

# Revisions to NAAQS –Data Handling and Interpretation NO<sub>2</sub>/SO<sub>2</sub> Update

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# Overview

- Recent primary NAAQS forms and ranges
- Addition of Appendix S (NO<sub>2</sub>) and Appendix T (SO<sub>2</sub>) – data handling

# Revisions to NO<sub>2</sub> and SO<sub>2</sub> NAAQS

- On January 22, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO<sub>2</sub>).
- On June 2, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO<sub>2</sub>).
- These new standards will protect public health, including the health of sensitive populations – people with asthma, children and the elderly.
- These actions do not impact either the NO<sub>2</sub> or SO<sub>2</sub> secondary standards, set to protect public welfare.
- Under a separate review, EPA is considering the need for changes to these secondary standards (to be completed in 2012).

# NO<sub>2</sub> Forms and Ranges

- EPA is setting a new 1-hour NO<sub>2</sub> standard at the level of 100 parts per billion (ppb). This level defines the maximum allowable concentration anywhere in an area. It will protect against adverse health effects associated with short-term exposure to NO<sub>2</sub>, including respiratory effects that can result in admission to a hospital.
- In addition to establishing an averaging time and level, EPA also is setting a new “form” for the standard. The form is the air quality statistic used to determine if an area meets the standard. The form for the 1-hour NO<sub>2</sub> standard, is the 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations.
- EPA also is retaining, with no change, the current annual average NO<sub>2</sub> standard of 53 ppb.

# SO<sub>2</sub> Forms and Ranges

- EPA is setting a new 1-hour SO<sub>2</sub> standard at the level of 75 parts per billion (ppb). This level defines the maximum allowable concentration anywhere in an area. It will protect against adverse health effects associated with short-term exposure to SO<sub>2</sub>, including respiratory effects that can result in admission to a hospital.
- In addition to establishing an averaging time and level, EPA also is setting a new “form” for the standard. The form is the air quality statistic used to determine if an area meets the standard. The form for the 1-hour SO<sub>2</sub> standard, is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.
- EPA replaced the existing annual and 24-hour primary SO<sub>2</sub> standards with a new 1-hour SO<sub>2</sub> standard set at 75 parts per billion (ppb) to better protect public health by reducing people’s exposure to high short-term (5-minutes to 24 hours) concentrations of SO<sub>2</sub>.

# Data Handling NO<sub>2</sub> Appendix S

## IV. Appendix S—Interpretation of the Primary NAAQS for Oxides of Nitrogen (Nitrogen Dioxide)

### 1. General

### 2. Requirements for Data Used for Comparisons With the NO<sub>2</sub> NAAQS and data Reporting Considerations

#### a) FRM/FEM

#### b) Primary Monitor

#### c) Reporting Units – ppb, one place after decimal, truncate rest

### 3. Comparisons With the NO<sub>2</sub> NAAQS

#### 1) Annual Standard

#### 2) 1-hour Primary NO<sub>2</sub> NAAQS

##### a) <=100 ppb

b) 75% of the hours in a day (including exceptional event hours), 75% of the days in a quarter, all 4 quarters per year, and all 3 years in the 3-year design value period.

##### c) i) 75% of the days in a quarter have at least 1 hour and DV is above level.

##### ii)A) when substitution below level qualifies

##### B) how to do substitution test

##### iii)A) when substitution below above qualifies

##### B) how to do substitution test

### 4. Rounding Conventions

### 5. Calculation Procedures for the Primary NO<sub>2</sub> NAAQS

Source: **Federal Register** / Vol. 75, No. 26 / Tuesday, February 9,  
2010 / Rules and Regulations

Available at:

<http://www.epa.gov/ttn/naaqs/standards/nox/fr/20100209.pdf>

# Data Handling SO<sub>2</sub> Appendix T

## IV. Appendix T—Interpretation of the Primary NAAQS for Oxides of sulfur (Sulfur Dioxide)

### 1. General

### 2. Requirements for Data Used for Comparisons With the SO<sub>2</sub> NAAQS and data Reporting Considerations

#### a) FRM/FEM

#### b) Primary Monitor

#### c) Reporting Units – ppb, one place after decimal, truncate rest

### 3. Comparisons With the 1-hour Primary SO<sub>2</sub> NAAQS

#### a) $\leq 75$ ppb

b) 75% of the hours in a day (including exceptional event hours), 75% of the days in a quarter, all 4 quarters per year, and all 3 years in the 3-year design value period.

#### c) i) 75% of the days in a quarter have at least 1 hour and DV is above level.

#### ii) A) when substitution below level qualifies

#### B) how to do substitution test

#### iii) A) when substitution below above qualifies

#### B) how to do substitution test

### 4. Rounding Conventions

### 5. Calculation Procedures for the Primary NO<sub>2</sub> NAAQS

Available at:

[http://www.epa.gov/ttn/naaqs/standards/so2/s\\_so2\\_cr\\_fr.html](http://www.epa.gov/ttn/naaqs/standards/so2/s_so2_cr_fr.html)

# Completeness Requirements

- 75% of the hours in a day (including exceptional event hours),
- 75% of the days in a quarter,
- all 4 quarters per year,
- all 3 years in the 3-year design value period.
- However, if 75% of the days in a quarter have at least 1 hour and DV is above level of the standard then it is still considered complete.

# Substitution Test Below Standard

- When substitution below level qualifies
  - When an incomplete design value is below the level of the standard, a test design value may be calculated by substituting high daily 1-hour max values and calculating a test design value.
  - Must have at least 200 days across 3 matching Qs (about 75%) that had complete days (including ee's).
    - But incomplete days can be used to find the high value to substitute.
- How to do substitution test
  - For the below level test, a Q must have at least 50% data capture (including ee's).
  - Identify the highest daily 1-hour max for each quarter (excluding ee's) and including incomplete days.
    - Substitute this value into the Q to make it 100% complete and calculate the test design value
    - If the test design value is below the standard, then the incomplete design value is valid, if not then it is incomplete.

# Substitution Test Above Standard

- When substitution above level qualifies
  - When an incomplete design value is above the level of the standard, a test design value may be calculated by substituting low daily 1-hour max values and calculating a test design value.
  - Must have at least 200 days across 3 matching Qs (about 75%) that had complete days (including ee's).
    - But only complete days can be used to find the low value to substitute.
- How to do substitution test
  - For the below level test, any Q below 75% data capture (including ee's).
  - Identify the lowest daily 1-hour max for each quarter (excluding ee's) but only from complete days.
    - Substitute this value into the Q to make it 75% complete and calculate the test design value
    - If the test design value is above the standard, then the incomplete design value is valid, if not then it is incomplete.

# Rounding Conventions

- Hourly measurements should be reported to AQS in ppb to at most one place after the decimal, with additional digit to the right truncated not rounded.
- Daily maximum 1-hour values and therefore the annual percentiles of those daily values are not rounded.
- The 1-hour primary standard design value is calculated and then rounded to the nearest whole number or 1 ppb.

The annual percentile is the higher of the following two procedures:

### Procedure 1

- Determine Number of days  $\geq 75\%$  complete (including ee's).
- From the complete days select the daily 1-hour maximum (excluding ee's).
- Sort the daily 1-hour maximum by site by year.
- Use the left column of the table to determine the number of days with valid data. The right hand column identifies the rank of the annual percentile value in the descending sorted list of daily values.

### Procedure 2

- Determine Number of days with at least 1 hourly value (including ee's).
- From all of the days select the daily 1-hour maximum (excluding ee's).
- Sort the daily 1-hour maximum by site by year.
- Use the left column of the table to determine the number of days with valid data. The right hand column identifies the rank of the annual percentile value in the descending sorted list of daily values.

## NO<sub>2</sub> Table

Annual number of days with valid data for year “y” (cn <sub>y</sub> )	<b>P<sub>0.98,y</sub></b> is the nth maximum value of the year, where n is the listed number
1–50	1
51-100	2
101-150	3
151-200	4
201-250.	5
251-300	6
301-350	7
351-366	8

## SO<sub>2</sub> Table

**Table 1**

Annual number of days with valid data for year “y” (cn <sub>y</sub> )	<b>P<sub>0.99,y</sub></b> is the nth maximum value of the year, where n is the listed number
1–100	1
101-200	2
201-300	3
301-366	4

# NO<sub>2</sub> 2007-2009 Design Values

- The county level has a sheet sorted by descending ppb showing 1 county above 100 ppb.
- The annual 98th percentile daily maximum 1-hour value is averaged over 2007-2009 for each site.
- The county level design value is the maximum design value of all the sites in the county.
- Completeness requirements for the NO<sub>2</sub> proposed daily 1-hour maximum standard 3-year design value are:
  - 75% of the hours in a day, 75% of the days in a quarter, all 4 quarters per year, and all 3 years in the 3-year design value period.
- Even if days are incomplete, a design value is still considered valid if there is a violation.
- Lastly, the substitution tests were performed on qualifying sites for the 07-09 design values but not any sites in lists made for 06-08 (data presented for the final).

# SO<sub>2</sub> 2007-2009 Design Values

- The county level has a sheet sorted by descending ppb showing 60 counties above 75 ppb.
- The annual 99th percentile daily maximum 1-hour value is averaged over 2007-2009 for each site.
- The county level design value is the maximum design value of all the sites in the county.
- Completeness requirements for the SO<sub>2</sub> proposed daily 1-hour maximum standard 3-year design value are:
  - 75% of the hours in a day, 75% of the days in a quarter, all 4 quarters per year, and all 3 years in the 3-year design value period.
- Even if days are incomplete, a design value is still considered valid if there is a violation.
- Lastly, the substitution tests were performed on qualifying sites for the 07-09 design values but not any sites in lists made for 05-07 (data use for the RIA) or 06-08 (data presented for the proposal).

# Contact Information

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