Comments on EPA's Tier 3 Light-duty Vehicle Proposal

February 28, 2013

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MECA & AESI Presentation

Comments on EPA's Tier 3 Light-duty Vehicle Proposal

provided by:
Advanced Engine Systems Institute
and
Manufacturers of Emission Controls Association
www.meca.org
www.dieselretrofit.org

February 28, 2013

AESI Advanced Engine Systems Institute

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The Emissions Control Industry Strongly Supports EPA's Tier 3 Proposal

- Tier 3 emission control solutions will build on the large experience base with millions of existing SULEV/PZEV vehicles – EPA's mobile source emission programs drive technology innovation and investment
- Precious metal-based catalyst performance is degraded by fuel sulfur. Lowering gasoline sulfur levels will provide significant emission reductions from existing vehicles and ensure the commercialization of the most cost effective Tier 3 emission solutions.
- The mobile source emissions control industry has a significant economic impact in the U.S. and in the world automotive market. Tier 3 regulations are needed to maintain U.S. leadership in this sector.
- Finalizing the Tier 3 proposal by the end of 2013 will ensure that the 2017 model year can be captured in the benefits of the program.

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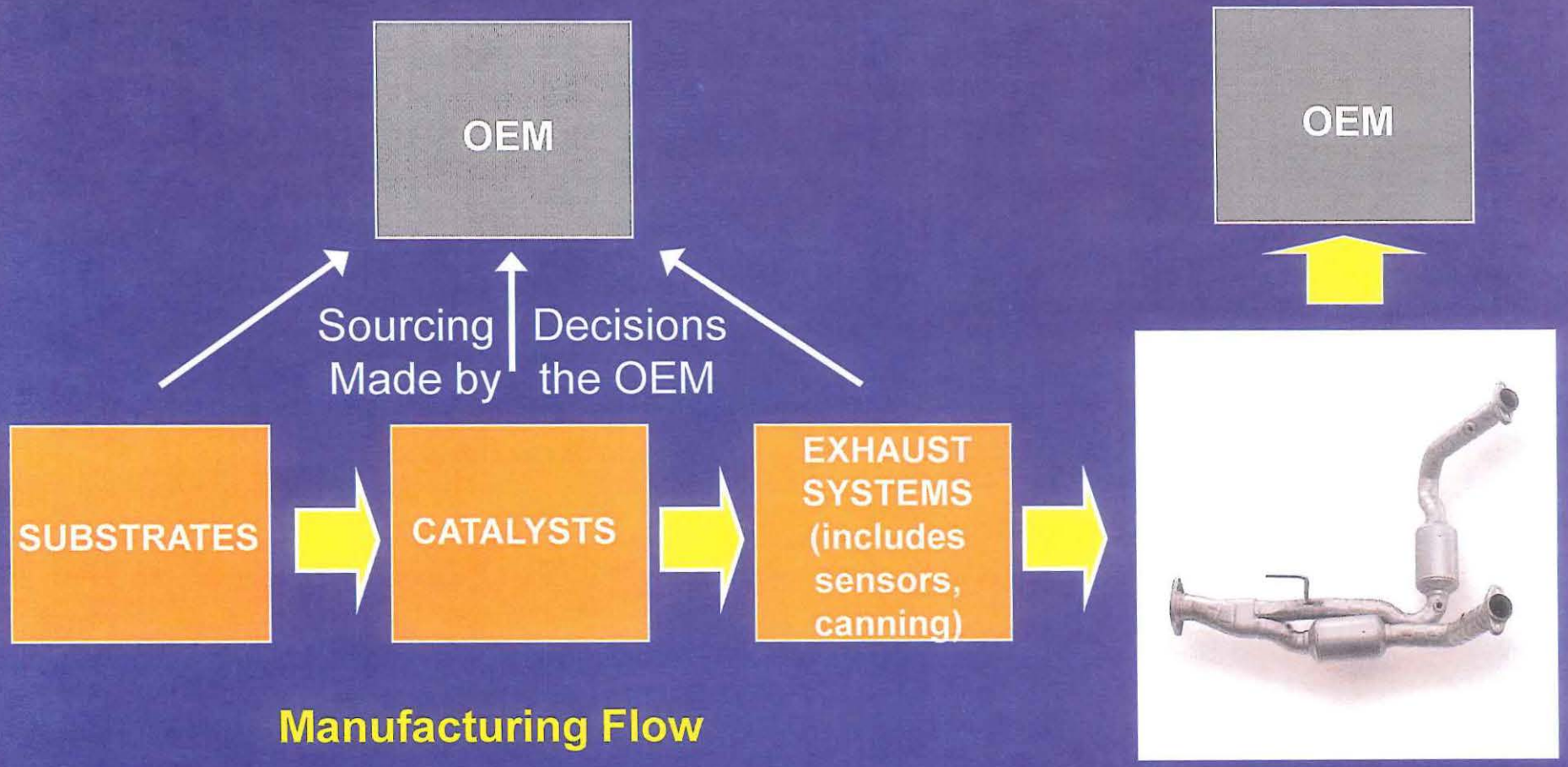
Emission Control Industry Has Long Standing Relationships with Vehicle and Engine Manufacturers



Manufacturing Flow

MECA and AESI Members Include the Full Range of Mobile Source Emission Technologies

- **Emission Control Technologies**
  - Catalytic Converters (All Fuels)
  - Particulate Filters (Diesel & Gasoline)
  - Selective Catalytic Reduction Catalysts and Systems
  - Direct Ozone Reduction Catalysts
  - Oxygen, NOx, and Temperature Sensors
  - Exhaust System Integration
  - Thermal Management Strategies
  - Engine/Fuel System/Reductant Management Technologies
  - Crankcase Emission Controls
  - Evaporative Emission Controls
  - Enhanced Combustion Technologies

- > 65,000 jobs in the U.S.
- Plants, engineering centers, facilities in nearly every state
- > 500 million vehicles sold in the U.S. equipped with exhaust and evaporative emission controls over the past, nearly 40 years (since 1975 model year)

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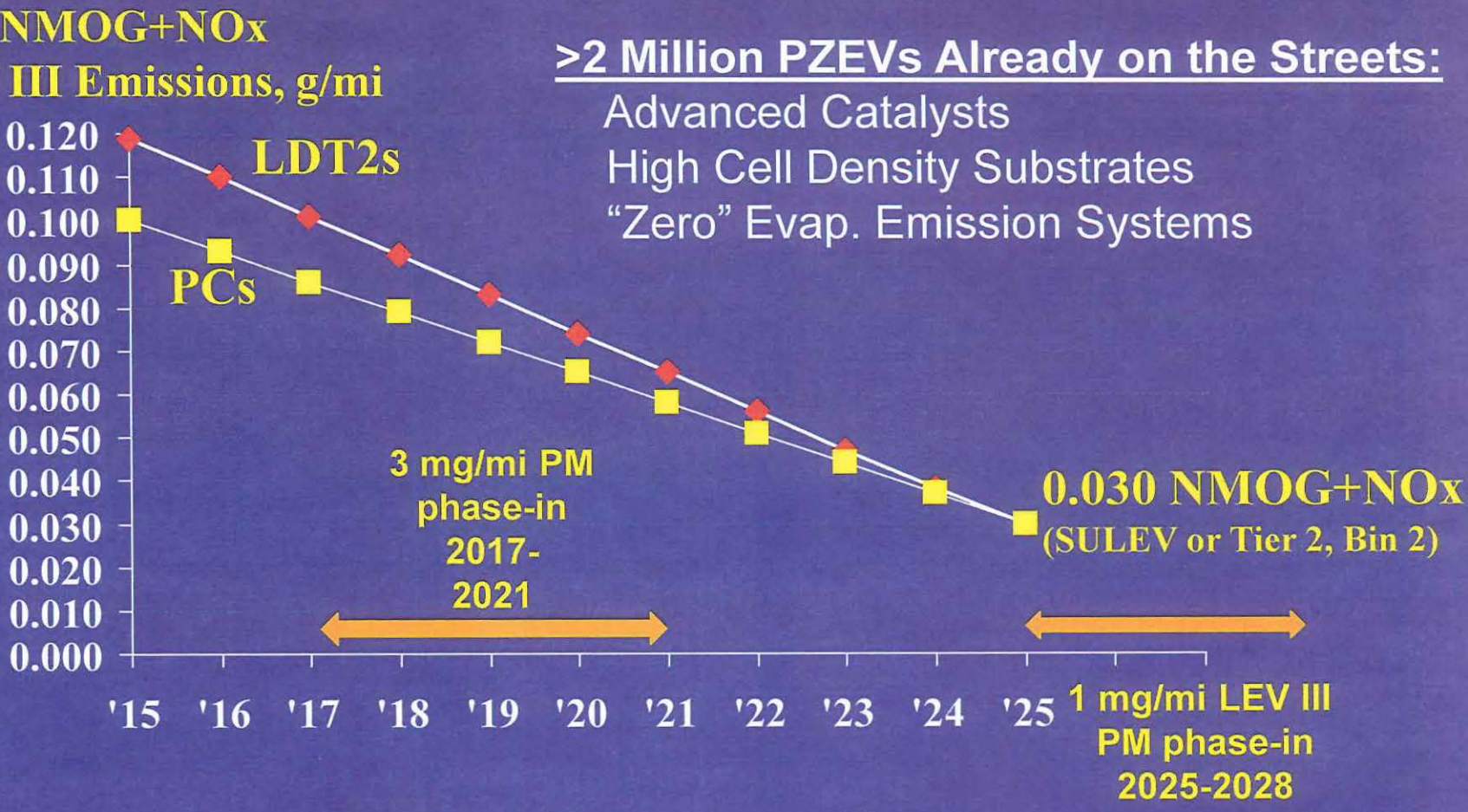
Emission Control Economic Impacts in the U.S.

- 2012: 14.5 million Light-duty Vehicles sold in U.S. – emission controls generated approximately $12.5 billion in economic activity
- 2012: 79 million Light-duty Vehicles sold worldwide – emission controls generated about $50 billion in economic activity
- 2012: every new, U.S. light-duty/medium-duty/heavy-duty diesel highway engine equipped with a *DPF*, most equipped with *SCR catalysts*; emission controls expanding into off-road diesel sector

LEV III/Tier 3 Resets the Emissions Performance Bar for Light-duty Vehicles – Drives Innovation



>2 Million PZEVs Already on the Streets:

Advanced Catalysts
High Cell Density Substrates
"Zero" Evap. Emission Systems

Note: California has a gasoline sulfur cap of 20 ppm

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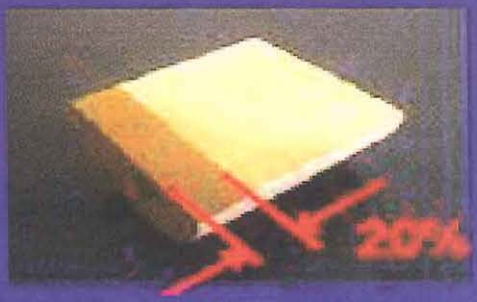
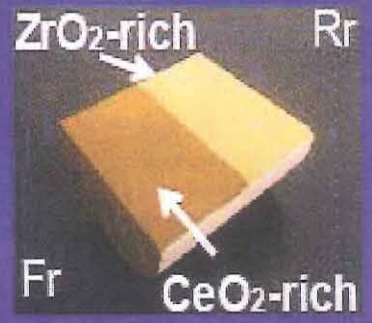
Gasoline Three-way Catalysts Utilize Advanced Design Strategies to Maximize Cost Effectiveness

Axial Zoning

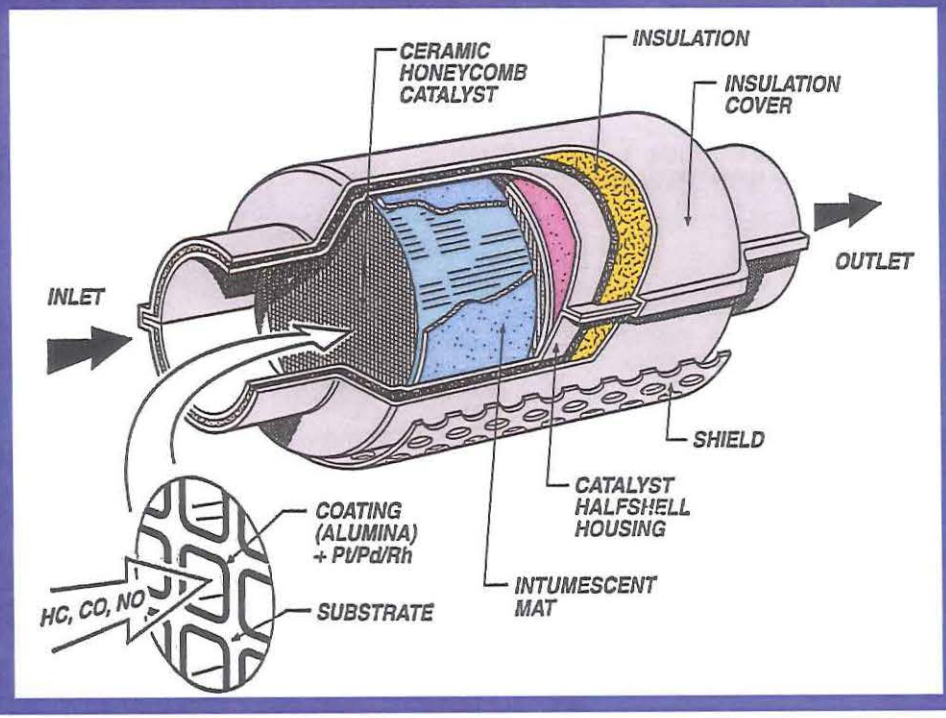




Pd is zoned in the front to give fast HC light-off

Rh is zoned in the back to protect against catalyst poisons

Zoned oxygen storage materials to give optimum performance



Multiple Coating Layers

Pd Catalyst Layer

Rh Catalyst Layer

SUBSTRATE WALL

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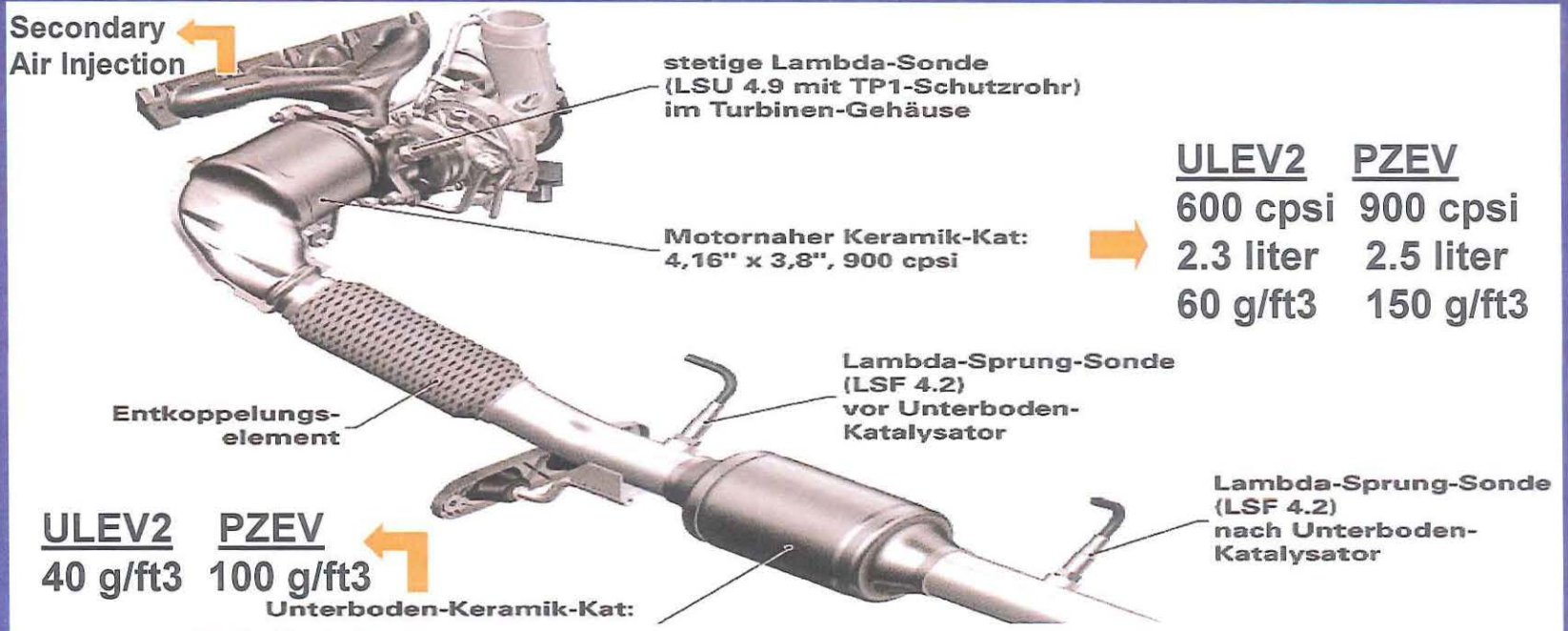
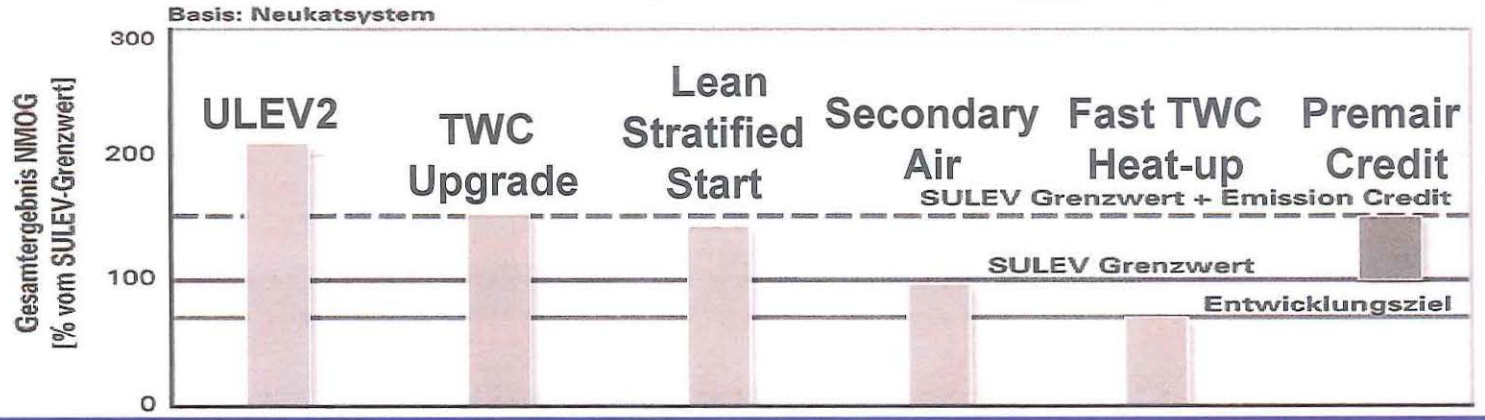
Tier 3 Emission Controls Builds on PZEV Experience, Including Turbo-GDI Applications



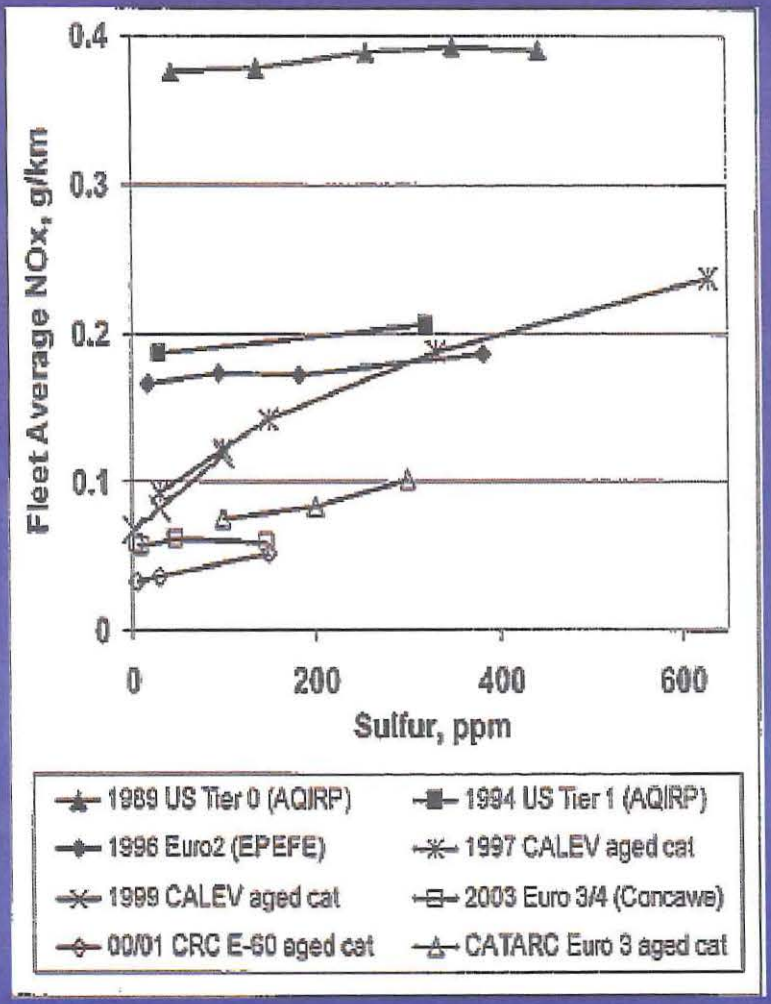
ULEV2	PZEV
600 cpsi	900 cpsi
2.3 liter	2.5 liter
60 g/ft3	150 g/ft3

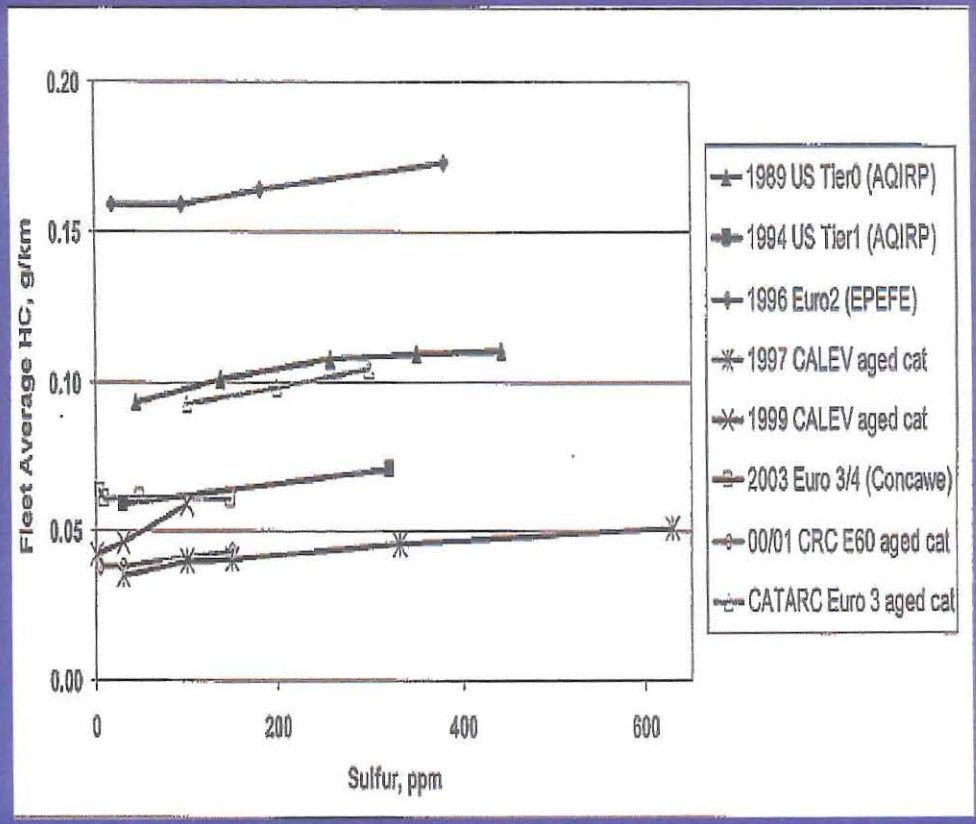
ULEV2	PZEV
40 g/ft3	100 g/ft3



Source: 2007 Aachen Colloquium

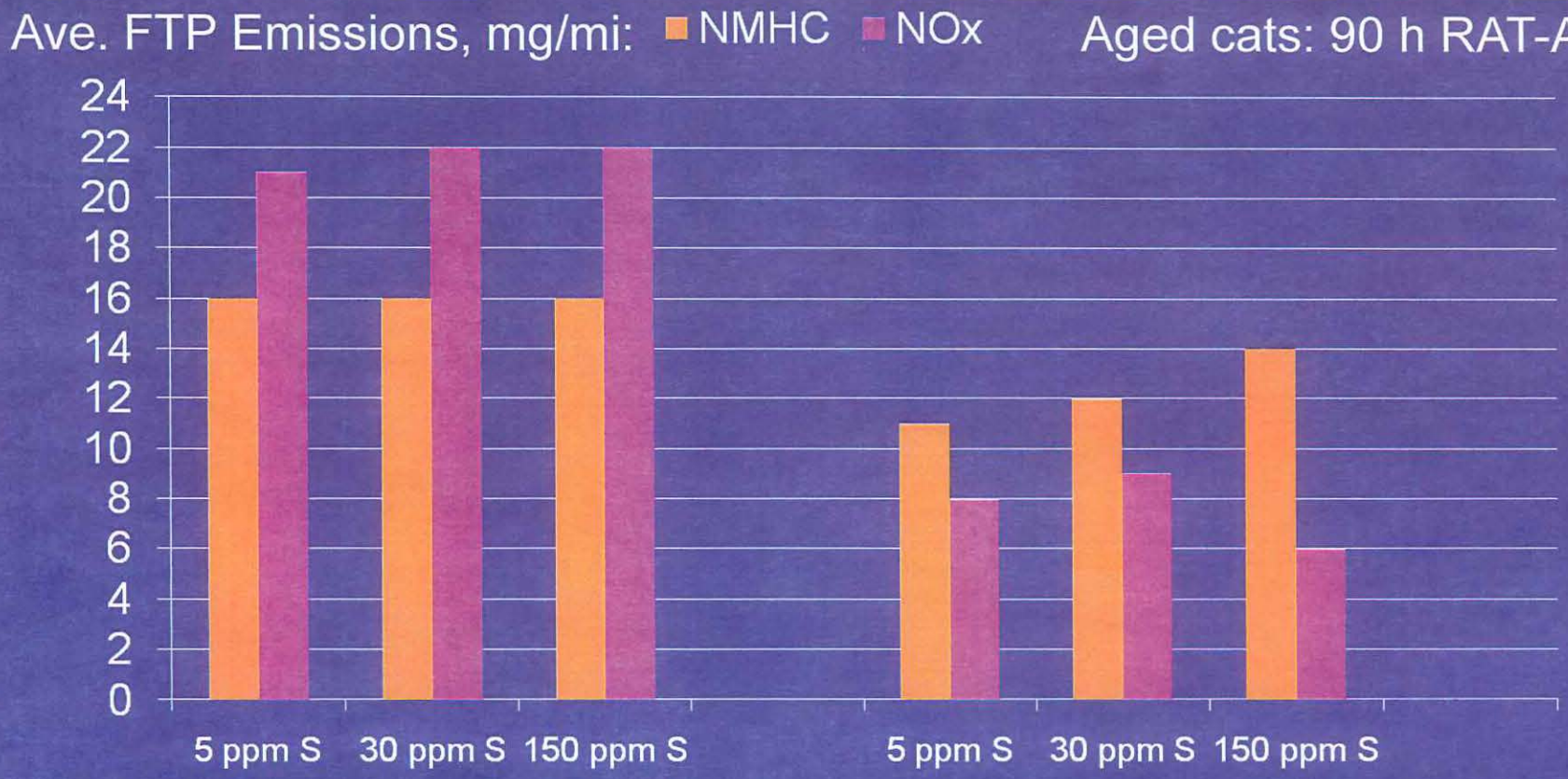
Vehicle Studies Have Shown Sulfur Effects on Emissions from Older Vehicles





Reference: SAE Paper 2006-01-3370
(also see CRC E-84 report)

Sulfur Effects Repeatedly Demonstrated – Early SULEV/PZEV



2000 Honda Accord SULEV: UF-only TWCs; very high PGM loadings

2001 Nissan Sentra-CA PZEV: CC TWC + 2 UF passive HC adsorber/ TWCs; very high PGM loadings

Ref: CRC E-60 Program

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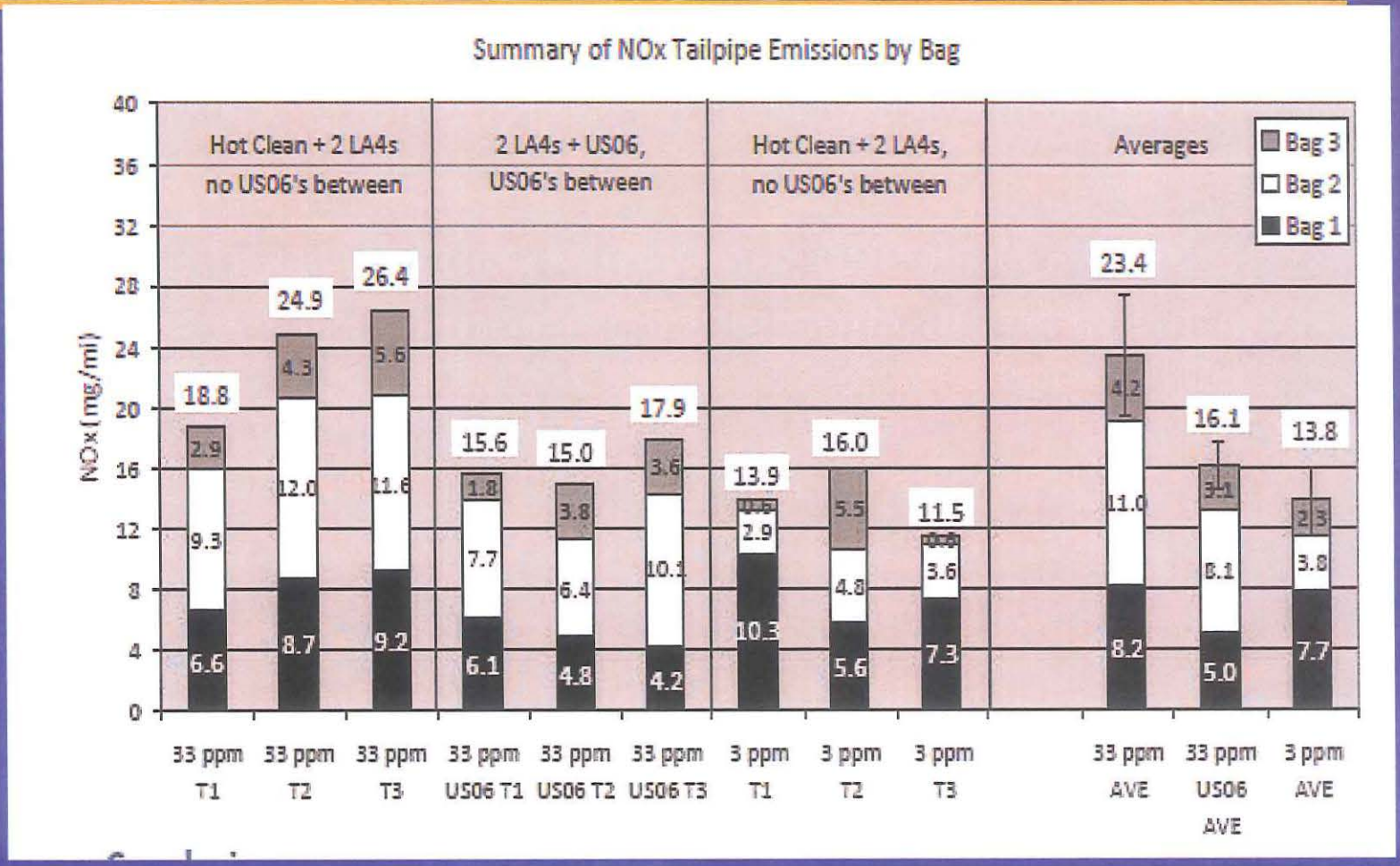
Gasoline Sulfur Degrades Catalyst Performance, Example Chevy Malibu PZEV Application

2.4 liter, 4 cyl.: CC+UF TWCs
Ref.: SAE 2011-01-0300



UF never above 600 C with FTP; <u>NOx "creep"</u>

UF at 700-750 C during US06; <u>NO NOx "creep"</u>

<u>NO NOx "creep"</u> with 3 ppm S

Summary: Gasoline Fuel Sulfur Effects on Emissions

- Large body of work available on the sulfur inhibition of precious metal-based three-way catalyst performance
- Sulfur poisoning of precious metal catalysts is impacted by a number of catalyst design/catalyst operation parameters
- Available vehicle studies consistently show improved emission performance with lower gasoline sulfur levels on older vehicles
- Recent work shows sulfur inhibition for aged vehicle TWC systems operating at very low emission levels and at low fuel sulfur levels
- California, Europe, Japan have moved to cleaner gasoline, China to follow.

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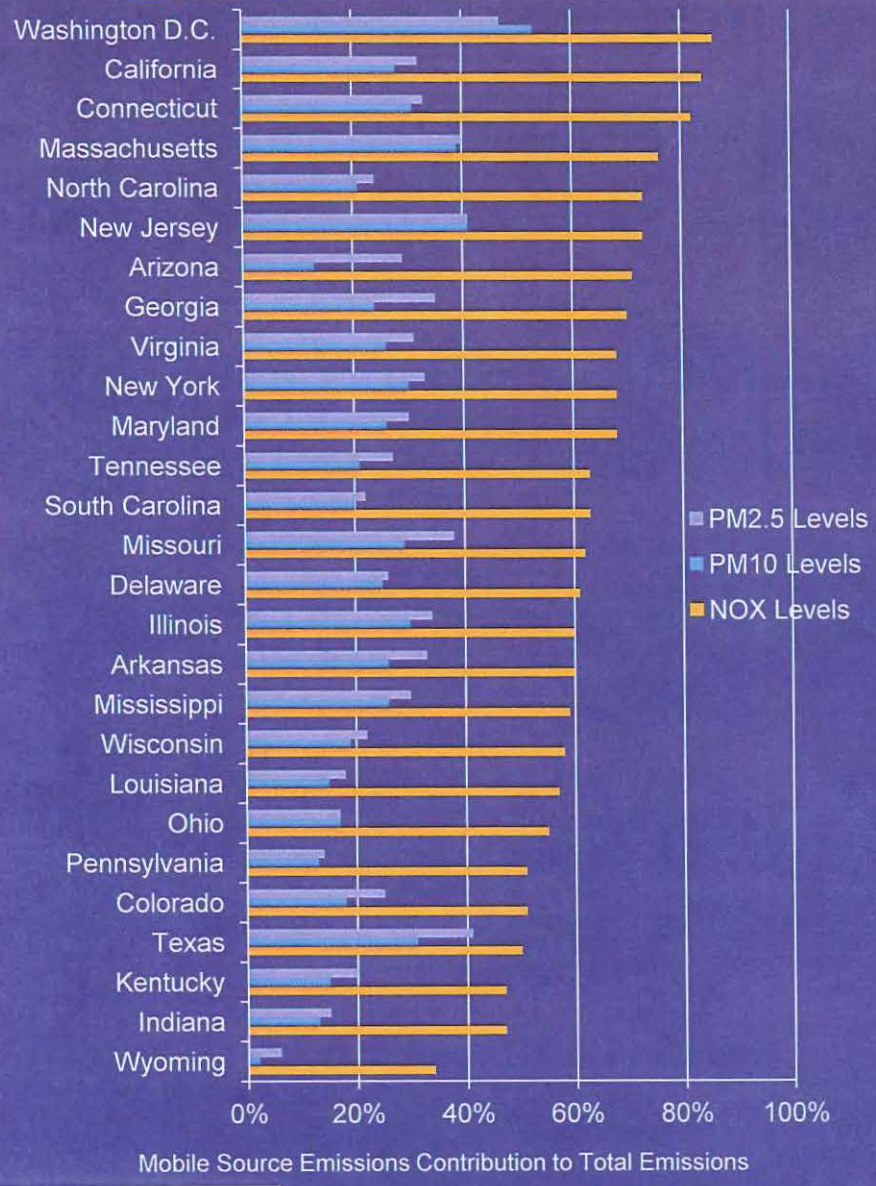
More Work to Be Done



- 1/3 of the nation lives where air fails federal air quality standards
- Further emission reductions must come either from fuels and vehicles or from electric generation and manufacturing
- About 60% of all ozone-forming NOx and 30% of all PM2.5 emissions come from vehicles
- Vehicle use grows with the economy
- Unless standards are tightened, total emissions from vehicles will rise – exacerbating air quality challenges

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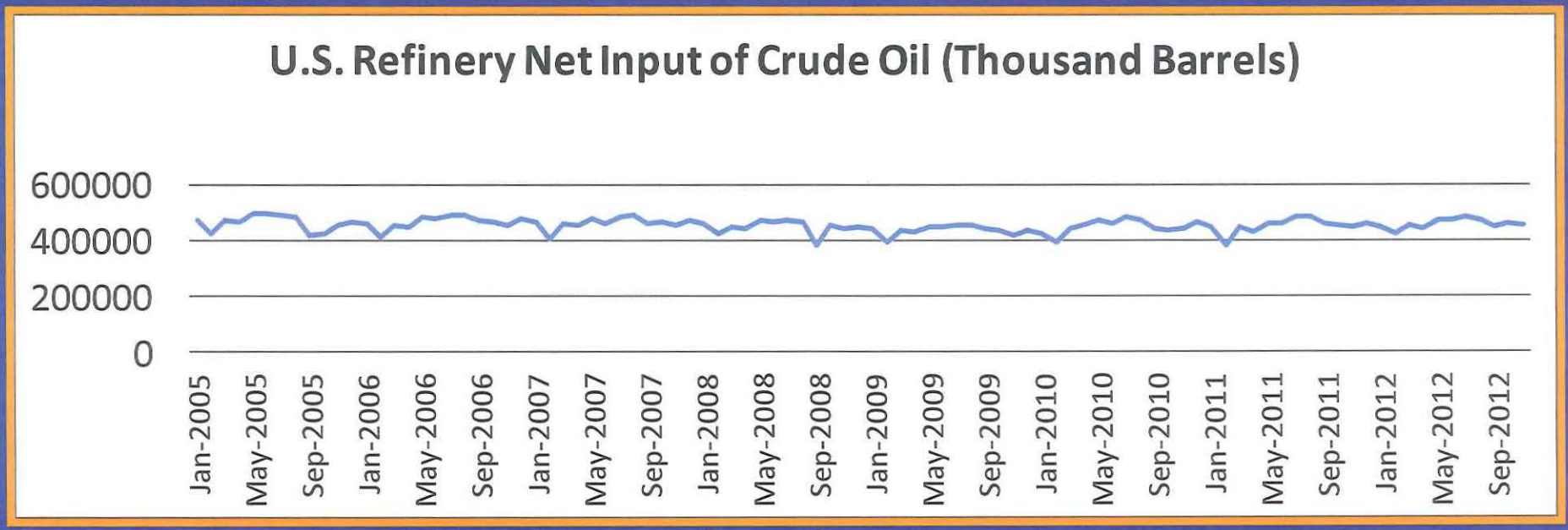
Predictions vs. Reality

- During debate on both Tier 2, and the diesel sulfur regulations, petroleum industry executives predicted dire outcomes including refinery closures, fuel shortages
- The industry bolstered its case using Baker & O'Brien studies which projected significant cost burdens and questioned the feasibility of sulfur reductions
- Since then refining activity has remained fairly constant, while shortages and price spikes (driven by de-sulfurization) failed to materialize
- As with all manufacturing, refineries expand, modernize, and close driven by major market factors such as swings in the cost of supplies (crude oil) or demand



Source: eia

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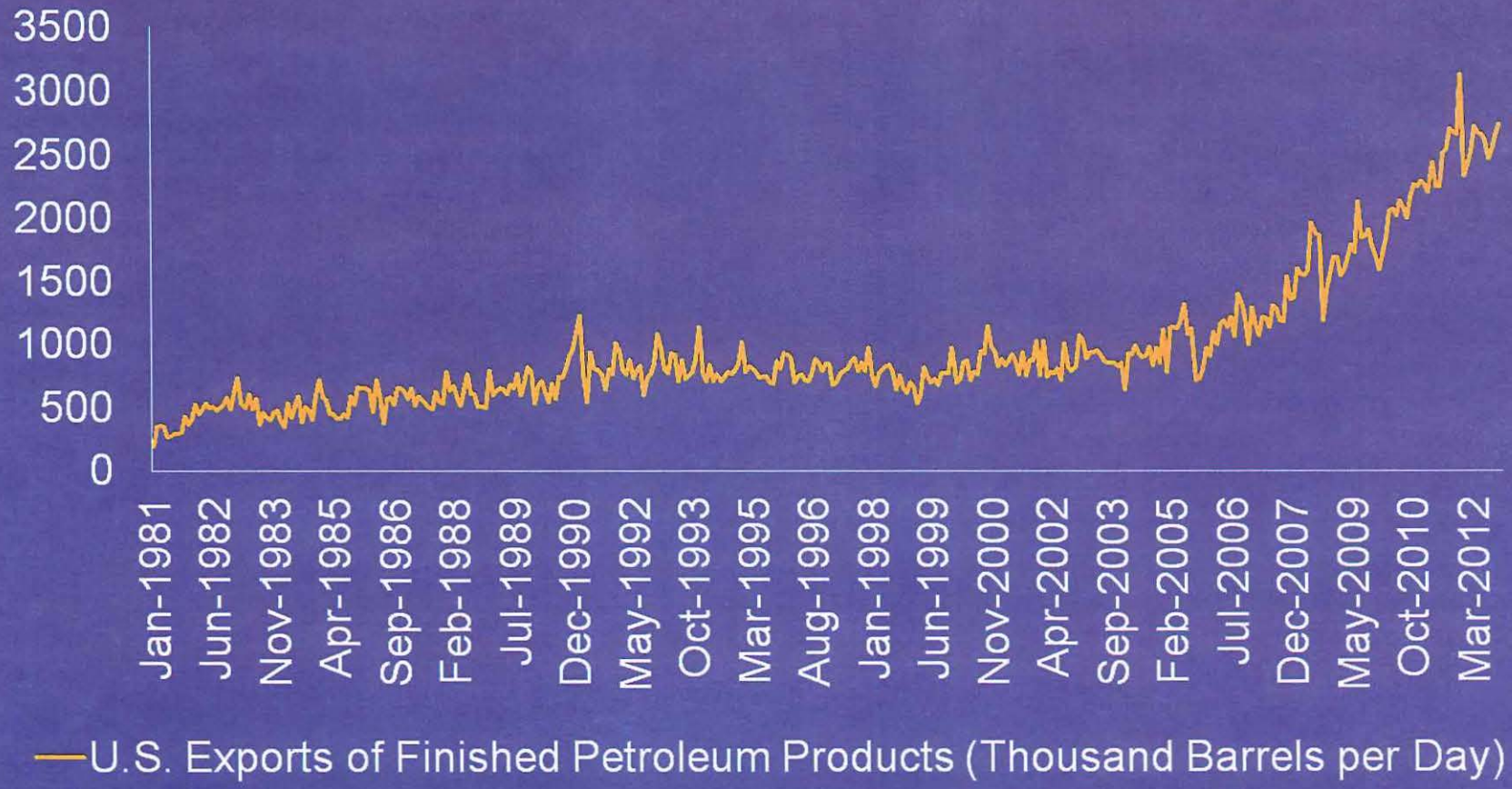
Sulfur Reductions Have Not Resulted In Supply Shortages



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The Emissions Control Industry Strongly Supports EPA's Tier 3 Proposal

- Tier 3 emission control solutions will build on the large experience base with millions of existing SULEV/PZEV vehicles – EPA's mobile source emission programs drive technology innovation and investment
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- Finalizing the Tier 3 proposal by the end of 2013 will ensure that the 2017 model year can be captured in the benefits of the program.

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Sulfur Impacts

Sulfur Impacts on Advanced Emission Control Technologies for Gasoline Engines

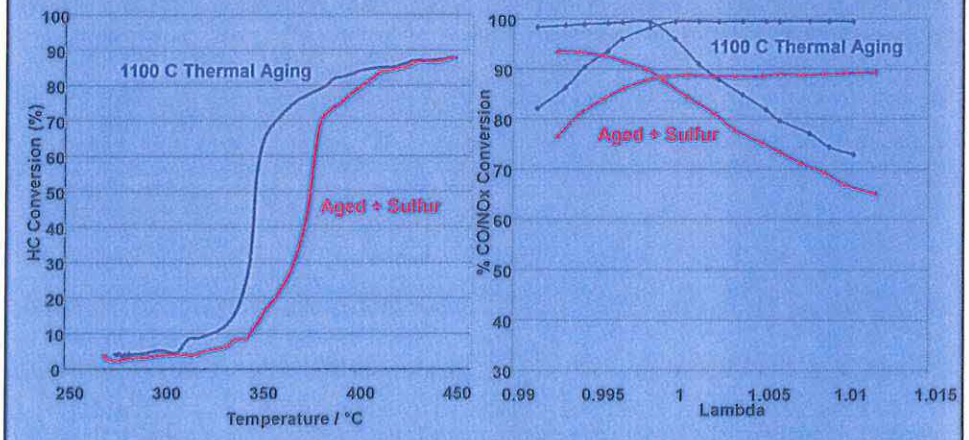
Joe Kubsh

Manufacturers of Emission Controls Association (MECA)

May 2011

www.meca.org; www.dieselretrofit.org

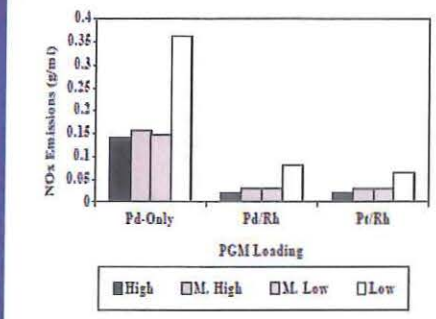
Sulfur is a Well Known Poison of Precious Metal-Based Three-Way Catalysts



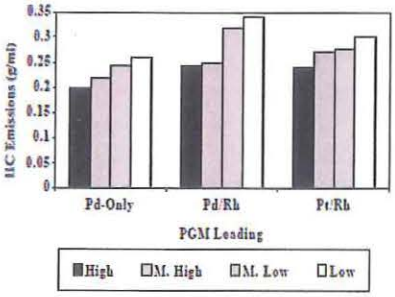
60 g/ft^3 Pd/Rh TWC with Pd/Rh = 11/1

Sulfur Impacts Dependent on TWC Composition (PGM type/loading)

FTP NOx Emissions Following Low Temperature (650 C), High Sulfur (300 ppm) Aging



FTP HC Emissions Following Low Temperature (650 C), High Sulfur (300 ppm) Aging

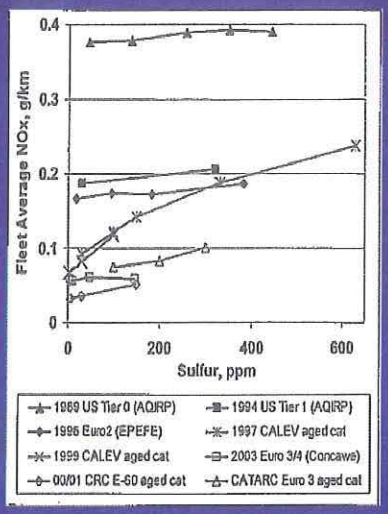


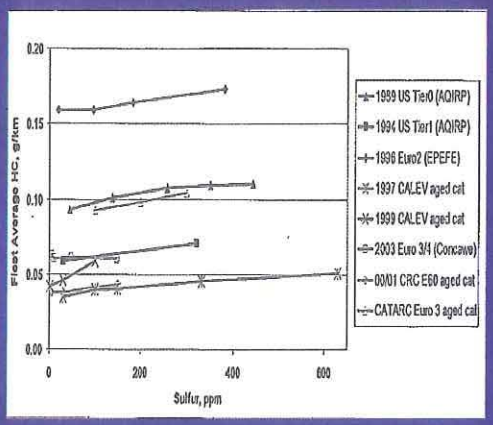
Reference: SAE Paper 970737

Sulfur Inhibition Influenced by a Large Number of Catalyst Formulation and Catalyst Operation Parameters

- Catalyst Formulation Factors
  - PGM Type/Loadings
  - Oxygen Storage Composition/Loadings
  - Catalyst Design (e.g., PGM/OSC placement in the washcoat)
- Catalyst Operation Factors
  - Catalyst Location/Volume/Temperature
  - Catalyst Aging History
  - Inlet Exhaust Gas Composition (e.g., engine calibration)
  - Fuel Sulfur Levels

Vehicle Studies Have Shown Sulfur Effects on Emissions from Older Vehicles





Reference: SAE Paper 2006-01-3370
(also see CRC E-84 report)

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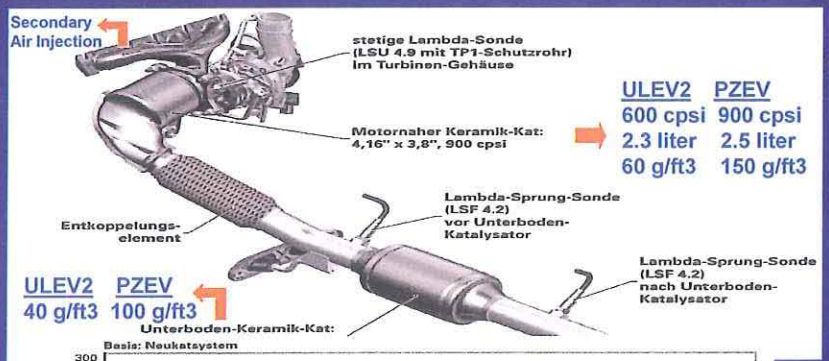
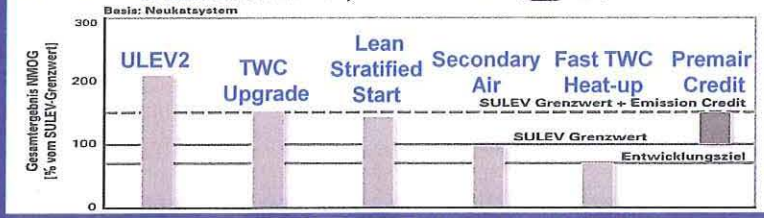
Significant Experience Base with Gasoline PZEV/SULEV Technology - Little Data on Sulfur Effects on Emissions





Reference: Audi 2.0 T PZEV; 2007 Aachen Colloquium

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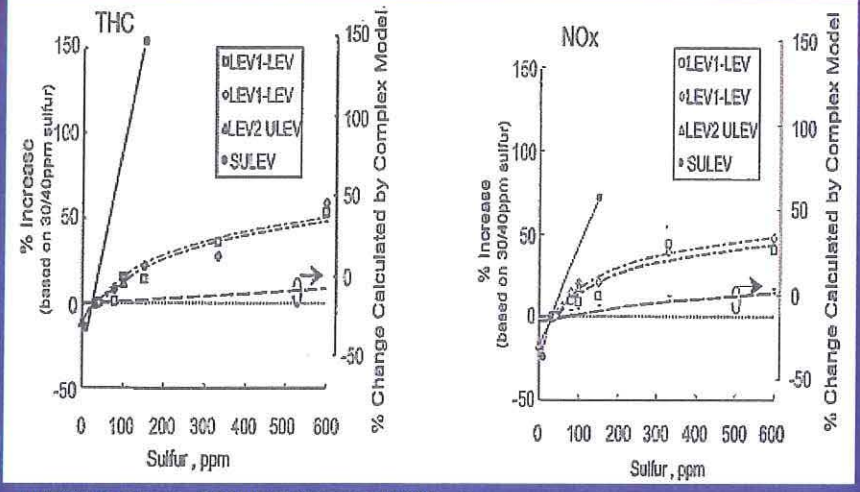
Significant Sulfur Sensitivity Reported for Early Prototype ULEV-2 and SULEV Vehicles



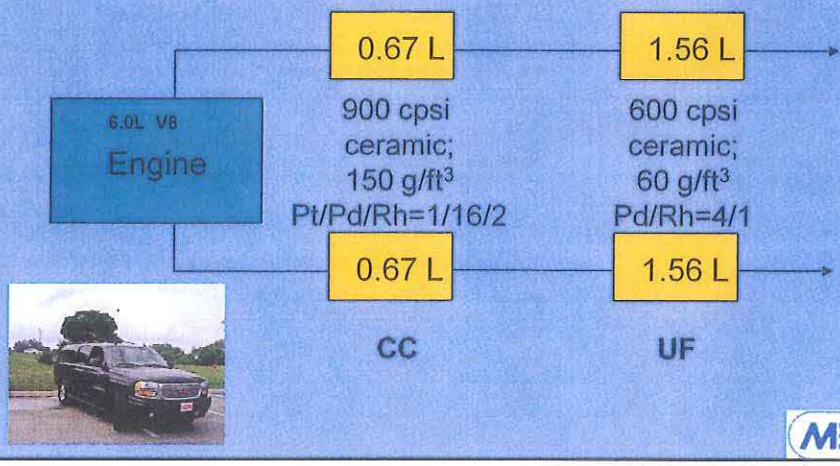
ULEV-2 Protoype: CC+UF TWCs aged 100K miles

SULEV Prototype: CC TWC + UF TWC+HC adsorber aged 50K miles

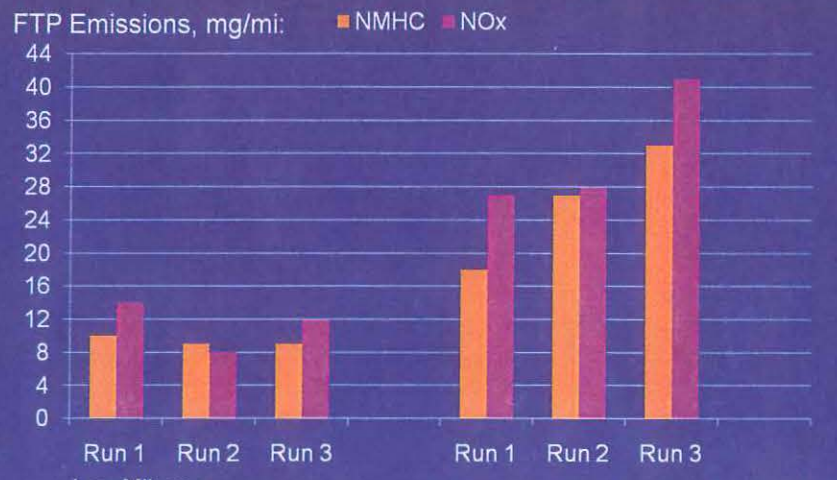
Reference: SAE Paper 2000-01-2019

6.0 Liter GMC Denali MECA Advanced Catalyst System Design (SAE 2007-01-1261)

Total TWC Catalyst Volume: 4.46 L (0.74 SVR)



GMC Denali with Advanced TWC System Showed Sulfur Sensitivity on Aged TWCs



Sulfur Impacts Reported for Late Model PZEV SAE Paper 2011-01-0300

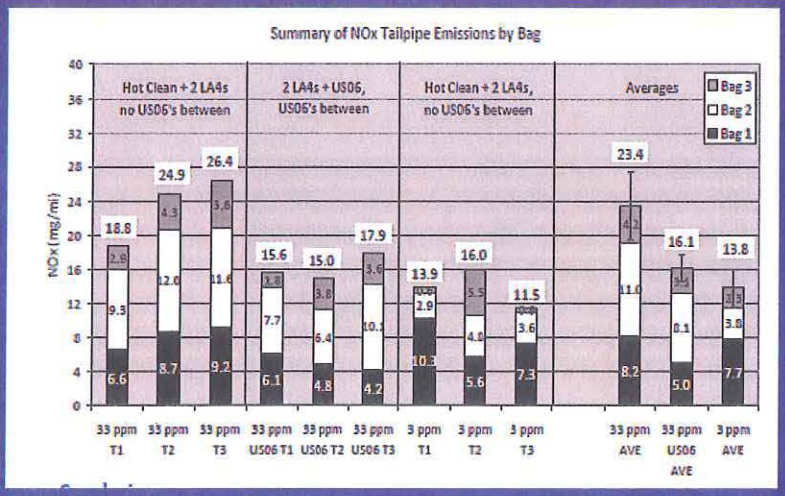
- MY2009 Chevrolet Malibu 2.4L PFI with secondary air Injection (PZEV Emissions Cert.)

Converter Layout on Vehicle

- CC TWC (exhaust manifold mounted) + UF TWC
- CC: 1.3L, 4.5/0.165 g/L Pd/Rh
- UF: 1.5L, 0.6/0.16 g/L Pd/Rh

- System dyno aged to full useful life (150k miles)
- FTP NOx sulfur effects evaluated as a function of vehicle prep. (33 vs. 3 ppm S)

Chevy Malibu PZEV FTP NOx Performance vs. Vehicle Prep & Fuel Sulfur Levels

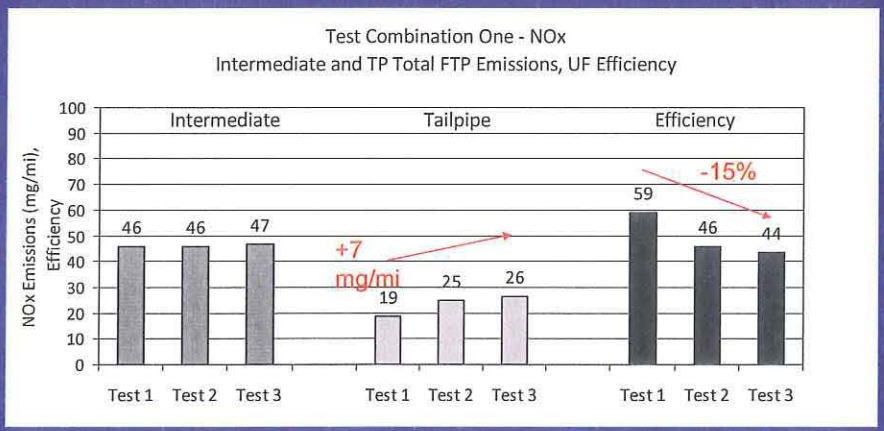


UF never above 600 C with FTP; NOx "creep"

UF at 700-750 C during US06; NO NOx "creep"

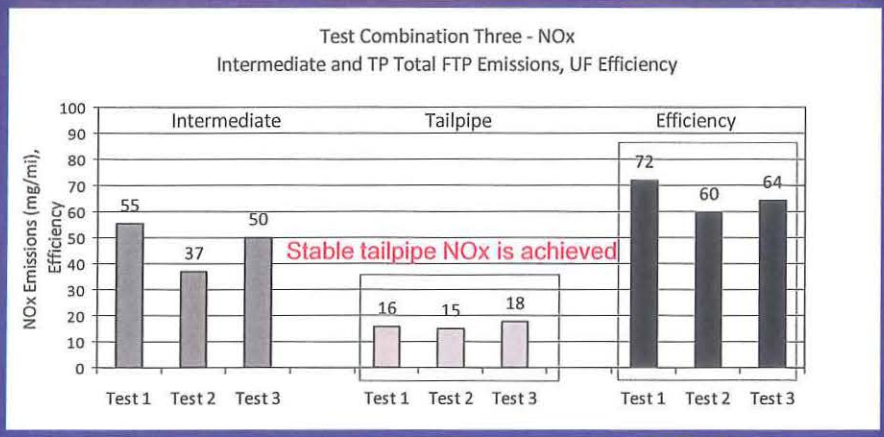
NO NOx "creep" with 3 ppm S

NOx Emissions with 33ppm S: "Hot clean" + 2 LA4's / FTP / FTP / FTP



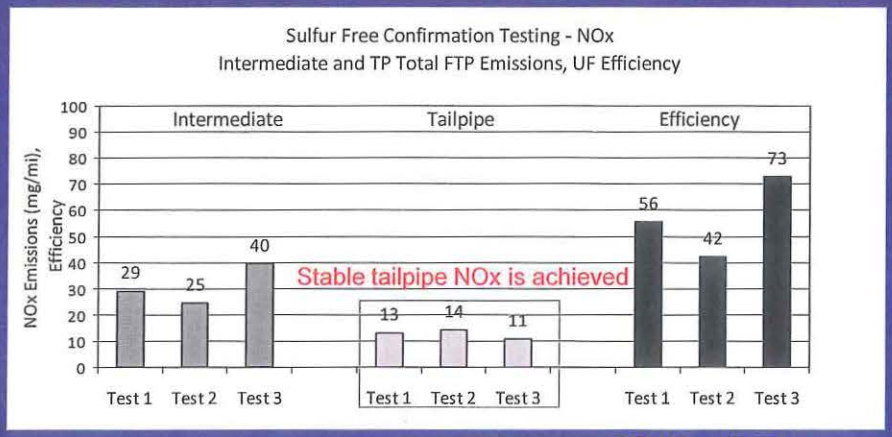
Decreasing UF NOx conversion efficiency test-to-test

NOx Emissions with 33ppm S: 2 LA4's + US06 / FTP+US06 / FTP+US06 / FTP



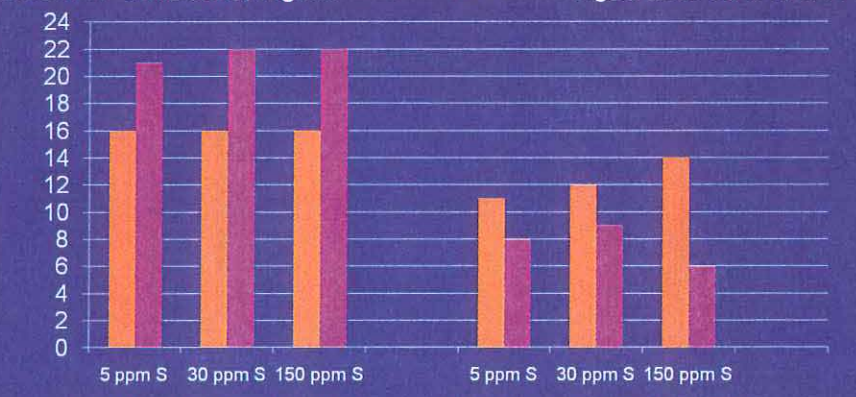
UF NOx efficiency appears to be a function of intermediate NOx emissions

NOx Emissions with 3ppm S: Hot Clean + 2 LA4 / FTP / FTP / FTP



UF NOx efficiency appears to be a function of intermediate NOx emissions

CRC E-60 Program
SULEV/PZEV Sulfur Effects

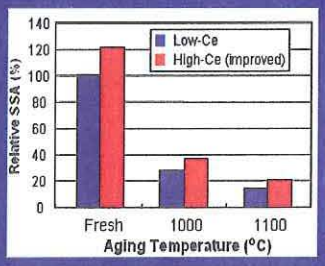


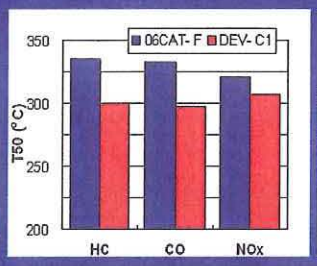
2000 Honda Accord SULEV: UF-only TWCs; very high PGM loadings

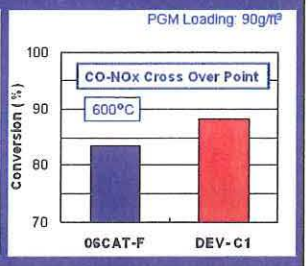
2001 Nissan Sentra-CA PZEV: CC TWC + 2 UF passive HC adsorber/ TWCs; very high PGM loadings

New PZEV Catalysts Drop PGM & Improve Performance with Advanced Catalyst Materials

	2006MY	2008MY
Relative PGM quantity of a car	100%	50%
Relative Backpressure	100%	55%
Catalyst Configuration	Underfloor 2 bricks	Close Coupled + Underfloor

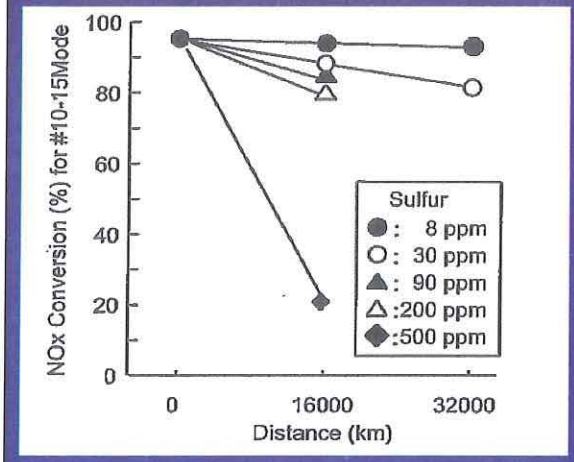






Reference: SAE Paper 2008-01-0812

Sulfur Can Impact Advanced Gasoline Emission Control Technologies in Other Ways



Sulfur impacts on CC TWC + UF NOx adsorber catalyst on lean GDI PC (Reference: SAE Paper 2000-01-2019)

- Sulfur degrades performance of NOx adsorber catalysts used in lean GDI applications (support for 10 ppm gasoline sulfur cap in Europe)
- Fuel sulfur levels can impact TWC emissions of NH_3 and N_2O but little data on SULEV capable emission systems (CRC E-60 study reports data for older vehicles)

Summary: Gasoline Fuel Sulfur Effects on Emissions

- Large body of work available on the sulfur inhibition of precious metal-based three-way catalyst performance
- Sulfur poisoning of precious metal catalysts is impacted by a number of catalyst design/catalyst operation parameters
- Available vehicle studies consistently show improved emission performance with lower gasoline sulfur levels on older vehicles
- Recent work shows sulfur inhibition for aged vehicle TWC systems operating at very low emission levels and at low fuel sulfur levels

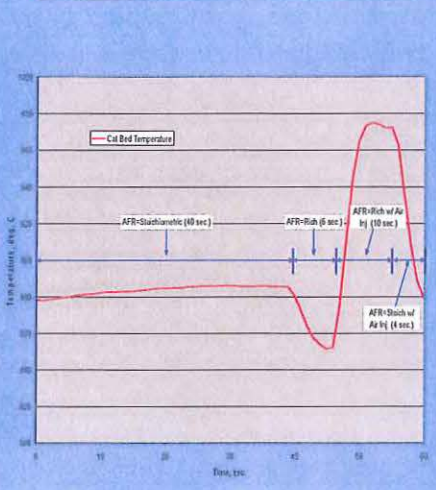
Back-up Slides

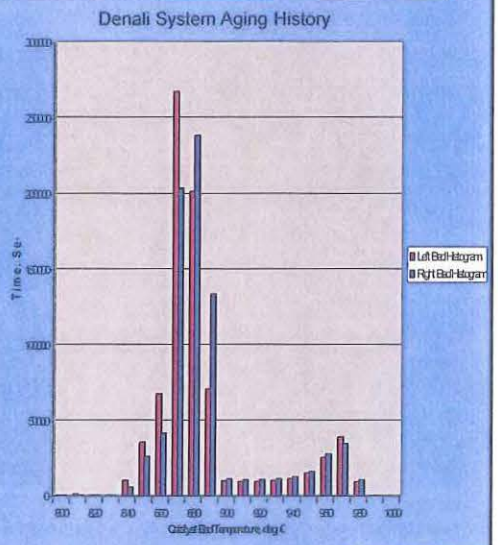
Denali Calibration Modified for Improved Cold-Start and Hot-Start Performance

- Cold idle speed increased from 900 to 1100 rpm
- Spark timing retarded during cold-start to accelerate catalyst light-off
- Less fuel enrichment during cold-start
- Closed-loop air-fuel control enabled right after cold crank
- Slight rich bias applied to first FTP hill after hot-start to reduce NOx spike

Reference: SAE Paper 2007-01-1261

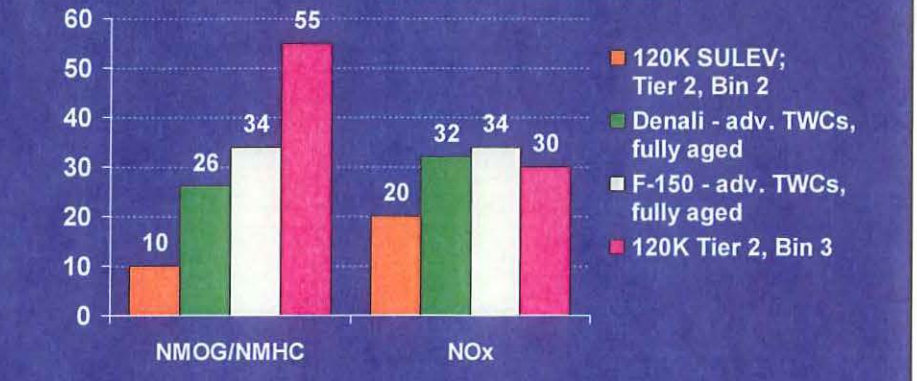
Advanced Emission Systems Aged for 220 hours Using an Accelerated Engine Aging Protocol





Reference: SAE Paper 2007-01-1261

GMC Denali & Ford F-150 Fully Aged Advanced Emission Systems FTP Performance – Near Tier 2, Bin 3 Limits



Denali Results Include Modified Calibration Strategy;
F-150 Results Using Stock Engine Calibration
Reference: SAE Paper 2007-01-1261

EIA Data

U.S. Energy Information Administration

PETROLEUM & OTHER LIQUIDS

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View History: ◉ Monthly ○ Annual

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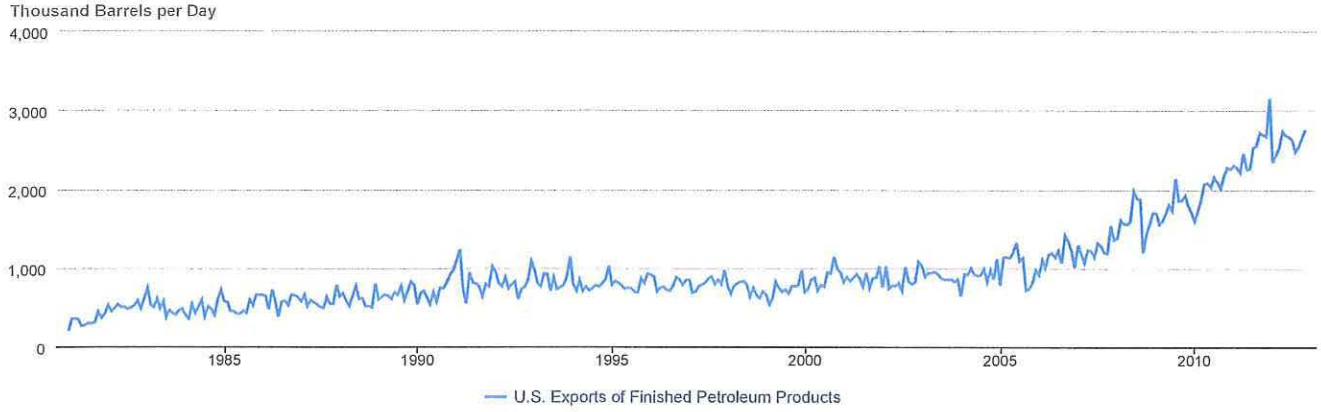
U.S. Exports of Finished Petroleum Products



Source: U.S. Energy Information Administration

Chart Tools

no analysis applied

U.S. Exports of Finished Petroleum Products (Thousand Barrels per Day)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	198	350	356	346	264	273	297	291	305	436	364	417
1982	523	449	487	534	499	503	475	493	522	580	487	611
1983	738	528	500	605	484	572	372	462	421	404	461	478
1984	399	353	531	427	503	587	383	506	476	400	597	713
1985	575	562	453	447	415	414	451	425	589	520	657	651
1986	653	635	469	720	583	376	568	579	524	654	648	626
1987	573	654	516	585	561	532	499	488	622	539	536	779
1988	632	670	584	516	636	761	603	609	509	508	494	792
1989	595	629	655	641	604	683	655	762	592	698	820	781
1990	532	674	703	623	540	686	569	742	737	806	907	965
1991	1,093	1,228	750	544	938	809	799	764	644	795	760	1,008
1992	946	796	763	869	735	791	823	600	732	757	841	1,080
1993	966	801	767	922	915	706	872	726	754	777	881	1,138
1994	783	708	839	705	760	710	741	778	759	800	848	1,018
1995	784	830	807	777	732	747	740	694	686	864	805	924
1996	914	886	698	747	758	718	709	771	877	851	785	843
1997	843	683	695	769	785	811	862	889	793	849	793	969
1998	765	674	769	800	823	831	784	641	748	653	614	698
1999	660	534	607	815	747	696	724	677	766	766	774	972
2000	693	728	855	875	717	783	762	943	929	1,143	984	943
2001	823	883	831	875	920	861	765	939	753	873	874	1,024
2002	755	1,024	739	776	769	807	716	1,013	829	792	821	1,076
2003	1,028	888	936	932	952	918	870	852	851	857	824	852
2004	643	922	914	994	924	901	907	981	832	969	855	1,115
2005	780	1,136	1,135	1,127	1,189	1,318	1,086	1,125	716	734	811	970
2006	910	1,098	1,001	1,166	1,191	1,134	1,218	1,064	1,406	1,335	1,216	1,001
2007	1,288	1,164	1,071	1,221	1,213	1,141	1,311	1,279	1,196	1,184	1,536	1,356
2008	1,377	1,601	1,559	1,551	1,592	1,974	1,880	1,868	1,191	1,440	1,558	1,698
2009	1,692	1,553	1,596	1,689	1,797	1,730	2,134	1,850	1,856	1,917	1,782	1,701
2010	1,595	1,725	1,851	2,063	2,077	2,026	2,148	2,089	2,010	2,169	2,272	2,254

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	2,298	2,269	2,211	2,451	2,252	2,257	2,524	2,546	2,714	2,686	2,664	3,147
2012	2,339	2,428	2,530	2,729	2,677	2,662	2,618	2,474	2,544	2,654	2,752	

- = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data.

Release Date: 2/1/2013
Next Release Date: Last Week of February 2013

Referring Pages:

- Finished Petroleum Products Exports
- Finished Petroleum Products Supply and Disposition
- U.S. Exports of Crude Oil and Petroleum Products

U.S. Energy Information Administration

PETROLEUM & OTHER LIQUIDS

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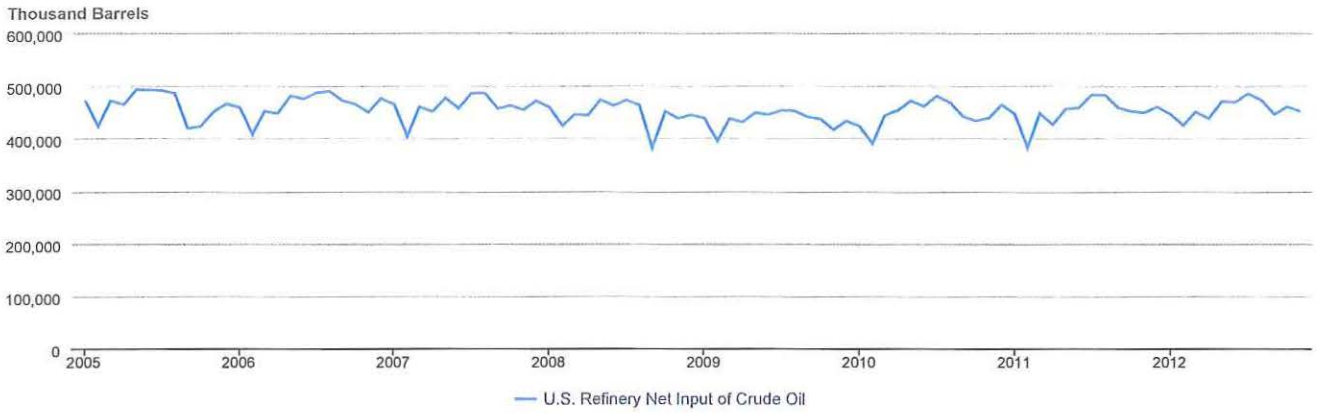
U.S. Refinery Net Input of Crude Oil



Source: U.S. Energy Information Administration

Chart Tools

no analysis applied

U.S. Refinery Net Input of Crude Oil (Thousand Barrels)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	472,881	423,976	471,641	464,806	493,063	492,043	491,357	485,586	419,573	423,029	450,966	466,411
2006	458,953	408,255	452,037	447,831	481,004	475,292	486,771	489,566	472,171	465,246	450,262	475,966
2007	464,739	404,184	460,039	451,360	476,790	457,432	485,807	486,242	456,777	462,926	454,535	471,266
2008	458,931	424,130	445,289	443,966	473,155	462,522	472,919	463,366	382,781	451,125	438,184	444,919
2009	438,531	395,745	437,672	431,469	448,961	445,507	453,727	452,372	441,304	436,954	416,928	433,486
2010	423,661	390,593	443,724	453,925	471,668	461,454	481,087	468,408	442,204	434,001	439,110	464,259
2011	447,107	382,929	447,988	426,917	456,252	458,825	483,271	482,239	458,248	451,659	448,802	460,110
2012	446,869	425,120	450,899	438,429	470,473	468,970	485,351	473,014	445,901	460,469	451,615	

- = No Data Reported; -- = Not Applicable; NA = Not Available; W = Withheld to avoid disclosure of individual company data.

Release Date: 2/1/2013
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Referring Pages:

- Refinery Net Input of Crude Oil
- U.S. Refinery Net Input

Federal Reserve Analysis

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EconomicLetter

Insights from the
FEDERAL RESERVE BANK OF DALLAS

What's Driving Gasoline Prices?

by Stephen P. A. Brown and Raghav Virmani

Most motorists are well aware that crude oil prices have surged to one record after another; yet the ups and downs in gasoline prices sometimes seem confusing.

Anyone who regularly fills a car's gas tank knows U.S. pump prices have been high and volatile in recent years, whether measured in current or inflation-adjusted dollars (*Chart 1*). Most motorists are well aware that crude oil prices have surged to one record after another; yet the ups and downs in gasoline prices sometimes seem confusing. This spring, gasoline was getting more expensive at a time when oil prices were falling. Just a few months later, oil had been bid back up, but gasoline prices didn't seem to respond.

These apparent disconnects prompted our examination of the forces that determine gasoline prices. Our econometric models confirm the traditional result that crude oil prices dominate movements in gasoline prices, but they also show that seasonal and nonseasonal movements in consumption, refinery production, imports and inventories influence gasoline prices in the short term.

Chart 1
Retail Gasoline Prices Rising

SOURCES: *Oil and Gas Journal*; Bureau of Labor Statistics.

Including these other factors with crude oil price provides a nearly complete picture of gasoline pricing in the U.S. market.

This year, some nonseasonal factors have been out of their normal ranges, contributing to gasoline price volatility and creating market conditions where prices are rising for gasoline and falling for oil, or vice versa. These events are unlikely to recur, so any disconnects should prove short-lived. Our most complete model suggests gasoline prices will retain their seasonal variations but decline slightly in the next few years, a result generally consistent with recent readings in the futures markets.

In an era of high energy prices, gasoline looms as an important pocketbook issue for American consumers, even though it now represents a smaller portion of household budgets than in the 1980s *(see box titled "How Gasoline Prices Affect American Budgets," page 4)*. A more complete understanding of what's driving gasoline prices may reduce confusion about how energy markets work.

Crude Oil and Gasoline Prices

Most of the fuel crises Americans remember were the result of spikes in crude oil prices. Sharp rises in gasoline prices followed the Arab oil embargo in the mid-1970s, the Iranian revolution and subsequent Iran–Iraq war in the late 1970s and early 1980s, and the disruption of Kuwaiti oil production after Iraq's 1990 invasion.

In recent years, higher crude oil prices have meant steadily rising gasoline prices. Demand for oil has increased worldwide, particularly in the rapidly expanding Chinese and Indian economies. Meanwhile, new supplies have been slow to develop—at least in part because large portions of world oil resources are in the hands of national oil companies or in countries where markets aren't particularly free.[1]

This quick historical survey reminds us of the close link between crude oil and gasoline prices. Constructing an econometric model using just those two factors, we find that spot gasoline prices eventually rise 2.8 cents for every $1 increase in spot prices for West Texas Intermediate (WTI), a benchmark crude.[2] The model explains nearly 98 percent of U.S. gasoline prices.

The close fit between raw material and final product prices reflects the realities of petroleum refining, a capital-intensive and high-volume process. Crude oil is the dominant input into refineries, and gasoline accounts for more than half of U.S. refinery output. Other refinery inputs contribute little to the variation in gasoline prices. We measure spot prices, which don't include the distribution, retailing and marketing costs folded into the prices Americans pay at the pump.

In general, the most dramatic movements in the country's gasoline prices have been associated with similar changes in crude oil prices (*Chart 2A*).[3] A more detailed look at the past three years, however, shows the two prices have diverged on several occasions—for example, in late 2005 and early 2006 and in the summer of 2007 (*Chart 2B*). We'll see whether we can close those gaps by looking at other factors that influence gasoline prices.

Seasonality and Gasoline Prices

Most U.S. gasoline is used in passenger automobiles, so when we drive determines when we use gasoline. The busiest American driving season is Memorial Day weekend through Labor Day weekend, with gasoline consumption the highest during those months (*Chart 3*).

In 2006, the seasonal differential in gasoline consumption was about 10 percent from the February low to the peak of the summer driving season.

A shorter driving peak occurs during the Thanksgiving holiday as Americans travel to visit family members. December also shows some spikes in consumption for the winter holiday season. After that, consumption falls to its annual low in February.

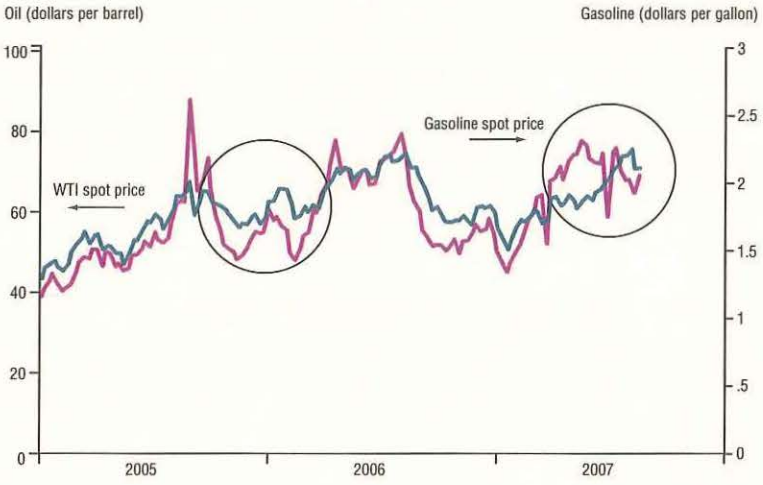
The seasonal driving patterns show up in gasoline prices. They generally rise relative to oil prices toward

Chart 2

Crude Oil Prices Heavily Influence Gasoline Prices

A. They Move Together over the Long Term...

B. ...but a Closer View Shows Disconnects



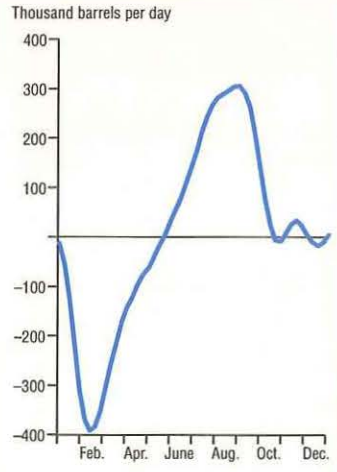
SOURCE: *Wall Street Journal.*

In 2006, the seasonal differential in gasoline consumption was about 10 percent from the February low to the peak of the summer driving season.

Chart 3

Gasoline Consumption Varies Throughout Year

(Seasonal variation from annual average)



SOURCES: Energy Information Administration, Department of Energy; authors' calculations.

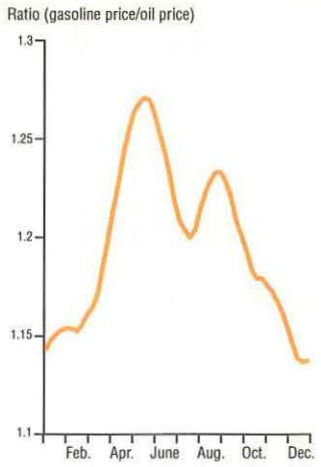
Memorial Day and are higher during the summer months. They generally fall after Labor Day and are lower during the winter months.

Gasoline production, imports and inventories are all adjusted to meet seasonal variations in U.S. gasoline demand. In spring, refiners begin shifting their product mix toward gasoline to build inventories in advance of summer. Gasoline production typically remains high during the summer months. The rising summer gasoline prices in the U.S. also attract imports.

The summer buildup impacts gasoline prices in other ways. As refiners shift their product mix toward gasoline, they must more extensively

Chart 4

Crack Ratio Shows Seasonality



SOURCES: *Wall Street Journal*; authors' calculations.

process the crude oil, pushing up production costs. Storing gasoline from the spring to the summer also adds to the costs. After Labor Day, the product mix begins to shift away from gasoline as refiners build up their winter supplies of heating oil. The forces pushing up gasoline prices then unwind.

The interaction of consumption, refinery production, imports and storage over the course of each year leads to a regular seasonal pattern of gasoline prices relative to crude oil prices. We measure it by the crack ratio, which captures the seasonal element of the relationship between gasoline and crude oil prices (*Chart 4*). It is calculated by multiplying the spot price of a gallon of regular unleaded gasoline by 42, the number of gallons in a barrel, and dividing the result by the spot price of WTI, which is quoted in barrels.[4] With oil at $75 a barrel, the gasoline price swing from winter lows to the Memorial Day high would be 27 cents a gallon.

To determine whether seasonal factors affect gasoline prices, we incorporated the crack ratio into our earlier model of U.S. gasoline prices, which was limited to the relationship

In 2005, Hurricanes Katrina and Rita shut down over a fourth of U.S. refinery capacity and sent gasoline prices skyrocketing.

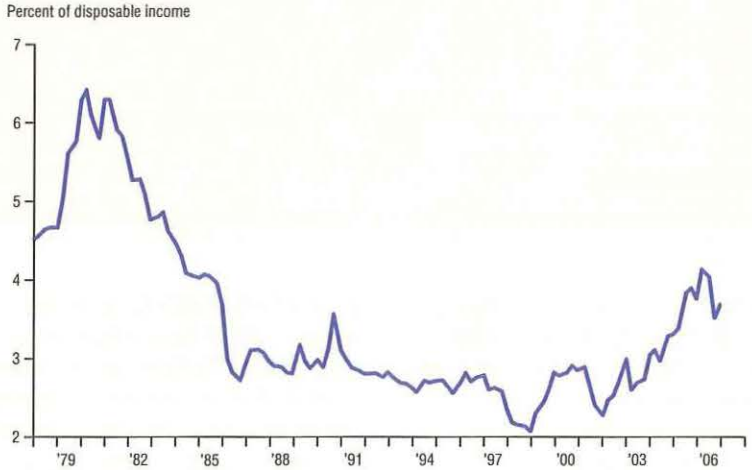
How Gasoline Prices Affect American Budgets

U.S. gasoline prices surged to an all-time high a few days before Memorial Day weekend, with a national average of $3.23 a gallon for unleaded regular. According to the U.S. Energy Information Administration, the previous inflation-adjusted high was $3.22, set in May 1981.

Despite this year's record gasoline prices, we still spend less of our take-home pay on gasoline than we did in the early 1980s. At today's higher incomes, gasoline expenditures claim less than 4 percent of U.S. after-tax personal income (*see chart*). The comparable figure for 1981 was more than 6 percent.

Since 2002, the share of disposable income used to purchase gasoline has risen steadily. Increasing per capita gasoline consumption has been a factor, but most of the hike comes from rising gasoline prices. At today's incomes, retail gasoline prices would have to reach about $5.50 a gallon before they took the same share of U.S. household budgets as they did in 1981.

Gasoline Expenditures Remain Below Highs



SOURCES: Energy Information Administration, Department of Energy; Bureau of Labor Statistics; Bureau of Economic Analysis.

between gasoline prices and crude oil. Adding the new data produced a tighter fit than the one we achieved with WTI alone (*Chart 5A*).

For our first model, the average weekly error was 5.36 cents a gallon. In this one, which accounts for seasonality, the error falls to 4.67 cents a gallon. The instances where crude oil and gasoline prices diverge have shrunk a bit, but they remain (*Chart 5B*).

Nonseasonal Factors

At times, gasoline consumption, production, imports and inventories break away from their normal seasonal patterns. These movements result in gasoline prices that temporarily deviate from the path determined by crude oil prices and normal seasonality.

In 2005, for instance, Hurricanes Katrina and Rita shut down over a fourth of U.S. refinery capacity and sent gasoline prices skyrocketing at a time when the driving season was coming to an end and oil prices were rising only slightly.

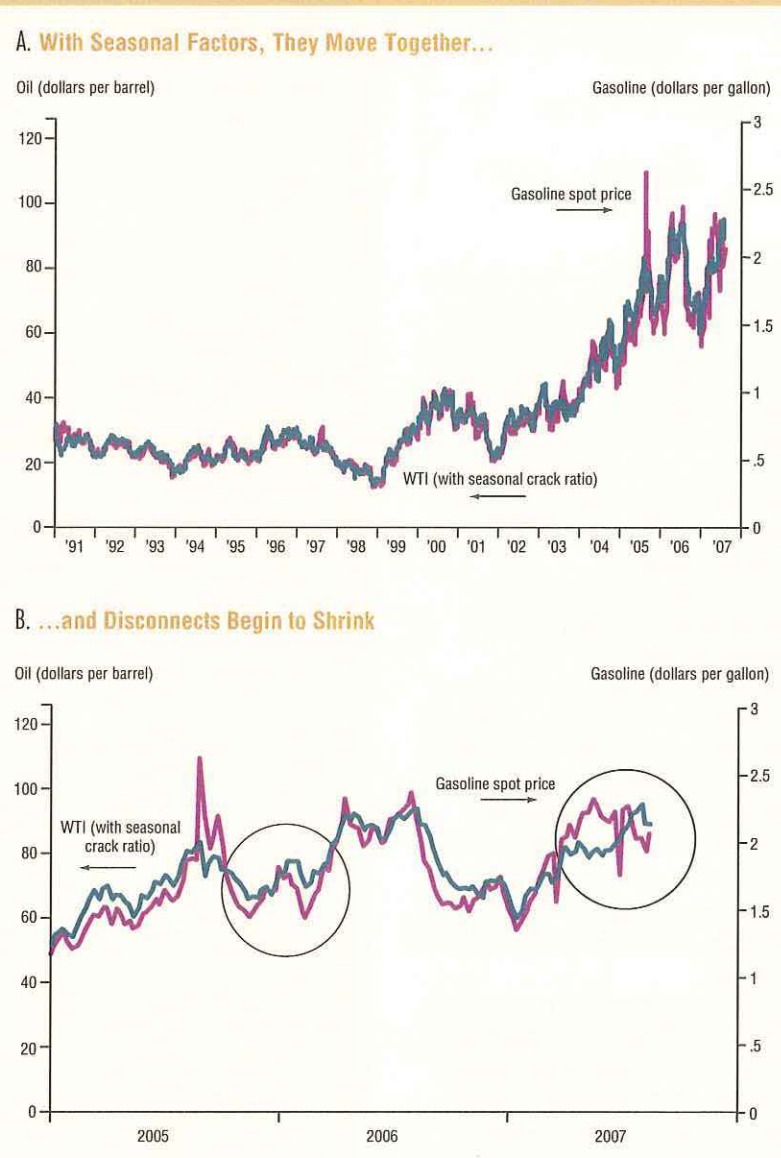
Earlier the same year, prolonged cold weather in the Northeast caused refineries to delay their switch from the winter product mix that includes more heating oil to the summer product mix that centers on gasoline. The result was lower inventories and higher prices for gasoline.

In early 2007, gasoline consumption began rising well ahead of the normal seasonal pattern. At the same time, refinery outages meant that suppliers were slow to increase gasoline production. The result was earlier-than-usual increases in gasoline prices, although the peak still occurred a few days before the Memorial Day weekend.

These aberrations suggest nonseasonal movements may provide additional insight into gasoline prices. To see their impact, we bolstered our econometric model of U.S. gasoline prices by adding nonseasonal movements in consumption, production, inventories and imports to the WTI price and the seasonal crack ratio.

Chart 5

Crack Ratio Improves Fit of Oil, Gasoline Prices



SOURCES: *Wall Street Journal*; Energy Information Administration, Department of Energy; authors' calculations.

We also measure international markets' influence on U.S. gasoline prices. Although major global crude oil prices such as WTI in the U.S., Brent in Europe, Bonny in Africa and Dubai Fateh in the Middle East move together in the long run, regional geopolitical events and market conditions can cause them to deviate from each other. At such instances, differences in global oil prices can influence U.S. gasoline prices (*see box titled "Global Markets and Gasoline Prices," back page*). To recognize this influence, the model also includes the price of Brent crude oil, which is produced in the North Sea.

Our final model incorporates a wide-ranging set of forces shaping U.S. gasoline prices—the cost of WTI

The outlook for crude oil prices can change significantly with economic conditions or geopolitical events.

and Brent crudes, the normal seasonal variations and nonseasonal influences from consumption, production, inventories and imports. Following standard econometric practices, we represent the price variables in natural logs and use error-correction processes to explain the relationship between the two crude oil prices and the U.S. spot price of gasoline.

The model shows that higher crude oil prices—WTI or Brent—result in higher gasoline prices. Gasoline prices have normal seasonal ups and downs and respond positively to nonseasonal increases in consumption and negatively to nonseasonal gains in production, imports and inventories. As estimated, the model explains more than 99 percent of gasoline price levels and 56 percent of the weekly changes in gasoline prices (*Chart 6A*).

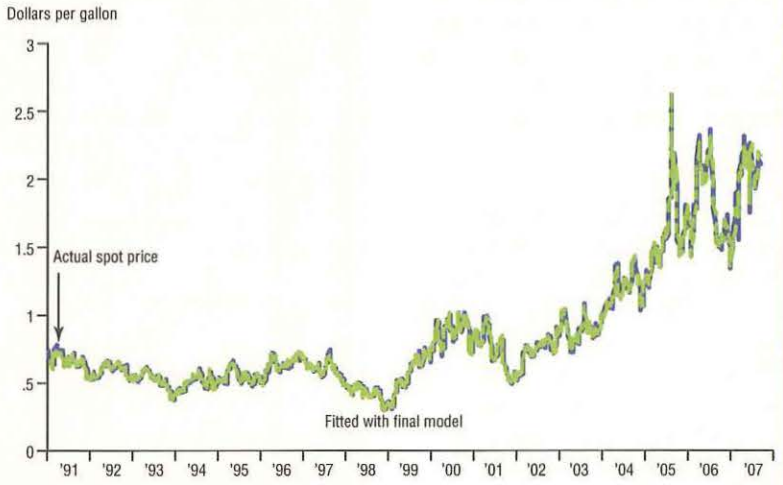
This more comprehensive model performs much better than the previous two. The average weekly error has been cut to 2.44 cents a gallon, compared with 5.36 cents when we use only crude oil and 4.67 cents when we add seasonality. Where crude oil and gasoline prices diverge in the other models, they now track quite well (*Chart 6B*).

Gasoline Price Outlook

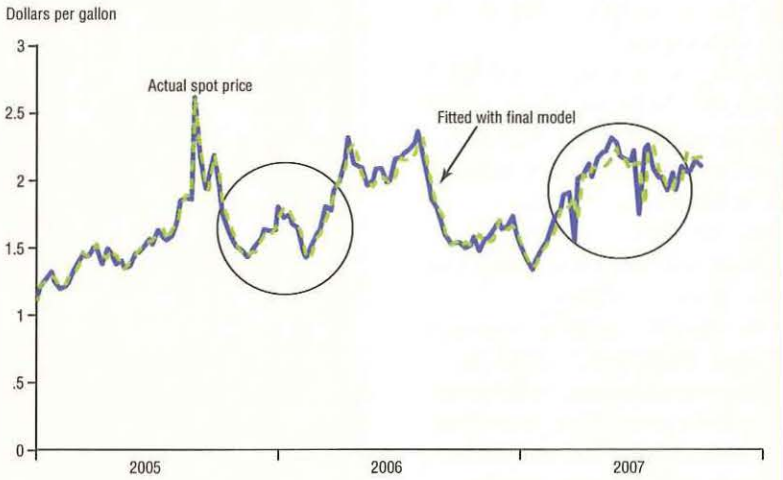
Armed with a model that explains gasoline prices, we're able to assess the outlook for U.S. gasoline prices over the next few years and compare it with the price path suggested by the futures market.

Chart 6
Full Model Creates Tightest Fit

A. Spot Gasoline Prices Are in Sync...



B. ...and Disconnects Nearly Disappear



SOURCES: *Wall Street Journal*; Energy Information Administration, Department of Energy; authors' calculations.

We start with assumptions for oil prices, seasonality and nonseasonal factors. We use futures market values for WTI and Brent for our crude prices. We generate a short-term outlook by assuming that the nonseasonal fluctuations in consumption, production, imports and inventories will persist. For the long-term outlook, we assume the nonseasonal fluctuations will wane as these influences abate and normal seasonal patterns assert themselves.

The short-term outlook generated with the model shows a general consistency between the futures prices for gasoline and crude oil (*Chart 7*). The model shows that the currently low gasoline inventories may continue

to keep gasoline prices a bit higher than is normal during the fall. The long-term outlook generated with the model is generally consistent with the futures prices for gasoline and crude oil (*Chart 8*).

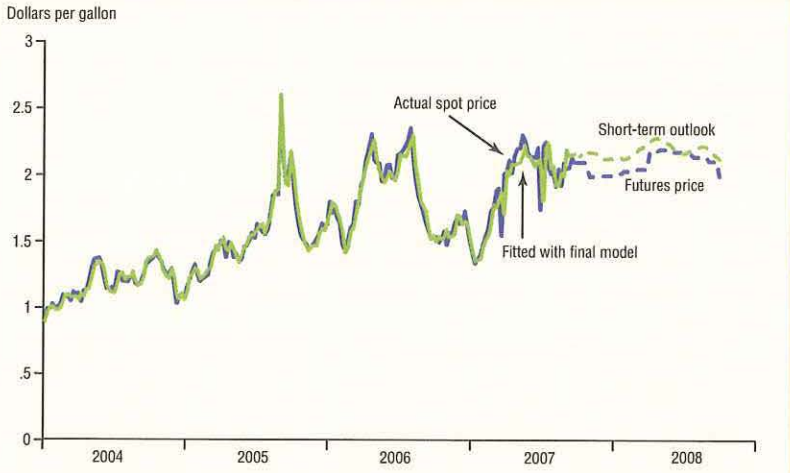
The outlook for crude oil prices can change significantly with economic conditions or geopolitical events, but in October the futures market anticipated a decline from this year's high levels over the next few years. WTI is expected to slide from $87 a barrel to $75 by the end of 2010.

Using those crude oil prices, our model suggests that spot gasoline prices will rise by 20 cents in the next few months, then decline by about 35 cents a gallon over the next three years, with seasonal variations during each year of about 27 cents a gallon. Retailing costs will mean slightly higher actual pump prices, of course, but the general outlook suggests a decline in gasoline prices, although they will remain relatively high.

The U.S. economy has continued to grow, with strong consumer spending and relatively tame inflation, despite rising and volatile gasoline prices in recent years. Household budgets won't get much relief, but continued high gasoline prices probably aren't going to be an unbearable burden for the economy as a whole.

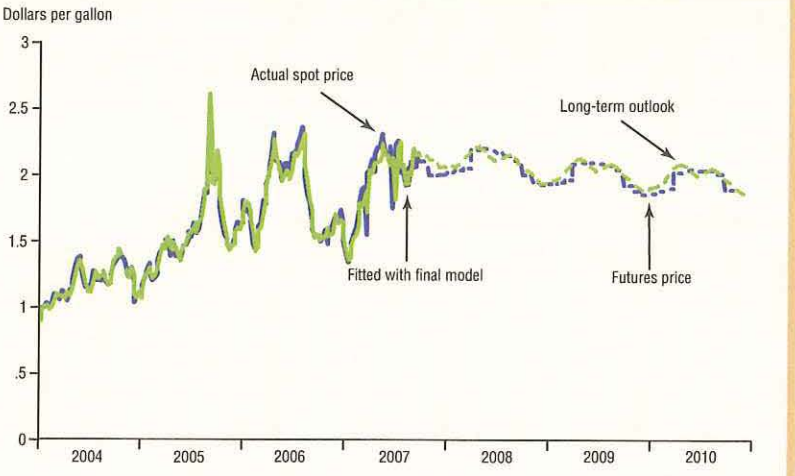
Brown is director of energy economics and microeconomic policy and Virmani is an economic analyst in the Research Department of the Federal Reserve Bank of Dallas.

Chart 7
Gasoline Prices Stable in Short Term



SOURCES: *Wall Street Journal*; Energy Information Administration, Department of Energy; FutureSource; authors' calculations.

Chart 8
Gasoline Prices Drift Lower in Long Term



SOURCES: *Wall Street Journal*; Energy Information Administration, Department of Energy; FutureSource; authors' calculations.

Notes

[1] See "Running on Empty? How Economic Freedom Affects Oil Supplies," by Stephen P. A. Brown and Richard Alm, Federal Reserve Bank of Dallas *Economic Letter*, April 2006.

[2] We use spot prices to represent the overall U.S. gasoline market. Although pump prices may respond more quickly to rising spot prices than they do to falling spot prices, movements in pump prices are the direct result of movements in spot prices. See "Crude Oil and Gasoline Prices: An Asymmetric Relationship?" by Nathan S. Balke, Stephen P. A. Brown and Mine K. Yücel, Federal Reserve Bank of Dallas *Economic Review*, First Quarter 1998.

[3] One exception was the 2005 hurricane season, when hurricanes Katrina and Rita temporarily shut down a significant portion of U.S. refinery capacity.

[4] With dramatically rising prices, we find the crack ratio shows more empirical consistency than the more commonly used crack spread—the spot price of gasoline multiplied by 42 less the spot price of WTI. Thus, it is better suited to econometric analysis.

Global Markets and Gasoline Prices

The world oil market is highly integrated, which means short-run opportunities for arbitrage are exploited swiftly and global oil and oil-product prices move together in the long run.

Just as world oil prices are tied to developments in major centers of supply and demand, regional gasoline prices are, in turn, linked to world oil prices. In our gasoline pricing model, we find that both North American (WTI) and European (Brent) benchmark oil prices exert significant influence on U.S. gasoline prices, as measured by the New York Harbor spot price.

Although international benchmark gasoline prices—such as New York Harbor spot and Rotterdam spot—generally move together, they occasionally exhibit short-run deviations from their normal relationship, creating arbitrage opportunities that, when acted upon, will eventually lead to a resumption of long-run trends.

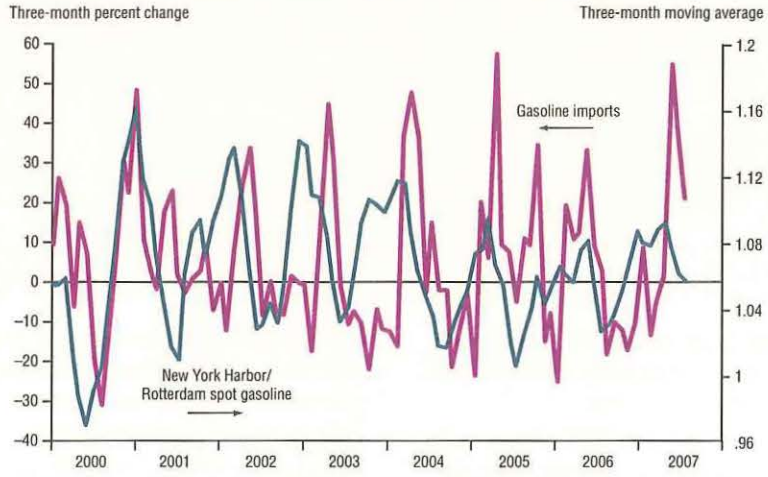
When prices for gasoline delivered at New York Harbor are higher than they are in Rotterdam, for example, European refiners seek to exploit the price differential by shipping gasoline to the North American market (*see chart*). In time, European gasoline in North American markets causes the New York price to fall relative to the Rotterdam price. The shipments continue to head westward until the arbitrage opportunity has been fully exploited and both prices are in sync.

Similarly, if the price of Brent falls relative to WTI, more imported crude oil finds itself in North American refineries, causing oil and refined product prices to fall in North America relative to those in Europe. It is the fungible nature of crude oil and refined products that allows oil producers and refiners to exploit short-run arbitrage opportunities and keeps the world oil market highly integrated.

The global nature of the market is also highlighted during unforeseen events and supply disruptions. During extraordinary production disruptions, gasoline imports play an important role in soothing markets, as they did when Hurricanes Katrina and Rita struck the U.S. Gulf Coast in 2005.

The devastating impact of these hurricanes temporarily shut down over a fourth of U.S. refinery capacity. In response, American gasoline imports from Europe tripled, with an unprecedented 50 tankers crossing the Atlantic in the first week of September 2005.

Global Price Differentials Spur Gasoline Imports



SOURCES: *Wall Street Journal*; Energy Information Administration, Department of Energy.

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CARING FOR THE ENVIRONMENT

CITGO continues its efforts to reduce waste generation and air emissions as reported by the Texas Commission on Environmental Quality (TCEQ). Emissions reduction is a priority; the results of which can be seen in the continuing reduction of benzene, other volatile organic compounds (VOCs) and sulfur dioxide levels as measured by air monitoring stations located around the refinery. CITGO maintains a series of groundwater monitoring and recovery wells. Communications with our neighbors about refinery activities and environmental progress are made through involvement with the Corpus Christi Community Advisory Council and its Long Term Health Committee.

Caring for the environment extends to concern for wild animals by the donation of a bird rehabilitation trailer to the Texas General Land Office (TGLO). The TGLO also has recognized the proactive steps taken by the CITGO Corpus Christi Refinery to enhance the protection and preservation of Texas' coastal resources by awarding the refinery with the 2007 and 2008 OSPRA Award. The CITGO Corpus Christi Refinery is the only refinery to be awarded the OSPRA two years in a row. Our Ultra Low Sulfur Diesel (ULSD) unit, completed in 2010, allows for a 99.7 percent reduction in sulfur in the diesel fuel that the refinery produces.

OZONE PREVENTION

CITGO has been an active participant in the Corpus Christi Air Quality Committee and in developing and implementing the voluntary Ozone Flex agreement. Included in the agreement are efforts to reduce emissions of VOCs and nitrous oxides (NOx); both contribute to the formation of ozone in the community. Over the past three years, both VOCs and NOx have been reduced by more than 50 percent. These efforts also include a marine vapor control system at our dock facilities, installation of flare gas recovery systems, improved tank emission controls and implementation of an enhanced leak detection and repair program, all of which reduce vapor emissions. Corpus Christi is one of the few industrial communities that is in attainment of Environmental Protection Agency (EPA) air standards. The refinery also produces, for local retail outlets, low Reid Vapor Pressure (RVP) gasoline that reduces ozone-producing VOCs.

WATER CONSERVATION

As a responsible and conservative water consumer, CITGO uses significantly less water per barrel of finished product than our industry average through efficient process design and control. A portion of the water entering the refinery is recycled and reused. That water, which is discharged into the Corpus Christi Ship Channel, is treated to stringent standards specified in our wastewater permit. The water discharged from the refinery was clean enough for a lost manatee, ultimately named Texas, to dwell at our wastewater treatment system outfall until it was recovered and returned to its native Florida.

www.CITGO.com

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REFINERIES: LEMONT

CITGO Refining Home
Corpus Christi
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Lemont
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Environment

CARING FOR THE ENVIRONMENT

The CITGO Lemont Refinery has taken the lead in environmental and safety community outreach by creating the Community Awareness Emergency Response Council and the Odor Alert Network. These initiatives have enabled the refinery to foster strong relationships and increase communications with surrounding communities and emergency responders.

The refinery's Waste Minimization and Pollution Prevention (WMPP) subcommittee coordinates household hazardous waste and electronic collection events for employees and contractors twice a year. The refinery sponsors the Village of Lemont's oil collection and recycling event and, over the past couple of years, the WMPP subcommittee has worked to expand recycling within the refinery. Additionally, several times throughout the school year, employees teach students about CITGO environmental programs and capital projects and they attend health and science fairs. They offer advice to students on how to be more environmentally conscious at home, at school and in their neighborhoods.

EMISSIONS REDUCTION INITIATIVES

A major accomplishment at the refinery has been the reduction of flaring events. This has been accomplished by procedural and equipment changes. Flare gas recovery compressors have been installed in the flare systems to recover the gas for reuse within the refinery. Employee teams have also improved procedures to minimize or eliminate the amount of material directed to the flare system during normal operations and when units are shut down for maintenance. The refinery is routinely not flaring more than 99 percent of the time. The CITGO Lemont Refinery has taken significant steps in improving its efficiency, environmental advances and production. Recent environmental enhancements include a new wet gas scrubber and selective catalytic reduction unit, which reduce atmospheric emissions. Additionally, the refinery boasts a gasoline hydrotreater, allowing gasoline produced at this refinery to be essentially free of sulfur. Our Ultra Low-Sulfur Diesel unit allows for a 97 percent reduction in sulfur in the diesel fuel that the refinery produces. Since the late 1990s, the CITGO Lemont Refinery has invested nearly $1 billion in enhancements to preserve our environment and to keep our air and water clean.

WATER CONSERVATION

A portion of the water entering the CITGO Lemont Refinery is recycled and reused. That water, which is discharged into the Chicago Sanitary Ship Canal (CSSC), is treated to stringent Illinois standards specified in our wastewater permit. For example, Illinois' ammonia standards are two-thirds less than the federal standard. Elevated concentrations of ammonia can deplete oxygen levels in water ways. The CITGO Lemont Refinery has been diligent in reducing ammonia concentrations in our wastewater. In fact, our discharge is lower in ammonia concentration than the water taken in from the CSSC. This has resulted in a net removal of ammonia from the CSSC.

Statement of Jerry Thompson, CITGO Petroleum, Tulsa, OK

Overview

The National Petrochemical & Refiners Association (NPRA) represents almost all of the refining industry including large, independent and small refiners as well as petrochemical producers. NPRA supports a 90% reduction in the sulfur content of highway diesel fuel to a 50 ppm sulfur cap. In contrast, we are deeply concerned about the impact EPA's new diesel sulfur program will have on the industry's ability to provide a steady and reliable source of diesel fuel to its customers.

NPRA does not believe that it is possible to consistently maintain needed supplies of highway diesel within the 15 ppm sulfur cap level sought by EPA. Although refineries may be able to produce some amount of this diesel, many would be forced by its high costs to limit or forego participation in the highway diesel market. This would reduce supplies well below those available under a more realistic sulfur cap. In addition, with the current logistics infrastructure, it will be extremely difficult to deliver highway diesel with a 15 ppm sulfur cap to consumers and maintain the integrity of the sulfur level of the product. This highway diesel must share a distribution system with other products that have significantly higher sulfur levels. At the EPA's proposed sulfur levels, a significant amount of highway diesel will have to be downgraded to a higher sulfur product due to product contamination in the pipeline.

The diesel plan announced on May 17th by the EPA is extreme, a blueprint for fuel shortages and future supply problems, and will pose severe economic impacts. It threatens to leave American consumers a legacy of scarce and costly energy supplies.

Role of Diesel in U.S. Economy

The trucking industry, America's motoring public, farm communities, commercial vehicle operators and others must all be assured a consistent and reliable source of supply. These vital industries may be severely impacted by reduced supplies and increased costs resulting from this rulemaking, and the consequent effect on the economy will be widespread.

Vehicles powered by heavy duty diesel are an essential element in the commercial distribution of goods and services in the United States. The EPA regulators must assess the decisions they are making and weigh the risks which new, costly and unrealistic standards could have on the country's ability to move goods and services. A reliable source of diesel supply for these customers could be threatened if the EPA proposal becomes final.

Refiners Offered A Reasonable Plan to Reduce Sulfur

The refining industry agrees that the sulfur levels in diesel must be reduced, but the program must be reasonable. The industry proposed a plan to EPA that would lower the current limit of 500 ppm of sulfur in diesel fuel to a limit of 50 ppm -- a 90% reduction. This is a very significant step. It will enable diesel engines to meet the particulate matter standards sought by EPA and also achieve significant NOx reductions. Our plan can yield a 90% reduction in particulate matter and a 75% reduction in NOx emissions from new heavy-duty diesel engines. Industry's plan is still expensive -- we estimate it will cost the industry roughly $4 billion to implement. But, unlike EPA's extreme and much more costly proposal, the level of sulfur reduction proposed by industry is attainable

and sustainable. Most refiners would choose to make the investments needed to meet a 50 ppm sulfur limit. Most refineries will be able to comply with this 90% reduction by making capital investments to upgrade existing facilities or by building new capacity.

The industry has shared this proposal with regulators. NPRA and its members have had protracted discussions with EPA and have tried to suggest reasonable ways to reduce diesel emissions. Unfortunately, industry's plan has been rejected and ignored by EPA.

Overlapping Fuel Standards

Implementing gasoline and highway diesel sulfur reduction and MTBE reduction concurrently will tax resources of the engineering and construction industries, as well as state permitting agencies. Implementation of a new 50 ppm low sulfur cap diesel program in a more reasonable timeframe (after gasoline sulfur reductions) would reduce the peak demands on the engineering and construction industry or state permitting agencies. EPA's proposed overlap - with gasoline sulfur reduction phased-in between 2004 and 2007 and extreme highway diesel sulfur reduction completed in 2006 - jeopardizes both programs.

This Subcommittee may recall that the refining industry is already implementing an $8 billion (6-7 cents per gallon) program to reduce sulfur in gasoline in the same timeframe. There are few synergies in the gasoline and diesel sulfur reduction strategies so there is no justification for doing both concurrently.

EPA'S Plan Will Jeopardize Diesel Supplies

EPA's plan will not maintain adequate diesel supplies. NPRA does not believe that it is possible to produce needed supplies of highway diesel nationwide within the 15 ppm sulfur cap level. Although refiners may be able to produce some amount of this diesel, many would be forced by its high costs to limit or forego participation in the highway diesel market. EPA's plan would reduce supplies well below those available under a more realistic sulfur cap.

While some refiners would invest in the expensive new equipment necessary to meet the 15 ppm limit, many others may not make the large investments necessary to produce it, especially at the same time that sulfur levels in gasoline must be greatly reduced. Since highway diesel is only about 10 percent of the average refinery's output, refiners could find other uses or markets for their current diesel output. More than 30% of the current supply of highway diesel could be lost until additional investments are made and new desulfurization capacity is built. This could take as long as four years. Also, some refineries will probably go out of business. When a refinery closes, we lose its entire output -- gasoline, diesel, jet fuel, home heating oil. With the demand for petroleum products projected to increase, we cannot afford to lose any refineries. This is a very strong argument for a more reasonable program.

It will be extremely difficult to deliver highway diesel with a 15 ppm sulfur cap to consumers and almost impossible to maintain the integrity of the sulfur level of the product. These products must be delivered though common carrier pipelines. Recent studies concluded that it would probably not be feasible for the distribution system to maintain low sulfur diesel fuel supplies in all areas. Spot outages will probably occur and there will be reduced flexibility to deal with unusual market conditions.

Technical Decisions Refiners Face

Today's highway diesel is produced from blendstocks containing several thousand ppm sulfur. Currently, sulfur is reduced by hydrotreating. The typical existing diesel hydrotreater at a refinery can be modified to produce a product meeting industry's proposed 50 ppm sulfur limit.

Some existing units that are more constrained than average may not be suitable for modification to produce this lower sulfur product. The existing hydrotreater may have a lower than average operating pressure or hydrogen recycle rate, or the refinery may use a mix of blendstocks that may be harder to desulfurize. A new hydrotreater would be required at some refineries because retrofitting an existing hydrotreater alone would not be an option for every refinery. Even with industry's proposed 50 ppm sulfur cap, there could be more limited supply impacts if necessary investments are not made. Most refiners, though, would choose to make the more affordable retrofit investments needed for a 50 ppm sulfur cap.

A diesel sulfur standard at a 15 ppm sulfur cap would make modification of a typical, existing unit uneconomical. It would require such a large increase in reactor volume that a new, high pressure unit would make more sense. This new hydrotreater would require additional hydrogen compression and a thick-walled pressure vessel. The worldwide manufacturing capability for high pressure vessels is limited to a handful of suppliers and could be a significant constraint on providing adequate supplies of ultra low sulfur diesel in the proposed timeframe.

Thus, a 15 ppm sulfur limit would require a decision to invest in an expensive new high pressure desulfurization unit or retrofit an existing unit to process only the lower sulfur blendstocks. If several refineries choose the latter option, supplies of highway diesel would decline from current levels. It would take some time to correct this supply/demand imbalance.

Even with investment in a new hydrotreater, compliance with a 15 ppm sulfur limit would not be guaranteed at today's highway diesel production volumes. Currently, vendors do not have commercial experience treating feeds containing a significant amount of cracked material to meet a 15 ppm sulfur cap. Therefore, the capital-intensive option will not necessarily satisfy domestic demand because some of the current feedstocks are very difficult to desulfurize at the greater than 99 percent reduction levels required by a 15 ppm sulfur limit. In summary, although it is possible to produce some highway diesel under 15 ppm sulfur, it is not technically possible to produce 15 ppm sulfur highway diesel at current volumes on a continuous basis.

Distribution of Ultra Low Sulfur Highway Diesel is not Feasible.

The distribution system will not be able to provide ultra low sulfur highway diesel supplies at all times. It will be very difficult to maintain the integrity of a 15 ppm sulfur cap when diesel is distributed in pipelines, barges and trucks which also carry gasoline with a cap of 80 ppm sulfur in 2006 and high (greater than 2,000 ppm) sulfur jet fuel, home heating oil and off-highway diesel.

Spot outages will occur if a product terminal discovers that the ultra low sulfur diesel is out of compliance for whatever reason. Nearly all or all of the non-compliant product would have to be removed (and perhaps the terminal tank cleaned) before new product could be brought in. In the past, product that was slightly out of compliance could be blended with complying product; however, at ultra low sulfur levels, this will not be an option.

NPRA supports only one grade of highway diesel.

EPA is considering a phase-in program with two types of highway diesel available for a few years: current diesel

(500 ppm cap) and ultra low sulfur diesel (15 ppm cap). Phase-in would create its own distribution and enforcement problems with significant potential of misfueling by new trucks. This alternative would not effectively address NPRA's concerns about technical producibility and maintaining product quality. The short period while two products would be in the marketplace guarantees that investments to distribute and segregate them will be stranded when the temporary program expires. The market may not be stable and balanced throughout the program as the existing fleet of trucks tries to chase dwindling supplies of the higher sulfur, lower cost highway diesel.

Lyondell/CITGO Experience Industry's repeated warnings about this rule are well-founded. Our company, CITGO, has some relevant real-world experience: in the EPA's proposed rule, our facilities at the Lyondell-CITGO Refinery (Houston) were referenced as having a diesel desulfurization technology capable of producing the 15 ppm sulfur cap diesel fuel. Based on our actual operating experience with this referenced technology, we find the capital and operating costs are much higher at the 15 ppm sulfur cap. The ability of the technology to consistently produce below 15 ppm diesel is problematic. The feedstocks to this revamped facility are 30 percent straight run stocks from the crude distillation unit and 70 percent heavy cracked stocks from conversion units. These heavy cracked stocks are significantly more difficult to treat to the 15 ppm level. Our operating data shows that to consistently desulfurize to 15 ppm or below, a significant portion of the cracked material must be removed from the feed, thereby reducing our diesel production by this amount.

Our first cost consideration is the use of capital. The Lyondell-CITGO project to improve our diesel quality was completed in late 1996 and included the installation of the world's largest free-standing reactor. We increased catalyst volume in the unit from 40 thousand pounds to 1.7 million pounds. The capital cost for conversion of this existing 50,000 BPSD Unit was $86 million dollars. This includes $69 million dollars for the process unit and $17 million dollars for supporting facilities. This is much higher than the $30 million revamp cost for a typical refinery processing light cycle oil as stated by the EPA . Also, a simple retrofit is not possible on many units because most older, smaller units do not have sufficient reactor design pressures, the requisite high purity hydrogen supply, a suitable fractionation system, or other hardware.

The second cost consideration is operating costs. The diesel sulfur level produced in the unit meets the 15 ppm sulfur cap at initial conditions at start of run. However, as the desulfurization catalyst ages, the reactor temperatures must be raised to achieve targeted sulfur levels. There are limits to raising temperature - equipment and product quality limits - such as color. These limits establish the cycle life of the catalyst.

At the proposed 15 ppm sulfur cap with 70% heavy cracked diesel stocks, the cycle life will be greatly reduced from current operation. This significantly raises the operating cost because of more frequent catalyst replacement and more frequent shutdowns. This also results in a loss of diesel production. Under the current mode of operation, the frequency of catalyst change-out is managed by reducing the cracked stocks in the feed to this unit. More frequent catalyst change-out to meet a 15 ppm sulfur cap raises the cost of diesel production by as much 7 cents/gallon on our existing unit.

What looks simple in theory doesn't always work in practice. I hope that the entire refining industry doesn't have to spend billions of dollars just to prove that our concerns about this rule are valid. This will happen, however, if we ignore the warning signs of an already stressed supply system, and rush to implement a plan based upon little more than wishful thinking. we can't make enough diesel at the 15 ppm level and what we can produce will cost much more than EPA represented.

Availability of Aftertreatment Technologies

The proposed heavy-duty diesel engine emissions standards for particulate matter (PM) and nitrogen oxides (NOx) will require the use of advanced aftertreatment equipment on new trucks. The PM control technology is more developed than the NOx technology, and it can meet the proposed 90 percent reduction in the emissions standard using a diesel fuel that is limited to 50 ppm sulfur. The PM standard chosen by EPA appears to be technically feasible with refining and emissions control technologies that are ready for commercialization. So EPA's PM standard is achievable using the industry's recommended 50 ppm fuel.

However, the various NOx control technologies being considered by vehicle manufacturers are much less developed. EPA's decision to reduce the NOx standard by 90 percent is likely to focus development efforts on an emerging technology that is the most delicate of those being considered. EPA's choice of this NOx standard is purely arbitrary. It is unrealistic and considerably more stringent than the NOx standard for the same period in Europe and Japan. Even with a sulfur limit of 15 ppm, this technology may not meet the durability requirements of the proposed standard. NPRA recommends that EPA set a more realistic NOx emissions standard, one that would rely on more developed and more robust emissions control technologies and a technically feasible diesel fuel with a sulfur limit of 50 ppm.

Fuels Transportation Systems Can Become Severely Stressed

The "regulatory blizzard" chart attached to our testimony shows 14 major regulatory actions which the refining industry will be required to comply with over the next ten years. The cost of these programs, which are largely uncoordinated, is astronomical. Gasoline sulfur reduction, diesel sulfur reduction and MTBE reduction alone will probably cost the industry a combined total of $20 billion.

During the 1990's the refining industry was also called on to make massive environmentally-related investments, totaling more than the actual book value of the entire industry, according to one study. At the same time, the average rate of return on capital in the industry was just 2%, which is less than banks pay on a passbook savings account.

As a result of this crushing burden on refiners and fuel distributors, we are starting to see signs of stress in the system. Increasing stringency of fuel specifications makes them more difficult to produce and harder to distribute. And the impact of unforeseen situations, such as a refinery outage, a pipeline malfunction or even the weather, is magnified under such conditions.

We experienced disruptions in the supply of home heating oil and diesel in the Northeast just last winter. Currently, logistical and supply problems in the Midwest, especially in the RFG markets of St. Louis, Chicago and Milwaukee, have resulted in increased gasoline costs. This situation occurs just as the industry is implementing changes to a new grade of reformulated gasoline, with more stringent requirements. These occurrences are usually temporary, but they will probably occur with increasing frequency as we produce ever-cleaner fuels. Policymakers can help to reduce the frequency of these situations by insisting that environmental programs be both reasonable and well-coordinated. The proposed diesel sulfur regulation fails on both counts. This is another reason why it should be rejected in favor of a more reasonable and timely approach, such as the industry has recommended.

Conclusions

EPA should not adopt a regulation that puts the nation's energy supply at risk. Fuel and engine emissions standards must be based on developed technologies and cost-effectiveness. An adequate supply of 15 ppm

sulfur diesel cannot be assured and distribution of 15 ppm sulfur fuel is probably also not feasible. There has been no demonstration - technological or otherwise - that the 15 ppm sulfur level advocated by EPA is achievable or sustainable across the current diesel pool for most refineries.

NPRA hopes that the entire refining industry does not have to spend billions of dollars just to prove that our concerns about this rule are valid. This will happen, however, if we ignore the warning signs of an already stressed supply system and rush to implement a plan based upon little more than wishful thinking. EPA argues its extreme proposal is needed to enable heavy-duty engines to meet stringent NOx standards in the 2007-10 timeframe. Of course, that NOx standard was arbitrarily selected by EPA. It is considerably lower than NOx standards for the same period in Europe and Japan, and is probably unrealistic. Thus, EPA's $10 billion plan for 15 ppm diesel is largely based upon an arbitrary and unattainable target.

NPRA wants to work with other stakeholders to achieve reasonable, cost-effective reductions in highway diesel emissions. Our industry wants to maintain the right balance between environmental goals and energy supply so we can implement fuel and emissions standards. This way, both the fuel and engine industries can comply with costs that consumers can afford.

Gary-Williams

From the Denver Business Journal
:http://www.bizjournals.com/denver/news/2011/11/03/gary-williams-energy-selling-for-525.html

Nov 3, 2011, 6:37am MDT Updated: Nov 3, 2011, 12:05pm MDT

Gary-Williams selling refinery for $525 million

Cathy Proctor

The Gary-Williams Co., a private Denver oil and gas company, is selling its Wynnewood refinery in Oklahoma to **CVR Energy Inc.** for $525 million, plus about $100 million in working capital.

Gary-Williams has 276 employees in Oklahoma that work for subsidiary Gary-Williams Energy Corp., and that company's subsidiary Wynnewood Refining Co. The Oklahoma employees will be retained by CVR (NYSE: CVI), based in Sugar Land, Texas, according to an announcement from Gary-Williams Co.

Gary-Williams also has 65 Denver-based employees that support the 70,000-barrels-per-day refinery, some of whom will be laid off after the deal closes at the end of the year, Gary-Williams said .

A "sizeable group" of the refinery's Denver employees will be retained to support the company's other operations — including oil and gas exploration and production, real estate, investment management and support for community development, the announcement said.

"CVR is a strong, profitable company and is extremely knowledgeable about the type of refining and marketing business we have been operating in Oklahoma since 1995," Ron Williams, president and CEO of Gary-Williams, said in a statement.

Gary-Williams acquired the Wynnewood refinery from Kerr-McGee in 1995, when its capacity was 55,000 barrels per day and the plant was facing the possibility of closure, Williams said in the announcement.

"We have been able to expand the plant from 55,000 barrels per day to 70,000 barrels per day and to operate successfully during that time," Williams said.

Davis Graham & Stubbs LLP served as legal adviser and Deutsche Bank served as financial adviser to Gary-Williams for the sale.

Statement of Ronald W. Williams
President of Gary-Williams Energy Corporation
Before the Senate Environmental and Public Works Subcommittee
for Clean Air, Wetlands, Private Property and Nuclear Safety
Washington, D.C., Thursday, September 21, 2000

Introduction

Good morning, Mr. Chairman and Members of the Committee.

My name is Ron Williams. I am President, Chief Executive Officer and an owner of Gary-Williams Energy Corporation, a Denver-based refining and marketing company. Our primary asset is a 50,000 BPD crude oil refinery in Wynnewood, Oklahoma. Companywide, we have about 275 employees and fall within the definition of small business refiner used for the Heavy Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements proposed by the Environmental Protection Agency in May of this year.

I have been asked to speak today on behalf of the oil and gas industry as a whole. We are members of both the National Petrochemical and Refiners Association (NPRA) and the American Petroleum Institute (API). NPRA represents virtually all of the US refining industry; API represents all sectors of the petroleum industry: exploration and production, transportation, refining and marketing. In addition, we served as a representative of an ad hoc coalition of some 15 small refiners producing diesel fuel during the SBREFA (Small Business Regulatory Enforcement Fairness Act) panel investigation into the impact of EPA's proposed rule on small business refiners.

General Industry Concerns NPRA and API have previously testified before this committee and have devoted extensive resources to try to work with EPA and to analyze technical issues on this proposed ruling. The industry as a whole firmly supports the clean air benefits of lower sulfur fuels. At the same time, however, the industry believes that the costs and benefits of these regulatory requirements must be carefully weighed in the context of their impact on energy supplies and the ultimate burden on consumers and the national economy. In short, we fear that EPA's haste to promote very sensitive engine technology is prematurely driving stringent and unreasonable fuel standards. We believe that a 15 ppm cap on diesel sulfur (effective in April 2006) will mean a sharp reduction of highway diesel fuel supplies, higher fuel prices and significant market volatility. In addition to those in the fuel industry, the rule will hurt all those who rely on highway diesel fuels, including truckers and distributors of goods and services. Diesel-fueled trucks and buses are the backbone of commerce in this country. The ultimate harm will be to consumers, jobs and the economy.

Among the key concerns shared by most of the refining industry are: 1. The 15 ppm diesel sulfur cap proposed by EPA is unreasonably stringent. To produce product consistently to that standard (allowing for inevitable operational disruptions), a refinery must in fact set itself a much lower cap. At least two things will happen: first, refiners choosing to produce for the highway market will incur significant capital and operating costs and consumers will experience about a 5% fuel economy loss; second, other refiners will be forced to limit or forgo participation in the highway diesel market. As a result, additional diesel volumes will be necessary just to match current demand.

2. The US fuel refining and distribution systems will not be able to expand to meet anticipated future demand. Refineries are now operating at over 95% of rated capacity which is approximately full sustainable capacity and this rule will shrink existing capacity. Forecasts (by the Energy Information Administration) are that US diesel demand will increase by 6.5% between now and 2007, gasoline demand will grow by 1.9% per year and jet fuel demand will rise by 3.2% per year. (Note: jet fuel is made mainly from high quality, light distillates and "competes" with diesel for blending components.)

3. Distribution problems will further reduce available supplies of ultralow sulfur diesel fuel and restrict the industry's ability to respond to any unexpected supply shortfalls. Potential for contamination in pipelines, barges, tankers, etc. will constrain shipment schedules and require more extensive interface cuts. EPA itself has suggested that some two percent of highway diesel may be downgraded to off-road fuel because of a required increase in pipeline transmix.

4. Importing additional diesel supplies to meet demand will be restricted because foreign producers will be unlikely to meet our more stringent sulfur standards.

5. Costs to meet a 15 ppm standard will be significantly greater than EPA projects. According to EPA, costs for diesel fuel under the new standard would be approximately three to four cents per gallon higher. API, however, projects incremental costs of 12 cents per gallon for diesel manufacturing ($8 billion in refinery capital investments) and an additional two cents per gallon for distribution expenses. API estimates that the capital costs to reach a 50 ppm standard (a 90% reduction in sulfur levels from today's standards) would be six cents per gallon higher than EPA forecasts but about half the outlay for the 15 ppm level.

6. Unable to make the huge investments required for a 15 ppm diesel cap and facing additional massive expenditures to meet almost simultaneous new regulations on gasoline sulfur, oxygenates and air toxics, some larger refineries will move out of the highway diesel market. Some smaller refineries will be forced to go out of business all together. The off-road market will be flooded with higher sulfur diesel. API has estimated that the shift away from on-road diesel could be in the 20 to 30 percent range. More production loss may result from refinery closures. Faced with the high cost of regulation and low rates of return, more than 25 U.S. refineries have already closed in the last ten years.

7. The industry is in agreement that major supply shortfalls should be anticipated. Estimates range from 10 to 30 percent of projected demand. A just-released Charles River Associates (CRA) study suggests a nationwide average shortfall of more than 12% with particularly acute supply shortages at the regional level. On road diesel supply is projected to decline by 18% in Petroleum Administration for Defense Districts (PADDs) I, II (where our Wynnewood refinery is located) and III and by 37% in PADD IV, relative to the DOE baseline forecast of market demand in 2007. CRA estimates potential price increases in PADDs I-III of $0.54 to $0.80/gallon and potential price spikes of $1.56 to $2.28/gallon in PADD IV should an insufficient volume of imports be available to cover the loss of domestic production.

8. The effective date of the proposed diesel rule overlaps the period when refiners will be making major refinery modifications needed to meet new Tier 2 gasoline sulfur requirements. In addition to the major cost burdens imposed, almost simultaneous implementation of the standards will exceed the capacity of available engineering and construction resources.

Industry Recommendations The refining industry has specifically urged EPA to take three critical steps: · Conduct a thorough technology review (for engine and emission systems as well as refinery desulfurization

technology) before finalizing the rule; · Set reasonable and cost-effective standards for vehicles and fuels; · Set an effective diesel sulfur implementation date that does not overlap the Tier 2 gasoline requirements. The industry has no reason to believe that the Agency will respond to these urgent recommendations without Congressional intervention.

Small Refiners' Dilemma Small business refiners share the same concerns as the majors with this rulemaking, but our problems are much greater. There are fewer than 25 small refiners meeting the EPA definition (fewer than 1,500 employees and total capacity not exceeding 155,000 BPD).

There are also numerous small refineries owned by larger companies with significant crude oil production and/or significant retail outlets which they also own or control. In some cases the owners are in partnership with foreign producers such as Saudi Arabia and Venezuela. In addition, they own other much larger refineries.

The benefits that these major companies enjoy from their sheer size, diversification and integration are many: · Easy access to both debt and equity capital; · Lower cost of capital; · Significant overhead savings and buying power with multiple refineries (e.g. utilities, operating supplied, engineering services, etc.); · Ability for one segment of their business to subsidize or "carry" another segment; and · Enormous "staying power".

For most of these major companies, their refineries are viewed as part of an integrated system. For example, several foreign producers have invested in US refineries to increase their market share of crude oil imports. Historically, profits from the major oil companies' crude oil production and retail marketing have subsidized the dismal rates of return on their refining assets. Many of the larger companies have publicly announced their desire to achieve a "balance" between the amount of refining capacity they own and retail distribution outlets they own or control. It is clear that the major oil companies' size, diversification and integration create a formidable, competitive advantage over the small refiners.

In short, small refiners are less able to raise the necessary capital and to endure the related increased operating costs which desulfurization investments will require; we face proportionately higher costs because we do not enjoy the same economies of scale; we cannot compete for limited construction and engineering resources. Many of us are also faced with meeting stringent Tier 2 gasoline standards in approximately the same time frame.

In our case, for example, we estimate that Wynnewood refinery's capital costs to reach 15 ppm diesel sulfur will total approximately $48.5 million. In addition, our annual operating and maintenance costs will increase $6 to $7 million, an amount equal to our historic annual net income. Clearly there would have to be a significant increase in profit margins, which has not been the case with past environmental investments.

If we must comply with the Tier 2, Diesel and Air Toxics rules as issued or proposed, according to our best estimates, GWEC must finance capital expenditures totaling $87 million in a five year period between 2003 and 2007. Not included in this total is an additional almost $3 million capital expenditure which will be required by the fall of 2003 under MACT standards expected to be released in the next few months.

Importance of Small Refiners in a Vibrant National Oil and Gas Industry Small business refiners believe this regulation will irreparably damage the competitive fabric of our industry and result in unnecessarily higher prices for diesel fuel consumers. Several will go out of business. In our case, the impact of this proposal is devastating and, if not amended, will ultimately cause us to shut down our refinery.

What then would result? The rapid and pervasive trend toward megamergers in the industry will continue

unchecked. There will be fewer if any small independents able to provide competitive products and to challenge the majors' price increases. Historically, small refiners have not only often been the lifeblood of the small communities in which they operate, they have served an essential function in providing pricing competition which requires the larger integrated companies to better meet the needs of the consuming public. Often the small independent provides the lowest wholesale price in the market for gasoline and diesel.

Also small refiners serve an essential national security function. In 1998/99, for example, small refiners (representing only about 4% of the diesel refining capacity in this country) provided almost 20% of the military jet fuel used by U.S. Military bases. Small refiners with defense contracts supplied almost 500 million gallons of jet fuel.

Extensive Effort Has Not Produced Comprehensive Small Refiner Solutions Small refiners have worked diligently with the SBREFA panel and with EPA directly to outline the complex range of problems and circumstances facing the small refiner group and to underline as strongly as possible that there is no one solution that will enable all small refiners to survive. Wynnewood Refining Company, for example, is one of only a few small refiners without a distillate desulfurization unit. Because of the strong local agricultural, ranch and oil field markets, the additional desulfurization capacity has not previously been necessary.

Our many discussions with EPA staff, give us no reason to believe that the final rule will include adequate accommodation for the majority of small refiners. The apparent sensitivity of diesel engine technology now contemplated and the Agency's headlong rush to impose a rule immediately mean that there will be no opportunity for additional research and no incentive for the development of alternative technologies that might be equally as effective with slightly higher sulfur fuel.

Preservation of the Small Refiner Segment Small refiners concur with the industry position summarized above. Like the industry as a whole, small business refiners are united in our belief that the costs, technical difficulties and tight time frames imposed under the proposed diesel rule will push the US refining industry to limit production of ultralow sulfur highway diesel, cause supply shortages and price increases and flood the off-road market with higher sulfur product. This shift away from the on-road market will be substantial as many refiners decide to drop their Light Cycle Oil (LCO) into the off-road market rather than make the large capital investments required to process the entire stream to a 15 ppm cap. The related glut in the off-road market will reduce the price of off-road diesel and put many small refiners who rely on that market, like Wynnewood Refining Company, out of business.

As the industry has pointed out, the rational and preferred solution is to delay issuing the rule. If the Agency were to withdraw the rule to allow for more time to complete the research and thoughtful analysis needed, a more thorough investigation of highway diesel supply questions and antidumping provisions could be undertaken and subsequently public comment could be invited.

If, however, EPA proceeds with the rulemaking, small refiners urge EPA to adopt anti-dumping provisions in its final rule, to preserve the small refiner segment and to mitigate the very real probability that the supply of highway diesel will be reduced. One suggestion is to limit sales of high sulfur diesel into the off-road market to a refiner's current volume or some appropriate baseline. Additional sales into the off-road market would be allowed, but the sulfur standard for incremental volumes would be whatever cap is adopted. Small business refiners, who produce only about 4% of the nation's diesel and who market almost exclusively in attainment areas, would be exempt from this provision. This sort of anti-dumping provision would provide certainty that the on-road market would be first priority and therefore adequately supplied since there would be no economic incentive to dump

incremental diesel into the off-road market. Such a provision would have no material environmental impact. In fact, because LCO is at the high end of allowable off-road sulfur levels, without an antidumping provision, off-road pollutants would probably increase.

Access to Capital Whatever provisions EPA adopts for small business refiners will not be sufficient to keep all of us in business. We must have help to finance these incredibly costly regulations. We ask that Congress and the Administration fully realize the ramifications of this rule to the small refiner. The extraordinary costs involved will result in small refinery shutdowns, and less competition in the market place. If EPA is allowed to proceed, we ask that Congress and the Administration consider providing tax credits, loan guarantees and other provisions to assist small business refiners.

For example, among the types of assistance that should be considered: · $0.05/gallon excise tax credit or an income tax credit for small refiners to defray costs of an investment in desulfurization technology; and · Increase in SBA maximum loan guarantee on pollution control loans from $1 million to $10 million or higher.

Conclusion In conclusion, the refining industry, including the endangered small business refiners, believe that this rule must be subject to much more extensive review than the Agency's current timetable will allow. Without some delay to allow the complex analyses of engine technology, desulfurization technologies and costs and supply disruption probability, this country can expect to see price spikes, fuel shortages and consumer outrage that may make recent protests in the midwest and Europe look mild in comparison.

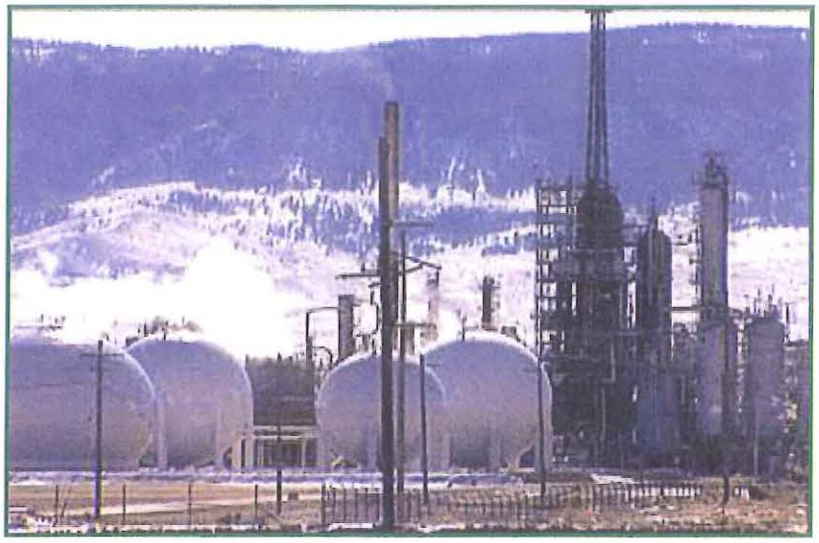
Thank you for the opportunity to express these views.

Sinclair

We're About as American As It Gets

Sinclair Casper Refinery

Casper Refinery
Sinclair Refinery
Refining Employment
Community Involvement



The Casper Refinery is a medium conversion refinery based in Casper, Wyoming. Starting operations as White Eagle Refinery in 1923, it remains one of the oldest refineries still operating in the Rocky Mountains today. It was acquired from Mobil Oil in 1968 and named the Little America Refining Company. Casper is a central hub for crude oil supplies and the refinery is capable of running a large array of crude oils, including domestic and Canadian synthetic crudes.

The refinery produces more than 1,000,000 gallons of product per day. The Casper Refinery has been updated to produce ultra-low sulfur diesel and recently installed projects to lower gasoline sulfur levels and increase gasoline production and octane levels. The refinery is an economic cornerstone for central Wyoming and many of its products are used by heavy equipment users and commercial companies throughout Wyoming.

In 2009, the refinery received the Gold Award for Achievement in Safety from the National Petrochemical and Refiners Association.

Comments of Clint W. Ensign,
Vice President, Government Relations
Sinclair Oil Corporation
On the issue of Tier 2 / Gasoline Sulfur Standards
Before the Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety
of the Committee on Environment and Public Works
United States Senate
May 18, 1999

Mr. Chairman and distinguished committee members, my name is Clint Ensign. I am Vice President of Government Relations for Sinclair Oil Corporation. I am honored to share some initial views and perspectives on the U.S. Environmental Protection Agency's Proposed Tier 2 Motor Vehicle Emission Standards and Gasoline Sulfur Control Requirements.

Sinclair is family owned company that operates three refineries, two in Wyoming and one in Oklahoma. Two of these refineries were closed by other companies before being purchased and reopened by Sinclair. As a manufacturer of fuels, I am proud to say that Sinclair routinely produces cleaner products than required by state and federal regulation.

All of our refineries are considered "small" by provisions established by Congress in the Clean Air Amendments of 1990 (CAAA). Regrettably, none of our refineries are considered small by standards EPA is using in this rulemaking. Therefore, we are not eligible for small refinery help in the proposal.

Environmentally, the air improvements that automakers and refiners can achieve through Tier 2 vehicle and fuel changes are impressive, especially in major urban cities. My company and the refining industry support large reductions in gasoline sulfur. We have made specific recommendations to EPA on how best to accomplish this task quickly across America.

But in reviewing EPA's gasoline sulfur proposal, we are surprised by how harsh it treats U.S. refiners. We are concerned the agency has overreached in many areas, particularly in the transition phase to low sulfur gasoline. The proposal's small refinery provisions are narrowly construed and were disappointing. Overall, the proposed gasoline sulfur regulation represents the largest and most costly government requirement in the history of our company. If made final as proposed, it directly threatens the future of our Casper, Wyoming refinery.

We respect EPA's authority to set standards at any desired level. But they cannot compel private investment. Recent history demonstrates that many refineries withdrew rather than invest in fuel desulfurization. With little or no surplus refining capacity available in industry today, the success of gasoline sulfur regulation depends on the ability of EPA to convince every refiner to invest in virtually every refinery nationwide. We do not believe the gasoline sulfur proposal accomplishes this important objective.

While Sinclair disagrees with many fundamental aspects of the gasoline sulfur proposal, I wish to make plain that I have been extended the opportunity to present our views to EPA on several occasions. I have appreciated meeting with senior agency officials on this issue.

Let me discuss several specific concerns we have with the proposal.

As a major stakeholder in developing gasoline sulfur standards, the basic views of the U.S. Refining industry were not incorporated in the proposed regulation.

In February 1998, the entire U.S. petroleum refining industry voluntarily proposed that EPA set new gasoline sulfur standards. We recommended large cuts in sulfur limits; a 70% reduction in the East and 55% in the West. Average sulfur levels in the national gasoline pool would fall by half in 2004. The largest sulfur cuts were targeted in the East. Our proposal recognized regional uniqueness and was designed to be consistent with congressionally established Tier 2 principles of need, feasibility, and cost-effectiveness.

In studying vehicle emissions data, we believed that Phase 11 pending emission standards for light duty vehicles and trucks as stated in the Clean Air Act could be achieved with these recommended sulfur reductions.

As a second step, many refiners offered to make gasoline meeting California's severe sulfur standard --- a 30 ppm average with an 80 ppm cap --- by 2010. Other refiners promised further cuts based on the outcome of technical studies as well as air quality need.

Our proposal gave a huge jump-start to the regulatory process. It essentially provided EPA with unanimous consent from our industry to impose regulation at this level. In the absence of gasoline sulfur workshops, feasibility studies, and the like, this represented a remarkable offer to EPA.~\1\ And since large and small refiners supported the plan, the agency did not need to worry about possible plant closings, fuel supply concerns, small business compliance, and other large challenges that accompany major regulation of this kind.

\1\ EPA has held one public workshop on gasoline sulfur control (May 1998). No other forum has been provided for refiners to meet directly with automakers to address gasoline sulfur issues.

Our initial gasoline sulfur proposal raised many questions. We listened closely to the concerns and made many modifications.

Automakers strongly opposed our plan. In response, the refining industry made a good faith attempt --- with the help of Administrator Carol Browner --- to meet directly with the autos. Issues important to the rulemaking needed a direct exchange of ideas and data, especially on the critical question of "reversibility." EPA has noted that "vehicles tested exhibited a wide range of reversibility,for reasons that are not fully understood."\2\ We hoped the meetings would help resolve questions on this an other key issues. While automakers have pressed EPA hard to mandate severe gasoline sulfur standards, they refused the offer to meet with us.

\2\ EPA, Proposed Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, pg. 98, emphasis supplied.

In sum, the U.S. refining industry made an unprecedented effort to help EPA develop a major gasoline sulfur regulation. I don't know how our industry could have been more helpful, open, or responsible on this matter.

Despite this background, EPA rejected our recommendations. The agency instead proposed a nationwide 30/80 ppm gasoline sulfur standard beginning in 2004. This is essentially the standard requested by the autos. From a fuel perspective, the proposal is a classic one-size fits all regulation. It falls evenly hard on urban and rural areas alike despite large differences in air quality. After making such a huge outreach to help EPA craft a meaningful and workable gasoline sulfur regulation, we are disappointed that our recommendations were set aside.

Even though regional air strategies are common in America today, a regional gasoline sulfur approach--- supported by many governors -- was rejected by EPA.

Regional strategies have been widely used throughout the country to improve air quality. The Ozone Transport Assessment Group (OTAG) made regional designations and recommendations for "fine-grid" and "course-grid" states. The Ozone Transport Commission, the Grand Canyon Visibility Commission, and the Western Regional Air Partnership are examples of coalitions of states that address regional air problems. Governors are often directly involved in these groups. When EPA and automakers established National Low Emission Vehicle (NLEV) regulations, the East and West were treated differently as to when each would receive NLEVs. In the CAA, areas receive reformulated and conventional gasoline based on air quality need. Precedent exists to support a regional gasoline sulfur approach.

Nine governors representing Rocky Mountain and Central Plains states have written to EPA urging regional gasoline sulfur controls. These governors are from both political parties and represent states that join each other in a large, geographically contiguous block. We were disappointed their collective recommendations were not reflected in some way in the gasoline sulfur proposal. In fact, their views were not even noted in the preamble of the proposal.

Collectively, these governors represent states with excellent compliance with National Ambient Air Quality Standards. With few exceptions, EPA projects these states will meet the new, more protective NAAQS in future years.\3\ In many states in the West, EPA projects nearly total compliance with future ozone NAAQS:

\3\ EPA, Proposed Tier 2 Motor vehicle Emissions Standards and Gasoline Sulfur Control Requirements, April 1999, Appendix C: One-Hour and Eight-Hour County Design Values

"Outside California and the OTAG region, the NAAQS RIA modeling indicated that all areas would attain the I hour standard by 2010. One area (Phoenix, AZ) was projected not at attain the 8-hour standard."\4\

\4\ EPA, Proposed Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, April 1999, pg. 27, emphasis supplied.

Other reasons support a regional standard:

ù Rural states have a small vehicle inventory and emissions are dispersed over large geographic areas. Gasoline sulfur control has little impact on air quality in these states.

ù Rural populations will pay more for sulfur control due to higher per capita gasoline usage rates than the nation at large.\5\

\5\ Highway statistics from the Federal Highway Administration show that populations in Rocky Mountain and Central Plains states have gasoline consumption rates higher than urban states.

ù EPA projects the cost of gasoline sulfur control in PADD IV (WY, ID, MT, CO, and UT) will be nearly twice as high as the nation at large.\6\

\6\ Tier 2/Sulfur Draft Regulatory Impact Analysis---April 1999, Table V-35.

It is also important to note the refining dynamics in the Rocky Mountain region. Unlike all other regions in the

United States, PADD IV is almost entirely supplied by small refineries. Every refinery in the region is small. (Few of these refineries are eligible for regulatory help in the proposal.) Historically, small refineries face the largest challenge meeting fuel sulfur standards. In view of this, Sinclair expressed concern to EPA that severe regulation could impact refineries and cause supply problems for consumers. As noted earlier, the gasoline sulfur proposal, if adopted, directly threatens the future of our Casper, Wyoming refinery.

But these concerns are dismissed in the proposal. In doing so, EPA references a study conducted by Math Pro, Inc. --- prepared for the autos --- that suggests that the potential for small refinery closures in the Rockies is small. This conclusion is not consistent with our situation or with our understanding of the region. We are meeting with Math Pro on May 20 to take a detailed look at their study.

But most of all, the various Math Pro studies have led to confusion. Just a few months ago they completed a PADD IV gasoline sulfur study for the U.S. refining industry and reached different findings. One company, two conclusions, in three months. This situation raises questions about the value of these studies to the gasoline sulfur standard debate.

EPA used a narrow small refinery definition for regulatory relief purposes in the gasoline sulfur proposal that is more restrictive than the definition established by Congress in the Clean Air Act.

In the gasoline sulfur proposal, EPA did not use the small refinery definition that exists in the Clean Air Act. As a brief background, Senator Chafee offered a small refinery amendment during consideration of the CAAA of 1990 on behalf of a bipartisan group of 11 senators, including Senator Reid and Senator Baucus. Congress established small refinery provision to enable small refineries to earn marketable SO2 allowances to encourage investment in low sulfur diesel equipment. I am pleased to report that the small refining amendment has been a success.

Since the desulfurization of diesel and gasoline share similar small refinery issues, we do not know why EPA's gasoline sulfur proposal contains a more restrictive small refinery eligibility requirement than that set by Congress in 1990. In reality, only a few small refineries in the country are extended regulatory relief in EPA's gasoline sulfur proposal.

In all meetings we have had with EPA officials on gasoline sulfur, Sinclair has expressed small refinery concerns. More than six months ago, we informed EPA there were 53 small refineries in the United States that made gasoline. This number was much larger than the 17 refineries being considered by EPA under the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) review. We noted that rural populations depend on these small facilities for fuel supply. Because of size limitations, the viability of these refineries, as a class, has historically been threatened by severe fuel sulfur regulation. Consequently, we urged EPA to expand the review of small refineries beyond the SBREFA process.

Instead, EPA has proposed using the small refinery eligibility requirements of the Small Business Administration. The SBA approach, which includes employee limits, disqualifies most small refineries. Companies such as Sinclair, Flying J. Giant Industries, and Cenex --- recognized by Congress as small refineries --- are excluded from small refinery treatment in the gasoline sulfur proposal. We reject the position that many small refineries should be excluded from needed regulatory relief in this rulemaking because they employ too many people.

Other small refinery concerns need to be addressed. For example, will refiners who expend great effort and cost to manufacture a 30/80 ppm gasoline sulfur in 2004 allow their fuel to be commingled with high sulfur gasoline of

small refineries in pipelines and terminals? Does this situation argue for a broader regional approach in areas where there is a preponderance of small refineries? Does the proposal encourage investment in instances when one small refinery receives regulatory help and other small refinery does not? Should small refineries owned by major oil companies be offered help since they share similar size challenges and are important to the rural markets they serve?

These questions need further review. But it is clear that the SBA small refinery definition is too restrictive and does not accurately reflect small refinery impacts with major gasoline sulfur regulation.

Adopting California gasoline sulfur standards nationwide may mean adopting California fuel challenges: "California Screamin"

Last month, the front page of USA Today noted that "Drivers in San Francisco reported paying as much as $1.86 a gallon for unleaded gasoline and $2 for premium."\7\ The next day, the cover story in the Money section of USA contained a photograph of gasoline pump prices for up to $1.99 per gallon with the caption, California Screamin."\8\ The Wall Street Journal reported that unexpected problems at two California refineries "cut California production by about 5%.... This decline has sent West Coast wholesale prices soaring by more than 55 cents a gallon..."\9\

\7\ USA Today, In just 6 weeks, gas prices up Who, April 13, 1999, front page.

\8\ USA Today, As gas prices zoom up, consumers wonder why", April 14, 1999, Section B. front page.

\9\ The Wall Street Journal, Output Snags In California Lift Fuel Prices, April 2, 1999, pg. A2

Some may argue this situation is unique and temporary. But the cost of gasoline in California has been such a concern that Senator Barbara Boxer has asked the Federal Trade Commission to investigate high fuel prices in the state. Her request was supported by the California state legislature. Senator Boxer stated in her letter to the FTC that "California drivers regularly pay 10-20 cents more per gallon of gasoline than the rest of the country."\10\

\10\ New Fuels & Vehicles Report, FTC Said Investigating Oil Companies For Alleged RFG Price Fixing in California, May 8, 1998.

California gasoline regulations --- which include the 30/80 sulfur standard --- are the most severe in the nation. These standards are needed to address widespread air quality problems in that state. But many refiners have fared poorly with such heavy regulation. The state has lost refineries, refining capacity, and fuel suppliers. The U.S. Department of Energy reports that since 1990, eight refineries with capacity of nearly 300,000 barrels per day have been lost in California. The state's small refinery sector no longer makes gasoline. While some may contend that the rash of small refinery closures resulted from numerous factors, the executive director of the Western Independent Refiners Association in California has stated that when ultra low-sulfur gasoline regulation passed, "at least a half a dozen California small refiners made gasoline."\11\ Years after the introduction of 30/80 sulfur standards and reformulated gasoline --- tight supply and price volatility remain a problem in California.

\11\ Letter from Craig A. Moyer, Executive Director and General Counsel for the Western Independent Refiners Association to Clint W. Ensign, Sinclair Oil Corporation, June 18, 1998.

In Canada, an extensive refinery competitiveness and viability study was performed to determine impacts of

sulfur regulation on Canadian refineries. The independent study was done by a respected firm with refining expertise, Purvin & Gertz, Inc. The study concluded that requiring California sulfur standards in Canada would seriously threaten 3 to 4 of the country's 17 refineries.\12\ The assessment was done by refinery and by region. Here in America, no independent study has been contracted by EPA on refinery impacts of sulfur regulation. And even though the United States has nearly 10 times more refineries than Canada, EPA has concluded "we do not expect refineries to close as a result of the implementation of the proposed sulfur standards."\13\ In view of the stringent time frames and overall harshness of the gasoline sulfur proposal, this area needs closer review.

\12\ Competitiveness and Viability Impact on Canadian Refining Industry of Reducing Sulfur in Canadian Gasoline and Diesel, May 1997, Purvin & Gertz, Inc.

\13\ EPA, Tier 2 Sulfur Draft Regulatory Impact Analysis-April 1999, pg. V-62.

Sinclair has long expressed its concern to EPA that adopting California gasoline sulfur standards nationally could cause other states to experience the same kinds of refinery closure, supply, and price impacts that have occurred in California.

The gasoline sulfur proposal does not address past impacts of fuel sulfur regulation and is instead based on technologies that are not yet commercially proven.

The preamble of the gasoline sulfur proposal does not discuss negative impacts many refineries experienced with recent fuel sulfur regulation. No reference is made to California. The widespread shortages of on-road low sulfur diesel in the West during the fourth quarter of 1993 are not cited. No mention is made that high costs caused some refineries not to invest in low sulfur diesel equipment. In some instances, refineries that compete with each other share desulfurization equipment.

EPA correctly noted in the gasoline sulfur draft RIA that the U.S. refining industry's return on investment has been a dismal three percent since 1992. The inability to recover capital costs during this long period makes it tough for refiners to face major new regulation.

Using conventional technology, EPA estimated the 30/80 gasoline sulfur standard would increase manufacturing costs 5.1 to 8 cents per gallon, or $5.6 to 8.8 billion dollars each year nationally.~\14\ A regulation this costly would close some refineries, affect supply, raise consumer concerns, and present cost-effectiveness problems in regulatory assessments.

\14\ EPA Staff Paper on Gasoline Sulfur Issues, May 1, 1998, pg. v. The cost estimate excludes California. The Federal Highway Administration reports that approximately 110 billion gallons of gasoline are consumed in the United States each year (x-CA).

In this rulemaking, EPA believes these problems will be avoided due to new desulfurization technologies. Agency confidence in the new processes is so high that the proposal's entire gasoline cost estimate is premised on the belief that all refineries will use these technologies. While new processes could reduce sulfur extraction costs, they have not yet been commercially tested or proven. EPA reported there was not a single refinery with the new desulfurization technology currently in operation today. Despite this fact, EPA is gambling this new technology will work and that more than 100 facilities will license this technology --- relatively trouble free --- in a few short years.

We hope the agency is correct. But the presumption is troubling for several reasons:

-- It is our experience with packages that we license that the guaranteed yields of the process are significantly less than the advertised performance. In other words, when we get to the point of signing a contract with a vendor, the guaranteed results of the technology are less than advertised. In this instance, where no track record has been established, what levels of sulfur reduction can refiners confidently count on with new gasoline desulfurization technology? Is it enough for refineries to meet severe 30/80ppm gasoline sulfur standards? Will additional conventional technology be needed to ensure that a refinery meets the new requirements?

-- We believe problems will inevitably occur as new technology is implemented. Pilot studies under controlled conditions are often not indicative of field operating parameters. For example, we do not know the actual operational cycle of the new technology, how it will perform under severe operating conditions, whether it is reliable or subject to unexpected downtimes, and whether it is adaptable to a wide variety of processing configurations. These large uncertainties argue for a reasonable phase in of the technology instead of the rigid timetables proposed by EPA.

-- Within the past year refiners have become aware of two new desulfurization technologies, CDTECH and OCTGAIN 220. While a few other options are beginning to emerge, they are not well known. Before applying for permits, refiners must choose the desulfurization technology they will use to meet the new standards. This decision will occur during a period when little will be known about these new processes. And if refiners all choose the new technologies as EPA has presumed, we question whether two vendors (perhaps a few others) can meet the needs of more than 100 refineries in the next few years.

-- In order for refiners to review new desulfurization technologies, companies must sign strict confidentiality agreements with vendors. We understand the need for companies to protect the technologies they have developed. But will confidentiality agreements restrict open assessments among refiners about these new technologies?

-- From an energy policy prospective, should a major regulation that requires severe, new standards for the nation's gasoline supply be based on commercially unproven technologies? Does the entire nation need the regulation at the same time or should priority be given to certain areas --- as was provided in the NLEV program?

-- EPA's comment period on the gasoline sulfur proposal will end before any factual operating results are known about the new technology on which the proposal rests. This makes comment on the new technology largely a theoretical, subjective exercise.

The short phase-in period proposed to refiners raises questions about simple fairness.

Statements often have been made that the emission controls of the vehicle and the fuel should be viewed as a single system. But for regulatory purposes, the proposed compliance timelines for each are quite different. EPA proposes that automakers be given more than twice the amount of time to phase into Tier 2 regulation than refiners. This raises questions about simple fairness.

Under EPA's proposal more than 97 percent of the refining capacity in the United States must meet the 30 ppm average sulfur standard by January 1, 2004. This represents an astonishing 90% reduction from existing sulfur levels in a very short period. The proposal provides the option for a restricted, but additional two year phase-in

period if a refiner makes gasoline sulfur reductions prior to 2004.

Compare this rigid timetable to the Tier 2 schedule proposed for the automobile industry. For new passenger cars and light duty trucks --- which comprise roughly 50% of all new vehicle production --- Tier 2 standards would phase-in for 4 years beginning in 2004. For heavier vehicles (e.g., minivans, sport utility vehicles, etc.) that comprise the remaining half of new vehicle production, the proposed Tier 2 standards would be phased in beginning in 2008, with full compliance in 2009.

The agency states that "the proposal is carefully designed to address the need for refiners to make low sulfur gasoline available at very nearly the same time as auto makers begin selling large numbers of Tier 2 vehicles."~\15\ We disagree. The phase-in periods proposed by EPA for refiners and autos are significantly different. In fairness, we believe the Tier 2/gasoline sulfur regulation should be phased in together and equally between the two industries.

\15\ EPA, Proposed Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, pg. 63-64.

Recommendations

-- There must a reasonble transition to low sulfur gasoline. If refiners select conventional desulfurization technology to meet new standards, a phase-in period is needed minimize harsh impacts and costs. If new, lower-cost desulfurization technology is used, time is needed to assess its actual processing performance and for a few vendors to meet the needs of the industry. In either case, more time is needed than proposed by EPA.

-- The phase in period of Tier 2/ Sulfur regulation for autos and refiners should be very similar.

-- Legitimate regional differences (and the views of rural state governors) need to be reflected in a gasoline sulfur regulation. This can be done with regional sulfur standards as refiners proposed or by implementing a national standard at different times in different regions. Nonattainment and attainment areas do not need the same level of regulation at the same time.

-- The proposed eligibility for small refineries to receive help in meeting severe gasoline sulfur regulation needs to be broadened to more facilities. We hope Congress will consider extending the small diesel refinery S02 allowance program with gasoline sulfur other fuel sulfur regulations. The program has proven to be a success.

On behalf of Sinclair, I sincerely extend our appreciation for the opportunity to comment on the important issue of gasoline sulfur control. I would be pleased to provide additional information or respond to questions of members or professional staff of the Subcommittee.

Letters

January 9, 2013

President Barack H. Obama
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

Dear Mr. President:

As a diverse group of industry, environmental, labor, and science-based organizations representing millions of Americans, we are writing to urge you to finalize the Tier 3 vehicle emission and gasoline standards no later than December 31, 2013. Cleaner gasoline and vehicles provided by Tier 3 will help deliver cleaner air to all Americans and help states meet their Clean Air Act implementation requirements.

Completing this rule will build on the strong foundation of clean car standards that nearly double fuel efficiency and cut dangerous tailpipe pollution in half by 2025, which you achieved in your first term. Tailpipe and fuel standards to control smog-forming and particulate emissions from passenger vehicles are key to reducing the health impacts of poor air quality including asthma, respiratory problems, and premature death. Passenger vehicles remain the second largest emitters of nitrogen oxides (NOx) and volatile organic compounds (VOCs) – the primary pollutants that form smog – in the U.S. These vehicles also emit more than half of all carbon monoxide pollution and contribute to particulate matter emissions. According to a National Association of Clean Air Agencies (NACAA) study, the anticipated Tier 3 program has the potential to cut gasoline vehicle emissions of nitrogen oxides, carbon monoxide, and volatile organic compounds by 29, 38 and 26 percent respectively. A study by Navigant Economics stated that these pollution reductions will have health benefits with an estimated value of $5-$6 billion annually by 2020 and $10-$11 billion annually by 2030.

More than 1 in 3 Americans still live in areas where air pollutant levels exceed at least one of the health-based National Ambient Air Quality Standards (NAAQS). Tier 3 will help states reach their NAAQS attainment goals as required under the Clean Air Act because reducing sulfur in gasoline will result in significant, immediate reductions of smog-forming pollutants from the existing fleet of vehicles. As the Tier 2 program demonstrated, the greatest benefits are achieved when the standards for the vehicle and fuel are developed as a system.

Tier 3 will promote innovation in the automotive sector and create jobs in the refining industry. Navigant's study estimated that implementation of the Tier 3 standard will create more than 5,300 permanent jobs in the operation and maintenance of new refining equipment, as well as over 24,000 new jobs over a three year period for equipment installation at the nation's refineries.

The benefits of Tier 3 are significant, and we therefore urge you to work to finalize this standard as soon as possible and before December 31, 2013.

Sincerely,

Ceres
Clean Air Watch
Conservation Law Foundation
Corning Incorporated

Donaldson Company, Inc.
Emissions Control Technology Association
ENE (Environment Northeast)
Energy Independence Now
Environment America
Environmental Defense Fund
Environmental Entrepreneurs
Hug Filtersystems
International Union, United Automobile, Aerospace and Agricultural Implement Workers of America, UAW
Manufacturers of Emission Controls Association (MECA)
Moms Clean Air Force
Natural Resources Defense Council
NGK Automotive Ceramics USA, Inc
Safe Climate Campaign
Sierra Club
Tenneco, Inc.
Union of Concerned Scientists

AESI Advanced Engine Systems Institute

December 21, 2012

The President
The White House
1600 Pennsylvania Ave.
Washington, D.C. 20500

Dear Mr. President;

On behalf of the Advanced Engine Systems Institute, I respectfully urge that you release for public comment the "Tier 3" proposal for vehicle emission standards and take the steps necessary to finalize the rule next year.

Our industry employs more than 65,000 people in facilities located in more than 30 States where we design, manufacture and test the devices automakers have used for nearly four decades to ensure cars and trucks meet emission standards. We are proud of our industry's innovations, which have sustained tens of thousands of engineering and manufacturing jobs, and made the U.S. the global leader in, and exporter of, advanced automotive technologies. We are equally proud of the cost-effective contribution our products have made to reductions in automobile and truck pollution. Ours is the first, and arguably the most successful, U.S. "cleantech" industry.

Years have been spent developing a still-unseen proposal to ensure a single, predictable nationwide standard is in place for light-duty vehicle emissions. Absent a nationwide standard, a patchwork of state-imposed standards will increase costs and while achieving fewer emission reductions. That outcome would be fundamentally unfair because differing requirements would be placed on vehicles sold only a few miles apart, but in different states.

Uncertainty about what standards we will have to meet in the future undermines our businesses and sidetracks our ability to develop more cost effective innovations to further reduce emissions. This cloud of uncertainty threatens to cede to other countries our nation's historical lead in emissions technology innovation and, with it, the most economically valuable component of our industry.

Some things are clear even before you make your proposal. Poor air quality creates significant economic costs and avoidable health burdens. One third of all Americans live in areas that fail to meet air quality standards set by the Environmental Protection Agency to protect public health. In most of those areas, more than half of the emissions that form ozone-related smog and a quarter of the particulate matter still come from motor vehicles. In addition, the nation will continue to increase its reliance on cars and trucks as the economy grows.

Cost-effective emission controls on vehicles are often the best, and sometimes the only option for states attempting to address air pollution problems. Absent a consistent national program to reduce vehicle pollution, some states may be forced into more expensive and slower options, including placing limits on local manufacturing facilities.

We respectfully ask that you support the jobs created by our industry and ensure the lowest costs for consumers by proposing a Tier 3 rule as soon as possible so the rulemaking process might be completed within the next 12 months.

Most respectfully yours,

Christopher Hessler
Acting Executive Director

2020 North 14th Street • Suite 220 • Arlington, VA 22201 • (202) 296-8086

January 13, 2012

BY E-MAIL

The Honorable Lisa Jackson
Administrator
U.S. EPA Headquarters
Ariel Rios Building
Mail Code: 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
jackson.lisa@epa.gov

Dear Administrator Jackson:

We are writing collectively as representatives of the mobile source emissions control industry to respectfully urge you to advance the agency's proposal for Tier 3 emission and fuel standards this month and adopt the new standards by mid-year. We fear that delay will jeopardize the ultimate adoption of these new standards and deny the country of the health and economic benefits associated with the new rule.

The potential health benefits associated with Tier 3 are well established by numerous health effects studies. The plain fact is passenger vehicles are a major source of emissions of ozone precursors, carbon monoxide, and particulate matter. Studies have shown that these pollutants threaten human health by reducing lung function, aggravating asthma and other chronic lung diseases, causing permanent lung damage through repeated exposure, and causing heart attacks.[1] These health threats can lead to premature death. Tier 3 has the potential to substantially reduce these health threats by cutting overall vehicle emissions of nitrogen oxides by 29%, carbon monoxides by 38%, and volatile organic compounds by 26% by 2030.[2]

Reducing the sulfur content of gasoline is critical to achieving these emission reductions on new vehicles. State-of-the-art emission control systems require low sulfur fuel to achieve optimal performance in terms of both emissions reduction and cost. Importantly, reducing the sulfur content of the fuel will also reduce harmful emissions from the in-use-fleet by almost 30% in the first year of the program.

In addition to these important environmental benefits, Tier 3 also has the potential to generate substantial economic benefits. First among these is the ability of the auto industry and its suppliers to scale production and maximize efficiency in the manufacture of new vehicles and systems that are designed to meet the tighter tailpipe emission standards.

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[1] Health Effects Institute, "Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects, Special Report 17," January 12, 2010.
[2] National Association of Clean Air Agencies, "Cleaner Cars, Cleaner Fuel, Cleaner Air: The Need for and Benefits of Tier 3 Vehicle and Fuel Regulations," October 2011, p 16.

California is adopting new emission standards under their LEV III rule to address serious ozone and PM nonattainment problems in many regions of the state. If EPA does not move forward promptly to adopt Tier 3, other states with ozone and PM nonattainment problems will likely adopt emission standards similar to LEV III, as they are authorized to do so under the Clean Air Act. This would result in automakers and their suppliers having to manufacture vehicles with different emission systems for different state markets.

Tier 3 addresses this problem by harmonizing emission standards across the country. This would enable car makers and their suppliers to scale production to one set of standards, thereby minimizing the cost of the emissions reduction for the auto industry, its suppliers, and consumers alike.

The second important economic benefit is the increased investment that will be driven by Tier 3. Automakers, their suppliers, and petroleum refiners will have to make an increased investment to meet the new tailpipe and fuel standards. This investment will most certainly generate employment opportunities in the United States. Our industry is willing and eager to make this investment to improve the national economy.

The third economic benefit is the technology development that will be required to meet the new Tier 3 standards. Over the last forty years, our industry has collaborated with our customers in the auto industry to develop successive generations of emission control technologies to meet the ever-tightening emission standards. Because the United States has led the world in mobile source regulation, we have also led the world in the development of emissions reduction technology. Tier 3 will be no different. It will establish a new threshold of tighter standards that will set the stage for the next step of emission reductions around the world. We will develop technology that will meet the new Tier 3 standards in the United States first. And, as these new standards migrate around the world, we will be in the best position to supply product into these new expanding markets.

The experience of our industry over the last 40 years vividly demonstrates this connection between regulation and economic development. Prior to 1970, our industry did not exist. But, with the enactment of the Clean Air Act in 1970, our industry has flourished, developing successive generations of technology to meet ever tightening regulatory standards. Since the introduction of the catalytic converter in 1975, more than 500 million light-duty vehicles have been sold in the United States equipped with exhaust and evaporative emission control technologies developed by our industry. This generated an estimated $250-$300 billion in economic activity since 1975. In 2010 alone, our industry generated $12 billion of economic activity and accounted for 65,000 U.S. jobs, mostly in manufacturing.[3]

We understand that other parties have argued against the adoption of low sulfur fuel standards because of increased investment that may be necessary at the refinery level to meet the lower sulfur standard and because of an alleged increase in the cost of gasoline for consumers. We believe that increased business investment is good for America and we are prepared to make the investment to meet the new Tier 3 tailpipe standards. We believe our customers in the automobile industry share this view.[4]

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[3] Manufacturers of Emission Controls Association, "MECA Highlights Economic Benefits of Mobile Source Emissions Control Industry," March 11, 2011.

[4] Bainwol, Mitch. Letter. Alliance of Automobile Manufacturers, October 6, 2011.

We also believe that the cost to consumers of low sulfur fuel is insignificant, at less than $5 per year for an average American driver.[5] This small increased cost of fuel will be more than offset for American consumers by the health benefits of cleaner air arising from the new Tier 3 emission and fuel standards.

We appreciate the opportunity to make our views known and stand ready to be of assistance to your agency as you proceed with your consideration of Tier 3.

Sincerely,

Joseph Kubsh
Executive Director
Manufacturers of Emission Controls Association
www.meca.org

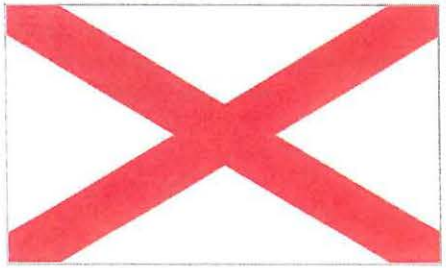
Timothy Regan
President
Emissions Control Technology Association
www.ectausa.com

BASF Corporation
BorgWarner Inc.
Bosal Emission Control Systems North America
Clean Diesel Technologies Inc., including Catalytic Solutions Inc. and
Engine Control Systems Limited
Corning Incorporated
Johnson Matthey Inc.
MANN+HUMMEL USA
NGK Automotive Ceramics USA, Inc.
Stoneridge Inc.
Tenneco, Inc.
Umicore Autocat USA
Unifrax I LLC

cc: Bob Perciasepe, Deputy Administrator, EPA (perciasepe.bob@epa.gov)
Gina McCarthy, Assistant Administrator, OAR (mccarthy.gina@epa.gov)
Nancy Sutley, Chair, CEQ (Nancy_H._Sutley@ceq.eop.gov)
Gary Guzy, Deputy Director, CEQ (Gary_S._Guzy@ceq.eop.gov)
Margo Oge, Director, OAR/OTAQ (oge.margo@epa.gov)
Cass Sunstein, Administrator, OIRA (Cass_R._Sunstein@omb.eop.gov)
Heather Zichal, Deputy Assistant to the President for Energy and Climate Change,
(Heather_R._Zichal@who.eop.gov)

[5] National Association of Clean Air Agencies, "Cleaner Cars, Cleaner Fuel, Cleaner Air: The Need for and Benefits of Tier 3 Vehicle and Fuel Regulations," October 2011, p 15. The sulfur provision translates to a cost of $4.80 per year for the average driver or the equivalent of about 1.5 gallons of gasoline at current prices (assumes 12,000 miles/year, 25 mpg, 1 cent/gal).

Industry Overview



Alabama:
BASF
Boysen
Donaldson Company

Arkansas:
3M
Denso

Nonattainment; Ozone
Emission contribution from mobile sources: 60%

California:
3M
Baumot North America
Calsonic Kansei
Car Sound Exhaust Systems
Cleaire
Clean Diesel Technologies
Denso
Diesel Emission Technologies
Donaldson Company
HUSS
Johnson Matthey
Miller Catalyzer Corporation
NGK Spark Plugs USA
Puritech
RYPOS
Nonattainment; Ozone, PM-10, PM-2.5
Emission contribution from mobile sources: 84%, 28%, 32%

Colorado:
Bosal International North America

Nonattainment; Ozone
Emission contribution from mobile sources: 51%

Connecticut:
3M

Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 82%, 33%

Delaware:
3M

Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 61%, 26%

Georgia:
Bosal International North America
Denso
Johnson Matthey
Tenneco

Nonattainment; Ozone
Emission contribution from mobile sources: 70%

Illinois:
3M
Borg Warner
Caterpiller Emission Solutions
Continental Automotive
Donaldson Company
Hereaus
Johnson Matthey
Ricardo
Performance Industries
Stoneridge
Tenneco
Watlow
Nonattainment; Ozone
Emission contribution from mobile sources: 60%

Emission Control Industry Design/Engineering/Manufacturing/Management & Sales Facilities

Indiana:
AirTek - CATCO
Benteler Automotive
Cummins Emission Solutions
Delphi
Donaldson Company
Faurecia Exhaust Systems
Pierburg
Stoneridge

Nonattainment; Ozone
Emission contribution from mobile sources: 47%

Kentucky:
3M
Calsonic Kansei
Clariant
Denso
Donaldson Company
Faurecia Exhaust Systems

Nonattainment; Ozone
Emission contribution from mobile sources: 47%

Louisiana:
CF Industries
MeadWestvaco

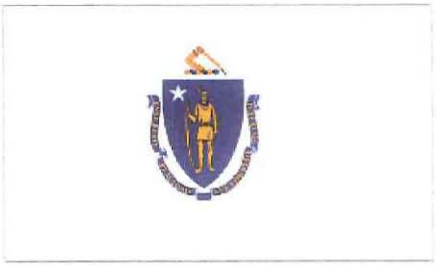
Nonattainment; Ozone
Emission contribution from mobile sources: 57%

Michigan:
AVL North America
BASF
Benteler Automotive
Borg Warner
Bosal International North America
Bosch
Calsonic Kansei
Cataler
Continental Automotive Systems
Delphi
Denso
Emitec
Eberspaecher North America
FEV
Hilite International
Ibiden
Johnson Matthey
Katcon
Mahle
MANN+HUMMEL
NGK Automotive Ceramics USA
Pierburg
Ricardo
Stoneridge
Tenneco
Visteon

Nonattainment;PM-2.5
Emission contribution from mobile sources: 30%

Maryland:
3M
Cristal

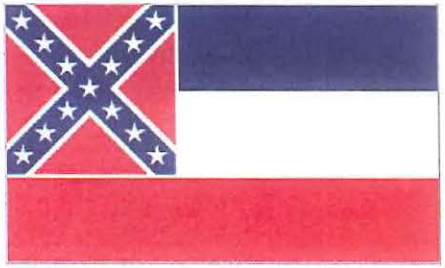
Nonattainment; Ozone
Emission contribution from mobile sources: 69%



Massachusetts:
3M
Clariant
RYPOS
Sensata
Umicore Autocat USA

Nonattainment; Ozone
Emission contribution from mobile sources: 76%

Minnesota:
3M
Donaldson Company
Liqtech North America

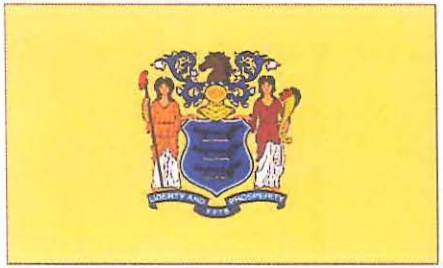


Mississippi:
CF Industries

Nonattainment; Ozone
Emission contribution from mobile sources: 58%

Missouri:
Donaldson Company
Faurecia Exhaust Systems
Ibiden
Porzellanfabrik Frauenthal
Watlow

Nonattainment; Ozone
Emission contribution from mobile sources: 62%



New Jersey:
BASF
Bosal International North America
Johnson Matthey
Rhodia
Umicore Autocat US

Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 73%, 41%

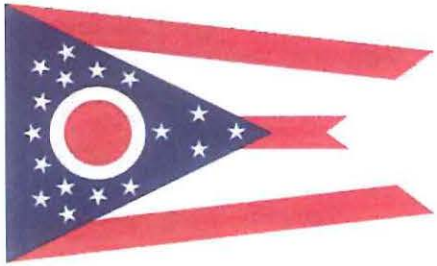
New York:
Borg Warner
Corning, Inc.
Delphi
Umicore Autocat USA
Unifrax

Nonattainment; Ozone, PM-10, PM-2.5
Emission contribution from mobile sources: 68%, 30%, 33%

Nevada:
Clean Diesel Technologies

North Carolina:
Airtec-CATCO
Cataler
Continental Automotive Systems
Denso
MANN + HUMMEL
NGK Automotive Ceramics

Nonattainment; Ozone
Emission contribution from mobile sources: 73%



Ohio:
Faurecia Exhaust Systems
Rhodia
Stoneridge
Tenneco

Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 55%, 17%

Oklahoma:
Umicore

Emission Control Industry Design/Engineering/Manufacturing/Management & Sales Facilities

Pennsylvania:
Donaldson Company
Eastern Manufacturing
ESW America
Hypercat ACP
Johnson Matthey
RYPOS

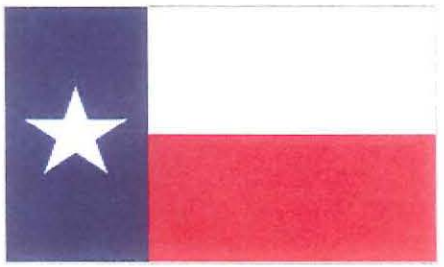
Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 51%, 14%

South Carolina:
Benteler Automotive
Bosch
Boysen
Denso
Emitec
Faurecia Exhaust Systems
MeadWestvaco
Pierburg
Pure Power
Unifrax

Nonattainment; Ozone
Emission contribution from mobile sources: 63%

Tennessee:
Calsonic Kansei
Cummins Emission Solutions
Denso
Donaldson Company
International Muffler Company
Johnson Matthey
Tenneco

Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 63%, 27%



Texas:
Cummins Emission Solutions
Haldor Topsoe
Hug Filtersystems
International Muffler
Johnson Matthey
Southwest Research Institute
Stoneridge
Visteon
Nonattainment; Ozone, PM-10
Emission contribution from mobile sources: 50%, 31%

Virginia:
Continental Automotive Systems
Tenneco

Nonattainment; Ozone
Emission contribution from mobile sources: 68%

Wisconsin:
3M
Cummins Emission Solutions
Donaldson Company
Katcon
Pierburg
Universal Acoustic & Emission Technologies

Nonattainment; Ozone, PM-2.5
Emission contribution from mobile sources: 58%, 22%

NEWS

Manufacturers of Emission Controls Association

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FOR IMMEDIATE RELEASE
March 11, 2011

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MECA Highlights Economic Benefits of Mobile Source Emission Control Industry

Washington, D.C. – The Manufacturers of Emission Controls Association (MECA) today released new information on the economic benefits of the mobile source emission control industry in the United States. For 2010, MECA estimates that the total economic activity associated with emission control technology on new cars and trucks in the U.S. is approximately $12 billion. In addition, MECA member companies currently account for approximately 65,000 green jobs in the U.S. These economic benefits are due in large part to the development and enforcement of important air pollution control regulations over the years by the U.S. Environmental Protection Agency (EPA) as required by the Clean Air Act Amendments (CAAA) of 1970.

According to data collected by MECA, since the introduction of catalytic converters on light-duty vehicles in the U.S. in 1975 as a result of emission requirements under the 1970 CAAA, more than 500 million light-duty vehicles have been sold in the U.S. equipped with exhaust and evaporative emission control technologies. A conservative estimate for the cumulative economic activity associated with emission controls on light-duty vehicles over this time period in the U.S. is $250-300 billion. In 2010 alone, sales of U.S. light-duty vehicles (meeting strict EPA Tier 2 emission standards) totaled 11.6 million units, which generated emission control economic activity of nearly $10 billion. Globally, light-duty vehicle sales totaled 72 million units in 2010; this translates into emission control economic activity of $36-43 billion.

For heavy-duty diesel vehicles, since 2007, approximately two million heavy-duty (and medium-duty) trucks have been sold in the U.S. equipped with diesel particulate filters (for control of particulate matter) to fulfill emission requirements under EPA's heavy-duty highway rulemaking. This translates into cumulative emission control economic activity of $4-6 billion dollars in the U.S. over the 2007-2010 timeframe. Adding in the fact that the majority of trucks sold in 2010 were also equipped with selective catalytic reduction systems (for control of nitrogen oxides), medium- and heavy-duty truck sales in the U.S. in 2010 provided approximately $2 billion in economic activity related to emission control technologies.

Overall, the total emission control economic activity in the U.S. in 2010 of approximately $12 billion (light-duty, medium-duty, and heavy-duty vehicles) is equivalent to the 2010 revenues of U.S. companies like Waste Management, Office Depot, or Kellogg – companies that rank in the range of 185 to 200 in the Fortune 500 for 2010. The global light-duty vehicle emission control economic activity in 2010 of $36-43 billion puts the emission control industry equivalent to U.S. companies such as Apple, Walt Disney, and PepsiCo – companies that rank in the range of 45-60 in the 2010 Fortune 500.

In terms of employment, MECA member companies currently account for approximately 65,000 green jobs in the U.S. These jobs are located in nearly every state in the U.S. – the top 10 states are: Texas, Michigan, New York, New Jersey, North Carolina, Ohio, Illinois, Indiana, Pennsylvania, and Nebraska – as well as in Canada and Mexico. This employment figure does not include the tens of thousands of jobs in the automobile, truck, and engine manufacturing industries that are involved with implementing emission control technologies on today's cars and trucks.

Furthermore, studies have shown that the public health benefits associated with reducing air pollution are significantly higher than the costs of implementation. EPA's recently released report on the benefits and costs of the Clean Air Act indicates that approximately $2 trillion in benefits will be achieved in 2020 – more than $30 in benefits for every dollar spent.

"The Clean Air Act and EPA policies have not only provided important health benefits stemming from large reductions in exhaust and evaporative emissions from mobile sources but have also created an industry with significant numbers of highly skilled jobs and a global economic reach," said MECA's Executive Director, Joseph Kubsh. "We expect this emission control economic activity to grow even more in the future as the industry continues to ramp up its efforts to meet the requirements of new and more stringent air quality standards, both in the U.S. and abroad."

The U.S. mobile source emission control program has rightly earned the reputation as one of the world's great environmental success stories. Today, emissions of harmful pollutants from new on- and off-road vehicles and equipment are a small fraction of those emitted from those made in the 1960s. As a result, the ambient air we breathe is much cleaner than it was 40 years ago. Notable emission control technologies that have contributed to this success story include catalytic converters for light-duty gasoline-fueled vehicles and diesel particulate filters for diesel-fueled vehicles. These emission control technologies have been applied to not only new engines but to in-use engines as well through the introduction of light-duty aftermarket converter programs and heavy-duty diesel retrofit programs across the U.S. Of equal importance, the technologies and strategies achieving these significant pollution reductions have contributed to a dramatic increase in fuel economy – and, therefore, a reduction in greenhouse gas emissions – by allowing vehicle and engine manufacturers to focus on designing higher efficiency powertrains.

Founded in 1976, MECA is a national association of companies that manufacture a variety of mobile source emission control equipment for automobiles, trucks, buses, and off-road vehicles and engines, as well as stationary internal combustion engines. For more information on exhaust and evaporative emission control technologies, please visit MECA's web site at: www.meca.org.

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NEWS

Manufacturers of Emission Controls Association

1730 M Street, NW * Suite 206 * Washington, D.C. 20036 * tel: 202.296.4797 * fax: 202.331.1388

FOR IMMEDIATE RELEASE
January 13, 2009

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MECA Highlights Economic and Public Health Impacts of Mobile Source Emission Control Industry

Washington, D.C. – The Manufacturers of Emission Controls Association (MECA) today released information on the economic and public health impacts of the mobile source emission control industry in the United States. According to data collected by MECA, the estimated U.S. sales of mobile source emission control technologies for on-road and off-road applications in 2005 was $16 billion. Despite the current state of the economy, these sales figures are expected to grow over the next decade – MECA forecasts U.S. sales to grow to $26 billion in 2010 and to $36 billion in 2020 – as the mobile source emission control industry continues to develop, optimize, and commercialize technologies in support of the many on- and off-road air pollution control regulations recently promulgated by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB). In terms of employment, MECA member companies currently account for approximately 65,000 green jobs in the U.S. These emission control-related jobs have been the foundation of the green economic movement in the U.S. that is set to grow rapidly over the next 10 years. In addition, President-elect Barack Obama has committed to create five million new green jobs by investing $150 billion over the next 10 years in private industry to spur efforts to build a cleaner environment.

Furthermore, the total public health benefits associated with the implementation of these EPA and ARB regulations are estimated to be in the hundreds of billions of dollars. For example, the EPA Tier 2 light-duty regulation and EPA Tier 3 small gasoline engine/marine gasoline engine regulation are expected to provide $29.3 billion in health benefits annually in 2030. For diesel vehicles and equipment, EPA's 2007/2010 heavy-duty on-road regulation, Tier 4 off-road diesel regulation, and Tier 4 locomotive and marine diesel regulation are projected to provide health benefits on the order of $181.1 billion in 2030. And, in California, the health benefits associated with ARB's in-use, on-road diesel private fleet regulation are estimated to be $69 billion cumulative from 2010 to 2025 and $26 billion cumulative for ARB's in-use, off-road diesel public and private fleet regulation from 2009 to 2030.

"The U.S. motor vehicle emission control program, created when Congress enacted the Clean Air Act Amendments of 1970, has long been recognized as one this century's great environmental and public health success stories. But the Clean Air Act has had another positive effect – it created the U.S. mobile source emission control industry, which, in turn, has generated tens of thousands of highly skilled jobs," said MECA's Executive Director, Joseph Kubsh.

The U.S. mobile source emission control program has rightly earned the reputation as one of the world's great environmental success stories. Today, emissions of harmful pollutants from new on- and off-road vehicles and equipment are a small fraction of those emitted from those made in the 1960s. As a result, the ambient air we breathe is much cleaner than it was 40 years ago. Notable emission control technologies that have contributed to this success story include catalytic converters for light-duty gasoline-fueled vehicles and diesel particulate filters for diesel vehicles. These emission control technologies have been applied to not only new engines but to in-use engines as well as part of the roll-out of diesel retrofit programs across the U.S. Of equal importance, the technologies and strategies achieving these significant pollution reductions have contributed to a dramatic increase in fuel economy – and, therefore, a reduction in greenhouse gas emissions – by allowing vehicle and engine manufacturers to focus on designing higher efficiency powertrains.

"Advanced mobile source emission control technology has been a cornerstone in our nation's continuing efforts to clean up the air we breathe. Investment in green industries is critical to the U.S.'s competitiveness in the global economy. This investment provides economic benefits by creating jobs and increasing productivity. The success story of the U.S. mobile source emission control industry has proven that a clean, healthy environment and economic growth are not mutually exclusive," said Kubsh.

Founded in 1976, MECA is a national association of companies that manufacture a variety of mobile source emission control equipment for automobiles, trucks, buses, and off-road vehicles and engines, as well as stationary internal combustion engines. For more information on exhaust emission control technology, please visit MECA's web site at: www.meca.org.

# # #