

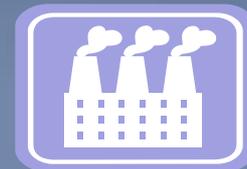
Creating Your Emissions Inventory



Where to start?

How will I recognize an emissions unit?

- An emission release point
- At least one process that produces air emissions
- One or more pollutants



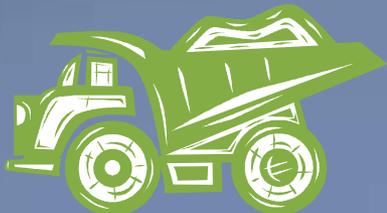
Omissions in Emissions!

- Obvious emission units:

engine, tanks, furnace

- Not so obvious:

Upset and start ups, fugitive leaks,
solvent use, haul roads/fugitive dust
sources



Regulations

Oklahoma Administrative Code (OAC) 252:100

Subchapter 5 – Emissions Inventory

Permit Exempt and De Minimus Facilities
not required to submit

Subchapter 7 – Minor Permits

Subchapter 8 – Major Permits

Resources

- Oklahoma DEQ Website

<http://www.deq.state.ok.us/>

- EPA'S Clearinghouse for Inventories & Emission Factors

<http://www.epa.gov/ttn/chief/index.html>



AND

Your Air Permit



PERMIT

AIR QUALITY DIVISION
STATE OF OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
707 N. ROBINSON, SUITE 4100
P.O. BOX 1677
OKLAHOMA CITY, OKLAHOMA 73101-1677

Date 2/27/2008 Permit No. 2008-999-O

HORN SPECIALTY CO, LLC

having complied with the requirements of the law, is hereby granted permission to operate the
Horn Compressor Station located in Sec. XX – TXN – RXXE, Oklahoma County, Oklahoma,

subject to the following conditions, attached:

Standard Conditions

Specific Conditions

Chief Engineer, Air Quality

DEQ Form 885
Revised 7/93



Permit Memorandum Sections

- I. FACILITY DESCRIPTION
- II. PROCESS DESCRIPTION
- III. EQUIPMENT
- IV. AIR EMISSIONS
- V. INSIGNIFICANT ACTIVITIES
- VI. OKLAHOMA AIR POLLUTION CONTROL RULES
- VII. FEDERAL REGULATIONS
- VIII. COMPLIANCE
- IX. SUMMARY

Your Permit Memorandum

- Permit writer includes initial application data
- Emission calculations and referenced sources
- Normally lists the acceptable Emission Factors

But Beware !

The permit memorandum is not the final word for Emission Inventories

The permit may list some processes as:

Insignificant

De Minimis

Specific Conditions

PERMIT TO OPERATE

AIR POLLUTION CONTROL FACILITY SPECIFIC CONDITIONS

Horn Specialty Company

Oklahoma City Facility

Permit No. 08-XXX-0

The permittee is authorized to operate in conformity with the specifications submitted to Air Quality on July 23, 2000, with supplemental information received October 7 and October 30, 2000. Continuing operations under this permit constitutes acceptance of, and consent to the conditions contained herein:

1. Applicable Emissions Limitations for the Facility:



| Process | PM Emissions | | VOC Emissions | |
|--------------------|--------------|------|---------------|-------|
| | lb/hr | TPY | lb/hr | TPY |
| Wood Finishing | 2.31 | 6.89 | -- | -- |
| Coating Operations | 0.89 | 2.68 | 41.69 | 62.54 |
| TOTALS | 3.20 | 9.57 | 41.69 | 62.54 |

2. The permittee shall be authorized to operate the facility continuously (24 hours per day, every day of the year).
3. Sanding activities shall be vented to a baghouse or equivalent method with at least 98% efficiency for control of PM emissions.

What important items may be in the Permit?

- Emission Units and Processes
- Emission Factors
- Emission Limits
- Design Capacity for engines, boilers and turbines
- Stack or Emission Release data
- Permitted pollutants
- Controls

Emission Units

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

MEMORANDUM

December 11, 2010

TO: John Smith, P.E., Permits and Engineering Group Manager,
Air Quality Division

THROUGH: Joan Smith, P.E., Engineering Section

THROUGH: Peer Review

FROM: Bob Smith, P.E., New Source Permit Section

SUBJECT: Evaluation of Permit Application No. 2010-555-TVR
Ajax Petroleum Company, LLC
Mustang Campus
Mustang, Canadian County
Sec. 26 - 10N - 11W
Latitude 35.317°N, Longitude 98.333°W
Driving Directions: Proceed North off I-40 at Exit 300.
At stop sign turn left on Smith street. Campus 1 mile on left.

INTRODUCTION -

Ajax Petroleum Corporation has requested a "synthetic minor" facility operating permit for the Canadian County Central Booster Station (SIC 1311). This facility is currently operating under Permit No. 2001-266-C, issued on January 2, 2004 and consists of two 450-hp Caterpillar G3408 TAA compressor engines with air fuel ratio controllers in compressor service, and a 200-bbl tank. The tank will store skid drips and rain water.

In addition, there are also two 300 gal. lube oil tanks, one 350 gallon anti-freeze tank and a large horizontal 770 gallon tank used as an accumulator for the engine air start system.

Multiple Processes Within an Emissions Unit

- TANKS: if over 5 tons of emissions – separate breathing, working and flashing losses
- ANY EQUIPMENT that utilizes different Process Material (coal, wood, natural gas)

Multiple Processes

Table 3 Rotary Dryer Emissions of the Plant
(based on an annual maximum production rate of 300,000 TPY)

| Pollutant | Emissions Using Natural Gas | | | Emissions Using #4 Fuel Oil | | |
|-----------------|--|--------|------|-----------------------------|-------|-------|
| | Emission Factor (lb/10 ⁶ scf)** | lb/hr | TPY | Emission Factor (lb/ton)* | lb/hr | TPY |
| NOx | 100 | 11.100 | 6.66 | 0.055 | 22.00 | 8.25 |
| CO | 84 | 9.324 | 5.59 | 0.13 | 52.00 | 19.50 |
| SO ₂ | 0.6 | 0.067 | 0.04 | 0.058 | 23.20 | 8.70 |
| VOC | 0.0132 | 0.001 | 0.01 | 0.032 | 12.80 | 4.80 |
| PM | 7.6 | 0.844 | 0.51 | *n | 15.57 | 5.84 |

*n=0.04 grain/dscf (NSPS Subpart I limits the emissions for PM;

** Emission factors from AP-42 (12/00), Table 11.1-3 for PM₁₀, Table 11.1-7 for CO, NOx, SO₂, and Table 11.1-8 for VOC

Table 4 Asphalt Cement Heater Emissions of the Plant
(based on 8,760 hours of operations)

| Pollutant | Emissions Using Natural Gas | | | Emissions Using #4 Fuel Oil | | |
|-----------------|---|-------|------|---|-------|------|
| | Emission Factor (lb/10 ⁶ scf)* | lb/hr | TPY | Emission Factor (lb/10 ³ gal)* | lb/hr | TPY |
| NOx | 100 | 0.147 | 0.64 | 20 | 0.160 | 0.70 |
| CO | 84 | 0.123 | 0.54 | 5 | 0.040 | 0.18 |
| SO ₂ | 0.6 | 0.001 | 0.01 | 71 | 0.720 | 3.15 |
| VOC | 0.0132 | 0.000 | 0.00 | 0.34 | 0.003 | 0.01 |
| PM | 7.6 | 0.011 | 0.05 | 3.30 | 0.068 | 0.30 |

* Emission factors from AP-42 (7/98), Table 1.3-1, using #2 fuel oil with S content of 0.5% by weight.

The emissions from the tanks were calculated using the TANKS4.0 software. Due to the very low vapor pressure of the asphalt cement (<0.01 psi at 300°F) and the fuel oil (<0.009 psi at ambient temperature), the emissions from all tanks will be minimal.

EUG 2 Glycol Dehydrators and Reboilers

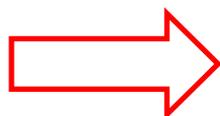
| <u>EU</u> | <u>Point</u> | <u>Make/Model</u> | <u>MMBTU/hr</u> | <u>Const. Date</u> |
|-----------|--------------|-------------------|-----------------|--------------------|
| D1 | S7 | Malony-Crawford | 1.00 | 1973 |
| D2 | S8 | Ball-Reid | 0.75 | 1975 |
| D3 | S9 | BS&B | 0.25 | 1975 |

EUG 3 Tanks

| <u>EU</u> | <u>Point</u> | <u>Contents</u> | <u>Barrels</u> | <u>Gallons</u> |
|-----------|--------------|----------------------|----------------|----------------|
| T1 | S10 | Condensate/water | 100 | 4,200 |
| T2 | S11 | Condensate/water | 210 | 8,820 |
| T3 | S12 | Glycol | 150 | 6,300 |
| T4 | S13 | Lube Oil | 120 | 5,040 |
| T5 | S14 | Methanol | 24 | 1,000 |
| T6 | S15 | Corrosion Prohibiter | 24 | 1,000 |
| T7 | S16 | Biocide | 24 | 1,000 |

EUG 4 Fugitives

| <u>Point</u> | <u>Number Items</u> | <u>Type of Equipment</u> |
|--------------|---------------------|--------------------------|
| S17 | 15 | Compressor Seals |
| | 10 | Pump Seals |
| | 150 | Valves |
| | 300 | Flanges |
| | 20 | Relief Valves |
| | 5 | Open Ended Lines |



Specific Conditions Section

- The points of emissions and emission limitations for each point are:

| Emissions Unit | Manufacturer | Size/Rating |
|--------------------------------|---------------------|------------------------|
| EP-3 Water Heater | Kemco | 15 MMBTUH |
| EP-2 Water Heater | Kemco | 12 MMBTUH |
| EP-1 Boiler | Williams & Davis | 125 HP/ 5.325 MMBTUH |
| EP-4 Boiler | Superior | 200 HP/ 8.40 MMBTUH |
| Live Receiving System Baghouse | MAC Equip., Inc. | 99.9% eff. @ 7,000 cfm |

| Emissions Source | Heat Input (MMBTUH) | NO_x | CO | PM | VOC |
|-------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | | Emissions (TPY) | Emissions (TPY) | Emissions (TPY) | Emissions (TPY) |
| Boiler EP-2 | 12 | 8.78 | 5.05 | 0.39 | 0.28 |
| Boiler EP-3 | 15 | 10.97 | 6.31 | 0.49 | 0.35 |

| Emissions Factor (grains/dscf) | System Air Flow (cfm) | Hourly Emissions (lbs/hr) | Annual Emissions (TPY) |
|---|----------------------------------|--------------------------------------|-----------------------------------|
| 0.02 | 7,000 | 1.20 | 5.26 |

EMISSION FACTORS

What Is An Emission Factor?

An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.

$$\text{Emissions} = \text{EF} \times \text{Process Rate}$$

These factors are usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant.

Is an Emission Factor Needed?

- Storage Tanks - use the Software *TANKS*
- Landfills - use *LANDGEM*, a gas emissions model
- Tank Flashing - *Vasquez-Beggs* equation
- Glycol Dehydrator Reboiler - *GRI-GLYCalc*

*These are models
with formulas using multiple variables.
There is no single emission factor.*



Sometimes it is as easy as this...

EUG 3 Boilers

There are five units in this EUG that combust natural gas and use emission factors from Tables 1.4-1 and 2 of AP-42 (7/98). Calculations of potential to emit are shown based on 351.9 MMBTUH total heat-input of all five, and assuming 1,020 BTU/CF.

+

| Pollutant | Emission factor Lbs/MMCF | Emissions | |
|------------------|-----------------------------|-----------|------|
| | | Lbs/hr | TPY |
| PM ₁₀ | 7.6 | 2.62 | 11.5 |
| SO ₂ | 0.6 | 0.21 | 0.91 |
| NO _x | 100 | 34.5 | 151 |
| CO | 84 | 29.0 | 127 |
| VOC | 5.5 | 1.90 | 8.31 |

The gas-fired ovens are rated at 1 MMBTUH each, so emissions are calculated for the combined heat rates using factors from Tables 1.4-1 and 2 of AP-42 (7/98), assuming 1,020 BTU/CF, and with 4,992 hours per year of use, as follow.

| Pollutant | Factor (Lb/MMCF) | Emissions (TPY) |
|------------------|------------------|-----------------|
| NO _x | 100 | 0.49 |
| CO | 84 | 0.41 |
| SO ₂ | 0.6 | Neg |
| PM ₁₀ | 7.6 | 0.04 |
| VOC | 5.5 | 0.03 |

Stockpiles

Fugitive emissions from stockpiles due to wind erosion are based on the emission factor in AP-42 (9/91), Table 8.19.1-1. The emissions factors used for wind erosion calculations are presented below. Table 8 shows the fugitive emissions of particulate matter PM₁₀ from stockpiles.

| Days | Storage area per pile | No. of storage piles | Factor |
|-------------------|-----------------------|----------------------|-----------------|
| 260 active days | 0.35 acres | 7 | 6.3 lb/acre/day |
| 105 inactive days | 0.35 acres | 7 | 1.7 lb/acre/day |

⊕ **Table 8 Fugitive Emissions of Particulate Matter (PM₁₀) from Stockpiles**

| Process | Emission Factor lb/ton | Efficiency (%) | Parameters | PM ₁₀ Emissions | |
|-----------------------------------|--|-------------------|---------------------|-------------------------------|-------------|
| | | | | lb/hr | TPY |
| Wind Erosion on Stockpiles (7) | 6.3 lb/acre/day (active) & 1.7 lb/acre/day (inactive) | 0% | 0.35 acre (each) | ---- | 2.23 |
| Total | | | | ---- | 2.23 |

Fugitive Emissions from vehicle traffic were estimated based on AP-42 (11/2006), Section 13.2.2. Introduction to Fugitive Dust Sources. Unpaved Roads. The Equation (1a) the formula

Fugitive Emissions

Emissions For Traffic on Paved and Unpaved Road

| Vehicle Type | Truck Per Year | Vehicle Mile Traveled | | Emission Factor | | Uncontrolled PM ₁₀ Emissions | | Controlled PM ₁₀ Emissions | |
|-------------------------------------|----------------|-----------------------|-----------|------------------|----------------|---|---------------|---------------------------------------|--------------|
| | | Unpaved VMT | Paved VMT | Unpaved (lb/VMT) | Paved (lb/VMT) | lb/yr | TPY | lb/yr | TPY |
| Soil Hauling Vehicles (daily cover) | 13692.90 | 1.0 | 0 | 0.748 | 4.678 | 64,049 | 32.02 | 16,012.25 | 8.01 |
| Waste Trucks | 136,928.98 | 1.0 | 0.5 | 0.748 | 4.678 | 371,485 | 185.74 | 92,871.25 | 46.43 |
| Total | | | | | | 435,534 | 217.77 | 108,883.5 | 54.44 |

13.2.1 Paved Roads

- [Final Section](#) - January 2011 (PDF 400K)
- Background Documentation - To be posted the week of January 17, 2011
- [Related Information](#)



Alternate EF Sources

- AP 42, Fifth Edition

*Compilation of Air Pollutant Emission Factors,
Volume 1: Stationary Point and Area Sources*

- WebFIRE

<http://cfpub.epa.gov/webfire/index.cfm>

- Stack Testing

252:100-5-2.1. Emission inventory

- (d) Method of calculation. The best available data at the time the emission inventory is or should have been prepared shall be used to determine emissions

EMISSION LIMITS

1. The points of emissions and emission limitations for each point are:

| Source | NO _x | | CO | | VOC | |
|---------------------------------|-----------------|------|-------|------|-------|------|
| | lb/hr | TPY | lb/hr | TPY | lb/hr | TPY |
| 0.25 MMBTUH Dehydrator Reboiler | 0.03 | 0.11 | 0.02 | 0.09 | 0.01 | 0.01 |
| Glycol Dehydrator Still Vent | -- | -- | -- | -- | 1.68 | 7.34 |

DESIGN CAPACITY

From Specific Conditions:

1. The points of emissions and emission limitations for each point are:

| Source | NO _x | | CO | | VOC | |
|---------------------------------|-----------------|------|-------|------|-------|------|
| | lb/hr | TPY | lb/hr | TPY | lb/hr | TPY |
| 0.25 MMBTUH Dehydrator Reboiler | 0.03 | 0.11 | 0.02 | 0.09 | 0.01 | 0.01 |
| Glycol Dehydrator Still Vent | -- | -- | -- | -- | 1.68 | 7.34 |

From Permit Memorandum:

EMISSIONS

Emissions from the natural gas-fired engine are based on the following data.

Engine Identification Data

| Point | Make/Model | Hp | Serial # | Mfg. Date |
|-------|-----------------|-------|-----------|-----------|
| SN-01 | Waukesha 5108GL | 1,072 | C-11058/2 | 1994 |

EMISSION RELEASE POINT PARAMETERS

Sometimes listed in the Permit

| Stack Parameters/Modeling Results | | | | | | | | |
|--------------------------------------|------------------------|------------------------|------------------|----------------|-------------------|----------------|-------------------------|---|
| Point | Source (make/model) | Stack Ht. (feet) | Dia. (inches) | Flow (acfm) | Velocity (fps) | Temp. (° F) | Emiss. Rate (g/s) | 1-hr GLC ($\mu\text{g}/\text{m}^3$) |
| S1 | Superior 6G-825 | 23.46 | 8 | 3,466 | 26.4 | 1,250 | 0.0083 | 5.296 |
| S2 | Superior 6G-825 | 23.46 | 8 | 3,466 | 26.4 | 1,250 | 0.0083 | 5.296 |
| S3 | Superior 8G-825 | 26.33 | 10 | 4,608 | 35.2 | 1,340 | 0.0111 | 3.460 |
| S4 | Superior 8G-825 | 26.33 | 10 | 4,608 | 35.2 | 1,340 | 0.0111 | 3.460 |
| S5 | Superior 8G-825 | 26.33 | 10 | 4,608 | 35.2 | 1,340 | 0.0111 | 3.460 |
| S6 | Superior 8G-825 | 26.33 | 10 | 4,608 | 35.2 | 1,340 | 0.0111 | 3.460 |
| Total Emission Rates and GLCs | | | | | | | 0.0610 | 24.432 |



SIGNIFICANT DISCHARGE POINTS

| Stack ID | Operation Served | Height Feet | Diameter Inches | Flow Rate ACFM | Temp. °F |
|----------|------------------|-------------|-----------------|----------------|----------|
| 1 | Stain Room | 22 | 24 | 10,000 | 72 |
| 2 | Paint Room | 22 | 24 | 10,000 | 72 |
| 3 | Paint Room | 22 | 24 | 10,000 | 72 |
| 4 | Paint Room | 22 | 24 | 4,500 | 72 |
| 5 | Mold Shop | 22 | 24 | 9,500 | 72 |
| 6 | Stain Booth | 22 | 36 | 14,500 | 72 |

EMISSIONS

What should be reported?

All Actual Emissions

not

Permit limits

or

Potential to Emit Values



If a process emits 2 pounds or more of a regulated air pollutant (≥ 0.001 tons)

Please Report Them!!



Trace (<0.001 TPY): Use the Trace check box to indicate annual emissions have been calculated but are less than 0.001 Tons (2.0 lbs).

A Control Device as an Emission Unit

EUG 11 Upset Flare

| Location | EP # | Heat Input (MBTUH) | Construction Date |
|--------------------------------|-------|--------------------------|-------------------|
| Cryogenic Ammonia Storage Tank | 10297 | 43 (pilot), 130 (assist) | 1974 |

| Point ID | PM ₁₀ | | NO _x | | VOC | | CO | |
|----------|------------------|------|-----------------|------|--------|------|--------|------|
| | lbs/hr | TPY | lbs/hr | TPY | lbs/hr | TPY | lbs/hr | TPY |
| 10297 | 0.04 | 0.17 | 13.8 | 60.4 | 0.03 | 0.12 | 0.41 | 1.80 |

The flare is a control device and should be used infrequently. Opacity monitoring shall include recording the date, time, and duration of any use of this device.



Controls

11. Exhausts from the biomass burner shall be sent through a wet scrubber or an equivalent PM emissions control device. The wet scrubber shall be maintained in good working order (per manufacturer's recommendation) and in use whenever the dryer is processing product. A properly functioning pressure-drop monitoring device shall be installed, and the ΔP shall be between 1.5" H₂O and 11" H₂O.

| Emissions Unit | Manufacturer | Size/Rating |
|--------------------------------|------------------|------------------------|
| EP-3 Water Heater | Kemco | 15 MMBTUH |
| EP-2 Water Heater | Kemco | 12 MMBTUH |
| EP-1 Boiler | Williams & Davis | 125 HP/ 5.325 MMBTUH |
| EP-4 Boiler | Superior | 200 HP/ 8.40 MMBTUH |
| Live Receiving System Baghouse | MAC Equip., Inc. | 99.9% eff. @ 7,000 cfm |

| Emissions Source | Heat Input (MMBTUH) | NO _x | CO | PM | VOC |
|------------------|---------------------|-----------------|-----------------|-----------------|-----------------|
| | | Emissions (TPY) | Emissions (TPY) | Emissions (TPY) | Emissions (TPY) |
| Boiler EP-2 | 12 | 8.78 | 5.05 | 0.39 | 0.28 |
| Boiler EP-3 | 15 | 10.97 | 6.31 | 0.49 | 0.35 |

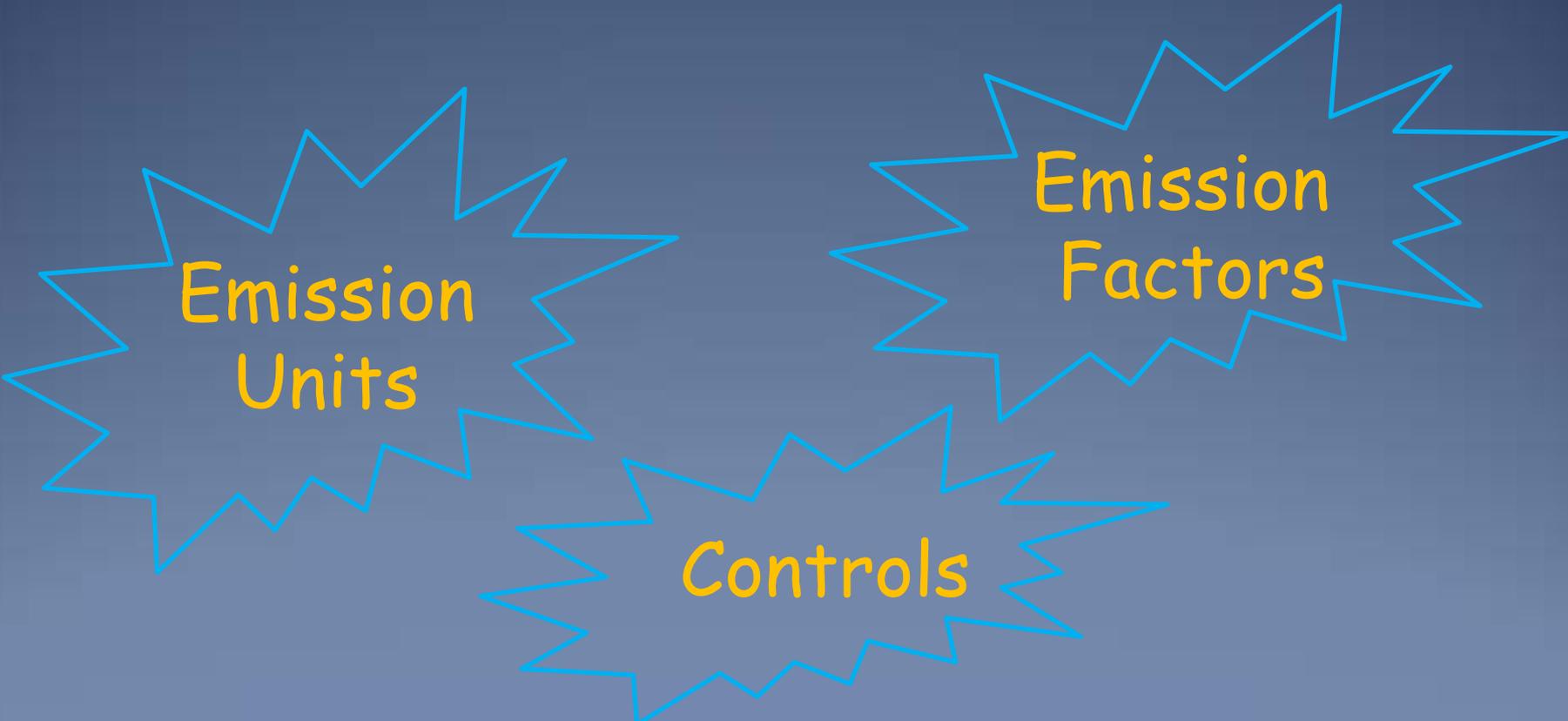
| Emissions Factor (grains/dscf) | System Air Flow (cfm) | Hourly Emissions (lbs/hr) | Annual Emissions (TPY) |
|--------------------------------|-----------------------|---------------------------|------------------------|
| 0.02 | 7,000 | 1.20 | 5.26 |

Summary

- Look to your PERMIT to CREATE or REVIEW your EMISSIONS INVENTORY



- Pay special attention to your **SPECIFIC CONDITIONS**



Emission
Units

Emission
Factors

Controls

- Emission Inventory Regulation Requirements MAY DIFFER from Permit

REPORT
Regulated
Pollutants
over 2 pounds



Even if permit
considers the process
insignificant

- Report your ACTUAL EMISSIONS

Not
Permit
Limits

Actual
Emissions



Call us if you have any question about using your permit and building your inventory.

| | | |
|---------------------------|---|------------------------|
| General Inquiries: | <u>aei@deq.ok.gov</u> | (405) 702- 4100 |
| Morris Moffett | <u>morris.moffett@deq.ok.gov</u> | (405) 702- 4179 |
| Robert Eddington | <u>robert.eddington@deq.ok.gov</u> | (405) 702- 4212 |
| Mark Gibbs | <u>mark.gibbs@deq.ok.gov</u> | (405) 702- 4214 |
| Michelle Horn | <u>michelle.horn@deq.ok.gov</u> | (405) 702- 4176 |
| Carrie Schroeder | <u>carrie.schroeder@deq.ok.gov</u> | (405) 702- 4178 |
| John Munro | <u>john.munro@deq.ok.gov</u> | (405) 702- 4208 |