

## Health and Welfare Effects of the Low Sulfur Rule Proposal - From the rule proposal document at 41 N.J.R. 4156

Because of its dominant contribution to the creation of fine particles, sulfate is also an obvious target for reduction in efforts to reduce fine particles emissions. To reduce sulfate requires the reduction of its precursor pollutant, SO<sub>2</sub>. Hence, USEPA, in its final implementation rule for fine particles at 40 CFR 51.1002(c)(1), required the evaluation of control measures for SO<sub>2</sub> in order to reduce fine particles emissions for those areas not in attainment of the annual fine particles National Ambient Air Quality Standards (NAAQS).

### **National Ambient Air Quality Standards (NAAQS)**

The Federal Clean Air Act requires the USEPA to set NAAQS (40 CFR Part 50) for six common air pollutants (also known as criteria pollutants): fine particles, ground level ozone, carbon monoxide, sulfur oxides, nitrogen oxides and lead. These pollutants harm human health and the environment and cause property damage. The USEPA calls these pollutants “criteria” air pollutants because it regulates them by developing human health-based and/or environment-based criteria for setting permissible levels. Limits based on human health are called primary standards. The Clean Air Act also provides that USEPA can establish a second set of limits intended to prevent environmental and property damage, which are referred to as secondary standards.

The primary (health-based) and secondary (welfare-based) standards for fine particles are an annual standard of 15 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) and a 24-hour (daily) standard of 35  $\mu\text{g}/\text{m}^3$  (40 CFR 50.13). The primary (health-based) standard for SO<sub>2</sub> includes an annual standard of 0.030 parts per million (ppm) and a 24-hour standard of 0.140 ppm (40 CFR 50.4). The secondary (welfare-based) standard for SO<sub>2</sub> is 0.500 ppm over a three-hour period (40 CFR 50.5).

The USEPA is currently considering more stringent NAAQS for fine particulates and ozone because of known health effects below the current NAAQS. Both fine particles and ozone formation will be reduced as a result of the proposed rules.

## **Nonattainment of the NAAQS**

When the USEPA establishes or revises a NAAQS, it designates each area of the country as either in attainment or in nonattainment with those NAAQS. States with areas designated as “nonattainment” for any criteria pollutant must develop State Implementation Plans (SIPs) that show how they will bring those areas into attainment of the standard by their designated attainment dates. Once an area meets its attainment date, it can be redesignated as “attainment.” States must submit maintenance plans to the USEPA for these redesignated areas to ensure continued attainment in the areas. These redesignated areas are referred to as “maintenance areas.”

## **Annual Fine Particulate NAAQS**

On December 17, 2004, the USEPA finalized attainment/nonattainment designations for the annual fine particles standard, which became effective on April 5, 2005 (40 CFR 51.1000-1012). Thirteen of New Jersey’s 21 counties were designated as nonattainment for the annual fine particles standard. These counties are associated with two multi-state fine particles nonattainment areas. Ten northern counties are part of the Northern New Jersey/New York/Connecticut (NNJ/NY/CT) nonattainment area and three southern counties are part of the Southern New Jersey/Philadelphia (SNJ/Phila) nonattainment area. New Jersey counties that are in the NNJ/NY/CT nonattainment area are Passaic, Bergen, Morris, Essex, Hudson, Union, Somerset, Middlesex, Monmouth and Mercer Counties. New Jersey counties that are in the SNJ/Phila nonattainment area are Burlington, Camden and Gloucester Counties.

On June 16, 2008, New Jersey submitted to USEPA its fine particles SIP, in accordance with the Federal final implementation rule for fine particles at 40 CFR 51.1000 through 51.1012. This SIP demonstrates how New Jersey will meet and maintain the  $15 \mu\text{g}/\text{m}^3$  annual fine particles standard by 2010. This SIP will also help the State meet other fine particles-related goals (reduced haze and air toxics) that

complement the efforts to attain the annual fine particles NAAQS and further improve air quality in an effort to meet the daily fine particles standard of  $35 \mu\text{g}/\text{m}^3$ .

### **Daily Fine Particulate NAAQS**

As it does with the annual fine particles standard, the USEPA must designate areas that are in nonattainment of the daily fine particles standards. In accordance with 42 USC 7407(d)(1)(A) ((Section 107(d)(1)(A) of the Clean Air Act), for any new NAAQS, each state recommends to the USEPA areas of the state that should be designated as in nonattainment. Although fine particles concentration in New Jersey has improved since December 2004, the air quality in several areas of New Jersey does not meet the daily fine particles standard.

In December 18, 2007, New Jersey recommended to the USEPA that it apply the nonattainment boundaries designated for the annual fine particles standard to the daily fine particles standard, with the addition that Knowlton Township in Warren County be included in the Northampton-Lehigh County (PA) nonattainment area. In response to this request, then-Regional Administrator Steinberg of the USEPA Region 2 advised, in an August 14, 2008 letter, that the USEPA agreed with all of the Department's recommendations, except for the Knowlton Township request. The Department submitted additional justification for this request on September 17, 2008 and October 20, 2008. The USEPA has not finalized the designation for the 24-hour fine particles nonattainment in New Jersey.

### **Regional Haze**

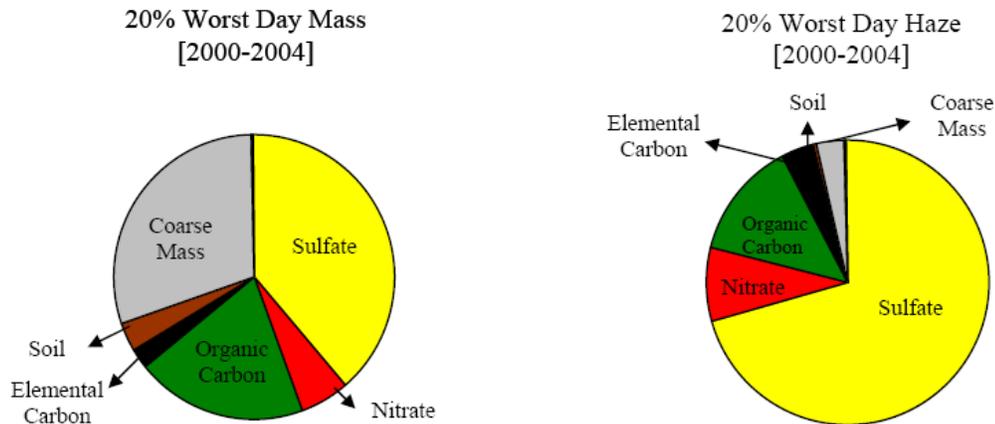
Fine particles are the major cause of visibility impairment in the U.S. Visibility impairment caused by the collection of air pollutants emitted by sources over a broad geographic area is known as regional haze. Some particles and gases can either absorb or scatter light, causing an effect known as "light extinction," resulting in haze. Very small or "fine" particles within the 2.5 micrometer size designation of fine particles ( $\text{PM}_{2.5}$ ) are the most effective at scattering light and are of primary concern from a regional haze

perspective. (Regional Haze and Visibility in the Northeast and Mid-Atlantic States, NESCAUM, January 31, 2001, (2001 NESCAUM Regional Haze Report), <http://www.nescaum.org/topics/regional-haze/regional-haze-documents>)

Monitoring data collected over the last decade at Federally protected Class I sites in the MANE-VU region show that fine particles concentrations, and resulting visibility impairment, are generally highest at those sites near industrial and highly populated areas of the region. Monitoring data indicate that particle concentrations are lower, and visibility conditions are better, at the more northern Class I sites (such as Acadia and Moosehorn, both in Maine) where visibility on the 20 percent clearest days is close to natural, unpolluted conditions. By contrast, visibility at the more southern Class I Brigantine site in New Jersey is substantially impaired, even on the 20 percent clearest days. On the 20 percent haziest days, visibility is substantially impaired throughout the region. (2001 NESCAUM Regional Haze Report)

Sulfate is a significant factor in creating hazy conditions, since it is the dominant contributor to fine particles mass that causes these conditions in the Eastern U.S. Figure 2a below reflects sulfate as the largest contributor to fine particles mass at New Jersey's Class I Brigantine Wilderness Area from 2000 to 2004. Furthermore, the sulfate components of total fine particles mass have an even larger effect when considering the differential visibility impacts of different particle species. Sulfate typically accounts for over 70 percent of estimated particle-induced light extinction at northeastern and mid-Atlantic Class I sites. (NESCAUM's 2006 MANE-VU Regional Haze Contribution Assessment) Different fine particles will scatter light more or less effectively. Sulfate is highly hygroscopic (meaning it has a strong affinity for water), a characteristic that enhances its light-scattering efficiency. By comparison, the light-scattering contribution of organic carbon, which is non-hygroscopic, becomes smaller. Sulfate's relative contribution to total light-extinction is disproportionately larger than its relative contribution to total particle mass. (2001 NESCAUM Regional Haze Report) This is evident from a comparison of Figures 1a and 1b below. On the haziest 20 percent of days, sulfate accounts for approximately one-half to two thirds of total fine particles mass, but is responsible for 70 to 82 percent of estimated particle-induced light extinction at northeastern and mid-Atlantic Class I sites. (NESCAUM's 2006 MANE-VU Regional

Haze Contribution Assessment) Figures 1a and 1b: Role of Sulfate in Visibility Impairment at the Brigantine Wilderness Area (2000-2004)



(SIP for Regional Haze Proposal, September 5, 2008, NJDEP,

<http://www.state.nj.us/dep/baqp/2008%20Regional%20Haze/Regional%20Haze%20SIP%20-%20PROPOSAL.pdf>)

To mitigate the visibility impairment that occurs from SO<sub>2</sub> emissions, MANE-VU states have committed to propose a coordinated course of action that includes the adoption and implementation of a low sulfur fuel strategy that focuses on reducing SO<sub>2</sub> emissions from stationary fuel combustion sources. (Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Course of Action Within MANE-VU Toward Assuring Reasonable Progress, June 20, 2007, (MANE-VU 2007 Statement), <http://www.manevu.org/document.asp?fview=Formal%20Actions#>)

The proposed amendments would implement this strategy in New Jersey in accordance with the USEPA's regional haze regulations, as discussed below.

### **Federal Regional Haze Regulations**

In amendments to the Clean Air Act in 1977, Congress added Section 169A (42 U.S.C. §7491) setting forth the following national visibility goal: "Congress hereby declares as a national goal the prevention of any future, and the remedying of any

existing, impairment of visibility in mandatory Class I Federal areas which impairment results from man-made air pollution.”

The USEPA addressed the problem of visibility impairment in two phases. The 1980 USEPA regulations (40 CFR 51.300-51.307) addressed what was termed “reasonably attributable” visibility impairment or “plume blight.” Reasonably attributable visibility impairment is the result of emissions from one or a few sources that are generally located in close proximity to a specific Class I area. “Plume blight” describes a discrete or coherent plume of pollution moving across the horizon or across a scenic view.

When it amended the Clean Air Act in 1990, Congress added Section 169B (42 U.S.C. § 7492) to strengthen and reaffirm the national visibility goal. Section 169B(e) calls for the USEPA “to carry out the Administrator’s regulatory responsibilities under [Section 169A], including criteria for measuring ‘reasonable progress’ toward the national goal.” Congress also included in Section 169B authorization for further research and regular assessments of the progress made. In 1993, the National Academy of Sciences concluded that “current scientific knowledge is adequate and control technologies are available for taking regulatory action to improve and protect visibility.”

The second phase of the USEPA’s attempts to reduce visibility impairment in national parks and wilderness areas was the adoption of the Federal Regional Haze Rule in 1999. The Regional Haze Rule slightly modified 40 CFR 51.300 through 51.307, including the addition of definitions in 40 CFR 51.301, and added new 40 CFR 51.308 and 51.309 to address regional haze visibility impairment on a national level.

The goal of the Federal Regional Haze Rule is to improve visibility to natural background levels by the year 2064, in all Federally designated Class I areas (42 U.S.C. 7492). This goal is to be achieved by requiring all states to periodically conduct an analysis of available reasonable measures and implement these measures. The analysis and measures must be included in a SIP. States with Class I areas are further required to establish Reasonable Progress Goals for Class I areas within their borders, using the results of the analysis of reasonable measures as a way to demonstrate movement towards the national goal of the absence of all manmade pollution from national parks and wilderness areas by 2064. States are required to reassess the progress toward the 2064

goal in five- and 10-year increments, with the first progress assessment occurring in 2013, for the first milestone year 2018 (40 CFR 51.308(f) and (g)). The five-year reassessment of progress is intended to keep the states on target to meet each 10-year goal established for the area.

### **State and Regional Efforts to Address Regional Haze**

In response to the requirements of the USEPA Regional Haze Rule, New Jersey proposed its regional haze air quality protection plan on June 16, 2008. (SIP for Regional Haze Proposal, September 5, 2008) This first New Jersey regional haze air quality protection plan includes a reasonable progress goal to improve visibility levels by 2018, in accordance with design standards established by the USEPA Regional Haze Rule. The Department anticipates that it will achieve the goal through a combination of reasonable control measures for New Jersey, and similar controls of sulfate emissions from sources in the other states in the region.

The Department consulted with the other Regional Planning Organizations and the contributing members of MANE-VU regarding the reasonableness of the measures contained in the State's SIP. To address the impact on Federally protected Class I areas, MANE-VU members have agreed to pursue a coordinated course of action. The MANE-VU agreement is designed to ensure reasonable progress toward preventing any future impairment of visibility in Class I areas, and remedying any existing impairment of visibility in Class I areas. This includes pursuing the adoption and implementation of a low sulfur fuel strategy in the MANE-VU region. (MANE-VU 2007 Statement)

To meet its commitment to the MANE-VU agreement, New Jersey proposed a low sulfur fuel strategy in its June 18, 2008 Regional Haze SIP. This strategy is also included in New Jersey's June 16, 2008 Fine Particles Attainment Demonstration SIP to attain and maintain the fine particles NAAQS.

The MANE-VU agreement contains an effective date of 2012 for sulfur-in-fuel standards. In the within proposed rules, New Jersey proposes an effective date of 2014, in response to feedback from the fuel oil industry on the time required to lower the sulfur in fuel regionally and in consultation with the other MANE-VU states. Otherwise, the

proposed sulfur-in-fuel limits are consistent with those contained in the MANE-VU low sulfur fuel oil strategy for the states in the inner zone, which includes New Jersey.

New Jersey's proposed limits are as follows: 500 ppm for No. 2 and lighter (distillate oil), 2,500 ppm for No. 4 (residual oil), and 3,000 ppm and 5,000 ppm for Nos. 5, 6 and heavier (residual oil), depending upon the zone. Measured as percentages, these maximum limits are 0.05 percent, 0.25 percent, 0.30 percent and 0.50 percent, respectively. The Department also proposes to further reduce the maximum sulfur content of No. 2 distillate oil in 2016 to 15 ppm (0.0015 percent).

In some counties and municipalities in New Jersey, the existing standards already meet the proposed MANE-VU limits for heavy oil (Nos. 5, 6 and heavier residual oil). That is, the maximum sulfur content standard for Nos. 5, 6 and heavier fuel oil is already 3,000 ppm for Zones 4 and 6, and 5,000 ppm for Zone 3. Existing N.J.A.C. 7:27-9 establishes maximum sulfur content standards and equivalent output-based performance standards for the six areas of New Jersey referred to as Zones 1 through 6, based on the level of SO<sub>2</sub> nonattainment of the zone at the time the rules were promulgated. To ensure maintenance of the SO<sub>2</sub> standard, the Department is proposing to retain the more stringent maximum sulfur content standard of 3,000 ppm for heavy oil in Zone 4 in the northern part of the State (Bergen, Essex, Hudson, Middlesex, Monmouth, Morris, Passaic, Somerset, and Union Counties), and in Zone 6, in the southern part of the State (the Townships of Bass River, Shamong, Southampton, Tabernacle, Washington and Woodland in Burlington County, and Waterford Township in Camden County). This is consistent with the MANE-VU limits for this grade of oil, which range from 3,000 to 5,000 ppm. Also, consistent with the proposed new maximum allowable sulfur-in-fuel standards, the Department proposes commensurate new maximum allowable SO<sub>2</sub> emissions standards for each grade of fuel oil.

Since 2004, the Department has participated in stakeholder meetings conducted by Northeast States for Coordinated Air Use Management (NESCAUM) and MANE-VU to solicit input from industrial and environmental advocates on how to effectively implement a regional low and ultra-low sulfur heating oil program. The major stakeholders included representatives from the heating oil industry, including oil-heat distributors, wholesalers and refiners, other states, NESCAUM, MANE-VU and the

Ozone Transport Commission. The Department also met on a number of occasions with members of the New Jersey's regulated fuel oil community to generally discuss what would be required for New Jersey facilities to comply with the lower sulfur in fuel oil standards.