

Question 20.2

Topic: Monitoring Requirements for SO₂ and Heat Input Rate

Question: What are the SO₂ mass emission rate and heat input rate monitoring requirements for Acid Rain Program affected units that are in a subtractive stack configuration?

Answer: Sections 75.16(b)(2)(ii)(B) and 75.16(e) of Part 75 specify the SO₂ mass emission rate and heat input rate monitoring requirements for the common stack and for the nonaffected units in a subtractive stack configuration.

These rule provisions are summarized in Sections A, B, and C, below. The hourly SO₂ mass emission rates and heat input rates described in Sections A, B and C are calculated using the applicable equations from Appendix F or Appendix D to Part 75:

A. Main Common Stack Hourly SO₂ and Heat Input Rate Monitoring Requirements

The owner or operator of an Acid Rain-affected facility with a subtractive stack configuration must monitor hourly SO₂ mass emission rate and heat input rate at the common stack using the following methodologies:

- (1) For SO₂ mass emission rate: an SO₂ CEM and a flow monitor; and
- (2) For heat input rate: a stack flow monitor and a diluent gas (CO₂ or O₂) monitor.

B. Nonaffected Unit(s) Hourly SO₂ Monitoring Requirements

The owner or operator must determine the hourly SO₂ mass emission rate (in lb/hr) at the nonaffected unit(s) using one of the methodologies below:

- (1) Install an SO₂ CEM and a flow monitor in the duct from each nonaffected unit to the common stack; or
- (2) If the emissions from two or more nonaffected units in the subtractive stack configuration are combined prior to discharging through the main common stack, you may monitor the combined nonaffected unit SO₂ emissions at a single location, defined as a second common stack, in lieu of installing separate CEMS on each unit; or
- (3) For nonaffected gas or oil-fired units, you may use Appendix D SO₂ mass emission rate estimation procedures based on fuel flow rate measurements and fuel sampling.

C. Nonaffected Unit(s) Hourly Heat Input Rate Monitoring Requirements

The owner or operator must determine the hourly heat input rate at each nonaffected unit using one of the following methodologies:

(1) You may install a flow monitor and a diluent gas monitor in the duct from each nonaffected unit to the common stack; or

(2) If the flue gases from two or more nonaffected units in the subtractive stack configuration are combined prior to discharging through the main common stack, you may monitor the combined heat input rate at a single location (designated as a secondary common stack) in lieu of separately monitoring each unit. If this alternative is chosen, you must apportion the heat input rate measured at the secondary common stack to the individual nonaffected units; or

(3) In lieu of directly monitoring the heat input rate(s) of the nonaffected unit(s), you may opt to monitor heat input rate at the main common stack, only. This option is only allowed if all of the units exhausting to the common stack:

(i) Combust the same type of fuel; and

(ii) Use the same F factor.

Note that when this option is selected, the heat input rate measured at the main common stack is a *combined* rate, representing both the affected and nonaffected units. Therefore, you must apportion the main common stack heat input rate to *all* of the units (affected and nonaffected) in the subtractive stack configuration; or

(4) For nonaffected gas and oil-fired units, you may use Appendix D heat input rate estimation procedures based on fuel flow rate measurements and fuel sampling.

(Note: For a common pipe configuration, you must apportion the heat input rate measured at the common pipe to the individual nonaffected units.)

See Question 20.4 for a more detailed discussion of heat input rate apportionment in subtractive stack configurations.

D. Affected Unit(s) Hourly SO₂ Monitoring Requirements

Use Equation SS-1a (see Table 20-1) to determine the total hourly SO₂ mass emissions (in lb) for the affected unit(s) by subtraction. In Equation SS-1a, use the measured SO₂ mass emission rates from Sections A and B, above, along with the unit and stack operating times. When the combined emissions from two or more nonaffected units are monitored at a single location, then, for those units, replace the term $SO_{2\text{nonaff}} t_{\text{nonaff}}$ in Equation SS-1a with the term $SO_{2\text{CS}} * t_{\text{CS}}$, where $SO_{2\text{CS}}$ is the combined SO₂ emission rate for the nonaffected units and t_{CS} is the stack operating time at the monitored location (which is designated as a secondary common stack).

If any of the nonaffected units are oil or gas-fired and receive fuel from a

common pipe, then, for those units, replace the expression $SO2_{nonaff} t_{nonaff}$ in Equation SS-1a with the expression $SO2_{CP} t_f$, where $SO2_{CP}$ is the measured hourly SO_2 mass emission rate at the common pipe and t_f is the fuel usage time at the common pipe.

After determining the total hourly SO_2 mass emissions for the affected units, use Equation SS-1b (see Table 20-1) to apportion the total hourly SO_2 mass emissions to the individual affected units.

Ensure that Equations SS-1a and SS-1b (as applicable) are implemented on an hourly basis in the data acquisition and handling system (DAHS), so that the cumulative SO_2 mass emissions reported are correct. Keep records of all hourly SO_2 mass emissions values for the affected units and use these values to calculate the quarterly and cumulative SO_2 mass emissions (in tons) from the affected units. However, do *not* report any SO_2 mass emission rates (in lb/hr) for the affected units.

Table 20-1: Hourly SO_2 Mass Emissions Formulas for the Affected Unit(s)

Equation Code	Formula	Where
SS-1a	$SO2M_{aff-tot} = SO2_{CS} t_{CS} - \sum_{All-nonaff} SO2_{nonaff} t_{nonaff}$	$SO2M_{aff-tot}$ = Total hourly SO_2 mass emissions from the affected unit(s) (lb) $SO2_{CS}$ = Hourly SO_2 mass emission rate measured at the common stack (lb/hr) $SO2_{nonaff}$ = Hourly SO_2 mass emission rate measured at a particular nonaffected unit (lb/hr) t_{CS} = Operating time for the common stack (hr) t_{nonaff} = Operating time for a particular nonaffected unit (hr)
SS-1b	$SO2M_{aff-i} = SO2M_{aff-tot} \frac{L_{aff-i} t_{aff-i}}{\sum_{all-affected} L_{aff-i} t_{aff-i}}$	$SO2M_{aff-i}$ = Hourly SO_2 mass emissions from a particular affected unit (lb) $SO2M_{aff-tot}$ = Total hourly SO_2 mass emissions from the affected unit(s) (lb) $(L)_{aff-i}$ = Hourly unit load for a particular affected unit (MW <u>or</u> klb per hour of steam) t_{aff-i} = Operating time for a particular affected unit (hr)

When using Equation SS-1a, if in a given hour the measured total SO_2 mass emissions (in lb) at the nonaffected units are greater than the mass

emissions measured at the main common stack (i.e., if the summation term to the right of the minus sign in Equation SS-1a is greater than the term to the left of the minus sign), this will result in negative mass emissions for that hour. For any hour in which this happens, substitute a value of zero for the total SO₂ mass emissions from the affected units when determining quarterly, or year-to-date SO₂ mass for the affected units.

E. Affected Unit(s) Hourly Heat Input Rate Determination

Determine the hourly heat input rate for each affected unit; using the applicable method described in Question 20.4.

F. Affected Unit(s) Hourly Load and Operating Time

As indicated in paragraphs A through D, above, emissions from the affected units in a subtractive stack configuration are not measured directly. However, the owner or operator must maintain hourly records of unit load and unit operating time for each affected unit, for the purposes of apportioning emissions and/or heat input to the individual affected units.

Report these hourly values in the <HourlyOperatingData> record.

References: § 75.16(b)(2)(ii)(B), § 75.16(e)

History: First published in March 2000, Update #12