

## Form Instructions: FORM INV-4

Submit a completed Form INV-4 (Unit Process Description-Actual Emissions) for each emissions process at your facility. If an emission unit has multiple processes, complete a separate INV-4 for each process.

- 1. Company/Facility Name:** Enter the company name as it appears on Form INV-1.
- 2. Form INV-4 page \_\_\_ of \_\_\_:** A separate Form INV-4 must be completed for each process at your plant. An emission unit is the equipment that produces the air pollution emissions, e.g. boiler, paint booth, generators, welders, haul roads, etc. Since many companies will need to use multiple Forms INV-4, this box identifies each page of the total number of Forms INV-4 included.
- 3. Release Point Identifier:** Enter the release point identifier your company assigns to this stack or vent. This must be the same numbering scheme as used on Form INV-2. Please use the same numbering scheme as any previous MSEI and/or construction permits and use it consistently throughout the emissions inventory.
- 4. Release Point Description:** Provide a brief description of the release point, i.e. boiler #1 & 2 stack, paint booth #7 wall vent, etc.
- 5. Emission Year:** Enter the calendar year for which you are calculating ACTUAL emissions from this emission unit and its processes. Usually, this will be the previous year.

## Emission Unit - Actual Operations and Emissions

- 6. Emission Unit Identifier:** Enter the identification number your company assigns to this emission unit. This must be the same numbering scheme as used on Form INV-2 and throughout the emissions inventory. Naming and numbering of release points and emission units should be consistent with any previous MSEI completed and with any construction permits. Please request assistance for help in resolving any numbering or naming inconsistencies. Keep in mind that an emission unit is the specific equipment, e.g. boiler, paint booth, which generates the air pollution emissions and may have multiple processes.
- 7. SCC Number:** Enter the Source Classification Code Number (SCC) that identifies the type of process or activity occurring at this emission unit. The SCC number corresponds to the Description of Process (Box 8) and specific emission factor units of measure (lb/ton, lb/gal, etc.). If you cannot find an SCC number for a process, please contact the DNR for assistance. For a list of SCC codes visit the [Emissions Inventory Tools webpage](#). Scroll down to "Classification Lists and Conversions." Click on "Updated Source Classification Codes - 10/11/19." Ethanol and Biodiesel plants should click on "Ethanol and Biodiesel Source Classification Code (SCC) List." Please do not use "99999999" for an SCC number because it does not accurately classify a process or its emissions.
- 8. Description of Process:** Provide a written description of the process as defined by the SCC number entered in Box 7 above. If an SCC number and corresponding description is not available for this specific process, please provide your best description of the process.

## Annual Throughput

- 9. Annual Throughput:** Enter the actual amount of the throughput material (identified in Box 12) that the emission unit processed during the emission year specified in Box 5.
- 10. Throughput Unit of Measure:** Enter the units of measure (tons, gallons, bushels, million cubic feet, etc.) of the annual throughput specified in Box 9.
- 11. Throughput Type:** Enter the type of throughput that was processed for this emissions process. Acceptable values are "Input," "Output," or "Existing." Examples of each are: I (Input) = Paint used in a surface coating process; O (Output) = Ethanol loaded out to fuel trucks; E (Existing) = A storage pile of sand.

**12. Throughput Material:** Identify the raw material used in this emissions process. For combustion sources, the throughput material is the fuel combusted. If an emission unit has more than one process or fuel (i.e., fuel oil and natural gas), **separate Forms INV-4** must be completed for each fuel used or throughput material processed except for paint booths.

**Actual Operating Rate/Schedule**

**13. Average Hours/Day:** Enter the actual average number of hours the process operated during a normal workday for the reporting year. The number should not exceed 24.

**14. Average Days/Week:** Enter the actual average number of days the process operated during a normal workweek for the reporting year. The number should not exceed seven.

**15. Average Weeks/Year:** Enter the actual number of weeks the process operated during the reporting year. The number should not exceed 52.

**16. Actual Hours for Year:** The hours per year should be consistent with the values entered for hours/day, days/week, and weeks/year as provided.

**17. January, February & December (%), 18. March, April & May (%), 19. June, July & August (%), and 20. September, October & November (%):** For each of the four meteorological seasons, specify the percentage of the total operating time attributable to each season. Estimates are acceptable. The total for all four seasons should equal 100%.

Example: ACME Corporation operated 8 hours per day, 5 days per week from Mar 1 – Nov 30, and 4 hours per day, 5 days per week from Jan 1 – Feb 28 and from Dec 1 – Dec 31.

Actual Operating Rate/Schedule	
13. Average Hours/Day	7
14. Average Days/Week	5
15. Average Weeks/Year	52
16. Actual Hours For Year	1,820
Seasonal Operations	
17. January, February & December (%)	14.2
18. March, April & May (%)	28.6
19. June, July & August (%)	28.6
20. September, October & November (%)	28.6

$(8 \text{ hrs/day}) \times (5 \text{ days/week}) \times (13 \text{ weeks/quarter}) = (520 \text{ hours/quarter}) \times (3 \text{ quarters/year}) = 1,560 \text{ hours}$   
 $(4 \text{ hrs/day}) \times (5 \text{ days/week}) \times (13 \text{ weeks/quarter}) = (260 \text{ hours/quarter}) \times (1 \text{ quarter/year}) = 260 \text{ hours}$

Total hours operated = 1,820 hours

Jan, Feb & Dec =  $260 \text{ hrs}/1,820 \text{ hrs} \times 100 = 14.2\%$

Mar, Apr & May =  $520 \text{ hrs}/1,820 \text{ hrs} \times 100 = 28.6\%$

Jun, Jul & Aug =  $520 \text{ hrs}/1,820 \text{ hrs} \times 100 = 28.6\%$

Sep, Oct & Nov =  $520 \text{ hrs}/1,820 \text{ hrs} \times 100 = 28.6\%$

**Air Pollution Control Devices**

**21. through 24. Control Device Identifier and Descriptions:** Enter the air pollution emissions control device identifier(s) and their appropriate descriptions i.e. baghouse, cyclone, scrubber, etc. Up to two different control devices may be

identified on each INV-4 form. If there are three or more control devices associated with an emission unit, please use additional INV-4 forms to indicate the additional control devices.

### Actual Emissions

- 25. Air Pollutant:** Besides the eight listed air pollutants, there are spaces for six hazardous air pollutants or additional regulated air pollutants. These six boxes are available to list any air contaminants not listed on the form that are emitted from this emissions process. Please indicate the identity of the pollutant by entering the name of the pollutant. If the name of the pollutant is too long to fit, you may use the CAS number. Use additional pages if more than six other pollutants are actually emitted from this emissions process. **Each HAP must be listed individually.**
- 26. Emission Factor:** Enter the numerical emission factor (in pounds per units of measure) used to calculate the actual emissions from this emissions process. As noted at the bottom of the form, emission factors can be obtained for some processes from EPA documents or calculated from stack test data, worksheets, or continuous emission monitoring data (see pages 6 & 7 for details). Only use lb/hr emission permit limits for emission factors as a last resort.
- 27. Emission Factor Units of Measure:** Enter the emission factor units of measure that correspond to the numerical emission factor utilized in Box 26 and the throughput material (for annual throughput) in box 9. Typical emission factor units of measure are expressed in pounds of pollutant emitted per unit of production or unit of fuel combusted. Examples are pounds/ton, pounds/gallon, pounds/million cubic feet, etc.
- 28. Source of Emission Factor:** Indicate the source of the emission factor used in Box 26. See the bottom of Form INV-4 for typical sources of emission factors. When using AP-42 as an emission factor source, please specify the table in which the emission factor was found. If "other" is used as the emission factor source, please specify the emission factor source.
- 29. Ash or Sulfur %:** For combustion sources, the ash and/or sulfur percent of the fuel may be needed to calculate emissions of particulate matter and sulfur dioxide. The source of the emission factors will state if this is needed. If needed, enter the percent ash in the fuel in the PM<sub>2.5</sub> & PM<sub>10</sub> row and the percent sulfur in the SO<sub>2</sub> row.
- 30. Combined Control Efficiency %:** If only one emission control device is used, enter the percent control efficiency. Be sure to enter the control efficiency in the box corresponding to the air pollutant for which that efficiency is appropriate. See pages 62 - 65 in Appendix C for guidance on **control efficiencies** that are accepted by DNR.

If more than one control device applies to the same pollutant at a release point, the control efficiency is calculated using the following formula:

$$\text{Control Efficiency} = \text{CE1} + \text{CE2} - [(\text{CE1} \times \text{CE2}) / 100]$$

where CE1 = Control Efficiency for First Device  
CE2 = Control Efficiency for Second Device

When two devices are used to remove the pollutant PM<sub>10</sub> from the same release point, the control efficiencies must be combined. For example, if the first device has a control efficiency of 50% and the second device has an efficiency of 80%, the calculation of combined efficiency is as follows:

$$\begin{aligned} \text{Control Efficiency} &= 50 + 80 - [(50 \times 80) / 100] \\ &= 130 - [4000 / 100] \\ &= 130 - [40] \\ &= 90\% \end{aligned}$$

Thus, the control efficiency for PM<sub>10</sub> at this release point is 90%. Do not enter a combined control efficiency if a controlled emission factor has been selected to calculate actual emissions.

**31. Transfer Efficiency:** For spray coating operations only. Enter the percent of material that adheres to the surface being coated. Table 1 in Appendix D gives typical values for transfer efficiencies for different types of spraying operations and surfaces. Manufacturers may also provide transfer efficiencies for their equipment.

**32. Actual Estimated Emissions (Tons):** This is the amount in tons per year of the pollutant emitted from the process described. All figures should be rounded to two decimal places. For example, assume the annual *throughput* is 30,000 tons of grain processed, the PM<sub>10</sub> emission factor is 0.91 pounds of PM<sub>10</sub> emitted per ton of grain processed and a PM<sub>10</sub> control device for this release point has an efficiency of 90%.

Actual Emissions =  
Annual Throughput (Boxes 9 & 10) x Emission Factor x [(100 – Percent Control Efficiency)/100]/ 2000.

Actual Emissions = 30,000 tons x 0.91 lbs/ton x [(100 - 90) / 100] / 2,000 lbs/ton  
= 27,300 lbs x [10 / 100] / 2,000 lbs/ton  
= 27,300 lbs x [.1] / 2,000 lbs/ton  
= 2,730 lbs / 2,000 lbs/ton  
= 1.37 tons of PM<sub>10</sub> emitted per year

Note: Do not enter a combined control efficiency if a controlled emission factor has been selected to calculate actual emissions.

Note: If no control devices are used, the Control Efficiency is 0%.  
Actual Emissions = (30,000 tons x 0.91 lbs/ton) / 2,000 lbs/ton  
= 27,300 lbs / 2,000 lbs/ton  
= 13.65 tons of PM<sub>10</sub> emitted per year

For additional examples on calculating actual emissions, see Example Calculations and Forms starting on page 20.