

**Commercial Fuel Oil Sulfur Limits for Combustion Units**  
***25 Pa. Code Chapters 121, 123 and 139***

Environmental Quality Board Regulation #7-462  
Independent Regulatory Review Commission #2874

**Comment and Response Document**

**Bureau of Air Quality**  
**Department of Environmental Protection**

The Environmental Quality Board (Board) published notice of the public comment period and public hearings for the Commercial Fuel Oil Sulfur Limits for Combustion Units proposed rulemaking in the *Pennsylvania Bulletin* on September 25, 2010 (40 *Pa.B.* 5456). The Board held three public hearings on the proposal at the following locations:

October 26, 2010 Department of Environmental Protection  
Rachel Carson State Office Building  
Conference Room 105  
400 Market Street  
Harrisburg, PA 17101

October 27, 2010 Cranberry Township Municipal Building  
2525 Rochester Road  
Cranberry Township, PA 16066-6499

October 28, 2010 Department of Environmental Protection  
Southeast Regional Office  
Delaware Conference Room  
2 East Main Street  
Norristown, PA 19401

The public comment period for the Commercial Fuel Oil Sulfur Limits for Combustion Units proposed rulemaking closed on November 29, 2010. Testimony received during the public hearings and written comments received during the public comment period are summarized in this comment and response document. The identity of each commentator is indicated by the assigned number(s) in parentheses after each comment.

On June 23, 2012, the Department of Environmental Protection (Department) published an Advance Notice of Final Rulemaking for a 30-day public comment period. Responses received during that comment period are summarized in a separate document.

| <b>ID</b> | <b>Name/Address</b>  | <b>Submitted<br/>one page<br/>Summary<br/>for<br/>distribution<br/>to EQB</b> | <b>Provided<br/>Testimony</b> | <b>Requested<br/>Final<br/>Rulemaking<br/>following<br/>EQB<br/>Action</b> |
|-----------|--|---|-------------------------------|--|
| 1.        | John W. Robinson<br>Vice President<br>American Refining Group<br>77 North Kendall Avenue<br>Bradford, PA 16701                             |   |                               |  |
| 2.        | Christopher S. Colman, Esq.<br>Deputy General Counsel<br>Hess Corporation<br>1 Hess Plaza<br>Woodbridge, NJ 07095                          |   |                               |  |
| 3.        | Marla Benyshek<br>Director, Fuels Regulatory Issues<br>ConocoPhillips<br>123 AL BTC<br>Highway 60 & 123<br>Bartlesville, OK 74004          |   |                               |  |
| 4.        | Sam Whitehead<br>Government Affairs Manager<br>Colonial Pipeline Company<br>1185 Sanctuary Parkway, Suite 100<br>Alpharetta, GA 30009-9934 |   |                               |  |
| 5.        | Patrick Kelly<br>Policy Advisor<br>American Petroleum Institute<br>1220 L Street, NW<br>Washington, DC 20005 - 4070                        |   |                               |  |
| 6.        | Gene Barr<br>Vice President<br>Pennsylvania Chamber of Business and<br>Industry<br>417 Walnut Street<br>Harrisburg, PA 17101-7224          |   |                               |  |
| 7.        | Thomas Au, Esq.<br>President<br>Clean Air Board of Central<br>Pennsylvania<br>528 Garland Drive<br>Carlisle, PA 17013                      |   |                               |  |

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| 8.        | Douglas L. Biden<br>President<br>Electric Power Generation Association<br>800 North Third Street, Suite 303<br>Harrisburg, PA 17102   |   |                               |  |
| 9.        | Gregory M. Scott, Esq.<br>Executive Vice President and General<br>Counsel<br>National Petrochemical & Refiners<br>Association<br>1667 K Street, NW<br>Suite 700<br>Washington, DC 20006 |   |                               |  |
| 10.       | Joseph Otis Monott, Esq.<br>Executive Director<br>Clean Air Council<br>135 South 19 <sup>th</sup> Street Suite 300<br>Philadelphia, PA 19103  |   |                               |  |
| 11.       | John V. Kulik<br>Executive Vice President<br>Pennsylvania Petroleum Marketers and<br>Convenience Store Association<br>P.O. Box 68<br>Highspire, PA 17034-0290                           |   |                               |  |
| 12.       | George M. Cohen<br>President and CEO<br>American Highway Users Alliance<br>1101 14 <sup>th</sup> Street, NW<br>Suite 750<br>Washington, DC 20005  |   |                               |  |
| 13.       | Keith D. Buchanan<br>Manager, Quality Assurance, Fuels<br>Regulatory and Compliance<br>Sunoco, Inc.<br>10 Industrial Highway G-Building<br>Lester, PA 19029                             |   |                               |  |

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| 14.       | Senator Mary Jo White<br>Chairman, Senate Environmental<br>Resources & Energy Committee<br>Senate Box 203021<br>Harrisburg, PA 17120-3021                    |   |                               |  |
| 15.       | Jim Runk<br>President and CEO<br>Pennsylvania Motor Truck Association<br>910 Linda Lane<br>Camp Hill, PA 17011   |   |                               |  |
|           | And  |   |                               |  |
|           | Richard Moskowitz<br>Vice President & Regulatory Affairs<br>Counsel<br>American Trucking Associations<br>950 N. Glebe Road, Suite 200<br>Arlington, VA 22203 |   |                               |  |
| 16.       | Dan J. Horton<br>State Regulations Advisor<br>ExxonMobil Refining and Supply<br>Company<br>P.O. Box 6390<br>Kingwood, TX 77325                               |   |                               |  |
| 17.       | Kim Kaufman<br>Executive Director<br>Independent Regulatory Review<br>Commission (IRRC)<br>333 Market Street, 14 <sup>th</sup> Floor<br>Harrisburg, PA 17101 |   |                               |  |

## **General Support for Proposed Sulfur Content Levels and Compliance Dates**

**1. Comment:** The commentators supported the proposed rulemaking to reduce sulfur in fuel oil. (7, 13)

**Response:** The Department thanks the commentators for their support.

**2. Comment:** The commentator believes that the proposed regulation is urgently needed in order to meet present and upcoming National Ambient Air Quality Standards (NAAQS) throughout the Commonwealth and to achieve regional haze goals. (10)

**Response:** The Department agrees with the commentator that the emission reductions from this final-form rulemaking will be useful in meeting the long-term strategy of the Commonwealth's regional haze State Implementation Plan (SIP) and both current and anticipated more stringent NAAQS.

**3. Comment:** The commentator strongly supports the proposed rulemaking to require the sulfur content of No. 2 fuel oil sold in the Commonwealth after May 1, 2012 to not exceed 15 parts per million (ppm). (11)

**Response:** The Department thanks the commentator for its support. However, there were significant concerns expressed by commentators about the proposed sulfur content limits and compliance date. The Department also received additional comments through an Advance Notice of Final Rulemaking (ANFR) published on June 23, 2012. As a result, the Department revised the compliance date to July 1, 2016 for reducing the allowable sulfur content in commercial fuel oil to allow time for refiners to add desulfurization capacity. In addition, the Department revised the sulfur content level in No. 2 fuel oil, which is most of the commercial fuel oil sold in the Commonwealth, to 500 ppm.

**4. Comment:** The commentator supports the statewide proposed requirement for 15 ppm sulfur in No. 2 fuel oil and May 2012 as the compliance date and believes it provides more than sufficient notice for the industry to prepare, including time for refiners to ramp up production of compliant fuels and for distribution networks to sell off existing supplies of non-compliant fuels. The commentator also notes the additional notice evinced from the discussion of the draft regulation at the Air Quality Technical Advisory Committee (AQTAC) meeting in February 2010. (10)

**Response:** The Department disagrees that the lead time in the proposed rule was sufficient to ensure production of compliant fuels. Written comments received on the proposed rulemaking, the ANFR and the Hart Consulting report, "Ultra Low Sulfur Heating Oil Assessment," indicate that supply disruption and price spikes can be avoided if refiners are provided a four-year lead-time to plan and install additional desulfurization equipment to remove sulfur from the remaining part of the fuel stream. Please see the

response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**5. Comment:** The commentator supports May 2012 as the compliance date for requiring No.2 fuel oil to not exceed a 15 ppm sulfur content limit. The commentator provided a summary of a Pennsylvania Heating Oil Market Study indicating that supply capabilities exist to provide for the transition. The commentator also noted that a Delaware refinery that is reopening plans to produce low-sulfur heating oil which will be a significant new source of supply. (11)

**Response:** The Department agrees that supply capabilities exist if an adequate time frame is provided. The specific products to be available in Pennsylvania from Northeast refineries, including the Delaware refinery noted by the commentator, remain uncertain at this time.

**6. Comment:** The commentator is not concerned with the 15 ppm sulfur content standard for No. 2 fuel oil and supports lowering the sulfur content standards for residual fuel oils as proposed. (13)

**Response:** The Department notes that the commentator represented a company which no longer operates refineries. The specific products to be available in Pennsylvania from Northeast refineries remain uncertain at this time.

**7. Comment:** The commentator notes that Pennsylvania's existing sulfur limits for commercial fuel oil have been in force for over 30 years. Over that time, technology has advanced greatly as has the understanding of the health impacts from exposure to PM and ozone. (10)

**Response:** The Department agrees that the emerging technology and health impacts are both good reasons for establishing more stringent sulfur standards for fuel oil.

**8. Comment:** The commentator notes that neighboring states New York and New Jersey have already adopted rules with the goal of limiting sulfur in commercial fuel oil to 15 ppm, recognizing that this measure will improve the health of residents and help consumers through energy efficiency and lower maintenance costs. (7)

**Response:** The Department agrees that lower sulfur content will improve health and help consumers. See also the response to #19 in regard to regional consistency.

**9. Comment:** In June 2010, EPA set the one-hour health standard for sulfur dioxide (SO<sub>2</sub>) at 75 parts per billion (ppb). SO<sub>2</sub> exposure is linked with an array of adverse respiratory effects, including bronchoconstriction and increased asthma symptoms, particularly for asthmatics. Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses. (7)

**Response:** Please see response below for comments 9 through 16.

**10. Comment:** Emissions of nitrogen oxides (NO<sub>x</sub>) and SO<sub>2</sub> impact the attainment and maintenance of the NAAQS for ozone and fine particulate (PM<sub>2.5</sub>) as respective precursors of these criteria pollutants. PM<sub>2.5</sub> and ozone cause respiratory disease, cardiovascular disease and premature death, with the elderly, people with preexisting heart and lung disease and the very young particularly at risk. (10)

**Response:** Please see response below for comments 9 through 16.

**11. Comment:** Heating oil burners emit PM, NO<sub>x</sub>, SO<sub>2</sub>, mercury and carbon dioxide (CO<sub>2</sub>). These pollutants have a major impact on public health, ozone formation, fine particulate, regional haze and acid precipitation. (10)

**Response:** The Department disagrees that heating oil burners emit mercury. Please see response below for comments 9 through 16.

**12. Comment:** The commentator notes that combustion of sulfur-containing commercial fuel oils releases SO<sub>2</sub>, which is harmful to human health. In addition, the emissions contribute to the formation of regional haze and PM<sub>2.5</sub> which are serious public welfare and human health threats. (7)

**Response:** Please see response below for comments 9 through 16.

**13. Comment:** By reducing SO<sub>2</sub> and PM<sub>2.5</sub>, the proposal will improve visibility and help Pennsylvania meet reasonable goals for the regional haze requirements. (10)

**Response:** Please see response below for comments 9 through 16.

**14. Comment:** Given the significant amount of pollution contributed by fuel oil combustion, it is imperative to obtain aggressive reductions in the allowable sulfur content of fuel oil sold and consumed in Pennsylvania. (10)

**Response:** Please see response below for comments 9 through 16.

**15. Comment:** The commentator supports the proposed rulemaking to reduce the sulfur content of commercial fuel oil because these measures represent extremely cost effective SO<sub>2</sub> control measures and are appropriate as part of a comprehensive strategy for Pennsylvania. (8)

**Response:** Please see response below for comments 9 through 16.

**16. Comment:** The commentator states that a reduction in sulfur in fuel will lead to a reduction in SO<sub>2</sub> air pollution, citing the paper entitled, "Low Sulfur Heating Oil: Evaluating the Impacts on Consumers (Bookhart and Zien, 2003) in which the authors find that "Roughly 99 percent of sulfur in fuel is oxidized to form SO<sub>2</sub> in the combustion

process, with the remaining 1 percent of sulfur converting to sulfur trioxide...” (at page 6) and “Not only will sulfur oxides be reduced, particulate matter and nitrogen oxides will be reduced.” (at pages 7-8) (7)

**Response for comments 9 through 16:** The Department agrees. The final-form rulemaking is being adopted to reduce sulfur emissions that contribute to the formation of regional haze. There are several important co-benefits of this final-form rulemaking, including reducing SO<sub>2</sub> emissions that could lead to violations of the 1-hour SO<sub>2</sub> standard as well as reducing fine particle (PM<sub>2.5</sub>) and nitrogen oxides (NO<sub>x</sub>) emissions. Emissions of NO<sub>x</sub>, which contribute to a number of public health and environmental problems in the northeast, including unhealthy levels of PM<sub>2.5</sub> and ground-level ozone, are another product of combustion and will also decrease with the use of low-sulfur content commercial fuel oil due to furnace and boiler efficiency improvements. Emissions of carbon dioxide, a greenhouse gas, should also decrease due to improved furnace and boiler combustion efficiency. SO<sub>2</sub> emissions also contribute to the formation of acid rain. Both acid rain and PM<sub>2.5</sub> contribute to agricultural crop and vegetation damage, and degradation of the Chesapeake Bay. Combustion of low-sulfur content commercial fuel oil will contribute to reducing the incidences of these adverse effects in this Commonwealth.

#### **General Opposition, Concerns, and Suggestions for Revised Sulfur Content Levels and Compliance Date for No. 2 Fuel Oil.**

**17. Comment:** Commentators expressed general concern and/or opposition to the proposed rulemaking to reduce sulfur in fuel oil. (1, 6, 12)

**Response:** The Department has considered these concerns. See response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**18. Comment:** The commentators expressed support for the removal of sulfur from fuel oil but request that the Department consider a different approach. (1, 16)

**Response:** Please see response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**19. Comment:** The commentator expressed support for rulemakings that improve the environment but believes this proposed rulemaking is misguided and not based on sound science. (1)

**Response:** The Department is required to make progress toward achieving natural background visibility conditions at Federal Class I areas, under section 169A of the Federal Clean Air Act and corresponding EPA regulations. See 42 U.S.C.A. § 7491 and 40 CFR Part 51, Subpart P (relating to protection of visibility). Reduction of allowable sulfur content of fuel oil has been identified as a reasonable strategy by the Mid-Atlantic/Northeast Visibility Union (MANE-VU), of which Pennsylvania is a member. The Department indicated in its Regional Haze State Implementation Plan (SIP) revision

that the Commonwealth would pursue adoption of reduced sulfur content in commercial fuel oil and other emission management strategies, as appropriate and necessary, as part of its long term strategy to meet the reasonable progress goals contained in the SIPs of states with Class I areas that may be affected by emissions from the Commonwealth. MANE-VU modeling identified sulfur dioxide as the primary source of visibility impairment in the region. MANE-VU performed a cost-benefit analysis for lowered sulfur limits and determined that the benefits exceed the costs. In addition, reducing SO<sub>2</sub> levels will assist the Commonwealth in meeting current and anticipated NAAQS for fine particulate matter (PM<sub>2.5</sub>) and SO<sub>2</sub>.

**20. Comment:** Visibility SIP requirements cannot be used as a basis to adopt a rule effective in 2012. There are no Class I areas in Pennsylvania. Pennsylvania has no obligation to show “reasonable further progress” toward attaining visibility standards in other states. Even if it did, the first milestone is not required until 2018. (2)

**Response:** The Department disagrees with the portion of the comment that states that Pennsylvania has no obligation to address visibility impairment in other states. The Federal Clean Air Act requires Pennsylvania to make progress towards achieving natural background visibility conditions in those Federally designated Class I areas which are or may be affected by Pennsylvania emissions. Visibility modeling was performed by MANE-VU using two models that were either developed or supported by EPA and evaluated for performance in this application. Similar modeling was performed by the Visibility Improvement - State and Tribal Association of the Southeast (VISTAS). The modeling indicated that Pennsylvania’s emissions have the potential to contribute to visibility impairment in several Class I areas in other states. Reduction of allowable sulfur content of fuel oil was identified as a reasonable strategy by MANE-VU, of which Pennsylvania is a member. The Department indicated in its Regional Haze SIP that it would pursue adoption of sulfur content reduction and other emission management strategies, as appropriate and necessary, as part of its long term strategy to meet the reasonable progress goals contained in the SIPs of states with Class I areas that may be affected by emissions from the Commonwealth. The Department agrees that the first milestone is 2018. The compliance date for the final-form rulemaking has been changed to 2016.

**21. Comment:** The proposed rule would have minimal (probably unmeasurable) benefits on even those Class I areas closest to Pennsylvania. SO<sub>2</sub> emissions from heating oil are approximately 2 – 3 % of the regional SO<sub>2</sub> emissions based on a 2002 inventory. Since 2002, distillate and residual fuel oil demand have fallen sharply in Pennsylvania, by 25% and 33%, respectively. Heating oil is a wintertime fuel, and reductions have little effect outside Pennsylvania in the winter, when local emissions trapped by inversions cause most of the visibility impairment. Additionally, the rate of transformation of SO<sub>2</sub> to sulfate is slower in the winter. The cost effectiveness of the sulfur reduction appears to be based on reductions of SO<sub>2</sub> not PM<sub>2.5</sub>. Because the PM<sub>2.5</sub> NAAQS and regional haze rule are both based on control of PM<sub>2.5</sub>, this is not an accurate representation, since not all SO<sub>2</sub> is converted to PM<sub>2.5</sub> sulfate particles, particularly in the winter. There is no basis to

impose hundreds of millions of dollars in higher costs on Pennsylvania distillate and residual fuel oil consumers to benefit wilderness areas far from Pennsylvania. (2)

**Response:** The final-form rulemaking applies not only to home heating oil, which is used primarily (but not exclusively) in the winter, but also to numerous other types and uses of fuel oil. Distillate and residual fuels are burned at all times of the year, for purposes including electric generation (especially to meet peak electric demand on very hot summer days) and other commercial and industrial applications.

The MANE-VU and NESCAUM studies of visibility impairment do not conclude that localized emissions are the only contributor to the visibility impairment found in Pennsylvania urban and rural areas and the MANE-VU Class I areas. In fact, these studies and others conclude that the regional transport of emissions plays a predominant role in the air pollutant levels. Specifically, according to the Executive Summary of the MANE-VU report, “Contributions to Regional Haze in the Northeast and Mid-Atlantic United States”: “Summertime visibility is almost exclusively driven by the presence or absence of regional sulfate, whereas wintertime visibility depends on a combination of regional *and* local influences coupled with local meteorological conditions (inversions) that can lead to concentrated build-up of emissions from local sources.” (italics in original). According to the MANE-VU report, an “effective emissions management approach would rely heavily on broad-based regional SO<sub>2</sub> control efforts in the eastern United States.” This rulemaking will reduce emissions that have an impact both locally and regionally and could be classified as a broad-based regional SO<sub>2</sub> control effort.

The MANE-VU studies show that the predominant air pollutant in the Class 1 areas, regardless of season, is sulfate. Sulfate forms from the sulfur in fuels combining with oxygen during combustion to form SO<sub>2</sub> gas. While the transformation rate of gaseous sulfur dioxide to sulfate aerosol particles does diminish in winter, its transformation rate is not zero. Moreover, the days of worst visibility impairment do not always occur in the summer months. The VIEWS website at [http://capita.wustl.edu/CAPITA/CapitaReports/PMFineAn/PMTopics\\_PPT/PM25Formation.ppt](http://capita.wustl.edu/CAPITA/CapitaReports/PMFineAn/PMTopics_PPT/PM25Formation.ppt) lists the transformation rate of SO<sub>2</sub> to sulfate on a typical July day as 0.8 percent per hour. The transformation rate of SO<sub>2</sub> to sulfate on a typical January day is 0.2 percent per hour, or 25 percent of what the transformation rate would be on a typical July day. Depending on the quantity and location of the SO<sub>2</sub> released in Pennsylvania, this transformation could and does have a localized effect upon Pennsylvania’s air quality, even in winter.

**22. Comment:** The Department has not shown this rule is needed to meet the PM<sub>2.5</sub> NAAQS. Area sources, which include, but are not limited to, heating oil use are a tiny fraction of SO<sub>2</sub> emissions in Pennsylvania. Most SO<sub>2</sub> emissions are from large point sources, so it is not rational to claim that a regulation targeted at heating oil is needed to achieve compliance with the PM<sub>2.5</sub> NAAQS. (2)

**Response:** The Department has cited reductions in PM<sub>2.5</sub> concentrations as an ancillary benefit of this regulation. PM<sub>2.5</sub> concentrations have both a regional and local

component. Regional reductions of SO<sub>2</sub> will help to reduce the regional component of PM<sub>2.5</sub> concentrations, and, therefore, will help nonattainment areas achieve compliance. On June 29, 2012, EPA proposed to conclude that the existing annual PM<sub>2.5</sub> standard is not protective of public health and therefore proposed a more protective primary standard to be set between 12-13 µg/m<sup>3</sup>. See 77 FR 38890 (June 29, 2012). EPA further proposed a new more protective secondary standard for visibility of either 28 or 30 deciviews (a measure of visibility impairment); the Pittsburgh-Beaver Valley area was one of the few that EPA projected would need additional reductions by 2020 to meet this proposed standard. EPA intends to finalize this rulemaking by mid-December 2012.

**23. Comment:** This rule cannot be justified as needed in the SIP for the substantial areas of Pennsylvania that are in attainment of the 1997 and 2006 PM<sub>2.5</sub> NAAQS. Reductions are not needed statewide because areas that contribute to nonattainment would already be included in the nonattainment area. The Department did not include the measure in the Pittsburgh-Beaver Valley attainment plan. (2)

**Response:** The Department has cited reductions in PM<sub>2.5</sub> concentrations as an ancillary benefit of this regulation. The Department did not include the measure in the Pittsburgh-Beaver Valley attainment plan because a state can only include measures in attainment plans that have already been adopted.

**24. Comment:** NO<sub>x</sub> and ozone cannot be used to justify this rule and are irrelevant because most heating oil is used in the winter. No. 2 fuel oil represents a tiny fraction of the NO<sub>x</sub> inventory in Pennsylvania which is generally dominated by power plants and mobile sources. Additionally, nitrate particles are not the major factor in visibility impairment. (2)

**Response:** The Department has cited reductions in NO<sub>x</sub> and ozone as an ancillary benefit of this regulation.

**25. Comment:** The commentator asks that the regulation not be included in the SIP because it may be difficult to amend if the fuel standard proves to be too problematic for the marketplace. (12)

**Response:** The Department disagrees that the regulation should not be included in the SIP. This strategy was included as a measure the Department would pursue as part of the Commonwealth's long-term strategy in its regional haze SIP revision which was submitted to the U.S. Environmental Protection Agency (EPA) on December 20, 2010, and granted limited approval on June 13, 2012. See 77 FR 41279. The low sulfur fuel strategy was also included in the contingency measure section of the SIP revision for the Pennsylvania portion of the Philadelphia-Wilmington, PA-NJ-DE PM<sub>2.5</sub> nonattainment area as a regulation in development and anticipated to be adopted. Because this strategy is an important component of Pennsylvania's plan for clean air, the Department will be submitting this rule to EPA upon adoption for inclusion in the Commonwealth's SIP. The final-form rulemaking includes the ability for the Department to grant a temporary

suspension upon request if there is an insufficient quantity of compliant fuel available in an air basin or non-air basin areas.

**26. Comment:** The commentator expressed concern that the timing of the rule proposal was deliberately delayed to make it inconvenient for the public to comment by making the comment due date the day after the Thanksgiving weekend and to avoid appropriate legislative oversight. The commentator recommends the Department withdraw the rule proposal and re-propose it later to ensure the Legislature and the public can comment and to provide adequate time for consideration of those comments. (2)

**Response:** The Department conducted a 65-day comment period for the proposed rulemaking, accepting comments from September 25, 2010 through November 29, 2010. The public hearings were held on October 26, 27 and 28 in Harrisburg, Cranberry Township and Norristown, respectively. Both the Independent Regulatory Review Commission (IRRC) and the Senate and House Environmental Resources and Energy Committees are provided an additional 30 days for comment after close of the comment period. Thus, the date for the close of the public comment period did not shorten the length of time commentators had to submit comments, or the ability of the legislature to exercise oversight.

**27. Comment:** The IRRC commented that the proposed regulation would have direct and indirect effects on a broad range of citizens, businesses and industry. The IRRC noted that several comments were received in support of the regulation, even by those who may have opposed portions of it. The IRRC recognized that the proposed regulation would involve the availability of fuel, the price of fuel, significant economic investment and approval of temporary suspensions by the EPA that may affect the economic interests of all of Pennsylvania. Therefore, the IRRC recommended the Environmental Quality Board (Board) seek the advice of the legislature on whether the regulation represents a policy decision of such a substantial nature that it requires legislative review. (17)

**Response:** This rulemaking is authorized under the Air Pollution Control Act. The proposed rulemaking was, and this final-form rulemaking will be, reviewed by the General Assembly according to the procedures in the Regulatory Reform Act (71 P.S. §§ 745.1-745.14). In reviewing the proposed rulemaking, the House and Senate Environmental Resources and Energy Committees had the opportunity to object, but the committees did not do so. The Department has taken the specific concerns of committee members into account in developing the final-form rulemaking.

**28. Comment:** The commentator is aware of the environmental benefits of lowering the sulfur content of heating oil but is concerned about the amount of the sulfur reduction and the timeline in the proposed rulemaking. (4)

**Response:** The Department understands the concerns about the proposed sulfur content limits and compliance date. Please see response to comment #3 for revisions made in the final-form rulemaking to address these concerns.

**29. Comment:** The commentators expressed support for lower sulfur standards that are cost effective, provide real environmental benefits, provide adequate lead time for the significant refining investments that are necessary, and guard against supply shortfalls for Pennsylvania's heating oil consumers. (1, 5)

**Response:** The Department agrees with the commentators' concerns. The Department has revised the compliance date for reducing the allowable sulfur content in commercial fuel oil to allow adequate lead time for refiners to invest in any necessary refining improvements. Given the longer lead-time for compliance, supply shortfalls are not expected to be an issue. Written comments received on the proposed rulemaking, the ANFR and the Hart Consulting report, "Ultra Low Sulfur Heating Oil Assessment," indicate that supply disruption and price spikes can be avoided if refiners are provided a four-year lead-time to plan and install additional desulfurization equipment to remove sulfur from the remaining part of the fuel stream.

**30. Comment:** The commentator urges the Department to seek a solution that offers environmental benefit while providing the necessary flexibility to the transportation and refinery segments. (1, 4)

**Response:** The Department has revised the compliance date for reducing the allowable sulfur content in commercial fuel oil to allow time for refiners to add hydrotreating capacity. Given the longer lead-time for compliance, price spikes and market disruptions are not expected to be an issue.

**31. Comment:** The commentator suggested that the sulfur content in home heating oil could be lowered in a thoughtful, flexible manner that helps improve the environment and limits economic impacts. (12)

**Response:** Please see responses to comments #3 and #29.

**32. Comment:** A study commissioned by heating oil dealers concluded that 500 ppm heating oil was, on balance, the equivalent to natural gas in environmental impact. (1)

**Response:** The Department appreciates the information. It is not the intent of the final-form rule to explicitly achieve parity among types of fuels.

**33. Comment:** The Department should conduct a market supply/demand study to gauge the potential impact of a 15 ppm sulfur content standard for No. 2 fuel oil. (1)

**Response:** Please see response below for comments 33 through 35.

**34. Comment:** The commentators recommend that Pennsylvania evaluate the energy and economic impacts of this proposal. (5, 9)

**Response:** Please see response below for comments 33 through 35.

**35. Comment:** The commentator recommends that Pennsylvania consider the impacts of the proposed rulemaking on refining, distribution and supply and provide sufficient lead time for implementation. (5)

**Response to Comments 33 through 34:** The Department conducted an Advance Notice of Final Rulemaking between June 23 and July 23, 2012 to solicit additional public comment on a proposal to adopt a 500 ppm sulfur content limit rather than a 15 ppm fuel content standard for No. 2 fuel oil, giving the public the opportunity to provide the Department updated information on adverse market, energy and economic impacts. The final-form rulemaking revises the sulfur content standard to 500 ppm in order to reduce the risks of adverse impacts. Comments on fuels heavier than No. 2 fuel oil are addressed in responses to comments 117 through 135.

### **Compliance Date And Sulfur Levels**

**36. Comment:** The commentators expressed concern that the proposed implementation date of May 1, 2012 is infeasible because industry typically needs a 4-year lead time to accomplish budgeting, engineering, permitting, and construction for the start-up of hydro-desulfurization equipment. (3, 4, 5, 6, 9, 14, 16)

**Response:** The Department agrees. Please see the response to comment #3 for the revisions made to requirements in the final-form rulemaking to address these concerns.

**37. Comment:** Low sulfur heating oil is not generally available today. It will take refinery investment, project permitting, engineering and construction to expand supplies of this product to meet and/or replace the existing high sulfur fuel oil demand. (1)

**Response:** While the Department disagrees that low sulfur heating oil is not generally available today, given developments since the close of the public comment period, the Department agrees that investment to expand supplies is necessary. See response to #3

**38. Comment:** After further assessment, if reduction beyond 500 ppm sulfur in No. 2 fuel oil is considered, it should not occur until at least four years later which would be in the 2018 timeframe. (1, 5, 9)

**Response:** The Department has revised the sulfur content limit to 500 ppm; should the Department recommend further reduction of sulfur content, the requested four-year timeframe for additional desulfurization would be taken into account.

**39. Comment:** Many refiners did not build hydrotreating capacity to make 100% of their diesel fuel stream 15 ppm sulfur content fuel, also known as ultra-low sulfur diesel (ULSD). Refiners based their plans on the Federal on-road fuel standards which had phase-in dates as late as 2014. The current hydrotreating equipment in place at refineries does not have adequate capacity to also treat heating oil volumes. Adding hydrotreating

capacity to make ULSD is capital intensive and requires four to five years of permits, engineering, construction and planning. (1, 2, 3)

**Response:** The Department agrees. Please see the response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**40. Comment:** The commentator notes that requiring refiners to comply with a new fuel specification in less than two years is unprecedented and unfair by not providing the refiners who have continued to make No. 2 fuel oil used by millions of heating oil consumers adequate time to retool to make the new fuel. (2)

**Response:** The Department agrees that additional time is warranted. Please see the response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**41. Comment:** The commentators support a requirement for 500 ppm sulfur in No. 2 fuel oil in 2014. This represents an 80% sulfur reduction from Pennsylvania's current standard of 0.3% while providing significant and needed flexibility to the transportation and refinery segments. The timing would accommodate the economic uncertainties, challenges to project financing and lead time for the major construction necessary and fits well with the timeline for the Federal programs for transportation fuels. (1, 3, 4, 5, 6, 9)

**Response:** The Department agrees that 500 ppm sulfur content limit provides both sulfur reduction and flexibility to the transportation and refinery segments. The Department revised the compliance date to July 1, 2016 for reducing the allowable sulfur content in commercial fuel oil to allow time for refiners to add desulfurization capacity.

**42. Comment:** The commentator supports the effort to reduce the sulfur content of commercial fuel oil, suggesting that a 500 ppm sulfur content limit would achieve nearly 90% reduction and appears to be achievable provided refiners are allotted adequate lead time. (14)

**Response:** The Department agrees that most of the reduction in SO<sub>2</sub> emissions will come from the reduction from existing levels to 500 ppm. A 500 ppm sulfur content limit for No. 2 fuel oil is expected to reduce SO<sub>2</sub> emissions by approximately 21,000 tons per year compared to approximately 25,000 tons per year for a reduction to 15 ppm. Please see the response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**43. Comment:** The commentators oppose the requirement for 15 ppm sulfur in No. 2 fuel oil and the sulfur limits in residual fuel oils by 2012. (1, 3, 9, 16)

**Response:** Please see the response to comment #3 for the revisions made to requirements for No. 2 fuel oil and response to comments 117 through 135 in regard to residual fuel oil in the final-form rulemaking.

**44. Comment:** No other major fuel specification change has ever been made in such a short period of time, and doing so will disrupt markets and increase costs for both road use and space heating use in Pennsylvania and elsewhere, not just heating costs as the Department's analysis assumes. (2)

**Response:** The Department agrees. Please see the response to comment #3 for the revisions made to the compliance date for No. 2 fuel oil.

**45. Comment:** EPA's on road diesel rule allowed refiners 5.5 years to make changes to their refineries to comply with the new fuel specification of 15 ppm sulfur content for diesel fuel which reduced the sulfur content of on-road diesel from 500 ppm sulfur. Even with 5.5 years lead time, some refiners chose not to invest or, if they did, the quantity of ULSD was less than the 500 ppm sulfur diesel they made before the specification change. It also eliminated foreign suppliers of on-road diesel, since Europe is a net importer of ULSD. The result was a tightening of the U.S. market for on-road diesel, resulting in a significant and long-lived price spike in on-road diesel. The historic differential between crude oil and 500 ppm sulfur diesel was 80 to 90 cents per gallon. In 2005, the differential began to widen to \$1 to \$1.10 per gallon. After ULSD was introduced in mid-2006, the differential settled at approximately \$1.30 and stayed there until the recession. This pattern supports Hart Fuels projected price increase of 20 to 40 cents per gallon across the entire regional distillate market, not just heating oil. The Department's proposed reduction is much greater from 2000 to 5000 ppm sulfur currently to 15 ppm sulfur in less than two years. (2)

**Response:** The Department agrees that the proposed rule posed a risk for price spikes. Please see the response to comment #3 for the revisions made to the compliance date for No. 2 fuel oil.

**46. Comment:** The IRRC requests an explanation of why the compliance date of May 1, 2012 is reasonable and the effect on the supply and price of the fuels listed in the regulation, as well as other fuels derived from the same source. (17)

**Response:** In light of the concerns expressed by many commentators related to the proposed compliance date of May 1, 2012 and the time necessary for refiners to plan and install additional desulfurization capacity to meet demand, the Department has revised the compliance date. Please see the response to Comment #3 for the revisions made to requirements in the final-form rulemaking.

Given the longer lead-time for compliance, price spikes and market disruptions are not expected to be an issue. Written comments received on the proposed rulemaking and the Hart Consulting report, "Ultra Low Sulfur Heating Oil Assessment," indicate that supply disruption and price spikes can be avoided if refiners are provided a four-year lead-time to plan and install additional desulfurization equipment to remove sulfur from the remaining part of the fuel stream.

**47. Comment:** The commentator suggests that a 500 ppm or 1000 ppm sulfur content limit for No. 2 fuel oil would be a more supportable standard than 15 ppm. (2)

**Response:** The Department agrees. Please see the response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**48. Comment:** A 15 ppm sulfur content standard for No. 2 fuel oil exceeds Federal requirements, and a cost benefit analysis is needed. (2)

**Response:** The Department disagrees that there are federal sulfur requirements for No. 2 fuel oil that is not used for transportation purposes. The Department is required to make progress towards achieving natural background visibility conditions at Federal Class I areas. Reduction of allowable sulfur content of fuel oil has been identified as a reasonable strategy by MANE-VU, of which Pennsylvania is a member. The Department indicated in its Regional Haze SIP revision that it would pursue adoption of reduced sulfur content in commercial fuel oil, as appropriate and necessary, as part of its long term strategy to meet the reasonable progress goals contained in the SIPs of states with Class I areas that may be affected by emissions from the Commonwealth. MANE-VU performed a cost-benefit analysis for this rulemaking and determined that the benefits exceeded the costs. The report used by MANE-VU, *Low Sulfur Heating Oil in the Northeast States, An Overview of Benefits, Costs and Implementation Issues*, found that a decrease in No. 2 fuel oil from a sulfur content of 2500 ppm to 500 ppm would produce a net savings, because a slightly higher fuel oil cost would be offset by reduced furnace maintenance costs and higher efficiency.

**49. Comment:** The commentator opposes a 15 ppm sulfur standard for No. 2 fuel oil and questions the scientific justification for any additional sulfur reduction below 500 ppm. (1)

**Response:** The Department agrees and has revised the final-form rulemaking to delete the proposed requirement for 15 ppm sulfur content in No. 2 fuel oil. Most of the reduction in SO<sub>2</sub> emissions will come from a reduction from existing levels to 500 ppm. While additional reductions could be obtained from reducing sulfur content to 15 ppm, the Department has concluded that the additional reductions are not cost effective at this time.

**50. Comment:** Several commentators summarized the relationship of the proposed level of 15 ppm sulfur to the federal requirements for transportation-related fuel oils, noting the proposed requirement for 15 ppm sulfur in No. 2 fuel oil mirrors the current Federal standard for on-road diesel and that the Federal requirement for ULSD to be expanded to all off-road diesel, locomotive and marine engines by 2012, with all exceptions ending in 2014. (1, 3, 5, 6, 10, 16)

**Response:** The Department agrees with the synopsis of the Federal requirements for ULSD. The Department is no longer requiring a fuel content limit of 15 ppm.

**51. Comment:** The commentator notes that sulfur levels in No. 2 fuel oil can currently be as high as 2000 ppm sulfur, which differs widely from the ultra-low sulfur requirement of 15 ppm sulfur for both on-road diesel fuel and off-road diesel fuel. (7)

**Response:** The Department agrees with the description of the existing situation.

**52. Comment:** There is no technical need for a 15 ppm sulfur content standard for No. 2 fuel oil. EPA's selection of 15 ppm as the ULSD standard for the Federal distillate sulfur reduction program for transportation fuels was driven by technical reasons to enable use of vehicle engine and equipment emission control devices because at higher sulfur levels catalyst poisoning occurs which prevents the vehicles from meeting tail pipe emission standards. There is no need for a 15 ppm sulfur limit for No. 2 fuel oil because there is no requirement for after-treatment control devices for residential, commercial and industrial No. 2 fuel oil furnaces/ boilers. (1, 2, 3, 5, 6, 9, 12, 15, 16)

**Response:** The Department agrees with the commentators and has adopted a 500 ppm sulfur content standard to achieve similar public health and welfare benefits to those in the proposed rulemaking.

**53. Comment:** The commentator cited a report by the International Fuels Quality Center reviewing international standards for No. 2 Fuel Oil. From a summary table of the report, the lowest required sulfur specification is 1000 ppm sulfur in the European Union for gasoil, which is essentially No. 2 fuel oil. There is a special 50 ppm sulfur heating oil in Germany for high efficiency burners, but its use is not mandated. A 15 ppm sulfur standard for heating oil would be the lowest sulfur standard for heating oil in the world. (2, 3)

**Response:** The Department disagrees with this statement, which is no longer correct due to developments occurring after the close of the public comment period (Nov. 29, 2010). New York currently requires heating oil to meet a 15 ppm standard (as of July 1, 2012). New Jersey has adopted a regulation requiring No. 2 fuel oil to meet a 15 ppm sulfur content limit by July 1, 2016. However, the Department has revised the final-form rulemaking and is not requiring a 15 ppm sulfur limit.

**54. Comment:** The commentator states that in the Regulatory Impact Analysis for the offroad diesel rule, EPA estimated an increased cost of two cents per gallon for the 500 ppm sulfur diesel compared with higher sulfur fuel. The reduction from 500 ppm sulfur to 15 ppm sulfur diesel was an estimated additional five cents per gallon. Based on EPA's cost estimates and sales of 891 million gallons of No. 2 fuel oil in Pennsylvania in 2008, the reduction from 2000 ppm to 500 ppm would cost about \$18 million and achieve a 75% reduction in sulfur content. The reduction from 500 ppm to 15 ppm would cost about \$45 million and achieve an additional 24% reduction. To mandate the additional step below 500 ppm is costly to refiners because of the technical difficulty of removing the sulfur from the distillate streams used to blend heating oil. The commentator states that refinery operating costs are significantly lower with a 500 ppm sulfur standard

compared with a 15 ppm sulfur standard because of longer catalyst life, lower hydrogen consumption, and product downgrade capability. Even a 50 ppm sulfur standard would reduce refinery operating expenses and waste generation because catalyst would have to be changed less frequently. (2)

**Response:** The Department agrees that the additional costs to reduce sulfur content from 500 ppm to 15 ppm are not cost-effective at this time.

**55. Comment:** The commentator points out that some stakeholders have argued that because 86% of the current U.S. distillate pool is at 15 ppm, the remainder should also meet this standard. This would be a costly and unneeded mandate and misses the point regionally, thereby understating the impact of the mandate. Fuel oil use for space heating is concentrated in the mid-Atlantic. In Pennsylvania, road use and heating use of fuel oil are roughly equal. Therefore, refineries serving the mid-Atlantic region are configured to produce much lower than 86% ULSD. (2)

**Response:** The Department has revised the compliance date for reducing the allowable sulfur content in commercial fuel oil to allow time for local refiners make any necessary investments for compliance. ULSD will no longer be required.

**56. Comment:** The proposed rulemaking will eliminate supplies of heating oil from refiners that currently do not make ULSD or cannot expand their current ULSD production without capital projects. Collectively, these refiners account for a large share of the supply of No. 2 fuel oil for the Northeast region. (2)

**Response:** The Department has revised the compliance date in the final rulemaking to allow more time for refiners to plan and invest in additional desulfurization capacity if they so choose.

**57. Comment:** The impact of the increased demand for ULSD must be considered coupled with refinery closures that have also reduced supplies of distillate to this region. Refineries nationwide are experiencing record or near record losses and many are hanging on by a thread. This proposed rule is particularly challenging to smaller refineries like Port Reading, American and United which cannot afford major capital investments in the current regulatory climate. (2)

**Response:** The Department recognizes the concerns of the commentator, particularly in regard to the smaller refineries. The final-form rulemaking does not increase the demand for ULSD. Since the comment period closed in November 29, 2010, there have been a number of significant changes in Eastern refineries, including the purchase and re-purposing of the former Sunoco Marcus Hook refinery, the purchase of the former Sunoco Philadelphia refinery, and the purchase of the Conoco-Phillips refinery. There are many reasons in addition to regulations, for the closures of smaller, less profitable refineries and the affordability of major capital investments. The factors

include decreasing gasoline use due to economic conditions and consumer habits and preferences, as well as the inability of some Eastern refineries to process a wide range of crude oil types.

**58. Comment:** The IRRC recommends review of the 15 ppm sulfur content standard for No. 2 oil and requests an explanation of how the limit in the final-form regulation recognizes the efficient operation of refineries while addressing the need to protect the environment. (17)

**Response:** The Department has reviewed the proposed 15 ppm sulfur content limit for No. 2 oil and has revised the final-form rulemaking to require a 500 ppm sulfur content limit, instead. As discussed in previous responses (see, for example, responses to 29, 39-41 and 47), one of the reasons for the revision is to address the refinery operation concerns.

**59. Comment:** The study commissioned by a heating oil dealer consortium by the New York State Energy Research and Development Authority (NYSERDA) and Brookhaven National Labs, “Low Sulfur Home Heating Oil Demonstration Project Summary Report” supported a voluntary approach to a low sulfur heating oil program. The report noted that state mandates should not be enacted until the use of low sulfur heating oil is expanded because mandates could cause price instability and supply shortages. (2)

**Response:** The Department appreciates the information. However, lower sulfur heating oil production will probably not be expanded until states enact requirements for its use. The final-form rulemaking will provide approximately four years between enactment and compliance date to provide a date certain by which 500 ppm sulfur content will be required.

### **Regional Consistency**

**60. Comment:** The commentator supports a reduction in sulfur content in fuel oil when phased in over an appropriate time period, citing the two step approach taken by New Jersey. The commentator supports an approach consistent with New Jersey’s regulation with a 500 ppm sulfur content limit for No. 2 fuel oil in 2014 and a second step reduction to 15 ppm sulfur by 2016. This would provide for regional fuel delivery consistency and security while reducing sulfur emissions from these products. (5, 9, 16)

**Response:** The Department agrees that more time than was contained in the proposed rulemaking is required. The Department has considered the two-step approach taken by New Jersey, but has concluded that Pennsylvania has a different profile of both users and producers than New Jersey. The sulfur content limit for No. 2 fuel oil in the final-form rulemaking is consistent with the first phase of implementation in New Jersey. However, factors such as consideration of the need to install additional desulfurization capacity in Pennsylvania’s western refineries make regional consistency a less important consideration than timing and cost-effectiveness in the choice of 500 ppm rather than 15 ppm for No. 2 fuel oil. Please see the response to comment #3 for the revisions made to requirements in the final-form rulemaking.

**61. Comment:** A 500 ppm sulfur in No. 2 fuel oil in 2014 would be consistent with recently adopted rules in New Jersey. The New Jersey rulemaking cited the Hart Consulting study, “Ultra Low Sulfur Heating Oil Assessment” that concluded the needed time for refineries to install desulfurization capacity was four years. (3)

**Response:** See responses to comments #3 and #29.

**62. Comment:** The commentator supports a requirement for 500 ppm sulfur content limit in No. 2 fuel oil in 2014 and a 50 ppm sulfur content limit in 2016. This would enable the use of high efficiency furnaces while avoiding excess demand and price pressure for on-road diesel fuel. This would be similar to the recent New Jersey regulation. (15)

**Response:** The Department appreciates the commentator’s support for a reduction in sulfur content to 500 ppm. The Department has taken the commentator’s concern for price pressure on on-road diesel fuel into account in the final-form rulemaking and has not adopted the same 15 ppm standard that is applicable to on-road diesel. The sulfur content limits in the final-form rulemaking will allow the use of most high efficiency furnaces (see also response to comment 66).

**63. Comment:** Pennsylvania’s proposed rulemaking is similar to action recently taken by New York, Connecticut and Maine. (10)

**64. Comment:** Pennsylvania should require No. 2 fuel oil to meet the 15 ppm sulfur standard in 2012 similar to New York’s compliance schedule to allow refiners and the supply network a clearly defined goal in the two largest oilheat fuel markets in the country. This would also provide the same benefits to Pennsylvania consumers and petroleum distribution network on the same timetable as those comparable entities in New York. (11)

**65. Comment:** The timing of Pennsylvania’s proposed requirement for 15 ppm sulfur content for No. 2 fuel oil coincides with New York’s recently enacted law. New York is the largest consumer of No. 2 fuel oil, consuming approximately 1.4 billion gallons annually. Pennsylvania is the third largest consumer of No. 2 fuel oil, consuming approximately 891 million gallons annually. This means that, by 2012, approximately 2 billion gallons of No. 2 fuel oil will have to be replaced with ULSD. In 2009, the two states combined consumed approximately 3.7 billion gallons of ULSD, meaning the amount of ULSD supplied to the Central Atlantic region will have to rise by over 50% by 2012. (2)

**Response to comments above:** The Department has considered all comments concerning the sulfur standard level being consistent regionally and has revised the sulfur levels and timing for compliance. The accelerated timeframe in New York is not appropriate for Pennsylvania. The Department revised the compliance date to July 1, 2016 for reducing the allowable sulfur content in commercial fuel oil to allow time for

refiners to add desulfurization capacity. In addition, the Department revised the sulfur content level in No. 2 fuel oil, which is most of the commercial fuel oil sold in the Commonwealth, to 500 parts per million.

### **Furnace Efficiency**

**66. Comment:** The lower sulfur content in fuel oil will provide the significant ancillary benefit of reduced furnace maintenance needs. (10)

**Response:** The Department agrees that reduced sulfur in fuel oil results in efficiency and reduces furnace maintenance. The Department has assumed that there is a median annual savings of \$29.00 per household on furnace vacuuming by using 500 ppm sulfur content commercial fuel oil. Please also see response to comment #74 concerning the costs and benefits of the lower sulfur fuel in furnaces.

**67. Comment:** Reducing sulfur content in fuel oil results in dramatic lessening of the sulfur residue from the combustion process in furnaces. This results in a more efficient burn and reduces the frequency of, and time needed for, furnace service calls. This would save consumers an estimated 14 cents per gallon in operating costs without the need to install new furnaces. (11)

**Response:** Please see response above for comment 67.

**68. Comment:** Manufacturers of furnaces in Pennsylvania have indicated an interest in establishing production of furnaces that only utilize ultra-low sulfur fuel oil if an ultra-low sulfur standard is adopted in Pennsylvania. (11)

**Response:** While the Department is not adopting an ultra-low sulfur fuel (15 ppm) standard, several states in the MANE-VU region have or are already doing so. In addition, transportation fuel is in most cases limited to 15 ppm. Therefore, there will be more ultra-low sulfur heating oil available for sale in the Commonwealth. The Department anticipates that as more low sulfur fuel oil is available in the State, more models of condensing furnaces and boilers will become available. Increased availability and lower prices will encourage consumers to replace inefficient, older units with efficient ones.

**69. Comment:** Consumers replacing boilers can achieve efficiency gains through condensing and other high efficiency boilers that operate on 2000 ppm or 500 ppm sulfur No. 2 fuel oil. Many consumers, faced with a choice between fuel oil and natural gas, choose natural gas, which would allow use of a condensing boiler. (2)

**Response:** The Department agrees. It is not the intention of the final-form rulemaking to influence a consumer's choice of fuel, but to reduce the emissions from the combustion units that use commercial fuel oil.

**70. Comment:** The highest efficiency condensing boiler/furnace systems can be fired by either natural gas or heating oil. The commentator has not found any equipment manufacturer's specifications that require the use of ultra-low sulfur heating oil or demonstration of the emissions benefits of condensing boiler/furnace systems. (3)

**Response:** The Department agrees that either natural gas or heating oil can be used in high efficiency systems and that it appears that the use of ultra-low sulfur heating oil is not explicitly required.

**71. Comment:** Condensing boilers have drawbacks and do not work in all applications. Drawbacks include a typically 30 – 40% higher boiler cost and a reputation for being less reliable and requiring professional installation and regular service. Condensing boilers are often unable to achieve reported efficiencies. One reason for this is condensing boilers are most efficient at lower water temperatures (below 55 degrees), so if used in a hot water central heating system, the unit will only be operating in condensing mode during initial heat-up. To enable the condensing boilers to operate in condensing mode, in many Pennsylvania homes, would require replacement of the entire heating system. (2)

**Response:** The purpose of the rulemaking is to lower sulfur dioxide emissions and improve visibility in the environment and health of residents. The Department, by mentioning condensing boilers, is merely presenting options for consumers. Consumers can use low sulfur heating oil in existing furnaces, change furnaces, change fuel, or choose another solution.

**72. Comment:** There are ultra-high efficiency condensing boilers that operate on 2000 ppm sulfur fuel oil. The corrosion problem can be dealt with by metallurgy and design. Additionally, there are many oil boilers that can meet the 85% efficiency standard that achieves an Energy Star rating from EPA. Ireland and the United Kingdom mandate that new boilers be high efficiency, approximately 86%, and neither impose 15 ppm or 50 ppm sulfur standards on No. 2 fuel oil. Energy efficiency does not require 15 ppm or 50 ppm sulfur No. 2 fuel oil, and the "gain" in efficiency is negligible. (2)

**Response:** The Department agrees.

**73. Comment:** ULSD is available to those customers that need it for higher efficiency heaters or boilers or otherwise want to purchase it. It is not necessary to mandate that all No. 2 fuel oil meet a 15 ppm sulfur content limit. (1, 2, 4, 5, 9)

**Response:** The Department agrees that ultra-low sulfur fuel oil is available for those customers who want fuel with even lower sulfur content than the final-form rulemaking requires. The final-form rulemaking contains recordkeeping and reporting requirements that would allow the ultimate consumer of the fuel to know the sulfur content of the fuel being purchased.

**74. Comment:** The commentator noted that the benefits cited in the preamble are based on the study by NYSERDA and Brookhaven National Labs, “Low Sulfur Home Heating Oil Demonstration Project Summary Report.” The report evaluated the benefits of 500 ppm (not 15 ppm) sulfur No. 2 fuel oil. The report indicated that the 500 ppm sulfur No. 2 fuel oil would reduce cleaning intervals from annually to approximately once in five years and improve heat transfer in the boiler to a limited extent. Therefore, reducing the sulfur content from 500 ppm to 15 ppm would have very little positive effect on equipment costs because cleaning intervals would not rise to 10 or 20 years. The report also questioned whether the savings would materialize because customers are accustomed to annual cleanings, and fire codes and warranties may continue to require annual cleaning. (2)

**Response:** The Department agrees that the report evaluated the benefits of 500 ppm, not 15 ppm sulfur. The NYSERDA Report calculated savings to consumers based on consumption of fuel with 500 ppm sulfur compared to 2,500 ppm sulfur. The NYSERDA Report assumed that the consumer would save only one percent from an increase in fuel oil efficiency. The savings to a consumer because of increased fuel efficiency, reduced maintenance and less corrosive exhaust gases could be in the three to five cents per gallon range, thereby offsetting the cost of the ultra-low sulfur heating oil. The Department relied on the NYSERDA Report for the estimate of cost savings associated with furnace cleaning at a 58-month (approximately five year) interval. The Department did not base its analysis on a less frequent interval. Consumers could potentially save more on avoided cleanings of boilers and furnaces.

**75. Comment:** The preamble to the Fuel Sulfur Rule and some proponents of this initiative cite more efficient "condensing boilers" as a reason for the 15 ppm standard. There are drawbacks and condensing boilers do not work in all applications. Condensing boilers normally cannot be vented through a chimney. They must be side vented which may not comply with codes in some areas. (2)

**Response:** The Department agrees that there are advantages and drawbacks to these boilers, which potential purchasers must consider. The Department disagrees with the assessment that “condensing boilers must be side vented”. The *Guide to the Condensing Boiler Installation Assessment Procedure for Dwellings* available at <http://www.idhee.org.uk/ExceptionsGuide.pdf> does not indicate that side venting is a must. This document explains the steps necessary to evaluate and overcome issues in installing a condensing boiler.

**76. Comment:** The commentator notes that the rule should not take credit for emissions reductions for boilers that need to use 15 ppm or 50 ppm heating oil because that fuel is already available and projected to be available for the limited number of boilers requiring it. A 15 ppm or 50 ppm sulfur standard will require the vast majority of fuel oil consumers to utilize a fuel they do not need, will cost them more and will increase emissions overall for some pollutants. (2)

**Response:** The Department does not intend to “take credit” for emissions reductions for any existing boilers that need to use 15 ppm or 50 ppm No.2 fuel oil because those units are already using ULSD.

**77. Comment:** Reducing sulfur content in fuel oil results in dramatic lessening of the sulfur residue from the combustion process in furnaces. This results in a more efficient burn and reduces the frequency and time needed for furnace service calls. This would save consumers an estimated 14 cents per gallon in operating costs without the need to install new furnaces. (11)

**Response:** The Department thanks the commentator for the supporting information. Please see response to comment #74 concerning the costs and benefits of the lower sulfur fuel in furnaces.

**78. Comment:** The commentator noted that the benefits cited in the preamble are based on the study by NYSERDA and Brookhaven National Labs, “Low Sulfur Home Heating Oil Demonstration Project Summary Report.” The report evaluated the benefits of 500 ppm (not 15 ppm) sulfur No. 2 fuel oil. The report indicated that the 500 ppm sulfur No. 2 fuel oil would reduce cleaning intervals from annually to approximately once in five years and improve heat transfer in the boiler to a limited extent. Therefore, reducing the sulfur content from 500 ppm to 15 ppm would have very little positive effect on equipment costs because cleaning intervals would not rise to 10 or 20 years. The report also questioned whether the savings would materialize because customers are accustomed to annual cleanings, and fire codes and warranties may continue to require annual cleaning. (2)

**Response:** See response to comment #3. The NYSERDA Report calculated savings to consumers based on consumption of fuel with 500 ppm sulfur compared to 2,500 ppm sulfur. The NYSERDA Report assumed that the consumer would save only one percent from an increase in fuel oil efficiency. The savings to a consumer because of increased fuel efficiency, reduced maintenance and less corrosive exhaust gases could be in the three to five cents per gallon range, thereby offsetting the cost of the ultra-low sulfur heating oil. The Department relied on the NYSERDA Report for the estimate of cost savings associated with furnace cleaning at a 58-month (approximately five year) interval. The Department did not base its analysis on a less frequent interval. Consumers could potentially save more on avoided cleanings of boilers and furnaces.

### **Comments Specific to Price and Cost**

**79. Comment:** The commentator believes the requirement for 15 ppm sulfur in No. 2 fuel oil by 2012 will harm Pennsylvania consumers by raising the price of both No. 2 fuel oil and diesel fuel by 15 to 25 cents per gallon. (2)

**Response:** Please see response below for comments 79 through 81.

**80. Comment:** The proposed rulemaking has the potential to disrupt supply, significantly increase cost to consumers, cause price spikes and/or negatively impact small business refiners. (1, 6)

**Response:** Please see response below for comments 79 through 81.

**81. Comment:** The proposed 15 ppm sulfur limit for No. 2 fuel oil would impose unnecessary costs on heating oil users. (9)

**Response for comments 79 through 81:** The Department agrees that the cost of fuel would be higher. However, with the final-form rulemaking limit at 500 ppm, the costs will be offset by reduced furnace maintenance costs. The cost of heating oil might increase once the 500 ppm sulfur content limit for heating oil in the final-form rulemaking is effective. However, Pennsylvania consumers should save money in the operation of existing furnaces due to improved furnace and boiler efficiency by reducing fouling rates of furnace and boiler heat exchangers and other components, leading to an overall savings from reduced sulfur content.

In addition, a 500 ppm sulfur content fuel may lead to new, more cost-effective designs and more widespread use of high efficiency condensing boilers or furnaces, reducing pollution and increasing fuel efficiency. One trade group noted that sulfur in fuel oil was the “real obstacle for equipment design.”

([www.biodieselmagazine.com/article.jsp?article\\_id=3937&q=&page=2](http://www.biodieselmagazine.com/article.jsp?article_id=3937&q=&page=2))

**82. Comment:** The commentator expressed concern that Pennsylvania homeowners who rely on home heating oil would be impacted by both the price and availability of fuel. (14)

**Response:** In light of the concerns expressed by commentators related to the time necessary for refiners to plan and install additional desulfurization capacity to meet demand, the Department revised the compliance date to July 1, 2016. Please see response to comment #3.

Given the longer lead-time for compliance, price spikes and market disruptions are not expected to be an issue. Written comments received on the proposed rulemaking and the Hart Consulting report indicate that supply disruption and price spikes can be avoided if refiners are provided a four-year lead-time to plan and install additional desulfurization equipment to remove sulfur from the remaining part of the fuel stream.

**83. Comment:** The commentator retained Hart Fuels to study the impact of lowering the heating oil specification by 2012 and provided a copy of the report “Ultra Low Sulfur Heating Oil Assessment.” The report concluded that production of 15 ppm sulfur content No. 2 fuel oil will cost five to nine cents per gallon more than high sulfur No. 2 fuel oil, with 20 – 30 cents per gallon premiums to be expected until additional desulfurization capacity can be brought on-line. Given similar requirements in New York and New Jersey, the market would not have the capability to respond to a cold weather surge in

demand with heating oil premiums of 30 to 60 cents per gallon reflecting market shortage conditions. (2)

**Response:** Please see response below for comments 83 and 84.

**84. Comment:** The Hart Fuels projections are also consistent with the winter 1999-2000 price spike due to an extreme cold snap in the Northeast which caused oil prices to rise by as much as 79 cents per gallon or 66% with the regional price of 500 ppm sulfur diesel increasing by a similar amount. EIA estimated the increase in demand was approximately 40%. The combined effect of the New York law and the proposed Pennsylvania regulation is a 50% change in demand, and that change is much higher in the winter. The 1999-2000 shortage was primarily ended by deliveries of No. 2 fuel oil from Europe and Asia. These products would not be available to end a future shortage because they exceed the temporary cap standard of 500 ppm. At a minimum, this will raise the duration and extent of a price spike and could even result in runouts.

Requiring use of 15 ppm sulfur content No. 2 fuel oil for home heating in Pennsylvania combined with New York's law, will drive up demand for ULSD by over 50% in the Central Atlantic region. The effect of this increase in demand is magnified by the fact that fuel oil use for space heating is concentrated in a four month period in the winter time. The proposed rule will cause large demand spikes of more than 100% of current ULSD to occur during cold snaps, affecting consumers of heating oil and road diesel in Pennsylvania. (2)

**Response for comments 83 and 84:** The Department revised the final-form rulemaking to allow more time for refiners to meet the revised standards, and has substituted a requirement for 500 ppm sulfur content for the proposed content of 15 ppm. Written comments received on the proposed rulemaking and the Hart Consulting report indicate that supply disruption and price spikes can be avoided if refiners are provided a four-year lead-time to plan and install additional desulfurization equipment to remove sulfur from the remaining part of the fuel stream. Given the longer lead-time for compliance and the revised sulfur content level for No. 2 fuel oil, price spikes and market disruptions are not expected to be an issue for either fuel oil or diesel fuel.

**85. Comment:** The commentator suggests that a 500 ppm instead of 15 ppm sulfur content standard for No. 2 fuel oil would be less likely to result in price spikes because there are more additional sources of supply. Approximately 26 additional countries can provide supply at a 500 ppm sulfur content standard which can reduce long term costs and supply disruption risks. A 500 ppm sulfur content standard would also allow use of 400 ppm sulfur kerosene as a blendstock to enhance No. 2 fuel oil supplies. (2)

**Response:** The Department agrees and has revised the sulfur content standard to 500 ppm.

**86. Comment:** Even using the Department's projections of price increases, which the commentator believes are too low, the rule is very costly to Pennsylvania consumers with a projected cost increase for No. 2 fuel oil users of \$79 million dollars annually. (2)

**Response:** Please see response below for comments 86 and 87.

**87. Comment:** The economic benefits will not materialize, at least in the short and intermediate term, and will not offset the increased costs. (2)

**Response to 86 and 87:** While the Department agrees that there may be a small increase in fuel costs, the costs are offset by the savings consumers should realize in furnace and boiler maintenance costs due to less fouling of their combustion units.

The 2008 Northeast Heating Oil Assessment estimates that there would be a 6.3 to 6.8 cents per gallon (cents/gal) incremental production cost for 500 ppm vs. 2500 ppm sulfur content home heating oil (No.2 commercial fuel oil), including capital costs. Note that this is a cost to the producers; prices to the ultimate consumer will be influenced by factors in addition to the cost of reducing the sulfur content in the fuel oil. Furthermore, this is a cost assuming all producers would incur some costs to install additional desulfurization, so this may be an overestimate for Pennsylvania. Assuming that the entire cost of producing 500 ppm fuel oil is passed on to the consumer, the increased cost to the residential customer would be about \$29.00 per year.

However, since furnace and boiler maintenance costs for consumers would be lower due to less fouling of their combustion units, NESCAUM reported a median annual savings of \$29.00 per household on furnace vacuuming by using 500 ppm sulfur content commercial fuel oil. This is probably an underestimate because furnace maintenance costs have most likely increased due to inflation since 2005.

### **Costs Of Transportation Fuel**

**88. Comment:** The commentator expressed concern that the proposed rulemaking could have unintended negative consequences for highway diesel fuel users by creating market competition between highway fuel and home heating oil. Such competition could have a sharp price impact, cause seasonal price spikes, and create year-round supply problems harming both home heating oil consumers and operators of diesel vehicles. (2,12)

**Response:** The final-form rulemaking does not require the same sulfur content in home heating oil as is required by EPA for highway fuel. Because more sulfur will be allowed in heating oil in Pennsylvania than in transportation fuels, off-specification transportation fuel can be used as home heating oil, thus easing supply concerns in both markets.

Home heating oil and on- and offroad diesel fuel are essentially the same fuel, called distillate fuel. They may have a different sulfur content, and on and off-road diesel fuel are taxed by the Federal government; however, the two fuels are essentially the same.

Home heating oil and diesel fuel competed in the same market for many years. All distillate fuel, regardless of its ultimate use, was marketed and traded together. It was only with the implementation in 1993 of the first Federal sulfur content standards for highway diesel fuel to 500 ppm that separate markets for low sulfur diesel, meeting a 500 ppm sulfur content standard, and distillate heating oil at higher sulfur limits were created. Prior to 1993, distillate fuel could be used interchangeably between markets for its uses as a motor vehicle fuel and as a home heating oil.

Having separate markets, as currently exists for the distillate oil used for home heating and for on and off-road diesel fuel, does not necessarily mean large differences in price or a large reduction in the price of home heating oil, even though currently there are less stringent sulfur content standards and, thereby, less costs associated with removing sulfur from home heating oil.

With the revisions in the final-form rulemaking, the Department does not expect that future competition in the marketplace between the users of home heating oil and the users of ultra-low sulfur distillate fuel as on or off-road diesel fuel will result in higher prices for either consumer.

**89. Comment:** The proposed rulemaking will raise the cost of on-road diesel fuel and home heating oil by 20 cents or more per gallon. Pennsylvania uses approximately two billion gallons of distillate fuel annually for heating and road use. Thus, a 20 cent increase will cost Pennsylvania consumers 400 million dollars annually. (2)

**Response:** The Department disagrees. The commentator's estimates pertain to their estimates of heating oil sulfur content limits of 15 ppm, which is not required in the final-form rulemaking. Furthermore, higher fuel purchase costs to consumers will be offset by lower furnace and boiler maintenance costs.

**90. Comment:** A 15 ppm sulfur content standard for No. 2 fuel oil would eliminate the distinct heating oil market and would make residential and commercial customers compete for supply from the transportation diesel market, which has been steadily growing globally. (1, 6, 14)

**Response:** Please see response to comment # 90-91, below.

**91. Comment:** The commentator recommends that a separate heating oil standard be adopted that could reasonably be expected to be adopted by other states in the Northeast region. (12)

**Response to comments 90 and 91:** The sulfur content limits in the final-form rulemaking should lead to retention of a distinct heating oil market, although transportation fuel meeting the 15 ppm standard could be used to meet the 500 ppm limit in the final-form rulemaking.

**92. Comment:** Keeping the price of fuels competitive with neighboring states helps Pennsylvania attract Federal highway and public transit funds because the Federal distribution of such funds is largely based on the amount of fuel purchased within the state. If a home heating oil rule caused diesel fuel prices to spike, it would negatively impact diesel fuel sales and could have the unintended consequence of reducing the amount of Federal funding for state highway and transit projects. It would also negatively impact Pennsylvania's economy and related businesses. (12)

**Response:** The Department does not agree that Pennsylvania will lose sales of distillate or residual fuels to other states or, as a result, a commensurate share of Federal highway funding. The Federal highway funding is based on the sales of motor fuel, not sales of all distillate fuel oils. The Federal sulfur in fuel standards for on and off-road vehicle use are consistent across state lines and do not vary between States. (40 CFR §§ 80.500 and 80.510) Whether Pennsylvania requires a lower sulfur standard in distillate or residual fuels in accordance with the adopted standards should not have an impact on sales of on and off-road diesel fuel in the State.

**93. Comment:** The commentator expressed concern that a 15 ppm sulfur content standard for No. 2 fuel oil will result in the need for additional refiner processing of higher sulfur distillate fuels and will increase the demand for a limited supply of ULSD, resulting in a higher price for on-road diesel fuel. (15)

**Response:** The final-form rulemaking adopts a standard of 500 ppm sulfur content, not 15 ppm. Please see the responses to comment #3 in regard to additional refiner processing and to comment #92 above regarding competition for ULSD.

**94. Comment:** The commentator recommends a more thorough analysis of the available supply of ULSD and the impact of the proposed 15 ppm sulfur content standard for No. 2 fuel oil on the on-road diesel supply and the Pennsylvania trucking industry. The commentator also recommends that the impact on diesel prices resulting from the elimination a distinct heating oil market that functions separately from the on-road ULSD market be calculated. The economic analysis accompanying the proposed regulation does not adequately address the impact that the regulation will have on the price of on-road diesel fuel and the trucking industry. (15)

**Response:** The final-form rulemaking adopts a standard of 500 ppm sulfur content, not 15 ppm. Please see the response to comment #3.

**95. Comment:** State-specific fuel specifications that increase the price of on-road diesel fuel sold in Pennsylvania produce a competitive disadvantage for trucking companies located within Pennsylvania because out-of-state carriers may reduce their costs by refueling outside the affected state while servicing accounts within the state. (15)

**Response:** There are numerous factors that affect the price of on-road fuels within a state as well as prices across states, most notably state taxes on fuel. Therefore, a regulation that may only indirectly affect Pennsylvania on-road fuel prices cannot be the

sole factor when comparing costs between Pennsylvania trucking companies and out-of-state trucking companies. Furthermore, with other states in the Northeast proposing and enacting regulations to lower the sulfur content of heating oil, any potential price increase in on-road fuels would be experienced in those same northeast states, not creating a competitive disadvantage.

**96. Comment:** Citing comments that express concern that homeowners relying on home heating fuel could be impacted by the price and availability of fuel, concern about overall fuel supply disruption, and concern about timing and sulfur limits translating into a higher price for on-road diesel fuel and price spikes for home heating oil, the IRRC indicates the Board should provide an analysis of the impact of the regulation on both the fuels directly included in the regulation and other fuels derived from the same sources, including an analysis of the supply and demand for the fuels and the effect of the regulation on the availability and price of these fuels. (17)

**Response:** The final-form rulemaking does not require the same sulfur content in home heating oil as is required by EPA for highway fuel, as did the proposed rulemaking. Because more sulfur will be allowed in heating oil in Pennsylvania than in transportation fuels, off-specification transportation fuel can be used as home heating oil, thus easing supply and demand concerns in both markets.

Home heating oil and diesel fuel competed in the same market for many years. It was only with the implementation in 1993 of the first Federal sulfur content standards for highway diesel fuel to 500 ppm that separate markets for low sulfur diesel, meeting a 500 ppm sulfur content standard, and distillate heating oil at higher sulfur limits were created. Requirements for 15 ppm diesel fuel have further separated these markets. Some commentators recommended that a distinct market for heating oil continue to exist in Pennsylvania so that demand for 15 ppm transportation fuel does not adversely affect supply and price of heating oil. The Department agrees. With the revisions in the final-form rulemaking, the Department does not expect that future competition in the marketplace between the users of home heating oil and the users of ultra-low sulfur distillate fuel as on or off-road diesel fuel will adversely impact supply or demand for heating oil.

**97. Comment:** Establishing the same 15 ppm sulfur content standard for heating oil as diesel fuel would result in dramatic operating cost reductions for distribution companies, many of which are small businesses. (11)

**Response:** Please see response to comments 97-99, below.

**98. Comment:** Because refineries and terminals are already handling multiple grades of distillate, the benefit of minimizing the number of tanks due to consistent sulfur content limits in distillate fuels is not significant. (3)

**Response:** Please see response below for comments 97 through 99.

**99. Comment:** A 15 ppm sulfur content standard for No. 2 fuel oil would preserve or create jobs in Pennsylvania because it would enhance and modernize the product to keep the oilheat distribution industry, which employs approximately 7,000 people, competitive in the future. (11)

**Response for comments 97 through 99:** While the final-form regulation does not require 15 ppm sulfur content in heating oil, the Department understands that because of such requirements in other states, some Pennsylvania suppliers may choose to purchase this fuel in order to reduce operating costs or offer a cleaner product to its customers. Fuel at 15 ppm sulfur would obviously be compliant fuel in Pennsylvania. This would be a business decision on the part of each distribution company.

### **Credit Banking And Trading**

**100. Comment:** ULSD was introduced, nationally and in Pennsylvania, with little or no supply or price disruption. The Federal diesel sulfur reduction program provided ample time for investment and execution of projects by refiners to increase desulfurization capacity. The Federal program also included credit banking and trading provisions. (1, 3, 5)

**Response:** The final-form rulemaking has a revised time frame that gives refiners additional time for investment in any needed desulfurization capacity. Please see the response to comment # 101 below concerning credit banking and trading provisions.

**101. Comment:** The commentator suggests consideration of an averaging, banking and trading program to provide flexibility to refineries. (16)

**Response:** Banking, averaging and trading programs are more difficult to administer than the regulatory approach that the Department has chosen, wherein all refiners must meet a 500 ppm sulfur in fuel level by July 1, 2016. A banking, averaging and trading program would require administrative oversight and costs to the Department and the regulated community, extensive involvement of financial planners and investors, an annual “true-up” of the bank and trading program, and a verification program, through an enforceable fuel sampling program, to guarantee that the sulfur dioxide credits traded are the result of real reductions in air pollution. This verification program could be burdensome, as it would need to ascertain compliance and the number of “credits” generated.

### **Comments Specific To Supply Of Heating Oil**

**102. Comment:** During peak heating oil season, a portion of the supply is provided by imports from areas that do not have diesel desulfurization requirements similar to the U.S. and Canada. (1)

**Response:** The Department understands the commentator’s concerns. Although the final-form rulemaking does not adopt fuel content limits equivalent to transportation fuel

(ULSD), there is a trend in the market toward lower sulfur levels. The Hart Study states, "Imports have played a decreasing role in the NY/NJ market coinciding with reductions in the high sulfur off-road distillate market. Peak seasonal winter supplies from imports have declined significantly." (Hart Study, page 11). Most countries are now undergoing the shift to ultra-low sulfur diesel in their transportation sectors. For example, Russia has just finished its changeover to 10 ppm ultra-low sulfur diesel transportation fuel in 2009, in accordance with Euro Directive 29V, the European Union's emission regulations for new heavy-duty diesel engines, and may soon be able to provide ultra-low sulfur diesel fuel to the world market. Other European and Asian countries are also completing this shift to ultra-low sulfur diesel, and the world market for this product is expected to return to balance in the near future. (See <http://www.dieselnet.com/standards/eu/fuel.php>)

**103. Comment:** Demand for low sulfur diesel will likely increase in 2015 when ocean going vessels in U.S. ports will be required to use 1000 ppm sulfur fuel. (1)

**Response:** The Department agrees. The EPA, through the International Maritime Organization (a specialized agency of the United Nations), finalized plans on March 26, 2010, that would subject ships within a 200 nautical mile buffer zone around the United States and Canadian coastlines to stricter air pollution regulations. As part of this effort, the EPA will require ships to use fuel oil meeting a lower sulfur content standard of 1,000 ppm by January, 2015 within the 200 nautical-mile zone. The ships now use fuel with as much as 40,000 ppm sulfur. The EPA standard for ships would provide a place for the refiners to market off-specification fuel after the 500 ppm sulfur content standard is in effect.

**104. Comment:** ULSD demand is expected to rebound as the U.S. and European economies recover and strengthen. (3, 2)

**Response:** The Department agrees that ULSD demand is likely to rebound when the global economy recovers and strengthens. The final-form rulemaking does not require heating oil to meet ULSD limits.

**105. Comment:** Demand for low sulfur distillates has been rising quickly in rapidly growing countries such as China and India and in some new markets, such as Chile, that have recently begun using ULSD for transportation fuel. The result has been a surge in exports of distillate and rising ULSD prices as the market becomes tighter. Diesel has risen 30 cents per gallon since November 2009 versus 26 cents per gallon for gasoline and about 20 cents per gallon for crude oil prices. (2)

**Response:** The final-form rulemaking does not require heating oil to meet ULSD limits for diesel fuel.

**106. Comment:** Availability of ULSD in the Gulf or Midwest does not translate into availability in Pennsylvania because of Jones Act shipping laws and pipeline constraints. This means additional quantities of distillate fuel required will have to be imported, with additional shipping and distribution environmental impacts. (2)

**Response:** The Department agrees that there are regulatory and logistical constraints in importing ULSD from domestic refineries outside the East Coast. By revising the fuel sulfur content limits and compliance date in the final-form rulemaking, the Department is allowing markets adequate time to transition to the new requirements and January 2016 compliance date.

### **Pipeline Interface**

**107. Comment:** A 500 ppm sulfur content standard for No. 2 fuel oil would allow flexibility to handle jet fuel/ULSD pipeline interfaces after 500 ppm diesel is phased out in 2014. Colonial Pipeline Company's system generates an estimated 6,000,000 barrels of jet fuel/ULSD interface per year. A 15 ppm sulfur content limit in No. 2 fuel oil would eliminate the flexibility for blending the interface into No. 2 fuel oil. This creates inefficiencies in the system, resulting in the interface having to be returned to a refinery for reprocessing. (2, 3, 4)

**Response:** Please see response below for comments 107 through 110.

**108.** Pipeline interfaces between higher sulfur products like jet fuel or kerosene and ULSD would no longer be able to be marketed as a high value fuel and would have to be downgraded to much lower value fuel. (2)

**Response:** Please see response below for comments 107 through 110.

**109. Comment:** The commentator stresses the need for justification of the 15 ppm sulfur content standard for No. 2 fuel oil and recommends a 500 ppm sulfur standard to allow handling of jet fuel/ULSD pipeline interface. (4)

**Response:** Please see response below for comments 107 through 110..

**110. Comment:** A sulfur limit phased in over several years similar to the New Jersey rule will allow pipeline systems and distribution terminals to adjust their facilities and operations to ensure the most efficient operations. (16)

**Response:** Please see response below for comments 107 through 110..

**Response for comments 107 through 110:** The Department acknowledges these concerns and has revised the sulfur content limit to 500 ppm, which should significantly reduce reprocessing and downgrading of fuel oil. Furthermore, not all outlets for "offspec" fuel would be foreclosed. EPA will require ships to use fuel oil meeting a sulfur content limit of 1000 ppm sulfur content by January 2015 within the 200 nautical mile zone. (Ships now use fuel with a sulfur content of as much as 40,000 ppm sulfur.)

## **Emission Reductions and Energy Savings**

**111. Comment:** The estimated emission reduction of 29,000 tons of SO<sub>2</sub> per year from the proposed rulemaking is a substantial decrease in local emissions. (10)

**Response:** Please see response to comments 111-113, below.

**112. Comment:** The commentator notes that the estimated emission reduction of 29,000 tons of SO<sub>2</sub> per year from the proposed rulemaking is not significant when compared to SO<sub>2</sub> emissions of 780,000 metric tons from power plants in Pennsylvania in 2008. (9)

**Response:** Please see response to comments 111-113, below.

**113. Comment:** The environmental benefits of the rule are overstated and do not justify its adoption at this time. (2)

**Response to comments 111-113:** The sulfur content limits in the final-form rulemaking are now estimated to reduce emissions by 25,000 tons of SO<sub>2</sub>. The Department evaluated this rulemaking as part of the regional haze strategy and determined that this reduction is necessary and appropriate. Please also see the response to comment #19 for more information related to the MANE-VU strategy.

**114. Comment:** The commentator believes it would be better to obtain SO<sub>2</sub> emissions reductions from coal-fired electric generating units before requiring a 15 ppm sulfur content limit for No. 2 fuel oil. (9)

**Response:** Reductions from coal-fired electric generating units are being made; additional reductions are expected as a result of federal regulatory requirements such as the Mercury and Air Toxics Standards, the 2010 one-hour standards for SO<sub>2</sub> and nitrogen dioxide, and programs addressing interstate transport in the Eastern United States to reduce PM<sub>2.5</sub> and ozone concentrations. The final-form rulemaking has considered the overall reduction of SO<sub>2</sub> from various sources needed to meet the Commonwealth's Regional Haze obligations and no longer contains requirements for 15 ppm sulfur content. Please also see response to comment # 19 for more information related to the MANE-VU strategy.

**115. Comment:** EPA's proposed area source NESHAPS rule imposes low PM and CO standards on new oil-fired boilers. If finalized, this rule would eliminate potential energy savings in oil-fired boilers from use of lower sulfur fuels. (2)

**Response:** The Department disagrees. The NESHAPS rule does not affect residential furnaces which constitute a large use of commercial fuel oil in the Commonwealth. Therefore, additional energy savings from increased efficiency from use of lower sulfur fuels in these furnaces will be realized.

**116. Comment:** A standard lower than 500 ppm sulfur for No. 2 fuel oil will have unintended negative environmental consequences and will probably raise greenhouse gas emissions and will not increase boiler efficiency. The desulfurization process is energy intensive and will emit GHGs in a larger amount than would be offset by the theoretical increased boiler efficiency. (2)

**Response:** The Department has not required a standard lower than 500 ppm sulfur.

### **Residual Fuel Oil Comments**

**117. Comment:** The commentators oppose the requirement for the sulfur limits in residual fuel oils by 2012. (1, 3, 9)

**Response:** Please see response below for comments 117 through 119.

**118. Comment:** The proposed 0.5% sulfur content standard for No. 5 and No. 6 residual fuel oil is too stringent. Sulfur removal from residual fuels is technologically difficult, very costly and usually economically prohibitive. The proposed standard would potentially lead to export of these fuels instead of treatment to remove sulfur. Alternatively refiners could upgrade the residual oil to lighter distillates. (3, 9)

**Response:** Please see response below for comments 117 through 119.

**119. Comment:** Residual fuel cannot be diluted with distillate oil because this would result in the residual fuel properties being off-specification and would also swell the volume of residual fuel oil to a level that far exceeds the size of the market. In addition, there is a strong economic disincentive to downgrade higher-valued distillate oil to lower-valued residual fuel oil. Use of distillate oil for blending with residual oil would also result in greater supply-demand tightness in the heating oil and transportation diesel markets. (3, 9)

**Response to comments 117 through 119:** The Department disagrees that the 0.5% or 5,000 ppm sulfur content standard is too stringent. Refiners are currently providing residual fuel oil with a 5,000 ppm sulfur content for sale in the Southeast Pennsylvania air basin, as well as several counties in New Jersey (and 3,000 ppm in some New Jersey counties). The MANE-VU states chose the 5,000 ppm residual oil standard as a goal, for a regionally consistent level to reasonably reduce SO<sub>2</sub> emissions from this fuel. New Jersey, Vermont, Maine and Massachusetts have already adopted a 5,000 ppm maximum sulfur content. A market for off-specification residual oil, above a 5,000 ppm sulfur content standard, exists in the marine vessel market. Marine vessels, located in the ocean and away from the United States and Canadian coast, will still be able to be use residual fuel oil with a sulfur content greater than 5,000 ppm. According to the U.S. Energy Information Administration State Energy Data System, in 2010 almost half of all residual oil is used for vessel bunkering purposes (residual oil by its nature and by EPA regulation cannot be used in on-road vehicles or most off-road uses).

[http://www.eia.gov/dnav/pet/pet\\_cons\\_821rsda\\_dcu\\_SPA\\_a.htm](http://www.eia.gov/dnav/pet/pet_cons_821rsda_dcu_SPA_a.htm)

Furthermore, existing provisions regarding emissions of SO<sub>2</sub> from installations where equipment or processes are used to reduce the emissions from burning fuels with a higher sulfur content than specified in the final-form rulemaking, allow higher sulfur content in commercial fuel oil as long as the emissions do not exceed those that would result from the use of commercial fuel oil that meets the applicable maximum allowable sulfur content of this final-form rulemaking.

The use of residual oil use has declined nationally due to a variety of factors; given the relatively small amount of residual oil in use in the Commonwealth for non-transportation purposes, it is unlikely that demand could not be met.

**120. Comment:** The commentator opposes the proposed 0.5% sulfur content standard for No. 5 and No. 6 residual fuel oil. There is a very limited supply of residual fuels nationally, and no refiner will make capital investments or use higher cost low sulfur crudes to produce lower sulfur residual fuel oils because each gallon of residual fuel oil is worth less than the crude oil from which it is refined. The requirement is unsustainable economically and environmentally and will place users of this fuel in Pennsylvania at a severe competitive disadvantage. The size of this market in Pennsylvania means that any reduction has a miniscule impact. (2)

**Response:** The Department agrees that most of the emission reductions in the final-form rulemaking will result from lowering sulfur content in No. 2 rather than from reducing sulfur in residual fuel oils. However, the reductions that are achieved will nonetheless be helpful for reducing regional haze and achieving the other co-benefits of the final-form rulemaking. Because of the small size of the market in Pennsylvania and the number of states that have adopted (or are anticipated to adopt) the sulfur content limits for residual fuel oil in the MANE-VU region, the Department believes that regional consistency is an important consideration for this fuel. Therefore, the residual fuel content limits in the final-form rulemaking have not changed from those in the proposed rulemaking. See also the response for comments 117 through 119 above.

**121. Comment:** The commentator is a refinery that has no hydrotreating capacity to treat Nos. 4, 5 and 6 commercial fuel oil. (1)

**Response:** The Department acknowledges the concern expressed by the commentator related to the current hydrotreating capacity of refiners. The Department revised the compliance date for reducing the allowable sulfur content in commercial fuel oil to allow time for refiners to add hydrotreating capacity.

**122. Comment:** The commentator's No. 6 fuel oil production currently meets or exceeds the proposed 0.5 % sulfur content standard and could be used as a blend stock by others to satisfy the proposed No. 4 and No. 5 oil sulfur standards. (13)

**Response:** The Department thanks the commenter for its support of the sulfur content requirements for No. 4 and No. 5 fuel oil.

**123. Comment:** The IRRC commented that two refinery commentators stated that sulfur removal from heavy fuel oils is technologically difficult, very costly and usually economically cost prohibitive. The IRRC noted that these commentators state that the market reality of the limit to 0.5% sulfur for these fuels is that these refiners will export the fuels rather than make the investments required to meet the 0.5% limit. The IRRC stated that it was concerned that the regulation may disrupt the supply of these fuels in Pennsylvania. The IRRC recommended that the Board review the 0.5% sulfur content standard for No. 5, No. 6 and heavier oils and explain why the limits in the final-form regulation are needed, reasonable and cost-effective. The IRRC requested the same evaluation of, and explanation regarding, the 0.25% limit for No. 4 fuel oil. (17)

**Response:** The Department determined that the 0.25% content standard for No. 4 fuel oil and the 0.5% sulfur content standard for No. 5, No. 6 and heavier oils are needed, reasonable and cost effective for a number of reasons.

Please see the response to comment #19, above, for an explanation why the limits are needed to satisfy the long term strategy for achieving reasonable progress goals for regional haze reduction, in accordance with the Clean Air Act. These sulfur content limits are consistent with the levels the Department agreed to pursue, as necessary and appropriate, in the Commonwealth's regional haze SIP.

Refiners are currently providing residual fuel oil meeting the 0.5% sulfur content for sale in the inner zone of Philadelphia as well as several counties in New Jersey, as this (or an even lower standard) has been the existing sulfur in fuel standard for those counties. See, 25 Pa. Code §123.22(e)(2); and N.J. Admin. Code § 7:27-9.2. The MANE-VU states chose to pursue the 0.25% content standard for No. 4 fuel oil and the 0.5% sulfur content standard for No. 5, No. 6 and heavier oils as a regionally consistent level to reasonably reduce sulfur dioxide emissions from the use of these fuels.

The Department revised the compliance date for reducing the allowable sulfur content in commercial fuel oil to allow time for refiners to add desulfurization capacity. Other options exist, too, to reduce the sulfur content of residual fuel oil, including reprocessing the fuel oil to remove more sulfur and blending lower sulfur fuel oil with higher sulfur fuel oil to meet the 0.25% and 0.5% standards.

**124. Comment:** The commentators suggested that, for areas not currently subject to a 0.5% sulfur standard, a 0.7% sulfur standard for residual fuel oil would offer needed flexibility. (3, 9)

**Response:** The Department appreciates the commentators' support for a residual fuel sulfur standard that lowers sulfur content from the existing levels. See also the response to comment #120.

### **Sell-Through Provision**

**125. Comment:** The commentators commend the Department for clarifying that the ultimate consumer is able to use fuel oil purchased prior to the compliance date of the rulemaking. (8, 9)

**Response:** The Department thanks the commentators for their support.

**126. Comment:** The commentators support the sell-through provision and recommends the provision be extended to terminals in Pennsylvania that store fuel oil for resale. Otherwise, terminals will have to turn over tanks before the compliance date to comply with the new sulfur limits. This could have the impact of a much earlier product roll-out date to meet the proposed standard that could create supply concerns. (9, 13)

**Response:** The Department thanks the commentators for their comments. The Department evaluated the request to extend the sell-through provision to terminals and determined that with the extended compliance date in 2016, the industry should have sufficient time for transition. Furthermore, the adoption of a sell-through provision would lengthen the time for full compliance with the standard and would be difficult to enforce.

### **Temporary Suspension Mechanism**

**127. Comment:** The commentator supports the exemptions provided in the proposed rulemaking as these appropriately recognize extenuating circumstances which could affect the production and/or availability of compliant fuel oil. (8)

**Response:** The Department agrees and is retaining the provision, with revisions, to ensure that residents of the Commonwealth using heating oil are not without the capacity to heat their homes, offices and places of employment in the winter.

**128. Comment:** The commentator expressed concern that the waiver provision could create winners and losers and introduces uncertainty. (9)

**Response:** The Department appreciates the commentator's concerns. Since the sulfur content limit has been increased, the time for compliance extended considerably, and the requirements for obtaining a temporary suspension or increase strengthened such that the granting of any temporary suspension has a high threshold of proof, the Department expects that temporary suspensions or increases will be granted sparingly. The Department is retaining the provision, with revisions, to ensure that residents of the Commonwealth using heating oil are not without the capacity to heat their homes, offices and places of employment in the winter.

**129. Comment:** The commentator opposes the temporary suspension procedures in the proposed rulemaking, expressing concern that the waiver provision could jeopardize the

effectiveness of the proposal in protecting public health and in meeting present and future NAAQS. (10)

**Response:** The granting of any temporary suspension has a high threshold of proof and be used sparingly. Furthermore, the Department revised the final-form rulemaking to include a specific time limit of 60 days. The Department is retaining the provision, with revisions, to ensure that residents of the Commonwealth using heating oil are not without the capacity to heat their homes, offices and places of employment in the winter.

**130. Comment:** The commentator views the temporary suspension procedures as lacking reasonable justification and urges their removal. The proposed sulfur limit is consistent with several national regulations which are already in effect or will be prior to the compliance date. It seems likely that expansion of the products with reduced sulfur by May 2012 will pose no technological hardship upon the refiners which supply the bulk of commercial fuel oil to Pennsylvania end users. When the draft rulemaking was discussed at the February 18, 2010 AQTAC meeting, both the Department and an industry representative acknowledged a lack of anxiety from industry regarding the compliance date. The February draft was approved by AQTAC by unanimous vote, and that draft rulemaking did not contain the temporary suspension procedure. (10)

**Response:** The Department is retaining the provision, with revisions, to ensure that residents of the Commonwealth using heating oil are not without the capacity to heat their homes, offices and places of employment in the winter. See also response to #129 immediately above.

**131. Comment:** The commentator does not believe the temporary suspension provisions would be effective, and they do not represent good policy. First, very little 500 ppm sulfur No. 2 fuel oil is made in the U.S., so it would take a week or more to import. Second, a runout is unlikely to occur. Instead, in a market-based system, the price will increase sharply to attract sufficient supply, resulting in the consumer paying a higher price. Third, the suppliers would have fuel in their tanks that could not be sold in Pennsylvania after the temporary suspension provision is lifted because it would exceed the 15 ppm standard. It takes a relatively small heel of 500 ppm oil to render an entire tank non-compliant with the 15 ppm standard. Lastly, allowing higher sulfur No. 2 fuel oil into the market at the Department's discretion undermines the decisions of refiners that make investments to produce additional supplies of 15 ppm ULSD for the heating oil market. (2)

**Response:** The final-form rulemaking contains revised provisions for the use of a temporary suspension as well as provisions for the maximum sulfur content of No. 2 fuel oil. Therefore, the Department disagrees that this provision would undermine decisions of refiners for additional desulfurization investments. The final-form rulemaking establishes a maximum term of the suspension at 60 days which addresses the length of time it may take for fuel suppliers to obtain compliant fuel. Suppliers would have to make a business decision about whether to purchase and store noncompliant fuel during a temporary suspension, including the issue of fuel left in tanks after the suspension is

limited. The Department is retaining the provision, with revisions, to ensure that residents of the Commonwealth using heating oil are not without the capacity to heat their homes, offices and places of employment in the winter.

**132. Comment:** The IRRC requests explanation of how the temporary suspension mechanism will be effective in addressing a shortage of compliant fuel. The IRRC states that the regulation is not clear regarding the process to be followed, when EPA would complete its review, content required by EPA to grant the request or whether EPA is required to entertain the request. The IRRC questions how an excessive price for compliant fuel would be considered in the determination of whether compliant fuel is “available” and whether the Department has alternatives if EPA refuses to entertain or denies the request. The IRRC requests an explanation of how the temporary suspension mechanism is feasible, reasonable and in the best interest of Pennsylvania. (17)

**Response:** The Department is retaining the temporary suspension provision with revisions to ensure that residents of the Commonwealth using heating oil are not without the capacity to heat their homes, offices and places of employment in the winter. The Department will determine if there are insufficient quantities of compliant fuel prior to granting a temporary suspension or increase in the maximum allowable sulfur content of the fuel. The Department has had operational experience in the multiple factors that must be taken into account in exercising enforcement discretion for fuel requirements in the gasoline program in 25 Pa. Code Chapter 126 Subchapter C (relating to gasoline volatility requirements). In that program, price is not considered to be a direct factor in determining availability; excessive prices, however, can be symptomatic of a significant fuel shortage.

The Department agrees that the temporary suspension provisions needed to be more specific. The final-form rulemaking adds additional criteria for granting a temporary suspension and a 60-day time limit. The additional criteria parallel criteria in the federal Clean Air Act regarding EPA waivers for certain motor vehicle fuel requirements (see 42 U.S.C.A. §7545(c)(4)(C)(ii) and (iii)), to ensure that the suspension is not used to address the lack of prudent planning on the part of fuel suppliers. The 60-day time limit was chosen to be roughly equivalent to a typical homeowner’s frequency of refilling a heating oil tank. A 60-day suspension would allow a homeowner to refill a tank with noncompliant fuel. The final-form rulemaking requires the Department to limit a suspension or increase in maximum allowable sulfur content to the shortest duration in which adequate supplies of compliant fuel oil can be made available.

The Department removed language requiring EPA approval from the final-form rulemaking. For all of these reasons, the temporary suspension provision is feasible, reasonable and in the best interest of Pennsylvania.

### **Sampling and Testing Requirements**

**133. Comment:** Refineries must test and certify that their products meet applicable specifications prior to leaving the refinery. Pipelines maintain the integrity of the product

while transporting the product to terminals. Re-testing in the terminal is an unnecessary burden and should not be required. (3, 9)

**Response:** The Department has revised the sampling and testing requirements to eliminate duplicate testing requirements. Sampling and testing are necessary only if the shipment lacks records regarding sulfur fuel content.

**134. Comment:** The proposed Section 123.22(f)(2) would require “a refinery owner or operator who produces fuel oil intended for use or used in the Commonwealth... to sample, test and calculate the sulfur content of each batch of commercial fuel oil.” Pennsylvania cannot require sampling and testing for out-of-state parties. (9)

**Response:** The Department disagrees. The final-form regulation regulates only a refinery owner or operator selling or transferring product in or into the Commonwealth for use in the Commonwealth. If the refiner wants to ship its product to Pennsylvania, then it is subject to these requirements. The regulated consumers in Pennsylvania require accountability of the sulfur content via the sampling and testing requirements in subsection (f) and the recordkeeping and reporting requirements in subsection (g). Given the revision to the sampling and testing provisions described in the response to comment #137, Pennsylvania customers are unlikely to accept shipment without documentation of sampling and testing because they would have to conduct their own sampling and testing.

**135. Comment:** The commentator supports the Department’s addition of sampling, recordkeeping and reporting requirements. These provisions enhance the Department’s ability to determine that only compliant fuels are being used and give the Department the ability to track batches of fuel oil from refinery production to end usage. (10)

**Response:** The Department agrees that both current industry practices and the final-form rulemaking provide the Department with the ability to track fuel batches.

**136. Comment:** The recordkeeping requirements are practical because no requirements are imposed on residential end users. (10)

**Response:** The Department agrees.

**137. Comment:** The IRRC requests an explanation of why the sampling and testing requirements are needed and would not result in excessive or repetitive sampling and testing of fuels. (17)

**Response:** The Department revised the sampling and testing requirements to eliminate excessive or repetitive sampling and testing provisions, based on comments received during the comment period on the Advance Notice of Final Rulemaking. Sampling and testing would be necessary only if the shipment lacks records regarding sulfur fuel content.