

## Form Instructions: FORM INV-4

Duplicate as needed and return a completed Form INV-4 (Emission Unit Description-Actual Emissions) for each emission unit 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.

**1a) 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.

**2) 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*

**3) Emission Point Number:** Enter the emission point number your company assigns to this stack or vent. This must be the same numbering scheme as used on Forms INV-2 and INV-3. Please use the same numbering scheme as any previous MSEI and/or construction permits and use it consistently throughout the emissions inventory.

**4) Emission Unit Number:** Enter the identification number your company assigns to this emission unit. This must be the same numbering scheme as used on Forms INV-2 and INV-3 and throughout the emissions inventory. Naming and numbering of emission 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.

**5) 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 6) 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. SCC numbers can be viewed at: <http://www.iowadnr.gov/InsideDNR/RegulatoryAir/EmissionsInventory/EmissionsEstimateTools.aspx> by clicking on the "Source Classification Code (SCC) List" link under the "Classification Lists" subheading. Please do not use "99999999" for an SCC number because it does not accurately classify a process or its emissions.

**6) Description Of Process:** Provide a written description of the process as defined by the SCC number entered in Box 5 above. If an SCC number and corresponding description is not available for this specific process, please provide your best description of the process.

### *Actual Throughput*

**7) Raw Material:** Identify the raw material used in this emission unit. For combustion sources, the raw 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 raw material processed except for paint booths.

**8) Actual Throughput - Yearly Total:** Enter the actual amount of the raw material (identified in Box 7) that the emission unit processed during the emission year specified in Box 2.

**9) Units Raw Material:** Enter the units of measure (tons, gallons, bushels, million cubic feet, etc.) of the raw material total specified in Box 8.

*Actual Operating Rate/Schedule*

**10) Percent of Total Operating Time:** For each of the four calendar quarters, specify the percentage of the total operating time attributable to each quarter. Estimates are acceptable. The total for all four quarters must equal 100%.

**11) Hours/Day:** This figure is the normal number of hours per day that the equipment or process (Emission Unit) was in operation. Since some processes operate on a different daily schedule over the course of the year, enter the hours per day the emission unit operated during each of the four calendar quarters.

**12) Days/Week:** This figure is the normal number of days per week that the equipment or process (Emission Unit) was in operation. Since some processes are operated on a different weekly schedule over the course of the year, enter the days per week that the emission unit operated during each of the calendar quarters.

**13) Weeks / 13 Week Quarter:** For each calendar quarter, enter the number of weeks the emission unit operated. There are 13 possible weeks of operation in each calendar quarter.

*Example: ACME Corporation operated 8 hours per day, 5 days per week from Jan 1 – Sept 30, and 4 hours per day, 5 days per week from Oct 1 – Dec 31.*

Actual Operating Rate/Schedule				
	10) Percent of Total Operating Time	11) Hours/Day	12) Days/Week	13) Weeks/Quarter
JAN – MAR	28.57	8	5	13
APR – JUN	28.57	8	5	13
JUL – SEP	28.57	8	5	13
OCT - DEC	14.29	4	5	13

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

$(4 \text{ hrs/day}) \times (5 \text{ days/week}) \times (13 \text{ weeks/quarter}) = (260 \text{ hours/quarter}) \times (1 \text{ quarter/year}) = 260 \text{ hours}$

Total hours operated = 1,820 hours

Jan – Mar =  $520 \text{ hrs}/1,820 \text{ hrs} \times 100 = 28.57\%$

Apr – Jun =  $520 \text{ hrs}/1,820 \text{ hrs} \times 100 = 28.57\%$

July – Sep =  $520 \text{ hrs}/1,820 \text{ hrs} \times 100 = 28.57\%$

Oct – Dec =  $260 \text{ hrs}/1,820 \text{ hrs} \times 100 = 14.29\%$

### *Air Pollution Control Equipment*

**14) Control Equipment (CE) Number:** Enter the air pollution emissions control equipment identification number(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 pieces of control equipment associated with an emission unit, please use additional INV-4 forms to indicate the additional piece(s) of control equipment.

### *Actual Emissions*

**15) 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 emission unit. 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 emission unit. **Each HAP must be listed individually.**

**16) Emission Factor:** Enter the numerical emission factor (in pounds per units of measure) used to calculate the actual emissions from this emission unit. 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 9 & 10 for details). Only use lb/hr emission permit limits for emission factors as a last resort.

**17) Emission Factor Units:** Enter the emission factor units of measure that correspond to the numerical emission factor utilized in Box 16 and the units raw materials (for actual 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.

**18) Source of Emission Factor:** Indicate the source of the emission factor used in Box 16. 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.

**19) Ash or Sulfur %:** For combustion sources the ash 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.

**20) Combined Control Efficiency %:** The same control efficiency used in Box 20 on Form INV-3 should be used here.

**21) 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.

**22) Actual Emissions (Tons/Yr):** 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 actual *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 emission point has an efficiency of 90%.

Actual Emissions =  
Actual Throughput (Boxes 8 & 9) x Emission Factor x [(100 – Percent Control Efficiency)/100]/ 2000.

$$\begin{aligned} \text{Actual Emissions} &= 30,000 \text{ tons} \times 0.91 \text{ lbs/ton} \times [(100 - 90) / 100] / 2,000 \text{ lbs/ton} \\ &= 27,300 \text{ lbs} \times [10 / 100] / 2,000 \text{ lbs/ton} \\ &= 27,300 \text{ lbs} \times [0.1] / 2,000 \text{ lbs/ton} \\ &= 2,730 \text{ lbs} / 2,000 \text{ lbs/ton} \\ &= 1.37 \text{ tons of PM}_{10} \text{ emitted per year} \end{aligned}$$

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

Note: If no control devices are used, the Control Efficiency is 0%.

$$\begin{aligned} \text{Actual Emissions} &= (30,000 \text{ tons} \times 0.91 \text{ lbs/ton}) / 2,000 \text{ lbs/ton} \\ &= 27,300 \text{ lbs} / 2,000 \text{ lbs/ton} \\ &= 13.65 \text{ tons of PM}_{10} \text{ emitted per year} \end{aligned}$$

**For additional examples on calculating actual emissions, see Example Calculations and Forms starting on page 28.**