



Welcome

2014 Triennial
Emissions Inventory
Workshop

Agenda

- Introduction
- New Inventory Section
 - Point, Area, On-Road, Non-Road
- Who Is Required to Submit an Inventory?
- Workbooks
- Filterable & Condensable PM
- General Calculations
- Useful Information
- Online Emissions Inventory System

Who is Required to Submit an Emissions Inventory? Part 1

Code of Federal Regulations (CFR): codification of the general and permanent rules published in the Federal Register by the departments and agencies of the Federal Government.

Title 40: Protection of the Environment

40 CFR Part 60: NSPS (New Source Performance Standards)

40 CFR Part 61: NESHAP (National Emission Standards for Hazardous Air Pollutants)

40 CFR Part 63: MACT (Maximum Achievable Control Technology)

Who is Required to Submit an Emissions Inventory? Part 2

Utah Administrative Code is the body of all effective administrative rules as compiled and organized by the Division of Administrative Rules.

Title R307: Environmental Quality, Air Quality

R307-150: Emissions Inventories

R307-150-5: Large Major Source Inventory Requirements

R307-150-6: Major Sources Other than Major, or Potential to Emit 5 tons/yr Lead, or Along Wasatch Front (NO_x, SO_x, PM₁₀ ≥ 25 tons/yr, or VOC ≥ 10 tons/yr)

R307-150-7: Other Part 70/Title V Sources not Major or Large Major

Workbooks

- Workbooks have been built for major and large major sources
- Most major and large major sources have been using workbooks for years
- Instructions included on disk that was sent
- Due to internal programming changes please make sure to use the workbook that was sent for this year
- If source makes changes or updates in the Changes worksheet of the workbook, DAQ will send back a revised copy of the workbook after changes have been made.



Questions?



Filterable & Condensable PM_{2.5} and PM₁₀



Federal regulations (40 CFR Part 51) require that sources now report emissions data for **filterable** and **condensable** components for both $PM_{2.5}$ and PM_{10} .

Filterable PM_{2.5} or PM₁₀ is defined as particles that are directly emitted by a source as a solid or liquid at stack or release conditions and captured on the filter of a stack test train.

Filterable PM_{2.5} is particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers.

Filterable PM₁₀ is particulate matter with an aerodynamic diameter equal to or less than 10 micrometers.



Condensable PM is defined as material that is vapor phase at stack conditions, but which condenses and/or reacts upon cooling and dilution in the ambient air to form solid or liquid PM immediately after discharge from the stack.

Note that all condensable PM, if present from a source, is typically in the $PM_{2.5}$ size fraction, and therefore all of it is a component of both primary $PM_{2.5}$ and primary PM_{10} .

Primary PM

- **Primary $PM_{2.5}$** is the sum of filterable $PM_{2.5}$ and condensable $PM_{2.5}$
- **Primary PM_{10}** is the sum of filterable PM_{10} and condensable PM_{10}



Questions?

Sample Calculations for Condensable and Filterable PM

- External Combustion of Bituminous and Subbituminous Coal
- External Combustion of Natural Gas

Required Data

- Operating Parameters
- Controls
- Throughputs
- Emission Factors
- Calculations

Emission Factors

- Stack Tests
- AP-42
- Manufacturer Specifications
- Industry Standards
- Other

Sections of AP-42 that contain condensable emission factors are listed in the general instructions found on the UDAQ website.

Sample Calculation #1

External Combustion of Bituminous and Subbituminous Coal

Using Emission Factors from AP-42 Chapter 1.1

Spreader Stoker

SCC = 10100204

- Throughput = 5000 tons of coal
- Heating Value = 13,000 btu/lb = 26 mmbtu/ton
- PM₁₀ Filterable EF = 13.2 lb/ton
- PM₁₀ Condensable EF = 0.04 lb/mmbtu


$$\text{PM}_{10} \text{ Filterable} =$$
$$5000 \text{ tons} * 13.2 \text{ lb/ton} * \text{ton}/2000 \text{ lb} = 33.0 \text{ tons}$$

$$\text{PM}_{10} \text{ Condensable} =$$
$$5000 \text{ tons} * 0.04 \text{ lb/mmbtu} * 26 \text{ mmbtu/ton} * \text{ton}/2000 \text{ lb}$$
$$= 2.6 \text{ tons}$$

$$\text{PM}_{10} \text{ Primary} =$$
$$33.0 \text{ tons} + 2.6 \text{ tons} = 35.6 \text{ tons}$$

Sample Calculation #2

External Combustion of Natural Gas
Using Emission Factors from AP-42 Chapter 1.4

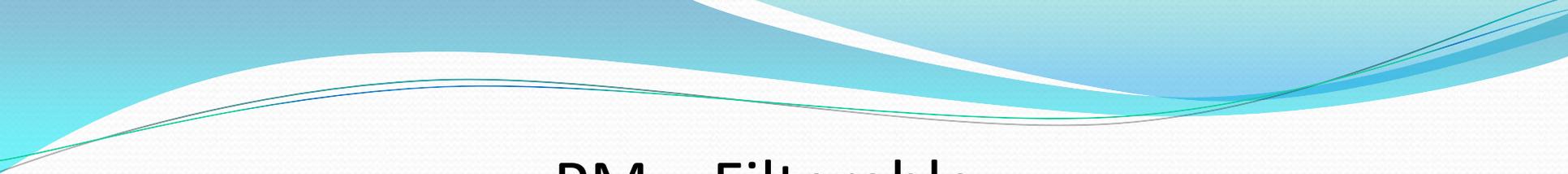
Small Natural Gas Boiler

SCC = 10100602

- Throughput = 10 mmscf/yr

AP-42 Emission Factors

- PM₁₀ Filterable (FIL) = 1.9 lb/mmscf
- PM₁₀ Condensable (CON) = 5.7 lb/mmscf
- PM₁₀ Primary (PRI) = 7.6 lb/mmscf


$$\text{PM}_{10} \text{ Filterable} =$$
$$10 \text{ mmscf} * 1.9 \text{ lb/mmscf} * \text{ton}/2000 \text{ lb} = 0.0095 \text{ tons}$$

$$\text{PM}_{10} \text{ Condensable} =$$
$$10 \text{ mmscf} * 5.7 \text{ lb/mmscf} * \text{ton}/2000 \text{ lb} = 0.0285 \text{ tons}$$

$$\text{PM}_{10} \text{ Primary} =$$
$$10 \text{ mmscf} * 7.6 \text{ lb/mmscf} * \text{ton}/2000 \text{ lb} = 0.0380 \text{ tons}$$



Questions?

General Calculations

- Form 2 – Process/Fuel Information
- Form 3 – Emissions for Controlled and Uncontrolled Processes
- Form 6b – Emissions from Solvents and Coatings
- Forms 15a – Engines

Required Data

- Operating Parameters
- Controls
- Throughputs
- Emission Factors
- Calculations

Emission Factors

- Stack Tests
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- Manufacturer Specifications
- Industry Standards
- Other

Sections of AP-42 that contain condensable emission factors are listed in the general instructions found on the UDAQ website.

Form 2 – Process/Fuel Information

Example - Natural Gas Boiler

SCC = 10100602

Design Rate = 25 mmBtu/hr

Throughput = 20.54 mmscf

Heating Value = 1020 Btu/scf

Control = Uncontrolled

Form 3 – Process/Fuel Calculations

Emission Factors from AP-42 Chapter 1.4 and the WebFIRE Database

PM₁₀ PRI = 7.6 lb/mmscf

PM₁₀ CON = 5.7 lb/mmscf

PM₁₀ FIL = 1.9 lb/mmscf

PM_{2.5} PRI = 7.6 lb/mmscf

PM_{2.5} CON = 5.7 lb/mmscf

PM_{2.5} FIL = 1.9 lb/mmscf

SO_x = 0.6 lb/mmscf

NO_x = 100 lb/mmscf

VOC = 5.5 lb/mmscf

CO = 84 lb/mmscf

NH₃ = 3.2 lb/mmscf

Lead = 0.0005 lb/mmscf

Form 3 – Process/Fuel Calculations

Continued...

$$\begin{aligned} \text{PM}_{10} \text{ PRI} &= (20.54 \text{ mmscf/yr}) * (7.6 \text{ lb/mmscf}) * (1 \text{ ton}/2000 \text{ lb}) \\ &= \mathbf{0.0781 \text{ tons/yr}} \end{aligned}$$

$$\begin{aligned} \text{PM}_{10} \text{ CON} &= (20.54 \text{ mmscf/yr}) * (5.7 \text{ lb/mmscf}) * (1 \text{ ton}/2000 \\ &\text{lb}) \\ &= \mathbf{0.0585 \text{ tons/yr}} \end{aligned}$$

$$\begin{aligned} \text{PM}_{10} \text{ FIL} &= (20.54 \text{ mmscf/yr}) * (1.9 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb}) \\ &= \mathbf{0.0195 \text{ tons/yr}} \end{aligned}$$

Form 3 – Process/Fuel Calculations

Continued...

$$\text{PM}_{2.5} \text{ PRI} = (20.54 \text{ mmscf/yr}) * (7.6 \text{ lb/mmscf}) * (1 \text{ ton}/2000 \text{ lb})$$
$$= \mathbf{0.0781 \text{ tons/yr}}$$

$$\text{PM}_{2.5} \text{ CON} = (20.54 \text{ mmscf/yr}) * (5.7 \text{ lb/mmscf}) * (1 \text{ ton}/2000 \text{ lb})$$
$$= \mathbf{0.0585 \text{ tons/yr}}$$

$$\text{PM}_{2.5} \text{ FIL} = (20.54 \text{ mmscf/yr}) * (1.9 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb})$$
$$= \mathbf{0.0195 \text{ tons/yr}}$$

Form 3 – Process/Fuel Calculations

Continued...

$$\text{SO}_x = (20.54 \text{ mmscf/yr}) * (0.6 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb})$$
$$= \mathbf{0.0062 \text{ tons/yr}}$$

$$\text{NO}_x = (20.54 \text{ mmscf/yr}) * (100 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb})$$
$$= \mathbf{1.0270 \text{ tons/yr}}$$

$$\text{VOC} = (20.54 \text{ mmscf/yr}) * (5.5 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb})$$
$$= \mathbf{0.0565 \text{ tons/yr}}$$

Form 3 – Process/Fuel Calculations

Continued...

$$\begin{aligned}\text{CO} &= (20.54 \text{ mmscf/yr}) * (84 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb}) \\ &= \mathbf{0.8627 \text{ tons/yr}}\end{aligned}$$

$$\begin{aligned}\text{NH}_3 &= (20.54 \text{ mmscf/yr}) * (3.2 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb}) \\ &= \mathbf{0.0329 \text{ tons/yr}}\end{aligned}$$

$$\begin{aligned}\text{Lead} &= (20.54 \text{ mmscf/yr}) * (0.0005 \text{ lb/ mmscf}) * (1 \text{ ton}/2000 \text{ lb}) \\ &= \mathbf{0.00001 \text{ tons/yr}}\end{aligned}$$

Form 6b – Fugitive Emissions from Solvents and Coatings

Example – Paint Booth

SCC = 40200110

Throughput = 7,500 gal/yr

Density = 8.5 lb/gal

% VOC = 90%

Control = 80%

Form 6b – Fugitive Emissions from Solvents and Coatings

Calculation

$$\text{VOC} = (7,500 \text{ gal/yr}) * (8.5 \text{ lb/gal}) * (0.90) * (1 - 0.80) * (1 \text{ ton}/2000 \text{ lb})$$

$$\text{VOC} = 5.738 \text{ tons/yr}$$

Form 11a – Fugitive Dust from Roads

SCC = 3050254

Equation (1a) from AP-42 13.2.2-4 11/06
(Unpaved Surfaces at Industrial Sites)

VMT = 12,000 miles/year

Silt Content (s) = 4%

Mean Vehicle Weight (W) = 15 tons

k = 1.50 for PM_{10}

k = 0.15 for $PM_{2.5}$

a = 0.90

b = 0.45

Control = 80% (Due to Watering)

Form 11a – Fugitive Dust from Roads Calculations

Emission Factor Calculations:

$$\text{E.F.} = k * ((s/12)^a) * ((W/3)^b)$$

$$\text{E.F. for PM}_{10} = 1.151 \text{ lb/vmt}$$

$$\text{E.F. for PM}_{2.5} = 0.115 \text{ lb/vmt}$$

Form 11a – Fugitive Dust from Roads

Calculations continued...

Using the emission factors, VMT, and controls from above you can now calculate the PM_{10} and $PM_{2.5}$ emissions.

$$PM_{10} = (12,000 \text{ vmt/yr}) * (1.151 \text{ lb/vmt}) * (1 - 0.80) * (1/2000 \text{ lb})$$

$$PM_{10} = \mathbf{1.382 \text{ tons/yr}}$$

$$PM_{2.5} = (12,000 \text{ vmt/yr}) * (0.115 \text{ lb/vmt}) * (1 - 0.80) * (1/2000 \text{ lb})$$

$$PM_{2.5} = \mathbf{0.138 \text{ tons/yr}}$$



Questions?

Useful Information

<http://www.airquality.utah.gov>

- Submittal Information
 - General Inventory Instructions
- Links to EPA's AP-42 Emission Factors
 - Link to the WebFIRE Database (source for looking up SCC's)
- Emissions Inventory Forms
 - Instructions (click "?" next to Form #)
 - Forms A, B, F1 – F22
 - F12 Form Instructions include off-highway mobile emission factors



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News and Announcements

- [2014 Annual Report](#)
(02/12/15)
- [2014 Emissions Inventory](#)
(02/03/15) Forms and Instructions
- [Sole Source Heating Registry Application R307-302](#)
(01/29/15)—Accepting applications February 1, 2015 to June 1, 2015
- [Open Burn Permit Application](#)
(12/16/14)—Apply for open burn permits based on a city or county.
- [Air Quality in Utah: Science for Solutions](#)
(12/11/15) A free workshop hosted by DAQ and the University of Utah's Program for Air Quality, Health and Society, January 13, 8:00-2:00. Free registration required. [More Information](#)
- [More News and Announcements](#)

Public Notices



Bryce Bird, Director

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Board: Air Quality

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DAQ Home > Emission Inventory > Submittal Forms

Emission Inventory: Submittal Forms

Submittal Information

The Emissions Inventory submittal requests for the 2014 calendar year are being mailed early in February 2015, with submittals due back to the Division by April 15, 2015.

Contact the [Inventory staff at DAQ](#) at any time for questions you may have about your inventory submittals.

[General Inventory Instructions](#), including HAPs tables and emission codes.

Note: The document is in PDF format, and designed for you to print it landscape and double-sided to deliver it in a booklet format.

EPA's AP-42 Equations and Factors

- [Ammonia \(NH3\) Factors](#)
Many processes are summarized from EPA's FIRE database.
- [Commonly Used AP-42 Chapters](#)
Short table of the most commonly used AP-42 chapters and the processes they address.
- [View the entire AP-42 on-line.](#)

Emissions Inventory Forms

Please contact Inventory staff before making use of these forms. They can advise you of the most applicable forms for your facility if no previous Inventory has been submitted.

- [Forms for Portable Equipment](#)

Follow the [?](#) link to the instructions for each of the forms.

Form #	Form Name	Purpose
A	Company/Site Information	Current or updated company name, address, phone, contact, and site information.
B	Summary—Total Emissions by Site (tons/year)	Provides a grand total of all criteria emissions, as well as hazardous air pollutant (HAPs) and other regulated pollutants associated with the company for each site.
F1 ?	Hazardous & Other Regulated Air Pollutants	HAPs and other non-Criteria pollutants that are emitted from a process or product are reported on this form. List of AP-42 chapters that include HAP calculations. All other forms are specific to the Criteria Pollutants (CO, NO _x , PM, SO _x , VOC).



Questions?

Online Emissions Inventory System

- History
- Current status
 - RFP
 - Evaluation of Bids
- Targeting Spring of 2018 for use in collecting 2017 triennial emissions inventory
- Will let sources know as process develops