Cimarex Energy Co.
202 S. Cheyenne Ave.
Suite 1000
Tulsa, Oklahoma 74103-4346
PHONE 918.560.7257
FAX 539.777.0501

Stuart Wittenbach
Director – Environmental Safety & Health

FedEx

December 28, 2020

New Mexico Environment Department
Air Quality Bureau
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico 87505-1816

Re: Application for GCP-Oil and Gas Registration
Cimarex Energy Co.
Tres Equis State Facility
Lea County, New Mexico
NOI #5660R3

Dear Sir/Madam:

Cimarex Energy Co. (Cimarex) owns and operates oil and natural gas production facilities in the State of New Mexico. With this submittal, Cimarex proposes to modify an oil and gas production facility known as Tres Equis State Facility that is located in Lea County, New Mexico. The Facility is currently authorized by NOI #5660R3. Please find enclosed one (1) copy of the GCP-Oil and Gas Registration forms, associated backup documents, and a check payable to NMED in the amount of $4,260 to cover the permit application fee.

Should you have any questions or need additional information, please contact me at (918) 560-7257 or via e-mail at SWittenbach@cimarex.com.

Sincerely,
Cimarex Energy Co.

Mr. Stuart Wittenbach
Director, Environmental Safety & Health

Enclosures (2): GCP-Oil and Gas Application
Permit Application Fee Check

Cc: Air Quality Library File: AQ-05-01 (PBNM Tres Equis State Facility GCP-Oil and Gas Registration)

CIMAREX ENERGY CO.

TRES EQUIS STATE FACILITY
LEA COUNTY, NEW MEXICO
NOI #5660R3

GENERAL CONSTRUCTION PERMIT
FOR OIL AND GAS FACILITIES
(GCP-OIL AND GAS)

DECEMBER 2020

Developed for:

202 S. Cheyenne Ave, Suite 1000
Tulsa, Oklahoma 74103
(918) 560-7257

TABLE OF CONTENTS

Attachments

1.0 INTRODUCTION

Cimarex Energy Co. (Cimarex) owns and operates an oil and gas production facility known as Tres Equis State Facility. The site is located in Lea County, New Mexico. A facility location map is included in Section 7 of Attachment A.

The facility is currently operating under NOI #5660R3. Due to the following updates, the facility-wide emissions have been revised and a General Construction Permit for Oil and Gas Facilities is being claimed:

- Removal of five (5) separators/scrubbers (SEP8-12),
- Removal of one (1) vapor recovery unit (VRU),
- Removal of six (6) condensate storage tanks (OILTK3-8),
- Removal of two (2) produced water storage tanks (SWTK3-4),
- Addition of one (1) enclosed combustor (ECD1),
- Updated horsepower of one (1) compressor engine (ENG3),
- Updated maximum burner rating of three (3) heater treaters (H1-3),
- Updated production, and
- Reconciliation of all impacted emission units based on the aforementioned changes.

This submittal contains the required forms, figures, and supporting documentation to claim a General Construction Permit for Oil and Gas Facilities (GCP-Oil and Gas).

2.0 PROCESS DESCRIPTION

The Tres Equis State Facility is an oil and gas production facility that flows natural hydrocarbons through five (5) three-phase separators (SEP1-5) to three (3) heater treaters (H1-3). From SEP1-5, the natural gas is processed by a low-pressure gas scrubber (SEP6) prior to either being compressed by a natural gas-fired compressor engine (ENG3) and utilized for gas lift operations or transmitted offsite. Oil/condensate from H1-3 is routed to a vapor recovery tower (VRT), where the oil/condensate is flashed. VRT flashing gas and heater treater flash gas is controlled by the flare (FL1). This is considered routine flaring. Oil remaining at the VRT is routed to two (2) oil/condensate storage tanks (OILTK1-2) prior to either being transmitted offsite via pipeline and a Lease Automatic Custody Transfer (LACT) Unit or loaded by tank truck (OILLOAD) and transported offsite. Produced water from SEP1-5 and H1-3 is routed to two (2) produced water storage tanks (SWTK1-2) from which it is either loaded by tank truck (SWLOAD) and transported offsite or transmitted offsite for saltwater disposal via pipeline with the aid of an electric water transfer pump (SWDPUMP). The storage tanks' air emissions are controlled by the enclosed combustor (ECD1). The flare (FL1) also controls the sales gas stream during instances of sales gas pipeline downtime. This is represented as FL1-STRAND in Sections 2 and 5 of the application and the AECT. This is considered intermittent flaring. Please note that FL1 is a dual-pressure flare however both tips have identical parameters. A flare scrubber (SEP7), four (4) electric pumping units (PU1-4), and an electric recirculation pump (PUMP) are also present at the facility. A glycol dehydrator is present at the facility but is disconnected and no longer in service.

A process flow diagram is included in Section 4 of Attachment A.

Summary of Emission Sources

Emission sources at the facility are listed and described in the following table.

Source ID	Point Source Description	Type of Emissions
ENG3	Compressor Engine, Caterpillar G3306 TA, 203 Hp (S/N: G6X08030)	Combustion emissions
SEP1-7	Separator(s)/Scrubber(s)	Fugitive emissions
H1	Heater Treater, 2.0 MMBtu/hr or less	Combustion emissions
H2	Heater Treater, 2.0 MMBtu/hr or less	Combustion emissions
H3	Heater Treater, 2.0 MMBtu/hr or less	Combustion emissions
FL1	Flare	Combustion emissions
ECD1	Enclosed Combustor	Combustion emissions
FUGAREA	Facility Fugitives	Fugitive emissions
OILTK1-2	Storage Tank(s), Condensate, 500 bbl	VOC - working, standing, and flashing (440 BPD @ 220 BPD/tank)
SWTK1-2	Storage Tank(s), Produced Water, 500 bbl	VOC - working, standing, and flashing (500 BPD @ 250 BPD/tank)
HR	Haul Road	PM emissions
VRT	Vapor Recovery Tower	VOC -flashing emissions
LACT	LACT Unit(s)	Fugitive emissions
SWDPUMP	Saltwater disposal pump(s), Electric	Fugitive emissions
PUMP	Recirculation Pump, Electric	Fugitive emissions
PU1-4	Pumping Unit, Electric	Fugitive emissions
OILLOAD	Truck loading from oil tank(s)	VOC - truck loading losses
SWLOAD	Truck loading from saltwater tank(s)	VOC – truck loading losses

Source ID	Point Source Description	Type of Emissions
SSM	Startup, Shutdown, Maint.	VOC, HAPs emissions
MALFUNCTIONS	Equipment Malfunctions	VOC, HAPs emissions

3.0 EMISSIONS CALCULATION METHODOLOGY

Engine emissions were estimated using manufacturer data for NOx, CO, VOC, and formaldehyde and AP-42 for all remaining pollutants. AP-42 factors were used to estimate emissions for criteria pollutants for heaters, haul road fugitives, and loading. Flare and enclosed combustor NOx, CO, and pilot emissions were estimated using AP-42 factors. Flare stream VOC emissions were estimated using mass balance. Storage tank working and breathing emissions are based on AP-42 Section 7.1.3.1 equations (June 2020). Promax was used to estimate the flashing emissions for the storage tanks and VRT. Please see Section 5 of Attachment A for detailed calculations.

ATTACHMENT A

GCP-OIL AND GAS REGISTRATION FORM

Mail Registration To:		For Department use only:
New Mexico Environment Department Air Quality Bureau 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone (505) 476-4300 Fax (505) 476-4375 www.env.nm.gov/aqb		AIRS #: AI #:

General Construction Permit (GCP-Oil and Gas)
Registration Form
Section 1

(Locating outside of Bernalillo County, Tribal Lands, and Nonattainment Areas)

This Registration is being submitted as (check all that apply)**:**

☐ An initial GCP-Oil and Gas Registration Form for a new facility (**Registration fee required**).
☒ An updated GCP-Oil and Gas Registration Form for a modification to an existing facility (**Registration fee required**).
☐ A GCP-Oil and Gas Registration Form for an existing facility previously operating under GCP-1 or GCP-4 **(No fee required)**

The Permitting Administrative Multi-Form may be used for administrative changes identified in the GCP O&G Permit Condition C101.A. No public notification is required, and no filing fees or permit fees apply.

Construction Status: □ Not Constructed ■ Existing Permitted (or NOI) Facility □ Existing Non-permitted (or NOI) Facility

Acknowledgements:

☒ I acknowledge that a pre-application meeting is available to me upon request.
☒ An original signed and notarized Certification for Submittal for this GCP-Oil and Gas Registration is included.
☒ Proof of public notice is included, if required.
☒ The Air Emission Calculation Tool (AECT) is included.
☒ The emissions specified in this Registration Form will establish the emission limits in the GCP-Oil and Gas.
☒ **For new registrations or modifications, a check for the full registration fee is included: $4260 prior to 1/1/2021 or $4320 beginning 1/1/2021.** There is an annual fee in addition to the registration fee: www.env.nm.gov/air-quality/permit-fees-2/.
Facilities qualifying as a "small business" under 20.2.75.7.F NMAC qualify for reduced fees, provided that NMED has a Small Business Certification Form from your company on file. This form can be found at: www.env.nm.gov/aqb/sbap/Small_Business_Forms.html
Provide your Check Number: _____ and Amount: $4,260

☒ I understand that if a fee is required and is not included, the project will not be assigned for review until the full fee is received.

1) Company Information		AI # (if known):	If updating, provide Permit/NOI #: 5660R1
1	Facility Name: Tres Equis State Facility	Plant primary SIC Code (4 digits): 1311 Plant NAIC code (6 digits): 211120	
a	Facility Street Address (If no facility street address, check here ☒ and provide directions in Section 4):		
2	Plant Operator Company Name: Cimarex Energy Co.	Phone/Fax: (918) 585-1100	
a	Plant Operator Address: 202 S. Cheyenne Ave, Suite 1000, Tulsa, OK 74103		
3	Plant Owner(s) name(s): Mr. Stuart Wittenbach	Phone/Fax: (918) 560-7257/(539) 777-0501	
a	Plant Owner(s) Mailing Address(s): 202 S. Cheyenne Ave, Suite 1000, Tulsa, OK 74103		
4	Bill To (Company): Cimarex Energy Co.	Phone/Fax: (918) 560-7257/(539) 777-0501	

a	Mailing Address: 202 S. Cheyenne Ave, Suite 1000, Tulsa, OK 74103	E-mail: SWittenbach@cimarex.com
5	■ Preparer: Mrs. Brittany Sewell Wilkinson □ Consultant:	Phone/Fax: (918) 560-7052
a	Mailing Address: 202 S. Cheyenne Ave, Suite 1000, Tulsa, OK 74103	E-mail: BSewell@cimarex.com
6	Plant Operator Contact: Mr. Stuart Wittenbach	Phone/Fax: (918) 560-7257/(539) 777-0501
a	Mailing Address: 202 S. Cheyenne Ave, Suite 1000, Tulsa, OK 74103	E-mail: SWittenbach@cimarex.com
7	Air Permit Contact[1]: Brittany Sewell Wilkinson	Title: Air Quality Specialist
a	E-mail: BSewell@cimarex.com	Phone/Fax: (918) 560-7052
b	Mailing Address: 202 S. Cheyenne Ave, Suite 1000, Tulsa, OK 74103	
	[1]The Air Permit Contact will receive official correspondence from the Department.	
8	Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and NOI or permit number (if known) of the other facility?	

2) Applicability

1	Is the facility located in Bernalillo County, on tribal lands, or in a nonattainment area?	☒**No** ☐**Yes**
If you answered ***Yes*** to the question above, your facility **does not** qualify for this general construction permit.		
2	Is the facility's SIC code 1311, 1321, 4619, 4612 or 4922? (Other SIC codes may be approved provided that all the equipment at the facility is allowed in the GCP-Oil & Gas Permit.)	☐**No** ☒**Yes**
3	Does the regulated equipment under this GCP-Oil and Gas Registration include any combination of Allowable Equipment listed in Table 104 of the GCP Oil & Gas Permit, and no others?	☐**No** ☒**Yes**
4	Will the regulated equipment as specified in this GCP-Oil and Gas Registration emit less than the total emissions in Table 106 of the GCP-Oil and Gas permit?	☐**No** ☒**Yes**
5	Does all equipment comply with the stack parameter requirements as established in the GCP-Oil and Gas Permit?	☐**No** ☒**Yes**
6	Equipment shall be at least 100 meters (m) from any stack to terrain that is five (5) or more meters above the top of the stack. Will the equipment at the facility meet this terrain requirement?	☐**No** ☒**Yes**
7	Is the facility at least 150 m from any source that emits over 25 tons/year of NO_x? This is the distance between the two nearest stacks that emit NOx at each of the facilities. Not the facility boundaries or the center to center distances.	☐**No** ☒**Yes**
8	Is the facility at least 3 miles from any Class I area? This is the distance from the nearest facility boundary to the nearest boundary of the Class I area.	☐**No** ☒**Yes**
If you answered ***NO*** to any of questions 2-8, your facility **does not** qualify for this general construction permit.		

3) Current Facility Status

1	Has this facility already been constructed? ■ Yes □ No	If yes, is it currently operating in New Mexico? ■ Yes □ No	
2	Does this facility currently have a construction permit or Notice of Intent (NOI) (20.2.72 NMAC or 20.2.73 NMAC)? ☒Yes ☐No	If yes, the permit No. or NOI No., and whether it will remain active or not: 5660R3 - Stay Active	
3	Is this Registration in response to a Notice of Violation (NOV)? ☐Yes ☒No If so, provide current permit #:	If yes, NOV date:	NOV Tracking No.
4	Check if facility is a: Minor Source: ☐ Synthetic Minor Source: ☒ (SM80 = Controlled Emissions > 80 TPY of any regulated air pollutant): ☐		

4) Facility Location Information

1	a) Latitude (decimal degrees): 32.25301	b) Longitude (decimal degrees): -103.61342	c) County: Lea	d) Elevation (ft): 3,651
2	a) UTM Zone: □ 12 or ■ 13	b) UTME (to nearest 10 meters): 630614	c) UTMN (to nearest 10 meters): 3569324	
3	e) Specify which datum is used: ☐ NAD 27 ☐ NAD 83 ☒ WGS 84 See this link for more info. http://en.wikipedia.org/wiki/North_American_Datum			
4	Name and zip code of nearest New Mexico town and tribal community: Jal, 88252			
5	Detailed Driving Instructions including direction and distance from nearest NM town and tribal community (attach a road map if necessary). If there is no street address, provide public road mileage marker: From Jal, head N on S 3rd St for 0.5 mi, L on NM-128 W for 25.3 mi, R for 3.4 mi, R for 0.6 mi to facility on the R.			

6	The facility is 26.4 (distance) miles NW (direction) of Jal (nearest town).
7	Land Status of facility (check one): □ Private □ Indian/Pueblo ■ Government □ BLM □ Forest Service □ Military

5) Other Facility Information

1	Enter the maximum daily and annual throughput of oil, gas, and natural gas liquids (NGL).	**Oil (bbl/day): 440.0** **Gas (MMscf/day): 1.4** **NGL (bbl/day): 0**	**(bbl/yr): 160,600.0** **(MMscf/yr): 511.0** **(bbl/yr): 0**
2	The facility, as described in this Registration, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes.	☐**No** ☒**Yes**	

6) Submittal Requirements

1	Include one hard copy **original signed and notarized Registration package printed double sided 'head-to-toe' 2-hole punched** as we bind the document on top, not on the side; except landscape tables, which should be head-to-head. If 'head-to-toe printing' is not possible, print single sided. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process.
2	Include one **double sided hard copy, flip on long edge** for Department use. This copy does not need to be 2-hole punched.
3	The entire Registration package should be submitted electronically on one compact disk (CD). Include a single PDF document of the entire Registration as submitted and the individual documents comprising the Registration. The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDFs of files (items that were not created electronically: i.e. brochures, maps, graphics, etc.), submit these items in hard copy format. Spreadsheets must be unlocked since we must be able to review the formulas and inputs. **Ensure all of these are included in both the electronic and hard copies.** ☒Word Document part of the Registration Form (Sections 1 and 3-10) ☒Excel Document part of the Registration Form (Section 2) ☒Air Emissions Calculation Tool (AECT) If there is a justified reason for including other calculations, include the unlocked Excel Spreadsheet. Justification must be provided in Section 5 of the application. ☒PDF of entire application **To avoid errors, it is best to start with both a blank version of this form and the AECT for each application.**

Section 2
Tables

Insert Excel spreadsheet with applicable tables filled out. If applicable to the facility all tables must be filled out completely. The unit numbering system must be consistent throughout this Registration

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Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. Equipment that qualifies for an exemption under 20.2.72.202.B NMAC should be included in Table 2-B **Note:** Equipment options **are not authorized.**

Unit Number[1]	Source Description	Manufacturer/Make /Model	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	RICE Ignition Type (CI, SI, 4SLB, 2SLB)[4]	For Each Piece of Equipment, Check Onc
SEP1-SEP7	Separator(s)/ Scrubber(s)	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ■ To Be Modified ☐ To be Replaced
ENG3	Compressor Engine	Caterpillar G3306 TA	G6X08030	203-Hp	203-Hp	1/4/2012 / -	CAT1 / ENG3	20200253	4SRB	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
H1	Heater Treater	N/A	N/A	2.0 MMBtu/hr	2.0 MMBtu/hr	- / -	N/A / H1	31000404	N/A	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ■ To Be Modified ☐ To be Replaced
H2	Heater Treater	N/A	N/A	2.0 MMBtu/hr	2.0 MMBtu/hr	- / -	N/A / H2	31000404	N/A	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ■ To Be Modified ☐ To be Replaced
H3	Heater Treater	N/A	N/A	2.0 MMBtu/hr	2.0 MMBtu/hr	- / -	N/A / H3	31000404	N/A	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ■ To Be Modified ☐ To be Replaced
FL1	Flare	Vaprox	N/A	20 MMscf/day	20 MMscf/day	- / -	N/A / FL1	31000215	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
ECD1	Enclosed Combustor	Vaprox	N/A	0.33 Mscf/hr	0.33 Mscf/hr	- / -	N/A / ECD1	31000215	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
FUGAREA	Facility Fugitives	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31088811	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
HR	Haul Roads	N/A	N/A	N/A	N/A	- / -	N/A / HR	31088811	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK1	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- / Post-9/18/2015	ECD1 / OILTK1	40400311	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK2	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- / Post-9/18/2015	ECD1 / OILTK2	40400311	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK3	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- / -	N/A / N/A	40400311	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number[1]	Source Description	Manufacturer/Make /Model	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	RICE Ignition Type (CI, SI, 4SLB, 2SLB)[4]	For Each Piece of Equipment, Check Onc
OILTK4	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400311	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK5	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400311	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK6	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400311	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK7	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400311	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILTK8	Oil/Condensate Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400311	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SWTK1	Produced Water Storage Tank	N/A	N/A	500-bbl	500-bbl	- Post-9/18/2015	ECD1 SWTK1	40400315	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SWTK2	Produced Water Storage Tank	N/A	N/A	500-bbl	500-bbl	- Post-9/18/2015	ECD1 SWTK2	40400315	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SWTK3	Produced Water Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400315	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SWTK4	Produced Water Storage Tank	N/A	N/A	500-bbl	500-bbl	- -	N/A N/A	40400315	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
OILLOAD	Oil/Condensate Truck Loading	N/A	N/A	6,745,200-gal/yr	6,745,200-gal/yr	- -	N/A OILLOAD	40400250	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SWLOAD	Produced Water Truck Loading	N/A	N/A	7,665,000-gal/yr	7,665,000-gal/yr	- -	N/A SWLOAD	40400250	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LACT	LACT Unit	N/A	N/A	N/A	N/A	- -	N/A FUGAREA	31000299	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
VRT	Vapor Recovery Tower	N/A	N/A	N/A	N/A	- -	FL1 VRT	31000299	N/A	■ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
VRU	Vapor Recovery Unit, Electric	N/A	N/A	N/A	N/A	- -	N/A N/A	31000299	N/A	☐ Existing (unchanged) ■ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number[1]	Source Description	Manufacturer/Make /Model	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classi-fication Code (SCC)	RICE Ignition Type (CI, SI, 4SLB, 2SLB)[4]	For Each Piece of Equipment, Check Onc
SWDPUMP	Saltwater Disposal Pump, Electric	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
PUMP	Recirculation Pump, Electric	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
PU1	Pumping Unit, Electric	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
PU2	Pumping Unit, Electric	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
PU3	Pumping Unit, Electric	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
PU4	Pumping Unit, Electric	N/A	N/A	N/A	N/A	- / -	N/A / FUGAREA	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
MALFUNCTIONS	Malfunctions	N/A	N/A	N/A	N/A	- / -	N/A / MALFUNCTIONS	31000299	N/A	□ Existing (unchanged) □ To be Removed ■ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
SSM	Startup, Shutdown, Maintenance	N/A	N/A	N/A	N/A	- / -	N/A / SSM	31000299	N/A	■ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced

[1] Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
[2] Specify dates required to determine regulatory applicability.
[3] To properly account for power conversion efficiencies, generator set rated capacity shall be reported as the rated capacity of the engine in horsepower, not the kilowatt capacity of the generator set.
[4] "4SLB" means four stroke lean burn engine, "4SRB" means four stroke rich burn engine, "2SLB" means two stroke lean burn engine, "CI" means compression ignition, and "SI" means spark ignition

Table 2-B: Exempted Equipment (20.2.72 NMAC)

All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.5, include emissions calculations and emissions totals for 202.B.5 "similar functions" units, operations, and activities in Section 5, Calculations. Unit & stack numbering must be consistent throughout the application package.

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction[1]	For Each Piece of Equipment, Check Onc
			Serial No.	Capacity Units		Date of Installation /Construction[1]	
N/A - No equipment exemptions under 2.72.202 NMAC apply.							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

1 Specify date(s) required to determine regulatory applicability.

Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
FL1	Flare		VOC, HAPs	VRT, heater treater flash, sales gas stream during pipeline downtime.	98%	Manuf. Guarantee
ECD1	Enclosed Combustor		VOC, HAPs	OILTK1-2, SWTK1-2	98%	Manuf. Guarantee
CAT1	Engine Catalyst Control		NOX, CO, VOC	ENG3	NOX: 94% CO: 92% VOC: 80%	Manuf. Spec Sheet

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

Table 2-D: Maximum Emissions (Consider federally enforceable controls under normal operating conditions)

This table must be filled out

Maximum Federally Enforceable Emissions are the emissions at maximum capacity with only federally enforceable methods of reducing emissions. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum facility capacity without pollution controls for 8760 hours per year. Account for federally enforcable controls, such as an NSPS or MACT regulation. Consider federally enforceable controls due to permitting. List Hazardous Air Pollutants (HAP) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
ENG3	5.37	23.52	5.37	23.52	0.97	4.24	0.00	0.00	0.03	0.15	0.03	0.15				
H1	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07	0.01	0.07				
H2	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07	0.01	0.07				
H3	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07	0.01	0.07				
FL1	-	-	-	-	23.67	51.95	-	-	-	-	-	-				
FL1-STRAND	-	-	-	-	10159.27	1828.67	-	-	-	-	-	-				
ECD1	-	-	-	-	0.05	0.20	-	-	-	-	-	-				
FUGAREA	-	-	-	-	1.99	8.71	-	-	-	-	-	-				
HR	-	-	-	-	-	-	-	-	0.92	0.32	0.09	0.03				
VRT	-	-	-	-	14.07	61.61	-	-	-	-	-	-				
OILTK1	-	-	-	-	4.04	17.69	-	-	-	-	-	-				
OILTK2	-	-	-	-	4.04	17.69	-	-	-	-	-	-				
SWTK1	-	-	-	-	0.16	0.69	-	-	-	-	-	-				
SWTK2	-	-	-	-	0.16	0.69	-	-	-	-	-	-				
OILLOAD	-	-	-	-	36.07	13.59	-	-	-	-	-	-				
SWLOAD	-	-	-	-	0.36	0.15	-	-	-	-	-	-				
SSM	-	-	-	-	-	10.00	-	-	-	-	-	-				
MALFUNCTIONS	-	-	-	-	-	10.00	-	-	-	-	-	-				
Totals	5.96	26.10	5.86	25.69	10280.20	2027.04	0.00	0.02	1.00	0.67	0.17	0.38				

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source.

Table 2-E: Requested Allowable Emissions

Enter an allowable emission limit for each piece of equipment with either an uncontrolled emission rate greater than 1 lb/hr or 1 ton per year (tpy) or a controlled emission rate of any amount. For H2S please represent all emissions even if they are less than 1 lb/hr and 1 tpy. If selecting combustion SSM emissions, enter lb/hr and tpy values. If selecting up to 10 tpy of Malfunction VOC emissions, enter tpy values. Combustion emissions from malfunction events are **not authorized** under this permit. Fill all cells in this table with the emissions in lb/hr and tpy, or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Total the emissions from all equipment in the Totals row. Add additional rows as necessary. Unit & stack numbering must be consistent throughout the application package. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or $1.41E^{-4}$).

Unit No.	NOx		CO		VOC		SOx		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
ENG3	0.40	1.76	0.54	2.35	0.31	1.37	0.00	0.00	0.03	0.15	0.03	0.15				
H1	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07	0.01	0.07				
H2	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07	0.01	0.07				
H3	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07	0.01	0.07				
FL1	0.15	0.42	0.67	1.91	0.52	1.24	0.00	0.00	-	-	-	-				
FL1-STRAND	71.63	12.89	326.53	58.78	203.19	36.57	0.00	0.00	-	-	-	-				
ECD1	0.04	0.19	0.19	0.84	0.05	0.20	0.00	0.00	-	-	-	-				
FUGAREA	-	-	-	-	1.99	8.71	-	-	-	-	-	-				
HR	-	-	-	-	-	-	-	-	0.92	0.32	0.09	0.03				
VRT	-	-	-	-	0.56	2.44	-	-	-	-	-	-				
OILTK1	-	-	-	-	0.16	0.70	-	-	-	-	-	-				
OILTK2	-	-	-	-	0.16	0.70	-	-	-	-	-	-				
SWTK1	-	-	-	-	0.01	0.03	-	-	-	-	-	-				
SWTK2	-	-	-	-	0.01	0.03	-	-	-	-	-	-				
OILLOAD	-	-	-	-	36.07	13.59	-	-	-	-	-	-				
SWLOAD	-	-	-	-	0.36	0.15	-	-	-	-	-	-				
SSM	-	-	-	-	-	10.00	-	-	-	-	-	-				
MALFUNCTIONS	-	-	-	-	-	10.00	-	-	-	-	-	-				
Totals	72.81	17.84	328.43	66.05	278.73	86.91	0.00	0.02	1.00	0.67	0.17	0.38				

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source.

Note: Emissions may not be split equally between the three Heater Treaters; therefore, Cimarex requests one emissions limit for the heater treater emissions

Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions.

Stack Type (Engine, Turbine, Flare, ECD, or Thermal Oxidizer Etc.)	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Height Above Ground (ft)	Temp. (F)	Flow Rate (acfs)	Velocity (ft/sec)	Inside Diameter (ft)
ENG3	ENG1	V	12	1055	16.62	121.9	0.42
H1	ENG2	V	15	400	2.61	13.3	0.50
H2	ENG3	V	15	400	2.61	13.3	0.50
H3	GEN1	V	15	400	2.61	13.3	0.50
FL1	GEN2	V	27	1400	231.86	2656.93	0.33
ECD1	H1	V	20	1400	0.09	0.10	1.09

Table 2-I: Emission Rates for HAPs

HAP In the table below, report the potential emission rate for each HAP from each regulated emission unit listed in Table 1, only if the entire facility emits the HAP. For each such emission unit, HAP shall be reported to the nearest 0.1 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAP shall be the sum of all HAP sources calculated to the nearest 0.1 ton per year. Use the HAP nomenclature as it appears in Section 112 (b) of the 1990 CAAA. Include tank-flashing emissions estimates of HAP in this table. For each HAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected, or the pollutant is emitted in a quantity less than the threshold amounts described above. Add additional rows as necessary.

Stack No.	Unit No.(s)	Total HAPs		n-Hexane ■ HAP		Provide Pollutant Name Here □ HAP		Provide Pollutant Name Here □ HAP		Provide Pollutant Name Here □ HAP		Provide Pollutant Name Here □ HAP		Provide Pollutant Name Here □ HAP	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
ENG3	ENG3	0.08	0.35	0.00	0.00										
H1	H1	0.32	0.01	0.19	0.01										
H2	H2	0.32	0.01	0.19	0.01										
H3	H3	0.32	0.01	0.19	0.01										
FL1	FL1	3.39	0.07	0.01	0.02										
FL1-STRAND	FL1-STRAND	8.94	1.61	3.25	0.59										
ECD1	ECD1	0.00	0.01	0.00	0.00										
FUGAREA	FUGAREA	0.08	0.34	0.03	0.13										
HR	HR	-	-	-	-										
VRT	VRT	0.01	0.06	0.01	0.03										
OILTK1	OILTK1	0.01	0.03	0.00	0.01										
OILTK2	OILTK2	0.01	0.03	0.00	0.01										
SWTK1	SWTK1	0.00	0.00	0.00	0.00										
SWTK2	SWTK2	0.00	0.00	0.00	0.00										
OILLOAD	OILLOAD	1.90	0.72	0.48	0.18										
SWLOAD	SWLOAD	0.02	0.01	0.00	0.00										
SSM	SSM	-	-	-	-										
MALFUNCTIONS	MALFUNCTIONS	-	-	-	-										
Totals:		15.41	3.25	4.36	1.00										

Table 2-J: Allowable Fuels and Fuel Sulfur for Combustion Emission Units:

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

Unit No.	Fuel Type (Natural Gas, Field Gas, Propane, Diesel, …)	Fuel Source (purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas, or other	Specify Units				
			Engines and Turbines: SO2 percentage (%) of the NOx emission rate (except flares)	Diesel Fuel Only: ppm of Sulfur	Lower Heating Value (BTU/SCF)	Annual Fuel Usage (MMSCF/y)	Does the Allowable Fuel and Fuel Sulfur Content meet GCP O&G Condition A110.A?
ENG3	Natural Gas	Pipeline Quality Natural Gas, Field Natural Gas	0.26%	N/A	1,020	15.23	☑ Yes ☐ No
H1	Natural Gas	Pipeline Quality Natural Gas, Field Natural Gas	0.60%	N/A	1,020	17.18	☑ Yes ☐ No
H2	Natural Gas	Pipeline Quality Natural Gas, Field Natural Gas	0.60%	N/A	1,020	17.18	☑ Yes ☐ No
H3	Natural Gas	Pipeline Quality Natural Gas, Field Natural Gas	0.60%	N/A	1,020	17.18	☑ Yes ☐ No
FL1	Natural Gas	Process Gas	N/A	N/A	Varies	307.47	☑ Yes ☐ No
ECD1	Natural Gas	Process Gas	N/A	N/A	2051	2.84	☑ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No
							☐ Yes ☐ No

Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Unit and stack numbering must correspond throughout the application package.

Tank No.	Date Installed	Materials Stored	Roof Type	Seal Type	Capacity (bbl)	Diameter (M)	Vapor Space (M)	Color		Separator Pressure (psia)	Annual Throughput (gal/yr)	Turn-overs (per year)
								Roof	Shell			
			Select one	Select one								
OILTK1	Post-9/18/2015	Oil/Condensate	Fixed	N/A	500	4.7244	1.95072	OT (green)	OT (green)	32	3,372,600	202.47
OILTK2	Post-9/18/2015	Oil/Condensate	Fixed	N/A	500	4.7244	1.95072	OT (green)	OT (green)	32	3,372,600	202.47
SWTK1	Post-9/18/2015	Produced Water	Fixed	N/A	500	4.7244	1.95072	OT (green)	OT (green)	32	3,832,500	230.08
SWTK2	Post-9/18/2015	Produced Water	Fixed	N/A	500	4.7244	1.95072	OT (green)	OT (green)	32	3,832,500	230.08

Section 3
Registration Summary

The Registration Summary: Provide information about the registration submittal. The Registration Summary shall include a brief description of the facility and its process. In case of a modification to a facility, please describe the proposed changes.

Specify Facility Type: Check the appropriate box below:

☒ Production Site

☐ Tank Battery

☐ Compressor Station

☐ Natural Gas Plant

☐ Other, please specify:_____

Registration Summary:

This document was prepared as a General Construction Permit Oil and Gas Registration (GCP-O&G) by Cimarex Energy Co. for the Tres Equis State Facility.

Cimarex Energy Co. (Cimarex) owns and operates an oil and natural gas production facility known as Tres Equis State Facility. The facility is currently operating under Notice of Intent (NOI) #5660R1. Due to the following changes, the facility-wide emissions have been revised and Cimarex is claiming a GCP-O&G:

- Removal of five (5) separators/scrubbers (SEP8-12).
- Removal of one (1) vapor recovery unit (VRU),
- Removal of six (6) condensate storage tanks (OILTK3-8),
- Removal of two (2) produced water storage tanks (SWTK3-4),
- Addition of one (1) enclosed combustor (ECD1),
- Updated horsepower of one (1) compressor engine (ENG3),
- Updated maximum burner rating of three (3) heater treaters (H1-3),
- Updated production, and
- Reconciliation of all impacted emission units based on the aforementioned changes.

The equipment list is as follows:

- Two (2) oil/condensate tanks, 500 bbls
- Two (2) produced water tanks, 500 bbls
- Three (3) heater treaters, 2.0 MMBtu/hr or less
- One (1) compressor engine, 203-Hp
- One (1) flare
- One (1) enclosed combustor
- One (1) vapor recovery tower
- One (1) LACT unit
- One (1) saltwater disposal pump, electric
- Four (4) pumping units, electric
- One (1) recirculation pump, electric
- Other separation equipment

Written description of the routine operations of the facility:

The Tres Equis State Facility is an oil and gas production facility that flows natural hydrocarbons through five (5) three-phase separators (SEP1-5) to three (3) heater treaters (H1-3). From SEP1-5, the natural gas is processed by a low-pressure gas scrubber (SEP6) prior to either being compressed by a natural gas-fired compressor engine (ENG3) and utilized for gas lift operations or transmitted offsite. Oil/condensate from H1-3 is routed to a vapor recovery tower (VRT), where the oil/condensate is flashed. VRT flashing gas and heater treater flash gas is controlled by the flare (FL1). This is considered routine flaring. Oil remaining at the VRT is routed to two (2) oil/condensate storage tanks (OILTK1-2) prior to either being

transmitted offsite via pipeline and a Lease Automatic Custody Transfer (LACT) Unit or loaded by tank truck (OILLOAD) and transported offsite. Produced water from SEP1-5 and H1-3 is routed to two (2) produced water storage tanks (SWTK1-2) from which it is either loaded by tank truck (SWLOAD) and transported offsite or transmitted offsite for saltwater disposal via pipeline with the aid of an electric water transfer pump (SWDPUMP). The storage tanks' air emissions are controlled by the enclosed combustor (ECD1). The flare (FL1) also controls the sales gas stream during instances of sales gas pipeline downtime. This is represented as FL1-STRAND in Sections 2 and 5 of the application and the AECT. This is considered intermittent flaring. Please note that FL1 is a dual-pressure flare however both tips have identical parameters. A flare scrubber (SEP7), four (4) electric pumping units (PU1-4), and an electric recirculation pump (PUMP) are also present at the facility. A glycol dehydrator is present at the facility but is disconnected and no longer in service.

Routine or predictable emissions during Startup, Shutdown and Maintenance (SSM):

Uncontrolled SSM emissions from various activities including compressor engine blowdowns, engine startups, and equipment degassing due to routine maintenance are included in this application.

Malfunction Emissions (M):

Malfunction emissions are accounted for as VOC emissions up to 10 tons per year of VOC in this Registration. The permit does not authorize combustion emissions for malfunctions.

The permit does not authorize emissions from SSM and Malfunction to be combined as 10 TPY VOC. However, they may be permitted separately. In the allowable emissions table in Section 2, these two events are separate line items and must be kept separate.

Allowable Operations: Check the appropriate box below:

☒ Facility operates continuously (8760 hours per year)

☐ The following regulated equipment will operate less than 8760 hours per year. Add additional rows as necessary. These units are subject to Condition A108.C of the Permit.

Table A – Equipment Operating Less Than 8760 hours per year

Unit #	Requested Annual Operating Hours

Verification of Compliance with Stack Parameter Requirements:

Please use the Stack Calculator and Stack Requirements Explained Guidance on our website: All of the verification information below is required to be filled out.

www.env.nm.gov/air-quality/air-quality-oil-and-gas-gcp-application-forms/

Check the box for each type of equipment at this facility:

- ☒ Engine(s)
- ☐ Turbine(s)
- ☒ Flares(s)
- ☒ Enclosed Combustion Device (s)
- ☒ Heater(s)
- ☐ Reboiler(s)

For each type of equipment checked above, complete the applicable section below.

Engines

1. Calculate the pound per hour (lb/hr) NO_x emission rate according to GCP O&G Condition A202.I Step 1 on page 15 of the GCP O&G. Enter this value in the top row of the table below.
2. Based on the calculated facility total NO_x emission rate, determine the minimum stack parameter requirements for engines and heaters from Table 1: Engines (page 17) of the GCP O&G and enter the minimum parameters from Table 1 (page 17) of the GCP O&G in the bottom row of the table below.
3. Enter the stack parameters from each engine and heater in the blank rows of the table below. Add rows as necessary.

Table B: Engine/Generator/Heater/Reboiler Stack Parameter Verification:

Calculated Facility Total NOx Emission Rate: 0.99 lb/hr				
Engine/Generator/Heater/Reboiler Unit Number	**Height (ft)**	**Temperature (°F)**	**Velocity (ft/s)**	**Diameter (ft)**
ENG3	12.00	1055	121.9	0.42
H1	15	400	13.3	0.5
H2	15	400	13.3	0.5
H3	15	400	13.3	0.5
Table 1 Minimum Parameters: For verification, list the minimum parameters based on the NOx lb/hr emission rate from the GCP O&G Table 1.	5.9	571	49.2	0.3

4. Do all engines and heaters comply with the minimum stack parameters from Table 1 (page 17) of the GCP O&G?
   - ☐ Yes. Skip step 5 below.
   - ☒ No. Go to step 5 below.

5. For engines and heaters that do not comply with the minimum stack parameters in Table 1 of the GCP O&G, explain and demonstrate in detail how the engines and heaters will be authorized according to the steps on page 16 of the GCP O&G or Condition A203.C of the GCP O&G. Show all calculations.
   ENG3 meets the minimum stack parameters. The combined heater emissions are less than 1.23 lb/hr which meets the exemption requirement in A203.C.

Turbines

1. Calculate the pound per hour (lb/hr) NO_x emission rate according to GCP O&G Condition A202.I Step 1 on page 17 of the GCP O&G. Enter this value in the top row of the table below.
2. Based on the calculated facility total NO_x emission rate, determine the minimum stack parameter requirements for turbines and heaters from Table 2: Turbines (page 18) of the GCP O&G. Enter the minimum parameters from Table 2 (page 18) of the GCP O&G in the bottom row of the table below.
3. Enter the stack parameters from each turbine and heater in the blank rows of the table below. Add rows as necessary.

Table C: Turbine/Heater/Reboiler Stack Parameter Verification:

Calculated Facility Total NOx Emission Rate: _____lb/hr				
Turbine/Heater/Reboiler Unit Number	**Height (ft)**	**Temperature (^{o}F)**	**Velocity (ft/s)**	**Diameter (ft)**
N/A				
Table 2 Minimum Parameters: For verification, list the minimum parameters based on the NOx lb/hr emission rate from the GCP O&G Table 2.				

4. Do all turbines and heaters comply with the minimum stack parameters from Table 2 (page 18) of the GCP O&G?

☐ Yes. Skip step 5 below.
☐ No. Go to step 5 below.

5. For turbines and heaters that do not comply with the minimum stack parameters in Table 2 of the GCP O&G, explain and demonstrate in detail how the turbines and heaters will be authorized according to the steps on page 18 of the GCP O&G or Condition A203.C of the GCP O&G. Show all calculations.

Flares

1. Enter SO_2 emission rates (lb/hr) for each flare in the second column of the table below.
2. Based on the SO_2 emission rates, determine the minimum stack height requirements for flares from Table 3 (page 26) of the GCP O&G and enter the minimum stack height requirements for flares from Table 3 (page 26) of the GCP O&G in the last column of the table below.
3. Enter the stack height of each flare in the third column of the table below. Add rows as necessary.

Table D: Flare Stack Height Parameter Verification:

Flare Unit Number	**SO_2 Emission Rate (lb/hr)**	**Height (ft)**	**Table 3 Minimum Stack Height:** For verification, list the minimum height parameters based on the SO2 emission rate from the GCP O&G Table 3.
FL1	<0.01	27	6.6 ft

4. Do all flares comply with minimum stack height requirements?
   - ☒ Yes
   - ☐ No

5. Does the flare gas contain 6% H_2S or less by volume (pre-combustion)?
   - ☒ Yes. Skip step 6 below.
   - ☐ No. Go to step 6 below.

6. Explain in detail how assist gas will be added to reduce the gas composition to 6% H_2S or less by volume.

Enclosed Combustion Device(s) (ECD):

According to GCP O&G Condition A208.A, the facility must meet one of the following options if an ECD is installed at the facility:

Option 1:

1. Will the ECD(s) meet the SO2 emission limit of 0.7 lb/hr and operate with a velocity of at least one (1) foot per second?
   - ☒ Yes. Skip Option 2 below.
   - ☐ No. Go to Option 2 below.

Option 2:

1. Will the ECD(s) meet the SO_2 emission limit of 0.9 lb/hr and operate with a velocity of at least two (2) feet per second?
   - ☐ Yes
   - ☐ No

Section 4

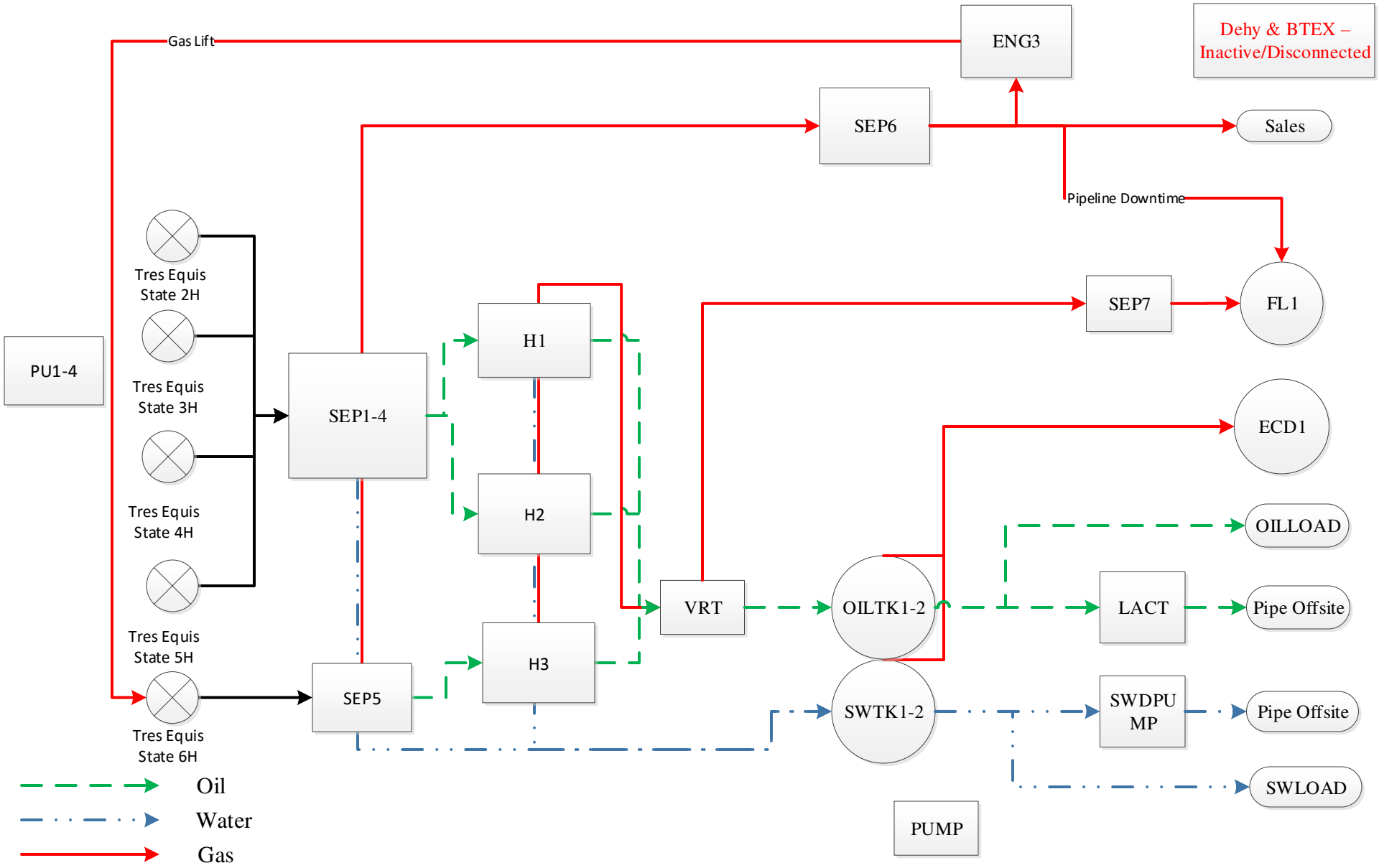
Process Flow Sheet

Attach a **process flow sheet** indicating all individual equipment, all emission points, and types of control applied to those points. All units must be labeled, and the unit numbering system must be consistent throughout this Registration. Identify all sources of emissions with a vertical arrow. Label each of the different material streams (e.g. crude oil, gas, water). The process flow sheet must be a legible size.

The Tres Equis State Facility is an oil and gas production facility that flows natural hydrocarbons through five (5) three-phase separators (SEP1-5) to three (3) heater treaters (H1-3). From SEP1-5, the natural gas is processed by a low-pressure gas scrubber (SEP6) prior to either being compressed by a natural gas-fired compressor engine (ENG3) and utilized for gas lift operations or transmitted offsite. Oil/condensate from H1-3 is routed to a vapor recovery tower (VRT), where the oil/condensate is flashed. VRT flashing gas and heater treater flash gas is controlled by the flare (FL1). This is considered routine flaring. Oil remaining at the VRT is routed to two (2) oil/condensate storage tanks (OILTK1-2) prior to either being transmitted offsite via pipeline and a Lease Automatic Custody Transfer (LACT) Unit or loaded by tank truck (OILLOAD) and transported offsite. Produced water from SEP1-5 and H1-3 is routed to two (2) produced water storage tanks (SWTK1-2) from which it is either loaded by tank truck (SWLOAD) and transported offsite or transmitted offsite for saltwater disposal via pipeline with the aid of an electric water transfer pump (SWDPUMP). The storage tanks' air emissions are controlled by the enclosed combustor (ECD1). The flare (FL1) also controls the sales gas stream during instances of sales gas pipeline downtime. This is represented as FL1-STRAND in Sections 2 and 5 of the application and the AECT. This is considered intermittent flaring. Please note that FL1 is a dual-pressure flare however both tips have identical parameters. A flare scrubber (SEP7), four (4) electric pumping units (PU1-4), and an electric recirculation pump (PUMP) are also present at the facility. A glycol dehydrator is present at the facility but is disconnected and no longer in service.

A process flow sheet is attached.

PROCESS FLOW DIAGRAM



Tres Equis State Facility
Lea County, New Mexico

CIMAREX

Section 5

Emissions Calculation Forms

The Department has developed the Air Emissions Calculation Tool (AECT), which is required to be used in the GCP-Oil and Gas Registration. If the AECT, for a piece of equipment is under development, provide alternate calculations. **Do not include alternative calculations unless there is an issue being resolved with the AECT. This will delay review of the application.** The AECT and this Registration Form may be updated as needed.

Tank Emissions Calculations: Provide the method used to estimate tank-flashing emissions, the input and output summary from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Pro-Max or Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation. **The inputs must match the gas analyses information submitted. Inputs that don't match may be grounds for denial of the application submittal.**

SSM Calculations: In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Table 2, and the rational for why the others are reported as zero (or left blank).

Control Devices: Report all control devices and list each pollutant controlled by the control device. Indicate in this section if you chose to not take credit for the reduction in emission rates. Only uncontrolled emission rates can be considered to determine applicability unless the state or federal acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

Calculation Details: The AECT is required for all emission calculations. If the AECT is not functioning, alternative calculations may be submitted only for the portions of the AECT with issues being resolved. Utilize this section to explain in detail, on an equipment-by-equipment basis, why alternative calculations are necessary.

Explain here: The AECT does not auto-populate the AP-42 PM factors for engines when the manufacturer data option is selected. Please refer to the attached calculations.

The AECT does not have the ability to calculate uncaptured heater treater flash emissions. Please refer to the attached calculations. The volume of heater treater flash gas was calculated using the total facility production and a gas to oil ratio (GOR) derived from Promax.

The AECT does not have the ability to calculate VRT emissions. Please refer to the attached calculations and the explanation in Section 6 for how VRT emissions were calculated using Promax. Please note that there are two (2) Promax runs in Section 6. One for tanks associated with the VRT (used by the VRT and OILTK1-2) and one for tanks not associated with a VRT (SWTK1-2).

In order to generate the correct number of flare pages in the AECT a "3" had to be entered for the number of flares. Please note that there is only one (1) flare and one (1) enclosed combustor at the facility. Please see the following list of streams in the AECT, what they correspond to, and where the uncaptured and uncombusted VOC is represented.

-ECD1: Storage tanks emissions. All VOC represented at the storage tanks
-FL1-VRT: VRT emissions (includes pilot). All VOC allocated to the VRT (except for pilot VOC which is represented at the flare.
-FL1-HT: Heater treater flash gas emissions. Uncaptured VOC represented at the heater treaters. Uncombusted VOC represented at the flare.
-FL1-STRAND: Sales gas stream during sales gas pipeline downtime. All VOC represented at the flare (FL1).

The VOC weight % used to estimate fugitive emissions is the VOC weight % of the hydrocarbon fraction of the analysis only. Fugitive emission factors are in lb-TOC/hr/component. Therefore, it would be inappropriate to use a weight % the incorporates non-organics.

Equipment Forms Submitted in this Section (add additional rows as necessary):

Equipment Type	Quantity	Check Box to Indicate Units that are Controlled	Enter Control Device Type and Pollutant Controlled
Engine	**1**	☒	Catalytic Converter (NOx, CO, VOC)
Turbine		☐	
Tanks	**4**	☒	Flare (VOC, HAPs)
Generator		☐	
VRU		☐	
VRT	**1**	☒	Flare (VOC, HAPs)
ULPS		☐	
Glycol Dehydrator		☐	
Flare	**1**	☐	FL1: VRT, heater treater flash, pilot FL1-STRAND: Sales gas stream during sales gas pipeline downtime.
Amine Unit		☐	
Cryogenic Unit		☐	
Fugitive Emissions	**X**	☐	
Heater	**3**	☐	
Truck Loading	**X**	☐	
Enclosed Combustion Device (ECD)	**1**	☐	OILTK1-2, SWTK1-2
Thermal Oxidizer (TO)		☐	
Other		☐	
Other		☐	

For each scenario below, if there are more than one emissions unit, control device, or gas combustion scenario. Please copy and paste each applicable section and label the unit number(s) if the scenarios vary.

Vapor Recovery Tower, Ultra Low-Pressure Separator, or Flash Tower Located Upstream of Storage Vessels: If the facility contains one of the following units located upstream of the storage vessels and is used to flash and capture flashing emissions, check the appropriate box.
Unit number: VRT
☐ Vapor Recovery Tower and VRU Compressor
☐ ULPS and VRU Compressor
☐ Flash Tower and VRU Compressor

Vapor Recovery Unit (VRU) located upstream of Storage Vessels: Check the box below if the facility is using a VRU to capture flashing emissions prior to any storage vessels to limit the PTE of the storage vessels to below applicability thresholds of NSPS OOOO and/or NSPS OOOOa. A process vs control determination should be prepared for this type of VRU application.
Unit number:
☐ VRU capturing emissions prior to any storage vessel and routing directly to the sales pipeline

Vapor Recovery Unit (VRU) attached to Storage Vessels: Check the box below if this facility is using a VRU to reduce storage vessel emissions to limit the PTE to below NSPS OOOO or NSPS OOOOa applicability thresholds:
Unit number:
☐ VRU controlling Storage Vessel emissions and the facility is subject to the requirements under NSPS OOOO, 40 CFR 60.5411
☐ VRU controlling Storage Vessel emissions and the facility is subject to the requirements under NSPS OOOOa, 40 CFR 60.5411a

Gas Combustion Scenarios: Read through the scenarios below and check the boxes next to any appropriate facility operating scenarios. Flares shall assume a destruction efficiency of 95%, unless the facility is subject to requirements for flares under 40

A flare, vapor combustion unit (VCU), enclosed combustion device (ECD), thermal oxidizer (TO):
Unit number: FL1

- ☐ Controls storage vessels in accordance with 40 CFR 60, Subpart OOOO or OOOOa.
- ☐ Provides a federally enforceable control for the storage vessels to limit the PTE to below applicability thresholds of 40 CFR 60, Subpart OOOO or OOOOa.
- ☐ Controls the glycol dehydrator
- ☐ Controls the amine unit
- ☐ Controls truck loading
- ☐ Operates only during maintenance events, such as VRU downtime, check one below:
  - ☐ The emissions during VRU downtime are represented as uncontrolled VOC emissions from the compressor
  - ☐ The combustion emissions during VRU downtime are represented as controlled emissions from the combustion device
- ☐ Controls the facility during plant turnaround
- ☒ Controls the sales gas stream during sales gas pipeline downtime
- ☒ Controls the VRT and heater treater flash

A flare, vapor combustion unit (VCU), enclosed combustion device (ECD), thermal oxidizer (TO):
Unit number: ECD1

- ☐ Controls storage vessels in accordance with 40 CFR 60, Subpart OOOO or OOOOa.
- ☒ Provides a federally enforceable control for the storage vessels to limit the PTE to below applicability thresholds of 40 CFR 60, Subpart OOOO or OOOOa.
- ☐ Controls the glycol dehydrator
- ☐ Controls the amine unit
- ☐ Controls truck loading
- ☐ Operates only during maintenance events, such as VRU downtime, check one below:
  - ☐ The emissions during VRU downtime are represented as uncontrolled VOC emissions from the compressor
  - ☐ The combustion emissions during VRU downtime are represented as controlled emissions from the combustion device
- ☐ Controls the facility during plant turnaround

Amine Unit: Provide the following information for each amine unit.

Design Capacity in MMscf/day	
Rich Amine Flowrate in gal/min	
Lean Amine Flowrate in gal/min	
Mole Loading H_2S	
Sour Gas Input in MMscf/day	

Glycol Dehydration Unit(s): Provide the following information for each glycol dehydration unit:
Please include an extended gas analysis in Section 6 of this application.

Unit #	Glycol Pump Circulation Rate

Voluntary Monitoring in Accordance with §40 CFR 60.5416(a): Check the box(s) to implement a program that meets the requirements of 40 CFR 60.5416(a). This monitoring program will be conducted in lieu of the monitoring requirements established in the GCP-Oil and Gas for individual equipment. Ceasing to implement this alternative monitoring must be reported in an updated Registration Form to the Department.

- ☐ Condition A205.B Control Device Options, Requirements, and Inspections for Tanks
- ☐ Condition A206.B Truck Loading Control Device Inspection
- ☐ Condition A206.C Vapor Balancing During Truck Loading
- ☐ Condition A209.A Vapor Recovery Unit or Department-approved Equivalent
- ☐ Condition A210.B Amine Unit Control Device Inspection

Fugitive H_2S Screening Threshold and Monitoring in accordance with Condition A212: Check the box that applies.

☒ Condition A212.A does not apply because the facility is below the fugitive H_2S screening threshold in Condition A212, or

☐ Condition A212.A applies. Because the facility is above the fugitive H_2S screening threshold in Condition A212, or the facility is voluntarily complying with Condition A212.A, and Condition A212.A applies

AIR EMISSIONS CALCULATION TOOL

Instructions for Completing the Equipment Calculation Forms

1. Click the **Start Button** below to reset the form to begin data entry.

2. The ***Air Emissions Calculation Tool*** initially loads with the **Core Data Information Form.** Once all information is entered on this form, the necessary equipment calculation pages will be created based on the information entered on the Core Data Information Form. The customized ***Air Emissions Calculation Tool*** should now be saved to your computer before entering any other information on the equipment calculation pages. **Warning,** every time you click on the **Start Button b**elow, the ***Air Emissions Calculation Tool*** will reset and all data entered will be lost.

3. Green/Blue colored information boxes require users to enter the required information for the subject facility. Default values may be changed if not appropriate for the facility.

4. Yellow colored boxes represent calculated values based on user information entered and may not be changed.

5. Yellow boxes with green/blue cross-hatching represent calculated values based on user information entered, however users may input data in these boxes, if necessary.

Start

Core Data Information

Mandatory - All appropriate Data Must Be Entered For All Boxes Below. This Data Will Automatically Create All Required Equipment Forms And Populate This Data In All Emissions Calculation Forms.

Date Field	Dec 23, 2020		Permit/NOI/NPR Number	5660R3	
Company Name:	Cimarex Energy Co.		Select Application Type	GCP-O&G	
Facility Name:	Tres Equis State Facility		AI# if Known		
Max. Facility Gas Production	1,400	(Mscf/d) 58.33 (Mscf/h)	Elevation (ft.)	3,651	
Max. Facility Oil Production	440	(BOPD) 18.33 (BOPH)	Sour Gas Streams at This Site?	NO	
Max. Facility Produced Water	500	(BWPD) 20.83 (BWPH)			

Enter The Quantity Of All Air Emissions Sources Located At The Facility
(Leave Blank For Each Equipment Type That Is Not Present)

Equipment	Quantity	Equipment	Quantity
Amine Unit(s)		Compressor Engine (s)	1
Dehydrator(s)		Enclosed Combustion Device(s) (ECD)	1
Equipment Fugitives	✓	Flare(s)	3
Flash Tower/Ultra-Low Pressure Separator(s)^	1	Generator Engine (s)	
Gunbarrel Separator(s)/Tank(s)		Heater(s), Heater Treaters	3
Number of Paved Haul Roads Segments		Number of Unpaved Haul Road Segments	1
Low Pressure Compressor(s)* & Compressor(s)*		Oil/Condensate Storage Tank(s)	2
Oil/Condensate Truck Loading	✓	Produced Water Storage Tank(s)	2
Produced Water Truck Loading	✓	Pumpjack Engine(s)	
Reboilers(s) (Amine Units)		Placeholder for Future Use	
Reboilers(s) (Glycol, others)		Startup, Shutdown & Maintenance and Malfunction	✓
Skim Oil or Slop Oil Tank(s)		Thermal Oxidizer(s) (TO)	
Vapor Combustion Device(s) (VCU)		Vapor Recovery Unit(s) (VRU)^	

Click Here to Generate Required Forms & Save to Your Computer

Complete all required forms that follow, for the equipment at the subject facility, based on the selections made above. Items with an * indicate an air emissions calculation form currently not required at this time and those with ^ indicate forms under construction at this time.

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Non-Emergency SI Rich Burn, Lean Burn & Clean Burn Natural Gas Fired Compressor Engines (100% Load) & Stationary & Non-Road Diesel (≤600hp & >600hp) & Gasoline Compressor Engines (≤600hp)

Enter data in green-shaded areas only! One engine per form unless like-kind engines

Emission Unit ID:	ENG 3
Engine Manufacturer:	Caterpillar
Engine Model:	G3306 TA
Engine Serial #:	G6X08030
Engine Manuf. Date:	1/4/2012
Engine Type:	4SRB
Factory HP Rating	203
Allowable HP Rating	203
Engine BSFC (Btu/(Hp*Hr))	8,736
Fuel LHV, (BTU/SCF)	1,020
Fuel Sulfur (grains/dscf)	0.002

Quantity of Like-kind Engines:	1
Engine Description	Compressor Engine
Hours/year	8,760
Fuel Type:	Field Gas

Engine Deration

- (•) No Deration
- ( ) Stationary - Naturally Aspirated
- ( ) Stationary - Turbo Aspirated
- ( ) Portable - Naturally Aspirated
- ( ) Portable - Turbo Aspirated

No Deration.

Notes:

Hourly Fuel Flow Rate (MMSCF/hr)	0.001739
Annual Fuel Flow Rate (MMSCF/yr)	15.23364
Maximum Engine RPM	1,800
Exhaust Temperature (°F)	1,055
Exhaust Velocity (ft/sec)	121.9
Exhaust Flow (ACFM)	997
Stack Diameter (ft)	0.42
Stack Height (ft)	12

Select Source of Emission Factors

- ( ) AP-42 Emission Factors
- (•) Manufacturer Specs (Enter Appropriate Emission Factors Below) or Diesel Tier 1, 2, 3 or 4
- ( ) NSPS JJJJ; Engine Manuf. Between July 1, 2007-June 30, 2010 & Engine HP≥500HP
- ( ) NSPS JJJJ; Engine Manuf. On or after July 1, 2010 & Engine HP≥500HP
- ( ) NSPS JJJJ; Engine Manuf. Between July 1, 2008-Dec. 31, 2010 & Engine HP 100≤HP<500
- ( ) NSPS JJJJ; Engine Manuf. on or after Jan.1, 2011 & Engine HP 100≤HP<500
- ( ) NSPS JJJJ; Eng. Manuf. Betw. Jan. 1, 2008-June 30, 2010 & LB Engine HP 500≤HP<1350
- ( ) NSPS JJJJ; Engine Manuf. on or after July 1, 2010 & LB Engine HP 500≤HP<1350
- ( ) NSPS JJJJ; Engines < 100HP (Enter Appropriate Emission Factors Below)
- ( ) NSPS IIII; Stationary Diesel Engines

Emission Factors, Catalyst Control Efficiency & Safety Factor						Uncontrolled Emissions		Manufacturer Spec. Emissions		Controlled Emissions (includes SF)[1]	
Pollutant	Uncontrld. EF g/hp-hr	% Control Efficiency	% Safety Factor	Contrld EF g/(hp-hr)	Manuf. Specs g/hp-hr	lb/hr	Tons/yr	lb/hr	Tons/yr	lb/hr	Tons/yr
NOx^	12	94	25	0.72	0.72	5.3704	23.5224	0.3222	1.4112	0.4028	1.7643
CO	12	92	25	0.96	0.96	5.3704	23.5224	0.4296	1.8816	0.537	2.3521
VOC*	2	80	25	0.4	0.4	0.8951	3.9205	0.179	0.784	0.3139	1.3749
Formaldehyde	0.15	0	0	0.15		0.0671	0.2939	0	0	0.0671	0.2939
TSP/PM10/PM2.5			0			0	0	0	0	0	0
[2]SO_2	0.002	0	0	0.002	0.002	0.000994	0.004354	0.000994	0.004354	0.000994	0.004354
AP-42 HAPs	lb/MMBtu										
Formaldehyde	0.0205	NA	NA	NA	NA	0.03635	0.15921	NA	NA	NA	NA
Acetaldehyde	0.00279	NA	NA	NA	NA	0.00495	0.02168	NA	NA	NA	NA
Acrolein	0.00263	NA	NA	NA	NA	0.00466	0.02041	NA	NA	NA	NA
Benzene	0.00158	NA	NA	NA	NA	0.0028	0.01226	NA	NA	NA	NA
Ethylbenzene	0.0000248	NA	NA	NA	NA	0.00004	0.00018	NA	NA	NA	NA
n-Hexane		NA	NA	NA	NA	0	0	NA	NA	NA	NA
Toluene	0.000558	NA	NA	NA	NA	0.00099	0.00434	NA	NA	NA	NA
Xylene	0.000195	NA	NA	NA	NA	0.00035	0.00153	NA	NA	NA	NA
Total HAPs	NA	NA	NA	NA	NA	0.08089	0.3543	NA	NA	0.08	0.35

* Uncontrolled & Controlled VOC emissions include aldehyde emissions. VOC Emissions for JJJJ do not include aldehyde emissions. [1] For NOI's & NPR, controlled emissions cannot be less than JJJJ emissions. [2] SO2 EF (grains/scf or ppm) except for AP-42 EF in g/hp-hr for SO2 & EF Values for NOx, CO, VOC, TSP/PM10/PM2.5 in lb/hp-hr for large gasoline & diesel engines. ^NOx+NMHC Emission Factors for diesel engines assume 75% NOx and 25% VOC

Calculation Tool for Non-Emergency SI Rich Burn, Lean Burn & Clean Burn Natural Gas Fired Compressor Engines (100% Load) & Large Stationary Diesel (≤600hp & >600hp) & Gasoline Compressor Engines (≤600hp) Emissions

AP-42 Gas-Fired Engine Emission factors based on AP-42, Tables 3.2-1, 3.2-2 & 3.2-3 (July 2000)
https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s02.pdf
40 CFR Part 60 Subpart JJJJ Emission Factors based on §60.4233 & Table 1
http://www.ecfr.gov/cgi-bin/text-idx?node=sp40.7.60.jjjj
AP-42 Diesel & Gasoline Fired Engine Emission factors based on AP-42, Tables 3.3-1, 3.2-2, 3.4-1, 3.4-2, 3.4-3 & 3.4-4
https://www3.epa.gov/ttn/chief/ap42/ch03/final/c03s03.pdf
40 CFR Part 60 Subpart IIII Emission Factors based on §60.4233 & Table 1
http://www.ecfr.gov/cgi-bin/text-idx?node=sp40.7.60.iiii
EPA Tier 1-4 Nonroad Compression Ignition Emission Standards (EPA-42--B-16-022)
https://nepis.epa.gov/Exe/ZyNET.exe/P100OA05.txt?ZyActionD=ZyDocument&Client=EPA&Index=2011%20Thru%202015&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C11THRU15%5CTXT%5C00000019%5CP100OA05.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1

Emission factors for natural gas and field gas internal combustion engines may be based on AP-42, Tables 3.2-1, 3.2-2 or 3.2-3 or NSPS JJJJ emission standards or manufacturer specifications based on engine applicability.

NOx Sample Calculation Using AP-42 Emission Factors for a 500-HP 4-Stroke Rich Burn Engine

pph = NOx Emission Factor (EF) lb/MMBtu * Heat Value Btu/scf/1020 Btu/scf * Maximum Heat Input (MMBtu/hr) * Allowable HP * 1/1000000 MMBtu/Btu
= 2.21 lb/MMBtu * 1020 Btu/scf/1020Btu/scf * 7500 MMBtu/hr *500 hp * 1/1000000 MMBtu/Btu
=8.29 lb/hr

tpy =NOx Emission Factor (EF) lb/MMBtu * Heat Value Btu/scf/1020 Btu/scf * Maximum Heat Input (MMBtu/hr) * Allowable HP * 1/1000000 MMBtu/Btu * 8760 hrs/yr * 1/2000 tons/lbs
= 2.21 lb/MMBtu * 1020 Btu/scf/1020 Btu/scf * 0.5 MMBtu/hr * 1/1020 Btu/scf * 1000000/1 Btu/MMBtu * 8760 hrs/yr * 1ton/2000lbs
= 36.31 tpy

AP-42 SO_2 emissions based on 100% conversion of fuel sulfur to SO_2 and assumes sulfur content in natural gas of 2,000 grains/10^6 scf. The SO2 emission factor is converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf. For all other engines not using AP-42, The SO_2 emissions are based on grains S/scf. Fuel Heat values for Diesel = 0.137 MMBtu/gal; LPG = 0.0905 MMBtu/gal and Gasoline = 0.13 MMBtu/gal per AP-42 Appendix A, pg 5 & 6. SO2 emissions for all diesel engines not using AP-42, equals Gal Diesel/hr * diesel wt (lb)/gal * 15 ppm S * 64 lb SO2/32 lb S, where diesel weighs 7.1089 lb/gal.

NOx Sample Calculation Using NSPS JJJJ Emission Factors for a July 1, 2010 500-HP 4-Stroke Rich Burn Engine

pph = NOx Emission Factor (EF) g/hp-hr * 1/453.6 lbs/grams * Allowable HP
= 1 g/hp-hr * 1/453.6 lbs/grams * 500 hp
= 1.1 lb/hr

tpy =NOx Emission Factor (EF) g/hp-hr * 1/453.6 lbs/grams * Allowable HP * 8760 hrs/yr * 1/2000 tons/lbs
= 1 g/hp-hr * 1/453.6 lbs/grams * 500 hp * 8760 hrs/yr * 1ton/2000lbs
= 4.82 tpy

Technical Disclaimer
This document is intended to help you accurately determine stationary compressor engine emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how these units work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as the AQB continue scientific studies and as new information becomes available. The AQB welcome any data, information, or feedback that may improve our understanding of stationary compressor engine emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

New Mexico Environment Department Air Quality Bureau Emissions Calculation Forms

Date: Dec 23, 2020
Company Name: Cimarex Energy Co.
Facility Name: Tres Equis State Facility

Permit Number: 5660R3
AI# if Known:
Elevation (ft.): 3,651

Total Requested Emissions For All Regulated Engines (GCP-O&G Request)

UnitID	NO_x		CO		VOC		SO_x		TSP		PM_{10}		$PM_{2.5}$		H_2S		Total HAP	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
ENG 3	0.4	1.76	0.54	2.35	0.31	1.37	0	0	0	0	0	0	0	0			0.08	0.35
ENG 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
ENG 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
ENG 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
ENG 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
ENG 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
ENG 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
ENG 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
GEN 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
PJENG 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	0
Page Totals	**0.4**	**1.76**	**0.54**	**2.35**	**0.31**	**1.37**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0.08**	**0.35**

New Mexico Environment Department Air Quality Bureau Emissions Calculation Forms

Date: Dec 23, 2020
Company Name: Cimarex Energy Co.
Facility Name: Tres Equis State Facility

Permit Number: 5660R3
AI# if Known:
Elevation (ft.): 3,651

Heaters, Heated Separators & Heater Treaters (Only for units rated <100 MMBTU/Hr)

Enter appropriate information in green boxes below changing default values as appropriate and adding additional rows for each heater unit.

Enter the Sulfur Content of Gas or use default value (grains/10^6 scf). **2,000**

SO_2 emissions based on AP-42 EF and assumes 100% conversion of fuel sulfur to SO2 and assumes sulfur content in natural gas of 2,000 grains/1000000 scf. Change default value of 2000 as needed based on gas analysis submitted with application.

Enter the Site Fuel Heat Value of Gas or use default value (Btu/scf). **1,020**

Emissions From All Heaters, Heated Separators & Heater Treaters

Add/Remove Rows	Unit ID	Heat Input	NO_x		CO		VOC		SO_2		$PM/PM_{10}/PM_{2.5}$	
		MMBtu/hr	pph	tpy	pph	tpy	pph	tpy	pph	tpy	pph	tpy
+ -	H1	2	0.196	0.858	0.165	0.723	0.011	0.048	0	0	0.015	0.066
+ -	H2	2	0.196	0.858	0.165	0.723	0.011	0.048	0	0	0.015	0.066
+ -	H3	2	0.196	0.858	0.165	0.723	0.011	0.048	0	0	0.015	0.066
	Totals		0.588	2.574	0.495	2.169	0.033	0.144	0	0	0.045	0.198

Calculation Tool for Heaters, Heated Separators & Heater Treater Emissions (Uncontrolled) for Oil & Gas Production Sites (Only for units rated <100 MMBTU/Hr)

All emission factors based on AP-42, Table 1.4-1, Table 1.4-2 and Table 1.4-3 (July 1998)
https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

Emission factors for natural gas combustion in boilers and furnaces are presented in AP42, Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4. The Tables present emission factors on a volume basis (lb/10^6 scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/10^6 scf. The emission factors may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value.

NOx Sample Calculation

pph = AP 42 NOx Emission Factor (EF) * site fuel heat value Btu/scf/1020 Btu/scf * Maximum Heat Input (MMBtu/hr) * 1/site fuel heat Value Btu/scf * 1000000/1Btu/MMBtu
= 100 lb/1000000 scf * 2000 Btu/scf/1020 Btu/scf * 0.5 MMBtu/hr * 1/2000 Btu/scf * 1000000/1Btu/MMBtu
=0.096 lb/hr

tpy = AP 42 NOx Emission Factor (EF) * site fuel heat value Btu/scf/1020 Btu/scf * Maximum Heat Input (MMBtu/hr) * 1/site fuel heat value Btu/scf * 1000000/1 Btu/MMBtu * 8760 hrs/yr * 1ton/2000 lbs
= 100 lb/1000000 scf * 2000 Btu/scf/1020 Btu/scf * 0.5 MMBtu/hr * 1/2000 Btu/scf * 1000000/1 Btu/MMBtu * 8760 hrs/yr * 1ton/2000lbs
= 0.42 tpy

SO_2 emissions based on 100% conversion of fuel sulfur to SO_2 and assumes sulfur content in natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor is converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Flash Tower/Ultra-low Pressure Separators Air Emissions Calculations Form

Under Development

Please submit all required calculations and supporting documentation for all Flash Tower/Ultra-low Pressure Separators emissions in the application.

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Vertical Fixed Roof (VFR) Oil/Condensate VOC Flash Emissions Calculations Form

Select Tanks Flash Emission Calculation Method

GOR	E & P Tanks	ProMax
Vasquez-Beggs	HYSYS	VMGSim

ProMax Oil Tanks Emission Calculations

Please attach the ProMAX printout with all input data provided along with the calculated emissions. Enter the uncontrolled VOC emissions below. If the tank vapors are routed to a flare, enclosed combustion device, vapor combustion unit, vapor recovery unit or thermal oxidizer select the appropriate VOC destruction method below along with selected VOC destruction efficiency supported by manufacturer specifications submitted with the application.

Tanks VOC Control Method

Capture Efficiency	98	Represent Uncaptured/Uncollected VOC's at Tanks	YES
VOC Control Method[1]	Enclosed Combustion Device (ECD)	Represent VRU/ULPC Downtime Emissions at Tanks	NA
VOC Destruction Efficiency[2]	98	Represent VOC Controlled Emissions at Tanks*	YES

Notes: Please refer to the explanation in Section 6 for how Promax was used to estimate emissions.

Total VOC Flash Emissions From Oil/Condensate Storage Tanks Calculated with ProMax

Add/Remove Rows	Tank ID	VOC Uncontrolled Emissions		VOC Emissions after Control		VOC Emissions at the Tanks	
Up To 10 Units		pph	tpy	pph*	tpy*	pph	tpy
+ -	OILTK1	1.69	7.41	0.03	0.15	0.07	0.29
+ -	OILTK2	1.69	7.41	0.03	0.15	0.07	0.29
	Totals	3.38	14.82	0.06	0.3	0.14	0.58

Notes 1 & 2 See next page; * Emissions only represented at tanks if "Yes" is selected to represent emissions at tanks.

Calculation Tool for Tanks Flashing & Working & Standing Emissions for Oil & Gas Production Sites

All flash emissions based on flash calculation methodology selected;

1) The appropriate ECD, flare, TO, VCU or VRU form must also be completed.
2) Manufacturer documentation required to support % control selected. If using a VRU/LPC, calculations assume VRU/ULPC with a 100% control efficiency, but with 5% downtime;
3) Information included in calculation tool must be based on representative oil and gas analysis which must be submitted with application;
4) GOR and Vasquez-Beggs sample calculations outlined below; E & P Tanks, ProMax, HYSYS & VMG Sim flash emissions require submittal of computer simulation model emissions calculations print-outs;
5) Working & Standing emissions based on AP-42 Chpt. 7, tanks 4.09d computer simulation or ProMax, or VMG computer simulation models.

Sample Calculations

GOR Methodology

VOC pph = GOR (scf/bbl) * Facility Oil Throughput (BOPD) * 1/24 (Hours/Day * 1/Universal Gas Constant 385 scf/lb-mole @ 70^{O}F, 1 atm) * Molecular Weight of Tank Vapors (lb/lb-mol)
= 40 (scf/bbl) * 1000 (BOPD)*1/24 (hrs/day) *1/385 scf/lb-mol * 50 lb/lb-mol
= 216.45 lbs/hr

VOC tpy = GOR (scf/bbl) * Facility Oil Throughput (BOPD) * 1/24 (Hours/Day * 1/Universal Gas Constant 385 scf/lb-mole @ 70^{O}F, 1 atm) * Molecular Weight of Tank Vapors (lb/lb-mol) * 8760 hr/yr * 1/2000 lbs/ton
= 40 (scf/bbl) * 1000 (BOPD)*1/24 (hrs/day) *1/385 scf/lb-mol * 50 lb/lb-mol * 8760 hr/yr * 1/2000 lbs/ton
= 948.05 tpy

Vasquez-Beggs Methodology

INPUTS			Constraints			
API Gravity		API	16	<API>	58	^{0}API
Separator Pressure (psig)		P	50	<P+Patm>	5250	psia
Separator Temp. (^{0}F)		Ti	70	<Ti>	295	^{0}F
Separator Gas Gravity at Initial Condition		SGi	0.56	<SGi>	1.18	MW/28.97
Barrels of Oil/Day (BOPD)	220	Q	None	<Q>	None	BOPD
Tank Gas MW		MW	18	<MW>	125	lb/lb-mole
VOC Fraction of Tank Gas		VOC	0.5	<VOC>	1.00	Fraction
Atmospheric Pressure (psia)		Patm	20	<Rs>	2070	scf/bbl

Constants			
	^{0}API Gravity		
^{0}APTI	<30	≥30	Given^{0}API
C1	0.0362	0.0178	
C2	1.0937	1.187	
C3	25.724	23.931	

SGx = Dissolved gas gravity at Separator pressure = SGi [1.0+0.00005912*API*Ti*Log(Pi/114.7)]

Rs = (C1 * SGx * Pi^C2) exp ((C3 * API) / (Ti + 460)) for P + Patm

THC = Rs * Q * MW * 1/385 scf/lb-mole * 365 D/Yr * 1 ton/2000 lbs

VOC = THC * Frac. of C3+ in the Stock Tank Vapor

Technical Disclaimer
This document is intended to help you accurately determine oil/condensate storage tank flash, working and standing emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how these units work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as the AQB continue scientific studies and as new information becomes available. The AQB welcome any data, information, or feedback that may improve our understanding of oil/condensate storage tank flash, working and standing emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Vertical Fixed Roof (VFR) Oil/Condensate VOC Working & Standing Emissions Calculations Form

Select Tanks W & S Emission Calculation Method

AP-42 Chpt. 7 | EPA Tanks 4.09d | ProMax | E & P Tanks

Tanks 4.09d Working & Standing VOC Emissions for (VFR) Oil/Condensate Storage Tank(s)

Please attach the Tanks 4.09d printout with all input data provided along with the calculated emissions. Enter the uncontrolled VOC emissions below. If the tank vapors are routed to a flare, enclosed combustion device, vapor combustion unit, vapor recovery unit or thermal oxidizer select the appropriate VOC destruction method below along with selected VOC destruction efficiency supported by manufacturer specifications submitted with the application.

Tanks VOC Control Method			
Capture Efficiency	98	Represent Uncaptured and/or Controlled VOC's at Tanks	YES
VOC Control Method	Flare (FL)	Represent VRU/ULPC Downtime Emissions at Tanks	NA
VOC Destruction Efficiency	98	Represent VOC Controlled Emissions at Tanks*	YES
Notes	AP-42 Chapter 7 (revised June 2020) was used to estimate emissions. The AECT has not been updated to incorporate these revisions. Therefore, the Tanks 4.09d option was selected so that emissions could be hard entered. Please refer to the included calculations.		

Total VOC W & S Emissions From Oil/Condensate Storage Tanks Calculated with Tanks 4.09d

Add/Remove Rows Up To 10 Units	Tank ID	VOC Uncontrolled Emissions		VOC Emissions after Control		VOC Emissions at the Tanks	
		pph	tpy	pph*	tpy*	pph	tpy
+ -	OILTK1	2.35	10.28	0.05	0.21	0.09	0.41
+ -	OILTK2	2.35	10.28	0.05	0.21	0.09	0.41
	Totals	4.7	20.56	0.1	0.42	0.18	0.82

 Notes 1 & 2 See next page; * Emissions only represented at tanks if "Yes" is selected to represent emissions at tanks.

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Emissions From Loading Petroleum Liquid

Select Appropriate AP-42 Petroleum Liquid Loading Methodology & Enter appropriate information in the green boxes below changing default values as appropriate.

Emission Unit ID: OILLOAD

Facility Oil Throughput (gal/yr)	6,745,200
Max. Hourly Loading Rate (gal/hr)	8,000

*Select Appropriate AP-42 Petroleum Liquid Loading Methodology Below**

(●) AP-42, 5.2-4 Equation 1 ( ) AP-42, Table 5.2-5

S - Saturation Factor (From AP-42 Table 5.2-1)	0.6
M - Molecular Weight of Vapors (lb/lb-mole)	36.4
P_{annual} - Avg. Annual True Vapor Pressure of Liquid Loaded (psia)	7.78
P_{hourly} - Max Hourly True Vapor Pressure of Liquid Loaded (psia)	9.23
T_{annual} - Average Annual Temperature ^{O}F of Bulk Liquid Loaded	65.37
T_{hourly} - Maximum Hourly Temperature ^{O}F of Bulk Liquid Loaded	97.16

Select Emission Source - From AP-42 Table 5.2-5

( ) Submerged Loading Dedicated Normal Service
( ) Submerged Loading Vapor Balance Service
( ) Splash Loading Dedicated Normal Service
( ) Splash Loading Vapor Balance Service

Truck Loading VOC Control Method

Capture Efficiency	100	Represent Uncaptured/Uncollected VOC's at Loading Rack	NA
VOC Control Method[1]	Uncontrolled	Represent VRU/ULPC Downtime Emissions at Loading Rack	NA
VOC Destruction Efficiency[2]	0	Represent VOC Controlled Emissions at Loading Rack	YES
Notes			

Total VOC Emissions From Loading Petroleum Liquids

Pollutant	VOC Uncontrolled Emissions		VOC Emissions after Control		VOC Emissions at the Loading Rack	
	pph*	tpy*	pph*	tpy*	pph*	tpy*
VOC	36.06	13.59	36.06	13.59	36.06	13.59

Footnote: * All emission factors based on AP-42, 5.2-4 Equation 1 or AP-42 Table 5.2-5 (July 2008); See next page for calculation notes. You may elect to represent the controlled emissions at the loading rack or at the control device or tanks by selecting the appropriate drop-down options under *Truck Loading VOC Control Method*.

Calculation Tool for Emissions From Loading Petroleum Liquid

Emissions based on AP-42, 5.2-4 Equation 1 (July 2008) or AP-42, Table 5.2-5

https://www3.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf

AP-42 5.2-4 Equation 1

Emissions from loading petroleum liquid can be estimated (with a probable error of ±30 percent)[4] using the following expression:

Equation 1 $L_L = 12.46 * SPM/T$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded;

S = a saturation factor (see Table 5.2-1 reproduced below))

P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")

M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")

T = temperature of bulk liquid loaded, °R (°F + 460)

VOC pph = (12.46*0.6*7.0 (psia)*50 (lb/lb-mole)/550°R)/1000 (gal) * 8400 (gal/hr)
= 39.96 lb/hr

VOC tpy = (12.46*0.6*4.5 (psia)*50 (lb/lb-mole)/525°R)/1000 * 1533000 (gal/yr) * 1/2000 (ton/lbs)
= 2.46 tpy

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.5
	Submerged loading: dedicated normal service	0.6
	Submerged loading: dedicated vapor balance service	1.0
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.0
Marine vessels[a]	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine Loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

AP-42 Table 5.2-5

VOC pph = (2lb/1000 (gal) * ((100-15)/100) * 8400 (gal/hr) = 16.8 pph

VOC tpy = (2lb/1000 (gal) * ((100-15)/100) * 100 (BOPD) * 42 (gal/bbl) * 365 (days/yr) * 1/2000 (ton/lb) = 1.53 tpy

Table 5.2-5 TOTAL UNCONTROLLED ORGANIC EMISSION FACTORS FOR PETROLEUM LIQUID RAIL TANK CARS AND TANK TRUCKS

Emission Source	Mode of Operation	Crude Oil (lb/1000 gal transferred)[b]
Loading Operations[c]		
	Submerged loading: dedicated normal service	2
	Submerged loading: dedicated vapor balance service	3
	Splash loading: dedicated normal service	5
	Splash loading: dedicated vapor balance service	3

a Reference 2. ……VOC factors for crude oil can be assumed to be 15% lower than the total organic factors, to account for the methane and ethane content of crude oil evaporative emissions. All other products should be assumed to have VOC factors equal to total organics; b The example crude oil has an RVP of 34 kPa (5 psia); c Loading emission factors are calculated using Equation 1 for a dispensed product temperature of 16°C (60°F). In the absence of specific inputs for Equations 1 , the typical evaporative emission factors presented in Tables 5.2-5 should be used. It should be noted that, although the crude oil used to calculate the emission values presented in this tables has an RVP of 5, the RVP of crude oils can range from less than 1 up to 10. In areas where loading and transportation sources are major factors affecting air quality, it is advisable to obtain the necessary parameters and to calculate emission estimates using Equations 1.

1) The appropriate ECD, flare, TO, VCU or VRU form must also be completed.

2) Manufacturer documentation required to support % control selected. If using a VRU/LPC, calculations assume VRU/ULPC with a 100% control efficiency, but with 5% downtime;

3) Information included in calculation tool must be based on representative oil and gas analysis which must be submitted with application;

^) Vapor balancing emissions to tanks must be represented at the tanks;

Technical Disclaimer

This document is intended to help you accurately determine truck loading petroleum emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how truck loading operations work and how it generates emissions, how it is monitored or tested, and what data are available for emissions determination, may change over time as the AQB continue scientific studies and as new information becomes available. The AQB welcome any data, information, or feedback that may improve our understanding of truck loading petroleum emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Startup, Shutdown & Maintenance and Malfunction

- ○ No SSM emissions are expected from routine operations.
- ◉ Request up to 10 tpy of VOC SSM emissions.
- ○ Request site specific VOC & H2S SSM and enter information below.
- ○ Request site specific VOC & H2S SSM plus 10 tpy VOC and enter information below.
- ○ Request site specific combustion SSM and those emissions are included in Section 4 (attach calculations.)

◉ Request 10 tpy VOC Malfunction emissions for GCP-O&G, GCP-6 or NSR permitting actions only.

	Blowdowns			Engine Startups		
Unit Numbers						
Quantity of Like-kind Blowdown Units or Engines	1					
Total Volume of Each Blowdown or Engine Startup Vent (acf)						
Duration of Event (Minutes)						
Maximum Blowdowns or Startups/hr	1					
Frequency of Blowdowns or Engine Startups (Events/yr)						
Total Actual Volume of Gas Vented (acf/yr)	0					
Pressure of Gas Inside Unit Before Venting (psig)						
Final Pressure (psia)	14.7					
Gas Temperature Prior to Venting (°F)						
Vented Gas Molecular Weight (lb/lb-mol						
Vented Gas VOC wt %						
Vented Total HAP wt %						
Vented Gas Benzene wt %						
Vented Gas H_2S wt %						

Startup, Shutdown and Maintenance Emissions (SSM) and Malfunction Emissions

SSM	VOC		Total HAP		Benzene		H_2S	
	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY
SSM Blowdowns								
SSM Startups								
SSM Other (Attach Calculations)								
SSM Totals		**10**						
Malfunction Total		**10**						

Notes

Planned SSM Emissions

The venting emissions calculations herein should only be used when only gas (no liquids) is present in the unit. The calculation of the vented gas is based on the volume of the unit and assumes the unit is saturated with vapor at the pressure and temperature of the unit before venting occurs. If liquids are also present in the gas, please enter the calculated amounts in the SSM Other row only and submit separate calculations, since the calculations on this form do not account for the evaporation of liquids that may be present in the unit.

Calculations are based on the Ideal gas law: P(V) = n(R)(T)

VOC result = (((Pressure of Gas Inside the Unit Before Venting) * (Actual Volume of the Vented Unit)) / (Frequency of events) * (Molecular Weight) * VOC wt%)/(Ideal Gas Constant) * (Temperature of Gas Inside the Unit Before Venting)

Where the Ideal Gas Constant = 10.73159 (ft^3*psia)/R*lb-mol

For SSM combustion emissions, attach separate calculations.

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Vertical Fixed Roof (VFR) Produced Water VOC Flash Emissions Calculations Form

Select Tanks Flash Emission Calculation Method

GWR	E & P Tanks	ProMax
Vasquez-Beggs	HYSIS	VMGSim

ProMax Produced Water Tanks Emission Calculations

Please attach the ProMAX printout with all input data provided along with the calculated emissions. Enter the uncontrolled VOC emissions below. If the tank vapors are routed to a flare, enclosed combustion device, vapor combustion unit, vapor recovery unit or thermal oxidizer select the appropriate VOC destruction method below along with selected VOC destruction efficiency supported by manufacturer specifications submitted with the application.

Tanks VOC Control Method			
Select % Oil in Water	1	VOC Uncontrolled emissions entered includes this percentage.	
Capture Efficiency	98	Represent Uncaptured and/or Controlled VOC's at Tanks	YES
VOC Control Method	Enclosed Combustion Device (E	Represent VRU/ULPC Downtime Emissions at Tanks	NA
VOC Destruction Efficiency	98	Represent VOC Controlled Emissions at Tanks*	YES
Notes	Please refer to the explanation in Section 6 for how Promax was used to estimate emissions.		

Total VOC Emissions From Produced Water Storage Tanks Calculated with ProMax

Add/Remove Rows Up To 10 Units	Tank ID	VOC Uncontrolled Emissions		VOC Emissions after Control		VOC Emissions at the Tanks	
		pph	tpy	pph*	tpy*	pph	tpy
+ -	SWTK 1	0.13	0.57	0	0.01	0.01	0.02
+ -	SWTK 2	0.13	0.57	0	0.01	0.01	0.02
	Totals	0.26	1.14	0	0.02	0.02	0.04

Notes 1 & 2 See next page; * Emissions only represented at tanks if "Yes" is selected to represent emissions at tanks.

Calculation Tool for Tanks Flashing & Working & Standing Emissions for Oil & Gas Production Sites

All flash emissions based on flash calculation methodology selected ;

1) The appropriate ECD, flare, TO, VCU or VRU form must also be completed.
2) Manufacturer documentation required to support % control selected. Assumes VRU/ULPC with a 100% control efficieny, but with 5% downtime;
3) Information included in calculation tool must be based on representative oil and gas analysis which must be submitted with application;
4) GOR and Vasquez-Beggs sample calculations outlined below; E & P Tanks, ProMax, HYSYS & VMG Sim flash emissions require submittal of computer simulation model emissions calculations print-outs;
5) Working & Standing emissions based on AP-42 Chpt. 7, tanks 4.09d computer simulation or ProMax, or VMG computer simulation models.

Sample Calculations

GWR Methodology

VOC pph = GWR (scf/bbl) * Facility Water Throughput (BOPD) * 1/24 (Hours/Day * 1/Universal Gas Constant 385 scf/lb-mole @ 70^{O}F, 1 atm) * Molecular Weight of Tank Vapors (lb/lb-mol) * Percent Oil in Water
= 40 (scf/bbl) * 1000 (BOPD)*1/24 (hrs/day) *1/385 scf/lb-mol * 50 lb/lb-mol * 1/100
= 2.16 lbs/hr

VOC tpy = GWR (scf/bbl) * Facility Water Throughput (BOPD) * 1/24 (Hours/Day * 1/Universal Gas Constant 385 scf/lb-mole @ 70^{O}F, 1 atm) * Molecular Weight of Tank Vapors (lb/lb-mol) * 8760 hr/yr * 1/2000 lbs/ton * Percent Oil in Water
= 40 (scf/bbl) * 1000 (BOPD)*1/24 (hrs/day) *1/385 scf/lb-mol * 50 lb/lb-mol * 8760 hr/yr * 1/2000 lbs/ton * 1/100
= 9.48 tpy

Vasquez-Beggs Methodology

INPUTS			Constraints			
API Gravity		API	16	<API>	58	^{0}API
Separator Pressure (psig)		P	50	<P+Patm>	5250	psia
Separator Temp. (^{0}F)		Ti	70	<Ti>	295	^{0}F
Separator Gas Gravity at Initial Condition		SGi	0.56	<SGi>	1.18	MW/28.97
Barrels of Water/Day (BOPD)	250	Q	None	<Q>	None	BOPD
Tank Gas MW		MW	18	<MW>	125	lb/lb-mole
VOC Fraction of Tank Gas		VOC	0.5	<VOC>	1.00	Fraction
Atmospheric Pressure (psia)		Patm	20	<Rs>	2070	scf/bbl

Constants			
	^{0}API Gravity		
^{0}APTI	<30	≥30	Given^{0}API
C1	0.0362	0.0178	
C2	1.0937	1.187	
C3	25.724	23.931	

SGx = Dissolved gas gravity at Separator pressure = SGi [1.0+0.00005912*API*Ti*Log(Pi/114.7)]

Rs = (C1 * SGx * Pi^C2) exp ((C3 * API) / (Ti + 460)) for P + Patm

THC = Rs * Q * MW * 1/385 scf/lb-mole * 365 D/Yr * 1 ton/2000 lbs

VOC = THC * Frac. of C3+ in the Stock Tank Vapor

Technical Disclaimer
This document is intended to help you accurately determine produced water storage tank flash, working and standing emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how these units work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as the AQB continue scientific studies and as new information becomes available. The AQB welcome any data, information, or feedback that may improve our understanding of produced water storage tank flash, working and standing emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Vertical Fixed Roof (VFR) Water Tanks VOC Working & Standing Emissions Calculations Form

Select Tanks W & S Emission Calculation Method

AP-42 Chpt. 7 | EPA Tanks 4.09d | ProMax | E & P Tanks

Tanks 4.09d Working & Standing VOC Emissions for (VFR) Produced Water Storage Tank(s)

(Assumes W & S emissions are 1% of the emissions calculated based on oil properties and entered as uncontrolled emissions)

Please attach the Tanks 4.09d printout with all input data provided along with the calculated emissions. Enter the uncontrolled VOC emissions below. If the tank vapors are routed to a flare, enclosed combustion device, vapor combustion unit, vapor recovery unit or thermal oxidizer select the appropriate VOC destruction method below along with selected VOC destruction efficiency supported by manufacturer specifications submitted with the application.

Tanks VOC Control Method

Capture Efficiency	98	Represent Uncaptured and/or Controlled VOC's at Tanks	YES
VOC Control Method	Enclosed Combustion Device (E	Represent VRU/ULPC Downtime Emissions at Tanks	NA
VOC Destruction Efficiency	98	Represent VOC Controlled Emissions at Tanks*	YES

Notes: AP-42 Chapter 7 (revised June 2020) was used to estimate emissions. The AECT has not been updated to incorporate these revisions. Therefore, the Tanks 4.09d option was selected so that emissions could be hard entered. Please refer to the included calculations.

Total VOC W & S Emissions From Produced Water Storage Tanks Calculated with Tanks 4.09d

Add/Remove Rows Up To 10 Units	Tank ID	VOC Uncontrolled Emissions		VOC Emissions after Control		VOC Emissions at the Tanks	
		pph	tpy	pph*	tpy*	pph	tpy
+ -	SWTK1	0.03	0.11	0	0	0	0
+ -	SWTK2	0.03	0.11	0	0	0	0
	Totals	0.06	0.22	0	0	0	0

Notes 1 & 2 See next page; * Emissions only represented at tanks if "Yes" is selected to represent emissions at tanks.

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Emissions From Loading Produced Water Liquids

Select Appropriate AP-42 Petroleum Liquid Loading Methodology & Enter appropriate information in the green boxes below changing default values as appropriate.

Emission Unit ID: SWLOAD

Facility Produced Water Throughput (gal/yr)	7,665,000
Max. Hourly Loading Rate (gal/hr)	8,000
% Oil in Water	1

*Select Appropriate AP-42 Petroleum Liquid Loading Methodology Below**

(●) AP-42, 5.2-4 Equation 1 ( ) AP-42, Table 5.2-5

S - Saturation Factor (From AP-42 Table 5.2-1)	0.6
M - Molecular Weight of Vapors (lb/lb-mole)	36.4
P_{annual} - Avg. Annual True Vapor Pressure of Liquid Loaded (psia)	7.78
P_{hourly} - Max Hourly True Vapor Pressure of Liquid Loaded (psia)	9.23
T_{annual} - Average Annual Temperature ^{o}F of Bulk Liquid Loaded	65.37
T_{hourly} - Maximum Hourly Temperature ^{o}F of Bulk Liquid Loaded	97.16

Select Emission Source - From AP-42 Table 5.2-5

- ( ) Submerged Loading Dedicated Normal Service
- ( ) Submerged Loading Vapor Balance Service
- ( ) Splash Loading Dedicated Normal Service
- ( ) Splash Loading Vapor Balance Service

Notes:

Total VOC Emissions From Loading Produced Water Liquids Based On % Oil in Water Selected Above

Pollutant	Uncontrolled Emissions (pph)	Uncontrolled Emissions (tpy)
VOC	0.36	0.15

Footnote: * All emission factors based on AP-42, 5.2-4 Equation 1 or AP-42 Table 5.2-5 (July 2008); See reverse side for calculation notes

Calculation Tool for Emissions From Loading Produced Water Liquids

Emissions based on AP-42, 5.2-4 Equation 1 (July 2008) or AP-42, Table 5.2-5

https://www3.epa.gov/ttn/chief/ap42/ch05/final/c05s02.pdf

AP-42 5.2-4 Equation 1

Emissions from loading produced water liquids can be estimated (with a probable error of ±30 percent)[4] using the following expression:

Equation 1 $L_L = 12.46 * SPM/T$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded (assumes 1% oil in water)

S = a saturation factor (see Table 5.2-1 reproduced below))

P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")

M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")

T = temperature of bulk liquid loaded, °R (°F + 460)

VOC pph = (12.46*0.6*7.0 (psia)*50 (lb/lb-mole)/550°R)/1000 (gal) * 8400 (gal/hr) * 0.01 (1% oil in water)
= 39.96 lb/hr

VOC tpy = (12.46*0.6*4.5 (psia)*50 (lb/lb-mole)/525°R)/1000 * 1533000 (gal/hr) * 1/2000 (ton/lbs) * 0.01 (1% oil in water)
= 2.46 tpy

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.5
	Submerged loading: dedicated normal service	0.6
	Submerged loading: dedicated vapor balance service	1.0
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.0
Marine vessels[a]	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine Loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

AP-42 Table 5.2-5 (assumes 1% oil in water)

VOC pph= (2lb/1000 (gal) * ((100-15)/100) * 8400 (gal/hr) * 0.01 (1% oil in water) = 0.168 pph

VOC tpy = (2lb/1000 (gal) * ((100-15)/100) * 100 (BOPD) * 42 (gal/bbl) * 365 (days/yr) * 1/2000 (ton/lb) * 0.01 (1% oil in water) = 0.0153 tpy

Table 5.2-5 TOTAL UNCONTROLLED ORGANIC EMISSION FACTORS FOR PETROLEUM LIQUID RAIL TANK CARS AND TANK TRUCKS

Emission Source	Mode of Operation	Crude Oil (lb/1000 gal transferred)[b]
Loading Operations[c]		
	Submerged loading: dedicated normal service	2
	Submerged loading: dedicated vapor balance service	3
	Splash loading: dedicated normal service	5
	Splash loading: dedicated vapor balance service	3

a Reference 2. ……VOC factors for crude oil can be assumed to be 15% lower than the total organic factors, to account for the methane and ethane content of crude oil evaporative emissions. All other products should be assumed to have VOC factors equal to total organics; b The example crude oil has an RVP of 34 kPa (5 psia); c Loading emission factors are calculated using Equation 1 for a dispensed product temperature of 16°C (60°F). In the absence of specific inputs for Equations 1 , the typical evaporative emission factors presented in Tables 5.2-5 should be used. It should be noted that, although the crude oil used to calculate the emission values presented in this tables has an RVP of 5, the RVP of crude oils can range from less than 1 up to 10. In areas where loading and transportation sources are major factors affecting air quality, it is advisable to obtain the necessary parameters and to calculate emission estimates using Equations 1.

Technical Disclaimer

This document is intended to help you accurately determine truck loading produced water emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how truck loading operations work and how it generates emissions, how it is monitored or tested, and what data are available for emissions determination, may change over time as the AQB continue scientific studies and as new information becomes available. The AQB welcome any data, information, or feedback that may improve our understanding of truck loading produced water emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Enclosed Combustion Device (ECD)

Enter information in green boxes below changing default values as appropriate.

Emission Unit ID:	ECD1	Hourly Gas Routed to ECD (MMBtu/hr)	0.552334
Hourly Gas Stream to ECD (Mscf/hr):	0.2693	Annual Gas Routed to ECD (MMBtu/yr)	4,837.6937
Annual Gas Stream to ECD (MMscf/yr):	2.3587	Pilot Gas Routed to ECD (MMBtu/hr)	0.06952
Max. Heat Value of Field Gas (Btu/scf)	2,051	Gas MW (lb/lbmol)	
Field Gas Mol Fraction: (lbmol H2S/lb-mol)		Gas Pressure (psia)	14.7
Field Gas Sulfur Content (S grains/100scf)	5	Gas Temperature (^{0} F)	70
Pilot Gas to ECD (Mscf/h):	0.055	Field Gas H2S Wt.% to ECD (%)	
Max. Heat Value of Pilot Gas (Btu/scf)	1,264	Flare Control Efficiency:	98
Pilot Gas Sulfur Content (S grains/100scf)	0.25	Total VOC wt% to ECD (%)[1]:	100
Source of ECD Emission Factors	AP-42 Table 13.5-1	Safety Factor (%) Applied to Total Emissions:	

Use Highest Emission Factors From AP-42 or TCEQ EF For NOx & CO: NO

Indicate in Box Below What Emission Units the Enclosed Combustion Device is Controlling

All VOC emissions aside from pilot emissions are allocated to the storage tanks that are controlled by the ECD. Please refer to the attached calculations

Total Emissions From Enclosed Combustion Device

Pollutant	Uncontrolled Emissions (pph)	Uncontrolled Emissions (tpy)	Field Gas To ECD Emissions (pph)	Field Gas To ECD Emissions (tpy)	Pilot Gas ECD Emissions[2] (pph)	Pilot Gas ECD Emissions[2] (tpy)	Total ECD Emissions (pph)	Total ECD Emissions (tpy)
NOx*	0	0	0.0376	0.1645	0.0047	0.0207	0.0423	0.1852
CO*	0	0	0.1712	0.7498	0.0216	0.0944	0.1928	0.8442
VOC*	0	0	0.3645	1.5964	0	0	0.3645	1.5964
SO2#	0	0	0	0	0	0.0002	0	0.0002
H2S+	0	0	0	0	0	0	0	0

See reverse side for calculation notes.
1) Based on representative gas analysis which must be submitted with application;
2) Assumes pilot gas has a negligible amount of VOC & 0.25 grains H2S/100scf;
*) Emission factors for NOx, CO & VOC based on AP-42, Table 13.5-1, (Dec. 2015) or TCEQ RG-360A/11 (February 2012)
#) Assumes H_2S is converted to SO_2 at selected control efficiency; SO2 emissions based on mass balance;
+) Assumes H_2S Destruction Efficiency equals flare destruction efficiency;

Calculation Tool for Enclosed Combustion Device Emissions for Oil & Gas Production Sites

All emission factors based on AP-42, Table 1.4-1, Table 1.4-2 and Table 1.4-3 (July 1998)
https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

1) Information included in calculation tool must be based on representative gas analysis which must be submitted with application;
2) Assumes pilot gas has a negligible amount of VOC's and 0.25 grains H2S/100 scf;
3) SO_2 calculations assumes H_2S is converted to SO_2 at selected control efficiency; SO_2 emissions based on mass balance;
4) H_2S calculations assume H_2S Destruction Efficiency equals thermal oxidizer destruction efficiency;

Sample Calculations

NOx pph = hourly gas routed to TO (MMScf/hr) * NOx Emission factor (lbs/MMScf) * Field Gas Heat Rate/1020 Btu/scf)
= 1(MMScf/hr) * 100 (lbs/MMScf) * 1200 (Btu/scf)/1020 (Btu/scf)
= 117.65 lbs/hr

NOx tpy = annual gas routed to TO (MMScf/yr) * NOx Emission factor (lbs/MMScf) * Field Gas Heat Rate/1020 (Btu/scf) * 1 (ton)/2000 (lbs)
= 1 (MMBtu/yr) * 100 (lb/MMScf) * 1200 (Btu/scf)/1020 (Btu/scf) * 1/2000 (lbs/ton)
= 0.059 tpy

SO_2 pph = Hourly Gas Stream to TO (MMScf/hr) * 1000000/1 (scf/MMScf) * Field Gas mol Fraction of H_2S (mol H_2S/lb-mol)/100 * 1/Universal Gas Constant 385 scf/lb-mole @ 60°F, 1 atm * Conversion Rate of H_2S to SO_2 lb-mol SO_2/lb-mol H_2S * Molecular Weight of Sulfur Dioxide (64 lb SO_2/lb-mol SO_2)
= 1 MMScf/hr * 1000000/1 (Scf/MMScf) * 0.1 mol H_2S* 1/385 scf/lb-mole * 0.98 lb-mol SO_2/lb-mol H_2S * 64 lb/lb-mol

Residual H_2S pph = Hourly Gas Stream to TO (MMScf/hr) * 1000000/1 (scf/MMScf) * Field Gas mol Fraction of H_2S (mol H_2S/lb-mol)/100 * 1/Universal Gas Constant 385 scf/lb-mole @ 60°F, 1 atm * (100-(Flare Control Efficiency))/100) * Molecular Weight of Hydrogen Sulfide (34 lb H_2S/lb-mol H_2S)
= 1 MMScf/hr * 1000000/1 (Scf/MMScf) * 0.1 mol H_2S* 1/385 scf/lb-mole * (100-98%/100) * 34 lb/lb-mol

Technical Disclaimer
This document is intended to help you accurately determine enclosed combustion device emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how these combustion units work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as the AQB continue scientific studies and as new information becomes available. The AQB welcome any data, information, or feedback that may improve our understanding of enclosed combustion device emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Flare

Enter information in green boxes below changing default values as appropriate.

	Gas Stream 1	Gas Stream 2	Gas Stream 3		Gas Stream 1	Gas Stream 2	Gas Stream 3
Emission Unit ID	FL1-VRT	FL1-HT		Hourly Gas Routed to Flare (MMBtu/hr)	0.582894	1.509249	0
Hourly Gas Stream to Flare (Mscf/hr)	0.2842	1.0267		Annual Gas Routed to Flare (MMBtu/yr)	5,105.5543	6,610.149	
Annual Gas Stream to Flare (MMscf/yr)	2.4893	4.4967		Pilot Gas Routed to Flare (MMBtu/hr)	0.06952	0	0
Max. Heat Value of Gas (Btu/scf)	2,051	1,470		Gas MW (lb/lbmol)			
Field Gas Mol Fraction (lbmol H2S/lb-mol)				Gas Pressure (psia)	14.7	14.7	14.7
Field Gas Sulfur Content (S grains/100 scf)	5	5		Gas Temperature (°F)	70	70	70
Pilot Gas to Flare (Mscf/hr)	0.055			Field Gas H2S Wt.% to Flare (%)			
Max. Heat Value Pilot Gas (Btu/scf)	1,264			Flare Control Efficiency	98	98	98
Pilot Gas Sulfur Content (S grains/100 scf)	0.25			Total VOC wt.% to Flare (%)[1]	100	100	100
Source of Flare Emission Factors	AP-42 Table	AP-42 Table	AP-42 Table	Safety Factor Applied to Total Emissions (%)			
Use Highest NOx & CO Emission Factors From AP-42 or TCEQ	NO	NO	NO				

Total Emissions to Flare

Pollutant	NOx			CO			VOC			SO2			H2S		
Gas Streams to Flare	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Uncontrolled (pph)	0	0	0	0	0	0	0.05	23.63		0	0	0	0	0	0
Uncontrolled (tpy)	0	0	0	0	0	0	0.2	51.74		0	0	0	0	0	0
Field Gas (pph)	0.0396	0.1026		0.1807	0.4679		0.05	0.47		0	0		0	0	
Field Gas (tpy)	0.1736	0.2247	0	0.7914	1.0246	0	0.2	1.03		0	0	0	0	0	0
Pilot Gas (pph)	0.0047			0.0216			0	0	0	0	0	0	0	0	0
Pilot Gas (tpy)	0.0207			0.0944			0	0	0	0.0002	0	0	0	0	0
Subtotal Flare (pph)	0.0443	0.1026	0	0.2023	0.4679	0	0.05	0.47	0	0	0	0	0	0	0
Subtotal Flare (tpy)	0.1943	0.2247	0	0.8858	1.0246	0	0.2	1.03	0	0.0002	0	0	0	0	0
Total Flare (pph)	0.15			0.67			0.52			0			0		
Total Flare (tpy)	0.42			1.91			1.23			0.0002			0		

See reverse side for calculation notes.

1) Based on representative gas analysis which must be submitted with application; 2) Assumes pilot gas has a negligible amount of VOC & 0.25 grains H2S/100scf; *) Emission factors for NOx, CO & VOC based on AP-42, Table 13.5-1, (Dec. 2015) or TCEQ RG-360A/11 (February 2012); #) Assumes H_2S is converted to SO_2 at selected control efficiency; SO2 emissions based on mass balance; +) Assumes H_2S Destruction Efficiency equals flare destruction efficiency;

Calculation Tool for Flare Emissions for Oil & Gas Production Sites

All emission factors based on AP-42, Emission factors for NOx, CO & VOC, Table 13.5-1, (December 2016); https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_12-13-16.pdf or https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg360/rg36011/rg-360a.pdf

1) Information included in calculation tool must be based on representative gas analysis which must be submitted with application;
2) Assumes pilot gas used has a negligible amount of VOC's and 0.25 grains H2S/100 scf;
3) SO_2 calculations assumes H_2S is converted to SO_2 at selected control efficiency; SO_2 emissions based on mass balance;
4) H_2S calculations assume H_2S Destruction Efficiency equals flare destruction efficiency;

Sample Calculations

NOx pph = hourly gas routed to flare (MMBtu/hr) * NOx Emission factor (lbs/MMBtu)
= 1(MMBtu/hr) * 0.068 (lbs/MMBtu)
= 0.068 lbs/hr

NOx tpy = annual gas routed to flare (MMBtu/yr) * NOx Emission factor (lbs/MMBtu) * 1/lbs/ton)
= 1000 (MMBtu/yr) * 0.068 (lb/MMBtu) * 1/2000 (lbs/ton)
= 0.034 tpy

SO_2 pph= Hourly Gas Stream to flare (MMScf/hr) * 1000000/1 (scf/MMScf) * Field Gas mol Fraction of H_2S (mol H_2S/lb-mol)/100 * 1/Universal Gas Constant 385 scf/lb-mole @ 60^{O}F, 1 atm * Conversion Rate of H_2S to SO_2 lb-mol SO_2/lb-mol H_2S * Molecular Weight of Sulfur Dioxide (64 lb SO_2/lb-mol SO_2)
= 1 MMScf/hr * 1000000/1 (Scf/MMScf) * 0.1 mol H_2S* 1/385 scf/lb-mole * 0.95 lb-mol SO_2/lb-mol H_2S * 64 lb/lb-mol

Residual

H_2S pph= Hourly Gas Stream to flare (MMScf/hr) * 1000000/1 (scf/MMScf) * Field Gas mol Fraction of H_2S (mol H_2S/lb-mol)/100 * 1/Universal Gas Constant 385 scf/lb-mole @ 60^{O}F, 1 atm * (100-(Flare Control Efficiency))/100) * Molecular Weight of Hydrogen Sulfide (34 lb H_2S/lb-mol H_2S)
= 1 MMScf/hr * 1000000/1 (Scf/MMScf) * 0.1 mol H_2S* 1/385 scf/lb-mole * (100-95%/100) * 34 lb/lb-mol

Flare, Vapor Combustion Devices & Enclosed Combustion Devices Emission Factors				
Contaminant	Assist Type	Waste Gas Stream Heat Value (Btu/scf)	AP-42 Emission Factor (lb/MMBtu)	TCEQ Emission Factor (lb/MMBtu)
NOx	Steam	≥1000	0.068	0.0485
	Steam	<1000	0.068	0.068
	Air or Unassisted	≥1000	0.068	0.138
	Air or Unassisted	<1000	0.068	0.0641
CO	Steam	≥1000	0.31	0.3503
	Steam	<1000	0.31	0.3465
	Air or Unassisted	≥1000	0.31	0.2755
	Air or Unassisted	<1000	0.31	0.5496
VOC	Air & Steam Assist	≥300	0.66	

Technical Disclaimer

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New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Flare

Enter information in green boxes below changing default values as appropriate.

	Gas Stream 1	Gas Stream 2	Gas Stream 3		Gas Stream 1	Gas Stream 2	Gas Stream 3
Emission Unit ID	FL1-STRANI			Hourly Gas Routed to Flare (MMBtu/hr)	1,053.3332	0	0
Hourly Gas Stream to Flare (Mscf/hr)	833.3333			Annual Gas Routed to Flare (MMBtu/yr)	379,200		
Annual Gas Stream to Flare (MMscf/yr)	300			Pilot Gas Routed to Flare (MMBtu/hr)	0	0	0
Max. Heat Value of Gas (Btu/scf)	1,264			Gas MW (lb/lbmol)			
Field Gas Mol Fraction (lbmol H2S/lb-mol)				Gas Pressure (psia)	14.7	14.7	14.7
Field Gas Sulfur Content (S grains/100 scf)	5			Gas Temperature (°F)	70	70	70
Pilot Gas to Flare (Mscf/hr)				Field Gas H2S Wt.% to Flare (%)			
Max. Heat Value Pilot Gas (Btu/scf)				Flare Control Efficiency	98	95	95
Pilot Gas Sulfur Content (S grains/100 scf)				Total VOC wt.% to Flare (%)[1]	100	100	100
Source of Flare Emission Factors	AP-42 Table			Safety Factor Applied to Total Emissions (%)			
Use Highest NOx & CO Emission Factors From AP-42 or TCEQ	NO						

Total Emissions to Flare

Pollutant	NOx			CO			VOC			SO2			H2S		
Gas Streams to Flare	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Uncontrolled (pph)	0	0	0	0	0	0	10,159.2			0	0	0	0	0	0
Uncontrolled (tpy)	0	0	0	0	0	0	1,828.67			0	0	0	0	0	0
Field Gas (pph)	71.6267	0		326.5333			203.19			0			0		
Field Gas (tpy)	12.8928	0	0	58.776	0	0	36.57			0	0	0	0	0	0
Pilot Gas (pph)							0	0	0	0	0	0	0	0	0
Pilot Gas (tpy)							0	0	0	0	0	0	0	0	0
Subtotal Flare (pph)	71.6267	0	0	326.5333	0	0	203.19	0	0	0	0	0	0	0	0
Subtotal Flare (tpy)	12.8928	0	0	58.776	0	0	36.57	0	0	0	0	0	0	0	0
Total Flare (pph)	71.63			326.53			203.19			0			0		
Total Flare (tpy)	12.89			58.78			36.57			0			0		

See reverse side for calculation notes.

1) Based on representative gas analysis which must be submitted with application; 2) Assumes pilot gas has a negligible amount of VOC & 0.25 grains H2S/100scf; *) Emission factors for NOx, CO & VOC based on AP-42, Table 13.5-1, (Dec. 2015) or TCEQ RG-360A/11 (February 2012); #) Assumes H_2S is converted to SO_2 at selected control efficiency; SO2 emissions based on mass balance; +) Assumes H_2S Destruction Efficiency equals flare destruction efficiency;

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Emission Unit ID: FUGARE **Fill all green/blue boxes changing default values as appropriate.**

Fugitive Volatile Organic Compounds (VOC), Total HAPs (HAP), Benzene (CH6) & Hydrogen Sulfide (H_2S) Emissions

					Uncontrolled Total								Controlled Total							
					VOC		Total HAP		CH_6		H_2S		VOC		Total HAP		CH_6		H_2S	
Service	%VOC	%HAP	%CH_6	%H_2S	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY	PPH	TPY
Gas	22.74%				0.79	3.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Oil	100%				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Oil	99.5%				1.2	5.24	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water/Oil	1%				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals					1.99	8.72	0	0	0	0	0	0	0	0	0	0	0	0	0	0

				Uncontrolled VOC, HAP & CH_6 Emissions							Controlled VOC, HAP & CH_6 Emissions					
Equipment Type	Service[a]	EF[b] PPH/Source	No. of Sources	VOC PPH	VOC TPY	HAP PPH	HAP TPY	CH_6 PPH	CH_6 TPY	Control Efficiency	VOC PPH	VOC TPY	HAP PPH	HAP TPY	CH_6 PPH	CH_6 TPY
Valves	Gas	0.0099207	258	0.582	2.5492	0	0	0	0	0%	0	0	0	0	0	0
	Heavy Oil	0.00001852	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
	Light Oil	0.0055115	138	0.7568	3.3148	0	0	0	0	0%	0	0	0	0	0	0
	Water/Oil	0.00021605	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
Subtotals				1.3388	5.864	0	0	0	0		0	0	0	0	0	0
Pump Seals	Gas	0.00529104	0	0	0	0	0	0	0	0%	0	0	0	0		0
	Heavy Oil	0.0286598	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
	Light Oil	0.0286598	2	0.057	0.2497	0	0	0	0	0%	0	0	0	0	0	0
	Water/Oil	0.00005291	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
Subtotals				0.057	0.2497	0	0	0	0		0	0	0	0	0	0
Connectors	Gas	0.00044092	774	0.0776	0.3399	0	0	0	0	0%	0	0	0	0	0	0
	Heavy Oil	0.00001653	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
	Light Oil	0.00046297	414	0.1907	0.8353	0	0	0	0	0%	0	0	0	0	0	0
	Water/Oil	0.00024251	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
Subtotals				0.2683	1.1752	0	0	0	0		0	0	0	0	0	0
Flanges	Gas	0.00085979	258	0.0504	0.2208	0	0	0	0	0%	0	0	0	0	0	0
	Heavy Oil	0.00000086	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
	Light Oil	0.00024251	138	0.0333	0.1459	0	0	0	0	0%	0	0	0	0	0	0
	Water/Oil	0.00000639	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
Subtotals				0.0837	0.3667	0	0	0	0		0	0	0	0	0	0
Open Ends	Gas	0.0044092	26	0.0261	0.1143	0	0	0	0	0%	0	0	0	0	0	0
	Heavy Oil	0.00030864	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
	Light Oil	0.00308644	14	0.043	0.1883	0	0	0	0	0%	0	0	0	0	0	0
	Water/Oil	0.00055115	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
Subtotals				0.0691	0.3026	0	0	0	0		0	0	0	0	0	0
Other[c]	Gas	0.01940048	13	0.0574	0.2514	0	0	0	0	0%	0	0	0	0	0	0
	Heavy Oil	0.00007055	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
	Light Oil	0.0165345	7	0.1152	0.5046	0	0	0	0	0%	0	0	0	0	0	0
	Water/Oil	0.0308644	0	0	0	0	0	0	0	0%	0	0	0	0	0	0
Subtotals				0.1726	0.756	0	0	0	0		0	0	0	0	0	0

Based on: *1995 Protocol for Equipment Leak Emission Estimates*, Table 2.4 Version Date: 6/23/16; See next page for calculation notes.

Calculation Tool for Fugitive Emissions Oil & Gas Production

Protocol for Equipment Leak Emission Estimates (EPA-453/R-95-017), Table 2-4;
available at the EPA Web site at https://www3.epa.gov/ttn/chief/efdocs/equiplks.pdf

a) Service categories are defined as follows:

1) Gas/vapor - material in a gaseous state at operating conditions;

2) Light liquid - material in a liquid state in which the sum of the concentration of individual constituents with a vapor pressure over 0.3 kilopascals (kPa) at 200C is greater than or equal to 20 weight percent;

3) Heavy liquid - not in gas/vapor service or light liquid service.

4) Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

b) These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

c) The "other" equipment type was derived from compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

d) Note that the average factors generally determine total hydrocarbon emissions. Therefore, you may need to multiply the calculated emission rates by the stream's weight percentage of VOC compounds to determine total VOC emissions. Please attach a copy of the appropriate gas and oil analysis with the stream's weight percentage of VOC compounds identified.

VOC Sample Calculation
For 10 Valves in Gas Service with a gas stream weight percentage of 25% VOC

Emission Factor (EF) lb/hr=0.0045 kg/hr * 2.2046 lbs/kg
Gas Valves Uncontrolled Emissions

pph EF (Valves in Gas Service) * Number of Valves in Gas Service & VOC wt%
0.0099207 lb/hr * 10 valves = 0.099207 lb/hr * 25%/100

tpy EF (Valves in Gas Service) * Number of Valves in Gas Service * 8760 hrs/yr * 1ton/2000 lbs
0.0099207 lb/hr * 10 valves * 8760 hrs/yr * 1/2000 ton/lbs = 0.4345 tons/yr * 25%/100

Total Uncontrolled Fugitive Emissions for all Service types in Gas Service

pph (Uncontrolled pph Emissions for Valves + Pump Seals + Connectors + Flanges + Open Ends + Other) * VOC wt%/100

tpy (Uncontrolled tpy Emissions for Valves + Pump Seals + Connectors + Flanges + Open Ends + Other) * VOC wt%/100

New Mexico Environment Department Air Quality Bureau Equipment Emissions Calculation Form

Date:	Dec 23, 2020	**Permit Number:**	GCP-O&G-5660R3
Company Name:	Cimarex Energy Co.	**AI# if Known:**	
Facility Name:	Tres Equis State Facility	**Elevation (ft.):**	3,651

Unpaved Haul Roads

Enter Information in all green boxes.

Haul Road Fugitive Emission Unit ID: HR

% Silt	4.8	**Haul Road Distance-Round-trip in Miles (Only enter round-trip distance within facility boundaries)**	0.3
Mean Vehicle Weight (tons)	20	**Number of Haul Road Round-trips/hour**	2
Rain Days	70	**Number of Haul Road Round-trips/yr**	1,716
User % Control	0	**Vehicle Miles Traveled/hr (VMT/hr)**	0.6
		Vehicle Miles Traveled/yr (VMT/yr)	514.8

Notes:

Hourly lbs/VMT			Annually lbs/VMT		
TSP	**PM10**	**PM2.5**	**TSP**	**PM10**	**PM2.5**
6.06	1.54	0.15	4.9	1.24	0.12

TSP/PM10/PM2.5 Emission Rates

Control	TSP		PM10		PM2.5	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
Continuous	3.64	12.88	0.92	3.26	0.09	0.32
0% Control	3.64	1.26	0.92	0.32	0.09	0.03
User % Control	3.64	1.26	0.92	0.32	0.09	0.03

Footnote: All emissions based on AP-42, 13.2.2-4 (November 2006); See reverse side for calculation notes.

NMED-AQB Unpaved Haul Road Calculation Tool

All emission factors based on AP-42, AP-42 13.2.2-4; November 2006
https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf

Emissions from vehicles traveling on unpaved surfaces at industrial sites (based on 8760 Hours/year) can be estimated using the following expression:

AP-42 13.2.2-4; Equation 1a: $$E = k\,(s/12)^a (W/3)^b$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)

s = surface material silt content (%)

W = mean vehicle weight (tons)

M = surface material moisture content (%)

Table 13.2.2-2. CONSTANTS FOR EQUATION 1a

Constant	Industrial Roads (Equation 1a)		
	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45
Quality Rating	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)

Technical Disclaimer

This document is intended to help you accurately determine unpaved haul road emissions. It does not supersede or replace any state or federal law, rule, or regulation. This guidance reflects the current understanding of how unpaved haul roads work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of unpaved haul road emissions and thereby further improve determinations within the emissions inventory. The calculation methods represented are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, contact the Permitting Section at 505-476-4300.

New Mexico Environment Department Air Quality Bureau Emissions Calculation Forms

Date: Dec 23, 2020
Company Name: Cimarex Energy Co.
Facility Name: Tres Equis State Facility

Permit Number: 5660R3
AI# if Known:
Elevation (ft.): 3,651

Total Requested Emissions For All Regulated Facility Equipment (GCP-O&G Request)

Emission Unit	NO_x		CO		VOC		SO_x		TSP		PM_{10}		$PM_{2.5}$		H_2S		Total HAP	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
Engines	0.4	1.76	0.54	2.35	0.31	1.37	0	0	0	0	0	0	0	0	-	-	0.08	0.35
Heaters	0.59	2.57	0.5	2.17	0.03	0.14	0	0	0.05	0.2	0.05	0.2	0.05	0.2	-	-		
Oil Tanks Flash	-	-	-	-	0.14	0.58	-	-	-	-	-	-	-	-				
Oil Tanks W & S	-	-	-	-	0.18	0.82	-	-	-	-	-	-	-	-				
Water Tks Flash	-	-	-	-	0.02	0.04	-	-	-	-	-	-	-	-				
Water Tks W & S	-	-	-	-	0	0	-	-	-	-	-	-	-	-				
Skim or Slop Tank	-	-	-	-			-	-	-	-	-	-	-	-				
GBS	-	-	-	-			-	-	-	-	-	-	-	-				
ECD	0.04	0.19	0.19	0.84	0.36	1.6	0	0										
VCU	0	0	0	0	0	0	0	0										
TO	0	0	0	0	0	0	0	0										
Flares	71.78	13.31	327.2	60.69	203.71	37.8	0	0										
Fugitives	-	-	-	-	1.99	8.72									0	0	0	0
SSM						10												
Malf.	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-
Unpaved Haul Rds.	-	-	-	-	-	-	-	-	3.64	1.26	0.92	0.32	0.09	0.03	-	-	-	-
Paved Haul Rds.	-	-	-	-	-	-	-	-	0	0	0	0	0	0	-	-	0	0
Oil Load	-	-	-	-	36.06	13.59	-	-	-	-	-	-	-	-				
Water Loading	-	-	-	-	0.36	0.15	-	-	-	-	-	-	-	-				
Amine Unt	-	-	-	-	0	0	-	-	-	-	-	-	-	-	0	0	0	0
Amine Reb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-		
Dehy Unit	-	-	-	-			-	-	-	-	-	-	-	-				
Dehy Reb.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-		
Totals	**72.81**	**17.83**	**328.43**	**66.05**	**243.16**	**84.81**	**0**	**0**	**3.69**	**1.46**	**0.97**	**0.52**	**0.14**	**0.23**	**0**	**0**	**0.08**	**0.35**

A red-outlined cell indicates that the facility exceeds the allowable emission limits for that pollutant for the requested permitting action and the application cannot be approved as proposed.

Cimarex Energy Co.
Tres Equis State Facility

Emission Summary
Controlled Criteria Pollutants & HAPs

Source ID:	Source Description	Nitrogen Oxides		Carbon Monoxide		Volatile Organic Compounds		Sulfur Oxides		Particulate Matter	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
ENG3	Compressor Engine	0.40	1.76	0.54	2.35	0.31	1.37	0.00	0.00	0.03	0.15
H1	Heater Treater	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07
H2	Heater Treater	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07
H3	Heater Treater	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07
FL1	Flare	0.15	0.42	0.67	1.91	0.52	1.24	0.00	0.00	-	-
FL1-STRAND	Flare - High Pressure	71.63	12.89	326.53	58.78	203.19	36.57	0.00	0.00	-	-
ECD1	Flare	0.04	0.19	0.19	0.84	0.05	0.20	0.00	0.00	-	-
FUGAREA	Fugitives	-	-	-	-	1.99	8.71	-	-	-	-
HR	Haul Road	-	-	-	-	-	-	-	-	3.64	1.26
VRT	VRT	-	-	-	-	0.56	2.44	-	-	-	-
OILTK1	Oil/Condensate Tank	-	-	-	-	0.16	0.70	-	-	-	-
OILTK2	Oil/Condensate Tank	-	-	-	-	0.16	0.70	-	-	-	-
SWTK1	Saltwater Tank	-	-	-	-	0.01	0.03	-	-	-	-
SWTK2	Saltwater Tank	-	-	-	-	0.01	0.03	-	-	-	-
OILLOAD	Oil/Condensate Loading	-	-	-	-	36.07	13.59	-	-	-	-
SWLOAD	Saltwater Loading	-	-	-	-	0.36	0.15	-	-	-	-
SSM	Startup, Shutdown, Maint.	-	-	-	-	-	10.00	-	-	-	-
MALFUNCTIONS	Malfunctions	-	-	-	-	-	10.00	-	-	-	-
Total Facility Annual Emissions		**72.81**	**17.84**	**328.43**	**66.05**	**278.73**	**86.91**	**0.00**	**0.02**	**3.72**	**1.61**

Cimarex Energy Co.
Tres Equis State Facility

Emission Summary
Controlled Criteria Pollutants & HAPs

Source ID:	Source Description	Formaldehyde		Benzene		Toluene		E-benzene		Xylenes		n-Hexane		TOTAL HAPs/TAPs	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
ENG3	Compressor Engine	0.07	0.29	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.35
H1	Heater Treater	-	-	0.05	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.19	0.01	0.32	0.01
H2	Heater Treater	-	-	0.05	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.19	0.01	0.32	0.01
H3	Heater Treater	-	-	0.05	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.19	0.01	0.32	0.01
FL1	Flare	-	-	0.96	0.02	1.56	0.03	0.16	0.00	0.71	0.01	0.01	0.02	3.39	0.07
FL1-STRAND	Flare - High Pressure	-	-	1.83	0.33	2.64	0.48	0.20	0.04	1.02	0.18	3.25	0.59	8.94	1.61
ECD1	Flare	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
FUGAREA	Fugitives	-	-	0.01	0.03	0.02	0.08	0.00	0.02	0.02	0.09	0.03	0.13	0.08	0.34
HR	Haul Road	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VRT	VRT	-	-	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.01	0.06
OILTK1	Oil/Condensate Tank	-	-	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.03
OILTK2	Oil/Condensate Tank	-	-	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.03
SWTK1	Saltwater Tank	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SWTK2	Saltwater Tank	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OILLOAD	Oil/Condensate Loading	-	-	0.18	0.07	0.53	0.20	0.11	0.04	0.59	0.22	0.48	0.18	1.90	0.72
SWLOAD	Saltwater Loading	-	-	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01
SSM	Startup, Shutdown, Maint.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MALFUNCTIONS	Malfunctions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Facility Annual Emissions		**0.07**	**0.29**	**3.13**	**0.48**	**4.95**	**0.82**	**0.49**	**0.10**	**2.40**	**0.52**	**4.36**	**1.00**	**15.41**	**3.25**

Cimarex Energy Co.
Tres Equis State Facility

Emission Summary
Uncontrolled Criteria Pollutants & HAPs

Source ID:	Source Description	Nitrogen Oxides		Carbon Monoxide		Volatile Organic Compounds		Sulfur Oxides		Particulate Matter	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
ENG3	Compressor Engine	5.37	23.52	5.37	23.52	0.97	4.24	0.00	0.00	0.03	0.15
H1	Heater Treater	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07
H2	Heater Treater	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07
H3	Heater Treater	0.20	0.86	0.16	0.72	11.79	0.39	0.00	0.01	0.01	0.07
FL1	Flare	-	-	-	-	23.67	51.95	-	-	-	-
FL1-STRAND	Flare - High Pressure	-	-	-	-	10159.27	1828.67	-	-	-	-
ECD1	Flare	-	-	-	-	0.05	0.20	-	-	-	-
FUGAREA	Fugitives	-	-	-	-	1.99	8.71	-	-	-	-
HR	Haulr Road	-	-	-	-	-	-	-	-	3.64	1.26
VRT	VRT	-	-	-	-	14.07	61.61	-	-	-	-
OILTK1	Oil/Condensate Tank	-	-	-	-	4.04	17.69	-	-	-	-
OILTK2	Oil/Condensate Tank	-	-	-	-	4.04	17.69	-	-	-	-
SWTK1	Saltwater Tank	-	-	-	-	0.16	0.69	-	-	-	-
SWTK2	Saltwater Tank	-	-	-	-	0.16	0.69	-	-	-	-
OILLOAD	Oil/Condensate Loading	-	-	-	-	36.07	13.59	-	-	-	-
SWLOAD	Saltwater Loading	-	-	-	-	0.36	0.15	-	-	-	-
SSM	Startup, Shutdown, Maint.	-	-	-	-	-	10.00	-	-	-	-
MALFUNCTIONS	Malfunctions	-	-	-	-	-	10.00	-	-	-	-
Total Facility Annual Emissions		**5.96**	**26.10**	**5.86**	**25.69**	**10280.20**	**2027.04**	**0.00**	**0.02**	**3.72**	**1.61**

Cimarex Energy Co.
Tres Equis State Facility

Emission Summary
Uncontrolled Criteria Pollutants & HAPs

Source ID:	Source Description	Formaldehyde		Benzene		Toluene		E-benzene		Xylenes		n-Hexane		TOTAL HAPs/TAPs	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
ENG3	Compressor Engine	0.07	0.29	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.35
H1	Heater Treater	-	-	0.05	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.19	0.01	0.32	0.01
H2	Heater Treater	-	-	0.05	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.19	0.01	0.32	0.01
H3	Heater Treater	-	-	0.05	0.00	0.06	0.00	0.00	0.00	0.02	0.00	0.19	0.01	0.32	0.01
FL1	Flare	-	-	47.80	0.80	77.94	1.21	7.83	0.11	35.71	0.51	0.38	0.84	169.66	3.47
FL1-STRAND	Flare - High Pressure	-	-	91.43	16.46	132.07	23.77	10.16	1.83	50.80	9.14	162.55	29.26	447.01	80.46
ECD1	Flare	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
FUGAREA	Fugitives	-	-	0.01	0.03	0.02	0.08	0.00	0.02	0.02	0.09	0.03	0.13	0.08	0.34
HR	Haulr Road	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VRT	VRT	-	-	0.06	0.28	0.05	0.23	0.00	0.02	0.02	0.07	0.20	0.86	0.33	1.46
OILTK1	Oil/Condensate Tank	-	-	0.02	0.08	0.04	0.18	0.01	0.03	0.04	0.18	0.05	0.24	0.16	0.71
OILTK2	Oil/Condensate Tank	-	-	0.02	0.08	0.04	0.18	0.01	0.03	0.04	0.18	0.05	0.24	0.16	0.71
SWTK1	Saltwater Tank	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02
SWTK2	Saltwater Tank	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02
OILLOAD	Oil/Condensate Loading	-	-	0.18	0.07	0.53	0.20	0.11	0.04	0.59	0.22	0.48	0.18	1.90	0.72
SWLOAD	Saltwater Loading	-	-	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.01
SSM	Startup, Shutdown, Maint.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MALFUNCTIONS	Malfunctions	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Facility Annual Emissions		**0.07**	**0.29**	**139.67**	**17.82**	**210.90**	**25.88**	**18.13**	**2.08**	**87.28**	**10.39**	**164.33**	**31.80**	**620.39**	**88.31**

Cimarex Energy Co.
Tres Equis State Facility

Engine Emission Calculations

Source ID:	ENG3
Service Type:	Compressor Engine

Engine Emission Summary

Component	Pre-Control		Post-Control	
	lb/hr	tpy	lb/hr	tpy
NOx	5.37	23.52	0.40	1.76
CO	5.37	23.52	0.54	2.35
VOC	0.97	4.24	0.31	1.37
Formaldehyde	0.07	0.29	0.07	0.29
Acetaldehyde	0.00	0.02	0.00	0.02
PM10/PM2.5	0.03	0.15	0.03	0.15
SO2	0.00	0.00	0.00	0.00
Benzene	0.00	0.01	0.00	0.01
Toluene	0.00	0.00	0.00	0.00
E-benzene	0.00	0.00	0.00	0.00
Xylenes	0.00	0.00	0.00	0.00
n-Hexane	0.00	0.00	0.00	0.00
Acrolein	0.00	0.02	0.00	0.02

Supplemental Information

Component	ENG3
Make	Caterpillar
Model	G3306 TA
HP	203
Serial Number	G6X08030
Type	4SRB
Fuel Type	Natural Gas
Mfg or Mod. Date	1/4/2012
Modified?	No

Engine Operation Information

Component		ENG3
Hours/Year		8,760
Fuel Heat Value	Btu/scf	1,020
Fuel Consumption	Btu/hp-hr	8,736
	mmbtuh	1.77
	mmbtuy	15,535
	scf/hr	1,738.64
	mmscf/yr	15.23

Engine Calculation Summary Safety Factor 25%

Component		ENG3	
		Pre-Control	Post-Control
NOx	JJJJ Limit	1	
	Catalyst Efficiency	94%	
	g/hp*hr	12.00	0.72
	lb/mmbtu	-	-
	lb/hr	5.37	0.40
	tpy	23.52	1.76
CO	JJJJ Limit	2	
	Catalyst Efficiency	92%	
	g/hp*hr	12.00	0.96
	lb/mmbtu	-	-
	lb/hr	5.37	0.54
	tpy	23.52	2.35
VOC (including Formaldehyde)	JJJJ Limit	0.7	
	Catalyst Efficiency	80%	
	g/hp*hr	2.00	0.40
	lb/mmbtu	-	-
	lb/hr	0.97	0.31
	tpy	4.24	1.37

Component		ENG3	
		Pre-Control	Post-Control
Formaldehyde	Catalyst Efficiency	-	
	g/hp*hr	0.15	0.15
	lb/mmbtu	-	-
	lb/hr	0.07	0.07
	tpy	0.29	0.29
PM10/PM2.5	lb/mmbtu	0.01941	
	-	-	-
	lb/hr	0.03	0.03
	tpy	0.15	0.15
SO2	lb/mmbtu	0.000588	
	lb/hr	0.00	0.00
	tpy	0.00	0.00
Benzene	lb/mmbtu	0.00158	
	lb/hr	0.00	0.00
	tpy	0.01	0.01
Toluene	lb/mmbtu	0.000558	
	lb/hr	0.00	0.00
	tpy	0.00	0.00

Notes:

(1) Emission factors for NOx, CO, and VOC are from manufacturer's data with a 25% safety factor.

(2) Emission factors for PM (Condensable & Filterable), SO2, benzene, and toluene were determined using AP-42 Table 3.2-3 (for 4-stroke, rich-burn engines).

*(3) Formaldehyde is included in the VOC emission calculations; however, the g/hp*hr value reflects VOC without formaldehyde.*

(4) Formaldehyde emissions are based on manufacturer's data.

Cimarex Energy Co.
Tres Equis State Facility

Engine Example Calculations

Emission factors for NOx in the form of g/hp*hr:

$$NOx\ (lb/hr) = \frac{0.72\ \text{grams NOx}}{\text{hp*hour}} \times \frac{\text{lb}}{453.6\ \text{grams}} \times 203\ \text{hp} = \frac{0.40\ \text{lb}}{\text{hour}}$$

$$NOx\ (tpy) = \frac{0.40\ \text{lb}}{\text{hour}} \times \frac{8760\ \text{hours}}{\text{year}} \times \frac{\text{ton}}{2000\ \text{lbs}} = 1.76\ \text{tpy of NOx}$$

Emission factors for CO in the form of g/hp*hr:

$$CO\ (lb/hr) = \frac{0.96\ \text{grams CO}}{\text{hp*hour}} \times \frac{\text{lb}}{453.6\ \text{grams}} \times 203\ \text{hp} = \frac{0.54\ \text{lb}}{\text{hour}}$$

$$CO\ (tpy) = \frac{0.54\ \text{lb}}{\text{hour}} \times \frac{8760\ \text{hours}}{\text{year}} \times \frac{\text{ton}}{2000\ \text{lbs}} = 2.35\ \text{tpy of CO}$$

Emission factors for VOC in the form of g/hp*hr:

$$VOC\ (lb/hr) = \frac{0.4\ \text{grams VOC}}{\text{hp*hour}} \times \frac{\text{lb}}{453.6\ \text{grams}} \times 203\ \text{hp} + \frac{0.07\ \text{lbs of aldehydes}}{\text{hour}} = \frac{0.31\ \text{lb}}{\text{hour}}$$

$$VOC\ (tpy) = \frac{0.31\ \text{lb}}{\text{hour}} \times \frac{8760\ \text{hours}}{\text{year}} \times \frac{\text{ton}}{2000\ \text{lbs}} = 1.37\ \text{tpy of VOC}$$

Emission factors in the form of lb/mmbtu:

$$PM\ 2.5\ (lb/hr) = \frac{8736\ \text{Btu}}{\text{hp*hour}} \times 203\ \text{hp} \times \frac{1\ \text{MMBtu}}{1000000\ \text{Btu}} \times \frac{1.94\text{E-}02\ \text{lb PM 2.5}}{\text{MMBtu}} = \frac{0.03\ \text{lb}}{\text{hour}}$$

$$PM\ 2.5\ (tpy) = \frac{0.03\ \text{lb}}{\text{hour}} \times \frac{8760\ \text{hours}}{\text{year}} \times \frac{\text{ton}}{2000\ \text{lbs}} = 0.15\ \text{tpy PM 2.5}$$

Cimarex Energy Co.
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Other Combustion Emission Calculations

Source ID	Type	Max Heat Input Rating (MMBtu/hr)	Natural Gas Heating Value (dry HHV) (Btu/scf) [3]	Fuel Gas Usage (MMscf/hr)	Hours (hr/yr)	NOx			CO		
						lb/MMscf	lb/hr	tpy	lb/MMscf	lb/hr	tpy
H1	Heater Treater	2	1,020	0.002	8,760	100	0.20	0.86	84	0.16	0.72
H2	Heater Treater	2	1,020	0.002	8,760	100	0.20	0.86	84	0.16	0.72
H3	Heater Treater	2	1,020	0.002	8,760	100	0.20	0.86	84	0.16	0.72

Source ID	VOC			PM			SO2		
	lb/MMscf	lb/hr	tpy	lb/MMscf	lb/hr	tpy	lb/MMscf	lb/hr	tpy
H1	5.5	11.79	0.39	7.6	0.01	0.07	0.6	0.00	0.01
H2	5.5	11.79	0.39	7.6	0.01	0.07	0.6	0.00	0.01
H3	5.5	11.79	0.39	7.6	0.01	0.07	0.6	0.00	0.01

Notes:

(1) Emission factors are based on AP-42 Tables 1.4-1 and 1.4-2 (dated 7/98) for small boilers.
(2) Maximum hourly emissions are assumed to be the same as average hourly emissions.
(3) The average heating value is from AP-42 Tables 1.4-1 and 1.4-2 (dated 7/98).
(4) Field gas is not anticipated to contain significant sulfur content.
(5) VOC emissions due to venting of heater treater flash gas to atmosphere are based on the representative heater treater flash gas analysis.

Flash Gas Vented to Atmosphere	
1.05E-05	MMscf/hr (average)
25.25	MW (lb/lb-mole)
34.33%	VOC Weight %
385.482512	V/n (scf/lb-mole @ stp)

Example Calculations

Example calculations for CO:

CO (MMscf/hr) = (2 MMBtu / hr) × (scf / 1020 Btu) = 0.002 MMscf / hr

CO (lb/hr) = (84 lb / MMscf) × (0.002 MMscf / hr) = 0.16 lb / hr

CO tpy) = (0.16 lb / hr) × (8760 hr / year) × (ton / 2000 lb) = 0.72 tons / year

Example calculations for NOx:

NOx (MMscf/hr) = (2 MMBtu / hr) × (scf / 1020 Btu) = 0.002 MMscf / hr

NOx (lb/hr) = (100 lb / MMscf) × (0.002 MMscf / hr) = 0.20 lb / hr

NOx (tpy) = (0.20 lb / hr) × (8760 hr / year) × (ton / 2000 lb) = 0.86 tons / year

Example calculations for VOC:

VOC (MMscf/hr) = (2 MMBtu / hr) × (scf / 1020 Btu) = 0.002 MMscf / hr

VOC (lb/hr) = (5.5 lb / MMscf) × (0.002 MMscf / hr) = 0.01 lb / hr

VOC (lb/hr) = *(Vent Gas)* (10.48 scf / hr) × (lb-mole @ stp / 385.48 scf) × (25.25 lb / lb-mol vent gas) × (34.33 lb VOC / 100 lb vent gas) × (1 / 1- 0.98 Flare Runtime) = 11.78 lb / hr

VOC (tpy) = (0.01 lb / hr) × (8760 hr / year) × (ton / 2000 lb) = 0.05 tons / year

VOC (tpy) = (Vent Gas) (3.49 scf / hr) × (lb-mole @ stp / 385.48 scf) × (25.25 lb / lb-mol vent gas) × (34.33 lb VOC / 100 lb vent gas) × (8760 hr / year) × (ton / 2000 lb) = 0.34 tons / year

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_X emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_X emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_x burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 scf] = (3.67) (CON) (C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

Cimarex Energy Co.
Tres Equis State Facility

Flare Emission Calculations

Source: Flare
Source ID: FL1

The flare is assumed to provide a destruction efficiency equal to 98% for VOC.

Flare Emissions Summary

	Flashing, Working, and Breathing Gas Vented to Flare					Pilot Gas Routed to Flare Stack				Total Emissions (Pre-Control)		Total Emissions (Post-Control)	
Component	Maximum Gas Routed to Flare Stack (MMBtu/hr)	Average Gas Routed to Flare Stack (MMBtu/hr)	Emission Factor[1] (lb/MMBtu)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions[2] (tons/yr)	Pilot Gas Routed to Flare Stack (MMBtu/hr)	Emission Factor[1] (lb/MMBtu)	Hourly Emissions (lb/hr)	Annual Emissions (tons/yr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions (tons/yr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions (tons/yr)
NOx	0.58	0.58	0.068	0.04	0.17	0.07	0.068	0.00	0.02	0.15	0.42	0.15	0.42
CO	0.58	0.58	0.31	0.18	0.79	0.07	0.31	0.02	0.09	0.67	1.91	0.67	1.91
VOC	0.58	0.58	Mass Balance	-	-	0.07	0.66	0.05	0.20	23.67	51.95	0.52	1.24
SO_2	-	-	Mass Balance	0.00	0.00	-	-	-	-	0.00	0.00	0.00	0.00
H2S	-	-	Mass Balance	0.00	0.00	-	-	-	-	0.00	0.00	0.00	0.00

Operating Parameters - VRT Vent Gas Routed to Flare

6.82E-03	MMscf/day routed to flare (Average)
2.84E-04	MMscf/hr routed to flare (Maximum)
2.49E+00	MMscf/yr routed to flare (Average)
8760	hours per year
2051	Btu/scf - gross heat value for gas[3]
15.5	scf/bbl - Gas to Oil Ratio (GOR) for VRT Flashing[4]
440	BOPD for VRT Flashing during VRU Downtime
0.20	H2S Concentration (ppm)[5]
100%	VOC adjustment percentage[6]

Operating Parameters (Pilot Gas)[7]

5.50E+01	scf/hr pilot gas to flare
4.82E-01	MMscf/yr
8760	hours per year
1264	Btu/scf heat value for gas pilot[8]

Notes:

(1) Flare emission factors for NOx and CO are from AP-42 Tables 13.5-1 and 13.5-2 (2/18). The pilot gas VOC emission factor is from AP-42 Table 13.5-2 (2/18).
(2) All uncaptured and uncombusted VOC emissions have been allocated to the storage tank emissions.
(3) Gas heat value based on the average heat value for off gases.
(4) GOR value based on representative analysis.
(5) H2S concentration is based on the representative gas analysis.
(6) VOC adjustment percentage assumed to be a conservative 100%
(7) The pilot gas flow rate is estimated based on manufacturer's data.
(8) The pilot gas heating value is based on gas analysis.

Flare Tip Exit Velocity Demonstration

Annual Operatior	8760	hr/yr
Gas Flow Rate:	842.38	Mcfd (Average)
	834.70	Mcfh (Maximum)
	231.86	cfs (Maximum)
	307.47	MMcfy (Average)
Flare Parameters	4	flare tip diameter (in)
	0.33	flare tip diameter (ft)
	0.09	area (ft^2)
	90	feed temp (°F)
	2656.93	tip velocity (ft/s)

Tip Velocity Example Calculations:

$$\textit{Flare tip area} = \frac{\pi}{\frac{0.33^2\ (ft)}{4}} = 0.09\ (ft^2)$$

$$\textit{Flare tip velocity} \quad \frac{\frac{231.86\ ft^3}{sec}}{0.09\ (ft^2)} = \frac{2656.93\ ft}{sec}$$

Cimarex Energy Co.
Tres Equis State Facility

Flare Emission Calculations - Produced Gas

Source: Flare
Source ID: FL1

The flare is assumed to provide a destruction efficiency equal to 98% for VOC.

Produced Gas Flaring Emissions Summary

	Produced Gas Routed to Flare Inlet			Pre-Control		Post-Control	
Component	Emission Factor[1] (lb/MMBtu)	Maximum Gas Routed to Flare Stack (MMBtu/hr)	Average Gas Routed to Flare Stack (MMBtu/hr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions[2] (tons/yr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions[3] (tons/yr)
NOx	0.07	1.51	0.75	0.10	0.22	0.10	0.22
CO	0.31	1.51	0.75	0.47	1.02	0.47	1.02
VOC	Mass Balance	1.51	0.75	23.63	51.74	0.47	1.03
SO2	Mass Balance	-	-	0.00	0.00	0.00	0.00
H2S	Mass Balance	-	-	0.00	0.00	0.00	0.00

Average Operating Parameters - Produced Gas Routed to Flare

1.23E-02	MMscf/day routed to flare
5.13E-04	MMscf/hr routed to flare
4.4967E+00	MMscf/yr routed to flare
8760	hours per year
1470	Btu/scf - gross heat value for gas vented to flare[4]
0.20	H2S Concentration (ppm)[5]
34	MW H2S (lb/lb-mole)
64	MW SO2 (lb/lb-mole)
98%	H2S Destruction Efficiency (%)
385.48	H2S V/n (scf/lb-mole @ stp)

Maximum Operating Parameters - Produced Gas Routed to Flare

2.46E-02	MMscf/day routed to flare
1.03E-03	MMscf/hr routed to flare
24	hours per day

Notes:
(1) Flare emission factors for NOx and CO are from AP-42 Tables 13.5-1 and 13.5-2 (2/18).
(2) Pre-flare VOC emissions are estimated based on the representative gas analysis and a maximum flowrate.
(3) Potential VOC emissions are based on a 98% capture efficiency to the flare for produced gas flaring, and a 98% destruction efficiency from the flare.
(4) Gas heat value based on average heat value for off gases.
(5) H2S concentration is based on the representative gas analysis.

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Flare Emission Calculations - Produced Gas

Source: Flare
Source ID: FL1

Produced Gas Flare Stream Evaluation

Component	Molecular Weight	Cu Ft/lb	Produced Gas Composition			Avg. Flow Rate (Flare Inlet)		Max. Flow Rate (Flare Inlet)		Flare Destruction Eff. (%)	Max. Uncombusted Emissions (lb/hr)	Avg. Uncombusted Emissions (lb/hr)
			Total Stream Mol. %	Total Stream Wt. %	Wt. % of VOC(1)	Volumetric Flow (Mscf/hr)	Mass Flow (lb/hr)	Volumetric Flow (Mscf/hr)	Mass Flow (lb/hr)			
H2S	34.08	11.31	0.00%	0.00%	--	0.00	0.00	0.00	0.00	98%	0.00	0.00
N2	28.01	13.76	1.03%	1.15%	--	0.01	0.39	0.01	0.77	--	--	--
CO2	44.01	8.76	0.64%	1.12%	--	0.00	0.38	0.01	0.75	--	--	--
Methane	16.04	24.03	61.33%	38.97%	--	0.31	13.10	0.63	26.20	99%	0.26	0.13
Ethane	30.07	12.82	20.51%	24.43%	--	0.11	8.21	0.21	16.43	99%	0.16	0.08
Propane	44.10	8.74	10.16%	17.75%	--	0.05	5.97	0.10	11.94	98%	0.24	0.12
Butanes (C4)	58.12	6.63	3.95%	9.09%	--	0.02	3.05	0.04	6.11	98%	0.12	0.06
Pentanes (C5)	72.15	5.34	1.42%	4.06%	--	0.01	1.36	0.01	2.73	98%	0.05	0.03
Other Hexanes (C6)	86.18	4.47	0.91%	3.28%	--	0.00	1.04	0.01	2.08	98%	0.04	0.02
Other Heptanes (C7)	100.20	3.85	0.27%	1.06%	--	0.00	0.35	0.00	0.71	98%	0.01	0.01
Other Octanes (C8)	114.23	3.37	0.02%	0.10%	--	0.00	0.03	0.00	0.07	98%	0.00	0.00
Nonanes (C9)	128.26	3.01	0.00%	0.00%	--	0.00	0.00	0.00	0.00	98%	0.00	0.00
Decanes Plus (C10+)	142.29	2.71	0.00%	0.00%	--	0.00	0.00	0.00	0.00	98%	0.00	0.00
Benzene	78.11	4.94	0.05%	0.15%	0.43%	--	0.05	0.00	0.10	98%	0.00	0.00
Toluene	92.14	4.18	0.05%	0.19%	0.53%	--	0.06	0.00	0.13	98%	0.00	0.00
E-benzene	106.17	3.63	0.00%	0.01%	0.02%	--	0.00	0.00	0.01	98%	0.00	0.00
Xylenes	106.17	3.63	0.01%	0.05%	0.15%	--	0.02	0.00	0.04	98%	0.00	0.00
n-Hexane	86.18	4.47	--	0.57%	1.60%	--	0.19	0.00	0.38	98%	0.01	0.00
Total	--	--	100.24%	101.00%	--	0.51	33.89	1.03	67.78	--	--	--
Total VOC	--	--	--	35.34%	--	0.09	11.81	0.17	23.63	--	0.47	0.24

Notes:
(1) HAP speciation is estimated based on the representative gas analysis.

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Flare Emission Calculations - High Pressure Gas

Source: Flare
Source ID: FL1-STRAND

The flare is assumed to provide a destruction efficiency equal to 98% for VOC.

High Pressure (HP) Gas Flaring Emissions Summary

	High Pressure Gas Routed to Flare Inlet			Pre-Control/Post-Process		Post-Control	
Component	Emission Factor[1] (lb/MMBtu)	Maximum HP Gas Routed to Flare Stack (MMBtu/hr)	Average Gas Routed to Flare Stack (MMBtu/hr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions[2] (tons/yr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions[3] (tons/yr)
NOx	0.07	1053.33	43.29	71.63	12.89	71.63	12.89
CO	0.31	1053.33	43.29	326.53	58.78	326.53	58.78
VOC	Mass Balance	1053.33	43.29	10159.27	1828.67	203.19	36.57
SO2	-	-	-	-	-	-	-
H2S	-	-	-	-	-	-	-

Average Operating Parameters - HP Gas Routed to Flare

8.22E-01	MMscf/day routed to flare
3.42E-02	MMscf/hr routed to flare
3.00E+02	MMscf/yr routed to flare
8760	hours per year
1264	Btu/scf - gross heat value for gas vented to flare[4]
0.00	H2S Concentration (ppm)[5]
34	MW H2S (lb/lb-mole)
64	MW SO2 (lb/lb-mole)
98%	H2S Destruction Efficiency (%)
385.48	H2S V/n (scf/lb-mole @ stp)

Maximum Operating Parameters - HP Gas Routed to Flare

2.00E+01	MMscf/day routed to flare
8.33E-01	MMscf/hr routed to flare
24	hours per day

Notes:
(1) Flare emission factors for NOx and CO are from AP-42 Tables 13.5-1 and 13.5-2 (2/18).
(2) Pre-flare VOC emissions are estimated based on the representative gas analysis and a maximum flowrate.
(3) Potential VOC emissions are based on a 100% capture efficiency to the flare for produced gas flaring, and a 98% destruction efficiency from the flare.
(4) Gas heat value based on average heat value for off gases.
(5) H2S concentration is based on the representative gas analysis.

Cimarex Energy Co.
Tres Equis State Facility

Flare Emission Calculations - High Pressure Gas

Source: Flare
Source ID: FL1-STRAND

High Pressure Gas Flare Stream Evaluation

Component	Molecular Weight	Cu Ft/lb	High Pressure Gas Composition			Avg. Flow Rate (Flare Inlet)		Max. Flow Rate (Flare Inlet)		Flare Capture Eff. (%)	Flare Destruction Eff. (%)	Max. Uncombusted Emissions (lb/hr)	Avg. Uncombusted Emissions (lb/hr)
			Total Stream Mol. %	Total Stream Wt. %	Wt. % of VOC[(1)]	Volumetric Flow (Mscf/hr)	Mass Flow (lb/hr)	Volumetric Flow (Mscf/hr)	Mass Flow (lb/hr)				
H2S	34.08	11.31	0.00%	0.00%	--	0.00	0.00	0.00	0.00	100%	98%	0.00	0.00
N2	28.01	13.76	2.16%	2.84%	--	0.74	53.78	18.01	1308.68	--	--	--	--
CO2	44.01	8.76	0.18%	0.36%	--	0.06	6.88	1.47	167.45	--	--	--	--
Methane	16.04	24.03	75.95%	57.08%	--	26.01	1082.47	632.93	26340.17	100%	99%	263.40	10.82
Ethane	30.07	12.82	12.57%	17.71%	--	4.30	335.79	104.75	8170.88	100%	99%	81.71	3.36
Propane	44.10	8.74	5.85%	12.08%	--	2.00	229.13	48.74	5575.59	100%	98%	111.51	4.58
Butanes (C4)	58.12	6.63	2.24%	6.10%	--	0.77	115.72	18.68	2815.78	100%	98%	56.32	2.31
Pentanes (C5)	72.15	5.34	0.63%	2.14%	--	0.22	40.57	5.28	987.29	100%	98%	19.75	0.81
Other Hexanes (C6)	86.18	4.47	0.42%	1.69%	--	0.14	32.08	3.49	780.61	100%	98%	15.61	0.64
Other Heptanes (C7)	100.20	3.85	0.00%	0.00%	--	0.00	0.00	0.00	0.00	100%	98%	0.00	0.00
Other Octanes (C8)	114.23	3.37	0.00%	0.00%	--	0.00	0.00	0.00	0.00	100%	98%	0.00	0.00
Nonanes (C9)	128.26	3.01	0.00%	0.00%	--	0.00	0.00	0.00	0.00	100%	98%	0.00	0.00
Decanes Plus (C10+)	142.29	2.71	0.00%	0.00%	--	0.00	0.00	0.00	0.00	100%	98%	0.00	0.00
Benzene	78.11	4.94	--	0.20%	0.90%	--	3.76	0.45	91.43	100%	98%	1.83	0.08
Toluene	92.14	4.18	--	0.29%	1.30%	--	5.43	0.55	132.07	100%	98%	2.64	0.11
E-benzene	106.17	3.63	--	0.02%	0.10%	--	0.42	0.04	10.16	100%	98%	0.20	0.01
Xylenes	106.17	3.63	--	0.11%	0.50%	--	2.09	0.18	50.80	100%	98%	1.02	0.04
n-Hexane	86.18	4.47	--	0.35%	1.60%	--	6.68	0.73	162.55	100%	98%	3.25	0.13
Total	--	--	100.00%	100.00%	--	34.25	1896.43	833.33	46146.45	--	--	--	--
Total VOC	--	--	--	22.02%	--	3.13	417.50	76.18	10159.27	--	--	203.19	8.35

Notes:
(1) HAP speciation is estimated based on Table 11.3-2, 'HAP Percent of VOC Emissions', from Gasoline Marketing (StRe I and StRe II), EPA Document Revised Final January 2001.

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Combustor Emission Calculations

Source: Combustor
Source ID: ECD1

The combustor is assumed to provide a destruction efficiency equal to 98% for VOC.

Combustor Emissions Summary

	Flashing, Working, and Breathing Gas Vented to Combustor					Pilot Gas Routed to Combustor				Total Emissions	
Component	Maximum Gas Routed to Combustor (MMBtu/hr)	Average Gas Routed to Combustor (MMBtu/hr)	Emission Factor[1] (lb/MMBtu)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions[2] (tons/yr)	Pilot Gas Routed to Combustor (MMBtu/hr)	Emission Factor[1] (lb/MMBtu)	Hourly Emissions (lb/hr)	Annual Emissions (tons/yr)	Maximum Hourly Emissions (lb/hr)	Average Annual Emissions (tons/yr)
NOx	0.55	0.55	0.068	0.04	0.16	0.07	0.068	0.00	0.02	0.04	0.19
CO	0.55	0.55	0.31	0.17	0.75	0.07	0.31	0.02	0.09	0.19	0.84
VOC	0.55	0.55	Mass Balance	-	-	0.07	0.66	0.05	0.20	0.05	0.20
SO_2	-	-	Mass Balance	0.00	0.00	-	-	-	-	0.00	0.00
H2S	-	-	Mass Balance	0.00	0.00	-	-	-	-	0.00	0.00

Operating Parameters - Tank Vent Gas Routed to Combustor

6.46E-03	MMscf/day routed to combustor (Average)
2.69E-04	MMscf/hr routed to combustor (Maximum)
2.36E+00	MMscf/yr routed to combustor (Average)
8760	hours per year
2051	Btu/scf - gross heat value for gas[3]
3.1	scf/bbl - Gas to Oil Ratio (GOR) for Oil Tank Flashing[4]
21.4	scf/bbl - Gas to Oil Ratio (GOR) for Water Tank Flashing[4]
440	BOPD for Oil Tank Flashing
5	BOPD for Water Tank Flashing (1% of produced water)
0.20	H2S Concentration (ppm)[5]
100%	VOC adjustment percentage[6]

Operating Parameters (Pilot Gas)[7]

5.50E+01	scf/hr pilot gas to combustor
4.82E-01	MMscf/yr
8760	hours per year
1264	Btu/scf heat value for gas pilot[8]

Notes:

(1) Combustor emission factors for NOx and CO are from AP-42 Tables 13.5-1 and 13.5-2 (2/18). The pilot gas VOC emission factor is from AP-42 Table 13.5-2 (2/18).
(2) All uncaptured and uncombusted VOC emissions have been allocated to the storage tank emissions.
(3) Gas heat value based on the average heat value for off gases.
(4) GOR value based on representative analysis.
(5) H2S concentration is based on the representative gas analysis.
(6) VOC adjustment percentage assumed to be a conservative 100%
(7) The pilot gas flow rate is estimated based on manufacturer's data.
(8) The pilot gas heating value is based on gas analysis.

Flare Tip Exit Velocity Demonstration

Annual Operation	8760	hr/yr
Gas Flow Rate:	7.78	Mcfd (Average)
	0.32	Mcfh (Maximum)
	0.09	cfs (Maximum)
	2.84	MMcfy (Average)
Flare Parameters	13.13	flare tip diameter (in)
	1.09	flare tip diameter (ft)
	0.94	area (ft^2)
	90	feed temp (°F)
	0.10	tip velocity (ft/s)

Tip Velocity Example Calculations:

$$\textit{Flare tip area} = \frac{\pi}{\frac{1.09^2\ (ft)}{4}} = 0.94\ (ft^2)$$

$$\textit{Flare tip velocity} = \frac{\frac{0.09\ ft^3}{sec}}{0.94\ (ft^2)} = \frac{0.1\ ft}{sec}$$

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Flare Example Calculations

Example Calculations for NOx

$$NOx\ (lb/hr) = \frac{1.407\ MMBtu}{hr} \times \frac{0.068\ lb}{MMBtu} = \frac{0.1\ lb}{hr}$$

$$NOx\ (tpy) = \frac{0.1\ lb}{hr} \times \frac{8760\ hr}{yr} \times \frac{1\ ton}{2000\ lb} = \frac{0.42\ tons}{yr}$$

Example Calculations for CO

$$CO\ (lb/hr) = \frac{1.407\ MMBtu}{hr} \times \frac{0.31\ lb}{MMBtu} = \frac{0.44\ lb}{hr}$$

$$CO\ (tpy) = \frac{0.44\ lb}{hr} \times \frac{8760\ hrs}{yr} \times \frac{ton}{2000\ lbs} = \frac{1.91\ tons}{yr}$$

Table 13.5-1 (English Units). THC AND SOOT EMISSIONS FACTORS FOR FLARE OPERATIONS[a]

EMISSIONS FACTOR RATING: B

Pollutant	SCC	Emissions Factor Value	Emissions Factor Units
Total hydrocarbons[b]	30190099	0.14	lb/10^6 Btu
Nitrogen oxides[c]	30190099	0.068	lb/10^6 Btu
Soot[c]	30190099	0 - 274	µg/L

[a] Reference 1. Based on tests using crude propylene containing 80% propylene and 20% propane.
[b] Measured as methane equivalent.
[c] Soot in concentration values: nonsmoking flares, 0 micrograms per liter (µg/L); lightly smoking flares, 40 µg/L; average smoking flares, 177 µg/L; and heavily smoking flares, 274 µg/L.

Table 13.5-2 (English Units). VOC and CO EMISSIONS FACTORS FOR FLARE OPERATIONS[a]

Pollutant	SCC	Emissions Factor (lb/10^6 Btu)	Representativeness
Volatile organic compounds[b]	30190099; 30600904	0.57	Poorly
Carbon monoxide[c]	30190099; 30600904	0.31	Poorly

[a] These factors apply to well operated flares achieving at least 98% destruction efficiency and operating in compliance with the current General Provisions requirements of 40 CFR Part 60, i.e. >300 btu/scf net heating value in the vent gas and less than the specified maximum flare tip velocity. These factors are based on steam-assisted and air-assisted flares burning a variety of vent gases.
[b] References 4-9 and 11.
[c] References 1, 4-8 and 11.

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Fugitive Emission Calculations

Fugitive Emission Summary

Gas Service Fugitive Component Type	Number of Components[1]	Factor (lb/hr/source)[2]	Total Emissions (lb/hr)	(tons/yr)
Valves	258	0.0099	0.58	2.55
Pump Seals	0	0.0053	0.00	0.00
Connectors	774	0.0004	0.08	0.34
Flanges	258	0.0009	0.05	0.22
Open-Ended Lines	26	0.0044	0.03	0.11
Other	13	0.0194	0.06	0.25
Total C3+ Hydrocarbon Emissions		*Total*	0.79	3.48

Light Oil Service Fugitive Component Type	Number of Components[1]	Factor (lb/hr/source)[2]	Total Emissions (lb/hr)	(tons/yr)
Valves	138	0.0055	0.76	3.31
Pump Seals	2	0.0287	0.06	0.25
Connectors	414	0.0005	0.19	0.84
Flanges	138	0.0002	0.03	0.15
Open-Ended Lines	14	0.0031	0.04	0.19
Other	7	0.0165	0.11	0.50
Total C3+ Hydrocarbon Emissions		*Total*	1.19	5.23

Gas Service Speciation Component	Stream Weight %[3]	Emissions (lb/hr)	Emissions (tons/yr)
Benzene	0.00%	0.00	0.00
Toluene	0.00%	0.00	0.00
E-Benzene	0.00%	0.00	0.00
Xylenes	0.00%	0.00	0.00
n-Hexane	1.75%	0.01	0.06
Total VOC	22.74%	0.79	3.48

Light Liq. Service Speciation Component	Stream Weight %[4]	Emissions (lb/hr)	Emissions (tons/yr)
Benzene	0.49%	0.01	0.03
Toluene	1.48%	0.02	0.08
E-Benzene	0.32%	0.00	0.02
Xylenes	1.64%	0.02	0.09
n-Hexane	1.34%	0.02	0.07
Total VOC	99.50%	1.19	5.23

Total Fugitive Component Emissions	Emissions (lb/hr)	Emissions (tons/yr)
Benzene	0.01	0.03
Toluene	0.02	0.08
E-Benzene	0.00	0.02
Xylenes	0.02	0.09
n-Hexane	0.03	0.13
Total VOC	1.99	8.71

Notes:

(1) Component counts are estimates based on similar facilities.

(2) Emission factors are EPA/API average emission factors, for oil and gas production operations, issued August 1995, for fugitive components.

(3) Natural gas speciation is based on facility natural gas analysis.

(4) Light liquid speciation is based on the representative analysis.

Example Calculations

Gas Service Emissions for Valves (lb/hr):

$$\frac{258 \text{ Components} \times \frac{0.00992 \text{ lb}}{\text{hr}}}{\text{Component}} \times 22.74\% \text{ VOC} = \frac{0.59 \text{ lb}}{\text{hr}}$$

Gas Service Emissions for Valves (tpy):

$$\frac{0.59 \text{ lb}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{yr}} \times \frac{\text{ton}}{2000 \text{ lb}} = \frac{2.55 \text{ tons}}{\text{yr}}$$

TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

Equipment Type	Service[a]	Emission Factor (kg/hr/source)[b]
Valves	Gas	4.5E-03
	Heavy Oil	8.4E-06
	Light Oil	2.5E-03
	Water/Oil	9.8E-05
Pump seals	Gas	2.4E-03
	Heavy Oil	NA
	Light Oil	1.3E-02
	Water/Oil	2.4E-05
Others[c]	Gas	8.8E-03
	Heavy Oil	3.2E-05
	Light Oil	7.5E-03
	Water/Oil	1.4E-02
Connectors	Gas	2.0E-04
	Heavy Oil	7.5E-06
	Light Oil	2.1E-04
	Water/Oil	1.1E-04
Flanges	Gas	3.9E-04
	Heavy Oil	3.9E-07
	Light Oil	1.1E-04
	Water/Oil	2.9E-06
Open-ended lines	Gas	2.0E-03
	Heavy Oil	1.4E-04
	Light Oil	1.4E-03
	Water/Oil	2.5E-04

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Fugitive Emission Calculations - Haul Roads

Fugitive Emission Summary

Component	Maximum Emissions (lb/hr)	Annual Emissions (tons/yr)
PM 2.5	0.09	0.03
PM 10	0.92	0.32
PM Total (TSP)	3.64	1.26

Supplemental Information:

Mean Vehicle Weight[1]	20	tons
Silt Content[2]	4.8	%
Rain Days[3]	70	days/yr
Miles Per Hauling[4]	0.30	miles
Average Volume per Hauling[5]	200	bbls
Oil Haulings	803	haulings/yr
Water Haulings	913	haulings/yr
Vehicle Miles Traveled (VMT)	514.800	miles/yr
	0.059	miles/hr

	PM 2.5	PM 10	TSP
k	0.15	1.5	4.9
a	0.9	0.9	0.7
b	0.45	0.45	0.45
E (lb/VMT) = Hourly Emission Factors[6,7]	0.15	1.54	6.06
E_{ext} (lb/VMT) = Annual Emission Factors[8]	0.12	1.24	4.90

Haul Road Fugitive Determination:

$E = k\ (s/12)^a (W/3)^b$

where:

k, a, and b are empirical constants from Table 13.2.2-2

s = surface material silt content (%)

W = mean vehicle weight (tons)

$E_{ext} = E\ [(365 - P)/365]$

where:

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT

E = emission factor from Equation 1a

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation (a.k.a. Rain Days)

Notes:

(1) Mean vehicle weight is based on maximum possible vehicle weight.

(2) Silt content based on NMED guidance and AP-42 Table 13.2.2-1 (Nov. 2006)

(3) Rain days value is the default allowed by NMED without additional justification.

(4) Miles per hauling is based on mileage of truck(s) to and from primary lease road.

(5) Oil and water haulings based on average loading of 200 bbls/hauling

(6) Hourly emission factors are calculated using AP-42 Section 13.2.2 Equation 1a (Nov. 2006).

(7) Maximum hourly emission calculations incorporate one water and one oil loading during an hour.

(8) Annual emission factors are extrapolated from hourly factors per AP-42 Section 13.2.2 Equation 2 (Nov. 2006).

Example Calculations

Example Calculations for PM 2.5:

$E = (0.15) * (4.8/12)^{0.9} * (20/3)^{0.45} = 0.15$ (lb/VMT)

$E_{ext} = (0.15) * [(365 - 70)/365] = 0.12$ (lb/VMT)

Maximum Hourly Emissions (lb/hr) = $\frac{0.15 \text{ lb}}{\text{VMT}} \times \frac{0.3 \text{ VMT}}{\text{hour}} \times \frac{2 \text{ haulings}}{} = \frac{0.09 \text{ lb}}{\text{hour}}$

Total Annual Emissions (tpy) = $\frac{0.12 \text{ lb}}{\text{VMT}} \times \frac{514.8 \text{ VMT}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = \frac{0.031 \text{ tons}}{\text{year}}$

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\,(s/12)^a (W/3)^b \quad (1a)$$

$$E_{ext} = E\,[(365 - P)/365] \quad (2)$$

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

Constant	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
	PM-2.5	PM-10	PM-30*	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	-	-	-	0.5	0.5	0.3
Quality Rating	B	B	B	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL UNPAVED ROADS[a]

Industry	Road Use Or Surface Material	Plant Sites	No. Of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16 - 19	17
Iron and steel production	Plant road	19	135	0.2 - 19	6.0
Sand and gravel processing	Plant road	1	3	4.1 - 6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4 - 16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4 - 7.1	4.3
	Haul road to/from pit	1	12	3.9 - 9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8 - 18	8.4
	Plant road	2	2	4.9 - 5.3	5.1
	Scraper route	3	10	7.2 - 25	17
	Haul road (freshly graded)	2	5	18 - 29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2 - 21	6.4

[a]References 1,5-15.

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Condensate Tank Emissions - Promax and Tanks 4.0.9d

Tank Emission Summary

Component	Weight Percent of VOC	Pre-Control						Post-Control					
		W&B (lb/hr)	W&B (tons/yr)	Flashing (lb/hr)	Flashing (tons/yr)	Total Hourly Emissions (lb/hr)	Total Annual Emissions (tons/yr)	W&B (lb/hr)	W&B (tons/yr)	Flashing (lb/hr)	Flashing (tons/yr)	Total Hourly Emissions (lb/hr)	Total Annual Emissions (tons/yr)
Benzene	0.49%	0.01	0.05	0.01	0.03	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	1.48%	0.03	0.15	0.01	0.03	0.04	0.18	0.00	0.01	0.00	0.00	0.00	0.01
E-benzene	0.32%	0.01	0.03	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Xylenes	1.64%	0.04	0.17	0.00	0.01	0.04	0.18	0.00	0.01	0.00	0.00	0.00	0.01
n-Hexane	1.34%	0.03	0.14	0.02	0.10	0.05	0.24	0.00	0.01	0.00	0.00	0.00	0.01
Total VOC	100.00%	2.35	10.28	1.69	7.41	4.04	17.69	0.09	0.41	0.07	0.29	0.16	0.70

Supplemental Information

Tank Data			TANKS 4.0.9d / W&B Data			Promax / Flashing Data		
Source:	Storage Tank, Condensate		Throughput:	3,372,600	gallons/yr-tank	Ambient Temperature:	65	F
Source ID:	OILTK1-2		Size:	500	bbls			
# of tanks:	2		Height:	16	ft			
Facility Throughput:	440.00	BPD	Diameter:	15.5	ft			
Tank Throughput:	220.00	BPD/tank	Max Height:	12.8	ft			
			Avg. Height:	9.6	ft			
			Color:	Gray/Medium (Average)				
			Equipment Reducing W&B Emissions:			Equipment Reducing Flashing Emissions:		
			Control Equipment:		Flare	Process Equipment:(3)	None	
			Capture Efficiency:		98%	Capture Efficiency:	0%	
			Destruction Efficiency:		98%	Runtime Percentage:	0%	
						Control Equipment:(4)	Flare	
			Working (lb/yr):		16,874.45	Capture Efficiency:	98%	
			Breathing (lb/yr):		3,678.55	Destruction Efficiency:	98%	
			W&B (tons/yr):		10.28			

Notes:

(1) Emission calculations are based on the representative liquid analysis (Hornsby 35 Federal No. 10H LP).

(2) APIG, separator pressure, separator temperature, and facility oil throughput based on facility estimate.

(3) No process equipment is claimed at this time.

*(4) Post-control emissions are calculated using the 98% flare capture efficiency and the 98% flare destruction efficiency(i.e. 17.69 tons/yr * (1 - 98%) = 0.7 tons/yr of VOC emissions).*

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Produced Water Tank Emissions - Promax and Tanks 4.0.9d

Tank Emission Summary

Component	Weight Percent of VOC	Pre-Control						Post-Control					
		W&B (lb/hr)	W&B (tons/yr)	Flashing (lb/hr)	Flashing (tons/yr)	Total Hourly Emissions (lb/hr)	Total Annual Emissions (tons/yr)	W&B (lb/hr)	W&B (tons/yr)	Flashing (lb/hr)	Flashing (tons/yr)	Total Hourly Emissions (lb/hr)	Total Annual Emissions (tons/yr)
Benzene	0.49%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	1.48%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E-benzene	0.32%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Xylenes	1.64%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Hexane	1.34%	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total VOC	100.00%	0.03	0.11	0.13	0.57	0.16	0.69	0.00	0.00	0.01	0.02	0.01	0.03

Supplemental Information

Tank Data			TANKS 4.0.9d / W&B Data			Promax / Flashing Data		
Source:	Storage Tank, Produced Water		Throughput:	3,832,500	gallons/yr-tank	Ambient Temperature:	65	F
Source ID:	SWTK1-2		Size:	500	bbls			
# of tanks:	2		Height:	16	ft			
Facility Throughput:	500.00	BPD	Diameter:	15.5	ft			
Tank Throughput:	250.00	BPD/tank	Max Height:	12.8	ft			
	2.50	BOPD/tank (assumes that only 1% of water is oil)	Avg. Height:	9.6	ft			
			Color:	Gray/Medium (Average)				
			Equipment Reducing W&B Emissions:			Equipment Reducing Flashing Emissions:		
			Control Equipment:		Flare	Process Equipment:(3)	None	
			Capture Efficiency:		98%	Capture Efficiency:	0%	
			Destruction Efficiency:		98%	Runtime Percentage:	0%	
						Control Equipment:(4)	Flare	
			Working (lb/yr):	191.76		Capture Efficiency:	98%	
			Breathing (lb/yr):	36.79		Destruction Efficiency:	98%	
			W&B (tons/yr):	0.11				

Notes:

(1) Emission calculations are based on the representative liquid analysis (Hornsby 35 Federal No. 10H LP).

(2) APIG, separator pressure, separator temperature, and facility oil throughput based on facility estimate.

(3) No process equipment is claimed at this time.

*(4) Post-control emissions are calculated using the 98% flare capture efficiency and the 98% flare destruction efficiency(i.e. 0.69 tons/yr * (1 - 98%) = 0.03 tons/yr of VOC emissions).*

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Promax Tank Flashing - Example Calculations (VOC)

Scenario 1: Tank Flashing at Facilities without Vapor Recovery Systems:

In this scenario, flashing occurs when liquid from the last process vessel prior to the tank(s) (e.g. heater treater, separator, etc.) enters the atmospheric storage tank(s). This scenario may or may not include a control device.

Values Obtained from Promax:

VOC_FF *VOC Flash Factor (lb VOC/bbl oil)*

Tank Flashing (Pre-Control):

$$VOC\,(lb/hr) = \left[VOC\_FF\left(\frac{lbs\ VOC}{bbl\ oil}\right)\right] * \left[Daily\ Tank\ Oil\ Throughput\left(\frac{bbl\ oil}{day-tank}\right)\right] * \left[\frac{1\ day}{24\ hrs}\right]$$

$$VOC\,(tons/yr) = \left[VOC\left(\frac{lb}{hr}\right)\right] * \left[\frac{8{,}760\ hr}{yr}\right] * \left[\frac{1\ ton}{2000\ lbs}\right]$$

Tank Flashing (Post-Control):

$$VOC\,(lb/hr) = \left[Pre\text{-}Control\ VOC\left(\frac{lb}{hr}\right)\right] * [100\% - Flare\ Capture\ Efficiency\ (\%)] + \left[Pre\text{-}Control\ VOC\left(\frac{lb}{hr}\right)\right] * [Flare\ Capture\ Efficiency\ (\%)] * [100\% - Flare\ Control\ Efficiency\ (\%)]$$

$$VOC\,(tons/yr) = \left[Pre\text{-}Control\ VOC\left(\frac{tons}{yr}\right)\right] * [100\% - Flare\ Capture\ Efficiency\ (\%)] + \left[Pre\text{-}Control\ VOC\left(\frac{tons}{yr}\right)\right] * [Flare\ Capture\ Efficiency\ (\%)] * [100\% - Flare\ Control\ Efficiency\ (\%)]$$

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Promax Tank Flashing - Example Calculations (VOC)

Scenario 2: Tank Flashing at Facilities with Vapor Recovery Systems:

In this scenario, Promax is used to model oil/condensate flashing at both the facility vapor recovery tower (VRT) and the atmospheric storage tank(s). VRT flashing gas is captured by a vapor recovery unit (VRU) or flash gas compressor and returned to the process. During VRU downtime, VRT flashing can either be vented to atmosphere or routed to a control device (e.g. flare). All post-process flashing emissions are allocated to the storage tank(s) for conservative purposes.

Values Obtained from Promax:

VRT_VOC_FF	*VOC Flash Factor for VRT Flashing (lb VOC/bbl oil)*
Tank_VOC_FF	*VOC Flash Factor for Storage Tank Flashing (lb VOC/bbl oil)*

VRT Flashing during VRU Downtime

$$Pre\text{-}Control\ VOC\ (tons/yr) = \left[VRT\_VOC\_FF\left(\frac{lbs\ VOC}{bbl\ oil}\right)\right] * \left[\frac{1\ ton}{2000\ lbs}\right] * \left[Annual\ Tank\ Oil\ Throughput\left(\frac{bbl\ oil}{yr-tank}\right)\right] * [100\% - VRU\ Runtime\ (\%)]$$

$$Post\text{-}Control\ VOC(tons/yr) = \left[Pre-Control\ VOC\left(\frac{tons}{yr}\right)\right] * [100\% - Flare\ Capture\ Efficiency\ (\%)] + \left[Pre-Control\ VOC\left(\frac{tons}{yr}\right)\right] * [Flare\ Capture\ Efficiency\ (\%)] * [100\% - Flare\ Control\ Efficiency\ (\%)]$$

Tank Flashing:

$$Pre\text{-}Control\ VOC\ (tons/yr) = \left[Tank\_VOC\_FF\left(\frac{lbs\ VOC}{bbl\ oil}\right)\right] * \left[\frac{1\ ton}{2000\ lbs}\right] * \left[Annual\ Tank\ Oil\ Throughput\left(\frac{bbl\ oil}{yr-tank}\right)\right]$$

$$Post\text{-}Control\ VOC(tons/yr) = \left[Pre-Control\ VOC\left(\frac{tons}{yr}\right)\right] * [100\% - Flare\ Capture\ Efficiency\ (\%)] + \left[Pre-Control\ VOC\left(\frac{tons}{yr}\right)\right] * [Flare\ Capture\ Efficiency\ (\%)] * [100\% - Flare\ Control\ Efficiency\ (\%)]$$

VRT Flashing during VRU Runtime (if VRU Capture Efficiency is < 100%):

$$VOC(tons/yr) = \left[VRT\_VOC\_FF\left(\frac{lbs\ VOC}{bbl\ oil}\right)\right] * \left[\frac{1\ ton}{2000\ lbs}\right] * \left[Annual\ Tank\ Oil\ Throughput\left(\frac{bbl\ oil}{yr-tank}\right)\right] * [VRU\ Runtime\ (\%)] * [100\% - VRU\ Capture\ (\%)]$$

Total Flashing:

$$Total\ VOC(tons/yr) = [VRT\ Flashing\ during\ VRU\ Downtime] + [Tank\ Flashing] + [Uncaptured\ VRT\ Flashing\ during\ VRU\ Runtime]$$

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AP-42 CHAPTER 7 FIXED-ROOF TANK WORKING & BREATHING EMISSIONS

Tank Identification	OILTK1-2	SWTK1-2
Location for Calculation Purposes	Roswell, New Mexico	Roswell, New Mexico
Contents of Tank	Hornsby 35 Federal No. 10H LP (RVP 9.28)	Hornsby 35 Federal No. 10H LP (RVP 9.28)
Tank/Roof Type	Cone	Cone
Underground?	Aboveground	Aboveground
Diameter, ft	15.5	15.5
Shell Height or Length, ft	16.0	16.0
Nominal Capacity, gal	21,000	21,000
Throughput, gallons/yr	3,372,600	3,832,500
Tank Paint Color	Gray/Medium	Gray/Medium
Tank Paint Condition	Average	Average
Effective Diameter, ft	15.5	15.5
Geometric Capacity, gal	18,067	18,067
Maximum Liquid Height, ft	12.8	12.8
Average Liquid Height, ft	9.6	9.6
Minimum Liquid Height, ft	1.0	1.0
Cone Tank Roof Slope, ft/ft	0.0625	0.0625
Dome Tank Roof Radius, ft	N/A	N/A
Dome Tank Roof Height, ft	N/A	N/A
Roof Outage, ft	0.161	0.161
Vapor Space Outage, ft	6.56	6.56
Vapor Space Volume, ft^3	1238	1238
Average Daily Minimum Ambient Temperature, F	47.60	47.60
Average Daily Maximum Ambient Temperature, F	75.80	75.80
Daily Total Solar Insolation Factor, Btu/ft^2/day	1722	1722
Daily Average Ambient Temperature, F	61.7	61.7
Tank Paint Solar Absorbance, dimensionless	0.710	0.710
Daily Vapor Temperature Range, R	43.0	43.0
Daily Average Liquid Surf. Temperature, F	68.9	68.9
Daily Minimum Liquid Surf. Temperature, F	58.2	58.2
Daily Maximum Liquid Surf. Temperature, F	79.7	79.7
Liquid Bulk Temperature	65.37	65.37
Vapor Molecular Weight, lb/lbmol	36.40	36.40
Antoine's Coefficient A	N/A	N/A
Antoine's Coefficient B	N/A	N/A
Antoine's Coefficient C	N/A	N/A
Type of Substance (for use in calculations)	Crude	Crude
Vapor Pressure at Daily Av. Liquid Surf. Temp., psia	7.78	7.78
Vapor Pressure at Daily Min. Liquid Surf. Temp., psia	6.50	6.50
Vapor Pressure at Daily Max. Liquid Surf. Temp., psia	9.23	9.23
Vapor Pressure Calculation Method	AP-42 Figure 7.1-13b: RVP=9.28	AP-42 Figure 7.1-13b: RVP=9.28
Vapor Density, lb/ft^3	0.049909	0.049909
Daily Vapor Pressure range, psi	2.728	2.728
Breather Vent Pressure Setting, psig	0.0300	0.0300
Breather Vent Vacuum Setting, psig	-0.0300	-0.0300
Breather Vent Pressure Setting Range, psi	0.0600	0.0600
Ambient Pressure, psia	12.9	12.9
Vapor Space Expansion Factor	0.6042	0.6042
Vented Vapor Saturation Factor	0.270	0.270
Annual Turnovers	202.47	230.08
Turnover Factor	1.00	1.00
Working Loss Product Factor	0.75	0.75
Standing Storage Loss, lb/yr	3,678.55	36.79
Working Loss, lb/yr	16,874.45	191.76
Total Losses, lb/yr	20,553.00	228.54
Standing Storage Loss, TPY	1.84	0.02
Working Loss, TPY	8.44	0.10
Total Losses, TPY	10.28	0.11

Based on AP-42, June 2020, Section 7.1.3.1.
Note: Produced water tank emissions are conservatively calculated using condensate assuming 1% is emitted. The lb/yr and TPY emission estimates represent the 1% emitted.

Cimarex Energy Co.
Tres Equis State Facility

Oil Loading Emissions Calculations

Loading Emission Summary

Component	Weight Percent of VOC[1]	Pre-Control		Post-Control	
		Maximum Emissions (lb/hr)	Annual Emissions (tons/yr)	Maximum Emissions (lb/hr)	Annual Emissions (tons/yr)
Benzene	0.49%	0.18	0.07	0.18	0.07
Toluene	1.48%	0.53	0.20	0.53	0.20
E-benzene	0.32%	0.11	0.04	0.11	0.04
Xylenes	1.64%	0.59	0.22	0.59	0.22
n-Hexane	1.34%	0.48	0.18	0.48	0.18
VOC Content	100.00%	36.07	13.59	36.07	13.59

Supplemental Information:

Oil Throughput	440	BOPD/entire facility
Max. Oil Loading Throughput:	6,745,200	gals per yr (assuming 100 % oil)
Vapor MW:	36.40	(Based on similar, nearby facility Gas/Liquids Analysis)
Paint Factor (α):	0.71	Gray/Medium
Daily Avg Ambient Temperature:	61.70	F (Based on AP-42 Chapter 7 Table 7.1-7)
Daily Max Ambient Temperature:	93.90	F (Based on AP-42 Chapter 7 Table 7.1-7)
Avg Bulk Liquid Temperature:	65.37	F (Based on AP-42 Chapter 7 Table 7.1-7)
	525.37	R
Max Bulk Liquid Temperature:	97.16	F (Based on AP-42 Chapter 7 Table 7.1-7)
	557.16	R
Avg TVP at Bulk Temperature:	7.78	psia (Based on AP-42 Chapter 7 calculations)
Max TVP at Bulk Temperature:	9.23	psia (Based on AP-42 Chapter 7 calculations)
Saturation Factor:	0.60	
Control:	None	
Capture Efficiency:	0%	
Control Efficiency:	0%	

Loading Loss Determination:

AP-42 Loading Loss Equation[2]:

L = 12.46 SPM/T

where:

L = Loading Losses (lb/1000 gal)

S = Saturation Factor (based on tank and loading type)[3]

P = True Vapor Pressure (psia)

M = Molecular Weight of Vapor

T = Temperature of Bulk Liquid (R)[4]

Loading (L) =	Average Annual Emissions:	Maximum Hourly Emissions[5]:
lb/10^3 gallons	4.03	4.51
lb/yr	27,185.22	30,411.55
tons/yr	13.59	-
hrs/yr	843.15	843.15
lb/hr	32.24	36.07

Notes:

(1) Light liquid speciation is based on the representative analysis.

(2) AP-42 Section 5.2, Equation 1 (January 1995)

(3) AP-42 Section 5.2. Table 5.2-1, Saturation Factors for Calculating Petroleum Liquid Loading Losses

(4) AP-42 Section 7.1, Equation 1-28 ($T_B = T_{AA} + 6\alpha - 1$)

(5) Assuming loading of 1 truck @ 8000 gallons per hour. Max. hourly based on condensate loading rate and avg. hourly emissions based on total condensate production.

Example Calculations

$$L_L = \frac{12.46 \quad 0.60 \quad 7.8 \text{ psia} \quad 36.4 \text{ lb}}{\qquad\qquad\quad 525.4 \text{ R} \quad \text{lb-mol}} = \frac{4.03 \text{ lb}}{1000 \text{ gal}}$$

$$L_L = \frac{440 \text{ bbls}}{\text{day}} \times \frac{42 \text{ gal}}{\text{bbl}} \times \frac{365 \text{ day}}{\text{year}} \times \frac{4.03 \text{ lb}}{1000 \text{ gal}} = \frac{27185.23 \text{ lbs}}{\text{year}}$$

$$L_L = \frac{27185.23 \text{ lbs}}{\text{year}} \times \frac{1 \text{ ton}}{2000 \text{ lbs}} = \frac{13.59 \text{ tons}}{\text{year}}$$

$$L_L = \frac{440 \text{ bbls}}{\text{day}} \times \frac{42 \text{ gal}}{\text{bbl}} \times \frac{365 \text{ day}}{\text{year}} \times \frac{1 \text{ hr}}{8000 \text{ gal}} = \frac{843.15 \text{ hrs}}{\text{year}}$$

$$L_L = \frac{27185.23 \text{ lbs}}{\text{year}} \times \frac{\text{year}}{843.15 \text{ hrs}} = \frac{36.07 \text{ lb}}{\text{hr}}$$

$$L_L = 12.46 \frac{SPM}{T} \quad (1)$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)
P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
T = temperature of bulk liquid loaded, °R (°F + 460)

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode Of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.50
	Submerged loading: dedicated normal service	0.60
	Submerged loading: dedicated vapor balance service	1.00
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.00
Marine vessels[a]	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

Table 7.1-2. PROPERTIES (M_V, P_{VA}, W_L) OF SELECTED PETROLEUM LIQUIDS[a]

Petroleum Liquid	Vapor Molecular Weight at 60°F, M_V (lb/lb-mole)	Liquid Density At 60°F, W_L (lb/gal)	True Vapor Pressure, P_{VA} (psi)						
			40°F	50°F	60°F	70°F	80°F	90°F	100°F
Crude oil RVP 5	50	7.1	1.8	2.3	2.8	3.4	4.0	4.8	5.7
Distillate fuel oil No. 2	130	7.1	0.0031	0.0045	0.0065	0.0090	0.012	0.016	0.022
Gasoline RVP 7	68	5.6	2.3	2.9	3.5	4.3	5.2	6.2	7.4
Gasoline RVP 7.8	68	5.6	2.5929	3.2079	3.9363	4.793	5.7937	6.9552	8.2952
Gasoline RVP 8.3	68	5.6	2.7888	3.444	4.2188	5.1284	6.1891	7.4184	8.8344
Gasoline RVP 10	66	5.6	3.4	4.2	5.2	6.2	7.4	8.8	10.5
Gasoline RVP 11.5	65	5.6	4.087	4.9997	6.069	7.3132	8.7519	10.4053	12.2949
Gasoline RVP 13	62	5.6	4.7	5.7	6.9	8.3	9.9	11.7	13.8
Gasoline RVP 13.5	62	5.6	4.932	6.0054	7.2573	8.7076	10.3774	12.2888	14.4646
Gasoline RVP 15.0	60	5.6	5.5802	6.774	8.1621	9.7656	11.6067	13.7085	16.0948
Jet kerosene	130	7.0	0.0041	0.0060	0.0085	0.011	0.015	0.021	0.029
Jet naphtha (JP-4)	80	6.4	0.8	1.0	1.3	1.6	1.9	2.4	2.7
Residual oil No. 6	190	7.9	0.00002	0.00003	0.00004	0.00006	0.00009	0.00013	0.00019

[a] References 10 and 11

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Tres Equis State Facility

Water Loading Emission Calculations

Loading Emission Summary

Component	Weight Percent of VOC[1]	Pre-Control		Post-Control	
		Maximum Emissions (lb/hr)	Annual Emissions (ton/yr)	Maximum Emissions (lb/hr)	Annual Emissions (ton/yr)
Benzene	0.49%	0.00	0.00	0.00	0.00
Toluene	1.48%	0.01	0.00	0.01	0.00
E-benzene	0.32%	0.00	0.00	0.00	0.00
Xylenes	1.64%	0.01	0.00	0.01	0.00
n-Hexane	1.34%	0.00	0.00	0.00	0.00
VOC Content	100.00%	0.36	0.15	0.36	0.15

Supplemental Information:

Water Throughput:	500	BWPD/entire facility
Max. Water Loading Throughput:	7,665,000	gallons per yr of produced water
Vapor MW:	36.40	(Based on similar, nearby facility Gas/Liquids Analysis)
Paint Factor (α):	0.71	Gray/Medium
Daily Avg Ambient Temperature:	61.70	F (Based on AP-42 Chapter 7 Table 7.1-7)
Daily Max Ambient Temperature:	93.90	F (Based on AP-42 Chapter 7 Table 7.1-7)
Avg Bulk Liquid Temperature:	65.37	F (Based on AP-42 Chapter 7 Table 7.1-7)
	525.37	R
Max Bulk Liquid Temperature:	97.16	F (Based on AP-42 Chapter 7 Table 7.1-7)
	557.16	R
Avg TVP at Bulk Temperature:	7.78	psia (Based on AP-42 Chapter 7 calculations)
Max TVP at Bulk Temperature:	9.23	psia (Based on AP-42 Chapter 7 calculations)
Saturation Factor:	0.60	
Control:	None	
Capture Efficiency:	0%	
Control Efficiency:	0%	

Loading Loss Determination:

AP-42 Loading Loss Equation[2]:

$L = 12.46 SPM/T$

where:

L = Loading Losses (lb/1000 gal)
S = Saturation Factor (based on tank and loading type)[3]
P = True Vapor Pressure (psia)
M = Molecular Weight of Vapor
T = Temperature of Bulk Liquid (R)[4]

Loading (L) =	Average Annual Emissions:	Maximum Hourly Emissions[5]:
lb/10^3 gallons	4.03	4.51
lb/yr	308.92	345.59
tons/yr	0.15	-
hrs/yr	958.13	958.13
lb/hr	0.32	0.36

Notes:

(1) Light liquid speciation is based on the representative analysis. Water loading emissions estimates use oil/condensate, assuming 1% is emitted.
(2) AP-42 Section 5.2, Equation 1 (January 1995)
(3) AP-42 Section 5.2. Table 5.2-1, Saturation Factors for Calculating Petroleum Liquid Loading Losses
(4) AP-42 Section 7.1, Equation 1-28 ($T_B = T_{AA} + 6\alpha - 1$)
(5) Assuming loading of 1 truck @ 8000 gallons per hour. Max. hourly based on condensate loading rate and avg. hourly emissions based on total condensate and water production.

Example Calculations:

$$L_L = \frac{12.46 \quad 0.60 \quad 7.8 \text{ psia} \quad 36.4 \text{ lb}}{\qquad\qquad\quad 525.4 \text{ R} \quad \text{lb-mol}} = \frac{4.03 \text{ lb}}{1000 \text{ gal}}$$

$$L_L = \frac{500 \text{ bbls}}{\text{day}} \frac{42 \text{ gal}}{\text{bbl}} \frac{365 \text{ day}}{\text{year}} \frac{4.03 \text{ lb}}{1000 \text{ gal}} \frac{1\% \text{ oil in water}}{} = \frac{308.93 \text{ lbs}}{\text{year}}$$

$$L_L = \frac{308.93 \text{ lbs}}{\text{year}} \frac{1 \text{ ton}}{2000 \text{ lbs}} = \frac{0.15 \text{ tons}}{\text{year}}$$

$$L_L = \frac{500 \text{ bbls}}{\text{day}} \frac{42 \text{ gal}}{\text{bbl}} \frac{365 \text{ day}}{\text{year}} \frac{1 \text{ hr}}{8000 \text{ gal}} = \frac{958.13 \text{ hrs}}{\text{year}}$$

$$L_L = \frac{308.93 \text{ lbs}}{\text{year}} \frac{\text{year}}{958.13 \text{ hrs}} = \frac{0.36 \text{ lb}}{\text{hr}}$$

$$L_L = 12.46 \frac{SPM}{T} \qquad (1)$$

where:

L_L = loading loss, pounds per 1000 gallons (lb/10^3 gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)
P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
T = temperature of bulk liquid loaded, °R (°F + 460)

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode Of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.50
	Submerged loading: dedicated normal service	0.60
	Submerged loading: dedicated vapor balance service	1.00
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.00
Marine vessels[a]	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

Table 7.1-2. PROPERTIES (M_V, P_{VA}, W_L) OF SELECTED PETROLEUM LIQUIDS[a]

Petroleum Liquid	Vapor Molecular Weight at 60°F, M_V (lb/lb-mole)	Liquid Density At 60°F, W_L (lb/gal)	True Vapor Pressure, P_{VA} (psi)						
			40°F	50°F	60°F	70°F	80°F	90°F	100°F
Crude oil RVP 5	50	7.1	1.8	2.3	2.8	3.4	4.0	4.8	5.7
Distillate fuel oil No. 2	130	7.1	0.0031	0.0045	0.0065	0.0090	0.012	0.016	0.022
Gasoline RVP 7	68	5.6	2.3	2.9	3.5	4.3	5.2	6.2	7.4
Gasoline RVP 7.8	68	5.6	2.5929	3.2079	3.9363	4.793	5.7937	6.9552	8.2952
Gasoline RVP 8.3	68	5.6	2.7888	3.444	4.2188	5.1284	6.1891	7.4184	8.8344
Gasoline RVP 10	66	5.6	3.4	4.2	5.2	6.2	7.4	8.8	10.5
Gasoline RVP 11.5	65	5.6	4.087	4.9997	6.069	7.3132	8.7519	10.4053	12.2949
Gasoline RVP 13	62	5.6	4.7	5.7	6.9	8.3	9.9	11.7	13.8
Gasoline RVP 13.5	62	5.6	4.932	6.0054	7.2573	8.7076	10.3774	12.2888	14.4646
Gasoline RVP 15.0	60	5.6	5.5802	6.774	8.1621	9.7656	11.6067	13.7085	16.0948
Jet kerosene	130	7.0	0.0041	0.0060	0.0085	0.011	0.015	0.021	0.029
Jet naphtha (JP-4)	80	6.4	0.8	1.0	1.3	1.6	1.9	2.4	2.7
Residual oil No. 6	190	7.9	0.00002	0.00003	0.00004	0.00006	0.00009	0.00013	0.00019

[a] References 10 and 11

Cimarex Energy Co.
Tres Equis State Facility
Composition Analysis

Representative Liquid Analysis (File Name: Hornsby 35 Federal No. 10H LP)*

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %	Weight Fraction of Total Sample	Weight Fraction of C3+ Hydrocarbons Only
hydrogen	0.0000	2.01588	0	0.0000	0.0000	
helium	0.0000	4.0026	0	0.0000	0.0000	
nitrogen	0.0696	28.01340	2	0.0133	0.0001	
CO2	0.0207	44.00950	1	0.0062	0.0001	
H2S	0.0000	34.08188	0	0.0000	0.0000	
methane (C1)	0.8166	16.04246	13	0.0892	0.0009	
ethane (C2)	2.0014	30.06904	60	0.4095	0.0041	
propane (C3)	3.8386	44.09562	169	1.1519	0.0115	0.0116
butanes (C4)	5.3207	58.12220	309	2.1046	0.0210	0.0212
pentanes (C5)	6.2285	72.14878	449	3.0582	0.0306	0.0307
benzene	0.9260	78.110000	72	0.4923	0.0049	0.0049
other hexanes (C6)	9.5222	86.18000	821	5.5133	0.0551	0.0554
toluene	2.3497	92.140000	217	1.4735	0.0147	0.0148
other heptanes (C7)	11.5381	100.20000	1156	7.7830	0.0778	0.0782
ethylbenzene	0.4364	106.170000	46	0.3153	0.0032	0.0032
xylenes (o, m, p)	2.2570	106.170000	240	1.6308	0.0163	0.0164
other octanes (C8)	9.5729	114.23000	1094	7.2621	0.0726	0.0730
nonanes (C9)	7.1789	128.26000	921	6.1896	0.0619	0.0622
decanes plus (C10+)	37.9227	242.2000	9185	62.5072	0.6251	0.6283
Totals:	100.0000	147.55	14754.74	100.00	1.0000	1.0000

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	99.48
VOC weight fraction =	0.99

VOC content of hydrocarbon fraction only

VOC weight% =	99.50
VOC weight fraction =	1.00

Hydrogen Sulfide

H2S weight% =	0.0000
H2S weight fraction =	0.0000
H2S ppm_V =	0.20
H2S ppm_{WT}=	0.05

N-Hexane

N-Hexane content of total sample

N-Hexane weight% =	1.34
N-Hexane weight fraction =	0.01

N-Hexane content of hydrocarbon fraction only

N-Hexane weight% =	1.34
N-Hexane weight fraction =	0.01

*Note: The Hornsby 35 Federal No. 10H LP oil analysis is a representative analysis with similar pressure and API gravity in the same reservoir.

** The extended liquid and gas analyses provided with the application are representative because they originated from the same producing reservoir/formation.

Cimarex Energy Co.
Tres Equis State Facility
Composition Analysis

Representative Heater Treater Flash Gas Analysis (File Name: Hornsby 35 Federal No. 10H LP)

Component	**mole %**	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	**weight %**	Weight Fraction of Total Sample	Weight Fraction of C3+ Hydrocarbons Only
hydrogen	0.0000	2.01588	0	0.0000	0.0000	
helium	0.0000	4.0026	0	0.0000	0.0000	
nitrogen	1.0349	28.01340	29	1.1484	0.0115	
CO2	0.6403	44.00950	28	1.1162	0.0112	
H2S	0.0000	34.08188	0	0.0000	0.0000	
methane (C1)	61.3284	16.04246	984	38.9721	0.3897	
ethane (C2)	20.5122	30.06904	617	24.4317	0.2443	
propane (C3)	10.1647	44.09562	448	17.7546	0.1775	0.5172
butanes (C4)	3.9465	58.12220	229	9.0861	0.0909	0.2647
pentanes (C5)	1.4200	72.14878	102	4.0582	0.0406	0.1182
benzene	0.0478	78.110000	4	0.1478	0.0015	0.0043
other hexanes (C6)	0.5536	86.18000	48	1.8900	0.0189	0.0551
toluene	0.0502	92.140000	5	0.1833	0.0018	0.0053
other heptanes (C7)	0.2658	100.20000	27	1.0551	0.0106	0.0307
ethylbenzene	0.0019	106.170000	0	0.0079	0.0001	0.0002
xylenes (o, m, p)	0.0121	106.170000	1	0.0511	0.0005	0.0015
other octanes (C8)	0.0215	114.23000	2	0.0974	0.0010	0.0028
nonanes (C9)	0.0000	128.26000	0	0.0000	0.0000	0.0000
decanes plus (C10+)	0.0000	142.29000	0	0.0000	0.0000	0.0000
Totals:	100.0000	25.25	2525	100.00	1.0000	

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	34.33
VOC weight fraction =	0.34

VOC content of hydrocarbon fraction only

VOC weight% =	35.13
VOC weight fraction =	0.35

Hydrogen Sulfide

H2S weight% =	0.0000
H2S weight fraction =	0.0000
H2S ppm_V =	0.00
H2S ppm_{WT}=	0.0000
H_2S grains/100 SCF =	0.0000

SWEET GAS

Constants:

453.5924	mol/lb-mol
0.064799	grams/grain
385.48	scf/lb-mol

N-Hexane

N-Hexane content of total sample

N-Hexane weight% =	1.89
N-Hexane weight fraction =	0.02

N-Hexane content of hydrocarbon fraction only

N-Hexane weight% =	1.93
N-Hexane weight fraction =	0.02

** The extended liquid and gas analyses provided with the application are representative because they originated from the same producing reservoir/formation.

Cimarex Energy Co.
Tres Equis State Facility
Composition Analysis

Facility Gas Analysis (File Name: Tres Equis 3H Alloc)

Component	mole %	Molecular Weight (grams/mole, lb/lb-mol)	grams per 100 moles of gas	weight %	Weight Fraction of Total Sample	Weight Fraction of C3+ Hydrocarbons Only
hydrogen	0.0000	2.01588	0	0.0000	0.0000	
helium	0.0000	4.0026	0	0.0000	0.0000	
nitrogen	2.1610	28.01340	61	2.8359	0.0284	
CO2	0.1760	44.00950	8	0.3629	0.0036	
H2S	0.0000	34.08188	0	0.0000	0.0000	
methane (C1)	75.9510	16.04246	1218	57.0795	0.5708	
ethane (C2)	12.5700	30.06904	378	17.7064	0.1771	
propane (C3)	5.8490	44.09562	258	12.0824	0.1208	0.5488
butanes (C4)	2.2410	58.12220	130	6.1018	0.0610	0.2772
pentanes (C5)	0.6330	72.14878	46	2.1395	0.0214	0.0972
benzene	0.0000	78.110000	0	0.0000	0.0000	0.0000
other hexanes (C6)	0.4190	86.18000	36	1.6916	0.0169	0.0768
toluene	0.0000	92.140000	0	0.0000	0.0000	0.0000
other heptanes (C7)	0.0000	100.20000	0	0.0000	0.0000	0.0000
ethylbenzene	0.0000	106.170000	0	0.0000	0.0000	0.0000
xylenes (o, m, p)	0.0000	106.170000	0	0.0000	0.0000	0.0000
other octanes (C8)	0.0000	114.23000	0	0.0000	0.0000	0.0000
nonanes (C9)	0.0000	128.26000	0	0.0000	0.0000	0.0000
decanes plus (C10+)	0.0000	142.29000	0	0.0000	0.0000	0.0000
Totals:	100.0000	21.35	2135	100.00	1.0000	

VOC (Non-methane, Non-ethane hydrocarbons)

VOC content of total sample

VOC weight% =	22.02
VOC weight fraction =	0.22

VOC content of hydrocarbon fraction only

VOC weight% =	22.74
VOC weight fraction =	0.23

Hydrogen Sulfide

		Constants:	
H2S weight% =	0.0000	453.5924	mol/lb-mol
H2S weight fraction =	0.0000	0.064799	grams/grain
H2S ppm_V =	0.00	385.48	scf/lb-mol
H2S ppm_{WT}=	0.0000	32.064	Mol. Wt. S
H_2S grains/100 SCF =	0.0000		
Sulfur grains/10^6 SCF =	0.00		
Sulfur weight% =	0.00000		
	SWEET GAS		

N-Hexane

N-Hexane content of total sample

N-Hexane weight% =	1.69
N-Hexane weight fraction =	0.02

N-Hexane content of hydrocarbon fraction only

N-Hexane weight% =	1.75
N-Hexane weight fraction =	0.02

		Constants:	
Gas Molecular Weight =	21.35	28.97	air mw
Gas Specific Gravity =	0.74	385.48	scf/lb-mol
Gas Throughput (MMscf/day)=	-		
Long Tons Sulfur Compounds per Day =	-		

Section 6

Information Used to Determine Emissions

Check the box for each type of information submitted. This documentation is required. If applicable to the facility.

Failure to include applicable supporting documentation may result in application denial.

☐ Specifications for control equipment, including control efficiency specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.

- ☒ Engine or Generator Manufacturer specifications
- ☒ Catalyst Manufacturer specifications (If a catalyst is being utilized to reduce emissions, the catalyst manufacturer emission factors must be used in all emission calculations. A 25% safety factor may be applied to each pollutant.
- ☒ NSPS JJJJ emission factors **may not** be utilized in lieu of catalyst manufacture specifications when a catalyst is installed, and the catalysts manufacturer achieves higher control efficiency.
- ☒ Flare Manufacturer specifications
- ☒ Oil/Liquid Analysis: This data is required to match the inputs in all applicable emission calculations. For facilities that have not been constructed and a representative analysis is used it cannot be older than 1 year. For existing facilities, the gas analyses required by Condition A201.A (must be 1 year old or less).
- ☒ Gas Analysis (must be 1 year old or less) This data is required to match the inputs in all applicable emission calculations.
- ☐ Extended Gas Analysis (must be 1 year old or less) This data is required to match the inputs in all applicable emission calculations.
- ☒ If requesting to use a representative gas sample, include a discussion of why the sample is representative for this facility and an explanation of how it is representative (e.g., same reservoir, same similar API gravity, similar composition).

☐ If test data are used, to support emissions calculations or to establish allowable emission limits, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.

☒ Fuel specifications sheet.

☐ If computer models are used to estimate emissions, include an input summary and a detailed report, and a disk containing the input file used to run the model.

☒ For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, accuracy of the model, the **input and output** summary from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

Representative Liquid and Heater Treater Flash Gas Analysis Justification: Same reservoir, similar conditions

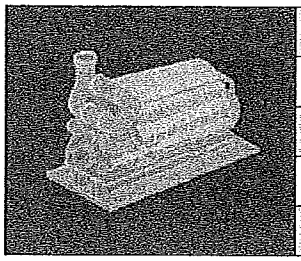
Tank Flashing Emissions Method: Promax was utilized to estimate tank and VRT flashing emissions using a representative liquid analysis from the same reservoir.

Attached Documentation:

- Engine Manufacturer Specifications
- Site-Specific Gas Analysis (a.k.a. fuel specifications sheet)
- Representative Extended Liquid Analysis (same reservoir)
- Representative Heater Treater Flash Gas Analysis (same reservoir)
- Promax Simulation Screenshot(s)
- VRT and Storage Tank Flashing Calculation Methodology
- Flare and Combustor Manufacturer Guarantee
- AP-42 factors are included in Section 5 with corresponding calculations

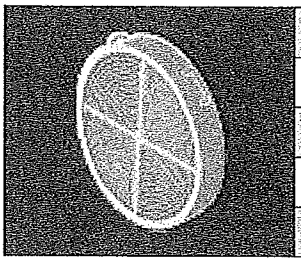
EMISSION GUARANTEE

ENGINE DATA



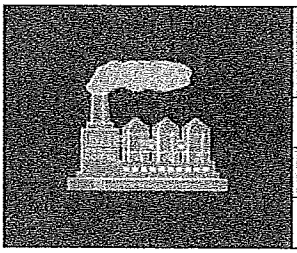
Engine Model	CAT G3306TA
Power	203 bhp
Fuel	PQNG
Exhaust Flow Rate	925 acfm
Exhaust Temperature	1044° F

CATALYST DATA



Catalyst Model	DC47-5 CC
Type	NSCR
# of Elements	1
Cell Density	300 cpsi
Approx. Dimensions	10" x 3.75"

EMISSION REQUIREMENTS



Exhaust Component	Engine Output (g/bhp-hr)	Warranted Converter Output (g/bhp-hr)	Actual Converter Efficiency (% Reduction)
NOx	12.0	0.7	94
CO	12.0	2.0	92
VOC	2.0	0.7	80

The catalyst model selection is based upon the reduction requirements above. Any variance in these requirements may affect the price and model required.

DCL America Inc. 27603 Commerce Oaks Drive, Oak Ridge North, TX 77385
Toll free: 1-877-965-8989 **Fax:** 281-605-5858 **Email:** info@dcl-inc.com www.dcl-inc.com

G3306

NON-CURRENT

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

Tres Equis State 6H grams

ENGINE SPEED (rpm):	1800	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	8	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	HPG IMPCO
AFTERCOOLER WATER INLET (°F):	130	SITE CONDITIONS:	
JACKET WATER OUTLET (°F):	210	FUEL:	Cimarex - Tres Equis State 6H
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig): (See note 1)	12.0-24.9
COOLING SYSTEM:	JW+OC, AC	FUEL METHANE NUMBER:	45.5
CONTROL SYSTEM:	MAG	FUEL LHV (Btu/scf):	1238
EXHAUST MANIFOLD:	WC	ALTITUDE(ft):	3000
COMBUSTION:	STANDARD SETTING	MAXIMUM INLET AIR TEMPERATURE(°F):	105
EXHAUST OXYGEN (% O2):	2.0	STANDARD RATED POWER:	203 bhp@1800rpm
SET POINT TIMING:	25		

			MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING	NOTES	LOAD	100%	100%	75%	56%
ENGINE POWER (WITHOUT FAN)	(2)	bhp	203	182	136	102
INLET AIR TEMPERATURE		°F	47	105	105	105
ENGINE DATA						
FUEL CONSUMPTION (LHV)	(3)	Btu/bhp-hr	7945	8179	8763	9304
FUEL CONSUMPTION (HHV)	(3)	Btu/bhp-hr	8736	8993	9636	10231
AIR FLOW (@inlet air temp, 14.7 psia) (WET)	(4)(5)	ft3/min	303	312	252	203
AIR FLOW (WET)	(4)(5)	lb/hr	1421	1315	1063	857
FUEL FLOW (60°F, 14.7 psia)		scfm	22	20	16	13
INLET MANIFOLD PRESSURE	(6)	in Hg(abs)	38.1	35.5	29.0	23.2
EXHAUST TEMPERATURE - ENGINE OUTLET	(7)	°F	1055	1038	1005	977
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia) (WET)	(8)(5)	ft3/min	997	912	721	570
EXHAUST GAS MASS FLOW (WET)	(8)(5)	lb/hr	1500	1388	1121	903
EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)	(9)(10)	g/bhp-hr	27.45	26.03	22.61	20.78
CO	(9)(10)	g/bhp-hr	2.44	2.50	2.55	2.45
THC (mol. wt. of 15.84)	(9)(10)	g/bhp-hr	0.86	0.85	0.92	1.09
NMHC (mol. wt. of 15.84)	(9)(10)	g/bhp-hr	0.45	0.45	0.48	0.57
NMNEHC (VOCs) (mol. wt. of 15.84)	(9)(10)(11)	g/bhp-hr	0.27	0.27	0.29	0.35
HCHO (Formaldehyde)	(9)(10)	g/bhp-hr	0.15	0.15	0.16	0.19
CO2	(9)(10)	g/bhp-hr	536	549	586	628
EXHAUST OXYGEN	(9)(12)	% DRY	2.0	2.0	2.1	2.6
HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(13)	Btu/min	8492	8198	7219	6062
HEAT REJ. TO ATMOSPHERE	(13)	Btu/min	1075	992	797	630
HEAT REJ. TO LUBE OIL (OC)	(13)	Btu/min	1343	1296	1141	959
HEAT REJ. TO AFTERCOOLER (AC)	(13)(14)	Btu/min	838	838	236	13

COOLING SYSTEM SIZING CRITERIA			
TOTAL JACKET WATER CIRCUIT (JW+OC)	(14)	Btu/min	10953
TOTAL AFTERCOOLER CIRCUIT (AC)	(14)(15)	Btu/min	879
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.			

CONDITIONS AND DEFINITIONS

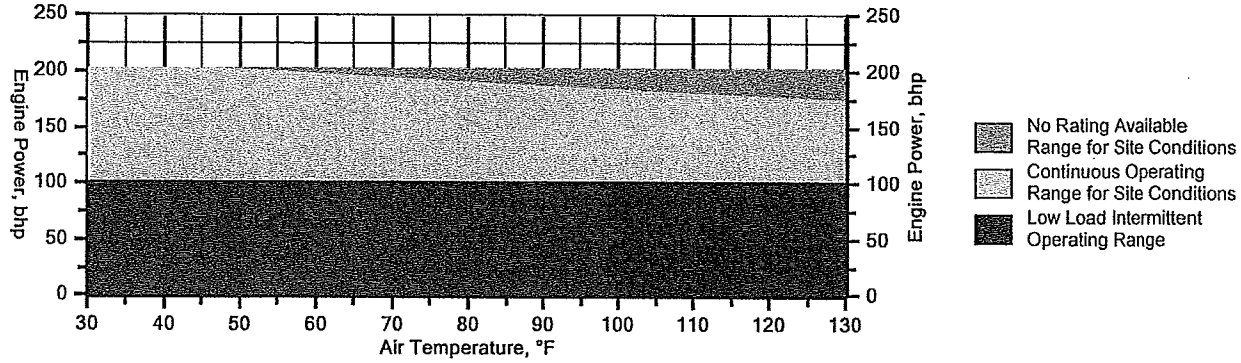
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

WARNINGS ISSUED FOR THIS RATING CONSULT PAGE 3

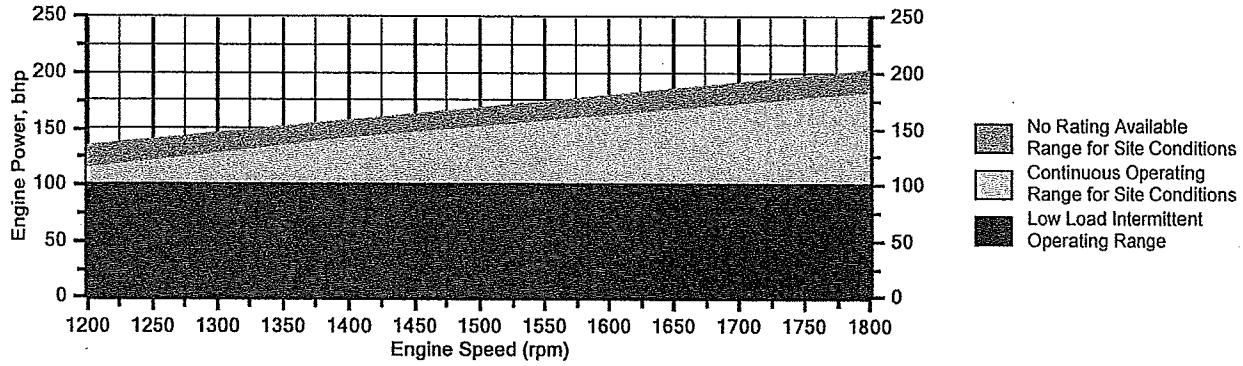
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 3000 ft and 1800 rpm



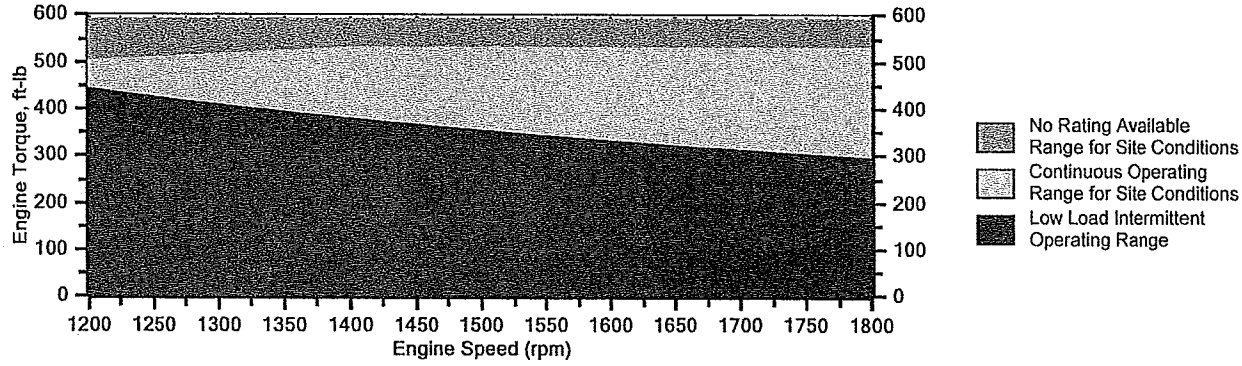
Engine Power vs. Engine Speed

Data represents speed sweep at 3000 ft and 105 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 3000 ft and 105 °F



Note: At site conditions of 3000 ft and 105°F inlet air temp., constant torque can be maintained down to 1400 rpm. The minimum speed for loading at these conditions is 1200 rpm.

Tres Equis State 6H grams

NOTES

1. Fuel pressure range specified is to the engine fuel pressure regulator. Additional fuel train components should be considered in pressure and flow calculations.

2. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

3. Fuel consumption tolerance is ± 5.0% of full load data.

4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

6. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

7. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

8. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

9. Emissions data is at engine exhaust flange prior to any after treatment.

10. Emission values are based on engine operating at steady state conditions. Fuel methane number cannot vary more than ± 3. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate "Not to Exceed" values. THC, NMHC, and NMNEHC do not include aldehydes. Part load data may require engine adjustment.

11. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

12. Exhaust Oxygen tolerance is ± 0.5.

13. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

14. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

15. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

WARNING(S):
1. The lower heating value of the fuel is higher than or equal to 1050 Btu/scf and lower than 1400 Btu/scf. May require on-site adjustment or tuning of the fuel system hardware.

RECOMMENDED ACTION
For additional information please contact your Caterpillar engine dealer.

October 1, 2020

FESCO, Ltd.
1100 FESCO Avenue - Alice, Texas 78332

For: Cimarex Energy Co.
202 S. Cheyenne Avenue, Suite 1000
Tulsa, Oklahoma 74105

Sample: Hornsby 35 Federal No. 10H
Last Stage Separator Hydrocarbon Liquid
Sampled @ 32 psig & 70 °F

Date Sampled: 09/12/2020 Job Number: 202481.012

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2186-M

COMPONENT	MOL %	LIQ VOL %	WT %
Nitrogen	0.070	0.013	0.013
Carbon Dioxide	0.021	0.006	0.006
Methane	0.817	0.235	0.089
Ethane	2.001	0.909	0.410
Propane	3.839	1.796	1.152
Isobutane	1.143	0.635	0.452
n-Butane	4.178	2.237	1.653
2,2 Dimethylpropane	0.038	0.025	0.019
Isopentane	2.425	1.506	1.191
n-Pentane	3.765	2.318	1.849
2,2 Dimethylbutane	0.023	0.016	0.013
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.216	0.150	0.127
2 Methylpentane	1.107	0.780	0.649
3 Methylpentane	0.695	0.482	0.408
n-Hexane	2.290	1.599	1.343
Heptanes Plus	77.374	87.293	90.628
Totals:	100.000	100.000	100.000

Characteristics of Heptanes Plus:

Specific Gravity	0.8210	(Water=1)
°API Gravity	40.86	@ 60°F
Molecular Weight	172.1	
Vapor Volume	14.76	CF/Gal
Weight	6.84	Lbs/Gal

Characteristics of Total Sample:

Specific Gravity	0.7907	(Water=1)
°API Gravity	47.44	@ 60°F
Molecular Weight	146.9	
Vapor Volume	16.65	CF/Gal
Weight	6.59	Lbs/Gal

Base Conditions: 15.025 PSI & 60 °F

Certified: FESCO, Ltd. - Alice, Texas

Sampled By: (24) D. Field
Analyst: ANB
Processor: ANBdjv
Cylinder ID: W-2692

David Dannhaus 361-661-7015

FESCO, Ltd. Job Number: 202481.012

TANKS DATA INPUT REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Carbon Dioxide	0.021	0.006	0.006
Nitrogen	0.070	0.013	0.013
Methane	0.817	0.235	0.089
Ethane	2.001	0.909	0.410
Propane	3.839	1.796	1.152
Isobutane	1.143	0.635	0.452
n-Butane	4.216	2.262	1.671
Isopentane	2.425	1.506	1.191
n-Pentane	3.765	2.318	1.849
Other C-6's	2.040	1.428	1.197
Heptanes	11.146	7.648	7.025
Octanes	14.530	11.103	10.506
Nonanes	7.179	6.485	6.190
Decanes Plus	37.923	57.960	62.507
Benzene	0.926	0.440	0.492
Toluene	2.350	1.336	1.473
E-Benzene	0.436	0.286	0.315
Xylenes	2.257	1.480	1.631
n-Hexane	2.290	1.599	1.343
2,2,4 Trimethylpentane	0.628	0.554	0.488
Totals:	100.000	100.000	100.000

Characteristics of Total Sample:

Specific Gravity	0.7907	(Water=1)
°API Gravity	47.44	@ 60°F
Molecular Weight	146.9	
Vapor Volume	16.65	CF/Gal
Weight	6.59	Lbs/Gal

Characteristics of Decanes (C10) Plus:

Specific Gravity	0.8528	(Water=1)
Molecular Weight	242.2	

Characteristics of Atmospheric Sample:

°API Gravity	46.41	@ 60°F
Reid Vapor Pressure Equivalent (D-6377)	8.41	psi

QUALITY CONTROL CHECK			
	Sampling Conditions	Test Samples	
Cylinder Number	------	W-2692*	W-2585
Pressure, PSIG	32	33	33
Temperature, °F	70	70	70

* Sample used for analysis

FESCO, Ltd. Job Number: 202481.012

TOTAL EXTENDED REPORT - GPA 2186-M

COMPONENT	Mol %	LiqVol %	Wt %
Nitrogen	0.070	0.013	0.013
Carbon Dioxide	0.021	0.006	0.006
Methane	0.817	0.235	0.089
Ethane	2.001	0.909	0.410
Propane	3.839	1.796	1.152
Isobutane	1.143	0.635	0.452
n-Butane	4.178	2.237	1.653
2,2 Dimethylpropane	0.038	0.025	0.019
Isopentane	2.425	1.506	1.191
n-Pentane	3.765	2.318	1.849
2,2 Dimethylbutane	0.023	0.016	0.013
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.216	0.150	0.127
2 Methylpentane	1.107	0.780	0.649
3 Methylpentane	0.695	0.482	0.408
n-Hexane	2.290	1.599	1.343
Methylcyclopentane	1.596	0.959	0.914
Benzene	0.926	0.440	0.492
Cyclohexane	3.596	2.079	2.060
2-Methylhexane	1.019	0.804	0.695
3-Methylhexane	0.963	0.750	0.656
2,2,4 Trimethylpentane	0.628	0.554	0.488
Other C-7's	1.275	0.942	0.861
n-Heptane	2.697	2.113	1.839
Methylcyclohexane	5.584	3.812	3.732
Toluene	2.350	1.336	1.473
Other C-8's	6.583	5.236	4.938
n-Octane	2.362	2.055	1.836
E-Benzene	0.436	0.286	0.315
M & P Xylenes	1.716	1.131	1.240
O-Xylene	0.541	0.349	0.391
Other C-9's	5.583	4.959	4.796
n-Nonane	1.596	1.525	1.393
Other C-10's	5.377	5.249	5.170
n-decane	1.258	1.311	1.218
Undecanes(11)	4.840	4.848	4.842
Dodecanes(12)	3.426	3.707	3.754
Tridecanes(13)	3.298	3.826	3.928
Tetradecanes(14)	2.680	3.330	3.465
Pentadecanes(15)	2.225	2.961	3.119
Hexadecanes(16)	1.685	2.398	2.546
Heptadecanes(17)	1.399	2.104	2.256
Octadecanes(18)	1.307	2.070	2.232
Nonadecanes(19)	1.108	1.828	1.983
Eicosanes(20)	0.875	1.501	1.638
Heneicosanes(21)	0.766	1.383	1.518
Docosanes(22)	0.656	1.234	1.363
Tricosanes(23)	0.571	1.114	1.236
Tetracosanes(24)	0.493	0.995	1.109
Pentacosanes(25)	0.438	0.917	1.028
Hexacosanes(26)	0.390	0.848	0.954
Heptacosanes(27)	0.357	0.803	0.908
Octacosanes(28)	0.314	0.731	0.829
Nonacosanes(29)	0.286	0.686	0.781
Triacontanes(30)	0.246	0.610	0.696
Hentriacontanes Plus(31+)	3.928	13.506	15.934
Total	100.000	100.000	100.000

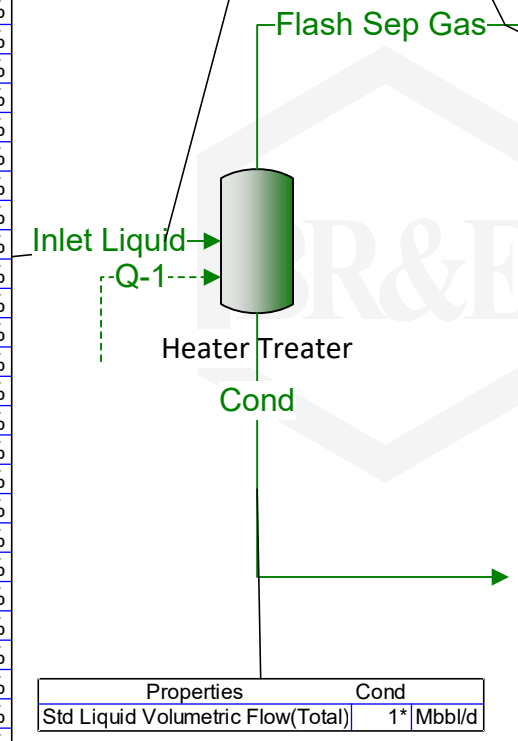
Hornsby 35 Federal No. 10H – Modeled HT Flash Composition

Hornsby 35 Federal No. 10H HP
2020 Analysis

Properties	Flash Sep Gas	
Temperature(Total)	70*	°F
Pressure(Total)	32*	psig
Std Vapor Volumetric Flow(Total)	22.6	MSCFD
Molecular Weight(Total)	25.248	lb/lbmol
Gross Ideal Gas Heating Value(Total)	1470.4	Btu/ft^3

Composition	Inlet Liquid	
Nitrogen(Mole Fraction, Total)	0.03697*	%
Carbon Dioxide(Mole Fraction, Total)	0.04426*	%
Methane(Mole Fraction, Total)	2.757*	%
Ethane(Mole Fraction, Total)	2.639*	%
Propane(Mole Fraction, Total)	4.053*	%
Isobutane(Mole Fraction, Total)	1.115*	%
n-Butane(Mole Fraction, Total)	4.047*	%
2,2-Dimethylpropane(Mole Fraction, Total)	0.05156*	%
Isopentane(Mole Fraction, Total)	2.389*	%
n-Pentane(Mole Fraction, Total)	3.702*	%
2,2-Dimethylbutane(Mole Fraction, Total)	0.0222*	%
Cyclopentane(Mole Fraction, Total)	0*	%
2,3-Dimethylbutane(Mole Fraction, Total)	0.2083*	%
2-Methylpentane(Mole Fraction, Total)	1.068*	%
3-Methylpentane(Mole Fraction, Total)	0.6708*	%
Hexane(Mole Fraction, Total)	2.211*	%
Methylcyclopentane(Mole Fraction, Total)	1.541*	%
Benzene(Mole Fraction, Total)	0.894*	%
Cyclohexane(Mole Fraction, Total)	3.472*	%
2-Methylhexane(Mole Fraction, Total)	0.9836*	%
3-Methylhexane(Mole Fraction, Total)	0.9293*	%
2,2,4-Trimethylpentane(Mole Fraction, Total)	0.6058*	%
Heptane(Mole Fraction, Total)	3.835*	%
Methylcyclohexane(Mole Fraction, Total)	5.391*	%
Toluene(Mole Fraction, Total)	2.268*	%
Octane(Mole Fraction, Total)	8.636*	%
Ethylbenzene(Mole Fraction, Total)	0.4213*	%
m-Xylene(Mole Fraction, Total)	1.657*	%
o-Xylene(Mole Fraction, Total)	0.5221*	%
Nonane(Mole Fraction, Total)	6.931*	%
Decanes Plus(Mole Fraction, Total)	36.9*	%

Properties	Inlet Liquid	
Temperature(Total)	77*	°F
Pressure(Total)	115*	psig



Properties	Cond	
Std Liquid Volumetric Flow(Total)	1*	Mbbl/d

Composition	Flash Sep Gas	
Nitrogen(Mole Fraction, Total)	1.035	%
Carbon Dioxide(Mole Fraction, Total)	0.6403	%
Methane(Mole Fraction, Total)	61.33	%
Ethane(Mole Fraction, Total)	20.51	%
Propane(Mole Fraction, Total)	10.16	%
Isobutane(Mole Fraction, Total)	1.131	%
n-Butane(Mole Fraction, Total)	2.815	%
2,2-Dimethylpropane(Mole Fraction, Total)	0.02709	%
Isopentane(Mole Fraction, Total)	0.6481	%
n-Pentane(Mole Fraction, Total)	0.7448	%
2,2-Dimethylbutane(Mole Fraction, Total)	0.00285	%
Cyclopentane(Mole Fraction, Total)	0	%
2,3-Dimethylbutane(Mole Fraction, Total)	0.01968	%
2-Methylpentane(Mole Fraction, Total)	0.09346	%
3-Methylpentane(Mole Fraction, Total)	0.05181	%
Hexane(Mole Fraction, Total)	0.1325	%
Methylcyclopentane(Mole Fraction, Total)	0.0926	%
Benzene(Mole Fraction, Total)	0.04777	%
Cyclohexane(Mole Fraction, Total)	0.1607	%
2-Methylhexane(Mole Fraction, Total)	0.02772	%
3-Methylhexane(Mole Fraction, Total)	0.02342	%
2,2,4-Trimethylpentane(Mole Fraction, Total)	0.01265	%
Heptane(Mole Fraction, Total)	0.07274	%
Methylcyclohexane(Mole Fraction, Total)	0.1079	%
Toluene(Mole Fraction, Total)	0.0341	%
Octane(Mole Fraction, Total)	0.05023	%
Ethylbenzene(Mole Fraction, Total)	0.001956	%
m-Xylene(Mole Fraction, Total)	0.006928	%
o-Xylene(Mole Fraction, Total)	0.00188	%
Nonane(Mole Fraction, Total)	0.01214	%
Decanes Plus(Mole Fraction, Total)	5.692e-06	%

Note: Vapor & Liquid throughputs are only used for reference

LABORATORY SERVICES Natural Gas Analysis
www.permianls.com
575.397.3713 2609 W Marland Hobbs NM 88240

C6+ Gas Analysis Report

Sample Point Code	Sample Point Name	Sample Point Location
9804G	NCW1471075	Tres Equis 3H Alloc

Source Laboratory	Lab File No	Container Identity	Sampler
Laboratory Services	2020030120	1906	J Regino - Spot

District	Area Name	Field Name	Facility Name
USA	USA	USA	New Mexico

Date Sampled	Date Effective	Date Received	Date Reported
Feb 25, 2020 11:49	Feb 25, 2020 11:49	Mar 5, 2020 09:31	Mar 5, 2020

Ambient Temp (°F)	Flow Rate (Mcf)	Analyst	Press PSI @ Temp °F Source Conditions
44.00		Torrance	118 @ 59

Operator	Lab Source Description
Cimarex Energy	NG

Component	Normalized Mol %	Un-Normalized Mol %	GPM
H2S (H2S)	0.0000	0	
Nitrogen (N2)	2.1610	2.16062	
CO2 (CO2)	0.1760	0.17562	
Methane (C1)	75.9510	75.95245	
Ethane (C2)	12.5700	12.56968	3.3610
Propane (C3)	5.8490	5.84852	1.6110
I-Butane (IC4)	0.6620	0.66227	0.2170
N-Butane (NC4)	1.5790	1.57895	0.4980
I-Pentane (IC5)	0.3170	0.3166	0.1160
N-Pentane (NC5)	0.3160	0.31622	0.1150
Hexanes Plus (C6+)	0.4190	0.41908	0.1820
TOTAL	100.0000	100.0000	6.1000

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

Analyzer Information

Device Type:	Gas Chromatograph	Device Make:	Shimadzu
Device Model:	GC-2014	Last Cal Date:	Feb 27, 2020

Gross Heating Values (Real, BTU/ft³)

14.696 PSI @ 60.00 °F		14.73 PSI @ 60.00 °F	
Dry	Saturated	Dry	Saturated
1,261.0000	1,240.4	1,263.9	1,243.3

Calculated Total Sample Properties

GPA2145-16 *Calculated at Contract Conditions

Relative Density Real	Relative Density Ideal
0.7406	0.7382

Molecular Weight: 21.3758

C6+ Group Properties

Assumed Composition

C6 - 60.000% C7 - 30.000% C8 - 10.000%

Field H2S: 0 PPM

PROTREND STATUS:
Passed By Validator on Mar 5, 2020

DATA SOURCE:
Imported

PASSED BY VALIDATOR REASON:
First sample taken @ this point, composition looks reasonable

VALIDATOR:
Dustin Armstrong

VALIDATOR COMMENTS:
OK

Hornsby 35 Federal No. 10H LP

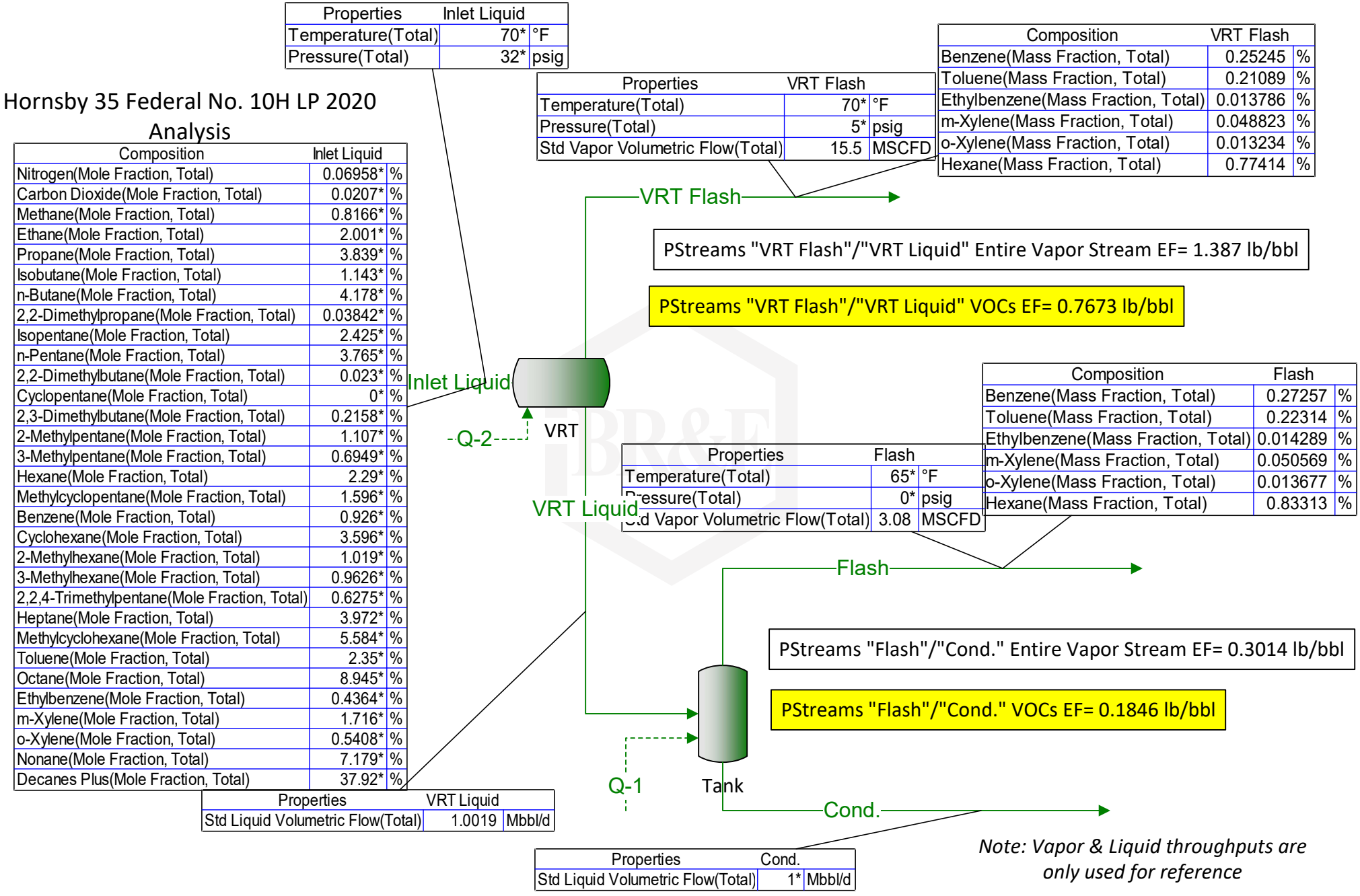
Properties	Inlet Liquid	
Temperature(Total)	70*	°F
Pressure(Total)	32*	psig

Properties	VRT Flash	
Temperature(Total)	70*	°F
Pressure(Total)	5*	psig
Std Vapor Volumetric Flow(Total)	15.5	MSCFD

Composition	VRT Flash	
Benzene(Mass Fraction, Total)	0.25245	%
Toluene(Mass Fraction, Total)	0.21089	%
Ethylbenzene(Mass Fraction, Total)	0.013786	%
m-Xylene(Mass Fraction, Total)	0.048823	%
o-Xylene(Mass Fraction, Total)	0.013234	%
Hexane(Mass Fraction, Total)	0.77414	%

Hornsby 35 Federal No. 10H LP 2020 Analysis

Composition	Inlet Liquid	
Nitrogen(Mole Fraction, Total)	0.06958*	%
Carbon Dioxide(Mole Fraction, Total)	0.0207*	%
Methane(Mole Fraction, Total)	0.8166*	%
Ethane(Mole Fraction, Total)	2.001*	%
Propane(Mole Fraction, Total)	3.839*	%
Isobutane(Mole Fraction, Total)	1.143*	%
n-Butane(Mole Fraction, Total)	4.178*	%
2,2-Dimethylpropane(Mole Fraction, Total)	0.03842*	%
Isopentane(Mole Fraction, Total)	2.425*	%
n-Pentane(Mole Fraction, Total)	3.765*	%
2,2-Dimethylbutane(Mole Fraction, Total)	0.023*	%
Cyclopentane(Mole Fraction, Total)	0*	%
2,3-Dimethylbutane(Mole Fraction, Total)	0.2158*	%
2-Methylpentane(Mole Fraction, Total)	1.107*	%
3-Methylpentane(Mole Fraction, Total)	0.6949*	%
Hexane(Mole Fraction, Total)	2.29*	%
Methylcyclopentane(Mole Fraction, Total)	1.596*	%
Benzene(Mole Fraction, Total)	0.926*	%
Cyclohexane(Mole Fraction, Total)	3.596*	%
2-Methylhexane(Mole Fraction, Total)	1.019*	%
3-Methylhexane(Mole Fraction, Total)	0.9626*	%
2,2,4-Trimethylpentane(Mole Fraction, Total)	0.6275*	%
Heptane(Mole Fraction, Total)	3.972*	%
Methylcyclohexane(Mole Fraction, Total)	5.584*	%
Toluene(Mole Fraction, Total)	2.35*	%
Octane(Mole Fraction, Total)	8.945*	%
Ethylbenzene(Mole Fraction, Total)	0.4364*	%
m-Xylene(Mole Fraction, Total)	1.716*	%
o-Xylene(Mole Fraction, Total)	0.5408*	%
Nonane(Mole Fraction, Total)	7.179*	%
Decanes Plus(Mole Fraction, Total)	37.92*	%



Properties	Flash	
Temperature(Total)	65*	°F
Pressure(Total)	0*	psig
Std Vapor Volumetric Flow(Total)	3.08	MSCFD

Composition	Flash	
Benzene(Mass Fraction, Total)	0.27257	%
Toluene(Mass Fraction, Total)	0.22314	%
Ethylbenzene(Mass Fraction, Total)	0.014289	%
m-Xylene(Mass Fraction, Total)	0.050569	%
o-Xylene(Mass Fraction, Total)	0.013677	%
Hexane(Mass Fraction, Total)	0.83313	%

Properties	VRT Liquid	
Std Liquid Volumetric Flow(Total)	1.0019	Mbbl/d

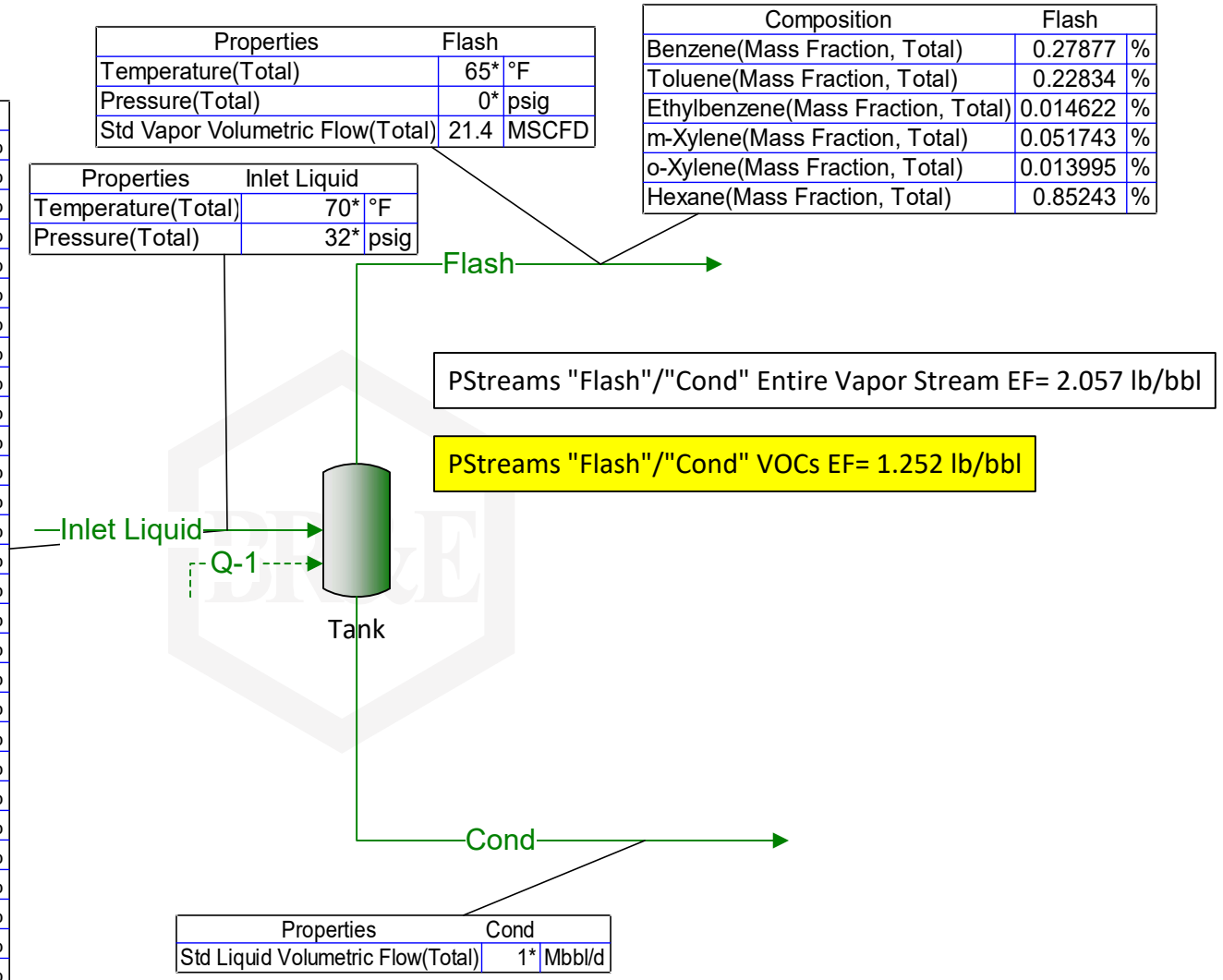
Properties	Cond.	
Std Liquid Volumetric Flow(Total)	1*	Mbbl/d

Note: Vapor & Liquid throughputs are only used for reference

Hornsby 35 Federal No. 10H LP

Hornsby 35 Federal No. 10H LP 2020 Analysis

Composition	Inlet Liquid	
Nitrogen(Mole Fraction, Total)	0.06958*	%
Carbon Dioxide(Mole Fraction, Total)	0.0207*	%
Methane(Mole Fraction, Total)	0.8166*	%
Ethane(Mole Fraction, Total)	2.001*	%
Propane(Mole Fraction, Total)	3.839*	%
Isobutane(Mole Fraction, Total)	1.143*	%
n-Butane(Mole Fraction, Total)	4.178*	%
2,2-Dimethylpropane(Mole Fraction, Total)	0.03842*	%
Isopentane(Mole Fraction, Total)	2.425*	%
n-Pentane(Mole Fraction, Total)	3.765*	%
2,2-Dimethylbutane(Mole Fraction, Total)	0.023*	%
Cyclopentane(Mole Fraction, Total)	0*	%
2,3-Dimethylbutane(Mole Fraction, Total)	0.2158*	%
2-Methylpentane(Mole Fraction, Total)	1.107*	%
3-Methylpentane(Mole Fraction, Total)	0.6949*	%
Hexane(Mole Fraction, Total)	2.29*	%
Methylcyclopentane(Mole Fraction, Total)	1.596*	%
Benzene(Mole Fraction, Total)	0.926*	%
Cyclohexane(Mole Fraction, Total)	3.596*	%
2-Methylhexane(Mole Fraction, Total)	1.019*	%
3-Methylhexane(Mole Fraction, Total)	0.9626*	%
2,2,4-Trimethylpentane(Mole Fraction, Total)	0.6275*	%
Heptane(Mole Fraction, Total)	3.972*	%
Methylcyclohexane(Mole Fraction, Total)	5.584*	%
Toluene(Mole Fraction, Total)	2.35*	%
Octane(Mole Fraction, Total)	8.945*	%
Ethylbenzene(Mole Fraction, Total)	0.4364*	%
m-Xylene(Mole Fraction, Total)	1.716*	%
o-Xylene(Mole Fraction, Total)	0.5408*	%
Nonane(Mole Fraction, Total)	7.179*	%
Decanes Plus(Mole Fraction, Total)	37.92*	%



Note: Vapor & Liquid throughputs are only used for reference

VRT & OILTK1-2 Uncontrolled Flashing Emissions Calculation Methodology:

Production: **440 BOPD**
VRT Flash Factor: **0.7673 lb VOC/bbl** (From Promax)
Oil Tank Flash Factor: **0.1846 lb VOC/bbl** (From Promax)
Number of Oil Tanks: 2

VRT Flash (lb/hr) = 440 BOPD / 24 hr/day * 0.7673 lb VOC/bbl

VRT Flash (lb/hr) = **14.07 lb/hr**

VRT Flash (TPY) = 440 BOPD * 365 day/yr * 0.7673 lb VOC/bbl / 2,000 lb/Ton

VRT Flash (TPY) = **61.61 TPY**

Oil Tank Flash (lb/hr) = 440 BOPD / 24 hr/day * 0.1846 lb VOC/bbl / 2 Tanks

Oil Tank Flash (lb/hr) = **1.69 lb/hr**

Oil Tank Flash (TPY) = 440 BOPD * 365 day/yr * 0.1846 lb VOC/bbl / 2,000 lb/Ton / 2 Tanks

Oil Tank Flash (TPY) = **7.41 TPY**

SWTK1-2 Uncontrolled Flashing Emissions Calculation Methodology:

Production: **500 BWPD**
Flash Factor: **1.252 lb/bbl**
Percent Condensate: 1%
Number of Water Tanks: 2

Water Tank Flash (lb/hr): 500 BWPD / 24 hr/day * 1.252 lb VOC/bbl * 1% / 2 tanks

Water Tank Flash (lb/hr): **0.13 lb/hr**

Water Flash (TPY) = 500 BWPD * 365 day/yr * 1.252 lb VOC/bbl / 2,000 lb/Ton * 1% / 2 tanks

Water Flash (TPY) = **0.57 TPY**

Vaprox Efficiency Guarantee

When operating our flare in accordance to NSPS 60.18 flare tip velocity rules, Vaprox guarantees that our flare is engineered to meet the most stringent emissions requirements while achieving up to 98% or greater VOC destruction.

Note:
NSPS 60.18

60.18(c)(1) - Flare shall be operated with no visible emissions except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

60.18(f)(2) - Presence of a flare pilot flame shall be monitored by a thermocouple or equivalent device to detect the presence of a flame. Auto-ignition systems may be considered equivalent devices under state rules.

60.18(c)(3)(ii) - Flare is non-assist, has no make-up gas with waste gas net heating value > 200 Btu/scf (7.45 MJ/scm).

Section 7

Map(s)

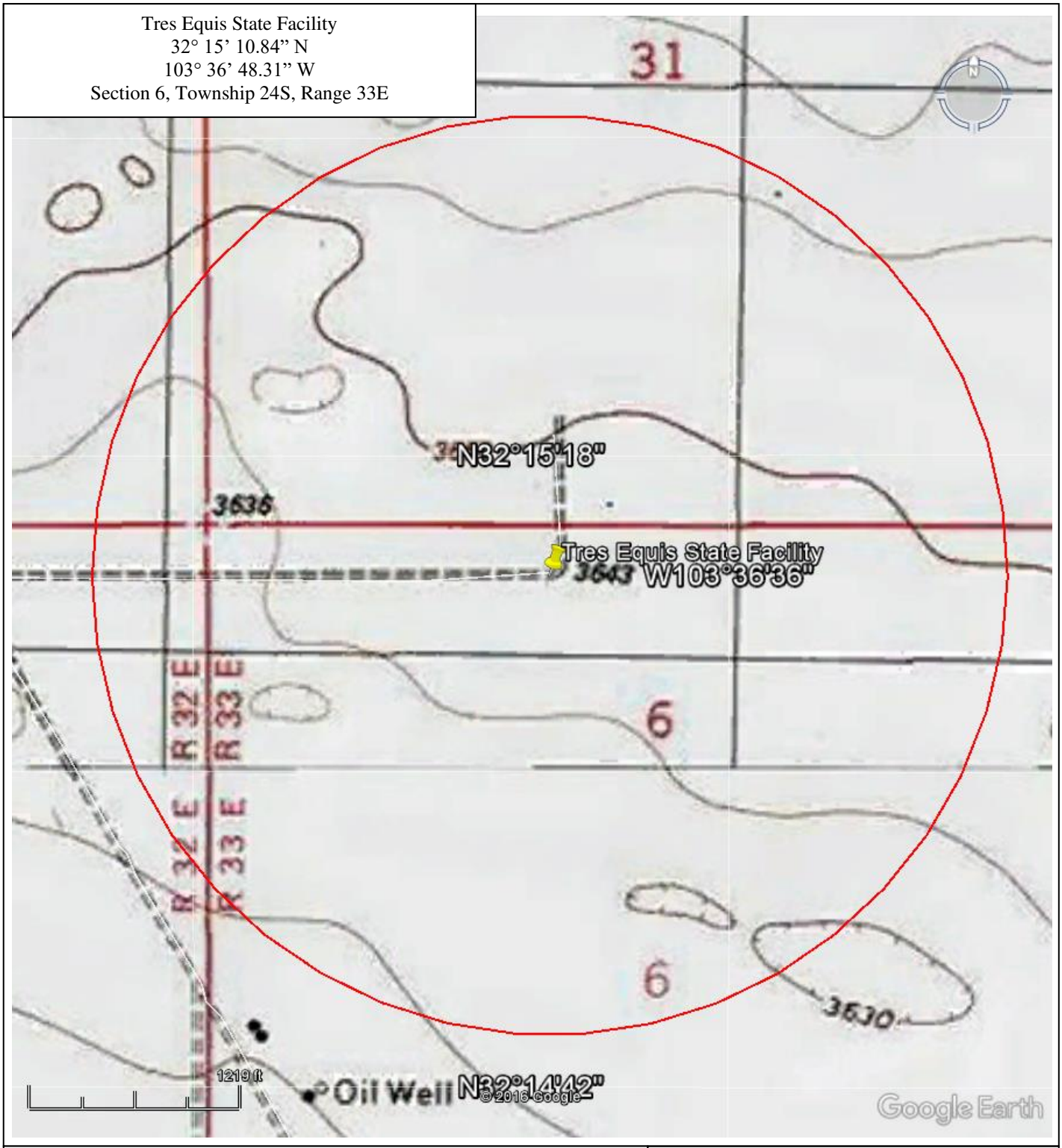
A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	A graphical scale

Tres Equis State Facility
32° 15’ 10.84” N
103° 36’ 48.31” W
Section 6, Township 24S, Range 33E

Tres Equis State Facility
Lea County, NM

Tres Equis State Facility
32° 15’ 10.84” N
103° 36’ 48.31” W
Section 6, Township 24S, Range 33E



Tres Equis State Facility
Lea County, NM

CIMAREX

Section 8A

Applicable State & Federal Regulations

Provide a discussion demonstrating compliance with each applicable state & federal regulation. All input cells should be filled in, even if the response is 'No' or 'N/A'.

In the "Justification" column, identify the criteria that are critical to the applicability determination, numbering each. For each unit listed in the "Applies to Unit No(s)" column, after each listed unit, include the lowest level citation of the applicable regulation. For each unit, list the information necessary to verify the applicability of the regulation, including date of manufacture, date of construction, size (hp), and combustion type. Doing so will provide the applicability criteria for each unit.

Applicable STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Federally Enforceable	Overview of Regulation	Unit(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m^3, 3. VOL)
20.2.1 NMAC	General Provisions	Yes	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.	Facility	Yes	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	Yes	20.2.3 NMAC is a State Implementation Plan (SIP) approved regulation that limits the maximum allowable concentration of Sulfur Compounds, Carbon Monoxide, and Nitrogen Dioxide.	Facility	Yes	The air pollutants subject to 20.2.3 NMAC are present at the facility and are thus subject to these requirements.
20.2.7 NMAC	Excess Emissions	Yes	If your entire facility or individual pieces of equipment are subject to emissions limits in a permit or numerical emissions standards in a federal or state regulation, this applies.	Facility	Yes	Per 20.2.7.108(A)(2), this ruling is applicable. The facility will comply with excess emission notifications and corrective action implementations as required.
20.2.38 NMAC	Hydrocarbon Storage Facility	No	Use the regulation link (left) then cut & paste applicable sections.	OILTK1 -2	Yes	More than 20,000 gallons of hydrocarbons are stored in individual tank(s); and the throughput will exceed 30,000 gallons per week per tank. Therefore, 20.2.38.109 NMAC is applicable. The total facility hydrocarbon storage tank capacity is less than 65,000 gallons. Therefore, the facility is not subject to 20.2.38.112 NMAC.

STATE REGU-LATIONS CITATION	Title	Federally Enforceable	Overview of Regulation	Unit(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m^3, 3. VOL)
20.2.61.109 NMAC	Smoke & Visible Emissions	No	Engines and heaters are Stationary Combustion Equipment. Specify units subject to this regulation.	ENG3 H1-3 FL1 ECD1	Yes	The engine, heaters, flare, and combustor are Stationary Combustion Equipment. Cimarex will maintain compliance with the regulation by operating the combustion units according to manufacturer's recommendations to ensure complete combustion.
20.2.73 NMAC	NOI & Emissions Inventory Requirements	Yes	NOI: 20.2.73.200 NMAC applies to all facilities emitting over 10 TPY of any regulated air contaminate. Thus, permitted facilities are also subject to this rule. This GCP-O&G registration also serves the purpose of meeting 20.2.73 the NMAC notification requirements.) Emissions Inventory: 20.2.73.300.A(1) NMAC applies to facilities registering under the GCP. Emission Inventory reporting is required upon request by the department per 20.2.73.300.B(4) NMAC.	Facility	Yes	Under 20.2.73.300.B(4) NMAC, the NMED is requesting emissions inventory reporting from minor sources for **calendar year 2020**.
20.2.77 NMAC	New Source Performance	Yes	This is a stationary source which is subject to the requirements of 40 CFR Part 60, as amended on the date of certification.	ENG3 FUGAREA	Yes	The facility wells were completed after September 18, 2015. Therefore, the facility is subject to fugitive monitoring under NSPS OOOOa. The listed engine is subject to NSPS JJJJ.
20.2.78 NMAC	Emission Standards for HAPS	Yes	This facility emits hazardous air pollutants which are subject to the requirements of 40 CFR Part 61, as amended on the date of certification.	N/A	No	There are no applicable units located at this facility.
20.2.82 NMAC	MACT Standards for source categories of HAPS	Yes	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63, as amended on the date of certification.	ENG3	Yes	The listed engine is subject to MACT ZZZZ.

Applicable FEDERAL REGULATIONS:

FEDERAL REGULATIONS CITATION	Title	Overview of Regulation	Units(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m3, 3. VOL)
40 CFR 50	NAAQS	Defined as applicable at 20.2.70.7.E.11, Any national ambient air quality standard	Facility	Yes	The engine(s) and/or heater(s) are small combustion sources. The emission levels are such that no exceedances of the NAAQS are expected.
40 CFR 60, Subpart A	General Provisions	Applies if any other NSPS subpart applies.	ENG3 FUGAREA	Yes	The facility wells were completed after September 18, 2015. Therefore, the facility is subject to fugitive monitoring under NSPS OOOOa. The listed engine is subject to NSPS JJJJ.
40 CFR 60, Subpart OOOO	Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction, Modification or Reconstruction Commenced After August 23, 2011, and on or before September 18, 2015	If there is a standard or other requirement, then the facility is an "affected facility." Currently there are standards for: gas wells (60.5375); centrifugal compressors (60.5380); reciprocating compressors (60.5385): controllers (60.5390); storage vessels (60.5395); equipment leaks (60.5400); sweetening units (60.5405). **If standards apply, list the unit number(s) and regulatory citation of the standard that applies to that unit (e.g. Centrifugal Compressors 1a-3a are subject to the standards at 60.5380(a)(1) and (2) since we use a control device to reduce emissions)**	N/A	No	The storage tanks at the facility were constructed and/or modified after September 18, 2015. Therefore, NSPS OOOO requirements are not applicable. Pneumatic devices are intermittent, no-bleed, or low bleed devices, and, therefore, are not subject to NSPS OOOO requirements.

FEDERAL REGULATIONS CITATION	Title	Overview of Regulation	Units(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m3, 3. VOL)
40 CFR 60, Subpart OOOOa	Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015	If there is a standard or other requirement, then the facility is an "affected facility." Currently there are standards for: gas wells (60.5375a); centrifugal compressors (60.5380a); reciprocating compressors (60.5385a): controllers (60.5390a); storage vessels (60.5395a); fugitive emissions at well sites and compressor stations (60.5397a); equipment leaks at gas plants (60.5400a); sweetening units (60.5405a).	FUGAREA	Yes	The facility wells were completed after September 18, 2015. Therefore, the facility is subject to fugitive monitoring under NSPS OOOOa. The storage tanks at the facility were constructed and/or modified after the NSPS OOOOa applicability date of September 18, 2015. However, the storage tanks' VOC emissions are less than 6 tons per year per tank, which meets the exemption requirements of the subpart. The compressor is not subject to NSPS OOOOa as they are located at a well site §60.5395a(c). Pneumatic controllers are intermittent, no-bleed, or low bleed devices, and therefore are not subject to NSPS OOOOa requirements. The facility does not have any affected natural gas-driven diaphragm pumps that were constructed or modified after September 18, 2015; therefore, no equipment is applicable.
40 CFR 60, Subpart IIII	Standards of performance for Stationary Compression Ignition Internal Combustion Engines	See 40 CFR 60.4200(a) 1 through 4 to determine applicable category and state engine size, fuel type, and date of manufacture.	N/A	No	There are no applicable units located at this facility.
40 CFR 60, Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	See 40 CFR 60.4230(a), 1 through 5 to determine applicable category and state engine size, fuel type, and date of manufacture.	ENG3	Yes	ENG3 was manufactured after January 1, 2011 and is thus subject to NSPS JJJJ requirements according to §60.4230(a)(4)(iii). It is subject to the standards in Table 1 of the subpart as established in §60.4233(e). The corresponding limits for the engine are as follows: 1.0 g/hp-hr NOx 2.0 g/hp-hr CO 0.7 g/hp-hr VOC
40 CFR 63, Subpart A	General Provisions	Applies if any other subpart applies.	ENG3	Yes	The listed engine(s) are subject to MACT ZZZZ.

FEDERAL REGULATIONS CITATION	Title	Overview of Regulation	Units(s) or Facility	Applies? (Yes or No)	JUSTIFICATION: Identify the applicability criteria, numbering each (i.e. 1. Post 7/23/84, 2. 75 m3, 3. VOL)
40 CFR 63, Subpart HH	NESHAP for Glycol Dehydrators	See 40 CFR 63, Subpart HH	N/A	Yes	There are no applicable units located at this facility.
40 CFR 63, Subpart ZZZZ	NESHAP for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)	Facilities are subject to this subpart if they own or operate a stationary RICE, except if the stationary RICE is being tested at a stationary RICE test cell/stand.	ENG3	Yes	ENG3 was constructed after June 12, 2006. The engine meets the definition of a new stationary RICE at an area source in §63.6590(a)(2)(iii). The engine must comply with MACT ZZZZ by complying with NSPS JJJJ per §63.6590(c)(1).

Section 8B
Compliance Test History

To evaluate the requirement for compliance tests, you must submit a compliance test history.

Compliance Test History Table

Unit No.	Test Description	Test Date
ENG3	NSPS JJJJ Initial Test for NOx, CO, and VOC	11/21/2017

Section 9 Proof of Public Notice

Proof of public notice is attached.

AFFIDAVIT OF PUBLICATION

STATE OF NEW MEXICO

County of Bernalillo SS

GCPOILANDGASPUBLICNOTICEEXAMPLE20272NMACGENERALPERMITSSECTION220A2BIINOTICECIMAREXENERGYCOANNOUNCESITSINTENTTOAPPLYTOTHENEW

Elise Rodriguez , the undersigned, on oath states that she is an authorized Representative of The Albuquerque Journal, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made of assessed as court cost; that the notice, copy of which hereto attached, was published in said paper in the regular daily edition, for 1 time(s) on the following date(s):

01/03/2021

OFFICIAL SEAL
Susan Ramirez
NOTARY PUBLIC - STATE OF NEW MEXICO
My Commission Expires: 2/15/2023

Sworn and subscribed before me, a Notary Public, in and for the County of Bernalillo and State of New Mexico this 4 day of January of 2021

PRICE $523.41

Statement to come at the end of month.

ACCOUNT NUMBER 1091987

GCP-Oil and Gas PUBLIC NOTICE EXAMPLE
20.2.72 NMAC – General Permits , Section 220.A(2)(b)ii

NOTICE

Cimarex Energy Co. announces its intent to apply to the New Mexico Environment Department for an air quality General Construction Permit, (GCP-Oil and Gas). The name of this facility is **Tres Equis State Facility** . The expected date of the submittal of our Registration for an air quality permit to the Air Quality Bureau is **December 30, 2020**. This notice is a requirement according to New Mexico air quality regulations.

The exact initial location of the facility is **UTM Zone 13, UTM Easting 630614, UTM Northing 3569324**. The approximate location of this site is **26.4** miles **NW** of **Jal** in **Lea** county. The standard operating schedule of this facility will be continuous.

Air emissions of any regulated air contaminant will be less than or equal to:

	Tons per year (TPY)
1. Nitrogen Oxides (NOx)	95
2. Carbon Monoxide (CO)	95
3. Volatile Organic Compounds (VOC) (stack)	95
4. Particulate Matter (PM10)	25
5. Particulate Matter (PM2.5)	25
6. Sulfur Dioxide (SO2)	95
7. Hydrogen Sulfide (H2S)	25
8. Any one (1) Hazardous Air Pollutant (HAP)	<10
9. Sum of all Hazardous Air Pollutants (HAPs)	< 25

The owner and/or operator of the Plant is:
Cimarex Energy Co.
202 S. Cheyenne Ave, Suite 1000
Tulsa, OK 74103

If you have any questions or comments about construction or operation of above facility, and want your comments to be made as a part of the permit review process, you must submit your comments in writing to the address below:

New Mexico Environment Department
Air Quality Bureau Permit Section
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico, 87505
Phone (505) 476-4300
Fax (505) 476-4375

Other comments and questions may be submitted verbally.

Please refer to the company name and site name, as used in this notice or send a copy of this notice along with your comments, since the Department may not have received the permit Registration at the time of this notice.

Attención
Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-476-5557.

Notice of Non-Discrimination
NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

Journal: January 3, 2021

Section 10
Certification

Company Name: Cimarex Energy Co.

I, Mr. Stuart Wittenbach, hereby certify that the information and data submitted in this Registration are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 30 day of Dec., 2020, upon my oath or affirmation, before a notary of the State of

Oklahoma.

*Signature

12/30/2020
Date

Mr. Stuart Wittenbach
Printed Name

Director, Environmental Safety & Health
Title

Scribed and sworn before me on this 30 day of December, 2020.

My authorization as a notary of the State of Oklahoma expires on the

29th ~~25th~~ day of March ~~June~~, 2021 ~~2023~~.

TIFFANI DAVIS NOTARY PUBLIC Commmission # 13003027 STATE OF OKLAHOMA

Notary's Signature

12/30/2020
Date

~~Brittany S Wilkinson~~ Tiffani L. Davis
Notary's Printed Name