Subpart Y Catalytic Cracking, Fluid Coking, and Catalytic Reforming Unit Information

This page provides a step-by-step description of how to enter Subpart Y Catalytic Cracking, Fluid Coking, or Catalytic Reforming unit information about this facility.

Adding or Updating Catalytic Cracking, Fluid Coking, or Catalytic Reforming Unit Information

To add or update Subpart Y Catalytic Cracking, Fluid Coking, or Catalytic Reforming unit information for this Facility, locate the CATALYTIC CRACKING UNITS, TRADITIONAL FLUID COKING UNITS, FLUID COKING UNITS WITH FLEXICOKING DESIGN, AND CATALYTIC REFORMING UNITS EMISSIONS SUMMARY table on the Subpart Y Overview page.

Click the link titled “ADD a Catalytic Cracking or Coking Unit.”

To edit an existing Catalytic Cracking, Fluid Coking, or Catalytic Reforming Unit, click on the edit icon or the Name/ID link, which is the first column in the CATALYTIC CRACKING AND COKING UNIT-LEVEL EMISSIONS SUMMARY table.

To delete an existing Catalytic Cracking, Fluid Coking, or Catalytic Reforming Unit, click on the delete icon, which is the last column in the CATALYTIC CRACKING UNITS, TRADITIONAL FLUID COKING UNITS, FLUID COKING UNITS WITH FLEXICOKING DESIGN, AND CATALYTIC REFORMING UNITS EMISSIONS SUMMARY table.

Click image to expand
Petco (2010)

Section 95113 (Subpart Y): Petroleum Refineries

**Subpart Overview**

**OVERVIEW OF SUBPART Y REPORTING REQUIREMENTS**

Subpart Y requires affected facilities to report greenhouse gas (GHG) emissions from flares, catalytic cracking units, traditional fluid coking units, fluid coking units with flexicoking design, delayed coking units, catalytic reforming units, sulfur recovery units, coke calcining units, asphalt blowing, equipment leaks, storage tanks, uncontrolled blowdown systems, loading operations, process vents, and non-merchant hydrogen plants. For additional information about Subpart Y reporting, please use the Cal e-GGRT Help link(s) provided.

### FACILITY LEVEL EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled Blowdown Systems</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Equipment Leaks</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Loading Operations</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Storage Tanks</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Sour Gas Sent Off-Site</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Delayed Coking</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
</tbody>
</table>

### DELAYED COKING UNITS

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCU 700</td>
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</tbody>
</table>

**ADD a Delayed Coking Unit**

### ASPHALT BLOWING UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 800</td>
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<td>Incomplete</td>
</tr>
</tbody>
</table>

**ADD an Asphalt Blowing Unit**

### CORE CALCINING UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCU1</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
</tbody>
</table>

**ADD a Coke Calcining Unit**

### CATALYTIC CRACKING UNITS, TRADITIONAL FLUID COKING UNITS, FLUID COKING UNITS WITH FLEXICOKING DESIGN, AND CATALYTIC REFORMING UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCCU 1</td>
<td>N/A</td>
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<td>N/A</td>
<td>Incomplete</td>
</tr>
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</table>

**ADD a Catalytic Cracking or Coking Unit**

### FLARES UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
</table>

**ADD a Flare**

### PROCESS VENTS UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>None entered</td>
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<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

**ADD a Process Vent**

### SULFUR RECOVERY UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
</table>

**ADD a Sulfur Recovery Unit**
Subpart Y collects the following data about your Catalytic Cracking, Fluid Coking, or Catalytic Reforming unit:

- A unique name or identifier, plus optional description for this unit (see also About Unique Unit Names)
- Specify the type of unit:
  - Fluid Catalytic Cracking Unit
  - Thermal Catalytic Cracking Unit
  - Traditional Fluid Coking Unit
  - Catalytic Reforming Unit (see note below)
  - Fluid Coking Unit with Flexicoking Design (see note below)
- For each unit, answer the following question: Do you operate and maintain a CEMS that measures CO₂ emissions according to subpart C? This means that both a flow meter and a concentration monitor need to be installed. If so, you must use the CEMS methodology for measuring CO₂ emissions from this unit. Click either Yes or No.

**For Catalytic Reforming Units**, if you are using Equation Y-11, please enter your average coke burn-off quantity (kg coke / cycle or kg coke / measurement period) in the “Description (optional)” text box on the Unit Information page. If using equation Y-11, average coke burn-off quantity is a required reporting element. The only location where this information can be submitted is in the “Description (optional)” field on the Unit Information page.

**For Fluid Coking Units with Flexicoking Design**, you will be asked if the GHG emissions from the low heat value gas are accounted for in Subpart C.

- If your answer to this question is ‘yes’, you are only required to report maximum rated throughput of the fluid coking unit with flexicoking design
- If your answer to this question is ‘no’, you are required to report maximum rated throughput of the fluid coking unit with flexicoking design and the methods used to calculate emissions per the sections below

When you are finished entering the required information, click NEXT.
For Catalytic Cracking or Coking units that are NOT monitored by CEMS, Subpart Y also collects the following data:

- Maximum rated throughput of the unit (bbl per stream day)
- Method used to calculate CO₂ emissions (only appears if you select No for using a CEMS):
  - 98.253(c)(2) - Equation Y-6 and continuous monitor for flow (but not meeting the CEMS monitoring requirements of 98.253(c)(1); e.g., not meeting the full CEMS quality assurance requirements)
  - 98.253(c)(2) - Equation Y-6 and Y-7a
  - 98.253(c)(2) - Equation Y-6 and Y-7b
  - 98.253(c)(3) - Equation Y-6 (option appears only for Catalytic Cracking or Coking units; available only for catalytic cracking units and fluid coking units with rated capacities of 10,000 barrels per stream day (bbls/sd) or less that do not use a continuous CO₂ CEMS for the final exhaust stack)
  - 98.253(e)(3) - Equation Y-11 (option appears only for Catalytic Reforming units)
- Method used to calculate CH₄ emissions:
• Equation Y-9
• Unit-specific measurement data
• A unit-specific emission factor based on a source test of the unit

Method used to calculate \( \text{N}_2\text{O} \) emissions:
• Equation Y-10
• Unit-specific measurement data
• A unit-specific emission factor based on a source test of the unit

When you are finished entering the required information, click SAVE.
For Catalytic Cracking or Coking units that are monitored by CEMS, Subpart Y also collects the following data:

- Maximum rated throughput of the unit (bbl per stream day)
- Method used to calculate CH₄ emissions:
  - Equation Y-9
  - Unit-specific measurement data
  - A unit-specific emission factor based on a source test of the unit
- Method used to calculate N₂O emissions:
  - Equation Y-10
  - Unit-specific measurement data
A unit-specific emission factor based on a source test of the unit

When you are finished entering the required information, click SAVE.
Adding or Updating Catalytic Cracking or Coking Unit Emissions Information

This section provides a step-by-step description of how to enter Subpart Y Catalytic Cracking or Coking unit emissions information.

To add or update CO₂ emissions information for a catalytic cracking or coking unit that is monitored by CEMS, please refer to the Subpart Y Emissions Information for Process Units Monitored by CEMS help page. CH₄ and N₂O emissions information for catalytic cracking or coking units that are monitored by CEMS are reported separately per the instructions below.

To add or update CO₂, CH₄, and N₂O emissions information for a catalytic cracking or coking unit that is NOT monitored by CEMS OR CH₄ and N₂O emissions information for a catalytic cracking or coking unit that is monitored by CEMS, locate the CATALYTIC CRACKING UNITS, TRADITIONAL FLUID COKING UNITS, FLUID COKING UNITS WITH FLEXICOKING DESIGN, AND CATALYTIC REFORMING UNITS EMISSIONS SUMMARY table on the Subpart Y Overview page, and click OPEN.

Note that Fluid Coking Units with Flexicoking Design for which the GHG emissions from the low heat value gas are accounted for in Subpart C require no emissions or additional data under Subpart Y thus the OPEN button is black and has no function.
### Section 90113 (Subpart Y): Petroleum Refineries

**Facility/Process/Equipment/Technology/Institutional Requirements**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| 
| 

**Sulfur Recovery Units**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| Sulfur Recovery Unit | X | 

**NOx Reduction Units**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| 
| 

**Hydrogenation Units**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| 
| 

**Sweep Air Systems**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| 
| 

**Adaptive Control Systems**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| 
| 

**Heat Exchangers**

| Equipment/Process | Code | Notes | Notes
|-------------------|------|-------|-------
| 
| 

**Additional Information:**

- Use the Additional Project Data and Scorecard (PD) spreadsheet to record the production amount for each product produced by the refinery. Upload the spreadsheet.

**Additional Project Data and Scorecard**

- Production Data
  - Production Data: 
  - Scorecard: 

**Contact:**

Additional comments or feedback can be provided through the contact information provided on the webpage.
### Petco (2010)

**Section 95113 (Subpart Y): Petroleum Refineries**

**Subpart Overview**

**OVERVIEW OF SUBPART Y REPORTING REQUIREMENTS**

Subpart Y requires affected facilities to report greenhouse gas (GHG) emissions from flares, catalytic cracking units, traditional fluid coking units, fluid coking units with flexicoking design, delayed coking units, catalytic reforming units, sulfur recovery units, coke calcining units, asphalt blowing, equipment leaks, storage tanks, uncontrolled blowdown systems, loading operations, process vents, and non-merchant hydrogen plants. For additional information about Subpart Y reporting, please use the Cal e-GGRT Help link(s) provided.

### FACILITY LEVEL EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled Blowdown Systems</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Equipment Leaks</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Loading Operations</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Storage Tanks</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Sour Gas Sent Off-Site</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Delayed Coking</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
</tr>
</tbody>
</table>

### DELAYED COKING UNITS

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>Status¹</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCU 700</td>
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</table>

**ADD a Delayed Coking Unit**

### ASPHALT BLOWING UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>Status¹</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 800</td>
<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

**ADD an Asphalt Blowing Unit**

### CORE CALCINING UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCU1</td>
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<td>N/A</td>
<td>N/A</td>
<td>Incomplete</td>
<td>OPEN</td>
</tr>
</tbody>
</table>

**ADD a Coke Calcining Unit**

### CATALYTIC CRACKING UNITS, TRADITIONAL FLUID COKING UNITS, FLUID COKING UNITS WITH FLEXICOKING DESIGN, AND CATALYTIC REFORMING UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCCU 1</td>
<td>N/A</td>
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<td>OPEN</td>
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<td>Incomplete</td>
<td>OPEN</td>
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</tbody>
</table>

**ADD a Catalytic Cracking or Coking Unit**

### FLARES UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>None entered</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**ADD a Flare**

### PROCESS VENTS UNITS EMISSIONS SUMMARY

<table>
<thead>
<tr>
<th>Unit Name/Identifier</th>
<th>CO₂ (metric tons)</th>
<th>CH₄ (metric tons)</th>
<th>NOₓ (metric tons)</th>
<th>Status¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>None entered</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**ADD a Process Vent**

### SULFUR RECOVERY UNITS EMISSIONS SUMMARY
The annual CO₂ emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-6 spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file using by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.

Subpart Y also collects the following CO₂ emission data:

- Annual average flow rate of exhaust gas (dscfh)
- Manufacturer’s recommended method used for annual average flow rate of exhaust gas
- Number of hours missing data procedures were used for annual average flow rate of exhaust gas (hours)
- Annual average percent CO₂ in exhaust gas stream (percent by volume - dry basis)
- Manufacturer’s recommended method used for annual average percent CO₂ in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent CO₂ in exhaust gas stream (hours)
- Annual average percent CO in exhaust gas stream (percent by volume - dry basis)
- Manufacturer’s recommended method used for annual average percent CO in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent CO in exhaust gas stream (hours)

The Equation Y-6 Summary and monitored flow requirements are presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.
Section 50111 (Subpart D). Petroleum Refineries

Readmission to California's Air Resource Board

Equation 5: Excess Air Factor (EF)

\[ EF = \frac{F_{\text{actual}}}{F_{\text{nominal}}} \]

Where:
- \( F_{\text{actual}} \) is the actual fuel flow rate.
- \( F_{\text{nominal}} \) is the nominal fuel flow rate.

Excess Air Factor is a measure of the air-to-fuel ratio in a combustion process. A higher EF indicates a more efficient combustion process, as it reduces the amount of unburned fuel emissions.
**Section 95113 (Subpart Y): Petroleum Refineries**

**Subpart Overview ➔ Catalytic Cracking and Coking Units ➔ FCCU 1**

**GHG DATA AND ASSOCIATED INFORMATION**

Use this page to enter the GHG data required by Subpart Y. Please enter the information shown for this catalytic cracking unit, fluid coking unit, or catalytic reforming unit. For additional information about the data collected on this page, please use the Cal e-GGRT Help link(s) provided.

**EQUATION Y-6 SPREADSHEET UPLOAD**

- **Browse**
- **UPLOAD**

<table>
<thead>
<tr>
<th>Uploaded File Name</th>
<th>Attached By</th>
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</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**EQUATION Y-6 SUMMARY AND RESULT**

\[
\text{CO}_2 = \sum_{i=1}^{n} \left( \frac{\left(\text{CO}_2\right)_{i} \times \left(\%\text{CO}_2 + \%\text{CO}_2\right)_{i}}{100\%} \times \frac{44}{MVC} \times 0.001 \right)
\]

Annual \(\text{CO}_2\) emission from this fluid catalytic cracking unit (metric tons)

- Use Y-6 spreadsheet to calculate

**ANNUAL AVERAGE VOLUMETRIC FLOW RATE OF EXHAUST GAS**

Annual average volumetric flow rate of exhaust gas from this fluid catalytic cracking unit prior to the combustion of other fossil fuels (dscfh)

**Describe the manufacturer’s recommended method that was used for annual average volumetric flow rate of exhaust gas**

**Number of hours missing data procedures were used for annual average volumetric flow rate of exhaust gas**

(hours)

**ANNUAL AVERAGE \(\text{CO}_2\) CONCENTRATION IN EXHAUST GAS STREAM**

Annual average percent \(\text{CO}_2\) in exhaust gas stream (percent by volume - dry basis; 0 \(\leq\) x \(\leq\) 100)

**Describe the manufacturer’s recommended method that was used for annual average percent \(\text{CO}_2\) in exhaust gas stream**

**Number of hours missing data procedures were used for annual average percent \(\text{CO}_2\) in exhaust gas stream**

(hours)
**CO₂ Emissions Calculation: 98.253(c)(2) – Equation Y-6 and Y-7a**

The annual CO₂ emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-6 and Y-7a spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file using by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.

The Equation Y-6 and Y-7a Summaries are presented on the page. You can hover over an element in the equation to reveal a definition of that element.

Subpart Y also collects the following CO₂ emission data:

- Annual CO₂ emission from this unit (metric tons)
- Annual average percent CO₂ in exhaust gas stream (percent by volume - dry basis; 0 ≤ x ≤ 100)
- Describe the manufacturer’s recommended method that was used for annual average percent CO₂ in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent CO₂ in exhaust gas stream (hours)
- Annual average percent CO₂ in exhaust gas stream (percent by volume - dry basis; 0 ≤ x ≤ 100)
- Describe the manufacturer's recommended method that was used for annual average percent CO₂ in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent CO₂ in exhaust gas stream (hours)
- Annual average volumetric flow rate of exhaust gas from this unit prior to the combustion of other fossil fuels (dscfh)
- Annual average flow rate of inlet air (dscfh)
- Annual average flow rate of oxygen enriched air (a value of “0” may be entered if inlet air is not oxygen enriched to avoid validation errors) (dscfh)
- Annual average percent O₂ in exhaust gas stream (percent by volume - dry basis; 0 ≤ x ≤ 100)
- Describe the manufacturer's recommended method that was used for annual average percent O₂ in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent O₂ in exhaust gas stream (hours)
- Annual average percent O₂ in oxygen-enriched gas stream inlet (a value of “0” may be entered if inlet air is not oxygen enriched to avoid validation errors) (percent by volume - dry basis; 0 ≤ x ≤ 100)

The Equation Y-6 and Y-7a Summaries are presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.
Section 95113 (Subpart Y): Petroleum Refineries

GHH DATA AND ASSOCIATED INFORMATION

Use this page to enter the GHH data required by Subpart Y. Please enter the information shown for this catalytic cracking unit, fluid coking unit, or catalytic reforming unit. For additional information about the data collected on this page, please use the Cal-e-GGRT Help link(s) provided.

EQUATION Y-6 SPREADSHEET UPLOAD

EQUATION Y-6 SUMMARY AND RESULT

\[ \text{CO}_2 = \sum_{p=1}^{n} \left( \frac{Q_{p} \times \left( \frac{\%CO_2 + \%CO}{100} \right) \times \frac{44}{MVC} \times 0.001 \right) \]

Annual CO\(_2\) emission from this fluid catalytic cracking unit (metric tons)

Use Y-6 spreadsheet to calculate

ANNUAL AVERAGE CO\(_2\) CONCENTRATION IN EXHAUST GAS STREAM

Annual average percent CO\(_2\) in exhaust gas stream (percent by volume - dry basis; 0 \leq x \leq 100)

Describe the manufacturer's recommended method that was used for annual average percent CO\(_2\) in exhaust gas stream

Number of hours missing data procedures were used for annual average percent CO\(_2\) in exhaust gas stream (hours)

ANNUAL AVERAGE CO CONCENTRATION IN EXHAUST GAS STREAM

Annual average percent CO in exhaust gas stream (percent by volume - dry basis; 0 \leq x \leq 100)

Describe the manufacturer's recommended method that was used for annual average percent CO in exhaust gas stream

Number of hours missing data procedures were used for annual average percent CO in exhaust gas stream (hours)

EQUATION Y-7a SUMMARY

\[ (79 \times Q_a + (100 - \%O_{2xy}) \times Q_{2xy}) \]
CO₂ Emissions Calculation: 98.253(c)(2) – Equation Y-6 and Y-7b

The annual CO₂ emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-6 and Y-7b spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file using by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.

Subpart Y also collects the following CO₂ emission data:

- Annual CO₂ emission from this fluid catalytic cracking unit (metric tons)
- Annual average percent CO₂ in exhaust gas stream (percent by volume - dry basis; 0 < x < 100)
- Describe the manufacturer’s recommended method that was used for annual average percent CO₂ in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent CO₂ in exhaust gas stream (hours)
- Annual average percent CO in exhaust gas stream (percent by volume - dry basis; 0 < x < 100)
- Describe the manufacturer’s recommended method that was used for annual average percent CO in exhaust gas stream
- Number of hours missing data procedures were used for annual average percent CO in exhaust gas stream (hours)
- Annual average volumetric flow rate of exhaust gas from this fluid catalytic cracking unit prior to the combustion of other fossil fuels (dscfh)
• Annual average flow rate of inlet air (dscfh)
• Annual average flow rate of oxygen enriched air (a value of "0" may be entered if inlet air is not oxygen enriched to avoid validation errors) (dscfh)
• Annual average percent \( N_2 \) in exhaust gas stream (percent by volume - dry basis; \( 0 < x < 100 \))
• Describe the method that was used to measure annual average percent \( N_2 \) in exhaust gas stream:
  • 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
  • Maximum \( N_2 \) impurity specification
  • Other (specify)
• Number of hours missing data procedures were used for annual average percent \( N_2 \) in exhaust gas stream (hours)
• Annual average percent \( N_2 \) in oxygen-enriched gas stream inlet (a value of "0" may be entered if inlet air is not oxygen enriched to avoid validation errors) (percent by volume - dry basis; \( 0 < x < 100 \))
• Describe the method that was used to measure annual average percent \( N_2 \) in oxygen-enriched gas stream inlet:
  • 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
  • Maximum \( N_2 \) impurity specification
  • Other (specify)
• Number of hours missing data procedures were used for annual average percent \( N_2 \) in oxygen-enriched gas stream inlet (a value of "0" may be entered if inlet air is not oxygen enriched to avoid validation errors) (hours)

If the gas stream in question does not contain any oxygen-enrichment, then a value of zero may be entered for questions related to oxygen-enrichment.

The Equation Y-6 and Y-7b Summaries are presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.
Petco (2010)

Section 95113 (Subpart Y): Petroleum Refineries

Subpart Overview » Catalytic Cracking and Coking Units » FCCU

GHC DATA AND ASSOCIATED INFORMATION

Use this page to enter the GHG data required by Subpart Y. Please enter the information shown for this catalytic cracking unit, fluid coking unit, catalytic reforming unit. For additional information about the data collected on this page, please use the Cal e-GGRT Help link(s) provided.

EQUATION Y-6 SUMMARY AND RESULT

\[
CO_2 = \sum_{p=1}^{n} \left( Q_p \times \frac{\%CO_2 + \%CO}{100} \times \frac{44}{MVC} \times 0.001 \right)
\]

Hover over an element in the equation above to reveal a definition of that element.

Annual CO2 emission from this fluid catalytic cracking unit (metric tons)

Use Y-6 spreadsheet to calculate

ANNUAL AVERAGE CO2 CONCENTRATION IN EXHAUST GAS STREAM

Annual average percent CO2 in exhaust gas stream (percent by volume - dry basis; \(0 \leq x \leq 100\))

Describe the manufacturer's recommended method that was used for annual average percent CO2 in exhaust gas stream

Number of hours missing data procedures were used for annual average percent CO2 in exhaust gas stream (hours)

ANNUAL AVERAGE CO CONCENTRATION IN EXHAUST GAS STREAM

Annual average percent CO in exhaust gas stream (percent by volume - dry basis; \(0 \leq x \leq 100\))

Describe the manufacturer's recommended method that was used for annual average percent CO in exhaust gas stream

Number of hours missing data procedures were used for annual average percent CO in exhaust gas stream (hours)

EQUATION Y-7b SUMMARY

\[
(78 \times Q_a + (\%N_2\text{oven}) \times Q_{xoy})
\]
### CO₂ Emissions Calculation: 98.253(c)(3) – Equation Y-8

The annual CO₂ emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-8 spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file using by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.

For this method, Subpart Y also collects the basis for the carbon content value:

- Weekly or more frequent measurements
- Periodic (less frequent than weekly but at least quarterly) measurements
- Semi-annual or annual measurements
- Historical measurement value
- Engineering estimate
- Default value
- Other

The Equation Y-8 Summary is presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.
Section 95113 (Subpart Y): Petroleum Refineries

**Petco (2010)**

**Subpart Overview** - Catalytic Cracking and Coking Units = FCCU 1

**GHG DATA AND ASSOCIATED INFORMATION**

Use this page to enter the GHG data required by Subpart Y. Please enter the information shown for this catalytic cracking unit, fluid coking unit, or catalytic reforming unit. For additional information about the data collected on this page, please use the Cal e-GGRT Help link(s) provided.

**EQUATION Y-8 SPREADSHEET UPLOAD**

Use the equation Y-8 Calculation Spreadsheet to calculate the result. Upload the completed XML exported from the spreadsheet.

![Equation Y-8 Calculation Spreadsheet](image)

**EQUATION Y-9 SPREADSHEET UPLOAD**

![Equation Y-9 Calculation Spreadsheet](image)

**EQUATION Y-10 SPREADSHEET UPLOAD**

![Equation Y-10 Calculation Spreadsheet](image)

**EQUATION Y-8 SUMMARY AND RESULT**

\[ \text{CO}_2 = Q_{ journalists} \times (\text{CBF} \times 0.001) \times \text{CC} \times \frac{44}{32} \]

Hover over an element in the equation above to reveal a definition of that element.

**Basis for the carbon content value**

Select

**EQUATION Y-9 SUMMARY AND RESULT**

\[ \text{CH}_4 = (\text{CO}_2 \times \frac{\text{Emf}5}{\text{Emf}4}) \]

Hover over an element in the equation above to reveal a definition of that element.

**EQUATION Y-10 SUMMARY AND RESULT**

\[ \text{N}_2\text{O}_5 = (\text{CO}_2 \times \frac{\text{Emf}5}{\text{Emf}1}) \]

Hover over an element in the equation above to reveal a definition of that element.
CO₂ Emissions Calculation: 98.253(c)(3) - Equation Y-11

The annual CO₂ emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-11 spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file using by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.

If you are submitting data for a Catalytic Reforming Unit and are using Equation Y-11, please enter your average coke burn-off quantity (kg coke / cycle or kg coke / measurement period) in the “Description (optional)” text box on the unit ID page. If using equation Y-11, average coke burn-off quantity is a required reporting element. The only location where this information can be submitted is in the “Description (optional)” field on the unit ID page.

For this method, Subpart Y also collects the total number of regeneration cycles or measurement periods.

The Equation Y-11 Summary is presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.

>> Click image to expand
The annual CH₄ emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-9 spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.

The Equation Y-9 Summary is presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.
For the unit-specific measurement data method, Subpart Y collects the annual CH₄ emission from this unit (metric tons).
The CH₄ Summary (Measurement Data) is presented in the screenshot below. 

>> Click image to expand
CH\textsubscript{4} Emissions Calculation: A Unit-Specific Emission Factor Based on a Source Test of the Unit

For the unit-specific emission factor based on a source test of the unit method, Subpart Y collects annual CH\textsubscript{4} emission from this unit (metric tons).

For this method Subpart Y also collects the basis for the CH\textsubscript{4} emission factor:

- Weekly or more frequent measurements
- Periodic (less frequent than weekly) measurements
- Average of multiple source tests
- One-time source test
The CH₄ Summary (Emission Factor Based on a Source Test) is presented in the screenshot below.
The annual N₂O emission rate from the unit operations is required. To calculate this value download the spreadsheet by clicking the link titled “Use Y-10 spreadsheet to calculate.” Fill in the spreadsheet using the instructions in the spreadsheet. After completing the spreadsheet, upload the file using by clicking the browse button, selecting the file from the appropriate directory, and clicking the blue UPLOAD button.
The Equation Y-10 Summary is presented in the screenshot below. You can hover over an element in the equation to reveal a definition of that element.

Click image to expand
For the unit-specific measurement data method, Subpart Y collects the annual \( N_2O \) emission from this unit (metric tons).
The N₂O Summary (Measurement Data) is presented in the screenshot below.
**N₂O Emissions Calculation: A Unit-Specific Emission Factor Based on a Source Test of the Unit**

For the unit-specific emission factor based on a source test of the unit method, Subpart Y collects annual N₂O emission from this unit (metric tons).

For this method Subpart Y also collects the basis for the N₂O emission factor:

- Weekly or more frequent measurements
- Periodic (less frequent than weekly) measurements
- Average of multiple source tests
- One-time source test
• Other (specify)

The N₂O Summary (Emission Factor Based on a Source Test) is presented in the screenshot below.
Screen Errors
Using Cal e-GGRT to Prepare Your Subpart Y Report
Subpart Y Summary Information for this Facility
Subpart Y Delayed Coking Unit Information
Subpart Y Asphalt Blowing Unit Information
Subpart Y Coke Calcining Unit Information
Subpart Y Catalytic Cracking, Fluid Coking, and Catalytic Reforming Unit Information
Subpart Y Flares Unit Information
Subpart Y Process Vents Unit Information
Subpart Y Sulfur Recovery Plant Information
Subpart Y Emissions Information for Process Units Monitored by CEMS
Subpart Validation Report