

Example Calculations and Forms

Introduction

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

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

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

Actual Emissions

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

General equation for calculating actual emissions with control equipment:

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

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

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

Control Efficiency is the control equipment pollutant removal efficiency.

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

Example MSEIs

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

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

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

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

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

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



IOWA DNR Minor Source Emission Inventory

FORM INV-1: FACILITY IDENTIFICATION

1. Emissions Inventory Type		<input checked="" type="checkbox"/> Initial Information		<input type="checkbox"/> Supplemental Information	
2. Facility Identifier		99-99-999			
3. Company/Facility Name		ACME CORPORATION			
4. Number of State-Wide Company Employees		<input checked="" type="checkbox"/> Less Than or Equal to 100		<input type="checkbox"/> Greater Than 100	
5. Emission Year		2021			
6. Facility Street Address		111 N 2 ND 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			

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME CORPORATION			2. Form INV-4 Page		1	of	3
3. Release Point Identifier		EP1							
4. Release Point Description		WELDING VENT							
5. Emission Year		2021							
6. Emission Unit Identifier		EU1							
7. SCC Number		30905212							
8. Description of Process		GMAW							
Annual Throughput									
9. Annual Throughput		40							
10. <u>Throughput Unit of Measure</u>		1,000 POUNDS							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		ELECTRODE E308							
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									

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					
$(40\ 1,000\text{LBS}) \times (5.4\ \text{LBS}/1,000\text{LBS}) \times (1\text{TON}/2,000\text{LBS}) = 0.11\ \text{TONS}$					
THE SAME FORMULA IS USED TO CALCULATE THE OTHER POLLUTANTS WITH THEIR CORRESPONDING EMISSION FACTORS.					
ACTUAL CHROMIUM TONS = 0.01					
ACTUAL MANGANESE TONS = 0.01 TONS					
ACTUAL NICKEL TONS = 0.00 TONS					

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME CORPORATION			2. Form INV-4 Page		2	of	3
3. Release Point Identifier		EP2							
4. Release Point Description		PAINT BOOTH							
5. Emission Year		2021							
6. Emission Unit Identifier		EU2							
7. SCC Number		40202501							
8. Description of Process		SPRAY PAINTING							
Annual Throughput									
9. Annual Throughput		1,300							
10. <u>Throughput Unit of Measure</u>		GALLONS							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		PAINT							
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									

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.

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.

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

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

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

= 1.63 TONS OF VOC

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

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

= 0.32 TONS OF XYLENE

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

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

= 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.

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

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

= 0.07 TONS

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

STEP 3 - CALCULATE THE EMISSION FACTOR

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

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

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

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

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

FORM INV-5 CALCULATIONS

1. Company/Facility Name	ACME CORPORATION	2. Form INV-5 Page	4	of	5
3. Release Point Identifier	EP2				
4. Emission Unit Identifier	EU2				
5. SCC Number:	40202501				
Calculations are provided in support of information reported on Form INV – 4 for the SCC Number listed above.					
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					

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME CORPORATION			2. Form INV-4 Page		3	of	3
3. Release Point Identifier		EP3							
4. Release Point Description		BOILER STACK							
5. Emission Year		2021							
6. Emission Unit Identifier		EU3							
7. SCC Number		10200502							
8. Description of Process		#2 FUEL OIL COMB							
Annual Throughput									
9. Annual Throughput		5							
10. <u>Throughput Unit of Measure</u>		1000 GALLONS							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		#2 FUEL OIL							
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		

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																					
<table> <thead> <tr> <th>POLLUTANT</th> <th>EMISSION FACTORS FROM AP-42, CHAPTER 12.19</th> </tr> </thead> <tbody> <tr> <td>PM-2.5</td> <td>1.55 LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> <tr> <td>PM-10</td> <td>2.3 LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> <tr> <td>SO2</td> <td>142(S) LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> <tr> <td>NOX</td> <td>20 LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> <tr> <td>VOC</td> <td>0.2 LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> <tr> <td>CO</td> <td>5 LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> <tr> <td>AMMONIA</td> <td>0.8 LBS/1,000 GALLONS OF #2 FUEL OIL</td> </tr> </tbody> </table>						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
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	2021				
The facility-wide actual emission totals for each air pollutant may be calculated by summing the "actual estimated emissions" (column 32) on the INV-4 forms					
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			



IOWA DNR Minor Source Emission Inventory

FORM INV-1: FACILITY IDENTIFICATION

1. Emissions Inventory Type		<input checked="" type="checkbox"/> Initial Information		<input type="checkbox"/> Supplemental Information	
2. Facility Identifier		99-99-999			
3. Company/Facility Name		ACME HOSPITAL			
4. Number of State-Wide Company Employees		<input checked="" type="checkbox"/> Less Than or Equal to 100		<input type="checkbox"/> Greater Than 100	
5. Emission Year		2021			
6. Facility Street Address		222 N 2 ND 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			

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		1	of	5
3. Release Point Identifier		EP1							
4. Release Point Description		BOILER STACK							
5. Emission Year		2021							
6. Emission Unit Identifier		EU1							
7. SCC Number		10200602							
8. Description of Process		NATURAL GAS COMB							
Annual Throughput									
9. Annual Throughput		24.5							
10. <u>Throughput Unit of Measure</u>		MMCF							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		NATURAL GAS							
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		

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																							
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">POLLUTANT</th> <th style="text-align: left;">EMISSION FACTORS FROM WEBFIRE (SCC NUMBER 10200602)</th> </tr> </thead> <tbody> <tr> <td>PM-2.5</td> <td>7.6 LBS/MMCF</td> </tr> <tr> <td>PM-10</td> <td>7.6 LBS/MMCF</td> </tr> <tr> <td>SO2</td> <td>0.6 LBS/MMCF</td> </tr> <tr> <td>NOX</td> <td>100 LBS/MMCF</td> </tr> <tr> <td>VOC</td> <td>5.5 LBS/MMCF</td> </tr> <tr> <td>CO</td> <td>84 LBS/MMCF</td> </tr> <tr> <td>AMMONIA</td> <td>3.2 LBS/MMCF</td> </tr> <tr> <td>HEXANE</td> <td>1.8 LBS/MMCF</td> </tr> </tbody> </table>						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
POLLUTANT	EMISSION FACTORS FROM WEBFIRE (SCC NUMBER 10200602)																						
PM-2.5	7.6 LBS/MMCF																						
PM-10	7.6 LBS/MMCF																						
SO2	0.6 LBS/MMCF																						
NOX	100 LBS/MMCF																						
VOC	5.5 LBS/MMCF																						
CO	84 LBS/MMCF																						
AMMONIA	3.2 LBS/MMCF																						
HEXANE	1.8 LBS/MMCF																						
CALCULATIONS																							
ACTUAL ANNUAL EMISSIONS																							
ACTUAL PM-2.5 TONS																							
$(24.5 \text{ MMCF}) * (7.6 \text{ LBS/MMCF}) * (1 \text{ TON}/2,000 \text{ LBS}) = 0.09 \text{ TONS}$																							
ACTUAL PM-10 TONS = 0.09 TONS																							
ACTUAL SO2 TONS = 0.01 TONS																							
ACTUAL NOX TONS = 1.23 TONS																							
ACTUAL VOC TONS = 0.07 TONS																							
ACTUAL CO TONS = 1.03 TONS																							
ACTUAL AMMONIA TONS = 0.04 TONS																							
ACTUAL HEXANE TONS = 0.02 TONS																							

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		2	of	5
3. Release Point Identifier		EP2							
4. Release Point Description		DIESEL GENERATOR							
5. Emission Year		2021							
6. Emission Unit Identifier		EU2							
7. SCC Number		20200102							
8. Description of Process		DIESEL COMBUSTIO							
Annual Throughput									
9. Annual Throughput		140							
10. <u>Throughput Unit of Measure</u>		MMBTU							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		DIESEL FUEL							
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									

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

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

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

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page	3	of	5
3. Release Point Identifier		EP3						
4. Release Point Description		DIESEL GENERATOR						
5. Emission Year		2021						
6. Emission Unit Identifier		EU3						
7. SCC Number		20200401						
8. Description of Process		DIESEL COMBUSTIO						
Annual Throughput								
9. Annual Throughput		266						
10. <u>Throughput Unit of Measure</u>		MMBTU						
11. Throughput Type (Input, Output, or Existing)		INPUT						
12. <u>Throughput Material</u>		DIESEL FUEL						
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								

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					
$(1,900 \text{ GALLONS}) * (0.14 \text{ MMBTU/GALLON}) * (0.05 \text{ LBS/MMBTU}) * (1 \text{ TON}/2,000 \text{ LBS}) = 0.01 \text{ TONS}$					
ACTUAL PM-10 TONS = 0.02 TONS					
ACTUAL SO2 TONS = 0.07 TONS					
ACTUAL NOX TONS = 0.43 TONS					
ACTUAL VOC TONS = 0.01 TONS					
ACTUAL CO TONS = 0.11 TONS					

FORM INV-2 EMISSION POINT DESCRIPTION

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

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page		4	of	5
3. Release Point Identifier		EP4							
4. Release Point Description		DUAL FUEL GENERA							
5. Emission Year		2021							
6. Emission Unit Identifier		EU4							
7. SCC Number		20200401							
8. Description of Process		DIESEL COMBUSTIO							
Annual Throughput									
9. Annual Throughput		2,100							
10. <u>Throughput Unit of Measure</u>		MMBTU							
11. Throughput Type (Input, Output, or Existing)		INPUT							
12. <u>Throughput Material</u>		DIESEL FUEL							
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									

FORM INV-4 PROCESS DESCRIPTION - ACTUAL EMISSIONS

1. Company/Facility Name		ACME HOSPITAL			2. Form INV-4 Page	5	of	5
3. Release Point Identifier		EP4						
4. Release Point Description		DUAL FUEL GENERA						
5. Emission Year		2021						
6. Emission Unit Identifier		EU4						
7. SCC Number		20200402						
8. Description of Process		DUAL FUEL COMBUS						
Annual Throughput								
9. Annual Throughput		2,100						
10. <u>Throughput Unit of Measure</u>		MMBTU						
11. Throughput Type (Input, Output, or Existing)		INPUT						
12. <u>Throughput Material</u>		DUAL FUEL						
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								

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					
<p>PROCESS: INTERNAL DIESEL COMBUSTION > 600 BHP SCC NUMBER: 20200401</p> <p>FUEL: DIESEL: 0.14 MMBTU/GALLON</p> <p>ACTUAL THROUGHPUT - YEARLY TOTAL: 15,000 GALLONS</p> <p>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)</p> <p>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)</p> <p>PM-2.5: 15,000 GALLONS * 0.14 MMBTU/GAL * 0.05 LBS/MMBTU * 1 TON/2,000 LBS = 0.05 TONS</p> <p>PM-10: 15,000 GALLONS * 0.14 MMBTU/GAL * 0.14 LBS/MMBTU * 1 TON/2,000 LBS = 0.15 TONS</p> <p>SO2: 15,000 GALLONS * 0.14 MMBTU/GAL * 1.01 LBS/MMBTU * 0.5 (SULFUR CONTENT) * 1 TON/2,000 LBS = 0.53 TONS</p> <p>NOX: 15,000 GALLONS * 0.14 MMBTU/GAL * 3.2 LBS/MMBTU * 1 TON/2,000 LBS = 3.36 TONS</p> <p>VOC: 15,000 GALLONS * 0.14 MMBTU/GAL * 0.0819 LBS/MMBTU * 1 TON/2,000 LBS = 0.09 TONS</p> <p>CO: 15,000 GALLONS * 0.14 MMBTU/GAL * 0.85 LBS/MMBTU * 1 TON/2,000 LBS = 0.89 TONS</p>					

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					
<p>PROCESS: DUAL FUEL COMBUSTION > 600 BHP SCC NUMBER: 20200402</p> <p>FUEL: DUAL FUEL: (95% NATURAL GAS AND 5% DIESEL FUEL) ACTUAL THROUGHPUT - YEARLY TOTAL: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FOOT) + (750 GALLONS * 0.14 MMBTU/GAL) = 2,100 MMBTU</p> <p>*APPLICABLE POLLUTANTS: PM-2.5, PM-10, SO2, NOX, VOC, CO, FORMALDEHYDE, AND TOLUENE (THESE POLLUTANTS HAVE ACTUAL EMISSIONS OF GREATER THAN 0.005 TONS/YR FOR THIS ENGINE) *POLLUTANTS EXEMPT FROM REPORTING THIS PROCESS: BENZENE, XYLENE, NAPHTHALENE, AND STYRENE (THESE EMISSION FACTORS, WHEN COMBINED WITH THE ACTUAL THROUGHPUT, LEAD TO EMISSIONS OF LESS THAN 0.005 TONS)</p> <p>PM-2.5: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.0556 LBS/MMBTU * 1 TON/2,000 LBS = 0.06 TONS</p> <p>PM-10: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.0573 LBS/MMBTU * 1 TON/2,000 LBS = 0.06 TONS</p> <p>SO2: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.05 LBS/MMBTU * 1 TON/2,000 LBS = 0.05 TONS</p> <p>NOX: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 2.7 LBS/MMBTU * 1 TON/2,000 LBS = 2.84 TONS</p> <p>VOC: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.2 LBS/MMBTU * 1 TON/2,000 LBS = 0.21 TONS</p> <p>CO: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 1.16 LBS/MMBTU * 1 TON/2,000 LBS = 1.22 TONS</p> <p>FORMALDEHYDE: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.0054 LBS/MMBTU * 1 TON/2,000 LBS = 0.01 TONS</p> <p>TOLUENE: (1,900,000 CUBIC FEET * 0.00105 MMBTU/CUBIC FEET) + (750 GALLONS * 0.14 MMBTU/GAL) * 0.00523 LBS/MMBTU * 1 TON/2,000 LBS = 0.01 TONS</p>					

FORM INV-6 FACILITY-WIDE ACTUAL EMISSIONS

1. Facility Name	ACME HOSPITAL	2. Form INV-6 Page	1	of	1
3. Emission Year	2021				
The facility-wide actual emission totals for each air pollutant may be calculated by summing the “actual estimated emissions” (column 32) on the INV-4 forms					
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			