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Reporting Emissions from Cooling Towers

Emissions Inventory Help Sheet

Maricopa County Air Quality Department

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What to Report

Facilities must report emissions from cooling towers if:

- Any cooling tower at the facility has a circulation rate greater than or equal to 3,000 gallons per minute (gpm); or
- The cooling towers at the facility have a combined circulation rate greater than or equal to 10,000 gallons per minute; or
- Any cooling tower at the facility is used to cool process water, water from barometric jets, or water from barometric condensers.

Facilities that are required to report emissions from cooling towers must report emissions of particulate matter (PM) primary, PM₁₀ primary, and PM_{2.5} primary.

PM primary refers to all particulate matter emissions (filterable and condensable) from an emissions process. PM₁₀ primary refers to all PM primary that measures less than 10 microns in diameter. PM_{2.5} primary refers to all PM primary that measures less than 2.5 microns in diameter. PM₁₀ primary and PM_{2.5} primary are both subsets of PM primary.

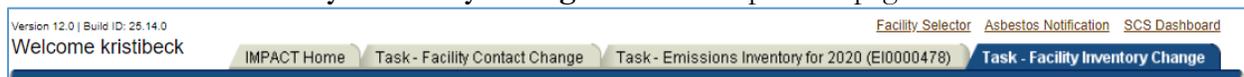
How to Report

This help sheet shows emissions inventory preparers how to accurately report emissions from cooling towers in the AQD Online Portal. First, preparers will use the “Task-Facility Inventory Change” tab to structure the emission units, processes, and release points. Then, preparers will use the “Task-Emissions Inventory” tab to enter the operating schedule, throughput, and emissions factors for each process.

Task – Facility Inventory Change

Step 1

Click on the **Task-Facility Inventory Change** tab at the top of the page.



Step 2

Emission Units

There should be one cooling tower (CTW) emission unit for each cooling tower at the facility. Identical cooling towers (with the same flow rate, drift rate, and water source) can be aggregated under one emission unit, if the number of identical cooling towers is specified.

If the CTW emission units are not in the facility inventory tree, click on the **Facility ID** at the top of the facility inventory tree on the left side of the page. Click **Create Emission Unit** at the bottom of the page.

Complete the required Emission Unit Information and click **Save**.

Emissions Unit Information

AQD ID:

* Emission Unit Type: [Help me select the Emission Unit Type](#)

AQD Description:

* Company Equipment ID:

* Company Equipment Description:

* Operating Status:

* Quantity:
Enter a value greater than 1 only in the scenario where you have multiple "identical" emission units that have the same emissions process and whose air flow follows the same path.

* Initial Construction Commencement Date:

* Initial Operation Commencement Date:

Most Recent Construction/Modification Commencement Date:

Most Recent Operation Commencement Date:

Emission Unit Type Specific Information

Drift Rate (%): Water Circulation Rate (gallons/min):

Total Dissolved Solids (ppm):

Permitted Emissions

This table is populated by AQD staff based on established/permitted emission limits. It is shown here for informational purposes only.

Pollutant	Potential Emissions		Allowable Emissions		Comments
	Lbs/Hour	Tons/Year	Lbs/Hour	Tons/Year	

The **initial construction commencement date** is the date when construction or installation of the emission unit began.

The **initial operation commencement date** is the date when the facility began operating the emission unit.

Step 3

Emissions Processes

Each cooling tower emission unit should have one emissions process attached. Use one of the following source classification codes, as applicable, depending on the type of cooling tower:

- 38500101 for mechanical draft
- 38500102 for natural draft
- 38500110 for any cooling tower that is not mechanical or natural draft

Process Information

Process ID: PRC005

Process Name: Cooling Towers - 12,000 gpm

Company Process Description:

Source Classification Code (SCC): 3-85-001-01

SCC Level 1 Description: 3:Industrial Processes

SCC Level 2 Description: 85:Cooling Tower

SCC Level 3 Description: 001:Process Cooling

SCC Level 4 Description: 01:Mechanical Draft

[SCC reference information](#)

If the cooling tower emission units do not have an emissions process attached, click on the **Emission Unit ID (CTW001)** in the facility inventory tree on the left side of the screen. Click **Create Emissions Process** at the bottom of the screen.

Emissions Unit Information

AQD ID: CTW001

Emission Unit Type: Cooling Tower [Help me select the Emission](#)

AQD Description:

Company Equipment ID: CT1-3

Company Equipment Description: Cooling Towers 1 - 3

Operating Status: Operating

Quantity: 3

Permitted Emissions

This table is populated by AQD staff based on established/permitted emission limits. It is shown here for information

Pollutant	Potential Emissions		Allowable Emissions	
	Lbs/Hour	Tons/Year	Lbs/Hour	Tons/Year

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Edit Create Cloned Emissions Unit

Create Emissions Process

Enter the **Company Process Description** and the applicable **Source Classification Code** and click **Save**.

Process Information

Process ID:

Process Name:

Company Process Description: CTW - 12,000 gpm

* Source Classification Code (SCC): 38500101

Enter as 1-22-333-44 or 12233344

Select SCC through cascading levels search SCCs by keyword

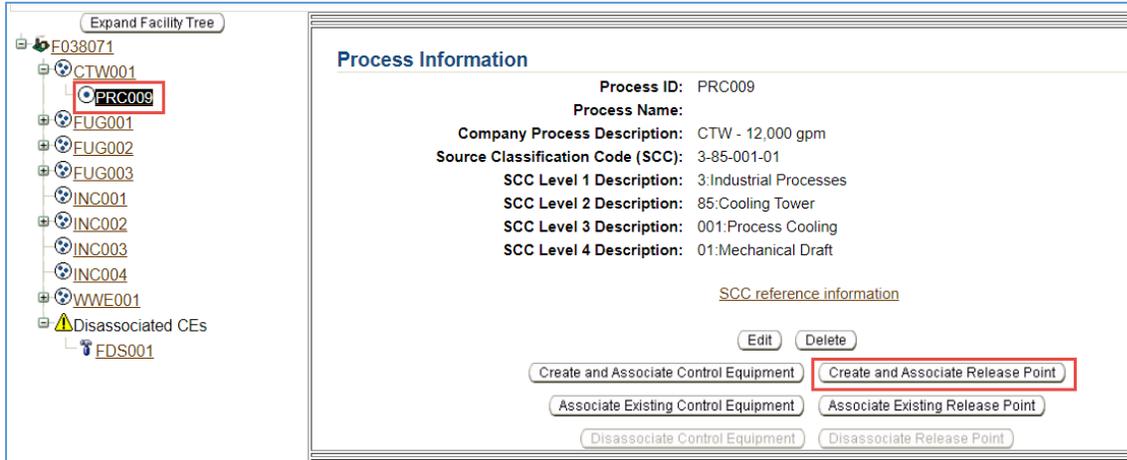
Save Cancel

Step 4

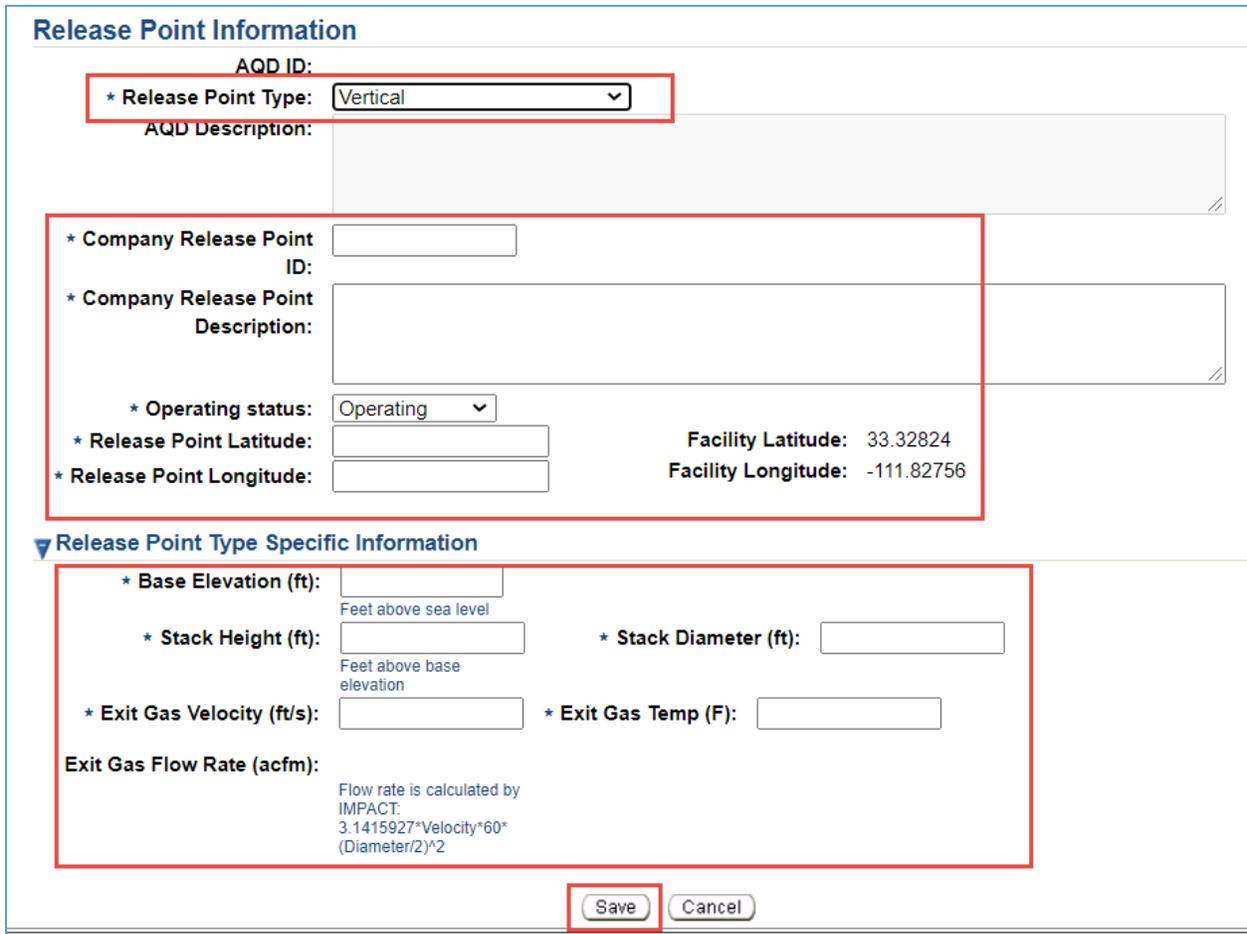
Release Points

A release point must be attached to the emissions process if the facility wide emissions of any pollutant exceeds 10 tons per calendar year.

If the release point is not attached to the emissions process, click on the emissions process attached to the CTW emissions unit (**PRC006**). Click **Create and Associate Release Point**.



Enter the Release Point Information and click **Save**.



Step 5

Validate Facility Inventory Changes

Once you have finished adding emissions units, processes, you must validate the “Task – Facility Inventory Change.” Click on the **Facility ID** at the top of the Facility Inventory Tree. At the bottom of the Facility Information screen, click **Validate**.

Facility Information	
Facility ID:	F006332
Facility Name:	AQ Production Validation
Facility Description:	Record created for validation of production environment.
Facility Class:	Minor
Facility Type:	Other (Unknown)
Associated Monitor	
Group ID:	
Operating Status:	Operating
Number of Employees:	
Department:	
▶ Annual Administrative Fee	
▶ Location	
▶ NAICS	
<input type="button" value="Edit"/> <input type="button" value="Validate"/> <input type="button" value="Submit"/> <input type="button" value="Download/Print Detail"/> <input type="button" value="Print Facility Tree"/>	
<input type="button" value="Create Emissions Unit"/> <input type="button" value="Create Control Equipment"/> <input type="button" value="Create Release Point"/>	

If there are errors that need to be corrected, a pop-up window will appear. Click on the error message to be directed to the screen that contains the error that must be corrected. Correct all errors and repeat Step 5 to validate the facility inventory changes.

Severity	EU ID	Message
ERROR		Control Equipment [PAF001]: Attribute Change Frequency - specify units is not set.

Task – Emissions Inventory for Reporting Year

Step 1

Click on the **Task-Emissions Inventory** tab at the top of the page.



Step 2

Click on the process attached to the CTW emission unit (**PRC006**) in the **Emissions Inventory Tree** on the left side of the screen. Click **Edit Material/Schedule/Seasons** in the middle of the screen.

Helpful Hint – Click on the triangle next to PRC006 at the top of the page to see the Company Process Description.

The screenshot shows the 'Process & Emissions Detail' window. On the left is a tree view with 'PRC009' selected. The main window displays the following information:

- Process & Emissions Detail**
 - PRC009: Source Classification Code (SCC) is 3-85-001-01
 - SCC Level 1: 3:Industrial Processes
 - SCC Level 2: 85:Cooling Tower
 - SCC Level 3: 001:Process Cooling
 - SCC Level 4: 01:Mechanical Draft
- Process Name:**
- Company Process Description:** CTW - 12,000 gpm
- Material Information, Annual Average Operating Schedule & Throughput Percent**

Maximum Hours Per Day:	24	Winter (Jan-Feb, Dec)%:	25
Maximum Days Per Week:	7	Spring (Mar-May)%:	25
Maximum Weeks Per Year:	52	Summer (Jun-Aug)%:	25
Actual Hours:		Fall (Sep-Nov)%:	25
- Material Table:**

Material	Action	Throughput	Confidential Units
Cooling Water	Throughput	pending	MILLION GALLONS
- Explanation:** To complete emissions reporting for this process, you have to provide values above for **Schedule, Season Percents** and **Material Throughput** in the units specified by **Units**. If there is a choice of more than one **Material**, you must select which is most appropriate, otherwise no action is needed on your part. The word pending appears each place a value is needed.
- Edit Material/Schedule/Seasons** button (highlighted with a red box).

1. Enter the **maximum number of hours per day**, **maximum number of days per week**, and the **maximum number of weeks per year** the cooling towers operated.
2. Enter the **actual hours** of operation for the cooling towers during the reporting year.
3. Enter the cooling water **throughput** in million gallons (MMgal). If throughput is not measured, it can be estimated based on hours of operation:

$$MMgal = \frac{\text{flow rate (gpm)} \times 60 \left(\frac{\text{min}}{\text{hour}}\right) \times \text{hours of operation}}{1,000,000 \frac{\text{gal}}{MMgal}}$$

4. Enter the **percentage** of cooling water used during each season.

5. Click **Save**.

Process & Emissions Detail

▼ PRC009: Source Classification Code (SCC) is 3-85-001-01

SCC Level 1: 3:Industrial Processes
 SCC Level 2: 85:Cooling Tower
 SCC Level 3: 001:Process Cooling
 SCC Level 4: 01:Mechanical Draft

Process Name:
 Company Process Description: CTW - 12,000 gpm

▼ Material Information, Annual Average Operating Schedule & Throughput Percent

Maximum Hours Per Day: 24
 Maximum Days Per Week: 7
 Maximum Weeks Per Year: 52
 * Actual Hours: 8760

* Winter (Jan-Feb, Dec)%: 25
 * Spring (Mar-May)%: 25
 * Summer (Jun-Aug)%: 25
 * Fall (Sep-Nov)%: 25

Material	Action	Throughput	Confidential	Units
Cooling Water	Throughput	6307.2	<input type="checkbox"/>	MILLION GALLONS

Variable Amount in Cooling Water Units & Meaning
 The variables table is empty because there are no variables in the form process.

To complete emissions reporting for this process, you have to provide values above for **Schedule**, **Season Percents** and **Material Throughput** in the units specified by **Units**. If there is a choice of more than one **Material**, you must select which is most appropriate, otherwise no action is needed on your part. The word pending appears each place a value is needed.

Save Reset Schedule/Seasons Cancel

Step 3

Click **Edit Emissions** at the bottom of the screen.

Pollutant	Method Used	Uncontrolled	Units (LBS/Hour)	Amount	Amount	Total Units	Explanation
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Edit Emissions							

Reporting Criteria Air Pollutant Emissions

- Some permits include site-specific emissions factors or equations for calculating CTW emissions. If your permit does not include site-specific instructions, calculate the **Uncontrolled Emissions Factors** for PM primary, PM₁₀ primary, and PM_{2.5} primary, using the Total Dissolved Solids (TDS) content of the cooling tower water (refer to analytical results when required by the permit, specifications from the water provider when available, or assume 2,000 ppm), and the % Drift Rate for the cooling tower drift eliminators (refer to cooling tower manufacturer's specification).

$$PM \text{ Primary} \left(\frac{lbs}{MMgal} \right) = 8.345 \frac{lbs}{gal} \times \frac{TDS (ppm)}{1,000,000} \times \frac{\% \text{ Drift Rate}}{100} \times 0.313 \times 1,000,000 \frac{gal}{MM \text{ gal}}$$

$$PM_{10} \text{ Primary} = PM \text{ Primary}$$

$$PM_{2.5} \text{ Primary} = 0.6 \times PM_{10} \text{ Primary}$$

- Enter the **Uncontrolled Emissions Factors** for each pollutant (enter zero (0) for all pollutants other than PM primary, PM₁₀ primary, and PM_{2.5} primary).
- In the **Hours Uncontrolled** column, enter 0 for all pollutants.

▼ Process Emissions

Criteria Air Pollutants/Other	Method Used	Uncontrolled Emissions Factor		Time-based Factor (LBS/Hour)	Emissions Reported			Units	Explanation
		Hours Uncontrolled	(Lbs/Throughput Units)		Fugitive Amount	Stack Amount	Total		
PM Primary (includes filterables > 10 microns + condensibles)	Throughput-based factor	0						TONS	add
PM10 Primary (includes filterables + condensibles)	Throughput-based factor	0						TONS	add
PM2.5 Primary (includes filterables + condensibles)	Throughput-based factor	0						TONS	add
CO - Carbon Monoxide	Throughput-based factor	0	0					TONS	add
NOx - Nitrogen Oxides	Throughput-based factor	0	0					TONS	add
SO2 - Sulfur Dioxide	Throughput-based factor	0	0					TONS	add
VOC - Volatile Organic Compounds	Throughput-based factor	0	0					TONS	add
Ammonia	Throughput-based factor	0	0					TONS	add

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Step 4

Click **Save** at the bottom of the screen. The AQD Online Portal will calculate emissions based on the operational information and the emissions factors provided.

The following information was developed using (Arizona) DEQ-generated pollutant emission calculations. The values may be provided to USEPA by the (Arizona) DEQ. You may modify these (Arizona) DEQ-generated emission calculations if you have more accurate information.

Hazardous Air Pollutants/Greenhouse Gases/Other	Method Used	Uncontrolled Emissions Factor		Time-based Factor (LBS/Hour)	Emissions Reported			Units	Explanation
		Hours Uncontrolled	(Lbs/Throughput Units)		Fugitive Amount	Stack Amount	Total		
Select Pollutant									

Add Emission Delete Selected Emission(s) Printable view Export to excel

Save Cancel

Step 5

Verify that the results match emission records from the facility. Repeat this process (Steps 1 – 5) for each cooling tower emissions process. Because the emissions factor will vary based on the drift rate of the cooling tower drift eliminators, emissions must be reported separately for cooling towers with different drift rates.

Step 6

Refer to other process specific help sheets or the Emissions Inventory Instructions to report emissions from other types of processes at the facility. When emissions have been reported for each process, refer to Task 5 on page 26 of the Emissions Inventory Instructions to validate and submit the emissions inventory. The process specific help sheets and the Emissions Inventory Instructions are available at maricopa.gov/5628.

Example

Emissions from a cooling tower that has a recirculation rate of 12,000 gpm, that operated for 8,760 hours, and is equipped with drift eliminators with a drift rate of 0.05%.

$$\text{Cooling water throughput} = \frac{12,000 \frac{\text{gal}}{\text{min}} \times 60 \frac{\text{m}}{\text{hr}} \times 8,760 \text{ hours}}{1,000,000 \frac{\text{gal}}{\text{MMgal}}} = 6307.2 \text{ MMgal}$$

$$\text{PM Primary} = 8.345 \frac{\text{lbs}}{\text{gal}} \times \frac{2000}{1,000,000} \times \frac{0.05\%}{100} \times 0.313 \times 1,000,000 \frac{\text{gal}}{\text{MM gal}} = 2.61 \frac{\text{lbs}}{\text{MMgal}}$$

$$\text{PM}_{10} \text{ Primary} = 2.61 \frac{\text{lbs}}{\text{MMgal}}$$

$$\text{PM}_{2.5} \text{ Primary} = 0.6 \times 2.61 \frac{\text{lbs}}{\text{MMgal}} = 1.57 \frac{\text{lbs}}{\text{MMgal}}$$

Process & Emissions Detail

▶ PRC009: Source Classification Code (SCC) is 3-85-001-01

▼ Material Information, Annual Average Operating Schedule & Throughput Percent

Maximum Hours Per Day: 24	Winter (Jan-Feb, Dec)%: 25
Maximum Days Per Week: 7	Spring (Mar-May)%: 25
Maximum Weeks Per Year: 52	Summer (Jun-Aug)%: 25
Actual Hours: 8,760.00	Fall (Sep-Nov)%: 25

Material	Action	Throughput	Confidential	Units
Cooling Water	Throughput	6307.2	<input type="checkbox"/>	MILLION GALLONS

▶ Explanation

Variable Amount in Cooling Water Units & Meaning
The variables table is empty because there are no variables in the formula associated with the FIRE rows for this process.

Edit Material/Schedule/Seasons

▼ Process Emissions

Criteria Air Pollutants/Other	Method Used	Hours Uncontrolled	Uncontrolled Emissions Factor (Lbs/Throughput Units)	Time-based Factor (LBS/Hour)	Emissions Reported			Units	Explanation
					Fugitive Amount	Stack Amount	Total		
PM Primary (includes filterables > 10 microns + condensibles)	Throughput-based factor Uncontrolled factor input by user.	0	2.61		8.2309	0	8.2309	TONS	
PM10 Primary (includes filterables + condensibles)	Throughput-based factor Uncontrolled factor input by user.	0	2.61		8.2309	0	8.2309	TONS	
PM2.5 Primary (includes filterables + condensibles)	Throughput-based factor Uncontrolled factor input by user.	0	1.57		4.95115	0	4.95115	TONS	
CO - Carbon Monoxide	Throughput-based factor Uncontrolled factor input by user.	0	0		0	0	0	TONS	
NOx - Nitrogen Oxides	Throughput-based factor Uncontrolled factor input by user.	0	0		0	0	0	TONS	
SO2 - Sulfur Dioxide	Throughput-based factor Uncontrolled factor input by user.	0	0		0	0	0	TONS	
VOC - Volatile Organic Compounds	Throughput-based factor Uncontrolled factor input by user.	0	0		0	0	0	TONS	
Ammonia	Throughput-based factor Uncontrolled factor input by user.	0	0		0	0	0	TONS	

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Helpful Hint - If you report five tons of PM primary, five tons of PM₁₀ primary, and three tons of PM_{2.5} primary emissions, that means your facility emitted five tons of particulate matter, all of the particulate matter was less than 10 microns in diameter and three tons (60%) of the particulate matter emissions was less than 2.5 microns in diameter.

Questions

If you have questions or are experiencing issues with the AQD Online Portal, please contact 602-506-6790 or EmissionsInventory@maricopa.gov. Please provide a brief explanation of the question or problem you are encountering and include a screenshot if contacting us via email. If you are encountering errors or malfunctions in the portal, include the following information in your message: the date and time when the error occurred, the browser you were using when the error occurred, and the type of device you were using when the error occurred (i.e., computer, tablet, phone, etc.).

Additional Resources

How to create a Shared CROMERR Services (SCS) electronic signature to access the AQD Online Portal: maricopa.gov/DocumentCenter/View/56270

Emissions inventory instructions and other process specific help sheets:
maricopa.gov/5628

Instructions for permit applications, compliance reports, asbestos notifications, performance test protocols, and other documents that can be submitted through the AQD Online portal:
maricopa.gov/1820