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U.S. Environmental Protection Agency
EPA Docket Center
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Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

RE: Section 610 (RFA) Review of Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements

To Whom It May Concern:

The Northeast States for Coordinated Air Use Management (NESCAUM) provides these comments in response to the U.S. Environmental Protection Agency's (EPA's) Notice,[1] announcing the impending Section 610 Review of Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements under the Regulatory Flexibility Act (RFA). NESCAUM is a non-profit association of the state air pollution control agencies in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. These comments reflect the views of our member state agencies and those of the air pollution control agency in Maryland.

The regulations subject to this impending review have created one of the most important mobile source air quality programs in the history of the Clean Air Act. The engine and vehicle standards are achieving very significant emission reductions from new, on-highway heavy-duty vehicles. When fully implemented, annual emissions of smog-causing nitrogen oxides will be reduced by 2.6 million tons and particulate matter (soot) by 110,000 tons.[2] The diesel sulfur control requirements, capping the sulfur content of the fuel at 15 ppm, have reduced sulfur dioxide emissions and enabled the deployment of advanced control technologies for reducing diesel soot emissions. These regulations continue to be needed in order to maintain their substantial air quality benefits and accompanying public health benefits, estimated at $70 billion annually upon full implementation. Nationally, ambient air concentrations of ozone and fine particulate matter (PM) continue to show significant downward trends[3] and this program is a significant component of the overall air quality control strategy that is achieving these results.

[1] 77 FR 65840, October 31, 2012
[2] EPA420-F-06-064, Program Update: *Introduction of Cleaner-Burning Diesel Fuel Enables Advanced Pollution Control for Cars, Trucks, and Buses,* October 2006.
[3] www.epa.gov/airtrends/index.html, Air Trends Home Page, accessed December 21, 2012.

In its original Regulatory Flexibility Analysis,[4] developed in conjunction with promulgation of these regulations, EPA identified small petroleum refiners[5] as the only small entities that would be significantly affected, "since they will have to invest in desulfurization technology to produce low sulfur highway diesel fuel." Accordingly, NESCAUM's comments focus on how the regulations have accommodated small refiners over the course of their implementation to ensure a continued, adequate supply of diesel fuel to the on-highway market.

During the rulemaking process, EPA responded to the concerns expressed on behalf of small refiners by incorporating flexibility provisions into the regulations to ease the transition to the low sulfur fuel requirements. These included providing a temporary compliance option allowing for up to 20 percent of the highway diesel fuel produced to continue to be subject to the previously established 500 ppm sulfur cap for more than three years beyond the initial compliance date for the new cap. This higher sulfur diesel had to be segregated in the fuel supply to ensure that it would only be used to fuel pre-2007 diesel vehicles. In addition, EPA established an averaging, banking, and trading (ABT) program with a system of credits and allotments. Refiners that achieved early reductions in the sulfur content of their diesel fuel generated credits to trade or sell to refiners that encountered difficulties in timely meeting the standards. The temporary compliance option in conjunction with the ABT program made it possible for many small refiners to continue exclusive production of 500 ppm sulfur diesel throughout the interim compliance period (2006-2010), thereby spreading out their capital investments in desulfurization equipment up to four years. In addition, the regulations included "hardship" provisions for temporary waivers of the sulfur standard for qualifying small refiners.

A year prior to promulgation of the diesel regulations, EPA finalized its "Tier 2" light duty vehicle and low sulfur gasoline standards. Recognizing that some refiners might encounter difficulty completing modifications in order to meet low sulfur requirements for both gasoline and highway diesel fuel within the same timeframe, the regulation allowed for PADD IV and certain other refiners to continue to meet interim, more lenient, gasoline sulfur standards for an extended period if the highway diesel fuel they produced fully complied with the 15 ppm sulfur cap by June 1, 2006. The intent was to allow these refiners to spread out their investments in desulfurization equipment over time.

Due in part to EPA's efforts to accommodate small and large refiners by phasing-in the low sulfur gasoline and diesel requirements, the regulations have had no discernible effect on the numbers or capacities of operating refineries nationally or in PADD IV. Refinery operating capacities continued to increase as did the available supply of fuels. In 2003, the year before any of the low sulfur fuel standards began to phase-in, there were 149 operable refineries in the U.S. Between 2004 and the beginning of 2011, the number of operable refineries ranged between 148

[4] EPA420-R-00-026, Chapter VIII, *Heavy-Duty Standards/Diesel Fuel RIA*, December 2000.
[5] The regulations define a small refiner, based on calendar year 1999 corporate-wide data, as one with no more than 1,500 employees and with a crude oil capacity of no more than 155,000 barrels per calendar day. Small refiners play a significant role in helping to meet the demand for petroleum products in the "PADD IV" states of Colorado, Idaho, Montana, Utah, and Wyoming.

and 150, ending up at 148, a net reduction of one operable refinery.[6] In PADD IV, between 2000 and 2011, there was a net gain of one refinery, from 16 to 17 total.
Refining activity in the U.S. increased over the same period as indicated in the table below. Particularly noteworthy was that desulfurization capacity increased by 40 percent from 2000 to 2010, indicating that the domestic refining industry responded positively to the regulatory challenge and succeeded in dramatically reducing the sulfur content of fuels.

Operable Capacities of U.S. Refineries – Selected Years (Barrels per Stream Day)

Year	Atmospheric Distillation	Catalytic Cracking	Hydrocracking	Desulfurization Including Hydrotreating
2000	17,393,070	5,948,938	1,575,800	11,439,704
2004	17,815,034	6,097,894	1,602,100	13,500,799
2006	18,307,502	6,187,883	1,637,200	14,807,986
2010	18,581,089	6,140,121	1,819,700	16,023,206

Source: U.S. Energy Information Administration

PADD IV refiners continued to maintain their industry share as indicated by the table below, achieving a modest increase in their share of U.S. distillation capacity, from 3.3 percent in 2000 to 3.5 percent in 2010. PADD IV refiners also dramatically increased their hydrocracking and desulfurization capacities from 2000 to 2010, by 81 percent and 55 percent respectively. These percentages suggest that small refiners were able to significantly upgrade their operations, thereby staying in the highway fuel markets.

Operable Capacities of PADD IV Refineries – Selected Years (Barrels per Stream Day)

Year	Atmospheric Distillation	Catalytic Cracking	Hydrocracking	Desulfurization Including Hydrotreating
2000	572,200	181,900	16,500	361,350
2004	616,300	190,324	17,000	409,350
2006	636,800	196,206	17,600	425,150
2010	659,200	204,006	29,800	561,660

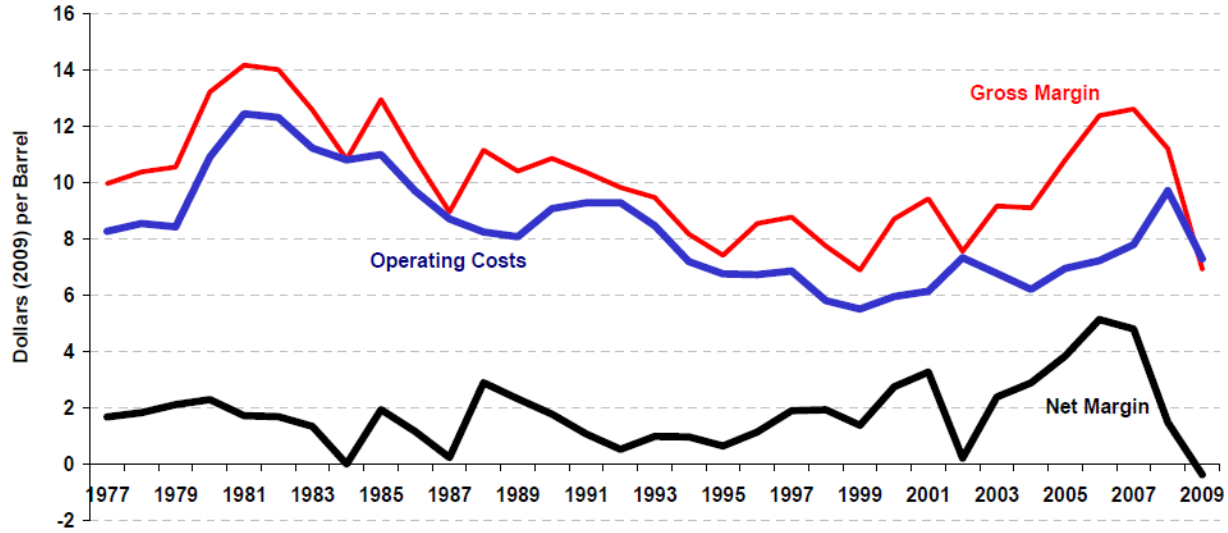
Source: U.S. Energy Information Administration

Refinery operating costs and profitability (net margin) have varied significantly over time as indicated by the figure below, largely driven by the cost of raw materials (54 percent) and the cost of refined product purchases (37 percent).[7] When the prices of these commodities are high, operating costs rise. If there are sudden spikes in the cost of these commodities, operating costs likewise show spikes. The steep rise in net margin from 2004 to 2008 occurred principally because product prices grew faster than crude oil prices in that period. The steep decline in 2009

[6] U.S. Energy Information Administration (EIA), *Workbook: U.S. Number of Operable Refineries as of January 1,* June 24, 2011.
[7] EIA, *Performance Profiles of Major Energy Producers 2009,* February 2011.

occurred principally because the opposite phenomenon occurred; i.e., product prices fell more rapidly than crude prices.[8]

Refined Product Margins & Costs/Barrel of Petroleum Product (1977-2009)



Source: EIA, Performance Profiles of Major Energy Producers 2009.

Operating costs due to environmental compliance requirements, such as the low-sulfur fuel standards, are difficult to separate out from other reported costs. The U.S. Energy Information Administration lumps these costs into a general "Other Refining Operating Expenses" category, along with other unspecified costs. This category amounts to between 4 and 5 percent of refining costs.[9] Thus, environmental compliance costs are low, relative to the cost of materials and are not as major a factor in refinery profitability, compared to raw material costs.

Refiners' original estimates of the cost of compliance were principally based on the assumption that they would continue to deploy traditional conventional, energy-intensive hydrotreating technology to achieve the low sulfur levels in the final products.[10] In reality, refiners opted for a combination of technology and facility efficiency improvements to cost-effectively remove the additional sulfur. Refiners also made a number of process improvements; some directly involving desulfurization technology and others affecting other processes within the refinery, including:

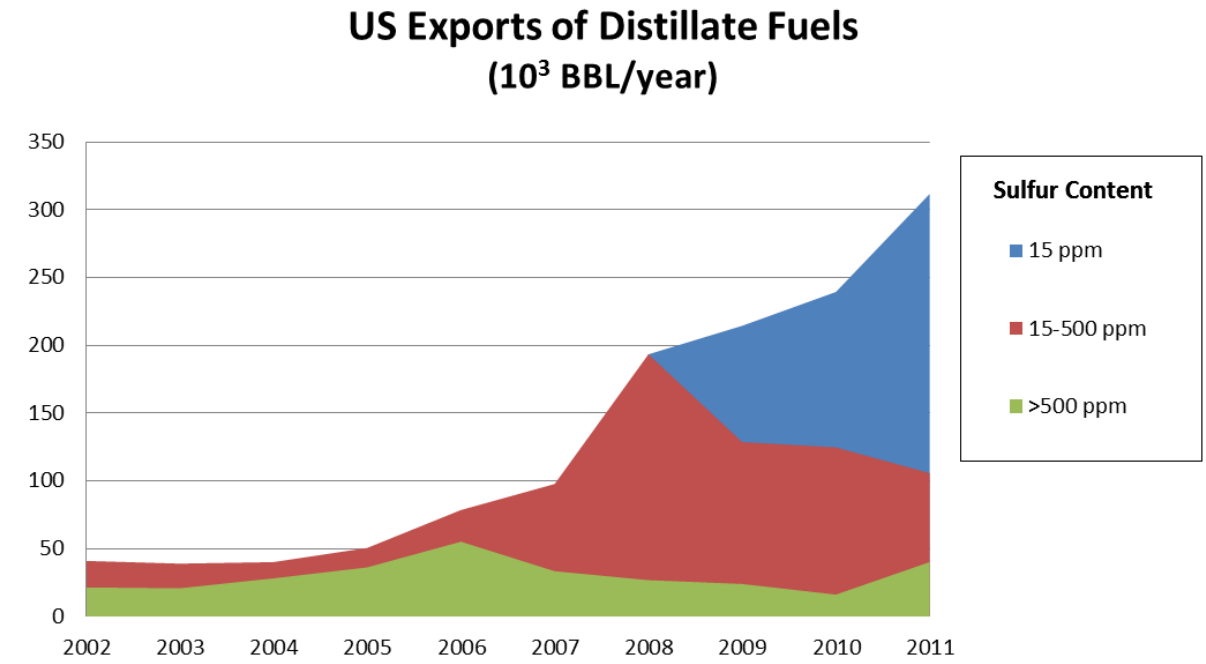
- Heat recovery and recycling processes aimed at reducing refinery fuel consumption,
- Purification of hydrogen streams to reduce hydrogen production demand and impurities affecting catalysts,
- Improved catalyst substrates and catalyst design,
- Improved heat exchanger design to enhance heat recovery and debottleneck processes,

[8] *Ibid.*
[9] *Ibid.*
[10] MathPro, Inc., *Evolution of Process Technology for FCC Naphtha Desulfurization: 1997-2003*, March 2003.

- More extensive use of pre-treatment of fluidized catalytic cracking unit (FCCU) feed streams with mild hydrotreating,
- Optimization of temperature and pressure in vessels to enhance reactor efficiencies, and
- Optimization of excess air in combustion systems.

These process improvements helped offset the cost of investment in new desulfurization equipment and reduced ongoing operating costs. In addition, many of these improvements also reduced facility-wide emissions, creating opportunities for refineries to net out of major new source review stationary source permitting that otherwise may have been required for process modifications.

It is also worth noting, as indicated by the graph below, that the U.S. refining industry's participation in world markets as an exporter of distillate fuels has increased significantly in the time that the low sulfur requirements have been in effect. The 15 ppm on-highway fuel has become by far the dominant export product of the three distillate grades with the principal destination countries being in Central and South America (50 percent), Europe (41 percent) and the non-European Mediterranean (7 percent).



Source: EIA, U.S. Exports - Petroleum and Other Liquids, 2012

Many industrialized countries have adopted more stringent limits on the sulfur content of highway diesel fuel. Several more countries with emerging economies are adopting schedules to implement low-sulfur diesel fuel between now and 2015.[11] These initiatives will help to promote long-term global demand for exported diesel product from the U.S. According to the American Petroleum Institute, "to the extent we export any products, that puts downward pressure on prices

[11] EPA-450/R-12-001, *Report to Congress on Black Carbon*, March 2012.

of the products we import. Exports also mean jobs for Americans, including good paying U.S. refinery jobs, and a lower trade deficit."[12]

In summary, the refining industry as a whole and small refiners in particular have complied with the Highway Diesel Sulfur Control Requirements with no or minimal adverse economic impact. This outcome is due to EPA's incorporation of flexibility provisions to ease the transition to the low sulfur control requirements and the refining industry's innovations, reducing desulfurization costs and energy consumption. The economic outlook for the U.S. refining industry is enhanced by emerging global markets for low-sulfur products. At the same time, the substantial reduction in air pollutant emissions and accompanying health benefits achieved through this program, now and into the future, are positive outcomes for everyone. EPA should retain the regulations in their current form, recognizing the continued need for this program. If you have any questions, feel free to contact Eric Skelton of my staff at (617) 259-2028.

Sincerely,

Arthur N. Marin
Executive Director

cc: NESCAUM Directors

[12] Felmi, John, API Chief Economist, *Press Briefing Teleconference on Gasoline Prices*, February 22, 2012.