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# Subpart Q - Iron and Steel Production

🖶 A printer-friendly version (pdf) (51 pp, 5,423K) of GHG reporting instructions for this subpart

Please select a help topic from the list below:

- Using e-GGRT to Prepare Your Subpart Q Report
  - Subpart Q Process Unit Information for Units NOT Monitored by CEMS
  - Subpart Q Process Unit Information for Units Monitored by CEMS
  - Subpart Q Coke Pushing Operations Information
  - Subpart Q Flares Information
  - Subpart Q Emissions Information for Units NOT Monitored by CEMS
  - Subpart Q Emissions Information for Units Monitored by CEMS
  - Subpart Q Emissions Information for Coke Pushing Operations
  - Subpart Q Emissions Information for Flares
- Using Subpart Q Calculation Spreadsheets
- Carry forward of data from previous submissions into RY2012 forms
- Subpart Q Rule Guidance
- Subpart Q Rule Language (eCFR)

Additional Resources:

- Part 98 Terms and Definitions
- Frequently Asked Questions (FAQs)
- Webinar Slides

# Using e-GGRT to Prepare Your Subpart Q Report

Subpart Q consists of facilities with any of the following processes: taconite iron ore processing, integrated iron and steel manufacturing, coke making not collocated with an integrated iron and steel manufacturing process, direct reduction not collocated with an integrated iron and steel manufacturing process and electric arc furnace (EAF) steelmaking not collocated with an integrated iron and steel manufacturing process. Note for by-product recovery coke oven battery combustion stacks, blast

If you previously reported for Reporting Year (RY) 2011, the Agency has carried some of your RY2011 data forward and entered it in your RY2012 forms to reduce the reporting burden. It is still your responsibility to review and ensure that all of the information in your submission is correct, but the Agency believes that most of the data which is carried forward is unlikely to change significantly from year to year. For more information about carry forward data, please see the Carry forward of data from previous submissions into RY2012 forms help content.

furnace stoves, boilers, process heaters, reheat furnaces, annealing furnaces, flame suppression, ladle reheaters, and other miscellaneous combustion sources you should review the reporting instructions for Subpart C.

This page provides an overview of subtopics that are central to Subpart Q reporting. This information is entered from the e-GGRT Subpart Q Overview web form shown below. Each topic represents a key web form(s) where you need to enter information:

- Subpart Q Unit Information
- Subpart Q Emissions Information
- Subpart Q Coke Pushing Operation Information
- Subpart Q Flares Information
- Subpart Q Validation Report

The end of the page provides links you can use for more detailed information and instructions on entering required information related to each of these topics.



## **Subpart Q Unit Information**

The required process unit information and the forms associated with required unit information entered into e-GGRT are different for units that are monitored by a Continuous Emissions Monitoring System (CEMS) and units that are NOT monitored by CEMS.

As a result, separate help content has been created in this subpart for entering process unit information for units monitored by CEMS and units NOT monitored by CEMS.

### For each process unit that is NOT monitored by CEMS at your facility, the following unit information is required:

- An indication of the calculation methodology used to estimate quantities of CO<sub>2</sub> for this unit (Carbon mass balance method or Site-specific emission factor method)
- A unique name or identifier, plus optional description for this process unit
- The type of process unit
- The name and type of each input and output associated with the process unit (Note: This requirement applies only if carbon mass balance method is used to estimate CO<sub>2</sub> process emissions for the unit. If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q-<u>1 through Q</u>-7 of this section, you must account for the carbon and mass rate of that process input or output in your calculations according to the procedures in §98.174(b)(5). See also the exception in 98.174(b)(4).)

#### For each process unit that is monitored by CEMS at your facility, the following unit information is required:

- A unique name or identifier for the process unit, plus optional description of the unit
  - The type of process unit, selected from the following:
    - Taconite indurating furnace
      - Basic oxygen process furnace
      - Non-recovery coke oven battery
      - Sinter process
      - Electric arc furnace (EAF)
      - Decarburization vessel (see note below)
      - Direct reduction furnace
- Annual production of taconite pellets (metric tons)
- Annual production of molten steel (metric tons)
- Annual production of coke (metric tons)
- Annual production of sinter (metric tons)
- Annual production of direct reduced iron (metric tons)
- In 2010, the information required for decarburization vessels applies only to argon-oxygen decarburization vessels. However, for 2011 and subsequent calendar years, the reporting requirements apply to other decarburization vessels used to refine molten steel with the primary intent of removing carbon content of steel including, but not limited to, argon-oxygen decarburization vessels and vacuum oxygen decarburization vessels. This amendment was finalized in October 2010 (75 FR 66434).

## Subpart Q Coke Pushing Operations Information

For each coke pushing operation at your facility, the following information is required:

· A unique name or identifier, plus optional description

## **Subpart Q Flares Information**

For each flare at your facility, the following information is required:

- A unique name or identifier, plus optional description
- The type of flare
- The flare service type
- The method used to calculate the CO<sub>2</sub> emissions

## **Subpart Q Emissions Information**

The required emissions information and the manner by which required emissions information is entered into e-GGRT is different for process units that are monitored by a Continuous Emissions Monitoring System (CEMS), process units that are NOT monitored by a CEMS, coke pushing operations, and flares.

As a result, separate help content has been created in this subpart for entering emissions information for each emissions source type.

### For each process unit that is NOT monitored by CEMS at your facility, the following information is required:

- The annual CO<sub>2</sub> process emissions (e.g. the results from Equation Q-1, in metric tons)
- For each input and output assigned to a process unit for which emissions will be estimated using the carbon mass balance method, also enter the following substitute data information:
  - · The annual mass or volume is based on one or more substitute monthly data values
  - The number of months that missing data procedures were followed, if applicable (*If not applicable, you must enter zero to avoid data completeness validation error messages on the validation report*)
  - The method used to develop the substitute data value(s), if applicable
  - The carbon content determination method

### For each CEMS Monitoring Location, provide the following information:

- A unique unit name or identifier for the CML (see also About Unique Unit Names)
- An optional description or label for the CML
- The configuration of processes or process units that are monitored by the CML:
  - Single industrial process or process unit that exhausts to a dedicated stack
  - Multiple industrial processes or process units share a common stack
  - Industrial process or process unit shares a common stack with one or more stationary fuel combustion units
- · The name of each fuel combusted in the unit(s) monitored by the CEMS
- The Tier 4/CEMS methodology start and end dates
- The cumulative total of hourly CO<sub>2</sub> mass emissions for each quarter of the reporting year (in metric tons) (*Do not cumulate emissions data between quarters*)
- The total annual CO2 mass emissions measured by the CEMS (in metric tons)
- An indication whether emissions reported for the CEMS include emissions calculated according to 98.33(a)(4)(viii) for a slipstream that bypassed the CEMS
- The total annual biogenic CO<sub>2</sub> emissions from the combustion of all biomass fuels combined (in metric tons) (*if applicable*)
- The total annual non-biogenic CO<sub>2</sub> emissions (includes fossil fuel, sorbent, and process CO<sub>2</sub> emissions, in metric tons)
- The total annual CH<sub>4</sub> and N<sub>2</sub>O emissions associated with the combustion of all Table C-2 fuels combusted in all processes/process units monitored by the CEMS derived from application of Equation C-10 (in metric tons) (*if there are no combustion emissions in this CML, please enter zero*)
- The total number of source operating hours in the reporting year
- The total operating hours in which a substitute data value was used in the emissions calculations for the CO<sub>2</sub> concentration parameter
- The total operating hours in which a substitute data value was used in the emissions calculations for the stack gas flow rate parameter
   If moisture correction is required and a continuous moisture monitor is used, the total operating hours in which a substitute data value
- was used in the emissions calculations for the stack gas moisture content parameter
- An indication of the process units monitored by the CML

### For each coke pushing operation at your facility, the following information is required:

The annual CO<sub>2</sub> process emissions (in metric tons) [See 98.176(c)]

#### For each flare at your facility, the following information is required:

- The annual CO<sub>2</sub> emissions from flare unit operations (the output of Equation Y-1a, Y-1b, Y-2, or Y-3 depending on the calculation method used for this flare, in metric tons) [98.256(e)(4)]
- The annual CH<sub>4</sub> emissions from flare unit operations (the output of Equation C-9a, in metric tons) [98.33(c)(2) as required by 98.172(b)]
- The annual N2O emissions from flare unit operations (the output of Equation C-9a, in metric tons) [98.33(c)(2) as required by 98.172(b)]

For each flare using the Equation Y-1a calculation method, Subpart Q requires you to enter the following supplemental emissions information:

- An indication of whether daily or weekly measurement periods are used [98.256(e)(6)]
- The annual volume of flare gas combusted (in scf) [98.256(e)(6)]
- The specific consensus-based standard method number or description of the procedure specified by the flow meter manufacturer [98.256(q)]
- The number of days during the reporting year missing data procedures were used to determine the volume of flare gas combusted
- The annual average molecular weight (in kg/kg-mole) [98.256(e)(6)]
   The method wood to measure redecular weight [08.256(e)(6)]
- The method used to measure molecular weight [98.256(q)] • Method 18 at 50 CFR part 60, appendix A-6
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  - ASTM D1945-03
     ASTM D1946-90 (Reapproved 2006)
  - GPA 2261-00
  - UOP539-97
  - ASTM D2503-92 (Reapproved 2007)
  - Chromatographic analysis: manufacturer's instructions
  - Other (specify)
    - Specify other method
- The number of days during the reporting year missing data procedures were used to determine molecular weight
- The annual average carbon content of the flare gas (kg carbon/kg flare gas) [98.256(e)(6)]
  - The method used to measure carbon content [98.256(q)]
    - Method 18 at 50 CFR part 60, appendix A-6
    - ASTM D1945-03
    - ASTM D1946-90 (Reapproved 2006)
    - GPA 2261-00
    - UOP539-97
    - ASTM D2503-92 (Reapproved 2007)
    - Chromatographic analysis: manufacturer's instructions
    - Other (specify)
      - Specify other method
- The number of days during the reporting year missing data procedures were used to determine carbon content

For each flare using the **Equation Y-1b** calculation method, Subpart Q requires you to enter the following supplemental emissions information:

- An indication of whether daily or weekly measurement periods are used [98.256(e)(7)]
- The annual volume of flare gas combusted (in scf) [98.256(e)(7)]
- The specific consensus-based standard method number or description of the procedure specified by the flow meter manufacturer [98.256(q)]
- The number of days during the reporting year missing data procedures were used to determine the volume of flare gas combusted
- The annual average CO<sub>2</sub> concentration (in percent by volume or mole) [98.256(e)(7)]
- The method used to measure CO<sub>2</sub> concentration [98.256(q)]
  - Method 18 at 50 CFR part 60, appendix A-6
    - ASTM D1945-03
    - ASTM D1946-90 (Reapproved 2006)
    - GPA 2261-00
    - UOP539-97
    - ASTM D2503-92 (Reapproved 2007)
    - Chromatographic analysis: manufacturer's instructions
    - Other (specify)
      - · Specify other method
- The number of days during the reporting year missing data procedures were used to determine CO<sub>2</sub> concentration
- For each carbon containing compound other than CO<sub>2</sub> in the flare gas stream identified by the facility, and for each flare using the Equation Y-1b, the system shall require the facility to identify:
- The annual average concentration of the compound (in percent by volume or mole) [98.256(e)(7)(i)]
- The method used to measure concentration of the compound [98.256(q)]
  - Method 18 at 50 CFR part 60, appendix A-6
  - ASTM D1945-03
  - ASTM D1946-90 (Reapproved 2006)
  - GPA 2261-00
  - UOP539-97
  - ASTM D2503-92 (Reapproved 2007)
  - Chromatographic analysis: manufacturer's instructions
  - Other (specify)
    - Specify other method
- The number of days during the reporting year missing data procedures were used to determine the concentration of the compound

For each flare using the Equation Y-2 calculation method, Subpart Q requires you to enter the following supplemental emissions information:

- An indication of whether daily or weekly measurement periods are used [98.256(e)(8)]
- The annual volume of flare gas combusted (in MMscf) [98.256(e)(8)]
- The specific consensus-based standard method number or description of the procedure specified by the flow meter manufacturer
- [98.256(q)]
- The number of days during the reporting year missing data procedures were used to determine the volume of flare gas combusted
- The annual average higher heating value of the flare gas (MMBtu/MMscf) [98.256(e)(8)]
- The method used to measure higher heating value of the flare gas [98.256(q)]
  - ASTM D4809-06
  - ASTM D240-02 (Reapproved 2007)
  - ASTM D1826-94 (Reapproved 2003)
  - ASTM D3588-98 (Reapproved 2003)
  - ASTM D4891-89 (Reapproved 2006)
  - Chromatographic analysis: manufacturer's instructions
  - Other (specify)
    - Specify other method
- The number of days during the reporting year missing data procedures were used to determine the higher heating value of the flare gas An indication of whether the annual volume of flare gas combusted was determined using standard conditions of 68 °F and 14.7 psia or 60 °F and 14.7 psia [98.256(e)(8)]
- An indication of whether the annual average higher heating value of the flare gas was determined using standard conditions of 68 °F and 14.7 psia or 60 °F and 14.7 psia [98.256(e)(8)]

For each flare using the Equation Y-3 calculation method, Subpart Q requires you to enter the following supplemental emissions information:

• The total number of start-up, shutdown, or malfunction (SSM) events exceeding 500,000 scf/day [98.256(e)(9)]

## Subpart Q Validation Report

The Validation Report assists with the completeness and quality of your reporting data.

We strongly encourage you to use the Validation Report to check your work. The Validation Report performs two types of checks:

- Data Completeness: Data required for reporting that are missing or incomplete.
- Data Quality: Data that are outside of the expected range of values.

You may view the Validation Report at any time.

Note that the Validation Report is intended to assist users in entering data, but it is not an indication that the reporter has entered all necessary information, nor is it an indication that the reporter is in compliance with part 98. Furthermore a negative finding on the validation report is not a guarantee that a data element was entered incorrectly.

Back to Top

### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Validation Report

# Subpart Q Process Unit Information for Units NOT Monitored by CEMS

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production process unit information for units that are NOT monitored by CEMS.

Under Subpart Q, "process unit" types may include any of the following:

- Taconite indurating furnace
- Basic oxygen process furnace
- Non-recovery coke oven battery
- Sinter process
- Electric arc furnace (EAF)

- Decarburization vessel (see note below)
- Direct reduction furnace



### Step 1: Add a process unit

To add a process unit that is NOT monitored by a CEMS, find the UNITS table on the Subpart Overview page and click the link titled "ADD a Unit."

To later edit information you have entered to identify a process unit, click the edit icon or the Name/ID link located in the first column of the table.

To delete a process unit, click the delete icon or red "x" located in the last column of the table.

#### Click image to expand

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### Step 2: Indicate CEMS utilization for the process unit

For each process unit, confirm whether or not the process unit utilizes CEMS.

Note that when adding a new process unit you are prompted to answer the CEMS question immediately (the answer to this question will default to "No" for process unit added using the "ADD a Unit" link and will default to "Yes" for units added using the "ADD a CEMS Unit" link). The CEMS response may be changed here and the process unit information will be relocated to the appropriate table on the Subpart Overview page.

When finished, click SAVE.



### Step 3: Select calculation methodology

Use the radio buttons to indicate the calculation methodology used to estimate quantities of CO<sub>2</sub> for this unit (Carbon mass balance method or Site-specific emission factor method)

When finished, click SAVE.

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### Step 4: Define the process unit

For each process unit, enter the following required information:

- The type of process unit, selected from the following:
  - Taconite indurating furnace
  - Basic oxygen process furnace
  - Non-recovery coke oven battery
  - Sinter process
  - Electric arc furnace (EAF)
  - Decarburization vessel
  - Direct reduction furnace
  - EAF/Decarburization Vessel Exhausting to Common Stack/Vent (applies ONLY if site-specific emission factor method is used to calculate CO<sub>2</sub> emissions)
- · A unique name or identifier, plus optional description for this process unit

### Step 5: Enter required input/output information for the process unit (if applicable)

Note that this step only applies if carbon mass balance method is used to estimate CO<sub>2</sub> process emissions for this unit. If CO<sub>2</sub> process emissions for this unit are estimated using the site-specific emission factor method, you may skip this step and proceed to Step 6.

To add an input or an output, click "Add an Input" or "Add an Output" below each respective table.

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	Is this unit's emissions * monitored using a CEMS?	© Yes ⊛ No		
	CALCULATION METHODOLOG	ïY		
	Please select the calculation methodology you will used to estimate quantities of CO <sub>2</sub> for this unit	Carbon mass balance metho     Site-specific emission factor	d method	

For each input or output associated with the process unit, Subpart Q requires you to report the following information:

- A unique name or identifier
- The type of input or output selected from the following list (Note that the list will be customized in e-GGRT to reflect the key inputs and outputs identified in the rule equations for a given type of process unit):
  - Input types:
    - Molten Iron
    - Ferrous Scrap
    - Flux Material
    - Carbonaceous Material
    - Other Solid
    - Other Liquid
    - Other Gas
    - Direct Reduced Iron
    - Carbon Electrode Consumed
  - Output types:
    - Slag Produced
    - Molten Steel Produced
    - Air Pollution Control Residue
    - Other Gas
    - Other Liquid
    - · Other Solid

When you are finished entering the required information for an input or output, click SAVE. Note, if you are using the carbon mass balance method, you must identify inputs and outputs associated with each process. If you do not, you will see a data completeness validation message on the Validation report page as a reminder that you have not completed Unit-Level data entry.



Repeat this step until all inputs and outputs associated with the process unit have been added and defined, then proceed to Step 6.

### Step 6: Save all entered information for the process unit

When you are finished entering all required information for the process unit, click SAVE.



### Step 7: Repeat Steps 1-6

Repeat Steps 1-6 until all process units NOT monitored by CEMS have been added for your facility.

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### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Q Emissions Information for Flares Subpart Validation Report

# Subpart Q Process Unit Information for Units Monitored by CEMS

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production process unit information for units that are monitored by CEMS.

Under Subpart Q, "process units" may include any of the following:

- Taconite indurating furnace
- Basic oxygen process furnace
- Non-recovery coke oven battery
- Sinter process
- Electric arc furnace (EAF)
- Decarburization vessel
- Direct reduction furnace

### Step 1: Add a process unit

To add a process unit that is monitored by CEMS, find the UNIT SUMMARY (Units Monitored by CEMS) table on the Subpart Overview page and click the link titled "ADD a CEMS Unit." When you report emissions information later you will have the opportunity to indicate or identify if a CEMS Monitoring Location (CML) is monitoring multiple units that may share a common stack.

To later edit information identifying a process unit, click the edit icon or the Name/ID link located in the first column of the table.

To delete a process unit, click the delete icon or red "x" located in the last column of the table.

EPA Environm	nental Protection			<mark>8</mark> -	GGRT,	
ME FACILITY REGISTR	RATION FACILITY MANAGEMEN	T DATA REPORTING		Electronic Gree	enhouse Gas	Y
	DR Enterprises - TEST Subpart Q: Iron and Subpart Overview	d Steel Production (20	11)			
	OVERNOE AURRARY					
	Subpart Q requires affected fi induating furnace, basic oxy stack; coke public operations vessel and direct reduction fu emissions from flares that bu procedures set out in Subpart fish page to identify each fact recovery colde oven battlers, or furnace and electric arc furna under their respective heading flare, cick on "Open" to enter	acilities to report carbon dioxide (CO en furnace, non-recovery cole oven) is, nietre processe, electrica car furnace, mace. Within this module, you must a holast furnace, gas and coke oven ge Y of Part 39. First, gas and coke oven relie indurating furnace, basic oxyger inter process, decarburger activity of gas Affer adding a process unit, coke Greenhouse gas (CHG) data require	2) from each taconite battery combustion (decarburization (so report CO2 as according to g "Units" below, use process fumace, non- , direct reduction rerations and flares pushing operation or (d by Subpart Q, For exercision CCDP)	EPA has finalized a deadline for reports used as inputs to e direct emitters until FR 53057 (publishes accordance with th currently collecting emission equations	rule that defers ng certain data e mission equation March 31, 2015. d August 25, 20 is rule, e-GGRT i this subset of in	the elements is for See 76 11). In is not puts to
	additional information about a	Subpart Q reporting and Subpart 1, pr	ease use the e-GGRT			
	Help link(s) provided in the sid	debar.		Subpart Q	t View Valida	tion
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### Step 2: Indicate CEMS utilization for the process unit

For each process unit, confirm whether or not the process unit utilizes CEMS.

Note that when adding a new process unit you are prompted to answer the CEMS question immediately (the answer to this question will default to "No" for process unit added using the "ADD a Unit" link and will default to "Yes" for units added using the "ADD a CEMS Unit" link). The CEMS response may be changed here and the process unit information will be relocated to the appropriate table on the Subpart Overview page.

When finished, click SAVE.

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	- CONTINUOUS EMISSIONS MONITORING Is this unit's emissions* ○ Yes monitored using a CEMS? ○ №	
	CANCEL	

### Step 3: Enter required information for the process unit

For each process unit monitored by CEMS at your facility, Subpart Q requires you to report the following information:

- The type of process unit, selected from the following:
  - Taconite indurating furnace
  - Basic oxygen process furnace
  - Non-recovery coke oven battery
  - Sinter process
  - Electric arc furnace (EAF)
  - Decarburization vessel
  - Direct reduction furnace
- · A unique name or identifier for the process unit, plus optional description of the unit
- Annual production of taconite pellets (metric tons)
- Annual production of molten steel (metric tons)

- Annual production of coke (metric tons)
- Annual production of sinter (metric tons)
- Annual production of direct reduced iron (metric tons)

When you are finished entering all required information for the process unit, click SAVE.

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	Description (optional)		
	CEMS UNIT DATA		
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	Annual production of molten raw steel	(metric tons)	
	Annual production of coke	(metric tons)	
	Annual production of sinter	(metric tons)	
	Annual production of direct reduced iron	(metric tons)	

### Step 4: Repeat Steps 1-3

Repeat Steps 1-3 until all process units monitored by CEMS have been added for your facility.

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#### See Also

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# **Subpart Q Coke Pushing Operations Information**

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production coke pushing operations information. Operations identified should include coke pushing occurring (coal charged) at both byproduct and non-recovery coke oven combustion battery stacks.

### Step 1: Add a coke pushing operation

To add a coke pushing operation, find the COKE PUSHING OPERATIONS table on the Subpart Overview page and click the link titled "ADD a Coke Pushing Operation."



To later edit information identifying a coke pushing operation, click the edit icon or the Name/ID link located in the first column of the table.

To delete a coke pushing operation, click the delete icon located in the last column of the table.

### Step 2: Enter required information for the coke pushing operation

For each coke pushing operation at your facility, Subpart Q requires you to report the following information:

• A unique name or identifier, plus optional description

When you are finished, click SAVE.

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### Step 3: Repeat Steps 1-2

Repeat Steps 1-2 until all coke pushing operations have been added for your facility.

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### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations

Subpart Q Emissions Information for Flares Subpart Validation Report

# Subpart Q Flares Information

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production flare information.

### Step 1: Add a flare

To add a flare, find the FLARES table on the Subpart Overview page and click the link titled "ADD a Flare."

To edit flare identification information for, click the edit icon or the Name/ID link located in the first column of the table.

To delete a flare, click the delete icon or red "x" located in the last column of the table.

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	OVERVIEW OF SUBPART	Q REPORTING REQUIREMENTS			
	Subpart Q requires affected	facilities to report carbon dioxide (CO2) fr	om each taconite		
	stack; coke pushing operation	/gen furnace, non-recovery coke oven bath on; sinter process, electric arc furnace; der	ery combustion carburization		
	vessel and direct reduction f	umace. Within this module, you must also	report CO2	EPA has finalized a rule that defers t	he
	procedures set out in Subpa	int Y of Part 98. First, under the heading "U	nits" below, use	used as inputs to emission equations	for
	this page to identify each tai	conite indurating furnace, basic oxygen pro	ocess furnace, non-	direct emitters until March 31, 2015. 1 FR 53057 (published August 25, 201	5ee 1), k
	furnace and electric arc furn	ace. Similarly, identify coke pushing opera	tions and flares	accordance with the rule, e-GGRT is currently collecting this subset of ing	not
	under their respective headi flare_click on "Open" to enter	ngs. After adding a process unit, coke pus ir Greenhouse gas (GHG) data required to	hing operation or subpart 0. For	emission equations.	
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#### Step 2: Enter required information for the flare

For each flare at your facility, Subpart Q requires you to report the following information:

- A unique name or identifier, plus optional description
  - The type of flare, selected from the following:
    - Steam assisted
    - ٠ Air-assisted
    - Unassisted
    - Other (specify)
- The flare service type, selected from the following: General facility flare
  - Unit flare

  - · Emergency only flare ٠ Back-up flare

  - Other (specify)
- The method used to calculate the CO<sub>2</sub> emissions, selected from the following (Note that certain methods must be used if certain criteria are met):
  - 98.253(b)(1)(ii)(A) Equation Y-1a Gas Composition Monitored (Equation Y-1a or Y-1b must be used if you have a continuous gas composition monitor on the flare or if you measure it at least weekly)
  - 98.253(b)(1)(ii)(A) Equation Y-1b Gas Composition Monitored (Equation Y-1a or Y-1b must be used if you have a continuous gas composition monitor on the flare or if you measure it at least weekly)
  - 98.253(b)(1)(ii)(B) Equation Y-2 Heat Content Monitored (Equation Y-2 must be used if you have a continuous higher heating value monitor or measure it at least weekly and the heating value monitor or measurement is not based on compositional analyses; if compositional analyses are used, you must use Equations 1a or 1b)
  - 98.253(b)(1)(iii) Equation Y-3 Start-up, Shutdown, Malfunction (Equation Y-3 must be used if you do not measure gas

composition or heating value at least weekly)

When finished entering information for the flare, click SAVE.

Click image to expand



### Step 3: Repeat Steps 1-2

Repeat Steps 1-2 until all flares have been added for your facility.

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### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Validation Report

# Subpart Q Emissions Information for Units NOT Monitored by CEMS

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production emissions information for process units that are NOT monitored by a Continuous Emissions Monitoring System (CEMS).

### Step 1. Select a process unit

To select a process unit NOT monitored by CEMS for which to enter emissions data, find the unit in the UNITS table and click OPEN.

If the CO<sub>2</sub> process emissions from the selected unit will be estimated using the carbon mass balance method, proceed to Section A - Carbon Mass Balance Method and execute steps A1-A4 for each type of process unit.

If the CO<sub>2</sub> process emissions from the selected unit will be estimated using the **site-specific emission factor method**, proceed to Section B - Site-specific Emission Factor Method and execute **steps B1-B2** for each process unit.



## Section A - Carbon Mass Balance Method

### Step A1: Equation Summary and Result

For each process unit that is NOT monitored by CEMS at your facility and for which CO<sub>2</sub> process emissions will be estimated using the carbon mass balance method, Subpart Q requires the following emissions information:

• The annual CO<sub>2</sub> process emissions (the results from Equation Q-1, Q-2, Q-3, Q-4, Q-5, Q-6, or Q-7 in metric tons)

For assistance in calculating  $CO_2$  process emissions for a process unit, access the calculation spreadsheets for this subpart by clicking the link titled "Use Q-1 spreadsheet to calculate," located below the red emissions data entry box, then follow the provided instructions. Similar spreadsheets are provided for applying mass balance equations (e.g. Q-2, Q-3, Q-4, Q-5, Q-6, or Q-7, etc.) for all relevant types of process units per the table below:

Process Unit Type	Applicable Subpart Q Equation
Taconite indurating furnace	Equation Q-1
Basic oxygen process furnace	Equation Q-2
Non-recovery coke oven battery	Equation Q-3
Sinter process	Equation Q-4
Electric arc furnace (EAF)	Equation Q-5
Decarburization vessel	Equation Q-6
Direct reduction furnace	Equation Q-7

REGISTRATION FACILITY MANAGEMENT DAT	REPORTING	Electronic Greenhouse Gas Reporting Tool
		Hello, Richard Richards   My Profile   L
DR Enterprises - TEST Subpart Q: Iron and Steel	Production (2011)	
Subpart Q. Iron and Steen Subpart Overview » Taconite Indurating Fur	nace + GHG Info	
GREENHOUSE GAS DATA AND ASSO	CIATED INFORMATION	
Use this page to enter the GHG data requi	ired by Subpart Q. Please enter the information	
coke oven battery, sinter process, decarb electric are firmace, as applicable. For ad	urization vessel, direct reduction furnace or different information about the date collected on	
this page, please use the e-GGRT Help lit	nk(s) provided.	denotes a required field
50 0 ( 00 SW00000 04 0/ 17		
Use equation Q-1 to calculate annual CO:	mass emissions for this Taconite Indurating	30000
Furnace.		Annual CO2 mass emissions from the Taconite Indurating Furnace (metric tons
CO. = 44 x [ (E <sub>4</sub> ) x (C <sub>4</sub> ) + (E <sub>4</sub> )	) × (C <sub>11</sub> ) × MW × 0.001 + (E <sub>1</sub> ) × (C <sub>1</sub> ) × 0.001 + (	(O) × (C_) - (P) × (C_) - (P) × (C_) ]
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Hover over	an element in the equation above to reveal a del	finition of that element.
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Method used to develop the substitu data value(s), if applicab	te le	
Carbon content determination metho	od Select	×
	Select "other" ONLY when identifying the m process inputs that are FUELS (see monito	ethods used to determine carbon content of ring and QA/QC requirements for fuel input
	98.174(b)(2)(vi) and reporting requirement	98.176(e)(2)).
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PAPT: OTHER: -GAS: BAOHOUSE 1, N     Anome are set volume is based on a     procedure set followed is applicat     advanced of the set of	COT     Cotton     Cotton	definition of the second

### Step A2: Input and output substitute data

For each input and output assigned to the process unit, enter the following substitute data information:

- Annual mass or volume is based on one or more substitute monthly data values. If this is not selected or is not applicable, you must enter zero, "0" in the box for the number of months with missing data. If you do not remember, you will receive a UNIT level validation message indicating that you have not completed entering data on this form in the validation report.
- Number of months that missing data procedures were followed, if applicable
- Method used to develop the substitute data value(s), if applicable. Enter information only if you applied missing data procedures, otherwise leave blank.
- Carbon content determination method, selected from the following, be sure the method selected is appropriate to the material being tested:
  - Supplier
  - ASTM C25-06
  - ASTM D5373-08
  - ASTM E1915-07a
  - ASTM E1019-08
  - ASM CS-104 UNS No. G10460
  - ISO/TR 15349-3:1998
  - Other (specify)

### Step A3: Save Your Data

When you have finished entering annual emissions, inputs and outputs and identifying whether substitute data were used to determine mass or volume of input/outputs, click SAVE. You will then return to the Subpart Overview page and you should see the status of data entry for the unit change to "Complete" in the Status column in the UNITS table.

After you save the data on this page, the next time you open the page, the calculator on the top of the page will display the CO<sub>2</sub> process emissions, rounded to the nearest 0.1 of a metric ton. The value displayed is for informational purposes only.

### Step A4: Repeat steps A1-A3

Repeat Steps A1-A3 until data have been entered for all process units NOT monitored by CEMS for which emissions were estimated using the carbon mass balance methods provide in the rule.

### Section B - Site-specific Emission Factor Method

### Step B1. Equation Q-8 (EF Approach) Summary and Result

For each process unit that is NOT monitored by CEMS at your facility and for which CO<sub>2</sub> process emissions will be estimated using the site-specific emission factor method, Subpart Q requires the following emissions information:

- The annual CO<sub>2</sub> process emissions (the results from Equation Q-8 and associated procedures in 98.73(b)(2)(i)-(iv) multiplied by the total amount of feed or production, as applicable, for the reporting period, in metric tons)
- The number of times that missing data procedures were followed and the performance test was repeated to determine the site-specific emission factor

For assistance in calculating  $CO_2$  process emissions for a process unit, access the calculation spreadsheets for this subpart by clicking the link titled "Use Q EF spreadsheet to calculate," located below the red emissions data entry box, then follow the provided instructions (*Note that the Equation Q-8 EF Approach Calculation Spreadsheet executes the additional step of multiplying the result of Equation Q-8 by the total amount of feed or production, as applicable and required by the rule, for the reporting period to calculate annual CO\_2 process emissions for the process unit ).* 

When you have finished entering the required emissions data, click SAVE.

After you save the data on this page, the next time you open the page, the calculator on the top of the page will display the CO<sub>2</sub> process emissions, rounded to the nearest 0.1 of a metric ton. The value displayed is for informational purposes only.

### Step B2: Repeat step B1

Repeat Steps B1 until data has been entered for all process units for which emissions were estimated using the site-specific emission factor method.



Back to Top

### See Also

Screen Errors

Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Q Emissions Information for Flares Subpart Validation Report

# Subpart Q Emissions Information for Units Monitored by CEMS

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production emissions information for process units that are monitored by a Continuous Emissions Monitoring System (CEMS).

### Step 1: Add a CEMS Monitoring Location (CML)

To add a CML, click the "Add a CEMS Monitoring Location" link below the CEMS MONITORING LOCATION (CML) SUMMARY table on the Subpart Overview page

The screenshot below is from Subpart G and is displayed as an example. The screen for other subparts may differ slightly.

	tes ental Protection	
HOME PROLETTINE BISTIN		Helo, Emmenuel Kalluri   My Profile   Logi
e-GGRT Help Using e-GGRT for Subpart G reporting	Facility ABC Subpart G: Ammonia Manufacturing (2011) Subpart Overview	100 has findined a nik that defers the
	OVERVIEW OF SUBPART REPORTING REQUIREMENTS Subpart G requires affected facilities to report carbon dioxide (CO:) process emissions from act harmonia manufacting process unit. First, use this page to identify each ammonia manufacturing process unit and there entic Greenhouse gas (SHG) data required by Subpart G for each ammonia manufacturing process unit and for your facility. For additional information about Subpart G reporting, please use the #-OGRT Heip Integl provided.	deadline for reporting certain data elements used as inputs to emission equations for direct emission equations for FR 55057 (published August 25, 2011), in accordance with the nuic, e-OQRT is not currently collecting this subset of inputs to emission equations.
	SUBPADT & SUMMARY INFORMATION FOR THIS FACILITY	Subpart G: No Validation Messages
	Annual Urea Prod. (metric tons) Quantity of CO2 use 45.0	d to produce urea (metric tons) 40 OPEN
	UNIT SUMMARY Unit Name/Identifier Feedstock CO2 (metric	tons) Status <sup>1</sup> Delet
	No units have been added	
	Vicial Sublick(Y Units monitored by CEUS) Unit Sublick(Y Units monitored by CEUS) Unit Name Idea Added No units have been Added ADD a Unit Monitored by CEUS ADD a Unit Monitored by CEUS	
	<sup>1</sup> A status of "Incomplete" means that one or more required data elements are incomplete. For	or details, refer to the Data Completeness

### Step 2: Define a CML and report emissions information

For each CEMS Monitoring Location, provide the following information:

- A unique unit name or identifier for the CML (see also About Unique Unit Names)
- An optional description or label for the CML
- The configuration of processes or process units that are monitored by the CML:
  - Single process or process unit that exhausts to a dedicated stack
  - Multiple processes or process units that share a common stack
  - Process or process unit that shares a common stack with one or more stationary fuel combustion units
- · The types of fuel combusted in the unit(s) monitored by the CEMS
- The Tier 4/CEMS methodology start and end dates
- The quarter total of hourly CO<sub>2</sub> mass emissions for each quarter of the reporting year (metric tons) (*Do not cumulate emissions data between quarters*)
- The total annual CO<sub>2</sub> mass emissions measured by the CEMS (metric tons)
- An indication whether emissions reported for the CEMS include emissions calculated according to 98.33(a)(4)(viii) for a slipstream that bypassed the CEMS
- The total annual biogenic CO<sub>2</sub> emissions from the combustion of all biomass fuels combined (metric tons) (if not applicable, enter '0')
- The total annual non-biogenic CO<sub>2</sub> emissions which includes fossil fuel, sorbent, and process CO<sub>2</sub> emissions (metric tons)
- The total annual CH<sub>4</sub> and N<sub>2</sub>O emissions associated with the combustion of all Table C-2 fuels combusted in all processes/process units monitored by the CEMS derived from application of Equation C-10 (metric tons) (*if there are no combustion emissions in this CML, please enter '0*)
- · The total number of source operating hours in the reporting year
- The total operating hours in which a substitute data value was used in the emissions calculations for the CO<sub>2</sub> concentration parameter
- The total operating hours in which a substitute data value was used in the emissions calculations for the stack gas flow rate parameter
  If moisture correction is required and a continuous moisture monitor is used, the total operating hours in which a substitute data value
- was used in the emissions calculations for the stack gas moisture content parameter
- The total annual CO2 emissions from the CEMS Monitoring Location (CML) Summary attributable to combustion (metric tons)

Do not leave any of these fields blank. If, for example, your facility has no biogenic CO<sub>2</sub> emissions, enter '0'.

For assistance in calculating annual  $CH_4$  and  $N_2O$  emissions using Equation C-10, access the optional calculation spreadsheet by clicking one of the links titled "Use Equation C-10 spreadsheet to calculate" located below each of the red emissions information data entry boxes and follow the provided instructions

### Step 3: Identify process units monitored at a CML

To identify the process units monitored at a CML, first click the link titled "ADD/REMOVE a process unit that exhausts to this CEMS Monitoring Location" at the bottom of the page

The screenshot below is from Subpart G and is displayed as an example. The screen for other subparts may differ slightly.

	tetes nental Protection					e-GGRT 🔑
HOME FACILITY REGISTRA	ATION FACILITY MANAGEMEN	DATA REP	ORTING H	ELP DESK		Electronic Greenhouse Gas Reporting Tool
😧 e-GGRT Help	Facility ABC Subpart G:Ammoni	a Manufa	cturing	(2011)		Hello, Emmanuel Kalluri   My Profile   Logout
	Subpart G Overview » Add/Edi	t CEMS Monit	oring Locati	on		
	CONTINUOUS EMISSION M LOCATION (CML) INFORMA	IONITORING :	SYSTEM (CE	MS) MONITOR	RING	
	Use this page to uniquely ide and provide the annual GHG the "ADD/REMOVE a Process	ntify each CEI emissions and or Unit" link at	VIS Monitorin other information	g Location (CN ation described	1L) Summary I below. Use fantify the	Total CO2 from CEMS (or applicable Part 75 methodology) (metric tons)
	process unit(s) monitored by additional information about t	this CEMS Me he data collect	onitoring Loca ed on this pa	ition (CML) Su ge, please use	mmary. For the e-GGRT	
	Help link(s) provided.					Total Biogenic CO2 (metric tons)
						Total Non-biogenic CO2 (metric tons)
	CONFIGURATION				140	charactere maximum)
	Location Name/ID					
	Configuration Tuno					
	Types of fuel combusted	Select			(200	characters maximum)
	in the unit(s) monitored by the CEMS					
	TIER 4 METHODOLOGY INFO	RMATION				
	Calculation Methodology*	01/01/2011				
	Carculation Methodology* End Date	12/31/2011				
	QUARTERLY CO2 EMISSION	Ounitor 1			(matria tanc)	
		Quarter 1			(metric tons)	
		Quarter 3			(metric tons)	
		Quarter 4			(metric tons)	
	ANNUAL CO2 EMISSIONS					
	Total annual CO2 mas (biogenic and non-biogenic b	s emissions ) measured y the CEMS			(metric tons)	
	Check this box to indic emissions reported fo include emissions calculate to 98.33(a)(4)(viii) for a slip bypassed	ate that the or the CEMS d according stream that d the CEMS.				
	Total annual biogeni	c CO2 mass emissions			(metric tons)	
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	EQUATION C-10 SUMMARY A	ND RESULTS				
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		Enter C	H4 and N2O ( are no combu	missions from stion emission	only combustions from Table C-2	n of Table C-2 Fuels directly below. ! Fuels in this CEMS Monitoring
	Total CH	Location	n, please enti	ər O.	(metric tons)	
	Y	) omlester	Use E	quation C-10 s	preadsheet to ca	alculate
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	a continuous moisture mon	itor is used)				
	CEMS MONITORING LOCATI Process Unit Name/Iden There are no process units mo by CEMS available for selection	on PROCESS iffier onitored on.	UNITS			
	ADD/REMOVE/EDIT a proc CANCEL SAVE	ess unit that e	exhausts to th	iis CEMS Mon	itoring Location	
	n Statement   Contact Us					e-GGRT RY2011.R.23   CEMS-Add CML

On the CML Process Units Selection page, use the check boxes to select the process unit(s) monitored at this CML. This will indicate that the unit(s) selected vent emission through the stack monitored by this CML.

1 The screenshot below is from Subpart G and is displayed as an example. The screen for other will differ slightly depending on the number of units with emissions monitored by a single CML at your facility.



Subpart Y also collects the CO<sub>2</sub> emissions from this CEMS Monitoring Location that are attributable to process CO<sub>2</sub> emissions from this process unit (metric tons).



	nental Protection	e-GGRT 🎺
HOME FACILITY REGIST	RATION FACILITY MANAGEMENT DATA REPORTING	Reporting Tool
😧 e-GGRT Help	Facility ABC (2010) Subpart Y:Petroleum Refineries Subod Y (Denter a Add Edit Process Units	unent kasa oonitees Lied kunne Lindhe
	IDENTIFY PROCESS UNIT(S) Use this page to select each process unit that is monitored by the CEMS Monitoring Location (CML) Summary. For additional information about this page, please use the e-GRT Help Init(s) provided.	ferrotes a required field
	PROCESS UNIT: CEMS1 Is this process unit monitored by the CEMS Monitoring Location? CO2+emissions from this CEMS Monitoring* Location that are attitutable to process (CO2)	
	emissions from this process unit PROCESS UNIT: CEMS3 Is this process unit monitored by the CEMS Honitoring Location?	
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	Is this process unit monitored by the CEMS [] (check if true) Monitoring Location?	
aperwork Reduction Act Burde	n Statement   ContactUs	e-GORT RY2010.R.60   CEMS-Add CML U

When finished selecting process unit for the CML and entering additional required information (if applicable), click SAVE. You should then be directed back to the Add/Edit a CML Location form and see the units you selected listed in the CEMS MONITORING LOCATION (CML) PROCESS UNITS table.

### Step 4: Save entered data for a CML

When you have finished entering data for a CML, click SAVE. You will then return to the Subpart Overview page. You will see the status of data entry for the CML updated to "Complete" in the Status column in the CEMS MONITORING LOCATION (CML) SUMMARY table.

If you don't have all the data, you can enter some now, save it, and finish later by clicking on the hyperlinked name of the CML in the CEMS MONITORING LOCATION (CML) SUMMARY table.

After you save the data on this page, the next time you open the page, the calculator on the top of the page will display the CO<sub>2</sub> process emissions for the CML, rounded to the nearest 0.1 of a metric ton. The value displayed is for informational purposes only.

1. Note: the screenshot below is from Subpart G and is displayed as an example. The screen for other subparts will differ slightly.

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### Step 5: Repeat Steps 1-4

Repeat Steps 1-4 until emissions information has been entered for all CMLs. If you have missed something, the validation report messages will help you identify any incomplete entries.

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### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Q Emissions Information for Flares Subpart Validation Report

# Subpart Q Emissions Information for Coke Pushing Operations

This page provides step-by-step instructions on how to enter and edit Subpart Q Iron and Steel Production emissions information for coke pushing operations. Emissions from coke pushing should include coke pushed at both byproduct and non-recovery coke pushing operations.

### Step 1: Select a coke pushing operation

To select a coke pushing operation for which to enter emissions data, find the operation in the COKE PUSHING OPERATIONS table and click OPEN.

	mental Protection			<b>8</b> -	igrt 🌽
IOME FACILITY REGIST	RATION FACILITY MANAGEMEN	NT DATA REPORTING		Electronic Gree Rej Hello, Richard Rich	nhouse Gas porting Tool hards   My Profile
e-GGRT Help ing e-GGRT for Subpart Q porting	DR Enterprises - TEST Subpart Q: Iron and Subpart Overview	d Steel Production (201	1)		
	OVERVIEW OF SUBPART Subpart Q regares affected fi industring framese basic cowy stack coke pushing operation vessel and direct reduction tu emissions from fares that but procedures set out in Subpart first page to identify each tack recovery coke oven battery, s furnace and electric arc furna- under their respective beadin fare, cick on "Open" to erter	Q REPORTING REQUIREMENTS diachties to report carbon dixide (CO2) ange finance, non-exceency cole over the n, enter process, electric act funance, di marce. Writhin the another, you must alse m blast funance pass and cole overn pass the blast funance pass and cole overn pass the fast function of the state of the stat	from each taconite ttery combustion ecarbuization o report CO2 according to Units' below, use rocess furnace, non- rect reduction rations and flares ushing operation or by Subpart Q. For	EPA has finalized a r deadline for reportin- used as inputs to en direct entitients until in FR 53057 (published accordance with the currently collecting 5 entission equations.	rule that defers the g certain data elemen risision equations for Janch 31, 2015. See 3 J August 25, 2011). In in rule, e-GORT is not this subset of inputs 5
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### Step 2: Enter emissions information

For each coke pushing operation at your facility, Subpart Q requires the following emissions information:

The annual CO<sub>2</sub> equivalent process emissions (in metric tons CO<sub>2</sub>e)

To calculate emissions from a coke pushing operation in metric tons CO<sub>2</sub>e, multiply the metric tons of coal charged to the coke ovens during the reporting period by 0.008 (*Note that there is NOT a calculation spreadsheet that does this*).

### Step 3: Save Your Data

When you have finished entering the required emissions information, click SAVE.

After you save the data on this page, the next time you open the page, the calculator on the top of the page will display the CO<sub>2</sub> emissions, rounded to the nearest 0.1 of a metric ton. The value displayed is for informational purposes only.

HOME         FACILITY MERGESTRATION         FACILITY MERGESTRATION         Exclusion for and steel Production Company 1 (2010)           © a CORT free Balance         Subpart C: Iron and Steel Production Company 1 (2010)         Subpart C: Iron and Steel Production           Subpart C: Iron and Steel Production Company 1 (2010)         Subpart C: Iron and Steel Production         Subpart C: Iron and Steel Production           Orgonity         Control Steel Production COMPANY 1 (2010)         Subpart C: Iron and Steel Production         Subpart C: Iron and Steel Production           Orgonity         Control Steel Production COMPANY 1 (2010)         Subpart C: Iron and Steel Production         Subpart C: Iron and Steel Production           Orgonity         Control Steel Production COKE PUSHING OPERATION         Use the method in 981 T3/c) to determine the annual CC0 mass emissions.         Memory Cogness emissions from two Code Pushing Operation remote tools           ANNUAL RESULT		tates nental Protection	e-GGRT <i></i>
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### Step 4: Repeat steps 1-3

Repeat Steps 1-3 until emissions information has been entered for all coke pushing operations at your facility.

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### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Validation Report

# **Subpart Q Emissions Information for Flares**

This page provides a step-by-step description of how to enter Subpart Q Flares unit emissions information.

### Step 1: Select a flare

To add or update flare emissions information, locate the FLARES table on the Subpart Q Overview page, and click OPEN.

	mental Protection			e-GGRT 🚄
ME FACILITY REGIST	RATION FACILITY MANAGEMEN	NT DATA REPORTING		Electronic Greenhouse Gas Reporting Tool
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### Step 2: Equation Summary and Results

The Equation Summary is presented on this page. You can hover over an element in the equation to reveal a definition of that element.

For each flare at your facility, Subpart Q requires you to enter the following emissions information:

- The annual CO<sub>2</sub> emissions from flare unit operations (the output of Equation Y-1a, Y-1b, Y-2, or Y-3 depending on the calculation method used for this flare, in metric tons) [98.256(e)(4)]
- The annual CH<sub>4</sub> emissions from flare unit operations (the output of Equation C-9a, in metric tons) [98.256(e)(4)]
- The basis for the fraction of carbon in the flare gas contributed by methane value:
  - Method 18 at 40 CFR part 60, appendix A-6

- ASTM D1945-03
- ASTM D1946-90-Reapproved 2006
- GPA 2261-00
- UOP539-97
- ASTM D2503-92-Reapproved 2007
- Chromatographic analysis: manufacturer's instructions
- Engineering calculations
- Other (specify)
- The annual N<sub>2</sub>O emissions from flare unit operations (the output of Equation C-9a, in metric tons) [98.256(e)(4)]

To calculate annual  $CO_2$  emissions, download the calculation spreadsheet by clicking the link titled "Use Y-x spreadsheet to calculate" (where 'x' represents 1a, 1b, 2, or 3 depending on the  $CO_2$  calculation method used for this flare). Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, copy the value of  $CO_2$  calculated by the spreadsheet to this page in the red box next to "Annual  $CO_2$  emission from this flare (metric tons)."

Per §98.172(b), you must report CO<sub>2</sub> emissions from flares that burn blast furnace gas or coke oven gas according to the procedures in §98.253(b)(1) of subpart Y (Petroleum Refineries). When using the alternatives set forth in §98.253(b)(1)(iii)(B) and §98.253(b)(1)(iii)(C), you must use the default CO<sub>2</sub> emission factors for coke oven gas (46.85 kg CO<sub>2</sub>/MMBtu) and blast furnace gas (274.32 kg CO<sub>2</sub>/MMBtu) from Table C-1 to subpart C in Equations Y-2 and Y-3 of subpart Y.

To calculate annual  $CH_4$  and  $N_2O$  emissions, download the calculation spreadsheets by clicking the link "Use C-9a spreadsheet to calculate." Fill in the spreadsheets using the instructions in each spreadsheet. After completing the spreadsheets, copy the values of  $CH_4$  and  $N_2O$  calculated by the spreadsheets to this page in the red box next to "Annual  $CH_4$  emission from this flare (metric tons)" and "Annual  $N_2O$  emission from this flare (metric tons)," respectively.

Per §98.172(b), you must report CH<sub>4</sub> and N<sub>2</sub>O emissions from flares under subpart Q according to the requirements in §98.33(c)(2) using the emission factors for coke oven gas and blast furnace gas in Table C--2 to subpart C.

### Step 3: Enter supplemental emissions information

For each flare using the Equation Y-1a calculation method, Subpart Q requires you to enter the following supplemental emissions information:

- An indication of whether daily or weekly measurement periods are used [98.256(e)(6)]
- The annual volume of flare gas combusted (in scf) [98.256(e)(6)]
- The specific consensus-based standard method number or description of the procedure specified by the flow meter manufacturer [98.256(q)]
- The number of days during the reporting year missing data procedures were used to determine the volume of flare gas combusted
- The annual average molecular weight (in kg/kg-mole) [98.256(e)(6)]
- The method used to measure molecular weight [98.256(q)]
  - Method 18 at 50 CFR part 60, appendix A-6
  - ASTM D1945-03
  - ASTM D1946-90 (Reapproved 2006)
  - GPA 2261-00
  - UOP539-97
  - ASTM D2503-92 (Reapproved 2007)
  - Chromatographic analysis: manufacturer's instructions
  - Other (specify)
- The number of days during the reporting year missing data procedures were used to determine molecular weight
- The annual average carbon content of the flare gas (kg carbon/kg flare gas) [98.256(e)(6)]
- The method used to measure carbon content [98.256(q)]
  - Method 18 at 50 CFR part 60, appendix A-6
  - ASTM D1945-03
  - ASTM D1946-90 (Reapproved 2006)
  - GPA 2261-00
  - UOP539-97
  - ASTM D2503-92 (Reapproved 2007)
  - · Chromatographic analysis: manufacturer's instructions
- The number of days during the reporting year missing data procedures were used to determine carbon content



For each flare using the Equation Y-1b calculation method, Subpart Q requires you to enter the following supplemental emissions information:

- An indication of whether daily or weekly measurement periods are used [98.256(e)(7)]
- The annual volume of flare gas combusted (in scf) [98.256(e)(7)]
- The specific consensus-based standard method number or description of the procedure specified by the flow meter manufacturer [98.256(q)]
- The number of days during the reporting year missing data procedures were used to determine the volume of flare gas combusted
- The annual average CO<sub>2</sub> concentration in the flare gas stream (in percent by volume or mole) [98.256(e)(7)]
- The method used to measure CO<sub>2</sub> concentration [98.256(q)]
  - Method 18 at 50 CFR part 60, appendix A-6
  - ASTM D1945-03
  - ASTM D1946-90 (Reapproved 2006)
  - GPA 2261-00
  - UOP539-97
  - ASTM D2503-92 (Reapproved 2007)
  - Chromatographic analysis: manufacturer's instructions
  - Other (specify)
- The number of days during the reporting year missing data procedures were used to determine CO<sub>2</sub> concentration
- For each carbon containing compound other than CO<sub>2</sub> in the flare gas stream identified by the facility, and for each flare using the Equation Y-1b, the system shall require the facility to identify:

- The annual average concentration of the compound (in percent by volume or mole) [98.256(e)(7)(i)]
- The method used to measure concentration of the compound [98.256(q)]
  - Method 18 at 50 CFR part 60, appendix A-6
  - ASTM D1945-03
  - ASTM D1946-90 (Reapproved 2006)
  - GPA 2261-00
  - UOP539-97
  - ASTM D2503-92 (Reapproved 2007)
  - Chromatographic analysis: manufacturer's instructions
- The number of days during the reporting year missing data procedures were used to determine the concentration of the compound

Click image to expand	1	
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CILITY REGISTRATION	FACILITY MANAGEMENT	DATA REPORTING Reporting Tool
		Hello, Richard Richards   My Profile   I
Help DR E	nterprises - TEST	Steel Draduction (0011)
for Subpart Y Subpa	Dart Q: Iron and	2 Ea, Y-1b
	Conciliant and a concernant	
GHG	DATA AND ASSOCIATE	ED INFORMATION
Use t	his page to enter the GHG in for this flare. For addition	data required by Subpart Q. Please enter the information tal information about the data collected on this page (Eq. Y-1b) CQ2 emissions (metrix lons)
pleas	e use the e-GGRT Help lin	k(s) provided.
_		50
		(Eq. C+9a) CH+ emissions (metric tons)
		(En C.93) MrC emissions (metric toos)
FOU	ATION Y-15 SUMMARY AF	ND RESULT
	n	y was
	co₂=∑	$\left[ (Flare)_{0} \times \frac{44}{MVC} \times 0.001 \times \left( \frac{(\% CO2)_{0}}{100\%} + \sum \left\{ 0.98 \times \frac{(\% CX)_{0}}{100\%} \times CMN_{x} \right\} \right) \right]$
	p=1	- <u>x</u> =1
		Hover over an element in the equation above to reveal a definition of that element.
Ann	ual CO <sub>2</sub> emission from this flare	1000000 (metric tons)
	uno nare	See Y-1b spreadsheet to calculate
MEA	SUDEMENT EDEOLIENC	×
in the second	50rtEment rite doend	
	measurement data	Daily
		O Weeky
VOL	JME OF FLARE GAS	
Ann	ual volume of flare gas	1000000000 (scf)
Spe	cific consensus-based	manufacturer
	standard method or	×
spec	ified by the flow meter	
N	manufacturer	47 (data)
N	data procedures were	17 (days)
use	d for annual volume of flare gas combusted	
	AL ALERAGE CO. CON	CENTRATION .
000	Annual average CO2	25 (nement by volume or mole: 0 < x < 100)
	concentration	
Met	hod used to determine te annual average CO2	Method 18 at 40 CFR part 60, appendix A-6
	concentration	
N	umber of days missing data procedures were	21 (days)
u	ed for annual average	
	CO2CONCENTRATION	
CAR	SON CONTAINING COMP	OUNDS (OTHER THAN CO2) IN THE FLARE GAS STREAM
	Carbon Containing	Annual Average Method(s) Used to Measure Annual Average
	Compound #1	25 % Method 18 at 40 CFR part 60, appendix A-6
	Compound #2	50 % ASTM D1945-03
+	ADD a Compound	
EQU	ATION C-9a SUMMARY A	ND RESULT
		CH <sub>4</sub> =1x10 <sup>-3</sup> × HHV × EF × Fuel
		Hover over an element in the equation above to reveal a definition of that element.
Ann	ual CH4 emission from	500 (metric tons)
	this flare	Use C-9a spreadsheet to calculate
		ND DEGULT
EQU	NITON C-98 SUMMARY A	ND RESULT
		N2O= 1x10* × mmv × EF × Fuel
		Hover over an element in the equation above to reveal a definition of that element.
Ann	ual N2O emission from	15 (metric tons)
	ALL	_
		Use C-9a spreadsheet to calculate

To add a non-CO<sub>2</sub> carbon-contain compound for the flare, click the "ADD a Compound" link in the CARBON CONTAINING COMPOUNDS (OTHER THAN CO2) IN THE FLARE GAS STREAM section on the Equation Summary and Result page and enter the required information.

When finished entering the required compound information, click SAVE.



For each flare using the Equation Y-2 calculation method, Subpart Q requires you to enter the following supplemental emissions information:

- An indication of whether daily or weekly measurement periods are used [98.256(e)(8)]
- The annual volume of flare gas combusted (in MMscf) [98.256(e)(8)]
- The specific consensus-based standard method number or description of the procedure specified by the flow meter manufacturer [98.256(q)]
- The number of days during the reporting year missing data procedures were used to determine the volume of flare gas combusted
- An indication of whether the annual average higher heating value of the flare gas was determined using standard conditions of 68 °F and 14.7 psia or 60 °F and 14.7 psia [98.256(e)(8)]
- The annual average higher heating value of the flare gas (Btu/scf) [98.256(e)(8)]
- The method used to measure higher heating value of the flare gas [98.256(q)]
  - ASTM D4809-06
  - ASTM D240-02 (Reapproved 2007)
  - ASTM D1826-94 (Reapproved 2003)
  - ASTM D3588-98 (Reapproved 2003)
  - ASTM D4891-89 (Reapproved 2006)
  - Chromatographic analysis: manufacturer's instructions
  - Other (specify)
- The number of days during the reporting year missing data procedures were used to determine the higher heating value of the flare gas
- An indication of whether the annual volume of flare gas combusted was determined using standard conditions of 68 °F and 14.7 psia or 60 °F and 14.7 psia [98.256(e)(8)]

GISTRATION FACILITY MANAGEMENT	DATA REPORTING Electronic Greenhouse Gas Reporting Total Control Contr
	Hello, Richard Richards   My Pro
DR Enterprises - TEST	
Subpart Q: Iron and	Steel Production (2011)
Subpart Overview » Flares » Flar	e 3 » Eq. Y-2
GHG DATA AND ASSOCIATE	ED INFORMATION
Use this page to enter the GHG	ada required by Subpart Q. Please enter the information
please use the e-GGRT Help in	na mornauon about ne data collected on his page, (eq. 1/2) dos ensisters (neuco nk(s) provided.
	(Eq. C-9a) CH4 emissions (metric
	(Eq. C-Sa) N2O emissions (metric
EQUATION Y-2 SUMMARY AN	ID RESULT
	<u>n</u>
	$CO_2 = 0.98 \times 0.001 \times \sum_{met} \left[ (Flare)_p \times (HHV)_p \times (EmF) \right]$
	Hover over an element in the equation above to reveal a definition of that element
Annual CO: emission from	1000000 (motio tane)
this flare	Lise Y.2 spreadsheet to religible
	- Ose riz spreadsneer to calculate
MEASUREMENT FREQUENC	Y
Frequency of	Daily
measurement data	O Weekly
Annual volume of flare gas	1000000 (MMrcf)
combusted	1000000 (WWSC)
Specific consensus-based standard method or	manufacturer
describe the procedure	
manufacturer	
Number of days missing	17 (days)
used for annual volume of	
nare gas combusted	
annual volume of flare gas	© 68 °F and 14.7 psia
was determined	O ou Pland 147 psia
HIGHER HEATING VALUE OF	THE FLARE GAS
Annual average higher heating value of the flare	1020 (MMBtu/MMscf)
gas combusted	
Method used to determine the annual average higher	ASTM D4809-06
heating value	
Number of days missing data procedures were	21 (days)
used for annual average higher heating value	
Conditions on which the	68 F and 14 7 nsia
annual average higher	O 60 'F and 14.7 psia
determined	
EQUATION C-9a SUMMARY A	ND RESULT
	CH <sub>4</sub> =1x10 <sup>-3</sup> × HHV × EF × Fuel
	Hover over an element in the equation above to reveal a definition of that element.
Annual CH4 emission from	500 (metric tons)
utis tiare	➡ Use C-9a spreadsheet to calculate
FOUATION C-98 SUMMARY A	ND RESULT
	N <sub>2</sub> Q=1 <sub>2</sub> 10 <sup>-3</sup> × HHV × EF × Fuel
	Hover over an element in the equation above to reveal a definition of that element
Appual NoO emission from	
this flare	Line C. On preparateboot to calculate
	- Vae Craix apresidenties to Calculate

For each flare using the **Equation Y-3** calculation method, Subpart Q requires you to enter the following supplemental emissions information:

• The total number of start-up, shutdown, or malfunction (SSM) events exceeding 500,000 scf/day [98.256(e)(9)]

COURT Not Stated       DR. Enterprises - TEST         Subpart Oct: In contant Stell Production (2011)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         Subpart Oct: In the State - Read - Ellipsi (State Instance)         State - Control (State Instance)         State - Control (State Instance)         State - State - Read - Ellipsi (State - Read - Re	IE FACILITY REGIST	ATION FACILITY MANAGEMENT	DATA REPORTING	Electronic Greenhouse Gas Reporting Tool Helio Richard Richards J. My Profile J. Lo
ECULATION Y.S SUMMARY AND RESULT CO <sub>2</sub> = 0.58 + 0.001 < (Filtersum +14rty + Emf + ∑ <sub>p=1</sub> <sup>∞</sup> [ <sup>1</sup> / <sub>2</sub> <sup>4</sup> / <sub>2</sub> (Filtersum / <sup>1</sup> / <sub>N</sub> / <sup>1</sup> / <sub>2</sub> + (CO <sub>2</sub> )]) Hore over an identified the equation above to reveal a definition of that denset. Annual CO <sub>2</sub> emission from <u>100000</u> (metric fore) Util Y 3 spreachabete to calculate START_UP, SHITOWOR MALFUNCTION EVENTS Teal numbers Biblio Start sys. Biblio Start sys. ECULATION C Su SUMMARY AND RESULT CH-1 sys10 <sup>-2</sup> + HV + EF + Fuel Hove over an element in the equation above to reveal a definition of that element. Annual CH+ emission from <u>6000</u> (metric fore) ECULATION C Su SUMMARY AND RESULT N <sub>2</sub> O-1 sys10 <sup>-2</sup> + HV + EF + Fuel Hove over an element in the equation above to reveal a definition of that element. Annual CH+ emission RESULT N <sub>2</sub> O-1 sys10 <sup>-2</sup> + HV + EF + Fuel Hove over an element in the equation above to reveal a definition of that element. Annual Host mission <u>10</u> (metric fore) Utils C Start sys. ECULATION C Su SUMMARY AND RESULT N <sub>2</sub> O-1 sys10 <sup>-2</sup> + HV + EF + Fuel Hove over an element in the equation above to reveal a definition of that element. Annual Host mission <u>10</u> (metric fore) Utils C Start sys. <u>10</u> (metric fore) <u>10</u> (metric for	e-GGRT Help i e-GGRT for Subpart Y ing	DR Enterprises - TEST Subpart Q: Iron and Subpart Q: Overview - Faires - Fair GHG DATA AND ASSAU Use his page to enter the GHG shown for this faire. For additio please use the e-GGRT Help in	Steel Production (2011) e 4 - Eq. Y-3 ED INFORMATION data required by Saligari Q. Pease erfor the information all information about the data collected on this page. Not provided	100,000.1           (E, Y-2) : C2: emissions (metric lons)           (E, 2-3) : C3: emissions (metric lons)           (E, C-4) : C3: emissions (metric lons)           (E, C-4) : hc0 emissions (metric lons)
Annual CGs emission from this fare 57AFT-UP. SHUTDOWN, OK MALFUNCTION EVENTS Total number of start-up, 155 155 155 155 155 155 155 15		EQUATION Y-3 SUMMARY AN CO2=0.98×	D RESULT 10.001 × (Flare <sub>Herm</sub> × HHV × EmF + $\sum_{p=1}^{n} \prod_{12}^{4.4} \sqrt{Flare_{BS}}$ Hover over an element in the equation above to reveal a de	$u_{1/p} \times \frac{(MW)_p}{MVC} \times (CC)_p$ )
START-UP, SHUDDOWL OR MALFUNCTION EVENTS         Total number of start-up,       15         (SSM) works accessing sexpose a start of start-up,       15         EQUATION C-Se SUMMARY AND RESULT       CHL 110 <sup>2</sup> × HHV × EF × Fuel         How core an element in the equation above to reveal a definition of that element.         Anneal CH4 emission from       2000 indictors)         EQUATION C-Se SUMMARY AND RESULT         CH4 = 110 <sup>2</sup> × HHV × EF × Fuel         How core an element in the equation above to reveal a definition of that element.         Anneal CH4 emission from       2000 indictors)         Line C-Se SUMMARY AND RESULT       No-0 = 110 <sup>2</sup> × HHV × EF × Fuel         How core an element in the equation above to reveal a definition of that element.         Anneal No emission from       12 indictors)         Line C-Se spreaddeved to calculate         Use C-Se spreaddeved to calculate		Annual CO2 emission from this flare	100000 (metric tons)	
EQUATION C-Se SUMMARY AND RESULT CH4=\$110 <sup>-3</sup> HMY × EF × Fuel Hove over an element in the equation above to reveal a definition of that element. Annual CH4 emission from Usic C-Se SUMMARY AND RESULT EQUATION C-Se SUMMARY AND RESULT NuO-\$110 <sup>-3</sup> HMY × EF × Fuel NuO-\$110 <sup>-3</sup> HMY × EF × Fuel NuO-\$100 <sup>-3</sup> HMY × EF × Fuel NuO-\$10 <sup></sup>		START-UP, SHUTDOWN, OR Total number of start-up, shutdown, or malfunction (SSM) events exceeding 500,000 scfiday	MALFUNCTION EVENTS 15	
Units units Units C-Sta spread/divert for calculate  EGUATION C-Sta SUMMARY AND RESULT  N.O* 1110 <sup>-3</sup> HH/ × EF × Fuel  NO* over an element in the equation above to reveal a definition of that element.  Annual N2O emission for the spread/divert of the spread/divert of calculate  List farm Usin C-Sta spread/divert of calculate		EQUATION C-9a SUMMARY A	ND RESULT CH <sub>4</sub> = 1x10 <sup>-3</sup> × HHV × EF × Fuel HV ver an element in the equation above to reveal a de 500 (metric tons)	finition of that element.
N₀O 1110 <sup>3</sup> × HH/ × EF × Fuel Hover over an element in the equation above to reveal a definition of that element. Annual NiO emission from this filter ↓ Use C the spreadsheets calculate			Use C-9a spreadsheet to calculate	
this flare Use C-9a spreadsheet to calculate		Annual N20 emission from	N2O = 1x10 <sup>-3</sup> × HHV × EF × Fuel Hover over an element in the equation above to reveal a de	finition of that element.
		this flare	Use C-9a spreadsheet to calculate	

### Step 4: Save Your Data

When you have finished entering emission results, click SAVE.

After you save the data on this page, the next time you open the page, the calculator on the top of the page will display the CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emissions, rounded to the nearest 0.1, 0.01, and 0.001 of a metric ton, respectively. The value displayed is for informational purposes only.

### Step 5. Repeat Steps 1-4

Repeat Steps 1-4 until you have entered emissions information for all flares at your facility.

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### See Also

Screen Errors Using e-GGRT to Prepare Your Subpart Q Report Subpart Q Process Unit Information for Units NOT Monitored by CEMS Subpart Q Process Unit Information for Units Monitored by CEMS Subpart Q Coke Pushing Operations Information Subpart Q Flares Information Subpart Q Emissions Information for Units NOT Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Units Monitored by CEMS Subpart Q Emissions Information for Coke Pushing Operations Subpart Q Emissions Information for Flares Subpart Validation Report

# **Using Subpart Q Calculation Spreadsheets**

These optional spreadsheets are provided to assist reporters in calculating emissions and in keeping records of these calculations.

Reporters are required to keep records of these calculations under 40 CFR 98.3(g) and additional subpart-specific provisions, but are not required to use these spreadsheets or to submit any spreadsheets to EPA.

Spreadsheets may include inputs to emission equations, reporting some of which EPA deferred until 2015. (See 76 FR 53057, published August 25, 2011, http://www.gpo.gov/fdsys/pkg/FR-2011-08-25/pdf/2011-21727.pdf).

### **Overview**

This help page provides guidance for working with the supplemental Subpart Q calculation spreadsheets. The guidance provides step-by-step instructions for the following tasks:

- Selecting the Appropriate Calculation Spreadsheet
- Downloading a Calculation Spreadsheet
- General Information on Using a Calculation Spreadsheet
- Using the Equation Q-1 Calculation Spreadsheet
- Using the Equation Q-2 Calculation Spreadsheet
- Using the Equation Q-3 Calculation Spreadsheet
- Using the Equation Q-4 Calculation Spreadsheet
- Using the Equation Q-5 Calculation Spreadsheet
- Using the Equation Q-6 Calculation Spreadsheet
- Using the Equation Q-7 Calculation Spreadsheet
- Using the Equation Q-8 EF Approach Calculation Spreadsheet

Specific information on each of the spreadsheets is provided below:

Calculation Spreadsheet (click to download)	Calculation Method	Selection Criteria: Emissions Source	Instructions (click to view)
Equation Q-1 Calculation Spreadsheet.xls	Carbon Mass Balance	Taconite indurating furnace	Q-1 Help
Equation Q-2 Calculation Spreadsheet.xls	Carbon Mass Balance	Basic oxygen process furnace	Q-2 Help
Equation Q-3 Calculation Spreadsheet.xls	Carbon Mass Balance	Non-recovery coke oven battery	Q-3 Help
Equation Q-4 Calculation Spreadsheet.xls	Carbon Mass Balance	Sinter process	Q-4 Help
Equation Q-5 Calculation Spreadsheet.xls	Carbon Mass Balance	Electric arc furnace (EAF)	Q-5 Help
Equation Q-6 Calculation Spreadsheet.xls	Carbon Mass Balance	Decarburization vessel	Q-6 Help
Equation Q-7 Calculation Spreadsheet.xls	Carbon Mass Balance	Direct reduction furnace	Q-7 Help
Equation Q-8 EF Approach Calculation Spreadsheet.xls	Site-specific emission factor approach	Exhaust Stack	Q-8 EF Approach Help

## Selecting the Appropriate Calculation Spreadsheet

Subpart Q requires facilities to report annual carbon dioxide (CO2) process emissions from each taconite indurating furnace, basic oxygen

furnace, non-recovery coke oven battery, coke pushing process sinter process, electric arc furnace, decarburization vessel, and direct reduction furnace or each exhaust stack used for iron and steel production. To calculate emissions, you may use the carbon mass balance method for each unit (furnace, oven battery, vessel, etc.) or process, or the site-specific emission factor approach for each exhaust stack used for iron and steel production.

### **Carbon Mass Balance Method**

Carbon mass balance method calculations are based on the annual mass of inputs and outputs to the process and an annual analysis of the respective weight fraction of carbon. Each unit type and process type has a unique Spreadsheet Tool for calculating emissions using the carbon mass balance method.

Equation Q--1 Calculation Spreadsheet. Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from a taconite indurating furnace used in iron and steel production. This spreadsheet performs the calculation using Equation Q-1, provided below:

(Equation Q-1)  $CO_{2} = \frac{44}{12} * \left[ (F_{s}) * (C_{sf}) + (F_{g}) * (C_{gf}) * \frac{MW}{MVC} * 0.001 + (F_{l}) * (C_{lf}) * 0.001 + (O) * (C_{o}) - (P) * (C_{p}) - (R) * (C_{R}) \right]$ 

*Equation Q--2 Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from a basic oxygen process furnace used in iron and steel production. This spreadsheet performs the calculation using Equation Q-2, provided below:

(Equation Q-2)

$$\begin{aligned} CO_2 &= \frac{44}{12} * \Big[ (Iron) * (C_{Iron}) + (Scrap) * (C_{Scrap}) + (Flux) * (C_{Flux}) \\ &+ (Carbon) * (C_{Carbon}) - (Steel) * (C_{Steel}) - (Slag) * (C_{Slag}) - (R) * (C_R) \Big] \end{aligned}$$

*Equation Q--3 Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from a non-recovery coke oven battery used in iron and steel production. This spreadsheet performs the calculation using Equation Q-3, provided below:

(Equation Q-3)  
$$CO_2 = \frac{44}{12} * \left[ (Coal) * (C_{Coal}) - (Coke) * (C_{Coke}) - (R) * (C_R) \right]$$

*Equation Q--4 Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from a sinter process used in iron and steel production. This spreadsheet performs the calculation using Equation Q-4, provided below:

(Equation Q-4)	
	$CO_2 = \frac{44}{12} * \left[ \left( F_g \right) * \left( C_{gf} \right) * \frac{MW}{MVC} * 0.001 + \left( Feed \right) * \left( C_{Feed} \right) - \left( \text{Sinter} \right) * \left( C_{Sinter} \right) - \left( R \right) * \left( C_R \right) \right]$

*Equation* Q--5 *Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from an electric arc furnace used in iron and steel production. This spreadsheet performs the calculation using Equation Q-5, provided below:

(Equation Q-5)  

$$CO_{2} = \frac{44}{12} * [ (Iron) * (C_{Iron}) + (Scrap) * (C_{Scrap}) + (Flux) \\ * (C_{f}) + (Electrode) * (C_{Electrode}) + (Carbon) * (C_{c}) - (Steel) \\ * (C_{Steel}) - (Slag) * (C_{Stag}) - (R) * (C_{R}) ]$$

*Equation Q--6 Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from a decarburization vessel used in iron and steel production. This spreadsheet performs the calculation using Equation Q-6, provided below:

(Equation Q-6)  
$$CO_2 = \frac{44}{12} * \left\{ (Steel) * [(C_{Steelin}) - (C_{Steelout})] - (R) * (C_R) \right\}$$

*Equation Q--7 Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from a direct reduction furnace used in iron and steel production. This spreadsheet performs the calculation using Equation Q-7, provided below:

(Equation Q-7)  

$$CO_{2} = \frac{44}{12} * \left[ (F_{g}) * (C_{gf}) * \frac{MW}{MVC} * 0.001 + (Ore) * (C_{Ore}) + (Carbon) * (C_{Carbon}) + (Other) * (C_{Other}) - (Iron) * (C_{Iron}) - (NM) * (C_{NM}) - (R) * (C_{R}) \right]$$

### Site-Specific Emission Factor Approach

Site-specific emission factor approach calculations are based on emission factors and feed rates derived from performance testing. Performance tests must measure CO<sub>2</sub> emissions from all exhaust stacks for the process and measure the feed rate of materials into the process during the test.

*Equation Q-8 EF Approach Calculation Spreadsheet.* Use this spreadsheet to calculate annual CO<sub>2</sub> emissions from each exhaust stack used in iron and steel production. This spreadsheet performs the calculation using the methodology described in 98.173(b)(2)(iii) and (iv) including the equations below:

(Equation Q-8 EF Approach - EF)  
$$EF = \frac{Hourly CO_2}{Hourly Feed}$$
(Equation Q-8 EF Approach - CO<sub>2</sub>)  
$$Annual CO_2 = EF \times Annual Feed$$

## **Downloading a Calculation Spreadsheet**

Calculation spreadsheets for Subpart Q may be downloaded by clicking one of the links in the first column of the table below. Users may also jump to instructions for each spreadsheet by clicking one of the links in the fourth column.

Calculation Spreadsheet (click to download)	Calculation Method	Selection Criteria: Emissions Source	Instructions (click to view)
Equation Q-1 Calculation Spreadsheet.xls	Carbon Mass Balance	Taconite indurating furnace	Q-1 Help
Equation Q-2 Calculation Spreadsheet.xls	Carbon Mass Balance	Basic oxygen process furnace	Q-2 Help
Equation Q-3 Calculation Spreadsheet.xls	Carbon Mass Balance	Non-recovery coke oven battery	Q-3 Help
Equation Q-4 Calculation Spreadsheet.xls	Carbon Mass Balance	Sinter process	Q-4 Help
Equation Q-5 Calculation Spreadsheet.xls	Carbon Mass Balance	Electric arc furnace (EAF)	Q-5 Help
Equation Q-6 Calculation Spreadsheet.xls	Carbon Mass Balance	Decarburization vessel	Q-6 Help
Equation Q-7 Calculation Spreadsheet.xls	Carbon Mass Balance	Direct reduction furnace	Q-7 Help
Equation Q-8 EF Approach Calculation Spreadsheet.xls	Site-specific emission factor approach	Exhaust Stack	Q-8 EF Approach Help

## Using a Spreadsheet to Make Calculations

The guidance provided in this section applies to each of the calculation spreadsheet for Subpart Q. Additional guidance is provided for each individual spreadsheet in the sections below.

### **Color coding**

The calculation spreadsheets contain green input cells, gray informational cells, and red-bordered results cells filled with yellow or white. Users should use green input cells to enter all data specific to their facility, unit, or process. Gray informational cells contain parameter names, column and row headings, equation constants and subtotals. Calculation results are displayed in red-bordered results cells filled with yellow or white. For red-bordered, yellow-filled results cells, the values in these cells should be entered in the appropriate and separate calculation spreadsheet (as directed below cell) where additional calculations will be made. For red-bordered, white filled results cells, the values in these cells should be entered in e-GGRT for the appropriate process units. All cells that are not green input cells are locked and cannot be modified.

Green input cell (data entry)
Gray informational cells (locked)
Red-bordered, yellow-filled results cells (enter in appropriate and separate calculation spreadsheet)
Red-bordered, white filled results cells (enter in e-GGRT)

### **Stop and Warning Messages**

The calculation spreadsheets will display a stop message if the user enters a value that is invalid or a warning message if the user enters a value outside the EPA estimated range for a particular data element. For invalid data entries, the stop messages will not allow a user to proceed and the user must reenter valid data before moving forward. For data entries that are outside the EPA estimated range for a particular data element, the warning messages will allow a user to proceed if the user deems the entered value to be accurate.

### Multiple Units, Processes, or Exhaust Stacks

Users with multiple unit or group configuration types and multiple fuels should use separate Spreadsheet Tools for each configuration type and for each fuel. Users should not aggregate data for multiple configuration types or fuels when using these Spreadsheet Tools.

### Using the Equation Q-1 Calculation Spreadsheet

Use the Equation Q-1 Calculation Spreadsheet to calculate annual  $CO_2$  emissions from a taconite indurating furnace using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-1 Calculation Spreadsheet performs the calculations using Equation Q-1 provided below.

(Equation Q-1)  

$$CO_{2} = \frac{44}{12} * \left[ (F_{s}) * (C_{sf}) + (F_{g}) * (C_{gf}) * \frac{MW}{MVC} * 0.001 + (F_{l}) * (C_{lf}) * 0.001 + (O) * (C_{o}) - (P) * (C_{p}) - (R) * (C_{R}) \right]$$

Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Taconite Indurating Furnace

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

$[F_{\mathfrak{s}}]$ = Annual mass of the solid fuel	
combusted (metric tons)	
[Cst] = Carbon content of the solid	
fuel, from the fuel analysis (percent	
by weight, expressed as a decimal	
fraction, e.g., 95% = 0.95)	
[Fg] = Annual volume of the	
gaseous fuel combusted (scf)	
[Cgf] = Average carbon content of	
the gaseous fuel, from the fuel	
analysis results (kg C per kg of	
[MW] = Molecular weight of the	
gaseous fuel (kg/kg-mole)	
[F <sub>1</sub> ] = Annual volume of the liquid	
fuel combusted (gallons)	
[C <sub>it</sub> ] = Carbon content of the liquid	
fuel, from the fuel analysis results	
(kg C per gallon of fuel)	
[O] = Annual mass of the greenball	
(taconite) pellets fed to the furnace	
(metric tons)	
$[C_0] = Carbon content of the$	
greenball (taconite) pellets, from	
the carbon analysis results	
(percent by weight, expressed as a	
[D] - Annual mass of fired nellets	
produced by the furnace (metric	
tons)	
[C <sub>n</sub> ] = Carbon content of the fired	
pellets, from the carbon analysis	
results (percent by weight	
expressed as a decimal fraction)	
[R] = Annual mass of air pollution	
control residue collected (metric	
tons)	
[C <sub>R</sub> ] = Carbon content of the air	
pollution control residue, from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	

If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--1, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.

### Inputs other than CO<sub>2</sub> in the exhaust gas that contain carbon that are not included in Equations Q-1 (if applicable per 98.173(b)(1))

Space provided for up to 3 addition inputs. For additional inputs, use additional copies of this workbook and sum results before entering in e-GGRT.

[IM] = Additional annual input	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>1</sub> ] = Carbon content of the	
additional annual input mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[IM <sub>J</sub> ] = Additional annual input	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
<pre>[IC<sub>j</sub>] = Carbon content of the</pre>	
additional annual input mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[IM <sub>k</sub> ] = Additional annual input	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>k</sub> ] = Carbon content of the	
additional annual input mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

Outputs other than  $CO_2$  in the exhaust gas that contain carbon that are not included in Equations Q-1 (if applicable per 98.173(b)(1)) Space provided for up to 3 addition outputs. For additional outputs, use additional copies of this workbook and sum results before entering in e-GGRT.

 uon outputs, i or adultional outputs,	use additional copies of this w
[OM <sub>I</sub> ] = Additional annual output	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>i</sub> ] = Carbon content of the	
additional annual output mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[OM <sub>J</sub> ] = Additional annual output	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>J</sub> ] = Carbon content of the	
additional annual output mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[OM <sub>k</sub> ] = Additional annual output	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>k</sub> ] = Carbon content of the	
additional annual output mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

The spreadsheet will calculate the annual CO<sub>2</sub> emissions from this taconite indurating furnace. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this furnace.

# Annual CO<sub>2</sub> Emissions (metric tons) from Equation Q-1



## **Using the Equation Q-2 Calculation Spreadsheet**

Use the Equation Q-2 Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from a basic oxygen process furnace using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-2 Calculation Spreadsheet performs the calculations using Equation Q-2 provided below.

$$\begin{split} CO_2 = & \frac{44}{12} * \Big[ (Iron) * (C_{Iron}) + (Scrap) * (C_{Scrap}) + (Flux) * (C_{Flux}) \\ & + (Carbon) * (C_{Carbon}) - (Steel) * (C_{Steel}) - (Slag) * (C_{Slag}) - (R) * (C_R) \Big] \end{split}$$

Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Basic Oxygen Process Furnace

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

[Iron] = Annual mass of molten iron	
charged to the furnace (metric tons)	
[Ciron] = Carbon content of the	
molten iron, from the carbon	
analysis results (percent by weight,	
expressed as a decimal fraction)	
[Scrap] = Annual mass of ferrous	
scrap charged to the furnace	
(metric tons)	
[C <sub>scrap</sub> ] = Carbon content of the	
ferrous scrap, from the carbon	
analysis results (percent by weight,	
expressed as a decimal fraction)	
[Flux] = Annual mass of hux	
delemite) charged to the furnace	
IC 1 - Corbon content of the flux	
materials, from the earbon enclusion	
materials, from the carbon analysis	
evoressed as a decimal fraction)	
[Carbon] = Annual mass of	
carbonaceous materials (e.g. coal	
coke) charged to the furnace	
(metric tons)	
[Corton] = Carbon content of the	
carbonaceous materials, from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	
[Steel] = Annual mass of molten	
raw steel produced by the furnace	
(metric tons)	
[Csteel] = Carbon content of the	
steel, from the carbon analysis	
results (percent by weight,	
expressed as a decimal fraction)	
[Slag] = Annual mass of slag	
produced by the furnace (metric	
tons)	
[Usiag] = Carbon content of the slag,	
from the carbon analysis (percent	
fraction)	
[R] = Annual mass of air pollution	
control residue collected (metric	
tons)	
[C <sub>R</sub> ] = Carbon content of the air	
pollution control residue, from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	

If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--2, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.

#### Inputs other than CO<sub>2</sub> in the exhaust gas that contain carbon that are not included in Equations Q-2 (if applicable per 98.173(b)(1))

Space provided for up to 3 addition inputs. For additional inputs, use additional copies of this workbook and sum results before entering in e-GGRT.

[IM,] = Additional annual input	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>i</sub> ] = Carbon content of the	
additional annual input mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
<pre>[IM<sub>j</sub>] = Additional annual input</pre>	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
<pre>[IC<sub>j</sub>] = Carbon content of the</pre>	
additional annual input mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[IM <sub>k</sub> ] = Additional annual input	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[ICk] = Carbon content of the	
additional annual input mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

Outputs other than  $CO_2$  in the exhaust gas that contain carbon that are not included in Equations Q-2 (if applicable per 98.173(b)(1)) Space provided for up to 3 addition outputs. For additional outputs, use additional copies of this workbook and sum results before entering in e-GGRT.

[OM <sub>i</sub> ] = Additional annual output	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>I</sub> ] = Carbon content of the	
additional annual output mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[OM <sub>J</sub> ] = Additional annual output	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>J</sub> ] = Carbon content of the	
additional annual output mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[OM <sub>k</sub> ] = Additional annual output	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>k</sub> ] = Carbon content of the	
additional annual output mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

The spreadsheet will calculate the annual CO<sub>2</sub> emissions from this basic oxygen process furnace. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this furnace.

## Annual CO<sub>2</sub> Emissions (metric tons) from Equation Q-2



### Using the Equation Q-3 Calculation Spreadsheet

Use the Equation Q-3 Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from a non-recovery coke oven battery using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-3 Calculation Spreadsheet performs the calculations using Equation Q-3 provided below.



Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Non-Recovery Coke Oven Battery

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

[Coal] = Annual mass of coal	
charged to the battery (metric tons)	
$[C_{Coal}]$ = Carbon content of the coal,	
from the carbon analysis results	
(percent by weight, expressed as a	
decimal fraction)	
[Coke] = Annual mass of coke	
produced by the battery (metric	
tons)	
[C <sub>Coke</sub> ] = Carbon content of the	
coke, from the carbon analysis	
results (percent by weight,	
expressed as a decimal fraction)	
[R] = Annual mass of air pollution	
control residue collected (metric	
tons)	
[C <sub>R</sub> ] = Carbon content of the air	
pollution control residue, from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	

If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--3, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.

Inputs other than CO <sub>2</sub> in th	ne exhaust gas that contain	carbon that are not inclu	uded in Equations Q–3 (if applicable per 98.173(b)(1))
Space provided for up to 3 addition	on inputs. For additional inputs, us	e additional copies of this work	kbook and sum results before entering in e-GGRT.
Π	IM <sub>1</sub> ] = Additional annual input		
n	nass (i) other than CO2 in the		
e	exhaust gas (metric tons)		
0	IC1 = Carbon content of the		
a	additional annual input mass (i)		
(	percent by weight, expressed as a		
d	lecimal fraction, e.g., 95% = 0.95)		
0	IM <sub>j</sub> ] = Additional annual input		
n	nass (j) other than CO2 in the		
e	xhaust gas (metric tons)		
0	IC <sub>j</sub> ] = Carbon content of the		
a	dditional annual input mass (j)		
(1	percent by weight, expressed as a		
d	lecimal fraction, e.g., 95% = 0.95)		
0	IM <sub>k</sub> ] = Additional annual input		
n	nass (k) other than CO2 in the		
e	exhaust gas (metric tons)		
0	IC <sub>k</sub> ] = Carbon content of the		
а	dditional annual input mass (k)		
(1	percent by weight, expressed as a		
d	lecimal fraction, e.g., 95% = 0.95)		]
	4		
Outputs other than $CO_2$ in	the exhaust gas that conta	in carbon that are not inc	cluded in Equations Q-3 (if applicable per 98.173(b)(1)
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition	the exhaust gas that conta on outputs. For additional outputs,	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output	in carbon that are not ind use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
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Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n a	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons)	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> t	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the xhaust gas (metric tons) OC] = Carbon content of the	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition ( n <u>e</u> a	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the xhaust gas (metric tons) OC] = Carbon content of the additional annual output mass (i)	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic [ [ [ [ [ [ [ ] ] ] ] ] ] ] ] ] ] ] ]	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> [ ] a d d d d	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95)	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> [t a () 1 t	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the xhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OMj] = Additional annual output	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> (i a (i) d f n f f n f f n f f n f n n n f n	the exhaust gas that conta on outputs. For additional outputs, OMJ = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (i) opercent by weight expressed as a lecimal fraction, e.g., 95% = 0.95) OMJ = Additional annual output nass (j) other than CO2 in the	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
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Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition ( n ( u a ( d ( u t t t t t t t t t t t t t t t t t t	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OM] = Additional annual output nass (j) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> [1 a (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the xhaust gas (metric tons) OC] = Carbon content of the dditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OMj] = Additional annual output nass (i) other than CO2 in the xhaust gas (metric tons) OCj] = Carbon content of the dditional annual output mass (j)	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	the exhaust gas that conta on outputs. For additional outputs, OMJ = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OMJ = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic n <u>e</u> [ [ d d [ t u a d d t t u a d d t t u a d d t t u a d d t t u t d d t t u t d d t u t d t d	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than Co2 in the exhaust gas (metric tons) OC_J = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ ) OMJ = Additional annual output nass (j) other than Co2 in the exhaust gas (metric tons) OC_J = Carbon content of the idditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ ) OWJ = 1.dditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ )	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> [1 a d [1 n [1 a [1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OM] = Additional annual output nass (j) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OM] = Additional annual output mass (j) other there CO2 is the	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition n <u>e</u> (( d () () () () () () () () () () () () ()	the exhaust gas that conta on outputs. For additional outputs, OMJ = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight expressed as a lecimal fraction, e.g., 95% = 0.95) OMJ = Additional annual output nass (j) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OMJ = Additional annual output nass (k) other than CO2 in the exhaust gas (metric tons)	in carbon that are not inc use additional copies of this w	cluded in Equations Q–3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ ) OMJ] = Additional annual output nass (j) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ ) OMJ] = Additional annual output nass (k) other than CO2 in the exhaust gas (metric tons) OCJ = Corbon content of the	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic n <u>e</u> [ [ 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than Co2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ ) OM] = Additional annual output nass (j) other than Co2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., $95\% = 0.95$ ) OM] = Additional annual output mass (k) other than Co2 in the exhaust gas (metric tons) OC] = Carbon content of the exhaust gas (metric tons) OC] = Carbon content of the exhaust gas (metric tons)	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 addition (	the exhaust gas that conta on outputs. For additional outputs, OM] = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (i) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OM] = Additional annual output nass (j) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OM] = Additional annual output mass (k) other than CO2 in the exhaust gas (metric tons) OC] = Carbon content of the idditional annual output mass (k) other than CO2 in the exhaust gas (metric tons)	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in Space provided for up to 3 additic [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	the exhaust gas that contain on outputs. For additional outputs, OMJ = Additional annual output nass (i) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (i) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (i) OHJ = Additional annual output mass (i) OHJ = Additional annual output mass (j) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (j) OHJ = Additional annual output mass (j) defined annual output mass (j) percent by weight, expressed as a lecimal fraction, e.g., 95% = 0.95) OMJ = Additional annual output mass (k) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (k) other than CO2 in the exhaust gas (metric tons) OCJ = Carbon content of the idditional annual output mass (k) expressed as a lecimal fraction e n. 06% = 0.05)	in carbon that are not inc use additional copies of this w	cluded in Equations Q-3 (if applicable per 98.173(b)(1) orkbook and sum results before entering in e-GGRT.

The spreadsheet will calculate the annual CO<sub>2</sub> emissions from this non-recovery coke oven battery. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this oven battery.

## Annual CO<sub>2</sub> Emissions (metric tons) from Equation Q-3



## **Using the Equation Q-4 Calculation Spreadsheet**

Use the Equation Q-4 Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from a sinter process using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-4 Calculation Spreadsheet performs the calculations using Equation Q-4 provided below.



Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Sinter Process

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

[Fg] = Annual volume of the	
gaseous fuel combusted (scf)	
[Cgr] = Carbon content of the	
gaseous fuel, from the fuel	
analysis results (kg C per kg of	
[MW] = Molecular weight of the	
gaseous fuel (kg/kg-mole)	
[Feed] = Annual mass of sinter	
feed material (metric tons)	
[CFeed] = Carbon content of the	
mixed sinter feed materials that	
form the bed entering the sintering	
machine, from the carbon analysis	
results (percent by weight,	
expressed as a decimal fraction)	
[Sinter] = Annual mass of sinter	
produced (metric tons)	
[Csinter] = Carbon content of the	
sinter pellets, from the carbon	
analysis results (percent by weight,	
expressed as a decimal fraction)	
[R] = Annual mass of air pollution	
control residue collected (metric	
tons)	
[C <sub>R</sub> ] = Carbon content of the air	
pollution control residue, from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	

If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--4, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.

### Inputs other than CO<sub>2</sub> in the exhaust gas that contain carbon that are not included in Equations Q-4 (if applicable per 98.173(b)(1))

Space provided for up to 3 addition inputs. For additional inputs, use additional copies of this workbook and sum results before entering in e-GGRT.

[IM,] = Additional annual input	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>1</sub> ] = Carbon content of the	
additional annual input mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
<pre>[IM<sub>j</sub>] = Additional annual input</pre>	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>J</sub> ] = Carbon content of the	
additional annual input mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[IM <sub>k</sub> ] = Additional annual input	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[ICk] = Carbon content of the	
additional annual input mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

Outputs other than  $CO_2$  in the exhaust gas that contain carbon that are not included in Equations Q-4 (if applicable per 98.173(b)(1)) Space provided for up to 3 addition outputs. For additional outputs, use additional copies of this workbook and sum results before entering in e-GGRT.

	•
[OM] = Additional annual output	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>1</sub> ] = Carbon content of the	
additional annual output mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[OM <sub>J</sub> ] = Additional annual output	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>j</sub> ] = Carbon content of the	
additional annual output mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[OM <sub>k</sub> ] = Additional annual output	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[OC <sub>k</sub> ] = Carbon content of the	
additional annual output mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

The spreadsheet will calculate the annual CO<sub>2</sub> emissions from this sinter process. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this sinter process.

# Annual CO<sub>2</sub> Emissions (metric tons) from Equation Q-4



## **Using the Equation Q-5 Calculation Spreadsheet**

Use the Equation Q-5 Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from an electric arc furnace using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-5 Calculation Spreadsheet performs the calculations using Equation Q-5 provided below.

(Equation Q-5)  

$$CO_{2} = \frac{44}{12} * [ (Iron) * (C_{Iron}) + (Scrap) * (C_{Scrap}) + (Flux) \\ * (C_{f}) + (Electrode) * (C_{Electrode}) + (Carbon) * (C_{c}) - (Steel) \\ * (C_{Steel}) - (Slag) * (C_{Stag}) - (R) * (C_{R}) ]$$

Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Electric Arc Furnace

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

[Iron] = Annual mass of direct	
reduced iron (if any) charged to the	
furnace (metric tons)	
[C <sub>iron</sub> ] = Carbon content of the direct	
reduced iron, from the carbon	
analysis results (percent by weight,	
expressed as a decimal fraction)	
[Scrap] = Annual mass of ferrous	
scrap charged to the furnace	
(methodions)	
[C <sub>scrap</sub> ] - Carbon content of the	
rerrous scrap, from the carbon	
expressed as a decimal fraction)	
[Flux] = Annual mass of flux	
materials (e.g. limestone	
dolomite) charged to the furnace	
[C <sub>Flux</sub> ] = Carbon content of the flux	
materials, from the carbon analysis	
results (percent by weight.	
expressed as a decimal fraction)	
[Electrode] = Annual mass of	
carbon electrode consumed	
(metric tons)	
[C <sub>Electrode</sub> ] = Carbon content of the	
carbon electrode, from the carbon	
analysis results (percent by weight,	
expressed as a decimal fraction)	
[Carbon] = Annual mass of	
carbonaceous materials (e.g., coal,	
coke) charged to the furnace	
(metric tons)	
[C <sub>carbon</sub> ] = Carbon content of the	
carbonaceous materials, from the	
carbon analysis results (percent by	
fraction)	
[Steel] = Annual mass of molten	
raw steel produced by the furnace	
(metric tons)	
[Csteel] = Carbon content of the	
steel, from the carbon analysis	
results (percent by weight,	
expressed as a decimal fraction)	
[Slag] = Annual mass of slag	
produced by the furnace (metric	
tons)	
[C <sub>slag</sub> ] = Carbon content of the slag,	
from the carbon analysis results	
(percent by weight, expressed as a	
decimal fraction)	
[K] = Annual mass of air pollution	
control residue collected (metric	
IONS)	
[C <sub>R</sub> ] = Carbon content of the air	
pollution control residue, from the	
weight expressed as a desired	
weight, expressed as a decimal	

fraction)	
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If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--5, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.



Space provided for up to 3 addition inputs. For additional inputs, use additional copies of this workbook and sum results before entering in e-GGRT.

[IM <sub>i</sub> ] = Additional annual input	
mass (i) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>I</sub> ] = Carbon content of the	
additional annual input mass (i)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
<pre>[IM<sub>j</sub>] = Additional annual input</pre>	
mass (j) other than CO2 in the	
exhaust gas (metric tons)	
<pre>[IC<sub>j</sub>] = Carbon content of the</pre>	
additional annual input mass (j)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	
[IM <sub>k</sub> ] = Additional annual input	
mass (k) other than CO2 in the	
exhaust gas (metric tons)	
[IC <sub>k</sub> ] = Carbon content of the	
additional annual input mass (k)	
(percent by weight, expressed as a	
decimal fraction, e.g., 95% = 0.95)	

Outputs other than CO<sub>2</sub> in the exhaust gas that contain carbon that are not included in Equations Q–5 (if applicable per 98.173(b)(1)) Space provided for up to 3 addition outputs. For additional outputs, use additional copies of this workbook and sum results before entering in e-GGRT.

o uuuu	don outputs, i or udultional outputs,	abe additional copies of an	
	[OM] = Additional annual output		
	mass (i) other than CO2 in the		
	exhaust gas (metric tons)		
	[OC <sub>i</sub> ] = Carbon content of the		
	additional annual output mass (i)		
	(percent by weight, expressed as a		
	decimal fraction, e.g., 95% = 0.95)		
	[OM <sub>j</sub> ] = Additional annual output		
	mass (j) other than CO2 in the		
	exhaust gas (metric tons)		
	[OC <sub>J</sub> ] = Carbon content of the		
	additional annual output mass (j)		
	(percent by weight, expressed as a		
	decimal fraction, e.g., 95% = 0.95)		
	[OM <sub>k</sub> ] = Additional annual output		
	mass (k) other than CO2 in the		
	exhaust gas (metric tons)		
	[OC <sub>k</sub> ] = Carbon content of the		
	additional annual output mass (k)		
	(percent by weight, expressed as a		
	decimal fraction, e.g., 95% = 0.95)		

The spreadsheet will calculate the annual CO<sub>2</sub> emissions from this electric arc furnace. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this furnace.

# Annual CO<sub>2</sub> Emissions (metric tons) from Equation Q-5



## Using the Equation Q-6 Calculation Spreadsheet

Use the Equation Q-6 Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from a decarburization vessel using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-6 Calculation Spreadsheet performs the calculations using Equation Q-6 provided below.

(Equation Q-6)  
$$CO_2 = \frac{44}{12} * \left\{ (Steel) * [(C_{Steelin}) - (C_{Steelout})] - (R) * (C_R) \right\}$$

Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Decarburization Vessel

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

[Steel] = Annual mass of molten steel charged to the vessel (metric tons)	
[C <sub>steelin</sub> ] = Carbon content of the molten steel before decarburization, from the carbon analysis results (percent by weight, expressed as a decimal fraction)	
[C <sub>steelout</sub> ] = Carbon content of the molten steel after decarburization, from the carbon analysis results (percent by weight, expressed as a decimal fraction)	
[R] = Annual mass of air pollution control residue collected (metric tons)	
[C <sub>R</sub> ] = Carbon content of the air pollution control residue, from the carbon analysis results (percent by weight, expressed as a decimal fraction)	

If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--6, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.

Inputs other than CO <sub>2</sub> in the exhaust gas that co	ntain carbon that are not incl	uded in Equations Q–6 (if applicable per 98.173(b)(1))
Space provided for up to 3 addition inputs. For additional input	its, use additional copies of this wor	kbook and sum results before entering in e-GGRT.
[IM] = Additional annual input		
mass (i) other than CO2 in the	9	
exhaust gas (metric tons)		
[IC <sub>1</sub> ] = Carbon content of the		
additional annual input mass	(i)	
(percent by weight, expressed	las a	
decimal fraction, e.g., 95% = 0	0.95)	
[IM <sub>j</sub> ] = Additional annual input	1	
mass (j) other than CO2 in the	9	
exhaust gas (metric tons)		
[IC <sub>j</sub> ] = Carbon content of the		
additional annual input mass	(j)	
(percent by weight, expressed	lasa	
decimal fraction, e.g., 95% = 0	0.95)	
[IM <sub>k</sub> ] = Additional annual inpu	t	
mass (k) other than CO2 in th	e	
exhaust gas (metric tons)		
[IC <sub>k</sub> ] = Carbon content of the		
additional annual input mass	(k)	
(percent by weight, expressed	as a	
decimal fraction, e.g., 95% = 0	).95)	
Outputs other than CO in the sylawst res that	antain anthan that are not in	sluded in Equations O. 6 (if explicable new 08 472/b)(4))
Outputs other than $CO_2$ in the exhaust gas that o	contain carbon that are not in	cluded in Equations Q–6 (if applicable per 98.173(b)(1))
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional ou	contain carbon that are not in tputs, use additional copies of this v	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual outp	contain carbon that are not in tputs, use additional copies of this v	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than $CO_2$ in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual outp mass (i) other than CO2 in the	contain carbon that are not in tputs, use additional copies of this v out	cluded in Equations Q-6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual outp mass (i) other than CO2 in the exhaust gas (metric tons)	contain carbon that are not in tputs, use additional copies of this v out	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional ou [OM] = Additional annual outputs mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the	contain carbon that are not in tputs, use additional copies of this w put	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional ou [OM] = Additional annual output mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mas	contain carbon that are not in tputs, use additional copies of this w uut a s (i)	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual out mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mass (percent by weight, expressed	contain carbon that are not in toputs, use additional copies of this v out s (i) as a	cluded in Equations Q-6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional outputs [OM] = Additional annual outputs mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = (	s (i) as a 9.95	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out (IOM) = Additional annual out mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = 0 [OM] = Additional annual output	s (i) lass a 0.955	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) rorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out mass (i) other than CO2 in the exhaust gas (metric tons) [OC_] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% e ( [OM_] = Additional annual output mas (percent by weight, expressed	contain carbon that are not in tputs, use additional copies of this v out s (i) as a 0.95) put	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual out mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mass (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM] = Additional annual output mass () other than CO2 in the exhaust gas (metric tons)	sontain carbon that are not in tputs, use additional copies of this v out s (i) l as a .95) Dut e	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual out mass (i) other than CO2 in the <u>exhaust gas (metric tons)</u> [OC] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM] = Additional annual out mass (j) other than CO2 in the <u>exhaust gas (metric tons)</u> [OC] = Carbon content of the	sontain carbon that are not in tputs, use additional copies of this v out a s (i) (as a ).95) Dut a	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than $CO_2$ in the exhaust gas that of Space provided for up to 3 addition outputs. For additional outputs, for additional annual outputs as (i) other than CO2 in the exhaust gas (metric tons) $[OC_2] = Carbon content of theadditional annual output mas(percent by weight, expresseddecimal fraction, e.g., 95% = ([OM_3] = Additional annual output mas (i) other than CO2 in theexhaust gas (metric tons)[OC_2] = Carbon content of theadditional annual output mas (i) other than CO2 in theexhaust gas (metric tons)[OC_3] = Carbon content of theadditional annual output mas$	sontain carbon that are not in toputs, use additional copies of this v unt s s (i) as a .95) .951 .951	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than $CO_2$ in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out mass (i) other than CO2 in the exhaust gas (metric tons) $[OC_2] = Carbon content of theadditional annual output mas(percent by weight, expresseddecimal fraction, e.g., 95% e ([OM_3] = Additional annual outputmass (j) other than CO2 in theexhaust gas (metric tons)[OC_2] = Carbon content of theadditional annual output mas(percent by weight, expresseddistinguish annual output mas(percent by weight, expresseddistinguish annual output mas(percent by weight, expressed$	sontain carbon that are not in toputs, use additional copies of this v vut a s (i) as a 0.95) put a s (j) as a	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) vorkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual out mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mass (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM]] = Additional annual output mass (percent by weight, expressed decimal fraction, e.g., 95% = ( [OC]] = Carbon content of the additional annual output mass (percent by weight, expressed decimal fraction, e.g., 95% = ( [OL]] = 6.400 content of the additional annual output mass (percent by weight, expressed decimal fraction, e.g., 95% = ( [OL]] = 6.400 content of the	sontain carbon that are not in tputs, use additional copies of this v out a s (i) l as a .95) but as a .95)	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than CO <sub>2</sub> in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out [OM] = Additional annual out mass (i) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM] = Additional annual output mass (j) other than CO2 in the exhaust gas (metric tons) [OC] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM] = Additional annual output mas	sontain carbon that are not in tputs, use additional copies of this v out a s (i) as a .95) but s (j) as a .95) but c	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) orkbook and sum results before entering in e-GGRT.
Outputs other than $CO_2$ in the exhaust gas that of Space provided for up to 3 addition outputs. For additional out mass (i) other than CO2 in the exhaust gas (metric tons) [OC_] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM_] = Additional annual output mas () other than CO2 in the exhaust gas (metric tons) [OC_] = Carbon content of the additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM_] = Additional annual output mas (percent by weight, expressed decimal fraction, e.g., 95% = ( [OM_] = Additional annual output mas (percent by weight, expressed	sontain carbon that are not in tputs, use additional copies of this v uut a s (i) as a .95) .95) s (j) as a .95) .95) .95) .95) .95) .95) .95) .95)	cluded in Equations Q–6 (if applicable per 98.173(b)(1)) vorkbook and sum results before entering in e-GGRT.
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The spreadsheet will calculate the annual CO<sub>2</sub> emissions from this decarburization vessel. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this decarburization vessel.

# Annual CO2 Emissions (metric tons) from Equation Q-6



## Using the Equation Q-7 Calculation Spreadsheet

Use the Equation Q-7 Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from a direct reduction furnace using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-7 Calculation Spreadsheet performs the calculations using Equation Q-7 provided below.

$$\begin{array}{l} \text{(Equation Q-7)} \\ CO_2 = \frac{44}{12} * \left[ \left( F_g \right) * \left( C_{gf} \right) * \frac{MW}{MVC} * 0.001 + \left( Ore \right) * \left( C_{Ore} \right) \right. \\ \\ \left. + \left( Carbon \right) * \left( C_{Carbon} \right) + \left( Other \right) * \left( C_{Other} \right) \right. \\ \\ \left. - \left( Iron \right) \left( C_{Iron} \right) - \left( NM \right) * \left( C_{NM} \right) - \left( R \right) * \left( C_R \right) \right] \end{array}$$

Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Direct Reduction Furnace

Next, enter the requested information in the green input cells in the Input Data table.

# Input Data

[Fg] = Annual volume of the	
IC J = Carbon content of the	
caseous fuel from the fuel	
analysis results (kg C per kg of	
MWD - Molecular weight of the	
asseous fuel (ka/ka-mole)	
[Ore] = Annual mass of iron ore or	
iron ore nellets fed to the furnace	
(metric tons)	
[Com] = Carbon content of the iron	
ore or iron ore nellets from the	
carbon analysis results (nercent by	
weight expressed as a decimal	
fraction)	
[Carbon] = Annual mass of	
carbonaceous materials (e.g., coal,	
coke) charged to the furnace	
(metric tons)	
[Ccarbon] = Carbon content of the	
carbonaceous materials, from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	
[Other] = Annual mass of other	
materials charged to the furnace	
(metric tons)	
[Cother] = Average carbon content of	
the other materials charged to the	
furnace, from the carbon analysis	
results (percent by weight,	
expressed as a decimal fraction)	
[iron] = Annual mass of iron	
produced (metric tons)	
[Ciron] = Carbon content of the iron,	
from the carbon analysis results	
(percent by weight, expressed as a	
decimal fraction)	
[wwj = Annual mass of non-	
furnace (metric tone)	
[C] = Carbon content of the non	
metallic materials, from the earbor	
analysis results (percent by weight	
expressed as a decimal fraction)	
[R] = Annual mass of air pollution	
control residue collected (metric	
tons)	
[C <sub>R</sub> ] = Carbon content of the air	
pollution control residue from the	
carbon analysis results (percent by	
weight, expressed as a decimal	
fraction)	

If you have a process input or output other than CO<sub>2</sub> in the exhaust gas that contains carbon that is not included in Equations Q--7, enter the carbon and mass rate of each additional process input or output in the provided additional green input cells.

Inputs other than CO <sub>2</sub> in	the exhaust gas that contain	carbon that are not includ	ed in Equations Q–7 (if applicable per 98.173(b)(1))
Space provided for up to 3 add	ition inputs. For additional inputs, us	e additional copies of this workbo	ook and sum results before entering in e-GGRT.
	[IM] = Additional annual input		
	mass (i) other than CO2 in the		
	exhaust gas (metric tons)		
	[IC <sub>1</sub> ] = Carbon content of the		
	additional annual input mass (i)		
	(percent by weight, expressed as a		
	decimal fraction, e.g., 95% = 0.95)		
	[IM <sub>J</sub> ] = Additional annual input		
	mass (j) other than CO2 in the		
	exhaust gas (metric tons)		
	<pre>[IC<sub>j</sub>] = Carbon content of the</pre>		
	additional annual input mass (j)		
	(percent by weight, expressed as a		
	decimal fraction, e.g., 95% = 0.95)		
	[IM <sub>k</sub> ] = Additional annual input		
	mass (k) other than CO2 in the		
	exhaust gas (metric tons)		
	[IC <sub>k</sub> ] = Carbon content of the		
	additional annual input mass (k)		
	(percent by weight, expressed as a		
	decimal fraction, e.g., 95% = 0.95)		
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The calculation spreadsheet will calculate the annual CO<sub>2</sub> emissions from this direct reduction furnace. The calculated value will be displayed in the red-bordered cell at the bottom of the spreadsheet. This value should be entered in e-GGRT for this furnace.

## Annual CO<sub>2</sub> Emissions (metric tons) from Equation Q-7



## Using the Equation Q-8 EF Approach Calculation Spreadsheet

Use the Equation Q-8 EF Approach Calculation Spreadsheet to calculate annual CO<sub>2</sub> emissions from an exhaust stack using the carbon mass balance method. Use a separate spreadsheet for each furnace. The Equation Q-8 EF Approach Calculation Spreadsheet performs the calculations using an equation to solve for the site-specific emission factor and an equation to calculate CO<sub>2</sub> emissions. These equations are provided below.

(Equation Q-8 EF Approach - EF)	$_{FF}$ – Hourly $CO_2$
	Hourly Feed

(Equation Q-8 EF Approach - CO<sub>2</sub>)

Begin by entering the facility name, your name, the unit name or identifier, reporting period, and any additional comments in the green input cells of the general information table located immediately below the equation in the spreadsheet. This is for your records.

Facility Name:	
Reporter Name:	
Unit Name/ ID:	
Reporting Period:	
Comments:	
Unit Type:	Exhaust Stack

Next, enter the requested information in the green input cells in the Input Data table.

### Input Data

[C <sub>CO2</sub> ] = Hourly CO <sub>2</sub> concentration,	
dry basis (% CO <sub>2</sub> )	
[Q] = Hourly stack gas volumetric flow rate (scfh)	
[%H <sub>2</sub> O] = Hourly moisture	
percentage in the stack gas	
[Hourly Feed] = Average hourly feed	
or production rate (as applicable)	
during the test (in metric tons per	
hour)	
[Annual Feed] = Annual feed or	
production rate (as applicable)	
used to estimate annual CO2	
emissions (in metric tons)	

The spreadsheet will first calculate the site-specific emission factor for this stack and then use that value to calculate annual  $CO_2$  emissions from this exhaust stack. The calculated values will be displayed in the red-bordered cells at the bottom of the spreadsheet. These values should be entered in e-GGRT for this stack.

# Annual CO2 Emissions (metric tons) from Site-Specific Emission Factor Approach



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