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Draft Regulatory Impact Analysis: Control of Hazardous Air Pollutants from Mobile Sources

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EPA is proposing new standards to reduce emissions of Mobile Source Air Toxics (MSATs) including benzene and overall hydrocarbons from motor vehicles, motor vehicle fuels, and portable gasoline containers (gas cans). This Regulatory Impact Analysis provides technical, economic, and environmental analyses of the proposed new emission standards. The anticipated emission reductions will significantly reduce exposure to harmful pollutants and also provide assistance to states and regions facing ozone and particulate air quality problems that are causing a range of adverse health effects, especially in terms of respiratory impairment and related illnesses.

Chapter 1 reviews information related to the health effects of mobile source air toxics. Chapter 2 provides emissions inventory estimates, including estimates of anticipated emissions reductions. Chapter 3 presents air quality and resulting health and welfare effects associated with air toxics, ozone, and particulate matter (PM). Chapter 4 contains an overview of the affected refiners and manufacturers, including a description of the range of products involved and their place in the market. Chapters 5 through 7 summarize the available information supporting the specific standards we are proposing, providing a technical justification for the feasibility of the standards for vehicles, fuels, and gas cans, respectively. Chapters 8 through10 present cost estimates of complying with the proposed standards or vehicles, fuels, and gas cans, respectively. Chapter 11 compares the costs and the emission reductions to generate an estimate of the cost per ton of pollutant removed. Chapters 12 and 13 describe the estimated societal costs and benefits of the proposed rulemaking. Chapter 14 presents our Regulatory Flexibility Analysis, as called for in the Regulatory Flexibility Act.

The following paragraphs briefly describe the standards that we are proposing and the estimated impacts.

Emissions Standards

Vehicles

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.

The current NMHC standards are typically tested at 75˚ F, and recent research and analysis indicates that these standards are not resulting in robust control of NMHC at lower temperatures. (There is an existing cold temperature standard, but it applies only to CO.) 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 propose today would codify the approach that manufacturers are already taking for 50-state evaporative systems, and thus the standards would 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.

Gasoline Fuel Standards

We are proposing that beginning January 1, 2011, refiners and fuel importers would meet an average gasoline benzene content standard of 0.62% by volume on all their gasoline, both reformulated and conventional (except for California, which is already covered by a similar relatively stringent 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 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. In all of these ways, we would significantly consolidate and simplify the existing national fuel-related MSAT regulatory program.

We are also proposing 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.

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. 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 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.

Projected Impacts

The following paragraphs and tables summarize the projected emission reductions and costs associated with the emission standards. See the detailed analysis later in this document for further discussion of these estimates.

Emissions Reductions

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 1 and 2 below summarize the expected reductions in benzene and total MSAT emissions, respectively, from our proposed vehicle, fuel, and gas can controls. Although the proposal does not apply to nonroad engines or the gasoline distribution industry, the fuels controls would reduce benzene emissions from these sources as well due to lower benzene levels in gasoline. In 2030, annual benzene emissions from gasoline on-road mobile sources would be 44% lower as a result of this proposal. Annual benzene emissions from gasoline light-duty vehicles would be 45% lower in 2030 as a

result of this proposal. Gasoline would have 37% lower benzene overall. Finally, this proposal would reduce annual emissions of benzene from gas cans by 78% in 2030.

Table 1: Estimated Reductions in Benzene Emissions from Proposed Control Measures by Sector, 2020 and 2030 (tons)

	2020	2030
Fuels	18,145	20,272
Vehicles	28,105	47,689
Gas Cans	1,567	1,772
Total	45,241	65,282

Table 2: Estimated Reductions in MSAT Emissions from Proposed Control Measures by Sector, 2020 and 2030 (tons)

	2020	2030
Fuels	18,145	20,272
Vehicles	181,509	308,887
Gas Cans	24,158	27,342
Total	221,081	351,894

VOC

VOC emissions would be reduced by the hydrocarbon emission standards for both light-duty vehicles and gas cans. Annual VOC emission reductions from these sources would be 35% lower in 2030 because of this proposal.

Table 3: Estimated Reductions in VOC Emissions from Light-Duty Gasoline Vehicles and Gas Cans, 2020 and 2030 (tons)

	2020	2030
Vehicles	536,484	913,439
Gas Cans	192,683	218,080
Total	729,167	1,131,519

$PM_{2.5}$

We expect that only the proposed vehicle control would reduce emissions of direct $PM_{2.5}$. As shown in Table 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 $PM_{2.5}$.

Table 4. Estimated National Reductions in Direct $PM_{2.5}$ Exhaust Emissions from Light-Duty Gasoline Vehicles and Trucks, 2020 and 2030 (tons)

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

Costs

Fuels

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. The aggregate costs for the fuel program for 2020 and 2030 are provided in Table 5. The increase in costs is due to the projected increase in gasoline usage.

Table 5. Estimated Aggregate Annual Cost for the Proposed Benzene Standard, 2020 and 2030

	2020	**2030**
Fuels program	$212,606,000	$248,421,000

Vehicles

We project that the average incremental costs associated with the new cold temperature standards would be less than $1 per vehicle. We are not projecting changes to vehicle hardware as a result of the proposed standard. Costs would be associated with vehicle R&D and recalibration as well as facilities upgrades to handle additional development testing under cold conditions. Also, we are not anticipating additional costs for the proposed new evaporative

emissions standard. 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. As shown in Table 6, the costs would be fully amortized by 2020.

Table 6. Estimated Aggregate Annual Cost for the Proposed Vehicle Standards, 2020 and 2030

	2020	2030
Vehicles program	$0	$0

Gas Cans

Table 7 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. The table also shows our projections of average fuel savings over the life of the gas can.

Table 7 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

We have also estimated aggregate costs and fuel savings which are projected to peak in 2013 at about $51 million and then drop to about $29 million once fixed costs are recovered. The aggregate annual costs and fuel savings estimates for 2020 and 2030 are provided in Table 8.

Table 8. Estimated Aggregate Annual Cost and Fuel Savings for the Proposed Gas Can Standards, 2020 and 2030

	2020	2030

Gas Can Costs	$31,767,000	$38,724,000
Gas Can Fuel Savings	$98,861,000	$111,210,000

Cost Per Ton

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. 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 2020 and 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 as well as gas cans and gasoline distribution.

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 of the analysis are provided in Tables 9 through 12.

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 9 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 2020	Long-Term Cost per Ton in 2030
Vehicles	$14	$18	$0	$0
Gas Cans (without fuel savings)	$230	$250	$160	$180
Gas Cans (with fuel savings)	$0	$0	$0	$0
Combined (with fuel savings)	$0	$0	$0	$0

Table 10 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 2020	Long-Term Cost per Ton in 2030
Fuels	$11,700	$11,900	$11,700	$12,300
Vehicles	$260	$340	$0	$0
Gas Cans (without fuel savings)	$27,800	$30,900	$20,000	$21,600
Gas Cans (with fuel savings)	$0	$0	$0	$0
Combined (with fuel savings)	$3,700	$4,000	$3,200	$2,700

Table 11 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 2020	Long-Term Cost per Ton in 2030
Fuels	$11,700	$11,900	$11,700	$12,300
Vehicles	$40	$53	$0	$0
Gas Cans (without fuel savings)	$1,800	$2,000	$1,300	$1,400
Gas Cans (with fuel savings)	$0	$0	$0	$0
Combined (with fuel savings)	$770	$850	$660	$500

Table 12 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 2020	Long-Term Cost per Ton in 2030
Vehicles	$620	$820	$0	$0

Benefits

This analysis projects significant benefits throughout the period from initial implementation of the proposed standards through 2030. 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. Table 13 provides the estimated monetized benefits of the proposed cold temperature vehicle standards for 2020 and 2030. 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, assuming a background PM threshold of 3 $\mu g/m^3$ in the calculation of PM mortality. There are no compliance costs associated with the proposed cold temperature vehicle program after 2019; vehicle compliance costs are primarily research and development, and facility costs are expected to be recovered by manufacturers over the first ten years of the program beginning in 2010. Total costs of the entire MSAT proposal, which

include both the proposed gasoline container and vehicle fuel standards, are $205 million in 2030 (in 2003$, including fuel savings).

EPA's consistent approach has been to model premature mortality associated with PM exposure as a nonthreshold effect; that is, with harmful effects to exposed populations modeled regardless of the absolute level of ambient PM concentrations. This approach has been shaped and supported by advice from EPA's technical peer review panel, the Science Advisory Board's Health Effects Subcommittee (SAB-HES). Note, however, that it is not certain whether there exists a threshold below which there would be no benefit to further reductions in $PM_{2.5}$. We consider the impact of a threshold in the PM-mortality concentration response function in Section 12.6.1.1 of the RIA.

Table 13 Estimated Monetized PM-Related Health Benefits of the Proposed Mobile Source Air Toxics Standards: Cold Temperature Controls

	Total Benefits[a, b, c] (billions 2003$)	
	2020	**2030**
Using a 3% discount rate	$3.4 + B	$6.5 + B
Using a 7% discount rate	$3.1 + B	$5.9 + B

[a] Benefits include avoided cases of mortality, chronic illness, and other morbidity health endpoints. PM-related mortality benefits estimated using an assumed PM threshold at background levels (3 $\mu g/m^3$). There is uncertainty about which threshold to use and this may impact the magnitude of the total benefits estimate. For a more detailed discussion of this issue, please refer to Section 12.6.1.1 of the RIA.

[b] For notational purposes, unquantified benefits are indicated with a "B" to represent the sum of additional monetary benefits and disbenefits. A detailed listing of unquantified health and welfare effects is provided in Table 13-2 of the RIA.

[c] Results reflect the use of two different discount rates: 3 and 7 percent, which are recommended by EPA's *Guidelines for Preparing Economic Analyses* and OMB Circular A-4. Results are rounded to three significant digits for ease of presentation and computation.

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. We estimate the net social costs of the proposed program for 2020 and 2030 are provided in Table 14 below. These estimates 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.

Table 14 Net Social Costs Estimates for the Proposed Program (Millions of 2003$)

	2020	2030
Net Social Costs	171.5	205.2

Impact on Small Businesses

We prepared a Regulatory Flexibility Analysis, which evaluates the potential impacts of new standards and fuel controls on small entities. Before issuing our proposal, we analyzed the potential impacts of this rule on small entities. As a part of this analysis, we interacted with several small entities representing the various affected sectors and convened a Small Business Advocacy Review Panel to gain feedback and advice from these representatives. This feedback was used to develop regulatory alternatives to address the impacts of the rule on small businesses. Small entities raised general concerns related to potential difficulties and costs of meeting the upcoming standards.

The Panel consisted of members from EPA, the Office of Management and Budget, and the Small Business Administration's Office of Advocacy. We either are proposing or requesting comment on the Panel's recommendations. These provisions would reduce the burden on small entities that would be subject to this rule's requirements. We have proposed provisions that give small light-duty vehicle manufacturers, small gasoline refiners, and small gas can manufacturers several compliance options aimed specifically at reducing the burden on these small entities. In general, for vehicles and fuels, the options proposed are similar to small entity provisions adopted in prior rulemakings where EPA set vehicle and fuel standards. The options proposed for small gas can manufacturers are unique to this rulemaking since we are proposing gas can standards for the first time. The small entity provisions for the three industry sectors would reduce the burden on small entities that would be required to meet this proposed rule's requirements.