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November 22, 2010

Environmental Quality Board
P. O. Box 8477
Harrisburg, PA 17105-8477

Re: Commercial Fuel Oil Sulfur Limits for Combustion Units
Chapters 121, 123 and 139

Dear Board Members:

On September 25, 2010, the Pennsylvania Bulletin published notice that the Environmental Quality Board (Board) proposes to amend Chapters 121, 123 and 139 (relating to general provisions; standards for contaminants; and sampling and testing). The Clean Air Board of Central Pennsylvania submits the following comments to the proposed regulations.

The Clean Air Board of Central Pennsylvania was formed in the fall of 2005 after over 100 Cumberland County physicians signed and published in the newspaper an open letter informing the community of the growing danger of ozone and particulate pollution. Initially a small group of people of faith gathered to support the physicians in educating our community and advocating for cleaner air. We have grown to include not only that faith community, but also people in the transportation business, teachers, lawyers, parents, and the medical community. Our members include people who suffer ailments from breathing polluted air.

Combustion of sulfur-containing commercial fuel oils releases sulfur dioxide (SO₂) emissions which is harmful to human health. In addition, these emissions contribute to the formation of regional haze and fine particulate matter (PM_{2.5}), both of which are serious public welfare and human health threats.

The Clean Air Board believes it is important to enact regulations to reduce the sulfur content of commercial fuel oil. Commercial fuel oil is commonly used as residential heating oil and is also used in industrial production. Currently, sulfur levels in commercial fuel oil can be as much as 2,000 parts per million, which differs widely from the ultra low sulfur (15ppm) requirement for both on-road diesel fuel and off-road diesel fuel. The sulfur in commercial fuel oil, when burned, produces sulfur dioxide in the air.

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Current scientific evidence links short-term exposures to sulfur dioxide, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing.) Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics. In June 2010, EPA set the one-hour health standard for exposure to sulfur dioxide at 75 ppb. A reduction in sulfur in fuel will lead to reducing sulfur dioxide air pollution.

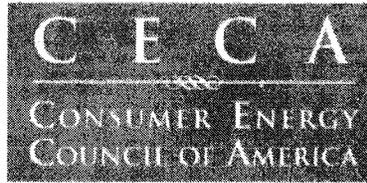
Regulatory measures to the sulfur in fuel have already led to improvements in air quality. Additional measures to reduce sulfur in commercial fuel oil, such as the proposal currently under consideration, will lead to further improvements in the air we breathe. In a paper entitled: "Low Sulfur Heating Oil: Evaluating the Impacts on Consumers" (Bookhart and Zien, 2003), the Consumer Energy Council of America evaluated the air pollution impact of moving toward low sulfur fuel oil. (copy attached) Among other findings, the authors state: "Lowering the content of sulfur in the fuel reduces the amount of sulfur dioxide (SO₂) in fuel emissions. Roughly 99 percent of sulfur in fuel is oxidized to form SO₂ in the combustion process, with the remaining 1 percent of sulfur converting to sulfur trioxide (SO₃), which forms sulfuric acid when it comes in contact with water. Research suggests that there is a clear linear relationship between sulfur content in heating oil and the emissions of sulfates. . . ." (at p. 6) Not only will sulfur oxides be reduced, particulate matter and nitrogen oxides will be reduced. (at pp. 7-8)

Our neighboring states New York and New Jersey have already adopted rules with the goal of limiting sulfur in commercial fuel oil to 15 ppm. They have recognized that reducing the levels of sulfur in heating fuel oil will improve the health of residents and will help consumers through energy efficiency and lower maintenance costs.

The Clean Air Board supports the proposed amendments, chapters 121, 123, and 139 to and urges the Environmental Quality Board to adopt them.

Sincerely,

The Clean Air Board of Central Pennsylvania
Thomas Au, President



Low Sulfur Heating Oil: Evaluating the Impacts on Consumers

Davis Bookhart and Katherine Zien

**THIS WHITE PAPER WAS DEVELOPED AS
PART OF AN ONGOING SERIES TO PROVIDE
ESSENTIAL INFORMATION ON FUEL
CHOICES FOR ENERGY CONSUMERS**

SEPTEMBER 2003

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Low Sulfur Heating Oil: Evaluating the Impacts on Consumers

Executive Summary

The Consumer Energy Council of America (CECA) has prepared this examination of low sulfur heating oil to demonstrate the benefits of low sulfur heating oil fuel to heating oil customers. CECA finds that a low sulfur fuel is superior to traditional heating oil, and will contribute to significant environmental and consumer benefits—both directly and indirectly. CECA’s research indicates that the slight fuel price premium is more than compensated by cost savings associated with longer equipment life, greater fuel stability, and reduced maintenance and cleanings of the heating equipment. CECA also finds that the environmental benefits of low sulfur fuel are considerable; emissions of sulfur dioxide, nitrogen oxides, and particulate matter are reduced up to 70 percent compared to traditional heating oil. Finally the report provides a brief overview of what the findings mean on a practical level, highlighting a number of real-life examples.

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Industry and Fuel Overview

Over the past fifty years, residential and business consumers of heating oil have historically had many choices of providers, but have had relatively little choice in the actual product. The characteristics of home heating oil vary little from dealer to dealer, making it a ubiquitous product regardless of region or who sells it. That is about to change. With no alterations necessary for consumer heating equipment, consumers may soon have the opportunity to buy fuel that is lower in sulfur content than traditional heating oil, resulting in significant consumer and environmental benefits.

History of the Oil Heat Industry

The heating oil industry has an extensive history of supplying home heating products and services in the United States: in the 1940s, oil began to replace coal as America's primary heating source. Compared to coal, oil was cleaner, less expensive, and more efficient. For these reasons it has been widely utilized in the United States and abroad. Many delivery companies that sold ice and coal converted to retailers of heating oil, and the industry grew steadily through the post-war years. A large proportion of these oil heat businesses were (and remain) family-owned, and have been in existence for several generations. Because of this characteristic, the oil heat industry has a unique position in the United States marketplace. Its profusion of small businesses fosters intense competition that often leads dealers to form personal bonds with their customers and offer services even in adverse weather conditions or outside of business hours to retain clients.

Today, heating oil serves as a home heating fuel for about 8.1 million out of 107 million households in the United States.¹ Of these households, 6.3 million (about 78 percent) are located in the Northeast, including New England and the Central Atlantic states.² Over the past three decades, however, the number of homes using oil heat has declined precipitously, as consumers switched from oil to natural gas, propane, or electric heat pumps. The number of households using oil has decreased from about 20 percent in 1975 to less than 10 percent in the late 1990s.³ Today only about 4 percent of new homes constructed use oil as their heating fuel.

The supply of heating oil in the United States comes from both domestic refineries and imported product, mainly from Canada, the Virgin Islands, and Venezuela. Heating oil is refined on a seasonal basis, with the majority of refining occurring in the summer and fall months. This oil is then stored in regional inventories. In 2000, after a particularly cold Northeast winter—when oil stocks were stretched thin and prices spiked in response to the shortage—President Clinton established the Northeast Heating Oil Reserve, with branches in New Haven, CT, Woodbridge, NJ, and Providence, RI, to protect oil heat consumers from major price fluctuations. The reserve can contain up to 2 million barrels of oil and was created by displacing and relocating crude oil from the Strategic Petroleum Reserve.

Characteristics of the Fuel

Residential heating oil, also known as #2 fuel oil, is a middle distillate like diesel fuel and is a close relative of kerosene and jet fuel. For many years, highway diesel (on-road diesel) and heating oil were identical; the same refined product

¹ "Residential Heating Oil Prices: What Consumers Should Know," published by the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE).

² Ibid.

³ Ibid.

would be bought and either distributed through gas stations as highway fuel or through heating oil dealers and distributed as a home heating oil. Today residential heating oil differs from highway diesel in two respects; in the 1990s, the U.S. Environmental Protection Agency (EPA) mandated that diesel used for transportation have a sulfur content of no more than 500 parts per million (ppm). This mandate was not carried over to heating oil, which averages between 2,000 and 2,500 ppm of sulfur. In addition, all highway fuels are taxed per unit of volume (per gallon) by both the federal and state governments to raise revenue and to provide funding for such programs as the Highway Trust Fund.⁴ Since heating oil is not taxed in this same manner, it is dyed a cranberry red color to distinguish it from highway diesel.

Lowering the sulfur content on highway diesel has had a slight impact on the sulfur content of heating oil. While voluntary consensus industry standards have designated 5,000 ppm as a sulfur limit for heating oil, the average stocks tend to be in the range of 2,000 to 2,500 ppm. This is partially due to a “spillover effect” from the refining of highway diesel. Because refineries manufacture transportation diesel and heating fuel through the same process, excess highway fuel formulated for the lower sulfur standard often mixes with heating oil, lowering the sulfur content of heating oil. The amount of sulfur in the oil, then, depends on where in the process the batch of oil was refined; heating oil stock refined directly after highway diesel tends to have a much lower sulfur content than heating oil refined later, creating a wide variation in the sulfur content from one tankful to the next. For end-users, there is no easy way to determine the sulfur level of the product they are buying.

⁴ The Highway Trust Fund (HTF) was created by the Highway Revenue Act of 1956 (Pub. L. 84-627), primarily to ensure a dependable source of financing for the National System of Interstate and Defense Highways and also as the source of funding for the remainder of the Federal-aid Highway Program. See Northeast Midwest Institute overview of the HTF at <http://www.nemw.org/HWtrustfund.htm>.

Heating oil prices are influenced by many factors, including seasonal demand (in the cold winter months, prices may rise as more consumers use oil to heat their homes), changes in the cost of crude oil, competition among local heating oil dealers, and regional operating costs (e.g., cost of distribution to remote areas). Prices are by no means fixed; in fact, they vary widely according to consumer location, dealer, and season. However, marketing and distribution makes up the largest percentage of heating oil's cost to customers, typically accounting for 46 percent of the retail price.

Low Sulfur Heating Oil

Refineries currently produce a low sulfur diesel fuel that meets EPA specifications for transportation use. Since diesel and heating oil are essentially the same product, dealers are considering the advantages of marketing the low sulfur fuel as a heating oil product.⁵ Currently, regular #2 heating oil must contain less than 5,000 ppm (or 0.5 percent) sulfur to comply with voluntary ASTM standards.⁶ The difference in price between regular #2 oil and low sulfur oil is estimated to be between one and two cents per gallon. If the usage of low sulfur oil increases, this price differential should be reduced to zero, since refineries will achieve economies of scale by producing one product instead of two. The analysis below compares low sulfur heating oil and traditional #2 heating oil in the following areas: air pollutant emissions, quantity of residue deposited on boiler and furnace surfaces, estimated environmental impacts (assigned monetary values), and costs and savings associated with equipment maintenance. The analysis is derived primarily from research performed at the

⁵ A handful of dealers are already selling low sulfur oil either as a premium fuel or as their standard product. Such dealers include: Champion Energy Corp of New York, Cheshire Oil of New Hampshire, and E. T. Lawson of Virginia.

⁶ ASTM International is a non-profit organization that provides a forum for the development and publication of voluntary consensus standards for materials, products, systems, and services. For more information, see the ASTM website at <http://www.astm.org>.

Brookhaven National Laboratory of the U.S. Department of Energy, the New York State Research and Development Authority (NYSERDA), and the Canadian Energy Technology Center (CETC).

Effects on Air Pollutant Emissions

Evidence so far points strongly to the conclusion that low-sulfur fuel oil emits substantially fewer air pollutants such as sulfur oxides (SO_x), nitrogen oxides (NO_x), and particulate matter (PM). Fewer airborne particles contribute to better overall consumer health by lessening heating oil's contribution to asthma, lung disease, and cancers, among other ailments.

Sulfates

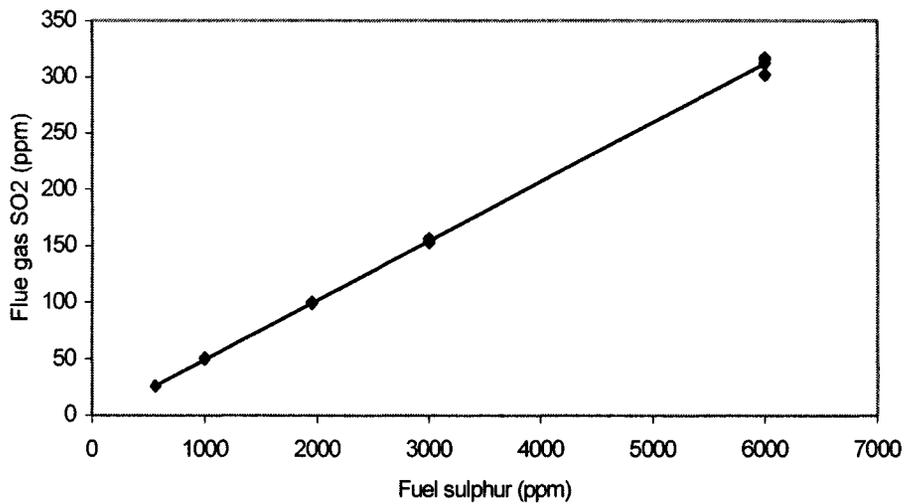
Emissions released by the combustion of many fuels—including heating oil—include tiny airborne particles, the majority of which are sulfates. Sulfates contribute to some of the most harmful air and environmental impacts, many of which also lead to a deterioration of public health. Sulfates are one of the targeted pollutants that the Bush Administration is proposing to reduce in its Clear Skies Initiative.⁷ Sulfate emissions lead to acid deposition, also known as acid rain, which raises the acidity levels in watershed areas like ponds and lakes to toxic levels, stunts or kills the growth of plants and trees, and damages buildings and other property by eroding the structure surfaces. Sulfur emissions also create smog, which is harmful to the human respiratory system when inhaled over long periods of time. In addition to exacerbating asthma and lung diseases, sulfates reduce visibility and generally lead to poor air quality.⁸

⁷ Under consideration in Congress as the Clear Skies Act of 2003.

⁸ Information provided by the California Air Resources Board, a division of the California Environmental Protection Agency.

Lowering the content of sulfur in the fuel reduces the amount of sulfur dioxide (SO_2) in fuel emissions. Roughly 99 percent of sulfur in fuel is oxidized to form SO_2 in the combustion process, with the remaining 1 percent of sulfur converting to sulfur trioxide (SO_3), which forms sulfuric acid when it comes in contact with water. Research suggests that there is a clear linear relationship between sulfur content in heating oil and the emissions of sulfates, as seen in Figure 1.

Figure 1: Relationship Between Oil Sulfur Content and SO_2 Emissions



Source: Batey and McDonald

This regression also makes clear that the creation of SO_2 is directly correlated with the amount of sulfur in the fuel and not necessarily the combustion process. This data suggests that by lowering the sulfur content in heating oil to a level of 500 ppm, SO_2 emissions would be reduced by 75 – 80 percent compared with the emissions released by the average home heating oil.⁹

⁹ John Batey and Roger McDonald. *Advantages of Low Sulfur Home Heating Oil: Interim Report of Compiled Research, Studies, and Data Resources*. Prepared in conjunction with the National Oilheat Research Alliance (NORA) and the U.S. Department of Energy (USDOE), p. 5.

Particulate Matter

Lowering sulfur content also appears to reduce emissions of other harmful air pollutants: of special interest is the dramatic drop in levels of particulate matter below 2.5 microns in size (designated PM_{2.5}), which are the most damaging to health because of their ability to cause cardiopulmonary and cardiovascular illnesses.¹⁰ Oil-fired heating releases both solid and condensable particles, with solid particles generally being the larger in size and therefore filterable. However, 77 percent of oil burner or furnace emissions are condensable, meaning that they flow through the chimney before condensing into fine particles in the cooler outside air. After these particles have condensed in the outside air, they are the most harmful to health because they are easily inhaled. Most of these condensable particles are sulfates, caused by the presence and quantity of sulfur in the fuel. Lowering the sulfur content from a level of 2,000 ppm to 500 ppm results in a decrease of particulate matter emissions of 80 percent.

Nitrogen Oxides

Lowering the sulfur content may also affect emissions of nitrogen oxides, or NO_x, the most harmful of which is nitrogen dioxide (NO₂).¹¹ NO_x contributes to smog and low-level ozone, which irritates the lungs and contributes to asthma attacks.¹² High temperatures have the effect of "baking" the NO_x, creating more low-level ozone. More ozone is more harmful to health (red warning air quality

¹⁰ Larger particulate sizes may also be harmful, but they are large enough to be captured by natural physiological defenses, such as nose hairs and mucus. See S. Win Lee, et al., "Assessing PM_{2.5} Emissions from Distillate Fuel Oil Heating," *Proceedings of the 2002 National Oilheat Research Alliance Technology Symposium*, BNL Report 52670, CANMET Energy Technology Center (August 2002).

¹¹ The notation for nitrogen oxides includes a variable X in the subnumeral position because nitrogen oxides can vary in the number of oxygen (O₂) atoms. Examples of nitrogen oxides include nitrogen dioxide (NO₂) and nitrogen trioxide (NO₃). The same basic principle applies to sulfur oxides (SO_x).

¹² Low-level ozone and high-level ozone both refer to concentrations of O₃. However, high-level ozone occurs naturally in the atmosphere and poses no health threat.

days refer to the unhealthy levels of ozone that become worse on the hottest days of the summer, especially in urban areas).

Because of the contribution of heat to the formation of NO_x, the combustion process itself is largely responsible for NO_x emissions. However, there is evidence that reducing the level of sulfur in fuel oil does have a positive effect on reducing the overall level of NO_x emissions. The same process that removes sulfur in the refining process also removes other “impurities,” including small amounts of nitrogen compounds. A large percentage of NO_x forms in the combustion process and depends on the heat of combustion, but there are fewer “fuel-bound” nitrogen compounds in low sulfur fuel.¹³ Lower levels of nitrogen in low sulfur fuel may reduce NO_x emissions levels by 5-10 percent.

Improvements in Equipment Performance

In addition to the above effects on air quality, another immediate effect of low sulfur fuel use is a noticeable reduction in the levels of buildup on the surfaces of heat-exchanging equipment (boilers and furnaces) and a consequent improvement in home heating oil equipment performance. Tests conducted by BNL, CETC, and NYSERDA indicate that as the percentage of sulfur in heating oil decreases, the rate of heat exchanger fouling (from buildup of residue on the boiler equipment) and the need for vacuum cleaning (a routine maintenance procedure) also decrease. When regular sulfur fuel is burned, iron sulfate scale buildup results, requiring frequent cleanings.¹⁴ Lowering the sulfur content will lead to greater equipment reliability and efficiency through less buildup. The most consistent decrease in deposition rates has been roughly two-and-a-half times, but some test results have demonstrated even greater reductions.

¹³ “Why You Should Convert to Low Sulfur (0.05%) Heating Oil,” National Oilheat Research Alliance, (April 2003).

¹⁴ Iron sulfate occurs when “sulfuric acid condenses on heat exchanger surfaces below the dew point temperature of the system” (see the *Oilheat Industry Roadmap: Toward a Sustainable Energy Future*, March 2002, p. 18).

Improving Fuel Stability

Reducing the sulfur content of fuel oil may also be associated with achieving greater degrees of fuel stability, which affects the energy capacity and deposition rates of heating oil. Petroleum is an inherently unstable substance that degrades over time due to many factors, including type of feedstock used at the refinery, process of refining, and variations in the makeup of the crude. Stabilizers are typically added to fuel to balance these natural deteriorating factors. One factor influencing fuel stability is the quantity of sulfur and nitrogen in the fuel. It is important to note that while “reactive hydrocarbons, sulfur and nitrogen compounds contribute to fuel instability...many factors other than fuel chemistry contribute to fuel stability problems.”¹⁵ It does appear, however, that reducing the quantity of sulfur in fuel oil improves its potential for stability. More research needs to be done in this area to fully understand the role of sulfur in fuel degradation.

Environmental Externalities

In addition to examining the immediate effects of low sulfur fuel use, such as reduced levels of sulfur dioxide emissions, it is important to analyze sulfur reduction’s broader environmental impacts. These impacts are called “externalities” because they literally occur outside of basic economic cost structures.¹⁶ The purpose of calculating externalities is to demonstrate in quantifiable terms the environmental impact of certain processes known to cause environmental harm. These costs take into account factors like health care and lost productivity that must be absorbed by the general public because they are not “internalized,” or built into the price of the fuel.

¹⁵ Batey and McDonald, 20.

¹⁶ For example, property damage caused by acid rain—caused by the emissions of fuel products—is paid for by the owners of the property, not by those who caused the emissions. The same is true for health care costs.

Environmental costs necessarily include factors that can only be calculated subjectively, and there is no overall consensus on what constitutes an agreeable cost figure for environmental impacts. Estimates vary widely. Because the monetary amounts are assigned arbitrarily, conclusions can only be drawn on a comparative basis, i.e., not calculating real-time effects of traditional heating oil but rather comparing its effects to those of its competitor fuels.

Environmental cost factors were examined in the report of the Oilheat Advantages Project¹⁷ based on data from the U.S. Environmental Protection Agency, Pace University, Brookhaven National Laboratory, and other researchers. Seven types of air pollutants were assigned a monetary value (reflecting such factors as crop damage and costs of equipment needed to control or reduce air pollution), and the values were multiplied by the amount of pollutant emitted, in million BTUs (MMBTUs). Through this analysis, the authors of the report concluded that low sulfur fuel reduces the environmental externality costs of heating oil from \$1.80 per MMBTU to \$1.36 per MMBTU, or a reduction of roughly 25 percent.¹⁸

How Consumers Benefit

Heating oil customers—especially those with older equipment—highlight odor, soot, and other “dirty” aspects of the oil as areas of great concern. Evidence suggests that moving to an industry-wide low sulfur standard, in combination with customers upgrading their equipment, would significantly eliminate bad health effects and odors, and dramatically reduce the dirty appearance, in essence eliminating such complaints. By reducing its emissions output to negligible amounts, low sulfur oil would decrease health concerns about lung

¹⁷ J.E. Batey and R. Heddon, “Oilheat Advantages Project – Engineering Analysis and Documentation Report,” (1995).

¹⁸ Ibid, 22-23.

cancer, asthma, and other related diseases caused in part by inhalation of airborne pollutants. The recent attention given to controversial health and environment issues (e.g., genetically modified food and the use of ethanol as a transportation fuel additive) in the press has demonstrated that a growing segment of the public is demanding a more environmental path towards energy usage. In terms of public concerns and needs, CECA has identified the following consumer benefits that would accrue with the adoption of low sulfur fuel:

Table 1: Consumer Benefits of Low Sulfur Heating Oil

CONSUMER BENEFITS
<ul style="list-style-type: none">▪ Higher equipment efficiency/longevity; less need for cleaning service▪ Improvements in equipment and fuel reliability▪ Reduction of “dirty” aspects of oil heat, including smell, soot▪ Environmental benefits felt locally▪ More product choices for consumers▪ Feeling of contribution to cleaner air and reduced emissions▪ Greater responsiveness of dealers to market demands

Effects of Low Sulfur Fuel on Consumer Costs

Even taking into account a slight increase in the cost of fuel, less frequent equipment maintenance due to the use of low sulfur heating oil may lead to consumer benefits (see above section, Improvements in Equipment Performance). For current customers of oil heat, the most compelling reasons to either retain a home oil heat infrastructure or to consider switching from electric heat to oil heat include improvements in equipment efficiency and longevity. Low sulfur heating oil’s cleaner burn would substantially reduce the impact of combustion on equipment—the fouling rate—which would in turn translate into increased customer savings through reduced service calls. In addition to the

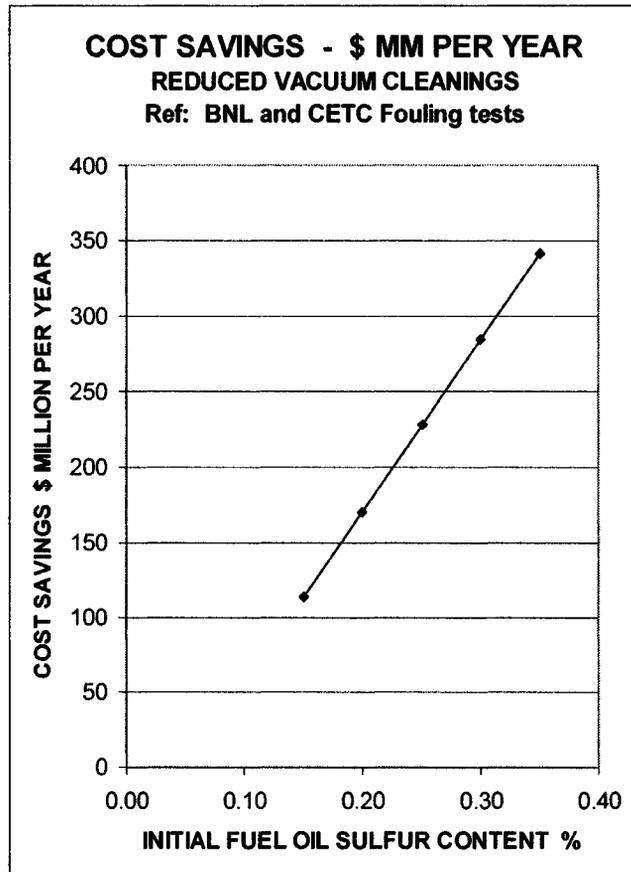
opportunity for consumer savings through low sulfur fuel, there is the issue of infrastructure reliability; oil heat providers strive to prevent problems with their heating/cooling systems before they occur. Reducing the amount of surface deposition lowers the risk of nozzle obstruction and sooty emissions, which account for many functional problems and unscheduled service calls.

As the fouling rate of the heat exchanger equipment decreases, consumers should expect to experience one of two benefits: either the interval between cleanings can be increased from 21 months (currently the average interval between cleanings) to 58 months, or cleanings will continue at the previous rate, but the duration of these cleanings will be shorter than the current average of 1.10 hours.¹⁹ In either case, consumers should pay a reduced rate for their equipment maintenance.

As mentioned earlier, the price differential between regular #2 heating oil and low sulfur oil is approximately one to two cents per gallon, and should decrease over time. Consumers should be able to recoup this modest increase in reduced service costs. Alternatively, dealers who service equipment may wish to absorb the increased cost of the low sulfur fuel because they save money on service costs.

¹⁹ Ibid, 18.

Figure 2: Dealer Savings from Reduced Service Calls



Source: Batey and McDonald

Moreover, as figure 2 shows, switching consumers from regular #2 oil to low sulfur oil will save dealers \$171 to \$228 million per year in vacuum-cleaning cost reductions (including time and energy spent in the cleaning process and transportation of technicians to sites for cleaning), savings that will be passed through to consumers.²⁰ Because of the opportunities for substantial cost reductions to dealers, savings should be passed through to consumers either in the form of lower service rates or in lower prices for the cost of the low sulfur fuel oil.

²⁰ Batey and McDonald, 19.

The cleaner properties of low sulfur fuel provide compelling reasons for its adoption in the residential sector. According to Evan R. Gaddis, President of the Gas Appliances Manufacturing Association (GAMA), "estimates are that using the new low sulfur fuel oil could save 50 million gallons of fuel oil per year on a national basis, and because heat exchangers stay cleaner, the equipment will require less frequent servicing."²¹

What Dealers Are Doing, Locally and Globally

In the United States, heating oil distributors are starting to envision a new range of niche markets for cutting-edge "green" fuel oils, including low- and ultra-low sulfur oil, and renewable blended oils such as biodiesel. In eastern Virginia, the E.T. Lawson Company has been marketing a low sulfur oil for nearly a decade. The oil, called "ULTRA," was originally marketed as a premium fuel that "burns cleaner, starts quicker, prolongs equipment life, improves the environment and more."²² Today ULTRA constitutes 100 percent of E.T. Lawson heating oil sales. Don Allen, Jr., the President of E.T. Lawson, indicates that his technicians are finding very clear evidence that the amount of scaling in low sulfur-burning furnaces is measurably less than compared to systems that use regular #2 oil.²³ The company is so confident of the benefits of the low sulfur oil that it guarantees that the oil will not sludge, gel, wax, or ice; otherwise the company will clean the entire heating system for free and will refund the cost of the tune-up.

Other companies are beginning to compete with products that are either low sulfur or blended with biodiesel. An example of a distributor making such a transformation is Frontier Oil, located in Maine, which markets heating oil

²¹ Gas Appliance Manufacturers Association press release, "New Grades of Fuel Oil Save Money and Reduce Emissions," 28 February 2003.

²² See <http://www.etlawson.com/premium.htm>.

²³ Phone interview with Don Allen, Jr., August 28, 2003.

blended with 20 percent biodiesel (B20) made from locally grown soybeans at a premium of between 20 and 30 cents/gallon. Frontier Oil is also considering offering 100 percent biodiesel (B100), in response to considerable interest.²⁴ The combination of low sulfur oil mixed with a percentage of biodiesel maintains all of the benefits of the low sulfur oil and adds additional renewable qualities that are desirable in certain market segments.

Global Changes

In the international arena, Switzerland and Germany are among other European nations that have instituted a dual sulfur standard. In Switzerland, the standard for regular heating oil is 2,000 ppm (to be lowered to 1,000 ppm in 2008 as part of the European sulfur directive) and a second standard for low sulfur oil is 500 ppm. The latter fuel has been well-received by European consumers; it currently occupies 20 percent of the market and is rising in popularity, even with the equivalent of a \$0.025 per gallon premium. In Germany, a committee formed to develop standards recently decided to create a second sulfur standard with a maximum sulfur level of 15 ppm, which is considered essentially sulfur-free. The low and ultra-low sulfur standards in Germany are allowing equipment manufacturers to develop new products—products that are not feasible with a regular #2 oil—including compact, wall hung, oil-fired condensing boiler systems, which have higher efficiencies and are smaller, taking up less space in the home.²⁵ There is also a tax instituted for use of all fuel oil with more than 0.1 percent sulfur, providing a policy disincentive for consumers who do not switch

²⁴ While B20 works well in existing equipment without modifications, it does present a couple of challenges for dealers, including maintaining separate storage tanks and keeping the biodiesel warm enough so that it can be blended.

²⁵ Boilers must let a certain amount of heat exhaust through the chimney because below a certain temperature, condensation takes place. As mentioned earlier, regular #2 oil produces SO₃ in the combustion process, and if mixed with water—which would happen if condensation takes place—it would create sulfuric acid that would erode the condenser unit in a short amount of time. By eliminating the sulfur, condensing boilers, which recapture the majority of heat exhaust and increase efficiencies to over 95%, can be used.

to the lower sulfur standard. In the European market, it appears that innovations on the part of equipment manufacturers and fuel providers is making heating oil a better option in general.

Local Benefits of Low Sulfur Fuel

The link between consumers and their oil heat providers tends to be stronger and more personal than the connection to a utility company, as many current oil heat customers can attest. Heating oil is delivered by local dealers who often know their customers through years of service. Because of their position within communities, heating oil dealers have the opportunity to offer low sulfur fuel as a product that produces local environmental benefits. If customers are offered the opportunity to shift to low sulfur fuel, they will produce environmental benefits that can be felt within their immediate vicinity. As can be seen with the market for green electricity, many consumers are demanding energy resources that produce a smaller environmental impact. Low sulfur heating oil fits the profile of an energy service that is more environmentally attractive. Furthermore, the low sulfur heating oil is pumped directly into the storage tanks of customers, unlike other environmental service options, giving consumers more direct control over their environmental impact.

Conclusions

The oil heat industry currently has a valuable opportunity to improve the cleanliness, safety, environmental friendliness, and cost of service by moving aggressively towards offering a low sulfur product to heating oil customers. The benefits of low sulfur oil accrue to both consumers and dealers, making it a win-win for all stakeholders. For consumers, low sulfur oil will reduce the “dirty” attributes of the oil, will keep their equipment cleaner, and is more stable than the standard. The environmental benefits are clearly significant. As

demonstrated in Europe, reducing the level of sulfur will also generate the opportunity for equipment manufacturers to begin producing more efficient systems, allowing consumers to use smaller units to gain the same heating benefits. For these reasons, CECA strongly endorses the use of low sulfur heating oil and urges the heating oil industry to take steps in offering this product to all consumers of heating oil.

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Cooper, Kathy

From: Thomas Au [thomxau@gmail.com]
Sent: Sunday, November 28, 2010 9:48 PM
To: EP, RegComments
Subject: Commercial Fuel Oil Sulfur Limits for Combustion Units
Attachments: sulfurinfuel regulation.pdf; 2003 CECA White Paper.pdf

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Attached are comments to proposed regulations on Commercial Fuel Oil Sulfur Limits for Combustion Units, published in the Pennsylvania Bulletin on Sept. 25, 2010.

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