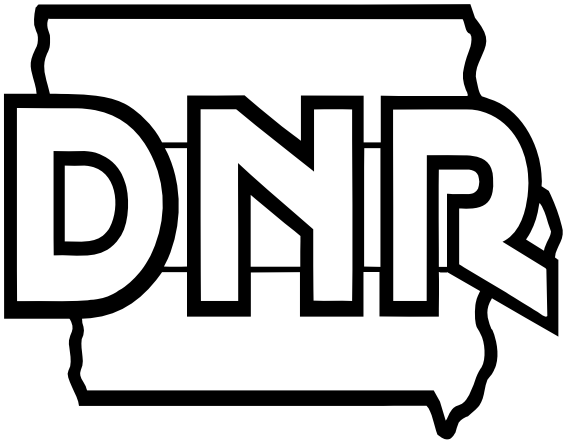
Minor Source Emission Inventory (MSEI) Instructions

(Revised January 2020)



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, 2nd Floor
502 E 9th St
Des Moines IA 50319

Table of Contents

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
Marnie Stein 515-725-9555

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 515-725-9576

Construction Permit Section
1-877-AIR-IOWA (1-877-247-4692)

Compliance Section
Mark Fields 515-725-9526

Hazardous Air Pollutants, MACTs
Casey Laskowski 515-725-9514

SLEIS Helpdesk
SLEIS electronic resources

Stack Test Information
Mark Fields 515-725-9526

Title V Operating Permits
Chris Kjellmark 515-725-9537

Weston Li 515-725-9580

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 10/11/19." 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.

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* ***PM2.5****),* 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 4 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 51) 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 7.

- ***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 details on these emission estimation methods may 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 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.

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 Forms 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 $PM_{2.5}$ and Ammonia emissions are included where applicable on each Form INV-4. If PM_{10} emissions are being reported, remember to also include emissions estimates for $PM_{2.5}$.
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_{10} (particulate matter 10 microns or less in diameter) and total $PM_{2.5}$ (particulate matter 2.5 microns or less in diameter). Total PM_{10} and $PM_{2.5}$ emissions are commonly referred to as primary PM_{10} and $PM_{2.5}$.
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 5 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 as a paper copy or electronically by using the State and Local Emissions Inventory System (SLEIS). 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.

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. 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.

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 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.

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 515-725-9572 or at 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.

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 - 10/11/19." Ethanol and Biodiesel plants should click on "Ethanol and Biodiesel Source Classification Code (SCC) List." Please do not use "99999999" for an SCC number because it does not accurately classify a process or its emissions.

8. **Description of Process:** Provide a written description of the process as defined by the SCC number entered in Box 7 above. If an SCC number and corresponding description is not available for this specific process, please provide your best description of the process.

Annual Throughput

9. **Annual Throughput:** Enter the actual amount of the throughput material (identified in Box 12) that the emission unit processed during the emission year specified in Box 5.

10. **Throughput Unit of Measure:** Enter the units of measure (tons, gallons, bushels, million cubic feet, etc.) of the annual throughput specified in Box 9.

11. **Throughput Type:** Enter the type of throughput that was processed for this emissions process. Acceptable values are "Input," "Output," or "Existing." Examples of each are: I (Input) = Paint used in a surface coating process; O (Output) = Ethanol loaded out to fuel trucks; E (Existing) = A storage pile of sand.

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

Actual Operating Rate/Schedule

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

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

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

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

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

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

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

(8 hrs/day) x (5 days/week) *x* (13 weeks/quarter) = (520 hours/quarter) *x* (3 quarters/year) = 1,560 hours
(4 hrs/day) x (5 days/week) *x* (13 weeks/quarter) = (260 hours/quarter) *x* (1 quarter/year) = 260 hours

Total hours operated = 1,820 hours
Jan, Feb & Dec = 260 hrs/1,820 hrs *x* 100 = 14.2%
Mar, Apr & May = 520 hrs/1,820 hrs *x* 100 = 28.6%
Jun, Jul & Aug = 520 hrs/1,820 hrs *x* 100 = 28.6%
Sep, Oct & Nov = 520 hrs/1,820 hrs *x* 100 = 28.6%

Air Pollution Control Devices

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

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

Actual Emissions

25. **Air Pollutant:** Besides the eight listed air pollutants, there are spaces for six hazardous air pollutants or additional regulated air pollutants. These six boxes are available to list any air contaminants not listed on the form that are emitted from this emissions process. Please indicate the identity of the pollutant by entering the name of the pollutant. If the name of the pollutant is too long to fit, you may use the CAS number. Use additional pages if more than six other pollutants are actually emitted from this emissions process. **Each HAP must be listed individually.**

26. **Emission Factor:** Enter the numerical emission factor (in pounds per units of measure) used to calculate the actual emissions from this emissions process. As noted at the bottom of the form, emission factors can be obtained for some processes from EPA documents or calculated from stack test data, worksheets, or continuous emission monitoring data (see pages 6 & 7 for details). Only use lb/hr emission permit limits for emission factors as a last resort.

27. **Emission Factor Units of Measure:** Enter the emission factor units of measure that correspond to the numerical emission factor utilized in Box 26 and the throughput material (for annual throughput) in box 9. Typical emission factor units of measure are expressed in pounds of pollutant emitted per unit of production or unit of fuel combusted. Examples are pounds/ton, pounds/gallon, pounds/million cubic feet, etc.

28. **Source of Emission Factor:** Indicate the source of the emission factor used in Box 26. See the bottom of Form INV-4 for typical sources of emission factors. When using AP-42 as an emission factor source, please specify the table in which the emission factor was found. If “other” is used as the emission factor source, please specify the emission factor source.

29. **Ash or Sulfur %:** For combustion sources, the ash and/or sulfur percent of the fuel may be needed to calculate emissions of particulate matter and sulfur dioxide. The source of the emission factors will state if this is needed. If needed, enter the percent ash in the fuel in the $PM_{2.5}$ & PM_{10} row and the percent sulfur in the SO_2 row.

30. **Combined Control Efficiency %:** If only one emission control device is used, enter the percent control efficiency. Be sure to enter the control efficiency in the box corresponding to the air pollutant for which that efficiency is appropriate. See pages 62 - 65 in Appendix C for guidance on ***control efficiencies*** that are accepted by DNR.

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

    Control Efficiency = CE1 + CE2 - [(CE1 x 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_{10} 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:

    Control Efficiency = 50 + 80 - [(50 x 80) / 100]
    = 130 - [4000 / 100]
    = 130 - [40]
    = 90%

    Thus, the control efficiency for PM_{10} 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_{10} emission factor is 0.91 pounds of PM_{10} emitted per ton of grain processed and a PM_{10} 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_{10} 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_{10} emitted per year

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

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 2019 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:

(Annual Throughput) x (Emission Factor) x (Control Efficiency) x (conversion factor to tons) = 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 67 in Appendix D.

Example MSEIs

The following examples show how calculations are performed and where data is reported on the inventory forms.

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:

AIR QUALITY BUREAU
Wallace Building, 2nd Floor
502 E 9th St
Des Moines IA 50319

IOWA DNR Minor Source Emission Inventory

FORM INV-1: FACILITY IDENTIFICATION

1. Emissions Inventory Type	☒ Initial Information	☐ Supplemental Information	
2. Facility Identifier	99-99-999		
3. Company/Facility Name	ACME CORPORATION		
4. Number of State-Wide Company Employees	☒ Less Than or Equal to 100	☐ Greater Than 100	
5. Emission Year	2019		
6. Facility Street Address	111 N 2ND 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			

CERTIFICATION STATEMENT

"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		

28. SECONDARY ACTIVITIES

SIC		NAICS	
Activity Description		Activity Description	
SIC		NAICS	
Activity Description		Activity Description	

29. PLANT LOCATION

Latitude (Decimal Degrees)	41.605621
Longitude (Decimal Degrees)	-93.588353

Duplicate this form for EACH RELEASE POINT

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** ☒	**Yes** ☐			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type

Downward-facing Vent	☐		**Indoor Vented**	☐	
Fugitive (specify)	☐		**Vertical**	☐	
Goose Neck	☐		**Vertical with Rain Cap**	☐	
Horizontal	☒				

6. Release Point Description	**WELDING VENT**						
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown**	☐	
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:	☐		**feet**			
Rectangular Dimensions:	☒	**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**	☒ **ACFM** ☐ **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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU1				
7. SCC Number	30905212				
8. Description of Process	GMAW				
Annual Throughput					
9. Annual Throughput	40				
10. Throughput Unit of Measure	1,000 POUNDS				
11. Throughput Type (Input, Output, or Existing)	INPUT				
12. Throughput Material	ELECTRODE E308				
Actual Operating Rate/Schedule					
13. Average Hours/Day	8				
14. Average Days/Week	6				
15. Average Weeks/Year	52				
16. Actual Hours For Year	2,496				
Seasonal Operations					
17. January, February & December (%)	25				
18. March, April & May (%)	25				
19. June, July & August (%)	25				
20. September, October & November (%)	25				
Associated Control Devices					
21. Control Device Identifier					
22. Control Device Description					
23. Control Device Identifier					
24. Control Device Description					

ACTUAL EMISSIONS

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_2							
NOX							
VOC							
CO							
Lead							
Ammonia							

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME CORPORATION**	**2. Form INV-5 Page**	**1**	**of**	**5**
3. Release Point Identifier	EP1				
4. Emission Unit Identifier	**EU1**				
5. SCC Number:	**30905212**				

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

6. Emissions Calculations

PROCESS: GAS METAL ARC WELDING, E308 ELECTRODE
SCC NUMBER: 30905212

ACTUAL THROUGHPUT YEARLY TOTAL: 40,000 POUNDS OF ELECTRODE

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 1,000LBS)*(5.4 LBS/1,000LBS)*(1TON/2,000LBS) = 0.11 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

Duplicate this form for EACH RELEASE POINT

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** ☒	**Yes** ☐			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type

Downward-facing Vent	☐	**Indoor Vented**	☐
Fugitive (specify)	☐	**Vertical**	☐
Goose Neck	☐	**Vertical with Rain Cap**	☒
Horizontal	☐		

6. Release Point Description	**SPRAY PAINT BOOTH STACK**				
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown** ☐
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:	☒	**2.5**	**feet**			
Rectangular Dimensions:	☐		**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**	☒ **ACFM** ☐ **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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU2				
7. SCC Number	40202501				
8. Description of Process	SPRAY PAINTING				

Annual Throughput	
9. Annual Throughput	1,300
10. Throughput Unit of Measure	GALLONS
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	PAINT

Actual Operating Rate/Schedule	
13. Average Hours/Day	8
14. Average Days/Week	5
15. Average Weeks/Year	52
16. Actual Hours For Year	2,080

Seasonal Operations	
17. January, February & December (%)	25
18. March, April & May (%)	25
19. June, July & August (%)	25
20. September, October & November (%)	25

Associated Control Devices	
21. Control Device Identifier	CE2
22. Control Device Description	PANEL FILTER
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2							
NOX							
VOC	2.51	LBS/GAL	MASS BALANCE				1.63
CO							
Lead							
Ammonia							

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME CORPORATION**	**2. Form INV-5 Page**	**2**	**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.

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.

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME CORPORATION**	**2. Form INV-5 Page**	**3**	**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.

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 ACOUNT 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

Duplicate this form for EACH EMISSIONS PROCESS

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.

6. Emissions Calculations

ACTUAL EMISSIONS:
STEP 3 - CALCULATE THE EMISSION FACTOR (CONTINUED)

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

Duplicate this form for EACH RELEASE POINT

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 ☒**	**Yes ☐**			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type

Downward-facing Vent	☐	**Indoor Vented**	☐
Fugitive (specify)	☐	**Vertical**	☐
Goose Neck	☐	**Vertical with Rain Cap**	☒
Horizontal	☐		

6. Release Point Description	**BOILER STACK**				
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown** ☐
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:	☒	**2**	**feet**		
Rectangular Dimensions:	☐		**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**	**☒ ACFM ☐ 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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU3				
7. SCC Number	10200502				
8. Description of Process	#2 FUEL OIL COMB				

Annual Throughput	
9. Annual Throughput	5
10. Throughput Unit of Measure	1000 GALLONS
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	#2 FUEL OIL

Actual Operating Rate/Schedule	
13. Average Hours/Day	24
14. Average Days/Week	7
15. Average Weeks/Year	38
16. Actual Hours For Year	6,384

Seasonal Operations	
17. January, February & December (%)	35
18. March, April & May (%)	21.7
19. June, July & August (%)	15
20. September, October & November (%)	28.3

Associated Control Devices	
21. Control Device Identifier	
22. Control Device Description	
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2	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

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

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

1. Facility Name	ACME CORPORATION	**2. Form INV-6 Page**	1	**of**	1
3. Emission Year	2019				

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

4. Facility-Wide Criteria Air Pollutant and Ammonia Emissions

Air Pollutant	ID or CAS Number	Actual Estimated Emissions (Tons)
PM-2.5	**PM-2.5**	**0.18**
PM-10	**PM-10**	**0.19**
Sulfur Dioxide	**7446-09-5**	**0.14**
Nitrogen Oxides	**NO_x**	**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**

5. Facility-Wide Hazardous Air Pollutant and Other Regulated Air Pollutant Emissions

Please duplicate this form as necessary to include all individual hazardous air pollutants and other regulated air pollutants being emitted at the facility

Air Pollutant	ID or CAS Number	Actual Estimated Emissions (Tons)
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**
Total Hazardous Air Pollutants	**THAP**	**0.61**

AIR QUALITY BUREAU
Wallace Building, 2nd Floor
502 E 9th St
Des Moines IA 50319

IOWA DNR Minor Source Emission Inventory

FORM INV-1: FACILITY IDENTIFICATION

1. Emissions Inventory Type	☒ Initial Information	☐ Supplemental Information	
2. Facility Identifier	99-99-999		
3. Company/Facility Name	ACME HOSPITAL		
4. Number of State-Wide Company Employees	☒ Less Than or Equal to 100	☐ Greater Than 100	
5. Emission Year	2019		
6. Facility Street Address	222 N 2ND 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			

CERTIFICATION STATEMENT

"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		

28. SECONDARY ACTIVITIES

SIC		NAICS	
Activity Description		Activity Description	
SIC		NAICS	
Activity Description		Activity Description	

29. PLANT LOCATION

Latitude (Decimal Degrees)	41.605621
Longitude (Decimal Degrees)	-93.588353

Duplicate this form for EACH RELEASE POINT

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** ☒	**Yes** ☐			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type

Downward-facing Vent	☐	**Indoor Vented**	☐
Fugitive (specify)	☐	**Vertical**	☒
Goose Neck	☐	**Vertical with Rain Cap**	☐
Horizontal	☐		

6. Release Point Description	**BOILER STACK**				
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown** ☐
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:	☒	**1.5**	**feet**		
Rectangular Dimensions:	☐		**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**	☒ **ACFM** ☐ **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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU1				
7. SCC Number	10200602				
8. Description of Process	NATURAL GAS COMB				

Annual Throughput	
9. Annual Throughput	24.5
10. Throughput Unit of Measure	MMCF
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	NATURAL GAS

Actual Operating Rate/Schedule	
13. Average Hours/Day	8
14. Average Days/Week	5
15. Average Weeks/Year	52
16. Actual Hours For Year	2,080

Seasonal Operations	
17. January, February & December (%)	25
18. March, April & May (%)	25
19. June, July & August (%)	25
20. September, October & November (%)	25

Associated Control Devices	
21. Control Device Identifier	
22. Control Device Description	
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2	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

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME HOSPITAL**	**2. Form INV-5 Page**	**1**	**of**	**5**
3. Release Point Identifier	EP1				
4. Emission Unit Identifier	**EU1**				
5. SCC Number:	**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 MMCF) * (7.6 LBS/MMCF) * (1 TON/2,000 LBS) = 0.09 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

Duplicate this form for EACH RELEASE POINT

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** ☒	**Yes** ☐			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type			
Downward-facing Vent	☐	**Indoor Vented**	☐
Fugitive (specify)	☐	**Vertical**	☒
Goose Neck	☐	**Vertical with Rain Cap**	☐
Horizontal	☐		

6. Release Point Description	**DIESEL GENERATOR STACK**						
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown**	☐	
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:	☒	**0.42**	**feet**				
Rectangular Dimensions:	☐		**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**	☒ **ACFM** ☐ **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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU2				
7. SCC Number	20200102				
8. Description of Process	DIESEL COMBUSTIO				

Annual Throughput	
9. Annual Throughput	140
10. Throughput Unit of Measure	MMBTU
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	DIESEL FUEL

Actual Operating Rate/Schedule	
13. Average Hours/Day	1.06
14. Average Days/Week	1
15. Average Weeks/Year	8
16. Actual Hours For Year	8.5

Seasonal Operations	
17. January, February & December (%)	25.5
18. March, April & May (%)	23.5
19. June, July & August (%)	23.5
20. September, October & November (%)	27.5

Associated Control Devices	
21. Control Device Identifier	
22. Control Device Description	
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2	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							

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME HOSPITAL**	**2. Form INV-5 Page**	**2**	**of**	**5**
3. Release Point Identifier	EP2				
4. Emission Unit Identifier	**EU2**				
5. SCC Number:	**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 GALLONS) * (0.14 MMBTU/GALLON) * (0.31 LBS/MMBTU) * (1 TON/2,000 LBS) = 0.02 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

Duplicate this form for EACH RELEASE POINT

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** ☒	**Yes** ☐			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type

Downward-facing Vent	☐	**Indoor Vented**	☐
Fugitive (specify)	☐	**Vertical**	☒
Goose Neck	☐	**Vertical with Rain Cap**	☐
Horizontal	☐		

6. Release Point Description	**DIESEL GENERATOR STACK**				
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown** ☐
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:	☒	**0.42**	**feet**		
Rectangular Dimensions:	☐		**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**	☒ **ACFM** ☐ **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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU3				
7. SCC Number	20200401				
8. Description of Process	DIESEL COMBUSTIO				

Annual Throughput	
9. Annual Throughput	266
10. Throughput Unit of Measure	MMBTU
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	DIESEL FUEL

Actual Operating Rate/Schedule	
13. Average Hours/Day	1.06
14. Average Days/Week	1
15. Average Weeks/Year	8
16. Actual Hours For Year	8.5

Seasonal Operations	
17. January, February & December (%)	25.5
18. March, April & May (%)	23.5
19. June, July & August (%)	23.5
20. September, October & November (%)	27.5

Associated Control Devices	
21. Control Device Identifier	
22. Control Device Description	
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2	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							

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME HOSPITAL**	**2. Form INV-5 Page**	**3**	**of**	**5**
3. Release Point Identifier	EP3				
4. Emission Unit Identifier	**EU3**				
5. SCC Number:	**20200401**				

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: 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 GALLONS) * (0.14 MMBTU/GALLON) * (0.05 LBS/MMBTU) * (1 TON/2,000 LBS) = 0.01 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

Duplicate this form for EACH RELEASE POINT

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** ☒	**Yes** ☐			
If YES, for which release point(s)? List release point identifiers:					

5. Release Point Type

Downward-facing Vent	☐	**Indoor Vented**	☐
Fugitive (specify)	☐	**Vertical**	☒
Goose Neck	☐	**Vertical with Rain Cap**	☐
Horizontal	☐		

6. Release Point Description	**DUAL FUEL GENERATOR STACK**				
7. Operating Status	**Operating**	☒	**Permanently Shutdown**	☐	**Temporarily Shutdown** ☐
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:	☒	**1.25**	**feet**		
Rectangular Dimensions:	☐		**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**	☐ **ACFM** ☒ **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			

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU4				
7. SCC Number	20200401				
8. Description of Process	DIESEL COMBUSTIO				

Annual Throughput	
9. Annual Throughput	2,100
10. Throughput Unit of Measure	MMBTU
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	DIESEL FUEL

Actual Operating Rate/Schedule	
13. Average Hours/Day	2.5
14. Average Days/Week	4
15. Average Weeks/Year	20
16. Actual Hours For Year	200

Seasonal Operations	
17. January, February & December (%)	10
18. March, April & May (%)	30
19. June, July & August (%)	40
20. September, October & November (%)	20

Associated Control Devices	
21. Control Device Identifier	
22. Control Device Description	
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2	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							

Duplicate this form for EACH EMISSIONS PROCESS

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	2019				
6. Emission Unit Identifier	EU4				
7. SCC Number	20200402				
8. Description of Process	DUAL FUEL COMBUS				

Annual Throughput	
9. Annual Throughput	2,100
10. Throughput Unit of Measure	MMBTU
11. Throughput Type (Input, Output, or Existing)	INPUT
12. Throughput Material	DUAL FUEL

Actual Operating Rate/Schedule	
13. Average Hours/Day	2.5
14. Average Days/Week	4
15. Average Weeks/Year	20
16. Actual Hours For Year	200

Seasonal Operations	
17. January, February & December (%)	10
18. March, April & May (%)	30
19. June, July & August (%)	40
20. September, October & November (%)	20

Associated Control Devices	
21. Control Device Identifier	
22. Control Device Description	
23. Control Device Identifier	
24. Control Device Description	

ACTUAL EMISSIONS

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_2	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							

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME HOSPITAL**	**2. Form INV-5 Page**	**4**	**of**	**5**
3. Release Point Identifier	EP4				
4. Emission Unit Identifier	**EU4**				
5. SCC Number:	**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 GALLONS * 0.14 MMBTU/GAL * 0.05 LBS/MMBTU * 1 TON/2,000 LBS = 0.05 TONS

PM-10:
15,000 GALLONS * 0.14 MMBTU/GAL * 0.14 LBS/MMBTU * 1 TON/2,000 LBS = 0.15 TONS

SO2:
15,000 GALLONS * 0.14 MMBTU/GAL * 1.01 LBS/MMBTU * 0.5 (SULFUR CONTENT) * 1 TON/2,000 LBS = 0.53 TONS

NOX:
15,000 GALLONS * 0.14 MMBTU/GAL * 3.2 LBS/MMBTU * 1 TON/2,000 LBS = 3.36 TONS

VOC:
15,000 GALLONS * 0.14 MMBTU/GAL * 0.0819 LBS/MMBTU * 1 TON/2,000 LBS = 0.09 TONS

CO:
15,000 GALLONS * 0.14 MMBTU/GAL * 0.85 LBS/MMBTU * 1 TON/2,000 LBS = 0.89 TONS

Duplicate this form for EACH EMISSIONS PROCESS

FORM INV-5 CALCULATIONS

1. Company/Facility Name	**ACME HOSPITAL**	**2. Form INV-5 Page**	**5**	**of**	**5**
3. Release Point Identifier	EP4				
4. Emission Unit Identifier	**EU4**				
5. SCC Number:	**20200402**				

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

6. Emissions Calculations

PROCESS: DUAL FUEL COMBUSTION > 600 BHP

SCC NUMBER: 20200402

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

*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)

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

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

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

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

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

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

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

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

FORM INV-6 FACILITY-WIDE ACTUAL EMISSIONS

1. Facility Name	ACME HOSPITAL	2. Form INV-6 Page	1	of	1
3. Emission Year	2019				

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

4. Facility-Wide Criteria Air Pollutant and Ammonia Emissions

Air Pollutant	ID or CAS Number	Actual Estimated Emissions (Tons)
PM-2.5	PM-2.5	0.23
PM-10	PM-10	0.34
Sulfur Dioxide	7446-09-5	0.66
Nitrogen Oxides	NO_x	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

5. Facility-Wide Hazardous Air Pollutant and Other Regulated Air Pollutant Emissions

Please duplicate this form as necessary to include all individual hazardous air pollutants and other regulated air pollutants being emitted at the facility

Air Pollutant	ID or CAS Number	Actual Estimated Emissions (Tons)
Hexane	110-54-3	0.02
Benzene	71-43-2	0.00
Formaldehyde	50-00-0	0.01
Toluene	108-88-3	0.01
Total Hazardous Air Pollutants	THAP	0.04

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 $PM_{2.5}$. 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.

Iowacleanair.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 page 51. 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. NAICS allows for the identification of 1,063 industries compared to the 1,004 found in the SIC system.

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 (O3) 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 (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight.

Particulate Matter of aerodynamic diameter less than or equal to 10 micrometers (PM10) 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 (PM2.5) 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 that replaced SPARS after the 2015 emissions reporting cycle.

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

$PM_{2.5}$	Particulate Matter less than or equal to 2.5 micrometers in diameter
PM_{10}	Particulate Matter less than or equal to 10 micrometers in diameter
SO_2	Sulfur Dioxide
NO_x	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); parachlorobenzotrifluoride (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 ($C_4F_9OCH_3$ or HFE-7100); 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OCH_3$); 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$ or HFE-7200); 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OC_2H_5$); methyl acetate; 1,1,1,2,2,3,3-heptafluoro-3-methoxy-propane (n-C3F7OCH3, HFE-7000); 3-ethoxy-1,1,1,2,3,4,4,5,5,6,6,6-dodecafluoro-2-(trifluoromethyl) hexane (HFE-7500); 1,1,1,2,3,3,3-heptafluoropropane (HFC 227ea); methyl formate (HCOOCH3); 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_2OCF_2H (HFE-134); $HCF_2OCF_2OCF_2H$ (HFE-236cal2); $HCF_2OCF_2CF_2OCF_2H$ (HFE-338pcc13); $HCF_2OCF_2OCF_2CF_2OCF_2H$ (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
- HCF2OCF2H (HFE-134)----March 14, 2013
- HCF2OCF2OCF2H (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-trifluoroethooxy) 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
A	
75-07-0	Acetaldehyde
60-35-5	Acetamide
75-05-8	Acetonitrile
98-86-2	Acetophenone
53-96-3	2-Acetylaminofluorene
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
107-05-1	Allyl chloride
92-67-1	4-Aminobiphenyl
62-53-3	Aniline
90-04-0	o-Anisidine
0	Antimony Compounds
0	Arsenic Compounds
1332-21-4	Asbestos (friable)
B	
71-43-2	Benzene
92-87-5	Benzidine
98-07-7	Benzoic trichloride
100-44-7	Benzyl chloride
0	Beryllium Compounds
92-52-4	Biphenyl
111-44-4	Bis(2-chloroethyl) ether
542-88-1	Bis(chloromethyl) ether
75-25-2	Bromoform
74-83-9	Bromomethane (Methyl Bromide)
106-99-0	1,3-Butadiene
106-88-7	1,2-Butylene oxide (1,2-Epoxybutane)
C	
0	Cadmium Compounds
156-62-7	Calcium cyanamide
133-06-2	Captan
63-25-2	Carbaryl
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
463-58-1	Carbonyl sulfide
120-80-9	Catechol
CAS Number	Chemical Name
133-90-4	Chloramben
57-74-9	Chlordane
7782-50-5	Chlorine
79-11-8	Chloroacetic acid
532-27-4	2-Chloroacetophenone
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate
75-00-3	Chloroethane (Ethyl chloride)
67-66-3	Chloroform
74-87-3	Chloromethane (Methyl chloride)
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene
0	Chromium Compounds
0	Cobalt Compounds
0	Coke Oven Emissions
1319-77-3	Cresol/Cresylic acid (isomers/mixtures)
108-39-4	m-Cresol
95-48-7	o-Cresol
106-44-5	p-Cresol
98-82-8	Cumene
0	Cyanide Compounds
D	
94-75-7	2,4-D, salts and esters
3547-04-4	DDE
117-81-7	Di(2-ethylhexyl) phthalate (DEHP)
334-88-3	Diazomethane
132-64-9	Dibenzofuran
96-12-8	1,2-Dibromo-3-chloropropane
106-93-4	1,2-Dibromoethane (Ethylene dibromide)
84-74-2	Dibutyl phthalate
106-46-7	1,4-Dichlorobenzene(p)
91-94-1	3,3'-Dichlorobenzidine
75-34-3	1,1-Dichloroethane (Ethylidene dichloride)
107-06-2	1,2-Dichloroethane (Ethylene dichloride)
75-09-2	Dichloromethane (Methylene chloride)
78-87-5	1,2-Dichloropropane (Propylene dichloride)
542-75-6	1,3-Dichloropropylene
62-73-7	Dichlorvos
111-42-2	Diethanolamine
121-69-7	N,N-Dimethylaniline
64-67-5	Diethyl sulfate
119-90-4	3,3'-Dimethoxybenzidine
60-11-7	4-Dimethylaminoazobenzene
119-93-7	3,3'-Dimethylbenzidine
68-12-2	Dimethyl formamide
57-14-7	1,1-Dimethyl hydrazine
534-52-1	4,6-Dinitro-o-cresol

CAS Number	Chemical Name
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
E	
106-89-8	Epichlorohydrin
140-88-5	Ethyl acrylate
100-41-4	Ethylbenzene
107-21-1	Ethylene glycol
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
151-56-4	Ethyleneimine
F	
0	Fine Mineral Fibers
50-00-0	Formaldehyde
G	
Glycol Ethers (See page 61)	
H	
76-44-8	Heptachlor
87-68-3	Hexachloro-1,3-butadiene
118-74-1	Hexachlorobenzene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
822-06-0	Hexamethylene-1,6-diisocyanate
680-31-9	Hexamethylphosphoramide
110-54-3	Hexane
302-01-2	Hydrazine
7647-01-0	Hydrochloric acid
7664-39-3	Hydrogen fluoride
123-31-9	Hydroquinone
I	
78-59-1	Isophorone
L	
0	Lead Compounds
58-89-9	Lindane
M	
108-31-6	Maleic anhydride
0	Manganese Compounds
0	Mercury Compounds
67-56-1	Methanol
72-43-5	Methoxychlor
60-34-4	Methyl hydrazine
74-88-4	Methyl iodide
108-10-1	Methyl isobutyl ketone
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
1634-04-4	Methyl tert-butyl ether
101-14-4	4,4'-Methylenebis(2-chloroaniline)
101-68-8	Methylenebis (phenylisocyanate)
CAS Number	Chemical Name
101-77-9	4,4'-Methylenedianiline
N	
91-20-3	Naphthalene
0	Nickel Compounds
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl
100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
62-75-9	N-Nitrosodimethylamine
59-89-2	N-Nitrosomorpholine
684-93-5	N-Nitroso-N-methylurea
P	
56-38-2	Parathion
87-86-5	Pentachlorophenol
108-95-2	Phenol
106-50-3	p-Phenylenediamine
75-44-5	Phosgene
7803-51-2	Phosphine
7723-14-0	Phosphorus (yellow or white)
85-44-9	Phthalic anhydride
85-44-9	Phthalic anhydride
1336-36-3	Polychlorinated biphenyls
0	Polycyclic Organic Matter
1120-71-4	Propane sultone
123-38-6	Propionaldehyde
57-57-8	beta-Propiolactone
114-26-1	Propoxur
75-56-9	Propylene oxide
75-55-8	Propyleneimine
Q	
91-22-5	Quinoline
106-51-4	Quinone
82-68-8	Quintozene
R	
0	Radionuclides (including Radon)
S	
0	Selenium Compounds
100-42-5	Styrene
96-09-3	Styrene oxide

CAS Number	Chemical Name
T	
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
79-34-5	1,1,2,2-Tetrachloroethane
127-18-4	Tetrachloroethylene
7550-45-0	Titanium tetrachloride
108-88-3	Toluene
CAS Number	Chemical Name
95-80-7	2,4-Toluene diamine (2,4-Diaminotoluene)
584-84-9	2,4-Toluene diisocyanate
95-53-4	o-Toluidine
800-135-2	Toxaphene
120-82-1	1,2,4-Trichlorobenzene
71-55-6	1,1,1-Trichloroethane
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
121-44-8	Triethylamine
1582-09-8	Trifluralin
540-84-1	2,2,4-Trimethylpentane
CAS Number	Chemical Name
U	
51-79-6	Urethane
V	
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride
X	
1330-20-7	Xylene (mixed isomers)
108-38-3	m-Xylene
95-47-6	o-Xylene
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 61)	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
95-95-4	2,4,5-Trichlorophenol
96-09-3	Styrene oxide
96-12-8	1,2-Dibromo-3-chloropropane
96-45-7	Ethylene thiourea
98-07-7	Benzoic trichloride
98-82-8	Cumene
98-86-2	Acetophenone
98-95-3	Nitrobenzene
100-02-7	4-Nitrophenol
100-41-4	Ethylbenzene
100-42-5	Styrene
100-44-7	Benzyl chloride
101-14-4	4,4'-Methylenebis(2-chloroaniline)
101-68-8	Methylenebis (phenylisocyanate)
101-77-9	4,4'-Methylenedianiline
106-42-3	p-Xylene
106-44-5	p-Cresol
106-46-7	1,4-Dichlorobenzene(p)
106-50-3	p-Phenylenediamine
106-51-4	Quinone
106-88-7	1,2-Butylene oxide (1,2-Epoxybutane)
106-89-8	Epichlorohydrin
106-93-4	1,2-Dibromoethane (Ethylene dibromide)
106-99-0	1,3-Butadiene
107-02-8	Acrolein
107-05-1	Allyl chloride
107-06-2	1,2-Dichloroethane (Ethylene dichloride)
107-13-1	Acrylonitrile
107-21-1	Ethylene glycol
107-30-2	Chloromethyl methyl ether
108-05-4	Vinyl acetate
108-10-1	Methyl isobutyl ketone
108-31-6	Maleic anhydride
108-38-3	m-Xylene
108-39-4	m-Cresol
108-88-3	Toluene
108-90-7	Chlorobenzene
108-95-2	Phenol
110-54-3	Hexane
111-42-2	Diethanolamine
111-44-4	Bis(2-chloroethyl) ether
114-26-1	Propoxur
117-81-7	Di(2-ethylhexyl) phthalate (DEHP)
118-74-1	Hexachlorobenzene
119-90-4	3,3'-Dimethoxybenzidine
119-93-7	3,3'-Dimethylbenzidine
120-80-9	Catechol
120-82-1	1,2,4-Trichlorobenzene
121-14-2	2,4-Dinitrotoluene
121-44-8	Triethylamine
121-69-7	N,N-Dimethylaniline
122-66-7	1,2-Diphenylhydrazine
123-31-9	Hydroquinone
123-38-6	Propionaldehyde
123-91-1	1,4-Dioxane
126-99-8	Chloroprene
127-18-4	Tetrachloroethylene
131-11-3	Dimethyl phthalate
132-64-9	Dibenzofuran
133-06-2	Captan
133-90-4	Chloramben
140-88-5	Ethyl acrylate
151-56-4	Ethyleneimine
156-62-7	Calcium cyanamide
302-01-2	Hydrazine
334-88-3	Diazomethane
463-58-1	Carbonyl sulfide
510-15-6	Chlorobenzilate
532-27-4	2-Chloroacetophenone
534-52-1	4,6-Dinitro-o-cresol
540-84-1	2,2,4-Trimethylpentane
542-75-6	1,3-Dichloropropylene
542-88-1	Bis(chloromethyl) ether
584-84-9	2,4-Toluene diisocyanate
593-60-2	Vinyl bromide
624-83-9	Methyl isocyanate
680-31-9	Hexamethylphosphoramide
684-93-5	N-Nitroso-N-methylurea
822-06-0	Hexamethylene-1,6-diisocyanate
1120-71-4	Propane sultone
1319-77-3	Cresol/Cresylic acid (isomers and mixture)
1330-20-7	Xylene (mixed isomers)
1332-21-4	Asbestos (friable)
1336-36-3	Polychlorinated biphenyls
1582-09-8	Trifluralin
1634-04-4	Methyl tert-butyl ether
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
3547-04-4	DDE
7550-45-0	Titanium tetrachloride
7647-01-0	Hydrochloric acid
7664-39-3	Hydrogen fluoride
7723-14-0	Phosphorus (yellow or white)
CAS Number	Chemical Name
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 monooctyl 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

The level of air emissions from a facility depends on many factors. For many industrial processes, technical information is available to assist in determining the quantity and types of air pollutants that a process would create and thus be emitted without any control. This information on the quantity of air pollutants generated during a particular process is referred to as an emission factor. Facilities can control the amount of pollutants emitted to the atmosphere from these processes 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 $PM_{2.5}$ control efficiency is currently assumed equal to the PM_{10} control efficiency due to a lack of documentation. If a facility has any questions regarding $PM_{2.5}$ control efficiency, please call the emissions inventory staff.

Control Efficiency Table

Control Device or Practice	Control Efficiency (%) TSP	PM_{10}	SOx	NOx	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[a]	--	--	--	--	--	2[a]
Centrifugal Collector (cyclone)-high efficiency*	95[c]	80[a]	--	--	--	--	65[a]
Centrifugal Collector (cyclone)-med efficiency*	75[c]	50[a]	--	--	--	--	40[a]
Centrifugal Collector (cyclone)-low efficiency*	35[c]	10[a]	--	--	--	--	8[a]
Electrostatic Precipitator-high efficiency**	95[a]	95[a]	--	--	--	--	75[a]
Electrostatic Precipitator-medium efficiency**	80[a]	80[a]	--	--	--	--	65[a]
Electrostatic Precipitator-low efficiency**	70[a]	70[a]	--	--	--	--	55[a]
Fabric Filter	99[a]	95[c]	--	--	--	--	80[a]
Catalytic Afterburner	--	--	--	--	95[c]	--	--
Direct Flame Afterburner	--	--	--	--	95[c]	--	--
Flaring	--	--	--	--	90[a]	--	--
Low NOx Burners	--	--	--	note 3	--	--	--
Staged Combustion	--	--	--	40[a]	--	--	--
Flue Gas Recirculation	--	--	--	50[a]	--	--	--
Reduced Combustion Air Preheat	--	--	--	note 4	--	--	--
Steam or Water Injection	--	--	--	65[a]	--	--	--
Low Excess Air Firing	--	--	--	30[a]	--	--	--
Fuel with low Nitrogen Content	--	--	--	50[a]	--	--	--
Sulfuric Acid Plant-Single Contact Process	--	--	50[a]	--	--	--	--
Sulfuric Acid Plant-Double Contact Process	--	--	95[a]	--	--	--	--
Vapor Recovery System (Condensers)	--	--	--	--	note 5	--	--
Activated Carbon Adsorption	--	--	note 6				--
Gas Absorption Column-packed	90[a]	90[a]	note 2				--
Gas Absorption Column-tray type	25[a]	25[a]	note 2				--
Spray Tower	20[a]	20[a]	note 2				--
Venturi Scrubber	90[a]	90[a]	note 2				--
Impingement Plate Scrubber	note 7		--	--	--	--	--
Mat or Panel Filter	90[c]	90[c]	--	--	--	--	--
Dust Suppression by Water Spray	40[a]	40[a,d]	--	--	--	--	--
Dust Suppression by Chemical or Wetting Agents	40[a]	40[a,d]	--	--	--	--	--
Catalytic Reduction	--	--	--	note 8	--	--	--
Wet Lime Slurry Scrubbing	--	--	85[c]	--	--	--	--
Multiple Cyclone w/o Fly Ash Reinjection	80[a]	80[a]	--	--	--	--	65[a]
Multiple Cyclone with Fly Ash Reinjection	50[a]	50[a]	--	--	--	--	40[a]
Water Curtain	50[c]	10[a]	--	--	--	--	--

[a]Control efficiency was taken from a literature review and developmental work by the Minnesota Pollution Control Agency

[b]Control efficiency was taken from AP-42
[c]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
[d]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:

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

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 NOx burners (LNB) have been developed by many boiler and burner manufacturers for both new and retrofit applications. Low NOx burners limit NOx 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_2 in the primary combustion zone, which limits fuel NOx formation;
2. Reduced flame temperature, which limits thermal NOx formation; and
3. Reduced residence time at peak temperature, which limits thermal NOx formation.

The amount of NOx 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 NOx 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 NOx 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^3 (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 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, 2nd Floor
502 E 9th St
Des Moines IA 50319