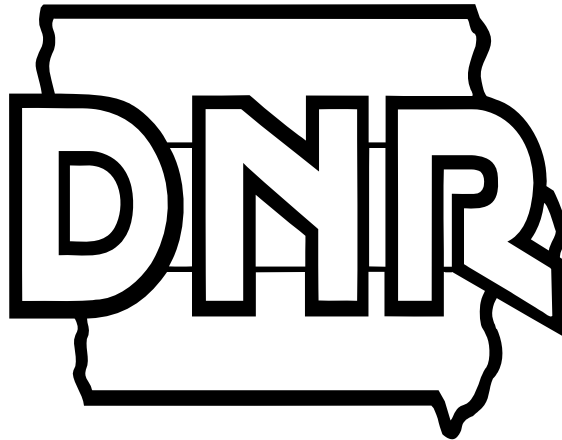


# Minor Source Emission Inventory (MSEI) Instructions

(Revised January 2022)



Iowa DNR - Air Quality Bureau

<http://www.iowacleanair.gov>

**Return the MSEI with relevant Safety Data Sheets and supporting documentation by May 15 to:**

**Emissions Inventory  
Air Quality Bureau, DNR  
Wallace Building, 2<sup>nd</sup> Floor  
502 E 9<sup>th</sup> St  
Des Moines IA 50319**

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## ***DNR Air Quality Contacts***

Emission Inventory Questions

[Nick Page](#) 515-725-9544

[Krysti Mostert](#) 515-725-9567

[Seth Anderson](#) 515-725-9559

Greenhouse Gas Questions

[Krysti Mostert](#) 515-725-9567

Iowa Waste Reduction Center

[Iowa Air Emissions Assistance Program](#) (IAEAP)

University of Northern Iowa

1-800-422-3109 or

319-273-8905, Fax: 319-273-6582

Air Bureau Records Center

515-725-9553

Air Bureau Numbers

515-725-8200 (phone)

515-725-9501 (fax)

Asbestos Program

[Tom Wuehr](#) 515-494-8212

[Construction Permit Section](#)

1-877-AIR-IOWA (1-877-247-4692)

Compliance Section

[Mark Fields](#) 515-343-6589

Hazardous Air Pollutants, MACTs

[Sarah Mousel](#) 515-418-7304

[SLEIS Helpdesk](#)

[SLEIS electronic resources](#)

Stack Test Information

[Mark Fields](#) 515-418-6589

Title V Operating Permits

[Chris Kjellmark](#) 515-725-9537

[Jeremy Arndt](#) 515-725-9511

[Polk County Air Quality](#)

515-286-3705 (phone)

515-286-3437 (fax)

[Linn County Air Quality](#)

319-892-6000 (phone)

319-892-6099 (fax)

## **Online Resources**

DNR Air Quality Bureau

[Air Quality Bureau Homepage](#)

Minor Source Emissions Inventory Forms

[DNR MSEI Forms](#)

eAirServices

Access [eAirServices](#) - a secure portal for online business services. It is the entry point for the regulated community and consultants to electronically complete and file air emissions inventories and permit applications.

[EPA Emission Factors](#)

Latitude and Longitude

[Google Maps](#)

[iTouchMap](#)

[Google Earth](#)

[GPS Visualizer](#)

Facility Classification Systems

[SIC Codes](#)

[NAICS Association](#)

SCC Codes

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 11/23/20.](#)" Ethanol and Biodiesel plants should click on "[Ethanol and Biodiesel Source Classification Code \(SCC\) List.](#)"

Calculation Spreadsheet and Tools

To access calculation spreadsheets for painting operations, haul roads, and asphalt, concrete and limestone processes visit the [Emissions Inventory Tools webpage](#). Scroll down to "Emissions Inventory Worksheets" then click on the spreadsheet of interest.

Iowa Air Emissions Assistance Program (IAEAP)

<http://iwrc.uni.edu/iaeap>

Iowa Administrative Code (IAC)

<https://www.legis.iowa.gov/law/administrativeRules/agencies> See section 567, Chapters 20-32

## General Instructions/Purpose

### Introduction

This packet contains forms, instructions, and information needed to complete a **minor source emissions inventory**. Submitting a complete inventory is required by 21.1(3) of the Iowa Administrative Code. Some companies may be unfamiliar with air quality terms, therefore a glossary is included in Appendix A. Terms included in the glossary are bolded and italicized. In addition, general air program definitions are found in 567 Iowa Administrative Code (IAC) 20.2. The IAC is available on the internet at <https://www.legis.iowa.gov/law/administrativeRules/agencies>.

The deadline for submitting a completed Minor Source Emissions Inventory is May 15. If you need assistance completing the inventory please contact the DNR or the [Iowa Air Emissions Assistance Program](#).

### SLEIS

The DNR offers an online emissions inventory reporting tool called the State & Local Emissions Inventory System (SLEIS). This web-based system has been populated with emissions data and facility equipment information that will allow for simpler and streamlined reporting. In addition, SLEIS offers the option of importing emissions data via a spreadsheet template, significantly reducing data entry for facilities with a large number of emission processes. Since its inception in December 2015, more facilities have used SLEIS than any other method. In fact, when comparing the number of SLEIS submittals with the number of paper copy submittals, the usage rate of SLEIS has increased from 45% in 2015 to 70% in 2020. For more information about accessing your facility's data in SLEIS and e-reporting, please visit [the Iowa DNR's eAirServices website](#) or contact us at [sleis@dnr.iowa.gov](mailto:sleis@dnr.iowa.gov).

SLEIS training sessions will be announced on the Air Quality Bureau's home page on the eAirServices website under the "What Kind of Training Is Available" heading, and through the DNR's Air Quality listserv. DNR's air quality technical listserv is targeted to the regulated public and consultants to deliver timely regulatory news, program updates, and technical guidance to your e-mail account. To subscribe, go to [www.IowaCleanAir.gov](http://www.IowaCleanAir.gov) and click on Sign up for Air Quality Technical Updates. For more information, please contact DNR's Wendy Walker at 515-725-9570 or [wendy.walker@dnr.iowa.gov](mailto:wendy.walker@dnr.iowa.gov).

### Getting Help Completing Your Inventory

The DNR assists small businesses by funding the Iowa Air Emissions Assistance Program (IAEAP) at the University of Northern Iowa. The IAEAP has developed a support webpage that contains emissions calculators, on-line tutorials, helpful links, answers to frequently asked questions and contact information. IAEAP also offers one on one assistance as requested by facilities as time permits. If you would like to utilize this free assistance, please contact IAEAP staff by calling 1-800-422-3109 or visiting the Iowa Air Emissions Assistance Program [website](#).

The DNR will provide assistance to facilities upon request or as time permits. If your facility would like assistance, please contact one of the emission inventory staff on the air quality contacts list on page 1 of this booklet or visit the [Minor Source Emissions Inventory webpage](#) for helpful tools, links, resources, and answers to frequently asked questions.

Please contact the DNR or IAEAP with any questions before submitting the MSEI. If the MSEI is incomplete or incorrect calculations were used, the DNR will require additional submittals until the MSEI is complete and correct.

### Emissions Reporting

All regulated air pollutants including the seven **Criteria Pollutants (including PM<sub>2.5</sub>)**, 187 **Hazardous Air Pollutants (HAPs)**, and **Ammonia** are required to be reported in the MSEI. The definition of volatile organic compounds (VOC) can be found in Appendix A and a listing of all HAPs can be found in Appendix B. Please consult this list if you are unsure if a pollutant needs to be reported.

Emission estimates should be evaluated for all emission sources at your facility including **fugitive emissions**. However, it may not be necessary to report all of the sources or pollutants in the MSEI. Please refer to page 5 for a list of sources that are considered exempt from the minor source emissions inventory.

Actual emissions need to be reported for each emission unit. **Emissions units** may be grouped for reporting actual emissions *only* if the emission units and their processes are identical, have identical control equipment, and they exhaust to the same release point. If an emission unit has multiple processes, each process should be reported on a separate form.

### **Actual Emissions**

**Actual emissions** are the actual rate of pollutant emissions from an emission unit. Actual emissions are calculated using the emission unit's actual operating hours, production rates, and quantities of materials processed, stored, or combusted for the calendar year.

## Exemptions

The DNR considers the following items exempt from MSEI reporting at this time:

1. Any pollutant with actual emissions of less than 0.005 tons per year. When reporting emissions, pollutants only need to be rounded to the nearest one hundredth of a ton;
2. If all pollutants for an emission unit have actual emissions of less than 0.005 tons per year (rounded down to 0.00 tons), then the emission unit can be excluded from the inventory;
3. Fuel-burning equipment for indirect heating and reheating furnaces with a capacity of less than 10 million BTU per hour input per combustion unit when burning natural gas or liquefied petroleum gas;
4. Fuel-burning equipment for indirect heating with a capacity of less than 1 million BTU per hour input per combustion unit when burning untreated wood or fuel oil;
5. Fuel-burning equipment for indirect heating constructed after 10/23/13 with a capacity of less than 265,600 Btu/hr when burning untreated wood, untreated seeds or pellets, or untreated vegetative materials or burning less than 378,000 pounds/yr of the same materials;
6. Fuel-burning equipment for indirect heating constructed after 10/23/13 with a capacity of less than 50,000 Btu/hr when burning on-spec used oil or burning less than 3,600 gallons/yr of on-spec used oil;
7. Direct-fired equipment burning natural gas, propane, or liquefied propane with a capacity of less than 10 million BTU per hour input, and direct-fired equipment burning fuel oil with a capacity of less than 1 million BTU per hour input, with emissions that are attributable only to the products of combustion;
8. An internal combustion engine with a brake horsepower rating of less than 400;
9. Any generator or engine that operated less than 100 hours during the emissions year;
10. Storage tanks with a capacity of less than 19,812 gallons AND an annual throughput of less than 200,000 gallons;
11. Any container, storage tank, or vessel that contains a fluid having a *maximum true vapor pressure* of less than 0.75 psia;
12. Non-production maintenance activities, which may include brazing, soldering, or welding equipment, and surface coating operations using only hand-held aerosol spray cans;
13. *Manually operated equipment* (see definition in Appendix A on page 53) used for buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, scarfing, surface grinding, or turning;
14. Indoor-vented powder coating operations with filters or powder recovery systems;
15. Parking lots and employee roads used to get to and from work. However, unpaved and paved roads used to haul material and/or product on a regular basis must be included.

NOTE: Indoor-vented sources MUST be included in the inventory if they do not qualify for any other exemption. If ALL emission units at the facility meet an exemption, the facility should submit a cover letter to the DNR explaining why the emission units are exempt and why the inventory will not be submitted.

## Small Unit Exemptions

Emission units that have a small unit exemption justification document required by 567 IAC 22.1(2)“w” *do not* have to be included in the minor source emissions inventory but the exemption justification document must be attached. Such exemption justification documents shall include the following:

1. A narrative description of how the emissions from the emission unit were determined and maintained at or below the annual small unit exemption levels.
2. If applicable, a description of air pollution control equipment associated with the emission unit and a statement that the emission unit will not be operated without the control equipment operating.
3. If control equipment is used, the applicant shall maintain a copy of any report of manufacturer’s testing results of any emissions test, if available. The Iowa DNR may require a test if it believes that a test is necessary for the exemption claim.
4. A description of all production limits required for the emission unit to comply with the exemption levels.
5. Detailed calculations of emissions reflecting the use of any air pollution control devices or production or throughput limitations, or both, for the applicable emission unit.
6. Records of actual operation that demonstrate that the annual emissions from the emission unit were maintained below the exemption levels.
7. Facilities designated as major sources with respect to rules 22.4(455B) and 22.101(455B), or subject to any applicable federal requirements, shall retain all records demonstrating compliance with the exemption justification document for five years. The record retention requirements supersede any retention conditions of an individual exemption.
8. A certification from the responsible official that the emission unit has complied with the exemption levels specified in 22.1(2)“w”(1).



## Emissions Estimation Methods

Emissions must be based on the best possible method. Do not use a less preferable method if a more preferable one is available. Using a less preferable method or unacceptable methods could result in your inventory being returned for revisions.

Regardless of the method used to calculate emissions, supporting documentation must be included with the MSEI submittal. This documentation must be sufficient in order to allow DNR to evaluate the emissions calculations.

### Methods of Calculating Emissions (*in order of preference*):

1. Continuous emissions monitoring
  2. Valid stack sampling which represents maximum operating conditions
  3. Material balance
  4. EPA-approved emission factors
  5. Vendor supplied emission factors
  6. Engineering estimates based on best available process operating data
- **Continuous Emissions Monitoring** systems measure pollutant concentrations in the exhaust stack 24 hours per day. There is no better method for determining emissions, however, these systems are very expensive and most facilities do not use them.
  - A **Stack Test** measures the concentration of pollutants in the exhaust stack during the test period. Test periods can vary from a couple of hours to an entire day. Stack test data that are representative of current conditions can provide an accurate emission rate for many different processes and pollutants.
  - **Material Balance** can only be used on specific types of emission units. It is most commonly used for surface coating operations (paint booths, dip tanks, etc.). Information must first be gathered on process rates, materials used, and material properties (usually from **safety data sheets** (SDS)). By combining this information with the knowledge of the process, an estimation of actual emissions can be made.
  - **EPA-Approved Emission Factors** are the basis for many calculations. These factors represent industry-wide averages and show the relationship between emissions and a measure of production. You will need to access EPA's emission factors. The DNR will not provide you with the entire volume of emission factors directly; however, if you encounter problems finding emission factors for a source you may contact DNR for assistance. When using EPA or other emission factors, you must use the most recently approved version. Sources of emission factors are listed on page 8.
  - **Vendor Supplied Factors** may be used if a more preferred method is not available. Many manufacturers of industrial equipment provide emission information for their products. This data may be used to calculate emissions only if the manufacturer's data is based on approved stack testing and no significant changes have been made to the emission unit. Supporting documentation must be included in the submittal if vendor supplied factors are used to calculate emissions.
  - **Engineering Estimation** is allowed if a more preferred method is not available. The DNR realizes some processes exist that have no published guidance regarding the estimation of emissions. In these cases, the estimation must be the best possible assessment given the amount of data available. Supporting documentation must be submitted to show how the estimation was made.

More information about emission factors can be found [on this EPA website](#).

## Sources of Emission Factors

**WebFIRE** is the internet version of FIRE and it has replaced the software application, FIRE version 6.25, and the Microsoft Access version of the database. An internet version of FIRE allows more frequent updates and easier access. Log on to <https://cfpub.epa.gov/webfire/> to access WebFIRE.

**AP-42 COMPILATION OF AIR POLLUTANT EMISSION FACTORS** is the recommended source of air pollutant emission factors, with descriptions of activities emitting criteria and hazardous air pollutants.

**TANKS** is the model that was developed using a software that is now outdated. Because of this, the model is not reliably functional on computers using certain operating systems such as Windows Vista or Windows 7. EPA anticipates that additional problems will arise as PCs switch to other operating systems. EPA and DNR can no longer provide assistance to users of TANKS 4.09d. The model will remain on the EPA website to be used at your discretion and at your own risk. EPA recommend the use of the equations/algorithms specified in AP-42 Chapter 7 for estimating VOC emissions from storage tanks. The equations specified in AP-42 Chapter 7 (<https://www.epa.gov/ttn/chief/ap42/ch07/index.html>) can be employed with many current spreadsheet/software programs. The Tanks 4.09D software estimates VOCs and hazardous air pollutants from vertical and horizontal fixed-roof tanks, internal and external floating-roof tanks, domed external floating roof tanks and underground storage tanks. It is based on the emissions estimation procedures presented in Section 7.1 of AP-42, 5th Edition. If your facility intends to use TANKS 4.09d to estimate emissions, please provide copies of the print outs as an attachment to the emissions inventory and any other documentation used for inputs into the program.

## Tips to Avoid Common Mistakes when filling out your MSEI:

1. Use the most current reporting forms and instructions.
2. Do not use outdated or old emission factors. The most up-to-date emission factors must be used for accurate emissions calculations. If you are referencing a previous inventory, double-check all emission factors as they may have changed since the last emissions inventory submittal.
3. Form INV-6 is intended for facilities to fill out their facility-wide actual emissions for each individual air pollutant. If you are submitting using paper forms, please complete only one INV-6 form by totaling the actual emissions reported on the INV-4 Forms and entering them on INV-6. If you're reporting using the State and Local Emissions Inventory System (SLEIS), the sum of the pollutants will be totaled for you.
4. Many HAPs are also Volatile Organic Compounds (VOCs). List such pollutants as both a HAP and a VOC on Forms INV-4, and INV-6.
5. Only one Form INV-1 is required for a facility's MSEI submittal.
6. Remember to submit Form INV-2 for all points, and submit Forms INV-4 for all processes.
7. Use DNR's INV-5 Form or other tools to show all your calculations. Please include all supporting documentation which was used to estimate emissions. Supporting documentation includes but is not limited to SDS, stack test summaries and reports, AP-42 citation, mass balance calculations, and any correspondence with DNR or other air pollution control agencies.
8. If higher control efficiencies are reported than what is given in the Control Efficiency Guidance Document (Appendix C), these control efficiencies must be verified by test data from an EPA-approved method. Please include supporting documentation of the test data, which confirms the reported control efficiency.
9. Make sure PM<sub>2.5</sub> and Ammonia emissions are included where applicable on each Form INV-4. If PM<sub>10</sub> emissions are being reported, remember to also include emissions estimates for PM<sub>2.5</sub>.
10. Use correct units of measure for emission factors and annual throughput. Units of measure need to correspond between emission factors and the annual throughput.
11. Remember to fill out the operating schedule on Form INV-4.
12. Do not report total particulate matter (PM), also commonly referred to as total suspended particulate (TSP). Report only total PM<sub>10</sub> (particulate matter 10 microns or less in diameter) and total PM<sub>2.5</sub> (particulate matter 2.5 microns or less in diameter). Total PM<sub>10</sub> and PM<sub>2.5</sub> emissions are commonly referred to as primary PM<sub>10</sub> and PM<sub>2.5</sub>.
13. Remember to include the small unit exemption justification document for all emission units which meet 567 IAC 22.1(2)"w." An INV-2 and INV-4 form **does not** need to be filled out for emission units that meet small unit

exemption status. Please see page 6 for a complete list of what needs to be included in a small unit exemption justification document.

### **Submitting the MSEI to the DNR**

Submittal Deadline: May 15

A completed Minor Source Emission Inventory should be returned to the DNR electronically by using the State and Local Emissions Inventory System (SLEIS) or as a paper copy. If the facility is not required to submit the emissions inventory because they are exempt, an exemption letter should be returned to the DNR indicating the reasons they are exempt from the requirement.

**Keep a Copy** – Keep a copy of your completed MSEI. Upon review of the emissions inventory, DNR staff frequently have questions. A copy will also be useful to you when completing future MSEIs. Only mail one copy.

The emission inventory data must be submitted electronically using SLEIS or by using forms provided by DNR.

### **Paper Copy**

The forms can be obtained on the [Emissions Inventory Forms website](#). If you do not have web access, you may contact the DNR to obtain paper forms. All information must be typed due to the volume of MSEIs the DNR receives. Other formats are not accepted.

### **Confidentiality**

The DNR recognizes the need to keep certain information about facility operation confidential. If you have any questions about keeping submitted information confidential, contact Kelli Book, DNR legal staff at 515-210-3408 or at [kelli.book@dnr.iowa.gov](mailto:kelli.book@dnr.iowa.gov).

### **SDS**

If using mass balance to estimate emissions, then copies of all safety data sheets (SDS) for materials used at each emission unit during the previous calendar year must be included with the MSEI submittal. Also, include the amount of each material used for each product. SDS are needed for a complete review of the submitted MSEI. Facilities may submit a [paint spreadsheet](#) in lieu of the SDS.

## Submitting an Emissions Inventory Using SLEIS

This instruction booklet contains form specific instructions for a paper submittal of an emissions inventory starting on page 11. The forms may use different terminology from SLEIS, but the same data is required in both methods.

## Accessing SLEIS

To access [SLEIS](#), users must complete the [SLEIS Electronic Reporting Registration Form](#). Email the completed form to [sleis@dnr.iowa.gov](mailto:sleis@dnr.iowa.gov). You may also mail the form to the address in the form's upper left corner. Facilities must have a designated Facility Signatory (Responsible Official). A new Facility Signatory must submit a paper copy of the [SLEIS Electronic Subscriber Agreement Form](#) to the Iowa DNR. This form is only necessary for users who will be submitting the emissions inventory. Please visit <https://www.iowadnr.gov/Environmental-Protection/Air-Quality/eAirServices> and click on the "How Do I Access My Facility Data" link under the SLEIS menu to download the SLEIS access forms.

## SLEIS Help Features

SLEIS has four different help features that ensure data being input into the database is accurate.

1. **Help Link:** Every SLEIS page has a help link in the upper right corner. This help link is unique to each page and provides a brief description of the information that can be viewed or edited on the screen.
2. **Tip Tool:** Each data entry field has a tip tool associated with it. The tip tool is a green circle with a question mark in it and is located above the data field. It contains specific information on where to find the data or equations to calculate the required information for the associated field.
3. **Required Data Elements:** Data elements that are required fields are indicated by a red bar on the left side of the required field. Fields without a red bar are optional.
4. **Data Validation Help Text:** SLEIS has multiple data validation checks. If the data entered does not meet the validation requirements, the requirements will be shown near the data input field in red font. Pages may contain multiple tabs and all of the data on all of the tabs must meet the data validation requirements before a save can be executed for that record. Tabs with fields that do not meet the requirements will have an exclamation point. The fields that don't meet the requirements will have red help text near them.

## SLEIS Training

DNR provides multiple in-person SLEIS training sessions every year. Information on SLEIS training sessions as well as recorded sessions and video tutorials are available on the DNR's [eAirServices website](#).

## **Minor Source Emission Inventory Form Instructions**

### **Form Instructions: Form INV-1**

Only one Form INV-1 (Facility Identification) is required per facility

- 1. Emissions Inventory Type:** Check initial if this is your first submittal for the current emission year. Check supplemental if you are submitting additional information for an emissions inventory that was already submitted for the current emission year.
- 2. Facility Identifier:** The facility identifier is a unique number assigned to your plant. It can be found on the mailing you received regarding the emissions inventory reporting requirement. This number has the following format: ##-##-###.
- 3. Company/Facility Name:** Enter the official company name and/or plant designation for the facility submitting the MSEI. This official facility name must be entered the same on every form submitted.
- 4. Number of State-Wide Company Employees:** Check less than or equal to 100 if your company employs less than or equal to 100 people at all facilities combined in the state of Iowa. Check greater than 100 if your company employs more than 100 people at all facilities combined in Iowa.
- 5. Emission Year:** Enter the calendar year for which you are submitting an emissions inventory. Usually, this will be the previous year.
- 6. Facility Street Address, 7. Facility City, and 8. ZIP Code:** The street address is the physical location of the facility, not the address of a corporate office where the MSEI may have been filled out.
- 9. Emissions Contact Person:** The emissions contact is the person most familiar with the operations of the plant and who should answer any questions regarding the MSEI submitted for this particular facility.
- 10. Emissions Contact Phone Number and Emissions Contact E-mail Address:** The telephone number where the emissions contact person can be reached directly and the e-mail address where the emissions contact person can be reached directly.
- 11. Mailing Street/P.O. Box Address, 12. Mailing City, 13. Mailing State, and 14. ZIP Code:** The mailing address of the facility.
- 15. Parent Company/Owner Name:** Complete this block with the name of the parent company or owner if another company at a different location owns your company wholly or in part. If there is no parent company at a different location, please leave this block blank.
- 16. Parent Company/Owner Mailing Address:** Enter the mailing address of the parent company or owner if one is identified in Box 15.
- 17. City, 18. State, 19. Zip Code:** Enter the city, state, and zip code of the parent company or owner identified in Box 15.
- 20. Parent Company Contact/Agent:** Enter the name of a person to contact at the parent company or the registered agent for the company.
- 21. Parent Company Contact Phone Number:** Enter the telephone number of the contact, if any is identified in Box 20.
- 22. Name of Responsible Official, 23. Title of Responsible Official, 24. Signature of Responsible Official, and 25. Date of Signature:** Enter the contact information, signature, and date of signature of the company official that is certifying the truth, accuracy, and completeness of the emissions inventory submission.

**26. Primary Standard Industrial Classification (SIC):** Enter the SIC code number that best describes the type of activity occurring at this facility. The SIC is a four digit number used to identify industries. The first two digits are the “major group” of a facility. For example, major group 20 is “Food and Kindred Products.” The last two digits of the SIC code identify the specific type of facility. Food products that have 43 as the last two digits, for instance, make Cereal Breakfast Foods (SIC code 2043). The Standard Industrial Classification Manual contains all SIC codes and may be available at your local library. SIC codes can also be found on the [OSHA SIC website](#).

There are times when sources having different major SIC codes may be part of the same facility. *In that case, use the SIC code that is the main one for your operations.* For example, a facility that both makes and prints on cardboard boxes has two SIC codes. It’s primary SIC code is 2653, Corrugated and Solid Fiber Boxes. Since the company does some of its own printing on site, its secondary SIC code is 2754, Commercial Printing, Gravure. List 2653 as the primary SIC code and list 2754 in Box 28.

**North American Industrial Classification (NAICS):** Enter the NAICS code number that best describes the type of activity occurring at this facility. This is a six-digit number used to identify the type of industry and describe the activity occurring at the facility. This six-digit hierarchical structure allows greater coding flexibility than the four-digit structure of the SIC. The NAICS code may be found on the [NAICS.com search](#).

**27. Activity Description:** Enter a written description of the activity occurring at this facility.

**28. Secondary Activities:** Enter the SIC and NAICS codes and written descriptions of any secondary activities that may be occurring at the facility (see discussion of secondary activities in #26 above).

**29. Plant Location:** Enter the plant’s latitude/longitude in degrees to six decimal places. This information may be obtained from your property deed or county plat maps available at your local library or county recorder. If not available, please refer to the latitude and longitude reference websites on page 2 of this instruction booklet. For help converting degrees, minutes and seconds to a decimal, visit this [website for converting to degrees, minutes, and seconds](#). **Note: if you are using SLEIS and the latitude/longitude has already been pre-filled by DNR, please do not change the coordinates.**

## Form Instructions: Form INV-2

Submit a completed Form INV-2 (Release Point Description) for each release point at your facility.

If the release point in question has a construction permit, most of the information asked for below can be found in the permit.

- 1. Company/Facility Name:** Enter the company name as it appears on Form INV-1.
- 2. Form INV-2 - page \_\_\_ of \_\_\_:** Some companies may need to use multiple Forms INV-2. This box identifies each page of the total number of Forms INV-2 included.
- 3. Release Point Identifier:** Enter the identification number your company assigns to this particular stack/vent. Please use the same numbering scheme as any previous MSEI and/or construction permits, and use it consistently throughout the emissions inventory. The **release point** identifier identifies the point where emissions vent to the atmosphere. Release points can include stacks, horizontal vents, building ventilation vents, and fugitive sources such as material storage piles, rock crushers, and volatile liquid storage tanks. Each fugitive emission source should be assigned a separate release point identifier.
- 4. Bypass Stack?** If this stack is a bypass stack, check yes. If Yes, for which stacks? List the release point identifier.
- 5. Release point Type:** Check the box that best describes the release point.
- 6. Release point Description:** Provide a brief description of the release point, i.e. boiler #1 & 2 stack, paint booth #7 wall vent, etc.
- 7. Operating Status:** Enter the operating status of the release point during the emissions year. If the release point was operating at any time during the emissions year, please check "Operating."
- 8. Operating Status Date:** If the status was entered as temporarily shut down or permanently shut down, please enter the date the shutdown occurred. The status date should be blank if the operating status was entered as operating.
- 9. Stack Height Above Ground:** Enter the height from the ground to the top of the stack.
- 10. Stack Shape and Dimensions:** Enter the shape of the exit point and the dimensions of the opening in feet.
- 11. Temperature:** Enter the temperature of the exhaust stream.
- 12. Flow Rate:** Enter the flow rate of the exhaust stream. The flow rate can be obtained from the rating on the exhaust fan. Be sure to enter the values in the same units of measure as already listed on Form INV-2. Refer to Appendix D for guidance on how to convert SCFM to ACFM.
- 13. Bypass Stacks:** If there are any bypass stacks or parallel stacks through which air contaminants from this release point may be emitted, enter the bypass stack release point identifier and description.
- 14. List of Emission Units Venting Through This Release point:** List the emission unit identifiers for all emission units venting through this release point.

## 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 - 08/25/21." 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 7 & 8 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 64 - 67 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 22.

## Form Instructions: FORM INV-5

Duplicate if needed and attach Form INV -5 Calculations to the form that it is documenting.

This form is a calculation worksheet to document how you calculated values on other individual FORMS throughout this MSEI. Include a description of any assumptions used in making the calculations.

KEEP A COPY OF YOUR COMPLETED MSEI INCLUDING CALCULATION SHEETS!

NOTE: If you are using SLEIS, there is not a separate tab for Form INV-5. SLEIS users should use the comment field on the emission tab within the emissions report or attach a document that includes their calculations using the “report attachments” button at the 2021 Emissions Report screen.

**1) Company/Facility Name:** Enter the company/facility name as it appears on Form INV-1.

**2) Form INV-5 - page \_\_\_ of \_\_\_:** Since some companies may need to use multiple Forms INV-5, this box identifies each page of the total number of Forms INV-5 that has been included.

**3) Release Point Identifier:** Enter the identifier of the release point (stack or vent) associated with the calculations you are documenting on this form.

**4) Emission Unit Identifier:** Enter the number of the emission unit associated with the calculations you are documenting on this form.

**5) SCC Number:** Enter the SCC number of the process associated with the calculation you are documenting on this form.

**6) Emission Calculations:** This space is provided for you to show your calculations. This documentation will allow DNR staff to follow how certain values were calculated. Please provide legible calculations. Attachments to Form INV-5 are acceptable.

## Form Instructions: FORM INV-6

Duplicate this form as needed to include all pollutants that are being emitted from your facility.

This form shows the total actual emissions from the entire facility. NOTE: If you are using SLEIS, there is not a separate tab for Form INV-6. In SLEIS, total facility-wide actual emissions for each pollutant may be viewed by:

- a) Clicking the open button for the facility on the "My Facilities" screen
- b) Clicking the open button for the emissions year on the "My Reports" screen
- c) Clicking the HTML, PDF, or CSV hyperlink for the "Total Emissions by Source" under the "Summary Reports" on the right side of the screen

**1) Facility Name:** Enter the company/facility name as it appears on Form INV-1.

**2) Form INV-6 - page \_\_\_ of \_\_\_:** Since some companies may need to use multiple Forms INV-6, this box identifies each page of the total number of Forms INV-6 that have been included.

**3) Emission Year:** Enter the calendar year for which you are submitting an emissions inventory. Usually, this will be the previous year.

**4) Facility-Wide Criteria Air Pollutant and Ammonia Emissions:** Enter the facility-wide actual emissions in tons for each pollutant being emitted at the facility. You may reference Forms INV-4 (box #32) to sum up the facility-wide actual emissions

**5) Facility-Wide Hazardous Air Pollutant and Other Regulated Air Pollutant Emissions:** Enter the appropriate air pollutant and its associated ID or CAS-number along with the facility-wide actual emissions in tons for each pollutant being emitted at the facility. You may reference Forms INV-4 (box #32) to sum up the facility-wide actual emissions. Each individual hazardous or other regulated air pollutant must be totaled individually.

## **Example Calculations and Forms**

### **Introduction**

This section provides example calculations and forms to show how emission estimation methods are used to develop an emissions inventory for actual emissions. There are six basic approaches or methods used to develop emission estimates and inventories. These methods are:

- Continuous emissions monitoring
- Stack test data
- Material balance
- EPA approved emission factors
- Vendor supplied factors
- Engineering estimates based on best available process operating data

Most sources will use material balance or EPA-approved emission factors for estimating emissions. These two methods will be the focus of this section. Each example calculation shows how the method may be used for a specific emissions source category. It is intended that the reader use the information to apply the methods to other applicable source categories.

### **Actual Emissions**

Actual emissions are the actual rate of air pollution from an emission unit calculated using the emission unit's actual operating hours, production rates, and types of materials processed, stored, or combusted for the calendar year.

General equation for calculating actual emissions with control equipment:

$(\text{Annual Throughput}) \times (\text{Emission Factor}) \times (\text{Control Efficiency}) \times (\text{conversion factor to tons}) = \text{tons per year}$

**Annual Throughput:** Amount of material actually used for the calendar year such as gallons per year, tons per year, million cubic feet per year, etc.

**Emission factors** are values based on the amount of pollution produced and the raw material processed such as lb/ton, lb/gal, or lb/MMcf.

**Control Efficiency** is the control equipment pollutant removal efficiency.

To convert to tons, see the conversion factors listed on page 69 in Appendix D.

## **Example MSEIs**

The following examples show how calculations are performed and where data is reported on the inventory forms. Note: If the inventory is submitted electronically, SLEIS fields are in different locations and look different than the paper forms, but all required information is the same for both submission methods.

ACME Corporation manufactures grain wagons and has three reportable emission units including a welding station, paint booth, and No. 2 fuel oil-fired boiler. Each emission unit has one release point associated with it. The release points, emission units, and any control equipment were identified and assigned a number.

ACME Hospital has four reportable emission units including a natural gas-fired boiler, two diesel-fired generators, and a dual-fuel fired generator.

For each release point, information was gathered on the stack opening, height, flow rate (fan rating), and temperature. Information gathered for each emission unit included a description of the process and raw materials used. If there is an air quality construction permit for the emission source, most of this information can be found in the permit.

The next step was finding emission factors in EPA documents for each pollutant produced by the boiler and welding station. A mass balance calculation was performed using Safety Data Sheets (SDS) information to estimate emission factors for the paint booth.

The following calculations were performed and inventory forms for ACME Corporation and ACME Hospital were completed:



## IOWA DNR Minor Source Emission Inventory

### FORM INV-1: FACILITY IDENTIFICATION

1. Emissions Inventory Type		<input checked="" type="checkbox"/> Initial Information		<input type="checkbox"/> Supplemental Information	
2. Facility Identifier		99-99-999			
3. Company/Facility Name		ACME CORPORATION			
4. Number of State-Wide Company Employees		<input checked="" type="checkbox"/> Less Than or Equal to 100		<input type="checkbox"/> Greater Than 100	
5. Emission Year		2021			
6. Facility Street Address		111 N 2 <sup>ND</sup> ST			
7. Facility City		ANYTOWN			IA
8. Zip Code		55555			
9. Emissions Contact Person		JOHN BEEMER			
10. Emissions Contact Phone Number / E-Mail Address		515-555-5555		JBEEMER@EMAILACMECORP	
11. Mailing Street/PO Box		PO BOX 123			
12. Mailing City		ANYTOWN			
13. State		IA			
14. Zip Code		55555			
15. Parent Company / Owner Name					
16. Parent Company / Owner Mailing Address					
17. City					
18. State					
19. Zip Code					
20. Parent Company Contact/Agent					
21. Parent Company Contact Phone Number					
<b>CERTIFICATION STATEMENT</b>					
"I certify under penalty of law that, based on the information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I understand that making false statements, representations, or certifications of this submission may result in civil or criminal penalties."					
22. Name of Responsible Official			23. Title of Responsible Official		
24. Signature of Responsible Official			25. Date of Signature		
26. Primary Standard Industrial Classification (SIC)		3523	Primary North American Industrial Classification System (NAICS)		333111
27. Activity Description		Manufacture farm equipment and grain wagons			
<b>28. SECONDARY ACTIVITIES</b>					
SIC		NAICS			
Activity Description		Activity Description			
SIC		NAICS			
Activity Description		Activity Description			
<b>29. PLANT LOCATION</b>					
Latitude (Decimal Degrees)		41.605621			
Longitude (Decimal Degrees)		-93.588353			



FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME CORPORATION			2. Form INV-2 Page		1	of	3
3. Release Point Identifier		EP1							
4. Is this release point used as an emergency bypass stack?					No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	
If YES, for which release point(s)? List release point identifiers:									
5. Release Point Type									
Downward-facing Vent	<input type="checkbox"/>		Indoor Vented	<input type="checkbox"/>					
Fugitive (specify)	<input type="checkbox"/>		Vertical	<input type="checkbox"/>					
Goose Neck	<input type="checkbox"/>		Vertical with Rain Cap	<input type="checkbox"/>					
Horizontal	<input checked="" type="checkbox"/>								
6. Release Point Description		WELDING VENT							
7. Operating Status	Operating	<input checked="" type="checkbox"/>	Permanently Shutdown	<input type="checkbox"/>	Temporarily Shutdown	<input type="checkbox"/>			
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)									
9. Stack Height Above Ground		12	feet						
10. Stack Shape and Dimensions: (interior dimensions at exit point)									
Circular Diameter:		<input type="checkbox"/>	feet						
Rectangular Dimensions:		<input checked="" type="checkbox"/>	0.67	feet	x	0.83	feet		
Composition Of Exhaust Stream									
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream			Units of Measure				
11. Temperature		68			Degree Fahrenheit				
12. Flow Rate		900			<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM				
13. Bypass Stacks									
Bypass Stack – Release Point Identifier									
Bypass Stack Description									
Bypass Stack – Release Point Identifier									
Bypass Stack Description									
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier									
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier						
EU1									

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME CORPORATION			2. Form INV-4 Page		1	of	3
3. Release Point Identifier		EP1							
4. Release Point Description		WELDING VENT							
5. Emission Year		2021							
6. Emission Unit Identifier		EU1							
7. SCC Number		30905212							
8. Description of Process		GMAW							
<b>Annual Throughput</b>									
9. Annual Throughput		40							
10. <u>Throughput Unit of Measure</u>		1,000 POUNDS							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		ELECTRODE E308							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		8							
14. Average Days/Week		6							
15. Average Weeks/Year		52							
16. Actual Hours For Year		2,496							
<b>Seasonal Operations</b>									
17. January, February & December (%)		25							
18. March, April & May (%)		25							
19. June, July & August (%)		25							
20. September, October & November (%)		25							
<b>Associated Control Devices</b>									
21. Control Device Identifier									
22. Control Device Description									
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	5.4	LBS/1000LBS	AP-42				0.11		
PM-10	5.4	LBS/1000LBS	AP-42				0.11		
SO <sub>2</sub>									
NOX									
VOC									
CO									
Lead									
Ammonia									

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	ACME CORPORATION	<b>2. Form INV-5 Page</b>	1	<b>of</b>	5												
<b>3. Release Point Identifier</b>	EP1																
<b>4. Emission Unit Identifier</b>	EU1																
<b>5. SCC Number:</b>	30905212																
<b>Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.</b>																	
<b>6. Emissions Calculations</b>																	
PROCESS: GAS METAL ARC WELDING, E308 ELECTRODE SCC NUMBER: 30905212																	
ACTUAL THROUGHPUT YEARLY TOTAL: 40,000 POUNDS OF ELECTRODE																	
<table style="width: 100%; border: none;"> <thead> <tr> <th style="text-align: left;">POLLUTANT</th> <th style="text-align: left;">EMISSION FACTORS FROM AP-42, CHAPTER 12.19</th> </tr> </thead> <tbody> <tr> <td>PM-2.5</td> <td>5.4 LBS/1,000LBS OF ELECTRODE CONSUMED</td> </tr> <tr> <td>PM-10</td> <td>5.4 LBS/1,000LBS OF ELECTRODE CONSUMED</td> </tr> <tr> <td>CHROMIUM</td> <td>0.524 LBS/1,000LBS OF ELECTRODE CONSUMED</td> </tr> <tr> <td>MANGANESE</td> <td>0.346 LBS/1,000LBS OF ELECTRODE CONSUMED</td> </tr> <tr> <td>NICKEL</td> <td>0.184 LBS/1,000LBS OF ELECTRODE CONSUMED</td> </tr> </tbody> </table>						POLLUTANT	EMISSION FACTORS FROM AP-42, CHAPTER 12.19	PM-2.5	5.4 LBS/1,000LBS OF ELECTRODE CONSUMED	PM-10	5.4 LBS/1,000LBS OF ELECTRODE CONSUMED	CHROMIUM	0.524 LBS/1,000LBS OF ELECTRODE CONSUMED	MANGANESE	0.346 LBS/1,000LBS OF ELECTRODE CONSUMED	NICKEL	0.184 LBS/1,000LBS OF ELECTRODE CONSUMED
POLLUTANT	EMISSION FACTORS FROM AP-42, CHAPTER 12.19																
PM-2.5	5.4 LBS/1,000LBS OF ELECTRODE CONSUMED																
PM-10	5.4 LBS/1,000LBS OF ELECTRODE CONSUMED																
CHROMIUM	0.524 LBS/1,000LBS OF ELECTRODE CONSUMED																
MANGANESE	0.346 LBS/1,000LBS OF ELECTRODE CONSUMED																
NICKEL	0.184 LBS/1,000LBS OF ELECTRODE CONSUMED																
CALCULATIONS																	
ACTUAL EMISSIONS FOR PM-2.5 AND PM-10																	
$(40 \text{ 1,000LBS}) * (5.4 \text{ LBS/1,000LBS}) * (1\text{TON}/2,000\text{LBS}) = 0.11 \text{ TONS}$																	
THE SAME FORMULA IS USED TO CALCULATE THE OTHER POLLUTANTS WITH THEIR CORRESPONDING EMISSION FACTORS.																	
ACTUAL CHROMIUM TONS = 0.01																	
ACTUAL MANGANESE TONS = 0.01 TONS																	
ACTUAL NICKEL TONS = 0.00 TONS																	

FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME CORPORATION		2. Form INV-2 Page		2	of	3
3. Release Point Identifier		EP2						
4. Is this release point used as an emergency bypass stack?				No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	
If YES, for which release point(s)? List release point identifiers:								
5. Release Point Type								
Downward-facing Vent	<input type="checkbox"/>			Indoor Vented	<input type="checkbox"/>			
Fugitive (specify)	<input type="checkbox"/>			Vertical	<input type="checkbox"/>			
Goose Neck	<input type="checkbox"/>			Vertical with Rain Cap	<input checked="" type="checkbox"/>			
Horizontal	<input type="checkbox"/>							
6. Release Point Description		SPRAY PAINT BOOTH STACK						
7. Operating Status		Operating	<input checked="" type="checkbox"/>	Permanently Shutdown	<input type="checkbox"/>	Temporarily Shutdown	<input type="checkbox"/>	
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)								
9. Stack Height Above Ground		18	feet					
10. Stack Shape and Dimensions: (interior dimensions at exit point)								
Circular Diameter:		<input checked="" type="checkbox"/>	2.5	feet				
Rectangular Dimensions:		<input type="checkbox"/>		feet	x		feet	
Composition Of Exhaust Stream								
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream			Units of Measure			
11. Temperature		68			Degree Fahrenheit			
12. Flow Rate		18,000			<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM			
13. Bypass Stacks								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier								
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier					
EU2								

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME CORPORATION			2. Form INV-4 Page		2	of	3
3. Release Point Identifier		EP2							
4. Release Point Description		PAINT BOOTH							
5. Emission Year		2021							
6. Emission Unit Identifier		EU2							
7. SCC Number		40202501							
8. Description of Process		SPRAY PAINTING							
<b>Annual Throughput</b>									
9. Annual Throughput		1,300							
10. <u>Throughput Unit of Measure</u>		GALLONS							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		PAINT							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		8							
14. Average Days/Week		5							
15. Average Weeks/Year		52							
16. Actual Hours For Year		2,080							
<b>Seasonal Operations</b>									
17. January, February & December (%)		25							
18. March, April & May (%)		25							
19. June, July & August (%)		25							
20. September, October & November (%)		25							
<b>Associated Control Devices</b>									
21. Control Device Identifier		CE2							
22. Control Device Description		PANEL FILTER							
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	6.15	LBS/GAL	MASS BALANCE		95	65	0.07		
PM-10	6.15	LBS/GAL	MASS BALANCE		95	65	0.07		
SO <sub>2</sub>									
NOX									
VOC	2.51	LBS/GAL	MASS BALANCE				1.63		
CO									
Lead									
Ammonia									

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	<b>ACME CORPORATION</b>	<b>2. Form INV-5 Page</b>	<b>2</b>	<b>of</b>	<b>5</b>
<b>3. Release Point Identifier</b>	EP2				
<b>4. Emission Unit Identifier</b>	EU2				
<b>5. SCC Number:</b>	40202501				

**Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.**

**6. Emissions Calculations**

ACME CORPORATION APPLIES A BASE COAT AND A TOP COAT TO EACH WAGON IN THE SAME SPRAY BOOTH. THE PAINT COMES IN FIVE GALLONS PAILS AND IS SPRAYED DIRECTLY FROM THE CONTAINER WITH NO THINNING OR MIXING AT THE FACILITY. ACME CORPORATION SPRAYED A TOTAL OF 1,300 GALLONS (500 GALLONS OF BASECOAT AND 800 GALLONS OF TOP COAT). THE FILTER USED IN THE BOOTH HAS A 95 PERCENT PARTICULATE REMOVAL EFFICIENCY.

MATERIAL BALANCE (ALSO KNOWN AS MASS BALANCE) UTILIZES THE RAW MATERIAL USAGE RATE TO ESTIMATE THE AMOUNT OF POLLUTANT EMITTED. IN THIS METHOD, EMISSIONS ARE ESTIMATED AS THE DIFFERENCE BETWEEN MATERIAL INPUT AND MATERIAL OUTPUT ACROSS A PROCESS. THIS METHOD IS TYPICALLY USED IN SURFACE COATING PROCESSES. INFORMATION REGARDING THE AMOUNT OF POLLUTANTS IN A MATERIAL CAN BE FOUND ON THE SAFETY DATA SHEET (SDS).

MOST MATERIAL BALANCES ASSUME THAT ALL SOLVENT USED IN A PROCESS WILL EVAPORATE TO BECOME AIR EMISSIONS SOMEWHERE AT THE FACILITY. IN THESE CASES, EMISSIONS EQUAL THE AMOUNT OF SOLVENT CONTAINED IN THE SURFACE COATING.

FROM INFORMATION FOUND ON PAINT SDS THE TOP AND BASE COATS HAVE THE FOLLOWING CHARACTERISTICS AND HAP COMPONENTS:

TOP COAT (8.75 LBS/GAL)  
 VOC = 25%  
 SOLIDS = 75%  
 XYLENE = 8%

BASE COAT (7.21 LBS/GAL)  
 VOC = 42%  
 SOLIDS = 58%  
 XYLENE = 2%  
 TOLUENE = 15%

NOTE: ALL PERCENTAGES ARE WEIGHT PERCENTAGES AND EXPRESSED AS PERCENT OF TOTAL PAINT WEIGHT.

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	<b>ACME CORPORATION</b>	<b>2. Form INV-5 Page</b>	<b>3</b>	<b>of</b>	<b>5</b>
<b>3. Release Point Identifier</b>	EP2				
<b>4. Emission Unit Identifier</b>	EU2				
<b>5. SCC Number:</b>	40202501				

**Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.**

**6. Emissions Calculations**

ACTUAL EMISSIONS:

STEP 1 - CALCULATING ACTUAL VOC AND HAP EMISSIONS

TO CALCULATE ACTUAL VOC AND HAP EMISSIONS YOU MUST CALCULATE THE EMISSIONS FROM EACH COATING THEN ADD THEM TOGETHER.

$$(PAINT USED GAL/YR) * (PAINT WEIGHT LB/GAL * POLLUTANT%) * (1 TON/2,000 LBS)$$

$$VOC - TOP COAT: (800 GAL) * (8.75 LBS/GAL * 0.25) = 1,750 LB * (1 TON/2,000 LBS) = 0.875 TONS$$

$$VOC - BASE COAT: (500 GAL) * (7.21 LBS/GAL * 0.42) = 1,514 LBS * (1 TON/2,000 LBS) = 0.75 TONS$$

$$= 1.63 TONS OF VOC$$

$$XYLENE - TOP COAT: (800 GAL) * (8.75 LBS/GAL * 0.08) = 560 LB * (1 TON/2,000 LBS) = 0.28 TONS$$

$$XYLENE - BASE COAT: (500 GAL) * (7.21 LBS/GAL * 0.02) = 72.1 LB * (1 TON/2,000 LBS) = 0.04 TONS$$

$$= 0.32 TONS OF XYLENE$$

$$TOLUENE - TOP COAT: (800 GAL) * (8.75 LBS/GAL * 0.00) = 0.00 LB * (1 TON/2,000 LBS) = 0.00 TONS$$

$$TOLUENE - BASE COAT: (500 GAL) * (7.21 LBS/GAL * 0.15) = 540.75 LB * (1 TON/2,000 LBS) = 0.27 TONS$$

$$= 0.27 TONS$$

STEP 2 - CALCULATING ACTUAL PM-2.5 AND PM-10 EMISSIONS

TO CALCULATE ACTUAL PM-2.5 AND PM-10 EMISSIONS, THE SAME FORMULA IS USED BUT TRANSFER EFFICIENCY AND CONTROL EFFICIENCY MUST BE TAKEN INTO ACCOUNT.

$$TOP COAT: (800 GAL) * (8.75 LBS/GAL * 0.75) * (1-0.65) * (1-0.95) = 91.88 LBS * (1 TON/2,000 LBS) = 0.05 TONS$$

$$BASE COAT: (500 GAL) * (7.21 LBS/GAL * 0.58) * (1-0.65) * (1-0.95) = 36.59 LBS * (1 TON/2,000 LBS) = 0.02 TONS$$

$$= 0.07 TONS$$

NOTE: THIS EXAMPLE IS FOR A PAINTING OPERATION WHERE THE PAINT IS NOT THINNED ON-SITE. IF THINNING OCCURS ON-SITE THIS MUST BE TAKEN INTO ACCOUNT TO DETERMINE THE MAXIMUM CONSTITUENTS OF EACH COATING. FOR ADDITIONAL GUIDANCE ON THIS, CONTACT THE DEPARTMENT OF NATURAL RESOURCES.

STEP 3 - CALCULATE THE EMISSION FACTOR

TO DETERMINE THE EMISSION FACTOR TO REPORT IN BOX 26, DIVID THE TOTAL TONS OF EMISSIONS BY THE GALLONS USED AND CONVERT TONS TO POUNDS.

$$[(TONS) / (GALLONS)] * (2,000 LBS/TON) = LBS/GAL$$

$$VOCS = (1.63 TONS/1,300 GALLONS * 2,000 LBS/TON) = 2.51 LBS/GAL$$

$$XYLENE = (0.32 TONS/1,300 GALLONS * 2,000 LBS/TON) = 0.49 LBS/GAL$$

$$TOLUENE = (0.27 TONS/1,300 GALLONS * 2,000 LBS/TON) = 0.42 LBS/GAL$$

**FORM INV-5 CALCULATIONS**

1. Company/Facility Name	ACME CORPORATION	2. Form INV-5 Page	4	of	5
3. Release Point Identifier	EP2				
4. Emission Unit Identifier	EU2				
5. SCC Number:	40202501				
Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.					
<b>6. Emissions Calculations</b>					
<p>ACTUAL EMISSIONS:                  STEP 3 - CALCULATE THE EMISSION FACTOR (CONTINUED)</p> <p>PM-2.5 = (0.07 TONS/1,300 GALLONS * 2,000 LBS/TON) * (1/1-0.95) * (1/1-0.65) = 6.15 LBS/GAL                  PM-10 = (0.07 TONS/1,300 GALLONS * 2,000 LBS/TON) * (1/1-0.95) * (1/1-0.65) = 6.15 LBS/GAL</p>					



FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME CORPORATION		2. Form INV-2 Page		3	of	3	
3. Release Point Identifier		EP3							
4. Is this release point used as an emergency bypass stack?				No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>		
If YES, for which release point(s)? List release point identifiers:									
5. Release Point Type									
Downward-facing Vent	<input type="checkbox"/>					Indoor Vented	<input type="checkbox"/>		
Fugitive (specify)	<input type="checkbox"/>					Vertical	<input type="checkbox"/>		
Goose Neck	<input type="checkbox"/>					Vertical with Rain Cap	<input checked="" type="checkbox"/>		
Horizontal	<input type="checkbox"/>								
6. Release Point Description		BOILER STACK							
7. Operating Status		Operating	<input checked="" type="checkbox"/>	Permanently Shutdown	<input type="checkbox"/>	Temporarily Shutdown	<input type="checkbox"/>		
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)									
9. Stack Height Above Ground		35	feet						
10. Stack Shape and Dimensions: (interior dimensions at exit point)									
Circular Diameter:		<input checked="" type="checkbox"/>	2	feet					
Rectangular Dimensions:		<input type="checkbox"/>		feet	x		feet		
Composition Of Exhaust Stream									
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream				Units of Measure			
11. Temperature		350				Degree Fahrenheit			
12. Flow Rate		6,100				<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM			
13. Bypass Stacks									
Bypass Stack – Release Point Identifier									
Bypass Stack Description									
Bypass Stack – Release Point Identifier									
Bypass Stack Description									
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier									
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier						
EU3									

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME CORPORATION			2. Form INV-4 Page		3	of	3
3. Release Point Identifier		EP3							
4. Release Point Description		BOILER STACK							
5. Emission Year		2021							
6. Emission Unit Identifier		EU3							
7. SCC Number		10200502							
8. Description of Process		#2 FUEL OIL COMB							
<b>Annual Throughput</b>									
9. Annual Throughput		5							
10. <u>Throughput Unit of Measure</u>		1000 GALLONS							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		#2 FUEL OIL							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		24							
14. Average Days/Week		7							
15. Average Weeks/Year		38							
16. Actual Hours For Year		6,384							
<b>Seasonal Operations</b>									
17. January, February & December (%)		35							
18. March, April & May (%)		21.7							
19. June, July & August (%)		15							
20. September, October & November (%)		28.3							
<b>Associated Control Devices</b>									
21. Control Device Identifier									
22. Control Device Description									
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	1.55	LBS/1000GAL	WEBFIRE				0.00		
PM-10	2.3	LBS/1000GAL	WEBFIRE				0.01		
SO <sub>2</sub>	142	LBS/1000GAL	WEBFIRE	0.4			0.14		
NOX	20	LBS/1000GAL	WEBFIRE				0.05		
VOC	0.2	LBS/1000GAL	WEBFIRE				0.00		
CO	5	LBS/1000GAL	WEBFIRE				0.01		
Lead									
Ammonia	0.8	LBS/1000GAL	WEBFIRE				0.00		

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	<b>ACME CORPORATION</b>	<b>2. Form INV-5 Page</b>	<b>5</b>	<b>of</b>	<b>5</b>
<b>3. Release Point Identifier</b>	EP3				
<b>4. Emission Unit Identifier</b>	EU3				
<b>5. SCC Number:</b>	10200502				

Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.

**6. Emissions Calculations**

PROCESS: FUEL OIL COMBUSTION  
 SCC NUMBER: 10200502

ACTUAL THROUGHPUT YEARLY TOTAL: 5 1,000 GALLONS OF #2 FUEL OIL

POLLUTANT	EMISSION FACTORS FROM AP-42, CHAPTER 12.19
PM-2.5	1.55 LBS/1,000 GALLONS OF #2 FUEL OIL
PM-10	2.3 LBS/1,000 GALLONS OF #2 FUEL OIL
SO2	142(S) LBS/1,000 GALLONS OF #2 FUEL OIL
NOX	20 LBS/1,000 GALLONS OF #2 FUEL OIL
VOC	0.2 LBS/1,000 GALLONS OF #2 FUEL OIL
CO	5 LBS/1,000 GALLONS OF #2 FUEL OIL
AMMONIA	0.8 LBS/1,000 GALLONS OF #2 FUEL OIL

SULFUR PERCENTAGE OF FUEL = 0.4%

**CALCULATIONS**

ACTUAL EMISSIONS FOR PM-2.5

$$(5\ 1,000\ GALLONS) * (1.55\ LBS/1,000\ GALLONS) * (1TON/2,000LBS) = 0.00\ TONS$$

THE SAME FORMULA IS USED TO CALCULATE THE OTHER POLLUTANTS WITH THEIR CORRESPONDING EMISSION FACTORS.

- ACTUAL PM-10 TONS = 0.01 TONS
- ACTUAL SO2 TONS = 0.14 TONS
- ACTUAL NOX TONS = 0.05 TONS
- ACTUAL VOC TONS = 0.00 TONS
- ACTUAL CO TONS = 0.01 TONS
- ACTUAL NH3 TONS = 0.00 TONS

**FORM INV-6 FACILITY-WIDE ACTUAL EMISSIONS**

<b>1. Facility Name</b>	ACME CORPORATION	<b>2. Form INV-6 Page</b>	1	<b>of</b>	1
<b>3. Emission Year</b>	2021				
The facility-wide actual emission totals for each air pollutant may be calculated by summing the "actual estimated emissions" (column 32) on the INV-4 forms					
<b>4. Facility-Wide Criteria Air Pollutant and Ammonia Emissions</b>					
<b>Air Pollutant</b>	<b>ID or CAS Number</b>	<b>Actual Estimated Emissions (Tons)</b>			
PM-2.5	PM-2.5	0.18			
PM-10	PM-10	0.19			
Sulfur Dioxide	7446-09-5	0.14			
Nitrogen Oxides	NO <sub>x</sub>	0.05			
Volatile Organic Compounds	VOC	1.63			
Carbon Monoxide	630-08-0	0.01			
Lead	7439-92-1	---			
Ozone	OZ	---			
Ammonia	7664-41-7	0.00			
<b>5. Facility-Wide Hazardous Air Pollutant and Other Regulated Air Pollutant Emissions</b>					
Please duplicate this form as necessary to include all individual hazardous air pollutants and other regulated air pollutants being emitted at the facility					
<b>Air Pollutant</b>	<b>ID or CAS Number</b>	<b>Actual Estimated Emissions (Tons)</b>			
Chromium Compounds	7440-47-3	0.01			
Manganese Compounds	7439-96-5	0.01			
Nickel Compounds	7440-02-0	0.00			
Xylene	1330-20-7	0.32			
Toluene	108-88-3	0.27			
<b>Total Hazardous Air Pollutants</b>	<b>THAP</b>	<b>0.61</b>			



## IOWA DNR Minor Source Emission Inventory

### FORM INV-1: FACILITY IDENTIFICATION

1. Emissions Inventory Type		<input checked="" type="checkbox"/> Initial Information		<input type="checkbox"/> Supplemental Information	
2. Facility Identifier		99-99-999			
3. Company/Facility Name		ACME HOSPITAL			
4. Number of State-Wide Company Employees		<input checked="" type="checkbox"/> Less Than or Equal to 100		<input type="checkbox"/> Greater Than 100	
5. Emission Year		2021			
6. Facility Street Address		222 N 2 <sup>ND</sup> ST			
7. Facility City		ANYTOWN			IA
8. Zip Code		55555			
9. Emissions Contact Person		DAVID SMITH			
10. Emissions Contact Phone Number / E-Mail Address		515-555-5555		DSMITH@EMAILACMECORP	
11. Mailing Street/PO Box		PO BOX 123			
12. Mailing City		ANYTOWN			
13. State		IA			
14. Zip Code		55555			
15. Parent Company / Owner Name					
16. Parent Company / Owner Mailing Address					
17. City					
18. State					
19. Zip Code					
20. Parent Company Contact/Agent					
21. Parent Company Contact Phone Number					
<b>CERTIFICATION STATEMENT</b>					
"I certify under penalty of law that, based on the information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I understand that making false statements, representations, or certifications of this submission may result in civil or criminal penalties."					
22. Name of Responsible Official			23. Title of Responsible Official		
24. Signature of Responsible Official			25. Date of Signature		
26. Primary Standard Industrial Classification (SIC)		8062	Primary North American Industrial Classification System (NAICS)		622110
27. Activity Description		General medical and surgical hospitals			
<b>28. SECONDARY ACTIVITIES</b>					
SIC		NAICS			
Activity Description		Activity Description			
SIC		NAICS			
Activity Description		Activity Description			
<b>29. PLANT LOCATION</b>					
Latitude (Decimal Degrees)		41.605621			
Longitude (Decimal Degrees)		-93.588353			

FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME HOSPITAL		2. Form INV-2 Page		1	of	4
3. Release Point Identifier		EP1						
4. Is this release point used as an emergency bypass stack?				No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	
If YES, for which release point(s)? List release point identifiers:								
5. Release Point Type								
Downward-facing Vent	<input type="checkbox"/>		Indoor Vented	<input type="checkbox"/>				
Fugitive (specify)	<input type="checkbox"/>		Vertical	<input checked="" type="checkbox"/>				
Goose Neck	<input type="checkbox"/>		Vertical with Rain Cap	<input type="checkbox"/>				
Horizontal	<input type="checkbox"/>							
6. Release Point Description		BOILER STACK						
7. Operating Status	Operating	<input checked="" type="checkbox"/>	Permanently Shutdown	<input type="checkbox"/>	Temporarily Shutdown	<input type="checkbox"/>		
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)								
9. Stack Height Above Ground		20	feet					
10. Stack Shape and Dimensions: (interior dimensions at exit point)								
Circular Diameter:	<input checked="" type="checkbox"/>	1.5	feet					
Rectangular Dimensions:	<input type="checkbox"/>		feet	x		feet		
Composition Of Exhaust Stream								
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream			Units of Measure			
11. Temperature		300			Degree Fahrenheit			
12. Flow Rate		3,600			<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM			
13. Bypass Stacks								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier								
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier					
EU1								

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		1	of	5
3. Release Point Identifier		EP1							
4. Release Point Description		BOILER STACK							
5. Emission Year		2021							
6. Emission Unit Identifier		EU1							
7. SCC Number		10200602							
8. Description of Process		NATURAL GAS COMB							
<b>Annual Throughput</b>									
9. Annual Throughput		24.5							
10. <u>Throughput Unit of Measure</u>		MMCF							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		NATURAL GAS							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		8							
14. Average Days/Week		5							
15. Average Weeks/Year		52							
16. Actual Hours For Year		2,080							
<b>Seasonal Operations</b>									
17. January, February & December (%)		25							
18. March, April & May (%)		25							
19. June, July & August (%)		25							
20. September, October & November (%)		25							
<b>Associated Control Devices</b>									
21. Control Device Identifier									
22. Control Device Description									
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	7.6	LBS/MMCF	WEBFIRE				0.09		
PM-10	7.6	LBS/MMCF	WEBFIRE				0.09		
SO <sub>2</sub>	0.6	LBS/MMCF	WEBFIRE				0.01		
NOX	100	LBS/MMCF	WEBFIRE				1.23		
VOC	5.5	LBS/MMCF	WEBFIRE				0.07		
CO	84	LBS/MMCF	WEBFIRE				1.03		
Lead									
Ammonia	3.2	LBS/MMCF	WEBFIRE				0.04		

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	ACME HOSPITAL	<b>2. Form INV-5 Page</b>	1	<b>of</b>	5
<b>3. Release Point Identifier</b>	EP1				
<b>4. Emission Unit Identifier</b>	EU1				
<b>5. SCC Number:</b>	10200602				

Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.

**6. Emissions Calculations**

PROCESS: INDUSTRIAL BOILER SCC NUMBER 10200602

FUEL: NAUTRAL GAS: 1,050 BTU/CUBIC FEET  
 ACTUAL THROUGHPUT - YEARLY TOTAL: 24.5 MMCF

POLLUTANT	EMISSION FACTORS FROM WEBFIRE (SCC NUMBER 10200602)
PM-2.5	7.6 LBS/MMCF
PM-10	7.6 LBS/MMCF
SO2	0.6 LBS/MMCF
NOX	100 LBS/MMCF
VOC	5.5 LBS/MMCF
CO	84 LBS/MMCF
AMMONIA	3.2 LBS/MMCF
HEXANE	1.8 LBS/MMCF

**CALCULATIONS**

ACTUAL ANNUAL EMISSIONS  
 ACTUAL PM-2.5 TONS

$$(24.5 \text{ MMCF}) * (7.6 \text{ LBS/MMCF}) * (1 \text{ TON}/2,000 \text{ LBS}) = 0.09 \text{ TONS}$$

- ACTUAL PM-10 TONS = 0.09 TONS
- ACTUAL SO2 TONS = 0.01 TONS
- ACTUAL NOX TONS = 1.23 TONS
- ACTUAL VOC TONS = 0.07 TONS
- ACTUAL CO TONS = 1.03 TONS
- ACTUAL AMMONIA TONS = 0.04 TONS
- ACTUAL HEXANE TONS = 0.02 TONS



FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME HOSPITAL		2. Form INV-2 Page		2	of	4
3. Release Point Identifier		EP2						
4. Is this release point used as an emergency bypass stack?				No <input checked="" type="checkbox"/>	Yes <input type="checkbox"/>			
If YES, for which release point(s)? List release point identifiers:								
5. Release Point Type								
Downward-facing Vent	<input type="checkbox"/>				Indoor Vented	<input type="checkbox"/>		
Fugitive (specify)	<input type="checkbox"/>				Vertical	<input checked="" type="checkbox"/>		
Goose Neck	<input type="checkbox"/>				Vertical with Rain Cap	<input type="checkbox"/>		
Horizontal	<input type="checkbox"/>							
6. Release Point Description		DIESEL GENERATOR STACK						
7. Operating Status		Operating <input type="checkbox"/>	<input checked="" type="checkbox"/>	Permanently Shutdown		<input type="checkbox"/>	Temporarily Shutdown <input type="checkbox"/>	
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)								
9. Stack Height Above Ground		67	feet					
10. Stack Shape and Dimensions: (interior dimensions at exit point)								
Circular Diameter:		<input checked="" type="checkbox"/>	0.42	feet				
Rectangular Dimensions:		<input type="checkbox"/>		feet	x		feet	
Composition Of Exhaust Stream								
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream			Units of Measure			
11. Temperature		400			Degree Fahrenheit			
12. Flow Rate		7,795			<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM			
13. Bypass Stacks								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier								
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier					
EU2								

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		2	of	5
3. Release Point Identifier		EP2							
4. Release Point Description		DIESEL GENERATOR							
5. Emission Year		2021							
6. Emission Unit Identifier		EU2							
7. SCC Number		20200102							
8. Description of Process		DIESEL COMBUSTIO							
<b>Annual Throughput</b>									
9. Annual Throughput		140							
10. <u>Throughput Unit of Measure</u>		MMBTU							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		DIESEL FUEL							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		1.06							
14. Average Days/Week		1							
15. Average Weeks/Year		8							
16. Actual Hours For Year		8.5							
<b>Seasonal Operations</b>									
17. January, February & December (%)		25.5							
18. March, April & May (%)		23.5							
19. June, July & August (%)		23.5							
20. September, October & November (%)		27.5							
<b>Associated Control Devices</b>									
21. Control Device Identifier									
22. Control Device Description									
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	0.31	LBS/MMBTU	WEBFIRE				0.02		
PM-10	0.31	LBS/MMBTU	AP-42				0.02		
SO <sub>2</sub>	0.29	LBS/MMBTU	AP-42				0.02		
NOX	4.41	LBS/MMBTU	AP-42				0.31		
VOC	0.35	LBS/MMBTU	AP-42				0.02		
CO	0.95	LBS/MMBTU	AP-42				0.07		
Lead									
Ammonia									

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	<b>ACME HOSPITAL</b>	<b>2. Form INV-5 Page</b>	<b>2</b>	<b>of</b>	<b>5</b>
<b>3. Release Point Identifier</b>	EP2				
<b>4. Emission Unit Identifier</b>	EU2				
<b>5. SCC Number:</b>	20200102				

Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.

**6. Emissions Calculations**

PROCESS: DIESEL GENERATOR < 600 BHP  
 SCC NUMBER: 20200102

FUEL: DIESEL: 0.14 MMBTU/GALLON

ACTUAL THROUGHPUT - YEARLY TOTAL: 1,000 GALLONS

POLLUTANT	EMISSION FACTORS FROM AP-42
PM-2.5	0.31 LBS/MMBTU (NOTE: PER WEBFIRE, PM-2.5 = PM-10 FOR SCC 20200102)
PM-10	0.31 LBS/MMBTU
SO2	0.29 LBS/MMBTU
NOX	4.41 LBS/MMBTU
VOC	0.35 LBS/MMBTU
CO	0.95 LBS/MMBTU

**CALCULATIONS**

ACTUAL ANNUAL EMISSIONS  
 ACTUAL PM-2.5 TONS

$$(1,000 \text{ GALLONS}) * (0.14 \text{ MMBTU/GALLON}) * (0.31 \text{ LBS/MMBTU}) * (1 \text{ TON}/2,000 \text{ LBS}) = 0.02 \text{ TONS}$$

ACTUAL PM-10 TONS = 0.02 TONS  
 ACTUAL SO2 TONS = 0.02 TONS  
 ACTUAL NOX TONS = 0.31 TONS  
 ACTUAL VOC TONS = 0.02 TONS  
 ACTUAL CO TONS = 0.07 TONS

FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME HOSPITAL		2. Form INV-2 Page		3	of	4
3. Release Point Identifier		EP3						
4. Is this release point used as an emergency bypass stack?				No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	
If YES, for which release point(s)? List release point identifiers:								
5. Release Point Type								
Downward-facing Vent	<input type="checkbox"/>		Indoor Vented	<input type="checkbox"/>				
Fugitive (specify)	<input type="checkbox"/>		Vertical	<input checked="" type="checkbox"/>				
Goose Neck	<input type="checkbox"/>		Vertical with Rain Cap	<input type="checkbox"/>				
Horizontal	<input type="checkbox"/>							
6. Release Point Description		DIESEL GENERATOR STACK						
7. Operating Status	Operating	<input checked="" type="checkbox"/>	Permanently Shutdown	<input type="checkbox"/>	Temporarily Shutdown	<input type="checkbox"/>		
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)								
9. Stack Height Above Ground		67	feet					
10. Stack Shape and Dimensions: (interior dimensions at exit point)								
Circular Diameter:	<input checked="" type="checkbox"/>	0.42	feet					
Rectangular Dimensions:	<input type="checkbox"/>		feet	x		feet		
Composition Of Exhaust Stream								
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream			Units of Measure			
11. Temperature		400			Degree Fahrenheit			
12. Flow Rate		7,795			<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM			
13. Bypass Stacks								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier								
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier					
EU3								

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		3	of	5
3. Release Point Identifier		EP3							
4. Release Point Description		DIESEL GENERATOR							
5. Emission Year		2021							
6. Emission Unit Identifier		EU3							
7. SCC Number		20200401							
8. Description of Process		DIESEL COMBUSTIO							
<b>Annual Throughput</b>									
9. Annual Throughput		266							
10. <u>Throughput Unit of Measure</u>		MMBTU							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		DIESEL FUEL							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		1.06							
14. Average Days/Week		1							
15. Average Weeks/Year		8							
16. Actual Hours For Year		8.5							
<b>Seasonal Operations</b>									
17. January, February & December (%)		25.5							
18. March, April & May (%)		23.5							
19. June, July & August (%)		23.5							
20. September, October & November (%)		27.5							
<b>Associated Control Devices</b>									
21. Control Device Identifier									
22. Control Device Description									
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	0.05	LBS/MMBTU	WEBFIRE				0.01		
PM-10	0.14	LBS/MMBTU	DNR MEMO				0.02		
SO <sub>2</sub>	1.01	LBS/MMBTU	AP-42	0.5			0.07		
NOX	3.2	LBS/MMBTU	AP-42				0.43		
VOC	0.0819	LBS/MMBTU	AP-42				0.01		
CO	0.85	LBS/MMBTU	AP-42				0.11		
Lead									
Ammonia									

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	ACME HOSPITAL	<b>2. Form INV-5 Page</b>	3	<b>of</b>	5
<b>3. Release Point Identifier</b>	EP3				
<b>4. Emission Unit Identifier</b>	EU3				
<b>5. SCC Number:</b>	20200401				
<b>Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.</b>					
<b>6. Emissions Calculations</b>					
PROCESS: DIESEL GENERATOR > 600 BHP SCC NUMBER: 20200401					
FUEL: DIESEL: 0.14 MMBTU/GALLON					
ACTUAL THROUGHPUT - YEARLY TOTAL: 1,900 GALLONS					
POLLUTANT	EMISSION FACTORS FROM WEBFIRE (SCC NUMBER 20200401)				
PM-2.5	7.55 LB/1,000 GALLONS OR 0.05 LB/MMBTU				
POLLUTANT	EMISSION FACTORS FROM DNR MEMO. THIS IS AN IOWA EMISSION FACTOR. IT IS BASED ON STACK TESTS PERFORMED IN THE STATE. AN EMISSION FACTOR RATING HAS NOT BEEN DETERMINED				
PM-10	0.14 LBS/MMBTU				
POLLUTANT	EMISSION FACTORS FROM AP-42 (SCC NUMBER 20200401)				
SO2	1.01(S) LBS/MMBTU				
NOX	3.2 LBS/MMBTU				
VOC	0.0819 LBS/MMBTU				
CO	0.85 LBS/MMBTU				
CALCULATIONS					
ACTUAL ANNUAL EMISSIONS					
ACTUAL PM-2.5 TONS					
$(1,900 \text{ GALLONS}) * (0.14 \text{ MMBTU/GALLON}) * (0.05 \text{ LBS/MMBTU}) * (1 \text{ TON}/2,000 \text{ LBS}) = 0.01 \text{ TONS}$					
ACTUAL PM-10 TONS = 0.02 TONS					
ACTUAL SO2 TONS = 0.07 TONS					
ACTUAL NOX TONS = 0.43 TONS					
ACTUAL VOC TONS = 0.01 TONS					
ACTUAL CO TONS = 0.11 TONS					

FORM INV-2 EMISSION POINT DESCRIPTION

1. Company/Facility Name		ACME HOSPITAL		2. Form INV-2 Page		4	of	4
3. Release Point Identifier		EP4						
4. Is this release point used as an emergency bypass stack?				No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	
If YES, for which release point(s)? List release point identifiers:								
5. Release Point Type								
Downward-facing Vent	<input type="checkbox"/>		Indoor Vented	<input type="checkbox"/>				
Fugitive (specify)	<input type="checkbox"/>		Vertical	<input checked="" type="checkbox"/>				
Goose Neck	<input type="checkbox"/>		Vertical with Rain Cap	<input type="checkbox"/>				
Horizontal	<input type="checkbox"/>							
6. Release Point Description		DUAL FUEL GENERATOR STACK						
7. Operating Status	Operating	<input checked="" type="checkbox"/>	Permanently Shutdown	<input type="checkbox"/>	Temporarily Shutdown	<input type="checkbox"/>		
8. Operating Status Date (Please enter the date the shutdown occurred. The status date should be blank if the status above was entered as operating.)								
9. Stack Height Above Ground		30	feet					
10. Stack Shape and Dimensions: (interior dimensions at exit point)								
Circular Diameter:	<input checked="" type="checkbox"/>	1.25	feet					
Rectangular Dimensions:	<input type="checkbox"/>		feet	x		feet		
Composition Of Exhaust Stream								
Exhaust Stream Characteristics		Release Point Composition of Exhaust Stream			Units of Measure			
11. Temperature		500			Degree Fahrenheit			
12. Flow Rate		4,000			<input type="checkbox"/> ACFM <input checked="" type="checkbox"/> SCFM			
13. Bypass Stacks								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
Bypass Stack – Release Point Identifier								
Bypass Stack Description								
14. List of Emission Unit Identifiers Venting Through This Release Point Identifier								
Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier	Emission Unit Identifier					
EU4								

**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		4	of	5
3. Release Point Identifier		EP4							
4. Release Point Description		DUAL FUEL GENERA							
5. Emission Year		2021							
6. Emission Unit Identifier		EU4							
7. SCC Number		20200401							
8. Description of Process		DIESEL COMBUSTIO							
<b>Annual Throughput</b>									
9. Annual Throughput		2,100							
10. <u>Throughput Unit of Measure</u>		MMBTU							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		DIESEL FUEL							
<b>Actual Operating Rate/Schedule</b>									
13. Average Hours/Day		2.5							
14. Average Days/Week		4							
15. Average Weeks/Year		20							
16. Actual Hours For Year		200							
<b>Seasonal Operations</b>									
17. January, February & December (%)		10							
18. March, April & May (%)		30							
19. June, July & August (%)		40							
20. September, October & November (%)		20							
<b>Associated Control Devices</b>									
21. Control Device Identifier									
22. Control Device Description									
23. Control Device Identifier									
24. Control Device Description									
<b>ACTUAL EMISSIONS</b>									
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)		
PM-2.5	0.05	LBS/MMBTU	WEBFIRE				0.05		
PM-10	0.14	LBS/MMBTU	DNR MEMO				0.15		
SO <sub>2</sub>	1.01	LBS/MMBTU	AP-42	0.5			0.53		
NOX	3.2	LBS/MMBTU	AP-42				3.36		
VOC	0.0819	LBS/MMBTU	AP-42				0.09		
CO	0.85	LBS/MMBTU	AP-42				0.89		
Lead									
Ammonia									



**FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS**

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page	5	of	5
3. Release Point Identifier		EP4						
4. Release Point Description		DUAL FUEL GENERA						
5. Emission Year		2021						
6. Emission Unit Identifier		EU4						
7. SCC Number		20200402						
8. Description of Process		DUAL FUEL COMBUS						
<b>Annual Throughput</b>								
9. Annual Throughput		2,100						
10. <u>Throughput Unit of Measure</u>		MMBTU						
11. Throughput Type (Input, Output, or Existing)		INPUT						
12. <u>Throughput Material</u>		DUAL FUEL						
<b>Actual Operating Rate/Schedule</b>								
13. Average Hours/Day		2.5						
14. Average Days/Week		4						
15. Average Weeks/Year		20						
16. Actual Hours For Year		200						
<b>Seasonal Operations</b>								
17. January, February & December (%)		10						
18. March, April & May (%)		30						
19. June, July & August (%)		40						
20. September, October & November (%)		20						
<b>Associated Control Devices</b>								
21. Control Device Identifier								
22. Control Device Description								
23. Control Device Identifier								
24. Control Device Description								
<b>ACTUAL EMISSIONS</b>								
25. Air Pollutant	26. Emission Factor	27. Emission Factor Units of Measure	28. Source of Emission Factor	29. Ash or Sulfur %	30. Combined Control Efficiency	31. Transfer Efficiency	32. Actual Estimated Emissions (Tons)	
PM-2.5	0.0556	LBS/MMBTU	WEBFIRE				0.06	
PM-10	0.0573	LBS/MMBTU	WEBFIRE				0.06	
SO <sub>2</sub>	0.05	LBS/MMBTU	AP-42	0.5			0.03	
NOX	2.7	LBS/MMBTU	AP-42				2.84	
VOC	0.2	LBS/MMBTU	AP-42				0.21	
CO	1.16	LBS/MMBTU	AP-42				1.22	
Lead								
Ammonia								

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	ACME HOSPITAL	<b>2. Form INV-5 Page</b>	4	of	5
<b>3. Release Point Identifier</b>	EP4				
<b>4. Emission Unit Identifier</b>	EU4				
<b>5. SCC Number:</b>	20200401				

Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.

**6. Emissions Calculations**

PROCESS: INTERNAL DIESEL COMBUSTION > 600 BHP  
 SCC NUMBER: 20200401

FUEL: DIESEL: 0.14 MMBTU/GALLON

ACTUAL THROUGHPUT - YEARLY TOTAL: 15,000 GALLONS

APPLICABLE POLLUTANTS: PM-2.5, PM-10, SO2, NOX, VOC AND CO (THESE POLLUTANTS HAVE ACTUAL EMISSIONS OF GREATER THAN 0.005 TONS/YR FOR THIS ENGINE)

POLLUTANTS EXEMPT FROM REPORTING THIS PROCESS: BENZENE, FORMALDEHYDE, TOLUENE, XYLENE, NAPHTHALENE, ACETALDEHYDE, AND ACROLEIN (THESE EMISSION FACTORS, WHEN COMBINED WITH THE ACTUAL THROUGHPUT, LEAD TO EMISSIONS OF LESS THAN 0.0005 TONS)

PM-2.5:

$$15,000 \text{ GALLONS} * 0.14 \text{ MMBTU/GAL} * 0.05 \text{ LBS/MMBTU} * 1 \text{ TON}/2,000 \text{ LBS} = 0.05 \text{ TONS}$$

PM-10:

$$15,000 \text{ GALLONS} * 0.14 \text{ MMBTU/GAL} * 0.14 \text{ LBS/MMBTU} * 1 \text{ TON}/2,000 \text{ LBS} = 0.15 \text{ TONS}$$

SO2:

$$15,000 \text{ GALLONS} * 0.14 \text{ MMBTU/GAL} * 1.01 \text{ LBS/MMBTU} * 0.5 \text{ (SULFUR CONTENT)} * 1 \text{ TON}/2,000 \text{ LBS} = 0.53 \text{ TONS}$$

NOX:

$$15,000 \text{ GALLONS} * 0.14 \text{ MMBTU/GAL} * 3.2 \text{ LBS/MMBTU} * 1 \text{ TON}/2,000 \text{ LBS} = 3.36 \text{ TONS}$$

VOC:

$$15,000 \text{ GALLONS} * 0.14 \text{ MMBTU/GAL} * 0.0819 \text{ LBS/MMBTU} * 1 \text{ TON}/2,000 \text{ LBS} = 0.09 \text{ TONS}$$

CO:

$$15,000 \text{ GALLONS} * 0.14 \text{ MMBTU/GAL} * 0.85 \text{ LBS/MMBTU} * 1 \text{ TON}/2,000 \text{ LBS} = 0.89 \text{ TONS}$$

**FORM INV-5 CALCULATIONS**

<b>1. Company/Facility Name</b>	ACME HOSPITAL	<b>2. Form INV-5 Page</b>	5	of	5
<b>3. Release Point Identifier</b>	EP4				
<b>4. Emission Unit Identifier</b>	EU4				
<b>5. SCC Number:</b>	20200402				
<b>Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.</b>					
<b>6. Emissions Calculations</b>					
<p>PROCESS: DUAL FUEL COMBUSTION &gt; 600 BHP                  SCC NUMBER: 20200402</p> <p>FUEL: DUAL FUEL: (95% NATURAL GAS AND 5% DIESEL FUEL)                  ACTUAL THROUGHPUT - YEARLY TOTAL: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FOOT) + (750 GALLONS * 0.14 MMBTU/GAL) = 2,100 MMBTU</p> <p>*APPLICABLE POLLUTANTS: PM-2.5, PM-10, SO2, NOX, VOC, CO, FORMALDEHYDE, AND TOLUENE (THESE POLLUTANTS HAVE ACTUAL EMISSIONS OF GREATER THAN 0.005 TONS/YR FOR THIS ENGINE)                  *POLLUTANTS EXEMPT FROM REPORTING THIS PROCESS: BENZENE, XYLENE, NAPHTHALENE, AND STYRENE (THESE EMISSION FACTORS, WHEN COMBINED WITH THE ACTUAL THROUGHPU, LEAD TO EMISSIONS OF LESS THAN 0.005 TONS)</p> <p>PM-2.5:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.0556 LBS/MMBTU * 1 TON/2,000 LBS = 0.06 TONS</p> <p>PM-10:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.0573 LBS/MMBTU * 1 TON/2,000 LBS = 0.06 TONS</p> <p>SO2:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.05 LBS/MMBTU * 1 TON/2,000 LBS = 0.05 TONS</p> <p>NOX:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 2.7 LBS/MMBTU * 1 TON/2,000 LBS = 2.84 TONS</p> <p>VOC:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.2 LBS/MMBTU * 1 TON/2,000 LBS = 0.21 TONS</p> <p>CO:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 1.16 LBS/MMBTU * 1 TON/2,000 LBS = 1.22 TONS</p> <p>FORMALDEHYDE:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.0054 LBS/MMBTU * 1 TON/2,000 LBS = 0.01 TONS</p> <p>TOLUENE:                  (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.00523 LBS/MMBTU * 1 TON/2,000 LBS = 0.01 TONS</p>					

**FORM INV-6 FACILITY-WIDE ACTUAL EMISSIONS**

<b>1. Facility Name</b>	ACME HOSPITAL	<b>2. Form INV-6 Page</b>	1	<b>of</b>	1
<b>3. Emission Year</b>	2021				
The facility-wide actual emission totals for each air pollutant may be calculated by summing the "actual estimated emissions" (column 32) on the INV-4 forms					
<b>4. Facility-Wide Criteria Air Pollutant and Ammonia Emissions</b>					
<b>Air Pollutant</b>	<b>ID or CAS Number</b>	<b>Actual Estimated Emissions (Tons)</b>			
PM-2.5	PM-2.5	0.23			
PM-10	PM-10	0.34			
Sulfur Dioxide	7446-09-5	0.66			
Nitrogen Oxides	NO <sub>x</sub>	8.17			
Volatile Organic Compounds	VOC	0.40			
Carbon Monoxide	630-08-0	3.32			
Lead	7439-92-1	---			
Ozone	OZ	---			
Ammonia	7664-41-7	0.04			
<b>5. Facility-Wide Hazardous Air Pollutant and Other Regulated Air Pollutant Emissions</b>					
Please duplicate this form as necessary to include all individual hazardous air pollutants and other regulated air pollutants being emitted at the facility					
<b>Air Pollutant</b>	<b>ID or CAS Number</b>	<b>Actual Estimated Emissions (Tons)</b>			
Hexane	110-54-3	0.02			
Benzene	71-43-2	0.00			
Formaldehyde	50-00-0	0.01			
Toluene	108-88-3	0.01			
<b>Total Hazardous Air Pollutants</b>	<b>THAP</b>	<b>0.04</b>			

## **Appendices**

### **APPENDIX A: Air Quality Glossary**

**ACFM** Actual cubic feet per minute. A measurement of exhaust rate from a release point.

**Act** refers to the 1990 Clean Air Act Amendments

**Actual Emissions** are the actual rate of emissions of a pollutant from an emission unit calculated using the emission unit's actual operating hours, production rates, and types of materials processed, stored, or combusted for the calendar year.

**Annual Throughput** is the quantity of raw material processed, handled, or used in an emission unit, such as fuels, solvents, coatings, or quantity of dust-producing material processed, handled, or transferred.

**Air Pollutant** is generally any substance in the air not part of the naturally occurring makeup of ambient air or that occurs in un-natural concentrations. In Iowa, this usually refers to hazardous air pollutants and criteria air pollutants.

**Allowable Emissions** is the emissions rate that represents a limit on the emissions that can occur from an emissions unit. This limit may be based on a federal, state, or local regulatory emission limit determined from state or local regulations and/or 40 Code of Federal Regulations (CFR).

**Ambient Standards** limit the concentration of a given pollutant in the ambient air. Ambient standards are not emissions limitations on sources, but usually result in such limits being placed on source operation as part of a control strategy to achieve or maintain an ambient standard.

**Ammonia** is a colorless gas with a very distinct odor. Ammonia emissions are important to air quality analyses because ammonia is involved in the formation of sulfate and nitrate, which are precursors for PM<sub>2.5</sub>. Only primary ammonia needs to be reported. Primary ammonia means it is in the same chemical form as when it was emitted into the atmosphere. Secondary ammonia, such as ammonium sulfate and ammonium nitrate, is formed by chemical reactions in the atmosphere.

**Attainment Area** is an area considered to have air quality as good as or better than the National Ambient Air Quality Standards (NAAQS) as defined in the Act. An area may be in attainment for one or more pollutants but be a nonattainment area for one or more other pollutants.

**Capture Efficiency** is the percentage of pollutant emitted from an emission unit that is caught or captured by a pickup hood or other collection mechanism. An example is a fume hood.

**Carbon Monoxide (CO)** is a colorless, odorless gas that depletes the oxygen-carrying capacity of blood. Example sources of CO emissions include industrial boilers, incinerators, and motor vehicles.

**CAS Number** refers to the Chemical Abstract Services number. CAS numbers are often found on Safety Data Sheets and are sometimes used as a way to identify air pollutants.

**CFR** is the Code of Federal Regulations. This is a book of rules published by the federal government. Title 40 of the CFR pertains to Protection of the Environment.

**Continuous Emissions Monitoring** Equipment that measures the concentration or emission rate of a gas or particulate matter using analyzer measurements and a conversion equation, graph, or computer program. Installation and operation of a CEM may be required by EPA or DNR in order to determine compliance with specific standards. Operation of a CEM must meet performance specifications, certification procedures, and recordkeeping and reporting requirements as specified in applicable regulations.

**Construction Permits** are permits required before installing or altering equipment or control equipment, with a goal of prevention of significant deterioration or degrading of clean air areas from new industrial development or expansion.

**Control Efficiency** is the emission reduction efficiency, and is a percentage value representing the amount of emissions that are controlled by a control device.

**Criteria Pollutant** refers to a pollutant for which a National Ambient Air Quality Standard has been set. Criteria pollutants are carbon monoxide, lead, nitrogen oxides, ozone, particulate matter with aerodynamic diameter less than or equal to 10 micrometers or less than or equal to 2.5 micrometers, and sulfur dioxide.

**Dual Fuel** refers to fuel burned at a ratio of 95% natural gas and 5% diesel fuel.

**Emergency Generator** ...any generator of which the sole function is to provide emergency backup power during an interruption of electrical power from the electrical utility. An emergency generator does not include peaking units at electrical utilities, generators at industrial facilities that typically operate at low rates, but are not confined to emergency purposes; or any standby generators that are used during times when power is available from the electric utility. An emergency is an unforeseeable condition that is beyond the control of the owner or operator.

**Emission** means pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities; from residential chimneys; and from motor vehicle, locomotive, aircraft, or other nonroad engines.

**Emission Factors** The relationship between the amount of pollution produced and the amount of raw material processed. For example – pounds of CO per ton of coal fired.

**Emission Inventory** is a listing, by source, of the amount of air pollutants discharged into the atmosphere.

**Emission Limits** are limits on emissions that may be federally enforceable and exist in a permit. Such limits are usually expressed as a rate, generally in pounds per hour of emissions or as a concentration such as grains per dry standard cubic foot (7,000 grains is one pound).

**Emission point** is the point where emissions enter the atmosphere such as stacks, vents and ventilation exhausts. The term emission point is used interchangeably with release point.

**Emission Unit** is a piece of equipment where emissions are generated. Emission units may have one or more processes with actual emissions. Some examples of an emission unit with one or more processes are boilers (the ability to burn both natural gas and fuel oil), generators (the ability to burn both fuel oil and dual fuel), and grain dryers (the ability to dry grain and burn natural gas).

**Engineering Estimate** is a term commonly applied to the best approximation that can be made when the specific emission estimation techniques such as stack testing, material balance, or emission factors are not available. This estimation is usually made by an engineer familiar with the specific process, and is based on process information.

**Federally Enforceable** means all limitations and conditions that are enforceable by the administrator including, but not limited to, the requirements of new source performance standards, national emission standards for hazardous air pollutants, state rules, administrative orders, construction permits, and operating permits.

**Fugitive Emissions** are emissions that cannot reasonably pass through a stack, chimney, duct, vent or other opening. Fugitive emission sources can include haul roads, exposed storage piles, and wastewater retention ponds, etc.

**HAP or Hazardous Air Pollutants** are any of the 187 pollutants listed in Section 112 of the 1990 Clean Air Act Amendments. HAPs are known or suspected of being toxic or carcinogenic.

**Indirect Heating** occurs when the material being heated does not come in direct contact with the combustion gas, such as a hot water boiler.

**lowcleanair.gov** is the web site for the DNR's Air Quality Bureau with forms, assistance and guidance data.

**MMcf** equals 1,000,000 cubic feet. This unit of measure is most typically associated with the amount of natural gas combusted.

**Material Balance or Mass Balance** A process of estimating emissions using knowledge of the process, process rate, material used, and material properties.

**Manually Operated Equipment** means a machine or tool that is hand-held, such as a hand-held circular saw or compressed air chisel; a machine or tool for which the work piece is held or manipulated by hand, such as a bench grinder; a machine or tool for which the tool or bit is manipulated by hand, such as a lathe or drill press; any dust collection system which is part of such machine or tool; but not including any machine or tool for which the extent of manual operation is to control power to the machine or tool and not including any central dust collection system serving more than one machine or tool.

**MACT or Maximum Achievable Control Technology** are standards set under Title III of the 1990 Clean Air Act Amendments with an emphasis on control of hazardous air pollutants.

**Maximum Hourly Design Rate** is the highest amount of raw material processed or production achieved per hour based on manufacturer's data.

**Maximum True Vapor Pressure** means the equilibrium partial pressure of the material considering 1) for a material stored at ambient temperature, the maximum monthly average temperature as reported by the National Weather Service, or 2) for a material stored above or below the ambient temperature, the temperature equal to the highest calendar-month average of the material storage temperature.

**Minor Source Emissions Inventory** is the emissions inventory report that is due every third year for minor source facilities. Minor sources are facilities that do not meet the definition of a "major source" in 567-IAC 22.100.

**MSDS or Material Safety Data Sheets** are known as SDS or Safety Data Sheets as of December 1, 2013. See the definition of SDS or Safety Data Sheets below.

**National Ambient Air Quality Standards (NAAQS)** are the ambient standards for the following six criteria pollutants: carbon monoxide, lead, nitrogen oxides, ozone, sulfur dioxide, and particulate matter with an aerodynamic diameter less than or equal to 10 micrometers or less than or equal to 2.5 micrometers.

**National Emission Standards for Hazardous Air Pollutants (NESHAP)** are health-based standards set under the 1970 Clean Air Act for beryllium, mercury, vinyl chloride, benzene, arsenic, asbestos, radon, radionuclides and other HAPs. Under the 1990 Act, roughly 170 source categories are identified for eventual MACT regulations. See MACT definition on this page above. The NESHAPs are published in 40 CFR Parts 61 and 63.

**New Source Performance Standards (NSPS)** are promulgated for criteria, hazardous, and other pollutant emissions from new, modified, or reconstructed sources that the U.S. EPA determines contribute significantly to air pollution. These are typically emission standards, but may be expressed in other forms such as concentration and opacity. The NSPS are published in 40 CFR Part 60.

**Nitrogen Oxides (NOx)** are a class of compounds that are respiratory irritants that react with volatile organic compounds (VOC's) in the presence of sunlight to form Ozone. NOx compounds are also precursors to acid rain. Motor vehicles, power plants, and other stationary combustion facilities emit large quantities of NOx.

**North American Industrial Classification System (NAICS)** A North American system for classifying industries by a six-digit code. This six-digit hierarchical structure allows greater coding flexibility than the four-digit structure of the SIC.

**Opacity** means the degree to which emissions reduce the transmission of light and obscure the view of an object in the background. Opacity can be measured by properly trained observers. The validity of such measurements has been well established in the courts, including the U.S. Supreme Court. DNR field inspectors often take opacity readings during inspections.

**Operating Permits** are permits required by Title V of the 1990 Act for major sources. Operating permits are for the facility as a whole and differ from construction permits, which are issued for individual release points.

**Overall Control Efficiency** is obtained by multiplying the capture efficiency by the control equipment's control efficiency to provide the overall control efficiency for reporting emissions.

**Ozone (O<sub>3</sub>)** is a colorless gas that damages lungs and can damage materials and vegetation. It is the primary constituent of smog, and is formed primarily when nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) react in the presence of sunlight.

**Particulate Matter of aerodynamic diameter less than or equal to 10 micrometers (PM<sub>10</sub>)** is a measure of small solid matter suspended in the atmosphere. Small particles can penetrate deeply into the lung where they can cause respiratory problems. Emissions of PM-10 are significant from fugitive dust, power plants, commercial boilers, metallurgical industries, mineral industries, fires, and motor vehicles.

**Particulate Matter of aerodynamic diameter less than or equal to 2.5 micrometers (PM<sub>2.5</sub>)** is another measure of small solid matter suspended in the atmosphere. Primary PM-2.5 results largely from combustion of fossil fuels or biomass, although selected industrial processes can also be significant in some areas. The sources of PM-2.5 include, but are not limited to, gasoline and diesel exhaust, wood stoves and fireplaces, land clearing, wildland prescribed burning, and wild fires. Sources of primary particulate including fugitive emissions from paved and unpaved roads, dust from ore processing and refining, and to a lesser extent, crustal material from construction activities, agricultural tilling, wind erosion and other crustal sources are less important based on their relatively small contribution to ambient PM-2.5 concentrations. The condensable components are largely made up of semi-volatile organic compounds that condense at ambient temperature to form aerosol.

**Release Point** is the point where emissions enter the atmosphere such as stacks, vents and ventilation exhausts. The term release point is used interchangeably with emission point.

**Reported Emissions** are emissions estimates that are submitted to a regulatory agency. Emissions inventories are used for a variety of purposes such as planning pollution control programs, promoting compliance with laws and regulations, and conducting permit reviews.

**SDS or Safety Data Sheets** are an information source with details about chemical substances such as chemical composition and other environmental information. SDS can be a useful source of emissions information and are available for all chemical substances from the supplier of the material.

**Source Classification Codes (SCCs)** are codes defined by EPA that classify air emissions sources by individual processes and/or operations.

**Stack Tests** A test that measures the concentration of pollutants in the exhaust stack. Measurements are performed following procedures specified and developed by the US EPA and/or DNR. Such testing is required by DNR to be conducted by various stationary sources to determine compliance with applicable air emissions limits.

**SCFM** Standard cubic feet per minute. A measurement of exhaust rate from a release point.



**Standard Industrial Classification (SIC)** A United States government system for classifying industries by a four-digit code.

**SLEIS** State and Local Emissions Inventory System. SLEIS is the online emissions inventory reporting tool.

**State Implementation Plan (SIP)** is a state plan approved by EPA for the establishment, regulation, and enforcement of air pollution standards.

**Stationary Source** is any building, structure, facility or installation that emits or may emit any air pollutant subject to regulation under the Clean Air Act. It includes all pollutant-emitting activities which belong in the same major industrial grouping as identified by the first two digits in the facilities SIC code, are located on one or more contiguous or adjacent properties and are under common ownership or control. Mobile sources such as cars, trains, and forklifts are not regulated by DNR.

**Sulfur Oxides (SOx)** are a class of colorless, pungent gases that are respiratory irritants and precursors to acid rain. Sulfur oxides are emitted from various combustion or incineration sources, particularly from coal combustion.

**Tertiary-Butyl Acetate (TBAC)** is a pollutant common to surface coating operations that is neither a VOC nor a HAP. However, EPA still requires that TBAC emissions be reported on the emissions inventory as an "additional pollutant".

**Threshold** is a level of emissions that once reached, triggers requirements to obtain a permit.

**Transfer Efficiency** is the percentage of sprayed material such as paint or solvent that is actually adhered to the intended surface.

**Twelve-Month Rolling Period** is a period of 12 consecutive months determined on a rolling basis.

**Volatile Organic Compounds (VOCs)** are organic compounds that contribute to ground-level ozone or smog formation. Ground level ozone is a strong lung oxidant. Large amounts of VOCs are emitted from fuel distribution, chemical manufacturing, motor vehicles, and a wide variety of industrial, commercial, and consumer solvent uses.

**1000gal** equals 1,000 gallons. This unit of measure is most typically associated with the amount of fuel oil or LPG combusted.

## APPENDIX B: List of Criteria Pollutants, Chemicals Not Considered VOCs, and Hazardous Air Pollutants

### Criteria Pollutants

PM <sub>2.5</sub> .....	Particulate Matter less than or equal to 2.5 micrometers in diameter
PM <sub>10</sub> .....	Particulate Matter less than or equal to 10 micrometers in diameter
SO <sub>2</sub> .....	Sulfur Dioxide
NO <sub>x</sub> .....	Nitrogen Oxides
VOC.....	Volatile Organic Compound
CO.....	Carbon Monoxide
Pb .....	Lead

Chemicals Not Considered Volatile Organic Compounds (VOCs) – from paragraphs 40 CFR 51.100 (s):

(1) This includes any such organic compound other than the following, which have been determined to have negligible photochemical reactivity: Methane; ethane; methylene chloride (dichloromethane); 1,1,1-trichloroethane (methyl chloroform); 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113); trichlorofluoromethane (CFC-11); dichlorodifluoromethane (CFC-12); chlorodifluoromethane (HCFC-22); trifluoromethane (HFC-23); 1,2-dichloro 1,1,2,2-tetrafluoroethane (CFC-114); chloropentafluoroethane (CFC-115); 1,1,1-trifluoro 2,2-dichloroethane (HCFC-123); 1,1,1,2-tetrafluoroethane (HFC-134a); 1,1-dichloro 1-fluoroethane (HCFC-141b); 1-chloro 1,1-difluoroethane (HCFC-142b); 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124); pentafluoroethane (HFC-125); 1,1,2,2-tetrafluoroethane (HFC-134); 1,1,1-trifluoroethane (HFC-143a); 1,1-difluoroethane (HFC-152a); perchlorobenzotrifluoride (PCBTF); cyclic, branched, or linear completely methylated siloxanes; acetone; perchloroethylene (tetrachloroethylene); 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca); 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb); 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC 43-10mee); difluoromethane (HFC-32); ethylfluoride (HFC-161); 1,1,1,3,3,3-hexafluoropropane (HFC-236fa); 1,1,2,2,3-pentafluoropropane (HFC-245ca); 1,1,2,3,3-pentafluoropropane (HFC-245ea); 1,1,1,2,3-pentafluoropropane (HFC-245eb); 1,1,1,3,3-pentafluoropropane (HFC-245fa); 1,1,1,2,3,3-hexafluoropropane (HFC-236ea); 1,1,1,3,3-pentafluorobutane (HFC-365mfc); chlorofluoromethane (HCFC-31); 1 chloro-1-fluoroethane (HCFC-151a); 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a); 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane (C<sub>4</sub>F<sub>9</sub>OCH<sub>3</sub> or HFE-7100); 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF<sub>3</sub>)<sub>2</sub>CF<sub>2</sub>OCH<sub>3</sub>); 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane (C<sub>4</sub>F<sub>9</sub>OC<sub>2</sub>H<sub>5</sub> or HFE-7200); 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ((CF<sub>3</sub>)<sub>2</sub>CF<sub>2</sub>OC<sub>2</sub>H<sub>5</sub>); methyl acetate; 1,1,1,2,2,3,3-heptafluoro-3-methoxy-propane (n-C3F7OCH<sub>3</sub>, HFE-7000); 3-ethoxy-1,1,1,2,3,4,4,5,5,6,6-dodecafluoro-2-(trifluoromethyl) hexane (HFE-7500); 1,1,1,2,3,3,3-heptafluoropropane (HFC 227ea); methyl formate (HCOOCH<sub>3</sub>); 1,1,1,2,2,3,4,5,5,5-decafluoro-3-methoxy-4-trifluoromethyl-pentane (HFE-7300); propylene carbonate; dimethyl carbonate; *trans*-1,3,3,3-tetrafluoropropene; HCF<sub>2</sub>OCF<sub>2</sub>H (HFE-134); HCF<sub>2</sub>OCF<sub>2</sub>OCF<sub>2</sub>H (HFE-236cal2); HCF<sub>2</sub>OCF<sub>2</sub>CF<sub>2</sub>OCF<sub>2</sub>H (HFE-338pcc13); HCF<sub>2</sub>OCF<sub>2</sub>OCF<sub>2</sub>CF<sub>2</sub>OCF<sub>2</sub>H (H-Galden 1040x or H-Galden ZT 130 (or 150 or 180)); *trans* 1-chloro-3,3,3-trifluoroprop-1-ene; 2,3,3,3-tetrafluoropropene; 2-amino-2-methyl-1-propanol; t-butyl acetate; 1,1,2,2- Tetrafluoro -1-(2,2,2-trifluoroethoxy) ethane; and perfluorocarbon compounds which fall into these classes:

- (i) Cyclic, branched, or linear, completely fluorinated alkanes;
- (ii) Cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
- (iii) Cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
- (iv) Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

The following chemicals have been added to the definition of chemicals not considered VOC:

- HFE-7300----January 18, 2007
- Propylene carbonate (108-32-7)----January 21, 2009
- Dimethyl carbonate (616-38-6)----January 21, 2009
- HFO-1234ze----July 23, 2012
- HCF<sub>2</sub>OCF<sub>2</sub>H (HFE-134)----March 14, 2013
- HCF<sub>2</sub>OCF<sub>2</sub>OCF<sub>2</sub>H (HFE-236cal2)----March 14, 2013

- HCF2OCF2CF2OCF2H (HFE-338pcc13)----March 14, 2013
- HCF2OCF2OCF2CF2OCF2H (H-Galden 1040X or H-Galden ZT 130 (or 150 or 180))----March 14, 2013
- Trans 1-chloro-3,3,3-trifluoroprop-1-ene (Solstice™ 1233zd(E))----September 27, 2013
- 2,3,3,3-tetrafluoropropene (HFO-1234yf)----November 21, 2013
- 2-amino-2-methyl-1-propanol (AMP)----March 27, 2014
- 1,1,2,2-Tetrafluoro-1-(2,2,2-trifluoroethoxy) Ethane (HFE-347pcf2)----September 30, 2016
- cis-1,1,1,4,4,4-hexafluorobut-2-ene (HFO-1336mzz-Z)----January 28, 2019

## Hazardous Air Pollutants – alphabetical listing

Note: Methyl ethyl ketone (MEK) is no longer considered to be a HAP as of 12/19/05.

CAS Number	Chemical Name	CAS Number	Chemical Name
<b>A</b>			
75-07-0	Acetaldehyde	510-15-6	Chlorobenzilate
60-35-5	Acetamide	75-00-3	Chloroethane (Ethyl chloride)
75-05-8	Acetonitrile	67-66-3	Chloroform
98-86-2	Acetophenone	74-87-3	Chloromethane (Methyl chloride)
53-96-3	2-Acetylaminofluorene	107-30-2	Chloromethyl methyl ether
107-02-8	Acrolein	126-99-8	Chloroprene
79-06-1	Acrylamide	0	Chromium Compounds
79-10-7	Acrylic acid	0	Cobalt Compounds
107-13-1	Acrylonitrile	0	Coke Oven Emissions
107-05-1	Allyl chloride	1319-77-3	Cresol/Cresylic acid (isomers/mixtures)
92-67-1	4-Aminobiphenyl		m-Cresol
62-53-3	Aniline	108-39-4	o-Cresol
90-04-0	o-Anisidine	95-48-7	p-Cresol
0	Antimony Compounds	106-44-5	Cumene
0	Arsenic Compounds	98-82-8	Cyanide Compounds
1332-21-4	Asbestos (friable)	0	
<b>B</b>			
71-43-2	Benzene	94-75-7	2,4-D, salts and esters
92-87-5	Benzidine	3547-04-4	DDE
98-07-7	Benzoic trichloride	117-81-7	Di(2-ethylhexyl) phthalate (DEHP)
100-44-7	Benzyl chloride	334-88-3	Diazomethane
0	Beryllium Compounds	132-64-9	Dibenzofuran
92-52-4	Biphenyl	96-12-8	1,2-Dibromo-3-chloropropane
111-44-4	Bis(2-chloroethyl) ether	106-93-4	1,2-Dibromoethane (Ethylene dibromide)
542-88-1	Bis(chloromethyl) ether		Dibutyl phthalate
75-25-2	Bromoform	84-74-2	1,4-Dichlorobenzene(p)
74-83-9	Bromomethane (Methyl Bromide)	106-46-7	3,3'-Dichlorobenzidine
106-99-0	1,3-Butadiene	91-94-1	1,1-Dichloroethane (Ethylidene dichloride)
106-88-7	1,2-Butylene oxide (1,2-Epoxybutane)	75-34-3	1,2-Dichloroethane (Ethylene dichloride)
		107-06-2	Dichloromethane (Methylene chloride)
<b>C</b>			
0	Cadmium Compounds	75-09-2	1,2-Dichloropropane (Propylene dichloride)
156-62-7	Calcium cyanamide	78-87-5	1,3-Dichloropropylene
133-06-2	Captan	542-75-6	Dichlorvos
63-25-2	Carbaryl	62-73-7	Diethanolamine
75-15-0	Carbon disulfide	111-42-2	N,N-Dimethylaniline
56-23-5	Carbon tetrachloride	121-69-7	Diethyl sulfate
463-58-1	Carbonyl sulfide	64-67-5	3,3'-Dimethoxybenzidine
120-80-9	Catechol	119-90-4	4-Dimethylaminoazobenzene
CAS Number	Chemical Name	60-11-7	3,3'-Dimethylbenzidine
133-90-4	Chloramben	119-93-7	Dimethyl formamide
57-74-9	Chlordane	68-12-2	1,1-Dimethyl hydrazine
7782-50-5	Chlorine	57-14-7	4,6-Dinitro-o-cresol
79-11-8	Chloroacetic acid	534-52-1	
532-27-4	2-Chloroacetophenone		
108-90-7	Chlorobenzene		

CAS Number	Chemical Name	CAS Number	Chemical Name
51-28-5	2,4-Dinitrophenol	1634-04-4	Methyl tert-butyl ether
121-14-2	2,4-Dinitrotoluene	101-14-4	4,4'-Methylenebis(2-chloroaniline)
<b>E</b>		101-68-8	Methylenebis (phenylisocyanate)
106-89-8	Epichlorohydrin	CAS Number	Chemical Name
140-88-5	Ethyl acrylate	101-77-9	4,4'-Methylenedianiline
100-41-4	Ethylbenzene	<b>N</b>	
107-21-1	Ethylene glycol	91-20-3	Naphthalene
75-21-8	Ethylene oxide	0	Nickel Compounds
96-45-7	Ethylene thiourea	98-95-3	Nitrobenzene
151-56-4	Ethyleneimine	92-93-3	4-Nitrobiphenyl
<b>F</b>		100-02-7	4-Nitrophenol
0	Fine Mineral Fibers	79-46-9	2-Nitropropane
50-00-0	Formaldehyde	62-75-9	N-Nitrosodimethylamine
<b>G</b>		59-89-2	N-Nitrosomorpholine
Glycol Ethers (See page 62)		684-93-5	N-Nitroso-N-methylurea
<b>H</b>		<b>P</b>	
76-44-8	Heptachlor	56-38-2	Parathion
87-68-3	Hexachloro-1,3-butadiene	87-86-5	Pentachlorophenol
118-74-1	Hexachlorobenzene	108-95-2	Phenol
77-47-4	Hexachlorocyclopentadiene	106-50-3	p-Phenylenediamine
67-72-1	Hexachloroethane	75-44-5	Phosgene
822-06-0	Hexamethylene-1,6-diisocyanate	7803-51-2	Phosphine
680-31-9	Hexamethylphosphoramide	7723-14-0	Phosphorus (yellow or white)
110-54-3	Hexane	85-44-9	Phthalic anhydride
302-01-2	Hydrazine	85-44-9	Phthalic anhydride
7647-01-0	Hydrochloric acid	1336-36-3	Polychlorinated biphenyls
7664-39-3	Hydrogen fluoride	0	Polycyclic Organic Matter
123-31-9	Hydroquinone	1120-71-4	Propane sultone
<b>I</b>		123-38-6	Propionaldehyde
78-59-1	Isophorone	57-57-8	beta-Propiolactone
<b>L</b>		114-26-1	Propoxur
0	Lead Compounds	75-56-9	Propylene oxide
58-89-9	Lindane	75-55-8	Propyleneimine
<b>M</b>		<b>Q</b>	
108-31-6	Maleic anhydride	91-22-5	Quinoline
0	Manganese Compounds	106-51-4	Quinone
0	Mercury Compounds	82-68-8	Quintozene
67-56-1	Methanol	<b>R</b>	
72-43-5	Methoxychlor	0	Radionuclides (including Radon)
60-34-4	Methyl hydrazine	<b>S</b>	
74-88-4	Methyl iodide	0	Selenium Compounds
108-10-1	Methyl isobutyl ketone	100-42-5	Styrene
624-83-9	Methyl isocyanate	96-09-3	Styrene oxide
80-62-6	Methyl methacrylate		

CAS Number	Chemical Name	CAS Number	Chemical Name
<b>T</b>			
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	121-44-8	Triethylamine
79-34-5	1,1,2,2-Tetrachloroethane	1582-09-8	Trifluralin
127-18-4	Tetrachloroethylene	540-84-1	2,2,4-Trimethylpentane
7550-45-0	Titanium tetrachloride	CAS Number	
108-88-3	Toluene	<b>U</b>	
CAS Number	Chemical Name	51-79-6	Urethane
95-80-7	2,4-Toluene diamine (2,4-Diaminotoluene)	<b>V</b>	
584-84-9	2,4-Toluene diisocyanate	108-05-4	Vinyl acetate
95-53-4	o-Toluidine	593-60-2	Vinyl bromide
800-135-2	Toxaphene	75-01-4	Vinyl chloride
120-82-1	1,2,4-Trichlorobenzene	75-35-4	Vinylidene chloride
71-55-6	1,1,1-Trichloroethane	<b>X</b>	
79-00-5	1,1,2-Trichloroethane	1330-20-7	Xylene (mixed isomers)
79-01-6	Trichloroethylene	108-38-3	m-Xylene
95-95-4	2,4,5-Trichlorophenol	95-47-6	o-Xylene
88-06-2	2,4,6-Trichlorophenol	106-42-3	p-Xylene

## Hazardous Air Pollutants - by CAS Number

Note: Methyl ethyl ketone (MEK) is no longer considered to be a HAP as of 12/19/05.

CAS Number	Chemical Name	CAS Number	Chemical Name
0	Antimony Compounds	75-05-8	Acetonitrile
0	Arsenic Compounds	75-07-0	Acetaldehyde
0	Beryllium Compounds	75-09-2	Dichloromethane (Methylene chloride)
0	Cadmium Compounds		
0	Chromium Compounds	75-15-0	Carbon disulfide
0	Cobalt Compounds	75-21-8	Ethylene oxide
0	Coke Oven Emissions	75-25-2	Bromoform
0	Cyanide Compounds	75-34-3	1,1-Dichloroethane (Ethylidene dichloride)
0	Fine Mineral Fibers		
0	Glycol Ethers (See page 62)	75-35-4	Vinylidene chloride
0	Lead Compounds	75-44-5	Phosgene
0	Manganese Compounds	75-55-8	Propyleneimine
0	Mercury Compounds	75-56-9	Propylene oxide
0	Nickel Compounds	76-44-8	Heptachlor
0	Polycyclic Organic Matter	77-47-4	Hexachlorocyclopentadiene
0	Radionuclides (including Radon)	77-78-1	Dimethyl sulfate
0	Selenium Compounds	78-59-1	Isophorone
50-00-0	Formaldehyde	78-87-5	1,2-Dichloropropane (Propylene dichloride)
51-28-5	2,4-Dinitrophenol		
51-79-6	Urethane	79-00-5	1,1,2-Trichloroethane
53-96-3	2-Acetylaminofluorene	79-01-6	Trichloroethylene
56-23-5	Carbon tetrachloride	79-06-1	Acrylamide
56-38-2	Parathion	79-10-7	Acrylic acid
57-14-7	1,1-Dimethyl hydrazine	79-11-8	Chloroacetic acid
57-57-8	beta-Propiolactone	79-34-5	1,1,2,2-Tetrachloroethane
57-74-9	Chlordane	79-44-7	Dimethylcarbamyl chloride
58-89-9	Lindane	79-46-9	2-Nitropropane
59-89-2	N-Nitrosomorpholine	80-62-6	Methyl methacrylate
60-11-7	4-Dimethylaminoazobenzene	82-68-8	Quintozene
60-34-4	Methyl hydrazine	84-74-2	Dibutyl phthalate
60-35-5	Acetamide	85-44-9	Phthalic anhydride
62-53-3	Aniline	87-68-3	Hexachloro-1,3-butadiene
62-73-7	Dichlorvos	87-86-5	Pentachlorophenol
62-75-9	N-Nitrosodimethylamine	88-06-2	2,4,6-Trichlorophenol
63-25-2	Carbaryl	90-04-0	o-Anisidine
64-67-5	Diethyl sulfate	91-20-3	Naphthalene
67-56-1	Methanol	91-22-5	Quinoline
67-66-3	Chloroform	91-94-1	3,3'-Dichlorobenzidine
67-72-1	Hexachloroethane	92-52-4	Biphenyl
68-12-2	Dimethyl formamide	92-67-1	4-Aminobiphenyl
71-43-2	Benzene	92-87-5	Benzidine
71-55-6	1,1,1-Trichloroethane	92-93-3	4-Nitrobiphenyl
72-43-5	Methoxychlor	94-75-7	2,4-D, salts and esters
74-83-9	Bromomethane (Methyl Bromide)	95-47-6	o-Xylene
74-87-3	Chloromethane (Methyl chloride)	95-48-7	o-Cresol
74-88-4	Methyl iodide	95-53-4	o-Toluidine
75-00-3	Chloroethane (Ethyl chloride)	95-80-7	2,4-Toluene diamine (2,4-Diaminotoluene)
75-01-4	Vinyl chloride		

CAS Number	Chemical Name	CAS Number	Chemical Name
95-95-4	2,4,5-Trichlorophenol	120-82-1	1,2,4-Trichlorobenzene
96-09-3	Styrene oxide	121-14-2	2,4-Dinitrotoluene
96-12-8	1,2-Dibromo-3-chloropropane	121-44-8	Triethylamine
96-45-7	Ethylene thiourea	121-69-7	N,N-Dimethylaniline
98-07-7	Benzoic trichloride	122-66-7	1,2-Diphenylhydrazine
98-82-8	Cumene	123-31-9	Hydroquinone
98-86-2	Acetophenone	123-38-6	Propionaldehyde
98-95-3	Nitrobenzene	123-91-1	1,4-Dioxane
100-02-7	4-Nitrophenol	126-99-8	Chloroprene
100-41-4	Ethylbenzene	127-18-4	Tetrachloroethylene
100-42-5	Styrene	131-11-3	Dimethyl phthalate
100-44-7	Benzyl chloride	132-64-9	Dibenzofuran
101-14-4	4,4'-Methylenebis(2-chloroaniline)	133-06-2	Captan
101-68-8	Methylenebis (phenylisocyanate)	133-90-4	Chloramben
101-77-9	4,4'-Methylenedianiline	140-88-5	Ethyl acrylate
106-42-3	p-Xylene	151-56-4	Ethyleneimine
106-44-5	p-Cresol	156-62-7	Calcium cyanamide
106-46-7	1,4-Dichlorobenzene(p)	302-01-2	Hydrazine
106-50-3	p-Phenylenediamine	334-88-3	Diazomethane
106-51-4	Quinone	463-58-1	Carbonyl sulfide
106-88-7	1,2-Butylene oxide (1,2-Epoxybutane)	510-15-6	Chlorobenzilate
106-89-8	Epichlorohydrin	532-27-4	2-Chloroacetophenone
106-93-4	1,2-Dibromoethane (Ethylene dibromide)	534-52-1	4,6-Dinitro-o-cresol
106-99-0	1,3-Butadiene	540-84-1	2,2,4-Trimethylpentane
107-02-8	Acrolein	542-75-6	1,3-Dichloropropylene
107-05-1	Allyl chloride	542-88-1	Bis(chloromethyl) ether
107-06-2	1,2-Dichloroethane (Ethylene dichloride)	584-84-9	2,4-Toluene diisocyanate
107-13-1	Acrylonitrile	593-60-2	Vinyl bromide
107-21-1	Ethylene glycol	624-83-9	Methyl isocyanate
107-30-2	Chloromethyl methyl ether	680-31-9	Hexamethylphosphoramide
108-05-4	Vinyl acetate	684-93-5	N-Nitroso-N-methylurea
108-10-1	Methyl isobutyl ketone	822-06-0	Hexamethylene-1,6-diisocyanate
108-31-6	Maleic anhydride	1120-71-4	Propane sultone
108-38-3	m-Xylene	1319-77-3	Cresol/Cresylic acid (isomers and mixture)
108-39-4	m-Cresol	1330-20-7	Xylene (mixed isomers)
108-88-3	Toluene	1332-21-4	Asbestos (friable)
108-90-7	Chlorobenzene	1336-36-3	Polychlorinated biphenyls
108-95-2	Phenol	1582-09-8	Trifluralin
110-54-3	Hexane	1634-04-4	Methyl tert-butyl ether
111-42-2	Diethanolamine	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
111-44-4	Bis(2-chloroethyl) ether	3547-04-4	DDE
114-26-1	Propoxur	7550-45-0	Titanium tetrachloride
117-81-7	Di(2-ethylhexyl) phthalate (DEHP)	7647-01-0	Hydrochloric acid
118-74-1	Hexachlorobenzene	7664-39-3	Hydrogen fluoride
119-90-4	3,3'-Dimethoxybenzidine	7723-14-0	Phosphorus (yellow or white)
119-93-7	3,3'-Dimethylbenzidine	CAS Number	Chemical Name
120-80-9	Catechol	7782-50-5	Chlorine
		7803-51-2	Phosphine
		8001-35-2	Toxaphene



## Glycol Ethers\*

Chemical Name	CAS Number
Diethylene glycol dimethyl ether	111-96-6
Diethylene glycol monobutyl ether acetate	124-17-4
Diethylene glycol monobutyl ether	112-34-5
Diethylene glycol monoethyl ether acetate	112-15-2
Diethylene glycol monoethyl ether	111-90-0
Diethylene glycol monohexyl ether	112-59-4
Diethylene glycol monomethyl ether acetate	629-38-9
Diethylene glycol monomethyl ether	111-77-3
Ethylene glycol dibutyl ether	112-48-1
Ethylene glycol diethyl ether	629-14-1
Ethylene glycol dimethyl ether	110-71-4
Ethylene glycol monoacetate	542-59-6
Ethylene glycol monobutyl ether acetate	112-07-2
Ethylene glycol monoethyl ether acetate	111-15-9
Ethylene glycol monoethyl ether	110-80-5
Ethylene glycol monohexyl ether	112-25-4
Ethylene glycol monomethyl ether acetate	110-49-6
Ethylene glycol monomethyl ether	109-86-4
Ethylene glycol monoethyl ether	10020-43-6
Ethylene glycol monophenyl ether	122-99-6
Ethylene glycol monopropyl ether	2807-30-9
Triethylene glycol	112-27-6
Triethylene glycol dimethyl ether	112-49-2
Triethylene glycol monoethyl ether	112-50-5
Triethylene glycol monomethyl ether	112-35-6

\*This is a partial list of common glycol ethers. A complete listing can be found on line at <https://www3.epa.gov/ttn/atw/glycol2000.pdf>

## **APPENDIX C: Iowa DNR Control Efficiency Guidance**

### Details

Facilities can control the amount of pollutants emitted to the atmosphere by installing air pollution control equipment. The level of control depends on various factors. These include: the type of equipment used; the design of the equipment; the process involved; temperature; air flow rates; raw materials; combustion products, etc.; as well as the pollutant(s) targeted for control. Control efficiency is contaminant specific.

DNR staff has prepared a general guidance document identifying typical control efficiencies achieved by different generic types of control equipment. The control efficiency values identified in the table represent single pieces of control equipment. Multiple pieces of control equipment in series should be evaluated on a case-by-case basis.

This control efficiency guidance document is used in reviewing emission inventories by comparing the facility's claimed control efficiency with the guidance document's value. If the facility claims higher control efficiency for a particular piece of equipment, DNR staff will request supporting information to substantiate the facility's claim. This supporting information would consist of test results either from a previous stack test, continuous emission monitoring, or from any other verifiable source of information.

The PM<sub>2.5</sub> control efficiency is currently assumed equal to the PM<sub>10</sub> control efficiency due to a lack of documentation. If a facility has any questions regarding PM<sub>2.5</sub> control efficiency, please call the emissions inventory staff.

## Control Efficiency Table

Control Device or Practice	Control Efficiency (%)						
	TSP	PM <sub>10</sub>	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO	Pb
Wet Scrubber - high efficiency	note 1		note 2				
Wet Scrubber - med efficiency	note 1		note 2				
Wet Scrubber - low efficiency	note 1		note 2				
Gravity Collector	3 <sup>a</sup>	--	--	--	--	--	2 <sup>a</sup>
Centrifugal Collector (cyclone)-high efficiency*	95 <sup>c</sup>	80 <sup>a</sup>	--	--	--	--	65 <sup>a</sup>
Centrifugal Collector (cyclone)-med efficiency*	75 <sup>c</sup>	50 <sup>a</sup>	--	--	--	--	40 <sup>a</sup>
Centrifugal Collector (cyclone)-low efficiency*	35 <sup>c</sup>	10 <sup>a</sup>	--	--	--	--	8 <sup>a</sup>
Electrostatic Precipitator-high efficiency**	95 <sup>a</sup>	95 <sup>a</sup>	--	--	--	--	75 <sup>a</sup>
Electrostatic Precipitator-medium efficiency**	80 <sup>a</sup>	80 <sup>a</sup>	--	--	--	--	65 <sup>a</sup>
Electrostatic Precipitator-low efficiency**	70 <sup>a</sup>	70 <sup>a</sup>	--	--	--	--	55 <sup>a</sup>
Fabric Filter	99 <sup>a</sup>	95 <sup>c</sup>	--	--	--	--	80 <sup>a</sup>
Catalytic Afterburner	--	--	--	--	95 <sup>c</sup>	--	--
Direct Flame Afterburner	--	--	--	--	95 <sup>c</sup>	--	--
Flaring	--	--	--	--	90 <sup>a</sup>	--	--
Low NO <sub>x</sub> Burners	--	--	--	note 3	--	--	--
Staged Combustion	--	--	--	40 <sup>a</sup>	--	--	--
Flue Gas Recirculation	--	--	--	50 <sup>a</sup>	--	--	--
Reduced Combustion Air Preheat	--	--	--	note 4	--	--	--
Steam or Water Injection	--	--	--	65 <sup>a</sup>	--	--	--
Low Excess Air Firing	--	--	--	30 <sup>a</sup>	--	--	--
Fuel with low Nitrogen Content	--	--	--	50 <sup>a</sup>	--	--	--
Sulfuric Acid Plant-Single Contact Process	--	--	50 <sup>a</sup>	--	--	--	--
Sulfuric Acid Plant-Double Contact Process	--	--	95 <sup>a</sup>	--	--	--	--
Vapor Recovery System (Condensers)	--	--	--	--	note 5	--	--
Activated Carbon Adsorption	--	--	note 6				--
Gas Absorption Column-packed	90 <sup>a</sup>	90 <sup>a</sup>	note 2				--
Gas Absorption Column-tray type	25 <sup>a</sup>	25 <sup>a</sup>	note 2				--
Spray Tower	20 <sup>a</sup>	20 <sup>a</sup>	note 2				--
Venturi Scrubber	90 <sup>a</sup>	90 <sup>a</sup>	note 2				--
Impingement Plate Scrubber	note 7		--	--	--	--	--
Mat or Panel Filter	90 <sup>c</sup>	90 <sup>c</sup>	--	--	--	--	--
Dust Suppression by Water Spray	40 <sup>a</sup>	40 <sup>a,d</sup>	--	--	--	--	--
Dust Suppression by Chemical or Wetting Agents	40 <sup>a</sup>	40 <sup>a,d</sup>	--	--	--	--	--
Catalytic Reduction	--	--	--	note 8	--	--	--
Wet Lime Slurry Scrubbing	--	--	85 <sup>c</sup>	--	--	--	--
Multiple Cyclone w/o Fly Ash Reinjection	80 <sup>a</sup>	80 <sup>a</sup>	--	--	--	--	65 <sup>a</sup>
Multiple Cyclone with Fly Ash Reinjection	50 <sup>a</sup>	50 <sup>a</sup>	--	--	--	--	40 <sup>a</sup>
Water Curtain	50 <sup>c</sup>	10 <sup>a</sup>	--	--	--	--	--

<sup>a</sup>Control efficiency was taken from a literature review and developmental work by the Minnesota Pollution Control Agency

<sup>b</sup>Control efficiency was taken from AP-42

<sup>c</sup>Control efficiency was developed from the combination of a literature review and developmental work by the Minnesota Pollution Control Agency, AP-42, and staff judgment

<sup>d</sup>Unless a higher efficiency is required as an operating condition of a DNR construction permit

\*Low, medium, and high efficiency cyclones will be defined based on pressure drop. The ranges of pressure drops are as follows:

Low-efficiency cyclones	2-4 inches water
Medium-efficiency cyclones	4-7 inches water
High-efficiency cyclones	7-10 inches water

\*\* Low, medium, and high efficiency electrostatic precipitators (ESP) will be defined based on the specific collection area (SCA). The SCA is the total collector plate area divided by the gas volume flow rate. It is usually expressed in terms of square feet per 1000 acfm of gas flow. For example, the SCA of an ESP with a gas flow rate of 250,000 acfm and collection plate area of 100,000 square feet is:

$$100,000 \text{ ft}^2 / 250,000 \text{ acfm} \times 0.001 = 400 \text{ ft}^2/\text{thousand acfm}$$

The ranges of SCA for low, medium, and high efficiency ESPs are as follows:

Low-efficiency ESP	< 400
Medium-efficiency ESP	400 - 700
High-efficiency ESP	> 700

Typical control efficiencies were not assigned to all control devices because some efficiencies strongly depend on source specific parameters. In these instances, the table will refer to one of the notes listed below for additional information.

Note 1. Particulate control equipment represented by these classifications should be included in the other, more specific categories (i.e., venturi scrubbers or packed bed absorption columns).

Note 2. The achievable gaseous pollutant control efficiencies for these types of control equipment will depend on the pollutant solubility, the solvent used, the vapor-liquid contact time, and the contact area. These devices are normally designed to achieve a promulgated control efficiency rather than the maximum achievable reduction. Control efficiencies for these devices should be evaluated on a case-by-case basis.

Note 3. Low NO<sub>x</sub> burners (LNB) have been developed by many boiler and burner manufacturers for both new and retrofit applications. Low NO<sub>x</sub> burners limit NO<sub>x</sub> formation by controlling both the stoichiometric and temperature profiles of the combustion process. This control is achieved with design features that regulate the aerodynamic distribution and mixing of the fuel and air, yielding one or more of the following conditions:

1. Reduced O<sub>2</sub> in the primary combustion zone, which limits fuel NO<sub>x</sub> formation;
2. Reduced flame temperature, which limits thermal NO<sub>x</sub> formation; and
3. Reduced residence time at peak temperature, which limits thermal NO<sub>x</sub> formation.

The amount of NO<sub>x</sub> reduction achievable is dependent upon the combustion system and burner design, actual operating practices, and fuel characteristics. The amount of reduction should be based on the manufacturer's demonstration.

Note 4. The amount of NO<sub>x</sub> reduction achievable from reducing preheating of combustion air will vary according to the temperatures before and after the modification. Therefore, efficiencies for this process should be evaluated on a case-by-case basis.

Note 5. Control efficiencies for a particular condenser will vary for different VOC compounds and depends on both the partial pressure of the pollutant and the operating parameters of the condenser. Efficiencies should be evaluated on a case-by-case basis.

Note 6. Since the overall control efficiency will depend on source specific parameters such as the physical characteristics of the absorbent bed and gaseous stream, the temperature, and the choice of regeneration technique, efficiencies should be evaluated on a case-by-case basis.

Note 7. Depending on the application, control efficiencies may range from 25-99%. Efficiencies should be evaluated on a case-by-case basis.

Note 8. Generic classification; recommend specific technologies be addressed on an individual basis. Two widely used NO<sub>x</sub> control technologies include Selective Catalytic Reduction (SCR) and Selective Noncatalytic Reduction (SNCR). SCR can obtain reductions of 60-90%. Urea based SNCR can achieve reductions of 30-80% and ammonia based 55-85%.

## APPENDIX D: Abbreviations, Conversion Factors, and Spray Painting Transfer Efficiencies

### Abbreviations

ACFM	Actual cubic feet per minute
CAA	Clean Air Act
CAS	Chemical Abstract Service Registry number
CFR	Code of Federal Regulation
CHIEF	Clearinghouse for Inventories and Emission Factors
CO	Carbon Monoxide
DNR	Iowa Department of Natural Resources
gr./dscf	grains per dry standard cubic foot
HAP	Hazardous Air Pollutant
IAC	Iowa Administrative Code
lbs/hr	pounds per hour
lbs/MMBtu	pounds per million British thermal units
lbs/MMcf	pounds per million cubic feet
MACT	Maximum Achievable Control Technology
MSEI	Minor Source Emission Inventory
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industrial Classification System
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
°F	degrees Fahrenheit
PM10	Particulate Matter less than or equal to 10 micrometers in diameter
PM2.5	Particulate Matter less than or equal to 2.5 micrometers in diameter
ppmv	parts per million by volume
SCC	Source Classification Code
SCFM	Standard cubic feet per minute
SDS (formerly MSDS)	Safety Data Sheet (formerly Material Safety Data Sheet)
SIC	Standard Industrial Classification
SLEIS	State and Local Emissions Inventory System
SO2	Sulfur Dioxide
TPY	Tons per year
TSP	Total Suspended Particulates
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

## Conversion Factors\*

\*Additional conversion factors are located in [AP-42, Appendix A.](#)

- 1,050 Btu per ft<sup>3</sup> (Natural Gas)
- 0.0905 MMBtu per gallon (Propane)
- 0.140 MMBtu per gallon (No.2 Fuel Oil)
- 0.140 MMBtu per gallon (Diesel Fuel)
- 1 pound is equal to 7,000 grains
- 1 ton is equal to 2,000 pounds
- 1 gallon is equal to 3.785 liters
- 1 gallon of water is equal to 8.345 pounds
- To convert ounces into pounds multiply by 0.0625
- 56 pounds per bushel (corn)
- 60 pounds per bushel (soybeans)
- To convert g/L to lbs/gal: lbs/gal = (g/L) x .008345
- To convert scfm to acfm at standard pressure:  
Acfm = (actual temp. (°F) + 460) x scfm (standard temp. (°F) + 460)
- standard temperature = 70 °F

## Spray Painting Transfer Efficiencies

Transfer Efficiency as a function of Spraying Method and Sprayed

Method of Spraying	Flat Surface (%)	Table Leg Surface (%)	Bird Cage Surface (%)
Air atomized	50	15	10
Airless	75-80	10	10
Electrostatic:			
Disk	95	90-65	90-95
Airless	80	70	70
Air atomized	75	65	65

Source: Air Pollution Engineering Manual (1992), Table 2, pg. 362

## APPENDIX E: Minor Source Emissions Inventory Paper Forms Completeness Checklist

### MSEI Completeness Checklist

Have you included...

#### Form INV-1 Facility Identification

- Your facility contact person's address and phone number
- Your facility latitude and longitude
- Your responsible official signature
- Your six digit NAICS
- Your statewide company employee count

#### Form INV-2 Release point Description

- Release point Forms for all emission units

#### Form INV-4 Emission Unit Description – Actual Emissions

- The annual throughput for each emission unit
- The actual operating schedule
- Multiple forms if more than one process
- PM-2.5 and Ammonia emissions where applicable

#### Form INV-5 Calculations

- All safety data sheets, if applicable
- For paint booths, a list containing the amount of each paint and solvent used
- All calculations shown in full, including engineering estimates

#### Form INV-6 Facility-Wide Actual Emissions

- Multiple forms if needed for additional pollutants
- Total actual emissions for each pollutant being emitted at the facility
- All pollutants listed on Form INV-4
- Facility-wide actual emissions for each pollutant on INV-6 match the total for each pollutant on all INV-4 forms

#### Other Reminders

- Are your control efficiencies acceptable according to the control efficiency guidance document?
- Did you use the most recent emission factors available?
- Did you address the emissions inventory to the correct location?

Air Quality Bureau  
Wallace Building, 2<sup>nd</sup> Floor  
502 E 9<sup>th</sup> St  
Des Moines IA 50319