

**FACT SHEET**  
**REVISIONS TO THE PRIMARY NATIONAL AMBIENT AIR QUALITY STANDARD,**  
**MONITORING NETWORK, and DATA REPORTING REQUIREMENTS for SULFUR**  
**DIOXIDE**

**SUMMARY OF ACTION**

- On June 2, 2010, EPA strengthened the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO<sub>2</sub>). The revised standard will improve public health protection, especially for children, the elderly, and people with asthma. These groups are susceptible to the health problems associated with breathing SO<sub>2</sub>.
- EPA is revising the primary SO<sub>2</sub> standard by establishing a new 1-hour standard at a level of 75 parts per billion (ppb). EPA's evaluation of the scientific information and the risks posed by breathing SO<sub>2</sub> indicate that this new 1-hour standard will protect public health by reducing people's exposure to high short-term (5-minutes to 24-hours) concentrations of SO<sub>2</sub>.
- The Agency is revoking the two existing primary standards of 140 ppb evaluated over 24-hours, and 30 ppb evaluated over an entire year because they will not add additional public health protection given a 1-hour standard at 75 ppb. Also, there is little health evidence to suggest an association between long-term exposure to SO<sub>2</sub> and health effects.
- EPA is not revising the secondary SO<sub>2</sub> NAAQS, set to protect public welfare (including effects on soil, water, visibility, wildlife, crops, vegetation, national monuments and buildings). EPA is assessing the need for changes to the secondary standard under a separate review.
- EPA estimates that the revised standard will yield health benefits valued between \$13 billion and \$33 billion, including reduced hospital admissions, emergency room visits, work days lost due to illness, and cases of aggravated asthma and chronic bronchitis, among other benefits.
- The revised SO<sub>2</sub> standard includes a new "form." The form is the air quality statistic that is compared to the level of the standard to determine if an area meets the standard. The new form is the 3-year average of the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour average concentrations.
- EPA is also revising the ambient air monitoring requirements for SO<sub>2</sub>. States will need to make adjustments to the existing monitoring network in order to ensure that monitors meeting the network design regulations for the new 1-hour SO<sub>2</sub> standard are sited and operational by January 1, 2013.
- EPA is describing an anticipated approach for implementing the new 1-hour SO<sub>2</sub> standard

that would use monitoring and refined dispersion modeling of SO<sub>2</sub> sources to determine compliance with the new standard.

- This final rule also changes the Air Quality Index to include the revised SO<sub>2</sub> standard.

## **SO<sub>2</sub> AND PUBLIC HEALTH**

- Current scientific evidence links health effects with short-term exposure to SO<sub>2</sub> ranging from 5-minutes to 24-hours. Adverse respiratory effects include narrowing of the airways which can cause difficulty breathing (bronchoconstriction) and increased asthma symptoms. These effects are particularly important for asthmatics during periods of faster or deeper breathing (e.g., while exercising or playing).
- Studies also show an association between short-term SO<sub>2</sub> exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses--particularly in at-risk populations including children, the elderly and asthmatics.
- EPA's National Ambient Air Quality Standard for SO<sub>2</sub> is designed to protect against exposure to the entire group of sulfur oxides (SO<sub>x</sub>). SO<sub>2</sub> is the component of greatest concern and is used to represent the larger group of gaseous sulfur oxides. Other gaseous sulfur oxides (e.g., SO<sub>3</sub>) are found in the atmosphere at concentrations much lower than SO<sub>2</sub>.
- Emissions that lead to high concentrations of SO<sub>2</sub> generally also lead to the formation of other SO<sub>x</sub>. Control measures that reduce SO<sub>2</sub> can generally be expected to reduce people's exposure to all gaseous SO<sub>x</sub>. Reducing SO<sub>2</sub> emissions is expected to have the important co-benefit of reducing the formation of fine sulfate particles that pose significant public health threats.
- SO<sub>x</sub> can react with other compounds in the atmosphere to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. EPA's NAAQS for particulate matter are designed to provide protection against exposures that cause these health effects.

## **REVISING THE SO<sub>2</sub> MONITORING NETWORK**

- In the final rule, EPA is requiring fewer monitors than proposed, because the Agency plans to use a hybrid approach combining air quality modeling and monitoring to determine compliance with the new SO<sub>2</sub> health standard.
- For a short-term 1-hour SO<sub>2</sub> standard, it is more technically appropriate, efficient, and effective to use modeling as the principal means of assessing compliance for medium to larger sources, and to rely more on monitoring for groups of smaller sources and sources not

as conducive to modeling. Such an approach is consistent with EPA's historical approach and longstanding guidance for SO<sub>2</sub>.

- EPA is setting specific minimum requirements that inform states on where they are required to place SO<sub>2</sub> monitors. Approximately 163 SO<sub>2</sub> monitoring sites nationwide are required by this rulemaking.
- The final monitoring regulations require monitors to be placed in Core Based Statistical Areas (CBSAs) based on a population weighted emissions index for the area. The final rule requires:
  - 3 monitors in CBSAs with index values of 1,000,000 or more;
  - 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000; and
  - 1 monitor in CBSAs with index values greater than 5,000.
- During 2009, approximately 470 SO<sub>2</sub> monitors were operating in the network. Some of these existing SO<sub>2</sub> monitors meet the siting requirements of this rule. EPA currently estimates that 41 new monitoring sites will need to be established, nationwide. States may, with EPA approval, relocate some of the existing SO<sub>2</sub> monitors.
- All newly sited SO<sub>2</sub> monitors must be operational by January 1, 2013.
- EPA is also making changes to data reporting requirements for SO<sub>2</sub>. State and local agencies are required to report two data values for every hour of monitoring conducted:
  - the 1-hour average SO<sub>2</sub> concentration; and
  - the maximum 5-minute block average SO<sub>2</sub> concentration of each hour.
- EPA Regional Administrators have the authority to require additional monitoring in certain circumstances, such as in areas with SO<sub>2</sub> sources that are not conducive to modeling, areas with multiple SO<sub>2</sub> sources with overlapping plumes, or in areas with susceptible and vulnerable populations.

#### **ANTICIPATED APPROACH TO IMPLEMENTING THE NEW SO<sub>2</sub> STANDARD**

- In addition to revising the SO<sub>2</sub> primary standard and finalizing associated ambient air quality monitoring requirements, EPA is providing initial guidance on its plan for implementing the new 1-hour SO<sub>2</sub> standard.
- EPA plans to use refined dispersion modeling to determine if areas with sources that have the potential to cause or contribute to a violation of the new SO<sub>2</sub> standard can comply with the standard. Dispersion modeling simulates how air pollutants spread throughout the atmosphere and is used to estimate the concentration of air pollutants from sources such as industrial plants or highways.

- EPA intends to complete designations within two years of promulgation of the revised SO<sub>2</sub> standard (June 2012.)
- EPA anticipates initially designating areas based on 2008-2010 monitoring data, or refined dispersion modeling results if provided by the state. Areas which violate the standard would be designated as “nonattainment”. Areas that have both monitoring data and appropriate refined modeling results showing no violations would be designated as “attainment.” All other areas would be designated as “unclassifiable.”
- States with areas designated nonattainment in 2012 would need to submit state implementation plans (SIPs) to EPA by early 2014 outlining actions that will be taken to meet the standards as expeditiously as possible, but no later than August 2017.
- For all other areas, states would need to submit to EPA “maintenance” or infrastructure SIPs by June 2013, 3 years following the promulgation of the new SO<sub>2</sub> standard. EPA expects these state plans would:
  - demonstrate, through refined air quality modeling, that all sources contributing to monitored and modeled violations of the new standard, or that have the potential to cause or contribute to a violation, will be sufficiently controlled to ensure timely attainment and maintenance of the new SO<sub>2</sub> standard;
  - account for SO<sub>2</sub> reductions that would result from compliance with national and regional regulations, including emissions controls for electric utilities and industrial boilers; and
  - include as necessary, enforceable emissions limitations, timetables for compliance, and appropriate testing/reporting to assure compliance.

EPA believes that these areas should plan to demonstrate attainment and maintenance of the standard as expeditiously as possible, but no later than August 2017, the date nonattainment areas must meet the standard.

- EPA intends to issue guidance on conducting refined air quality dispersion modeling and implementing the new SO<sub>2</sub> standard. Examples of the issues that this guidance will address include how to translate the modeling results into a form appropriate for comparison to the new standard, and how to identify and appropriately assess the air quality impacts of SO<sub>2</sub> sources that may potentially cause or contribute to a violation of the new standard. EPA will provide an opportunity for public comment on the guidance before issuing it in final form.
- EPA will be making designations for all areas in the country, both for state lands and for Indian country. Unlike states, tribes are not obligated to submit designation recommendations but are invited to participate in the designations process by submitting a designation recommendation for Indian country and/or by engaging in formal or informal consultation with EPA and states.
- EPA also is finalizing a strategy for maintaining public health protection during the transition from the existing SO<sub>2</sub> standard to the revised SO<sub>2</sub> standard. In most areas, the 1-hour and annual SO<sub>2</sub> standards will remain in effect for 1-year after designations for the new 1-hour standard take effect. For areas currently designated nonattainment for SO<sub>2</sub> or with

unresolved issues relating to their plans to attain and maintain the standards, the existing standards will remain in effect until they submit and EPA approves a plan meeting the requirements of the new 1-hour standard.

- Areas that do not comply with the standard will likely use a combination of source-specific, statewide and national control measures to reduce SO<sub>2</sub> emissions.

## **BACKGROUND**

- The Clean Air Act requires EPA to set national ambient air quality standards for especially widespread air pollutants listed by EPA, often called “criteria pollutants.” Currently, sulfur oxides and five other major pollutants are criteria pollutants. The others are ozone, lead, carbon monoxide, nitrogen oxides, and particulate matter. The law also requires EPA to review the standards periodically and revise them if appropriate to ensure that they provide requisite health and environmental protection, and to update those standards as necessary.
- Sulfur dioxide is one of a group of highly reactive gases known as “oxides of sulfur.” The largest sources of SO<sub>2</sub> emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent). Smaller sources of SO<sub>2</sub> emissions include industrial processes such as extracting metal from ore, and the burning of high-sulfur fuels by locomotives, large ships, and non-road equipment. SO<sub>2</sub> is linked with a number of adverse effects on the respiratory system.
- EPA first set NAAQS for SO<sub>2</sub> in 1971. EPA set a 24-hour primary standard at 140 ppb and an annual average standard at 30 ppb (to protect health). EPA also set a 3-hour average secondary standard at 500 ppb (to protect public welfare).
- The last review of the SO<sub>2</sub> NAAQS was completed in 1996 and the Agency chose not to revise the standards at that time.
- In the last review, EPA also considered, but did not set, a 5-minute SO<sub>2</sub> NAAQS to protect asthmatics at elevated ventilation rates from bronchoconstriction and other respiratory symptoms associated with 5-10 minute peak concentrations of SO<sub>2</sub>.
- The decision not to set a 5-minute standard in 1996 was challenged successfully by the American Lung Association and remanded back to EPA in 1998; no formal action with regard to the remand has been taken until this final rule.
- Under a judicial consent decree, EPA completed this review of the primary SO<sub>2</sub> standard on June 2, 2010. The current review focuses only on the primary SO<sub>2</sub> standard. EPA is addressing the secondary standard for SO<sub>2</sub> as part of a separate review.
- Currently, there are several areas designated as nonattainment for the primary SO<sub>2</sub> NAAQS, although none of them currently exceeds the standards. There is also one area in Montana

that must revise its State Implementation Plan to address emissions that may be contributing to violations of the standard.

- This revised primary standard for SO<sub>2</sub> is consistent with the advice and recommendations of EPA's principal independent science advisors on National Ambient Air Quality Standards: the Clean Air Scientific Advisory Committee.

## **FOR MORE INFORMATION**

- To download a copy of the final rule, go to EPA's Web site at:  
<http://www.epa.gov/air/sulfurdioxide>
- Today's rule and other background information are also available either electronically at <http://www.regulations.gov>, EPA's electronic public docket and comment system, or in hardcopy at the EPA Docket Center's Public Reading Room. (Docket ID No. EPA-HQ-OAR-2007-0352)
- The Public Reading Room is located in the EPA Headquarters, Room Number 3334 in the EPA West Building, located at 1301 Constitution Avenue, NW, Washington, DC. Hours of operation are 8:30 a.m. to 4:30 p.m. eastern standard time, Monday through Friday, excluding Federal holidays.
- Visitors are required to show photographic identification, pass through a metal detector, and sign the EPA visitor log. All visitor materials will be processed through an X-ray machine as well. Visitors will be provided a badge that must be visible at all times.