedence of the corporate average standard. Manufacturers shall also report their credit balances or deficits.

(iii) If a manufacturer fails to meet the corporate average cold temperature NMHC standard for two consecutive years, as required in paragraph (o)(8) of this section, the vehicles causing the corporate average exceedence will be considered not covered by the certificate of conformity. A manufacturer will be subject to penalties on an individual-vehicle basis for sale of vehicles not covered by a certificate.

(iv) EPA will review each manufacturer's sales to designate the vehicles that caused the exceedence of the corporate average standard. EPA will designate as nonconforming those vehicles in test groups with the highest certification emission values first, continuing until a number of vehicles equal to the calculated number of noncomplying vehicles as determined above is reached. In a group where only a portion of vehicles would be deemed nonconforming, EPA will determine the actual nonconforming vehicles by counting backwards from the last vehicle produced in that test group. Manufacturers will be liable for penalties for each vehicle sold that is not covered by a certificate.

(o) *How does the cold temperature NMHC averaging, banking and trading (ABT) program work?* (1) Manufacturers shall average the cold temperature NMHC emissions of their vehicles and comply with the cold temperature NMHC fleet average corporate standard. Credits may be generated during and after the phase-in period. Credits may also be generated prior to the phase-in periods as described in paragraph (5) of this section. A manufacturer whose cold temperature NMHC fleet average emissions exceed the 0.3 g/mile standard for LDV/LLDTs, or 0.5 g/mi for HLDT/MDPVs, must complete the calculation in paragraph (o)(4) of this section to determine the size of its NMHC credit deficit. A manufacturer whose cold temperature NMHC fleet average emissions are less than the 0.3 g/mile standard for LDV/LLDTs, or less than 0.5 g/mi for HLDT/MDPVs, must complete the calculation in paragraph (o)(4) of this section if it desires to generate NMHC credits.

(2) There are no property rights associated with NMHC credits generated under this subpart. Credits are a limited authorization to emit the designated amount of emissions. Nothing in this part or any other provision of law should be construed to limit EPA's authority to terminate or limit this authorization through a rulemaking.

(3) Each manufacturer must comply with the reporting and recordkeeping requirements of paragraph (p) of this section for NMHC credits, including early credits. The averaging, banking and trading program shall be enforced through the certificate of conformity that allows the manufacturer to introduce any regulated vehicles into commerce.

(4) Credits are earned on the last day of the model year. Manufacturers must calculate, for a given model year, the number of credits or debits it has generated according to the following equation, rounded to the nearest tenth:

NMHC Credits or Debits = (Cold Temperature NMHC Standard – Manufacturer's Sales-Weighted Fleet Average Cold Temperature NMHC Emissions) × (Total Number of Vehicles Sold)

Where:

Cold Temperature NMHC Standard = 0.3 g/mi for LDV/LLDTs or 0.5 g/mi for HLDT/MDPV, per § 86.1811–10(g)(2).

Manufacturer's Sales-Weighted Fleet Average Cold Temperature NMHC Emissions = average calculated according to paragraph (m) of this section.

Total Number of Vehicles Sold = Total 50-State sales based on the point of first sale.

(5) The following provisions apply for early banking:

(i) Manufacturers may certify LDV/LLDTs to the cold temperature NMHC exhaust standards in § 86.1811–10(g)(2) for model years 2008–2009 in order to bank credits for use in the 2010 and later model years. Manufacturers may certify HLDT/MDPVs to the cold temperature NMHC exhaust standards in § 86.1811–10(g)(2) for model years 2010–2011 in order to bank credits for use in the 2012 and later model years.

(ii) This process is referred to as ''early banking'' and the resultant credits are referred to as ''early credits.'' In order to bank early credits, a manufacturer must comply with all exhaust emission standards and requirements applicable to LDV/LLDTs and/or HLDT/MDPVs. To generate early credits, a manufacturer must separately compute the sales-weighted cold temperature NMHC average of the LDV/LLDTs and HLDT/MDPVs it certifies to the exhaust requirements and separately compute credits using the calculations in paragraph (o)(4) of this section. Early HLDT/MDPV credits may not be applied to LDV/LLDTs before the 2010 model year. Early LDV/LLDT credits may not be applied to HLDT/ MDPV before the 2012 model year.

(6) NMHC credits are not subject to any discount or expiration date except as required under the deficit carryforward provisions of paragraph (o)(8) of this section. There shall be no discounting of unused credits. NMHC credits shall have unlimited lives, subject to the limitations of paragraph (o)(2) of this section.

(7) Credits may be used as follows:

(i) Credits generated and calculated according to the method in paragraph (o)(4) of this section may only be used to offset deficits accrued with respect to the standard in § 86.1811–10(g)(2). Credits may be banked and used in a future model year in which a manufacturer's average cold temperature NMHC level exceeds the 0.3 or 0.5 g/mi standard for LDV/LLDTs and HLDT/MDPVs, respectively. Credits may be exchanged between the LDT/LLDT and HLDT/MDPV fleets of a given manufacturer. Credits may also be traded to another manufacturer according to the provisions in paragraph (o)(9) of this section. Before trading or carrying over credits to the next model year, a manufacturer must apply available credits to offset any credit deficit, where the deadline to offset that credit deficit has not yet passed.

(ii) The use of credits shall not be permitted to address Selective Enforcement Auditing or in-use testing failures. The enforcement of the averaging standard shall occur through the vehicle's certificate of conformity. A manufacturer's certificate of conformity shall be conditioned upon compliance with the averaging provisions. The certificate shall be void ab initio if a manufacturer fails to meet the corporate average standard and does not obtain appropriate credits to cover its shortfalls in that model year or in the subsequent model year (see deficit carryforward provision in paragraph (o)(8) of this section). Manufacturers shall track their

certification levels and sales unless they produce only vehicles certified to cold temperature NMHC levels below the standard and do not plan to bank credits.

(8) The following provisions apply if debits are accrued:

(i) If a manufacturer calculates that it has negative credits (also called ''debits'' or a ''credit deficit'') for a given model year, it shall be allowed to carry that deficit forward into the next model year. Such a carry-forward may only occur after the manufacturer exhausts any supply of banked credits. At the end of that next model year, the deficit must be covered with an appropriate number of credits that the manufacturer generates or purchases. Any remaining deficit shall be subject to an enforcement action, as described in this paragraph (o)(8). Manufacturers are not permitted to run a deficit for two consecutive years.

(ii) If debits are not offset within the specified time period, the number of vehicles not meeting the fleet average cold temperature NMHC standards and not covered by the certificate must be calculated by dividing the total amount of debits for the model year by the fleet average cold temperature NMHC standard applicable for the model year in which the debits were first incurred.

(iii) EPA will determine the number of vehicles for which the condition on the certificate was not satisfied by designating vehicles in those test groups with the highest certification cold temperature NMHC emission values first and continuing until a number of vehicles equal to the calculated number of noncomplying vehicles as determined above is reached. If this calculation determines that only a portion of vehicles in a test group contribute to the debit situation, then EPA will designate actual vehicles in that test group as not covered by the certificate, starting with the last vehicle produced and counting backwards.

(iv)(A) If a manufacturer ceases production of LDV/LLDTs and HLDT/MDPVs, the manufacturer continues to be responsible for offsetting any debits outstanding within the required time period. Any failure to offset the debits will be considered a violation of paragraph (o)(8)(i) of this section and may subject the manufacturer to an enforcement action for sale of vehicles not covered by a certificate, pursuant to paragraphs (o)(8)(ii) and (iii) of this section.

(B) If a manufacturer is purchased by, merges with, or otherwise combines with another manufacturer, the controlling entity is responsible for offsetting any debits outstanding within the required time period. Any failure to offset the debits will be considered a violation of paragraph (o)(8)(i) of this section and may subject the manufacturer to an enforcement action for sale of vehicles not covered by a certificate, pursuant to paragraphs (o)(8)(ii) and (iii) of this section.

(v) For purposes of calculating the statute of limitations, a violation of the requirements of paragraph (o)(8)(i) of this section, a failure to satisfy the conditions upon which a certificate(s) was issued and hence a sale of vehicles not covered by the certificate, all occur upon the expiration of the deadline for offsetting debits specified in paragraph (o)(8)(i) of this section.

(9) The following provisions apply to NMHC credit trading:

(i) EPA may reject NMHC credit trades if the involved manufacturers fail to submit the credit trade notification in the annual report. A manufacturer may not sell credits that are not available for sale pursuant to the provisions in paragraphs (o)(7)(i) of this section.

(ii) In the event of a negative credit balance resulting from a transaction that a manufacturer could not cover by the reporting deadline for the model year in which the trade occurred, both the buyer and seller are liable, except in cases involving fraud. EPA may void ab initio the certificates of conformity of all engine families participating in such a trade.

(iii) A manufacturer may only trade credits that it has generated pursuant to paragraph (o)(4) of this section or acquired from another party.

(p) *Maintenance of records and submittal of information relevant to compliance with fleet average cold temperature NMHC standards—(1) Maintenance of records.* (i) Manufacturers producing any light-duty vehicles, light-duty trucks, or medium-duty passenger vehicles subject to the provisions in this subpart must establish, maintain, and retain all the following information in adequately organized and indexed records for each model year:

(A) Model year.

(B) Applicable fleet average cold temperature NMHC standard: 0.3g/mi for LDV/LLDTs; 0.5 g/mi for HLDT/MDPVs.

(C) Fleet average cold temperature NMHC value achieved.

(D) All values used in calculating the fleet average cold temperature NMHC value achieved.

(ii) Manufacturers producing any light-duty vehicles, light-duty trucks, or medium-duty passenger vehicles subject to the provisions in this subpart must establish, maintain, and retain all the following information in adequately organized and indexed records for each LDV/T or MDPV subject to this subpart:

(A) Model year.

(B) Applicable fleet average cold temperature NMHC standard.

(C) EPA test group.

(D) Assembly plant.

(E) Vehicle identification number.

(F) Cold temperature NMHC FEL to which the LDV/T or MDPV is certified.

(G) Information on the point of first sale, including the purchaser, city, and state.

(iii) Manufacturers must retain all records required to be maintained under this section for a period of eight years from the due date for the annual report. Records may be stored in any format and on any media, as long as manufacturers can promptly send EPA organized, written records in English if we ask for them. Manufacturers must keep records readily available as EPA may review them at any time.

(iv) Nothing in this section limits the Administrator's discretion to require the manufacturer to retain additional records or submit information not specifically required by this section.

(v) Pursuant to a request made by the Administrator, the manufacturer must submit to the Administrator the information that the manufacturer is required to retain.

(vi) EPA may void ab initio a certificate of conformity for vehicles certified to emission standards as set forth or otherwise referenced in this subpart for which the manufacturer fails to retain the records required in this section or to provide such information to the Administrator upon request.

(2) *Reporting.* (i) Each covered manufacturer must submit an annual report. The annual report must contain for each applicable cold temperature NMHC standard, the fleet average cold temperature NMHC value achieved, all values required to calculate the cold temperature NMHC emissions value, the number of credits generated or debits incurred, all the values required to calculate the credits or debits, the resulting balance of credits or debits, and sufficient information to show compliance with all phase-in or alternative phase-in requirements.

(ii) For each applicable fleet average cold temperature NMHC standard, the annual report must also include documentation on all credit transactions the manufacturer has engaged in since those included in the last report. Information for each transaction must include all of the following:

(A) Name of credit provider.

(B) Name of credit recipient.

(C) Date the trade occurred.

(D) Quantity of credits traded.

(E) Model year in which the credits were earned.

(iii) Unless a manufacturer reports the data required by this section in the annual production report required under § 86.1844–01(e), a manufacturer must submit an annual report for each model year after production ends for all affected vehicles produced by the manufacturer subject to the provisions of this subpart and no later than May 1 of the calendar year following the given model year. Annual reports must be submitted to: Director, Compliance and Innovative Strategies Division, U.S. Environmental Protection Agency, 2000 Traverwood, Ann Arbor, Michigan 48105.

(iv) Failure by a manufacturer to submit the annual report in the specified time period for all vehicles subject to the provisions in this section is a violation of section 203(a)(1) of the Clean Air Act (42 U.S.C. 7522) for each applicable vehicle produced by that manufacturer.

(v) If EPA or the manufacturer determines that a reporting error occurred on an annual report previously submitted to EPA, the manufacturer's credit or debit calculations will be recalculated. EPA may void erroneous credits, unless traded, and must adjust erroneous debits. In the case of traded erroneous credits, EPA must adjust the selling manufacturer's credit or debit balance to reflect the sale of such credits and any resulting generation of debits.

(3) *Notice of opportunity for hearing.* Any voiding of the certificate under paragraph (p)(1)(vi) of this section will be made only after EPA has offered the affected manufacturer an opportunity for a hearing conducted in accordance with § 86.614–84 for light-duty vehicles or § 86.1014–84 for light-duty trucks and, if a manufacturer requests such a hearing, will be made only after an initial decision by the Presiding Officer.

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