

EPA Method 22 – Visual Determination of Fugitive Emissions¹

1. *What is Method 22 and what are fugitive emissions?*

- Method 22 is a simple procedure that uses the human eye to determine the total time an industrial activity causes visible emissions.
- Fugitive emissions are non-stack emissions that escape during material transfer, from buildings that contain the process, or directly from process equipment. Some examples include dust from unpaved roads; dust from grinding, crushing and sandblasting operations; and dry material loading or unloading.
- Some emission standards require that you minimize any visible emissions from your process. Method 22 is one method used to make sure the process and any emission control equipment are operating properly and are not generating excess emissions.
- Method 22 can also be used for visible emissions from stationary sources such as smoke stacks if there is such a requirement in the applicable emission standard.

2. *What training or certification is required for me to perform Method 22 observations?*

- No certification is required because it is a simple method that just requires you to record the amount of time you see emissions. You do not have to be certified to determine the opacity (or density) of the emissions so you do not need Method 9 certification.
- However, you must know and understand the effects of background contrast, ambient lighting, and where you should stand to make your observation (for example, with respect to lighting, wind, and the presence of condensing water vapor). EPA has some general references you can read to understand these general procedures for determining visible emissions. The basics are having the sun at your back, trying for a dark background, not looking into the sun and not counting steam plumes. You can also obtain additional training by attending the lecture portion of the Method 9 certification course.

3. *What equipment do I need?*

- You need two stopwatches. They must be the accumulative type and must measure to at least ½ of a second.
- If you make observations inside a building, you will need a light meter. The brightness of the lighting must read at least 100 lux or 10 foot candles on the light meter in order to perform Method 22 observations inside a building.

¹ This is only a summary and not the official Method 22. You can find Method 22 at <http://www.epa.gov/ttn/emc/promgate/m-22.pdf>

4. *Where do I stand to look for visible emissions?*

- First, find out what processes, stacks, or buildings you need to observe based on what the visible emission rule requires for your facility. In other words, what pieces of equipment or buildings at your plant does the rule say you must observe using Method 22?
- Walk around the facility, building, or structure that has the process you need to observe and find where potential emissions may occur.
- Choose a location with a clear view of the building or operation you are supposed to observe. Make sure it is safe - not in the way of moving equipment -- and does not pose any other safety hazard.
- The method recommends that you stand no closer than 15 feet and no farther away than ¼ mile from the source you want to observe.
- Pick a spot where the sunlight is not shining directly into your eyes.

6. *What part of the form can I fill out before I start?*

- Copies of the forms are attached. Fill in the company name, type of industry, the process unit (or building being observed), your name, your company's name, and the date.
- If you are outdoors, record the estimated wind speed, wind direction, and sky condition (for example, cloudy, sunny, partly cloudy, etc.). Sketch the emission source you are observing and mark your location on the sketch relative to the emission source and the sun. Show the actual and potential emission points on the sketch.
- If you are indoors, record the type, location, and intensity of the inside lighting. Sketch the process unit you are observing, and mark your location on the sketch relative to the unit you are observing. Show the actual and potential emission points on the sketch.

7. *How long do I have to observe for fugitive emissions?*

- Check the rule that applies to your plant and process and find out how long you must observe for fugitive emissions (15 minutes to one hour is typical).
- Check for what the rule allows for visible emissions. For example, if the rule says emissions must not be visible for more than 6 minutes in any hour, you may quit after observing 6 minutes of emissions before the hour elapses; otherwise, continue observing for one hour.
- In any case, no matter what the applicable rule lists as the visible emission requirement, the observation period must not be less than a total of 6 minutes.

8. *How do I make the observations and measure and record the time?*

- Record the clock time on the form when you begin.
- Use one stopwatch (SW1) to time the entire observation period. Stop it if you take a break (see #10 below) or the process stops operating. Restart it without resetting it when you begin your observations again. When this stopwatch indicates you have finished the observation period that the rule specifies, such as one hour, stop the stopwatch and record the accumulated time and the clock time.
- During the observation period, continuously watch the source, and if you see any emissions, start the second stopwatch (SW2) and then stop it when the emissions stop. Restart it without resetting it if emissions occur again, and stop it if the emissions stop. Continue doing this throughout the observation period.
- Remember that steam and other forms of condensed water vapor are not emissions and are not a reason to start the stopwatch.
- When the observation period is over, record the total time on the second stopwatch, which is the total time that emissions were visible.

9. *What do I do if emissions from other sources interfere or mix with those from the operation I am supposed to be observing?*

- Sometimes fugitive emissions from another source, such as dust blown by wind or from vehicle traffic, may keep you from getting a clear view or make it hard to see if fugitive emissions are occurring from the source.
- When other emissions interfere, stop making your observations and make a note of this on your form. Begin observing again when there is a clear view.

10. *When should I take a break?*

- You should not continuously observe emissions for more than 15 to 20 minutes without taking a rest break. If you have to observe for more than 20 consecutive minutes, you **must** take a break of 5 to 10 minutes. To do this, once you have been observing for fifteen minutes, finish timing any visible emissions currently in progress, stop both stopwatches, and note each of their times and the clock time. Then, take your break. Before resuming further observations, record the clock time and start the accumulative time stop watch. Continue to observe as before
- If the rule requires continuous observations for more than 20 minutes, you must get another observer to help you make the observations. However, this is not common.

11. How do I calculate emissions in percent if my rule requires that?

If your rule requires that the emission rate be expressed as an emission frequency in percent:

- Divide the accumulated emission time (in seconds) by the duration of the observation period (in seconds), and multiply this quotient by 100.
- For example, if a person observes a process for a total observation period of 20 minutes (1200 seconds), and sees fugitive dust for 5 minutes (300 seconds), then calculate the percentage as follows:

$$(300 \text{ seconds of fugitive emissions} / 1200 \text{ seconds of observation}) \times 100 = 25\%$$

12. Where can I find the general references mentioned earlier?

- A reference cited in Method 22 that is available online:

Wohlschlegel, P., and D.E. Wagoner. *Guideline for Development of a Quality Assurance Program: Volume IX—Visual Determination of Opacity Emissions from Stationary Sources*. EPA Publication No. EPA-650/4-74-005i. November 1975.

- Go to this website: <http://www.epa.gov/nscep/> and select “Document Number” under “Search the Collection.” Then select “600 Series” and scroll down until you see this document and select it: “650474005I Guidelines For Development Of A Quality Assurance Program, Volume IX Visual Determination Of Opacity Emissions From Stationary Source.”

**FUGITIVE OR SMOKE EMISSION INSPECTION
OUTDOOR LOCATION**

Company	Observer
Location	Affiliation
Company Rep.	Date
Sky Conditions	Wind Direction
Precipitation	Wind Speed
Industry	Process Unit

Sketch process unit: indicate observer position relative to source; indicate potential emission points and/or actual emission points.

OBSERVATIONS	Clock Time	Observation period duration, minutes:seconds	Accumulated emission time, minutes:seconds
Begin Observation			
To complete this form, record the following:			
• the initial clock time			
• the total time of the observation (from SW1)			
• the total time of emissions (from SW2), and			
• the final clock time.			
For more details on recording this data and taking breaks, see #7 and #10 above.			
End Observation			

FUGITIVE OR SMOKE EMISSION INSPECTION
INDOOR LOCATION

Company Location Company Rep.	Observer Affiliation Date
Precipitation	Wind Speed
Industry	Process Unit

Light type (fluorescent, incandescent, natural) _____

Light location (overhead, behind observer, etc.) _____

Illuminance (must be greater than or equal to 100 lux or 10 foot candles) _____

Sketch process unit: indicate observer position relative to source; indicate potential emission points and/or actual emission points.

OBSERVATIONS	Clock Time	Observation period duration, minutes:seconds	Accumulated emission time, minutes:seconds
Begin Observation	_____	_____	_____
To complete this form, record the following:	_____	_____	_____
• the initial clock time	_____	_____	_____
• the total time of the observation (from SW1)	_____	_____	_____
• the total time of emissions (from SW2), and	_____	_____	_____
• the final clock time.	_____	_____	_____
For more details on recording this data and taking breaks, see #7 and #10 above.	_____	_____	_____
End Observation	_____	_____	_____