SWN Production Company, LLC
P O Box 12359
Spring, Texas 77391-2359
www.swn.com

BROOKE COUNTY PARKS

MODIFICATION

1	CHK	5/8/2013	R13-2994A REM COMP, HT, COMB	NA	NA
2	CHK	7/10/2013	R13-2994B CORR ENG EF, RE-ROUTE LPT VAP	NA	NA
3	CM	1/3/2017	G70-D MOD: ADD 4 GPU, 1 ENG, 2 SH; REM 2 LH, 1 HT	JH	1/18/2017
REV	BY	DATE	DESCRIPTION	FACILITIES REVIEWED	DATE

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INTRODUCTION

SWN Production Company, LLC (SWN), submits this G70-D General Permit Application for the Shawn Couch Pad. The facility currently operated under Permit No. R13-2994B, issued on July 10, 2013. With this application, SWN requests authorization to operate under the General Permit G70-D for Oil and Natural Gas Production Facilities. Included with this application are changes in the emission estimates for the emission sources at the facility. The changes are summarized below:

- Four (4) wells have been added to the equipment representation.
- One (1) 145-hp Caterpillar G3306 NA compressor engine has been added to the equipment representation.
- One (1) 0.5-mmBtu/hr natural gas-fired heater treater (EU-HT1) that was previously authorized has been removed from the equipment representation.
- Two (2) 1.5-mmBtu/hr natural gas-fired line heaters (EU-LH1 and EU-LH2) that were previously authorized have been removed from the equipment representation.
- Four (4) 1.0-mmBtu/hr natural gas-fired GPU burners (EU-GPU3 - EU-GPU6) have been added to the equipment representation.
- Two (2) 1.5-mmBtu/hr stabilizer heaters (EU-SH1 and EU-SH2) have been added to the equipment representation.
- The low pressure tower that was previously authorized has been removed from the equipment representation.
- The condensate throughput estimate has been revised from 800 bbl/d to 1,634 bbl/d.
- The produced water throughput estimate has been revised from 800 bbl/d to 2,500 bbl/d.
- Truck loading emissions have been revised based on the change in condensate and produced water composition and throughput.
- Vapor combustor emissions have been revised based on the change in condensate and produced water composition and throughput.
- Fugitive component counts have been revised based on the equipment changes.
- Fugitive haulroad estimates have been revised based on the change in condensate and produced water throughput and a shorter access road length.
- Greenhouse gas emissions have been revised based on the current Global Warming Potential multipliers.

No changes were made to the emission estimates for the existing engine, GPU burners or vapor combustor pilots. Note that other small storage tanks may be present on site (i.e., methanol, lube oil) but are considered de minimis sources per Table 45-13B and are listed on the application form.

Proposed Emissions

Emissions calculations for the project are presented in Attachment T. A fuel heating value of 905 Btu/scf was used to calculate emissions from natural gas-fired equipment. Actual heating value may vary (generally 905 - 1,300) but using a lower heating value in the emissions calculations provides a more conservative (higher) estimate of fuel use.

Emissions from the Caterpillar engines were calculated with manufacturer data when available and AP-42/EPA emissions factors for the remaining pollutants.

Condensate and produced water tank emissions and loading emissions were calculated using ProMax process simulation software. Tank emissions are routed to a vapor combustor with 100% capture efficiency and 98% destruction efficiency. Loading emissions are routed to a vapor combustor with 70% capture efficiency and 98% destruction efficiency.

Fugitive emissions were calculated with a component count by equipment type from a similar facility, and representative extended gas and liquids analyses. Fugitive haul road emissions were calculated using EPA/AP-42 methodologies.

Greenhouse gas emissions were calculated with the latest EPA factors and manufacturer data when available. Documents used as references for the emissions calculations including manufacturer specification sheets, gas and liquids analyses, and process simulation results are attached.

REGULATORY DISCUSSION

<u>STATE</u>

45 CSR 13 - PERMITS FOR CONSTRUCTION, MODIFICATION, RELOCATION AND OPERATION OF STATIONARY SOURCES OF AIR POLLUTANTS, NOTIFICATION REQUIREMENTS, ADMINISTRATIVE UPDATES, TEMPORARY PERMITS, GENERAL PERMITS, AND PROCEDURES FOR EVALUATION:

The facility requests to operate under the General Permit G70-D. Emissions of carbon monoxide and volatile organic compounds are less than 80 tons per year (TPY). Oxides of nitrogen emissions are less than 50 TPY and particulate matter 10/2.5 and sulfur dioxide emissions are each less than 20 TPY. Also, the facility will have less than 8 TPY for each hazardous air pollutant and less than 20 tons for total hazardous air pollutants.

45 CSR 22 - AIR QUALITY MANAGEMENT FEE PROGRAM:

The facility will be required to maintain a valid Certificate to Operate on the premises.

45 CSR 30 - REQUIREMENTS FOR OPERATING PERMITS:

Emissions from the facility do not exceed major source thresholds; therefore, this rule does not apply.

FEDERAL

40 CFR PART 60 SUBPART KB—STANDARDS OF PERFORMANCE FOR VOLATILE ORGANIC LIQUID STORAGE VESSELS (INCLUDING PETROLEUM LIQUID STORAGE VESSELS) FOR WHICH CONSTRUCTION, RECONSTRUCTION, OR MODIFICATION COMMENCED AFTER JULY 23, 1984

The affected facility to which this Subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. The tanks at this facility were constructed after the effective date of this Subpart but are less than 75 m3 (which equals approximately 471 bbl); therefore, this Subpart does not apply.

40 CFR PART 60 SUBPART KKK - STANDARDS OF PERFORMANCE FOR STATIONARY FOR EQUIPMENT LEAKS OF VOC FROM ONSHORE NATURAL GAS PROCESSING PLANTS:

The facility is not considered an affected source (natural gas processing plant) and is therefore not subject to this Subpart.

40 CFR PART 60 SUBPART IIII - STANDARDS OF PERFORMANCE FOR STATIONARY COMPRESSION IGNITION INTERNAL COMBUSTION ENGINES:

The facility does not contain the affected source (diesel-fired engine) and is therefore not subject to this Subpart.

40 CFR PART 60 SUBPART JJJJ - STANDARDS OF PERFORMANCE FOR STATIONARY SPARK IGNITION INTERNAL COMBUSTION ENGINES:

The proposed 145-hp, four-stroke, rich-burn natural gas-fired flash gas compressor engines are assumed to have been constructed after the June 12, 2006 effective date and manufactured after July 1, 2008; therefore, they will be subject to this subpart. Although final selection of the engines has not yet been made, it is presumed that the engines were manufactured after January 1, 2011 and are therefore subject to Stage 2 emission limitations under this subpart. SWN will comply with all applicable requirements.

40 CFR PART 60 SUBPART OOOO - STANDARDS OF PERFORMANCE FOR CRUDE OIL AND NATURAL GAS PRODUCTION, TRANSMISSION, AND DISTRIBUTION:

The emission sources affected by this Subpart include well completions, pneumatic controllers, equipment leaks from natural gas processing plants, sweetening units at natural gas processing plants, reciprocating compressors, centrifugal compressors and storage vessels which are constructed, modified or reconstructed after August 23, 2011 and before September 18, 2015.

The two existing gas wells located at this production pad were drilled during the effective date of this rule; therefore, they are affected sources subject to the applicable provisions of this Subpart.

Pneumatic controllers affected by this Subpart include continuous bleed, natural gas-driven pneumatic controllers with a natural gas bleed rate greater than 6 SCFH. No pneumatic devices with a continuous bleed greater than 6 SCFH are installed or in service at this facility.

Storage vessels affected by this Subpart include those with VOC emissions greater than 6 TPY. Emissions from the storage vessels at this facility are less than 6 TPY each.

40 CFR PART 60 SUBPART OOOOA - STANDARDS OF PERFORMANCE FOR CRUDE OIL AND NATURAL GAS FACILITIES FOR WHICH CONSTRUCTION, MODIFICATION, OR RECONSTRUCTION COMMENCED AFTER SEPTEMBER 18, 2015:

The emission sources affected by this Subpart include well completions, centrifugal compressors, reciprocating compressors, pneumatic controllers, storage vessels, fugitive sources at well sites, fugitive sources at compressor stations, pneumatic pumps, equipment leaks from natural gas processing plants and sweetening units at natural gas processing plants which are constructed, modified or reconstructed after September 18, 2015.

The four new gas wells located at this production pad will be completed after the effective date of this Subpart and is subject to the compliance requirements.

40 CFR PART 63 SUBPART HH - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES FROM OIL AND NATURAL GAS PRODUCTION FACILITIES:

The site is a minor (area) source of hazardous air pollutants. This Subpart applies to affected emission points that are located at facilities that are major and area sources of HAP, and either process, upgrade, or store hydrocarbon liquids prior to custody transfer or that process, upgrade, or store natural gas prior to entering the natural gas transmission and storage source category. For purposes of this Subpart natural gas enters the natural gas transmission and storage source category after the natural gas processing plant, if present. The facility is a minor (area) source of HAP; however, there is no triethylene glycol (TEG) dehydration unit present at the facility and therefore this Subpart does not apply.

40 CFR PART 63 SUBPART HHH - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES FROM NATURAL TRANSMISSION AND STORAGE FACILITIES:

The facility is not a natural gas transmission and storage facility and is therefore not subject to this Subpart.

40 CFR PART 63 SUBPART ZZZZ - NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES FROM STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES - AREA SOURCE:

The original rule, published on February 26, 2004, initially affected new (constructed or reconstructed after December 19, 2002) reciprocating internal combustion engines (RICE) with a site-rating greater than 500 brake horsepower (HP) located at a major source of HAP emissions. On January 18, 2008, EPA published an amendment that promulgated standards for RICE constructed or reconstructed after June 12, 2006 with a site rating less than or equal to 500 HP located at major sources, and for engines constructed and reconstructed after June 12, 2006 located at area sources. On August 10, 2010, EPA published another amendment that promulgated standards for existing (constructed or reconstructed before June 12, 2006) RICE at area sources and existing RICE (constructed or reconstructed before June 12, 2006) with a site rating of less than or equal to 500 HP at major sources.

Owners and operators of new or reconstructed engines at area sources must meet the requirements of Subpart ZZZZ by complying with either 40 CFR Part 60 Subpart IIII (for CI engines) or 40 CFR Part 60 Subpart JJJJ (for SI engines). Based on emission calculations, this facility is a minor source of HAP. The 145-hp, four-stroke, rich-burn natural gas-fired flash gas compressor engines are considered new engines manufactured after January 1, 2011 and will meet the requirements of this subpart by complying with requirements under NSPS Subpart JJJJ.

APPLICATION FOR GENERAL PERMIT REGISTRATION

dep	**west virginia** department of environmental protection	Division of Air Quality 601 57th Street SE Charleston, WV 25 4 Phone (304) 926-0475 Fax (304) 926-0479 www.dep.wv.gov

G70-D GENERAL PERMIT REGISTRATION APPLICATION

PREVENTION AND CONTROL OF AIR POLLUTION IN REGARD TO THE CONSTRUCTION, MODIFICATION, RELOCATION, ADMINISTRATIVE UPDATE AND OPERATION OF NATURAL GAS PRODUCTION FACILITIES LOCATED AT THE WELL SITE

☐CONSTRUCTION
☒MODIFICATION
☐RELOCATION
☐CLASS I ADMINISTRATIVE UPDATE
☐CLASS II ADMINISTRATIVE UPDATE

SECTION 1. GENERAL INFORMATION

Name of Applicant (as registered with the WV Secretary of State's Office): SWN Production Company, LLC

Federal Employer ID No. (FEIN): 26-4388727

Applicant's Mailing Address: 10000 Energy Drive

City: Spring	State: TX	ZIP Code: 77389

Facility Name: Brooke County Parks Pad

Operating Site Physical Address: 224 Chesapeake Way
If none available, list road, city or town and zip of facility.

City: Wellsburg	Zip Code: 26070	County: Brooke

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 40.26472
Longitude: -80.54794

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 009 – 00113

CERTIFICATION OF INFORMATION

This G70-D General Permit Registration Application shall be signed below by a Responsible Official. A Responsible Official is a President, Vice President, Secretary, Treasurer, General Partner, General Manager, a member of the Board of Directors, or Owner, depending on business structure. A business may certify an Authorized Representative who shall have authority to bind the Corporation, Partnership, Limited Liability Company, Association, Joint Venture or Sole Proprietorship. Required records of daily throughput, hours of operation and maintenance, general correspondence, compliance certifications and all required notifications must be signed by a Responsible Official or an Authorized Representative. If a business wishes to certify an Authorized Representative, the official agreement below shall be checked off and the appropriate names and signatures entered. **Any administratively incomplete or improperly signed or unsigned G70-D Registration Application will be returned to the applicant. Furthermore, if the G70-D forms are not utilized, the application will be returned to the applicant. No substitution of forms is allowed.**

I hereby certify that Carla Suszkowski is an Authorized Representative and in that capacity shall represent the interest of the business (e.g., Corporation, Partnership, Limited Liability Company, Association Joint Venture or Sole Proprietorship) and may obligate and legally bind the business. If the business changes its Authorized Representative, a Responsible Official shall notify the Director of the Division of Air Quality immediately.

I hereby certify that all information contained in this G70-D General Permit Registration Application and any supporting documents appended hereto is, to the best of my knowledge, true, accurate and complete, and that all reasonable efforts have been made to provide the most comprehensive information possible.

Responsible Official Signature: [signature]
Name and Title: Carla Suszkowski — Phone: 832-796-1000 — Fax: 405-849-3102
Email: Carla_Suszkowski@SWN.com — Date: 01/18/2017

If applicable:
Authorized Representative Signature:
Name and Title: — Phone: — Fax:
Email: — Date:

If applicable:
Environmental Contact
Name and Title: Clay Murral — Phone: 304-884-1715 — Fax:
Email: Clay_Murral@SWN.com — Date:

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: This application proposes to remove one (1) low pressure tower, two (2) 1.5-mmBtu/hr natural gas-fired line heaters (EU-LH1 and EU-LH2), and one (1) 0.5-mmBtu/hr natural gas-fired heater treaters (EU-HT1) and to add one (1) Caterpillar G3306 NA engine (EU-ENG2), four (4) 1.0-mmBtu/hr natural gas-fired GPU burners (EU-GPU3 - EU-GPU6) and two (2) 1.5-mmBtu/hr stabilizer heaters (EU-SH1 and EU-SH2). Emissions from the condensate and produced water storage tanks, vapor combustor, haul road, and fugitive sources have been revised to reflect the process change.	
Directions to the facility: From I-70 exit onto SR-2 north. Travel SR-2 north for 15.7 miles to SR-27 or 10st in Wellsburg. Turn right on SR-27 and travel 4.2 miles to Brooke Hills Park Road. Turn right on Brooke Hill Park road and travel .5 miles to a wye in the road. Bear right and travel.3 miles to access road on right.	
ATTACHMENTS AND SUPPORTING DOCUMENTS	
I have enclosed the following required documents:	
Check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR13 and 45CSR22). ☒ Check attached to front of application. ☐ I wish to pay by electronic transfer. Contact for payment (incl. name and email address): ☐ I wish to pay by credit card. Contact for payment (incl. name and email address): ☒$500 (Construction, Modification, and Relocation) ☐$300 (Class II Administrative Update) ☒$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa [1] ☐$2,500 NESHAP fee for 40 CFR63, Subpart ZZZZ and/or HH [2] [1] Only one NSPS fee will apply. [2] Only one NESHAP fee will apply. The Subpart ZZZZ NESHAP fee will be waived for new engines that satisfy requirements by complying with NSPS, Subparts IIII and/or JJJJ. *NSPS and NESHAP fees apply to new construction or if the source is being modified.*	
☒ Responsible Official or Authorized Representative Signature (if applicable)	
☒ Single Source Determination Form **(must be completed)** – Attachment A	
☐ Siting Criteria Waiver (if applicable) – Attachment B	☒ Current Business Certificate – Attachment C
☒ Process Flow Diagram – Attachment D	☒ Process Description – Attachment E
☒ Plot Plan – Attachment F	☒ Area Map – Attachment G
☒ G70-D Section Applicability Form – Attachment H	☒ Emission Units/ERD Table – Attachment I
☒ Fugitive Emissions Summary Sheet – Attachment J	
☒ Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
☒ Storage Vessel(s) Data Sheet (include gas sample data, USEPA Tanks, simulation software (e.g. ProMax, E&P Tanks, HYSYS, etc.), etc. where applicable) – Attachment L	
☒ Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
☒ Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
☒ Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O	
☐ Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
☒ Pneumatic Controllers Data Sheet – Attachment Q	
☒ Pneumatic Pump Data Sheet – Attachment R	
☒ Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S	
☒ Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T	
☒ Facility-wide Emission Summary Sheet(s) – Attachment U	
☒ Class I Legal Advertisement – Attachment V	
☒ One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

All attachments must be identified by name, divided into sections, and submitted in order.

ATTACHMENT A: SINGLE SOURCE DETERMINATION

ATTACHMENT A - SINGLE SOURCE DETERMINATION FORM

Classifying multiple facilities as one "stationary source" under 45CSR13, 45CSR14, and 45CSR19 is based on the definition of Building, structure, facility, or installation as given in §45-14-2.13 and §45-19-2.12. The definition states:

"Building, Structure, Facility, or Installation" means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Pollutant-emitting activities are a part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same two (2)-digit code) as described in the Standard Industrial Classification Manual, 1987 (United States Government Printing Office stock number GPO 1987 0-185-718:QL 3).

The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term "adjacent" and stated that equipment and activities in the oil and gas sector that are under common control will be considered part of the same source if they are located on the same site or on sites that share equipment and are within ¼ mile of each other.

Is there equipment and activities in the same industrial grouping (defined by SIC code)?

Yes ☐ No ☒

Is there equipment and activities under the control of the same person/people?

Yes ☐ No ☒

Is there equipment and activities located on the same site or on sites that share equipment and are within ¼ mile of each other?

Yes ☐ No ☒

Proximity Map

SWN Production Company™

Brooke County Parks Pad

NAD83 UTM Zone 17N
538.442 4,456.777 Km
-80.547922 40.260578 Degrees
Brooke County, WV

Schools
Residential Structures
Rivers and Lakes
Compressor Stations
Processing Plant
Power Plant
Hospital

ATTACHMENT C: BUSINESS REGISTRATION CERTIFICATE

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
SWN PRODUCTION COMPANY, LLC
5400D BIG TYLER RD
CHARLESTON, WV 25313-1103

BUSINESS REGISTRATION ACCOUNT NUMBER: **2307-3731**

This certificate is issued on: **12/8/2014**

This certificate is issued by the West Virginia State Tax Commissioner in accordance with Chapter 11, Article 12, of the West Virginia Code

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued

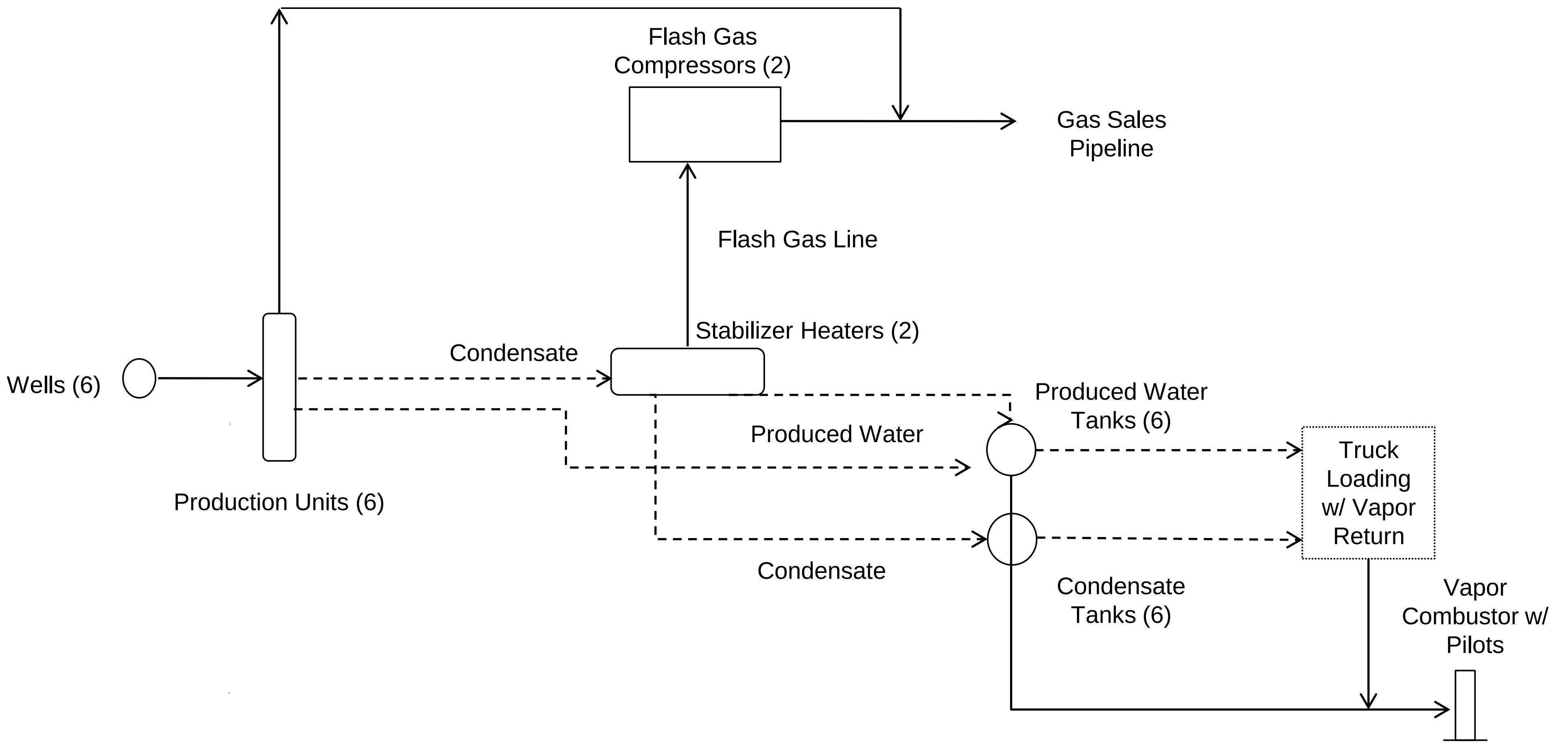
This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

atL006 v.4
L1180094016

ATTACHMENT D: PROCESS FLOW DIAGRAM



Gas/Vapor

Liquids (Condensate and Produced Water)

Note: Drawing is a depiction of general facility process and is not intended to represent facility and/or equipment layout.

SWN Production Company, LLC

Brooke County Parks Pad

Attachment D: Process Flow Diagram

January 2017

ATTACHMENT E: PROCESS DESCRIPTION

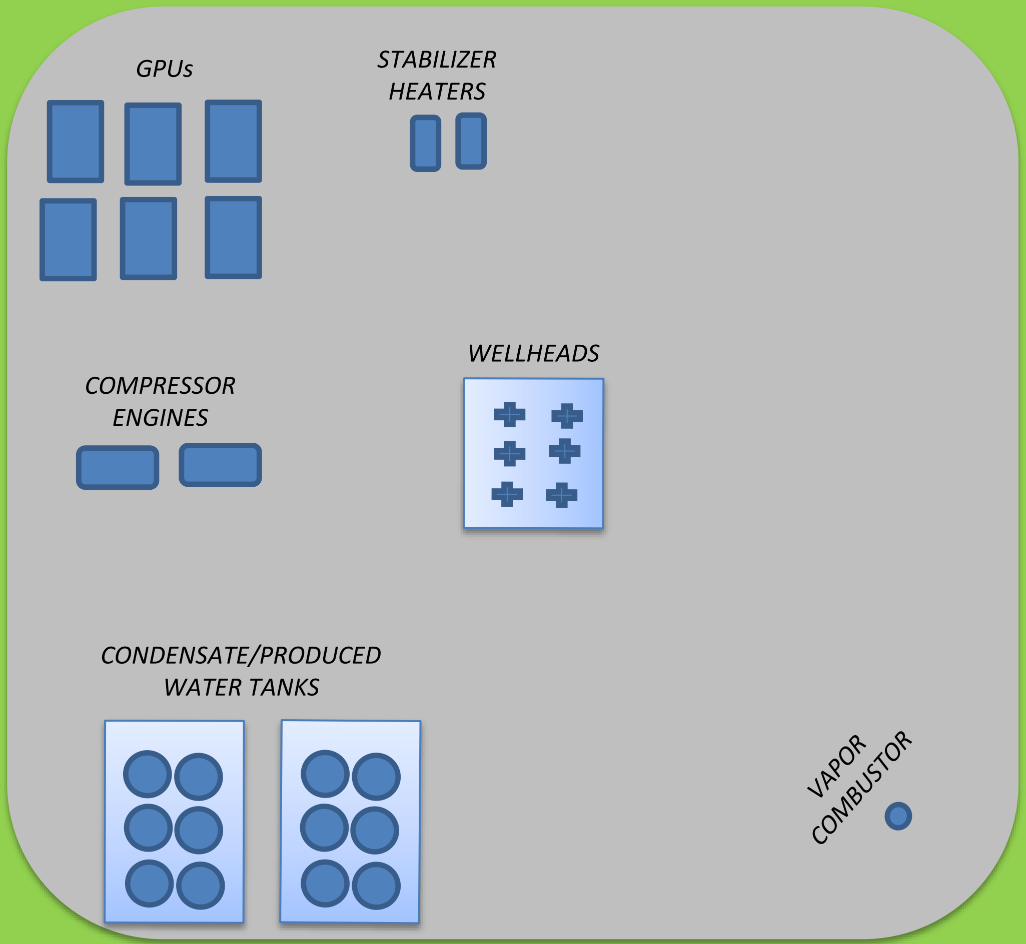
The facility is an oil and natural gas exploration and production facility, responsible for the production of natural gas. Storage of condensate and produced water also occur on-site. A description of the facility process is as follows: Condensate, gas and water come from the six wellheads to the production units, where the first stage of separation occurs. Produced water is sent from the production units to the produced water tanks. Condensate and residual water are sent to the stabilizer heaters. The flash from the stabilizer heaters is captured via natural gas-fired engine-driven flash gas compressors. Condensate and produced water from the stabilizer heaters are routed to the storage tanks.

The natural gas stream exits the facility for transmission via pipeline. Condensate and produced water are transported offsite via truck. Loading emissions are controlled with vapor return, which has at least 70% capture efficiency, routed to the vapor combustor for at least 98% destruction efficiency. Working, breathing and flashing vapors from the condensate and produced water storage tanks are routed to the vapor combustor to be burned with at least 98% combustion efficiency. The vapor combustor has two (2) natural gas-fired pilots to ensure a constant flame for combustion.

A process flow diagram reflecting facility operations is shown in Attachment D.

ATTACHMENT F: PLOT PLAN

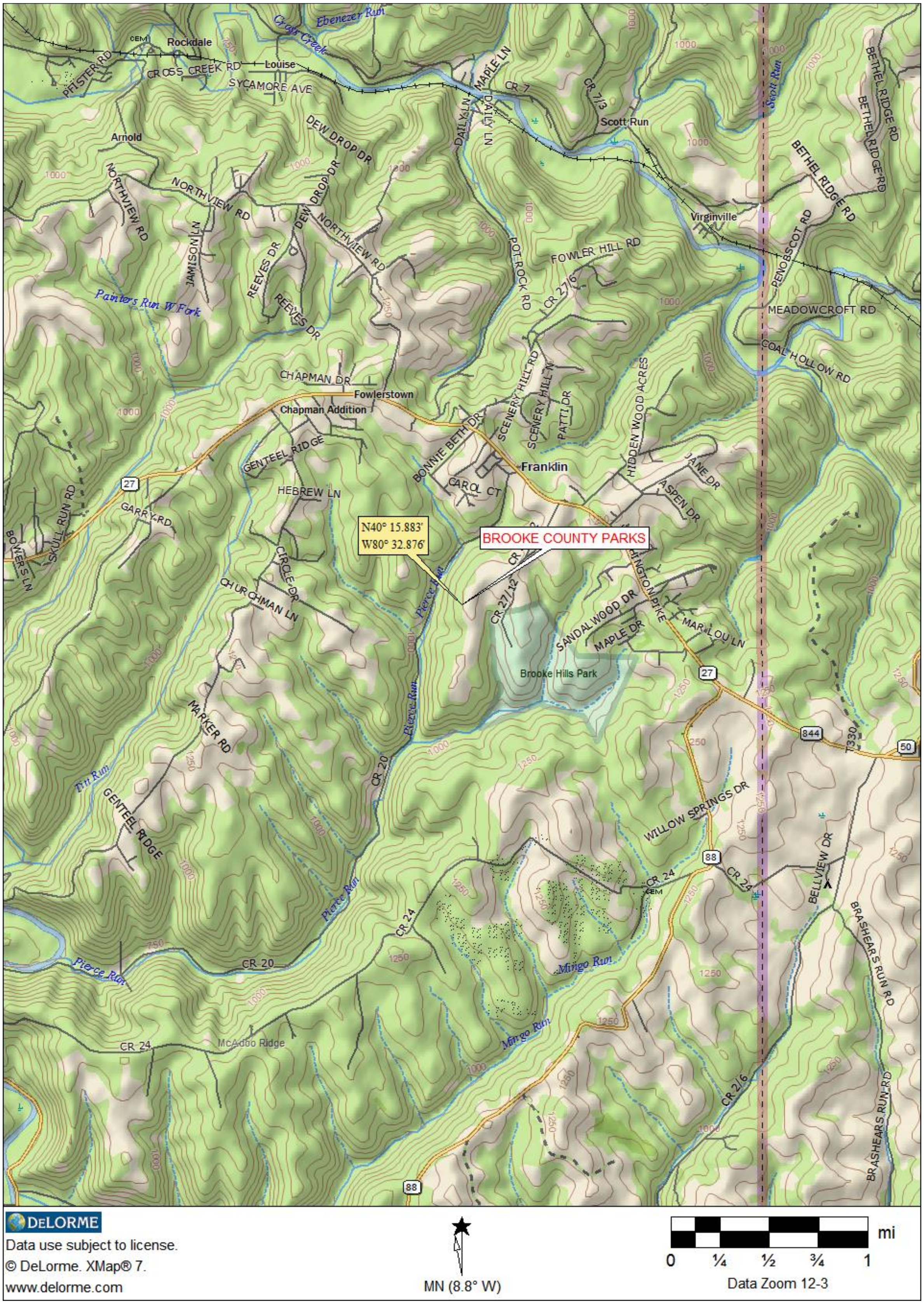
Please note that the simple plot plan provided is only a representation of production/emissions equipment to be installed. Actual location specifications and equipment placement are not to scale.



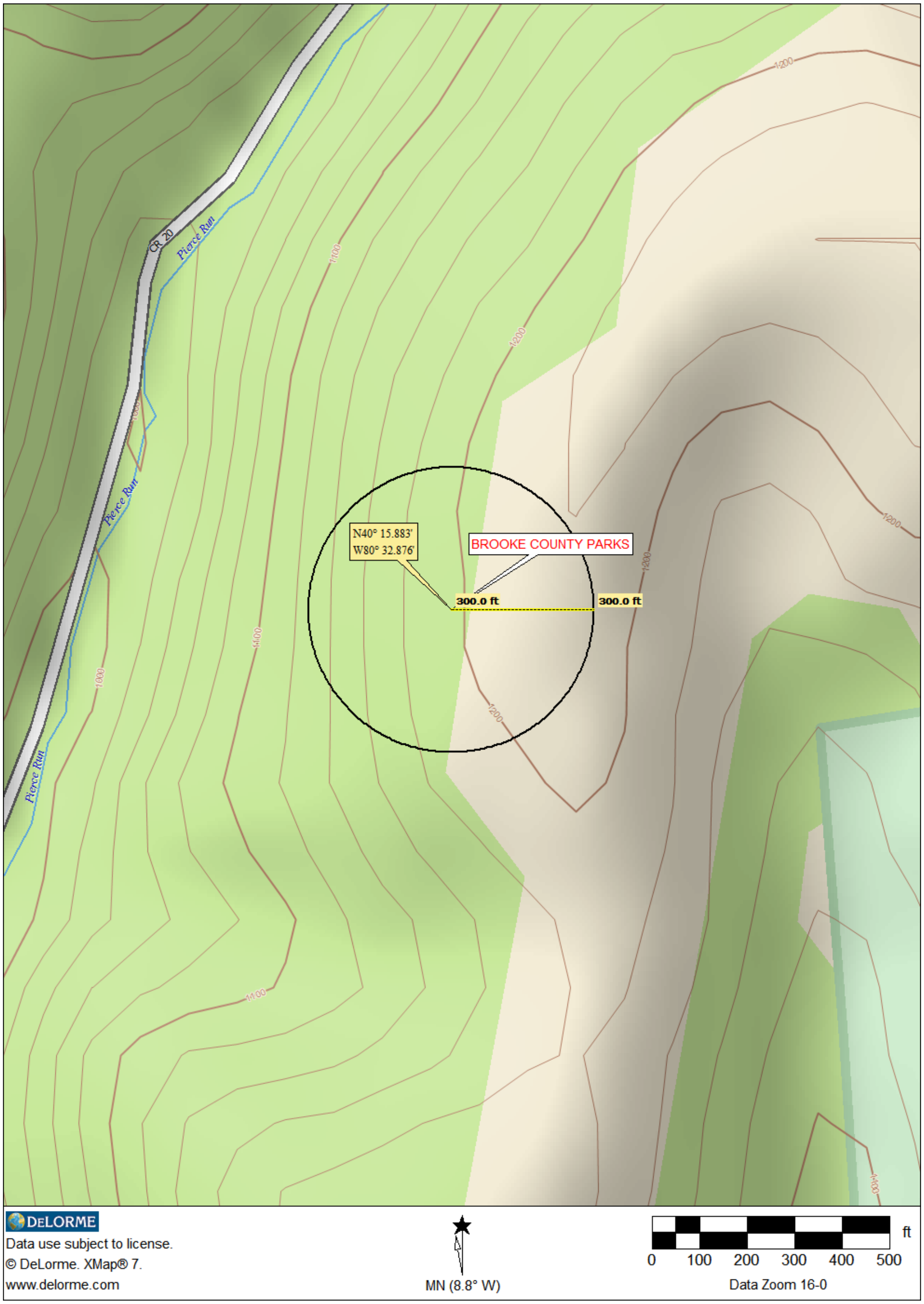
<u>NOTE</u>: Image is only a representation of production/emissions equipment to be installed. Actual location specifications and equipment placement are not to scale.

SWN Production Company, LLC
Brooke County Parks Pad
Attachment F: Simple Plot Plan
January 2017

ATTACHMENT G: AREA MAPS



SWN Production Company, LLC
Brooke County Parks
Attachment G: Area Map
January 2017



Brooke County Parks
Attachment G: Area Map with 300' Radius
Brooke County, West Virginia
January 2017

ATTACHMENT H: G70-D SECTION APPLICABILITY FORM

ATTACHMENT H – G70-D SECTION APPLICABILITY FORM

General Permit G70-D Registration
Section Applicability Form

General Permit G70-D was developed to allow qualified applicants to seek registration for a variety of sources. These sources include gas well affected facilities, storage vessels, gas production units, in-line heaters, heater treaters, glycol dehydration units and associated reboilers, pneumatic controllers, pneumatic pumps, reciprocating internal combustion engines (RICEs), tank truck/rail car loading, fugitive emissions, completion combustion devices, flares, enclosed combustion devices, and vapor recovery systems. All registered facilities will be subject to Sections 1.0, 2.0, 3.0, and 4.0.

General Permit G70-D allows the registrant to choose which sections of the permit they are seeking registration under. Therefore, please mark which additional sections that you are applying for registration under. If the applicant is seeking registration under multiple sections, please select all that apply. Please keep in mind, that if this registration is approved, the issued registration will state which sections will apply to your affected facility.

GENERAL PERMIT G70-D APPLICABLE SECTIONS	
☒Section 5.0	Gas and Oil Well Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 6.0	Storage Vessels Containing Condensate and/or Produced Water[1]
☐Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
☒Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
☒Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
☐Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
☐Section 11.0	Pneumatic Pump Affected Facility (NSPS, Subpart OOOOa)
☐Section 12.0	Fugitive Emissions GHG and VOC Standards (NSPS, Subpart OOOOa)
☒Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines
☒Section 14.0	Tanker Truck/Rail Car Loading[2]
☐Section 15.0	Glycol Dehydration Units[3]

1 *Applicants that are subject to Section 6 may also be subject to Section 7 if the applicant is subject to the NSPS, Subparts OOOO or OOOOa control requirements or the applicable control device requirements of Section 8.*

2 *Applicants that are subject to Section 14 may also be subject to control device and emission reduction device requirements of Section 8.*

3 *Applicants that are subject to Section 15 may also be subject to the requirements of Section 9 (reboilers). Applicants that are subject to Section 15 may also be subject to control device and emission reduction device requirements of Section 8.*

ATTACHMENT I: EMISSIONS UNITS/ERD TABLE

ATTACHMENT I - EMISSION UNITS/EMISSION REDUCTION DEVICES (ERD) TABLE

Include ALL emission units and air pollution control devices/ERDs that will be part of this permit application review. Do not include fugitive emission sources in this table. Deminimis storage tanks shall be listed in the Attachment L table. This information is required for all sources regardless of whether it is a construction, modification, or administrative update.

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed	Manufac. Date[3]	Design Capacity	Type[4] and Date of Change	Control Device(s)[5]	ERD(s)[6]
EU-ENG1	EP-ENG1	145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter	TBD	4S-RB	145-hp	Existing	NSCR	NSCR
EU-ENG2	EP-ENG2	145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	TBD	4S-RB	145-hp	New	NSCR	NSCR
EU-GPU1	EP-GPU1	1.0-mmBtu/hr GPU Burner	2012	N/A	1-mmBtu/hr	Existing	N/A	N/A
EU-GPU2	EP-GPU2	1.0-mmBtu/hr GPU Burner	2012	N/A	1-mmBtu/hr	Existing	N/A	N/A
EU-GPU3	EP-GPU3	1.0-mmBtu/hr GPU Burner - Add	TBD	N/A	1-mmBtu/hr	New	N/A	N/A
EU-GPU4	EP-GPU4	1.0-mmBtu/hr GPU Burner - Add	TBD	N/A	1-mmBtu/hr	New	N/A	N/A
EU-GPU5	EP-GPU5	1.0-mmBtu/hr GPU Burner - Add	TBD	N/A	1-mmBtu/hr	New	N/A	N/A
EU-GPU6	EP-GPU6	1.0-mmBtu/hr GPU Burner - Add	TBD	N/A	1-mmBtu/hr	New	N/A	N/A
EU-SH1	EP-SH1	1.5-mmBtu/hr Stabilizer Heater - Add	TBD	N/A	1.5-mmBtu/hr	New	N/A	N/A
EU-SH2	EP-SH2	1.5-mmBtu/hr Stabilizer Heater - Add	TBD	N/A	1.5-mmBtu/hr	New	N/A	N/A
EU-HT1	EP-HT1	0.50-mmBtu/hr Heater Treater - Remove	2012	N/A	0.5-mmBtu/hr	Removal	N/A	N/A
EU-LH1	EP-LH1	1.5-mmBtu/hr Line Heater - Remove	2013	N/A	1.5-mmBtu/hr	Removal	N/A	N/A
EU-LH2	EP-LH2	1.5-mmBtu/hr Line Heater - Remove	2013	N/A	1.5-mmBtu/hr	Removal	N/A	N/A
EU-TANKS-COND	APC-COMB	Six (6) 400-bbl Condensate Tanks Routed to Vapor Combustor - Modify	2012	N/A	1,634-bbl/day	Modification	APC-COMB	APC-COMB
EU-TANKS-PW	APC-COMB	Six (6) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Modify	2012	N/A	2,500-bbl/day	Modification	APC-COMB	APC-COMB
EU-LOAD-COND	APC-COMB	Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	2013	N/A	25,049,220 gal/yr	Modification	APC-COMB	APC-COMB
EU-LOAD-PW	APC-COMB	Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	2013	N/A	38,325,000 gal/yr	Modification	APC-COMB	APC-COMB
APC-COMB	APC-COMB	One (1) 20.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Modify	2013	N/A	20-mmBtu/hr	Modification	N/A	N/A
EU-PILOTS	APC-COMB	Vapor Combustor Pilots	2013	N/A	100-scfh	Existing	N/A	N/A
EU-FUG	EP-FUG	Fugitive Emissions - Modify	2013	N/A	N/A	Modification	N/A	N/A
EU-HR	EP_HR	Fugitive Haul Road Emissions - Modify	2013	N/A	N/A	Modification	N/A	N/A

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.

[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.

[3] When required by rule

[4] New, modification, removal, existing

[5] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

[6] For ERDs use the following numbering system: 1D, 2D, 3D,... or other appropriate designation.

ATTACHMENT J: FUGITIVE EMISSIONS SUMMARY SHEET

Fugitive emissions at this site consist of haul road emissions, condensate and produced water loading operations, and equipment leaks.

	ATTACHMENT J – FUGITIVE EMISSIONS SUMMARY SHEET
	Sources of fugitive emissions may include loading operations, equipment leaks, blowdown emissions, etc. Use extra pages for each associated source or equipment if necessary.
	Source/Equipment: EU-FUG
	Leak Detection Method Used ☐ Audible, visual, and olfactory (AVO) inspections ☐ Infrared (FLIR) cameras ☐ Other (please describe) ☐ None required

Component Type	Closed Vent System	Count	Source of Leak Factors (EPA, other (specify))	Stream type (gas, liquid, etc.)	Estimated Emissions (tpy)		
					VOC	HAP	GHG (methane, CO_2e)
Pumps	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Valves	☐ Yes ☒ No	100 – gas 81 - LL	EPA	☐ Gas ☐ Liquid ☒ Both	1.19 – gas 1.90 – LL	0.03 – gas 0.16 - LL	53.24 – gas 0.37 - LL
Safety Relief Valves	☐ Yes ☒ No	33	EPA	☒ Gas ☐ Liquid ☐ Both	0.77	0.02	34.36
Open Ended Lines	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			
Connections (Not sampling)	☐ Yes ☒ No	318	EPA	☐ Gas ☒ Liquid ☐ Both	0.63	0.05	0.12
Compressors	☐ Yes ☒ No	6	EPA	☒ Gas ☐ Liquid ☐ Both	0.14	<0.01	6.25
Flanges	☐ Yes ☒ No	398	EPA	☒ Gas ☐ Liquid ☐ Both	0.41	0.01	18.36
Other[1]	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both			

[1] Other equipment types may include compressor seals, relief valves, diaphragms, drains, meters, etc.

Please provide an explanation of the sources of fugitive emissions (e.g. pigging operations, equipment blowdowns, pneumatic controllers, etc.):
Equipment leaks

Please indicate if there are any closed vent bypasses (include component): N/A
Specify all equipment used in the closed vent system (e.g. VRU, ERD, thief hatches, tanker truck/rail car loading, etc.) N/A

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

[a]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, diaphrams, 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.

ATTACHMENT K: GAS WELL AFFECTED FACILITY DATA SHEET

ATTACHMENT K – GAS WELL AFFECTED FACILITY DATA SHEET

Complete this data sheet if you are the owner or operator of a gas well affected facility for which construction, modification or reconstruction commenced after August 23, 2011. This form must be completed for natural gas well affected facilities regardless of when flowback operations occur (or have occurred).

API Number	Date of Flowback	Date of Well Completion	Green Completion and/or Combustion Device	Subject to OOOO or OOOOa?
047-009-00105	5/21/2013	6/26/2012	Green Completion	OOOO
047-009-00111	5/21/2013	6/22/2012	Green Completion	OOOO
047-009-00166	TBD	TBD	Green Completion	OOOOa
047-009-00168	TBD	TBD	Green Completion	OOOOa
047-009-00165	TBD	TBD	Green Completion	OOOOa
047-009-00167	TBD	TBD	Green Completion	OOOOa

Note: If future wells are planned and no API number is available please list as PLANNED.
If there are existing wells that commenced construction prior to August 23, 2011, please acknowledge as existing.

This is the same API (American Petroleum Institute) well number(s) provided in the well completion notification and as provided to the WVDEP, Office of Oil and Gas for the well permit. The API number may be provided on the application without the state code (047).

Every oil and gas well permitted in West Virginia since 1929 has been issued an API number. This API is used by agencies to identify and track oil and gas wells.

The API number has the following format: 047-001-00001

Where,
047 = State code. The state code for WV is 047.
001 = County Code. County codes are odd numbers, beginning with 001 (Barbour) and continuing to 109 (Wyoming).
00001= Well number. Each well will have a unique well number.

ATTACHMENT L: STORAGE VESSELS DATA SHEET

REPRESENTATIVE GAS ANALYSES

PROMAX PROCESS SIMULATION RESULTS

ATTACHMENT L – STORAGE VESSEL DATA SHEET

Complete this data sheet if you are the owner or operator of a storage vessel that contains condensate and/or produced water. This form must be completed for ***each*** new or modified bulk liquid storage vessel(s) that contains condensate and/or produced water. (If you have more than one (1) identical tank (i.e. 4-400 bbl condensate tanks), then you can list all on one (1) data sheet). **Include gas sample analysis, flashing emissions, working and breathing losses, USEPA Tanks, simulation software (ProMax, E&P Tanks, HYSYS, etc.), and any other supporting documents where applicable.**
 	
The following information is REQUIRED:
 	
☒ Composition of the representative sample used for the simulation
☒ For each stream that contributes to flashing emissions:
    ☒ Temperature and pressure (inlet and outlet from separator(s))
    ☒ Simulation-predicted composition
    ☒ Molecular weight
    ☒ Flow rate
☒ Resulting flash emission factor or flashing emissions from simulation
☒ Working/breathing loss emissions from tanks and/or loading emissions if simulation is used to quantify those emissions
 	
Additional information may be requested if necessary.

GENERAL INFORMATION (REQUIRED)

1. Bulk Storage Area Name Condensate Storage	2. Tank Name Six (6) 400-bbl Condensate Storage Tanks
3. Emission Unit ID number EU-TANKS-COND	4. Emission Point ID number APC-COMB
5. Date Installed , Modified or Relocated *(for existing tanks)* 2012 Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☒ Yes ☐ No Was the tank manufactured after September 18, 2015? ☐ Yes ☒ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* Throughput and flash factor update.	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

1. Bulk Storage Area Name Produced Water Storage	2. Tank Name Six (6) 400-bbl Produced Water Storage Tanks
3. Emission Unit ID number EU-TANKS-PW	4. Emission Point ID number APC-COMB
5. Date Installed , Modified or Relocated *(for existing tanks)* 2012 Was the tank manufactured after August 23, 2011 and on or before September 18, 2015? ☒ Yes ☐ No Was the tank manufactured after September 18, 2015? ☐ Yes ☒ No	6. Type of change: ☐ New construction ☐ New stored material ☒ Other ☐ Relocation
7A. Description of Tank Modification *(if applicable)* Throughput and flash factor update.	
7B. Will more than one material be stored in this tank? *If so, a separate form must be completed for each material.* ☐ Yes ☒ No	
7C. Was USEPA Tanks simulation software utilized? ☒ Yes ☐ No ***If Yes, please provide the appropriate documentation and items 8-42 below are not required.***	

STORAGE TANK DATA TABLE

List all deminimis storage tanks (i.e. lube oil, glycol, diesel etc.)

Source ID #[1]	Status[2]	Content[3]	Volume[4]
EU-TANKS-LUBEOIL	EXIST	Lube Oil	50 gal
EU-TANKS-LUBEOIL	NEW	Lube Oil	50 gal
EU-TANKS-METHANOL	EXIST	Methanol	50 gal
EU-TANKS-METHANOL	EXIST	Methanol	50 gal
EU-TANKS-METHANOL	EXIST	Methanol	50 gal
EU-TANKS-METHANOL	NEW	Methanol	50 gal
EU-TANKS-METHANOL	NEW	Methanol	50 gal
EU-TANKS-METHANOL	NEW	Methanol	50 gal
EU-TANKS-METHANOL	NEW	Methanol	50 gal
EU-TANKS-METHANOL	NEW	Methanol	50 gal

1. Enter the appropriate Source Identification Numbers (Source ID #) for each storage tank located at the well site. Tanks should be designated T01, T02, T03, etc.
2. Enter storage tank Status using the following:
   - EXIST Existing Equipment
   - NEW Installation of New Equipment
   - REM Equipment Removed
3. Enter storage tank content such as condensate, pipeline liquids, glycol (DEG or TEG), lube oil, diesel, mercaptan etc.
4. Enter the maximum design storage tank volume in gallons.

TABLE 1-B

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{11+}

SEPARATOR GOR..........................: 7195 Scf/Sep Bbl
SEPARATOR PRESSURE...............: 204 psig
SEPARATOR TEMPERATURE......: 94 °F

	SEPARATOR GAS		SEPARATOR OIL		WELLSTREAM	
Component	**Mole%**	*** GPM**	**Mole %**	**Liquid Volume %**	**Mole %**	*** GPM**
Hydrogen Sulfide	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.544	0.000	0.016	0.004	0.482	0.000
Carbon Dioxide	0.131	0.000	0.015	0.006	0.118	0.000
Methane	69.506	0.000	4.241	1.639	61.889	0.000
Ethane	17.845	4.810	6.176	3.767	16.483	4.443
Propane	7.460	2.072	8.547	5.370	7.587	2.107
Iso-butane	0.725	0.239	1.876	1.400	0.859	0.283
N-butane	2.230	0.709	8.305	5.971	2.939	0.934
2-2 Dimethylpropane	0.007	0.003	0.063	0.055	0.014	0.005
Iso-pentane	0.381	0.140	3.316	2.766	0.724	0.267
N-pentane	0.614	0.224	6.936	5.734	1.352	0.494
2-2 Dimethylbutane	0.007	0.003	0.100	0.095	0.018	0.008
Cyclopentane	0.006	0.002	0.000	0.000	0.005	0.002
2-3 Dimethylbutane	0.012	0.005	0.286	0.267	0.044	0.018
2 Methylpentane	0.097	0.041	2.339	2.214	0.359	0.150
3 Methylpentane	0.055	0.023	1.481	1.378	0.221	0.091
Other Hexanes	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.177	0.073	5.794	5.434	0.833	0.345
Methylcyclopentane	0.012	0.004	0.688	0.555	0.091	0.032
Benzene	0.002	0.001	0.080	0.051	0.011	0.003
Cyclohexane	0.016	0.005	0.867	0.673	0.115	0.040
2-Methylhexane	0.022	0.010	1.979	2.098	0.250	0.117
3-Methylhexane	0.023	0.011	1.827	1.913	0.234	0.108
2,2,4 Trimethylpentane	0.000	0.000	0.000	0.000	0.000	0.000
Other Heptanes	0.021	0.009	0.825	0.818	0.115	0.050
n-Heptane	0.042	0.020	4.616	4.856	0.576	0.268
Methylcyclohexane	0.016	0.006	1.943	1.781	0.241	0.098
Toluene	0.003	0.001	0.353	0.270	0.044	0.015
Other C-8's	0.026	0.012	5.933	6.336	0.715	0.338
n-Octane	0.009	0.005	3.071	3.587	0.366	0.189
Ethylbenzene	0.001	0.000	0.304	0.268	0.036	0.014
M&P-Xylene	0.001	0.000	0.599	0.530	0.071	0.028
O-Xylene	0.001	0.000	0.821	0.712	0.097	0.037
Other C-9's	0.006	0.003	3.670	4.378	0.434	0.229
n-Nonane	0.001	0.001	1.960	2.516	0.230	0.130
Other C10's	0.000	0.000	3.963	5.195	0.463	0.268
n-Decane	0.000	0.000	1.231	1.724	0.144	0.089
Undecanes Plus	0.001	0.001	15.778	25.640	1.842	1.323
TOTAL	100.000	8.433	100.000	100.000	100.000	12.522

TABLE 1-B

COMPOSITIONAL ANALYSIS OF THE SEPARATOR GAS, OIL AND MATHEMATICALLY RECOMBINED WELLSTREAM THROUGH C_{11+}

SEPARATOR GOR..........................: 7195 Scf/Sep Bbl
SEPARATOR PRESSURE...............: 204 psig
SEPARATOR TEMPERATURE......: 94 °F

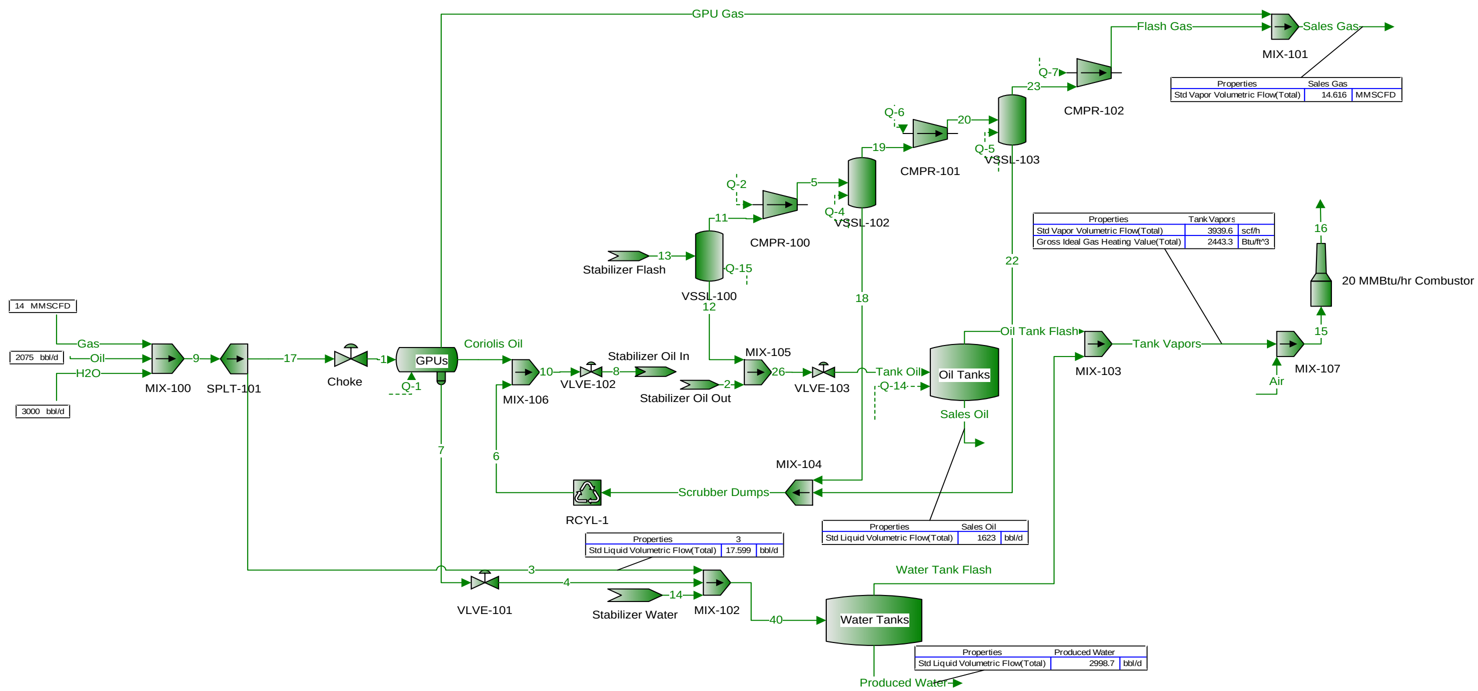
UNDECANES PLUS (C_{11+}) FRACTION CHARACTERISTICS					
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***
Gas	N/A	0.8250	156.000	16.558	8,400
Oil	41.256	0.8191	184.200	13.922	129,541
Wellstream	N/A	0.8191	184.186	13.923	N/A

TOTAL SAMPLE CHARACTERISTICS						
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value	
					Dry	Saturated
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***	***
Gas	N/A	0.7966	22.965	118.576	1,391	1,368
Oil	71.218	0.6980	96.596	22.625	N/A	117,348
Wellstream	N/A	1.0896	31.558	43.165	N/A	N/A

* GPM (gallons per Mscf) determined at 14.85 psia and 60 °F

** Gas specific gravity and wellstream specific gravity determined relative to air (SG=1.000).
Oil specific gravity determined relative to water (SG=1.000).

*** Gross Heating Value units for gas (real basis) and oil are BTU/Scf and BTU/Gal, respectively.



Oil Tank TL W&B

Annual tank loss calculations for "Tank Oil".
Total working and breathing losses from the Vertical Cylinder are 68.58 ton/yr.
Loading losses are 28.34 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.

"Oil Tank Flash" VOCs = 1,459 ton/yr

"Oil Tank Flash" HAPs = 44.53 ton/yr

PStreams "Oil Tank Flash"/"Sales Oil" VOCs EF= 4.924 lb/bbl

PStreams "Oil Tank Flash"/"Sales Oil" VOCs EF= 33.62 SCF/bbl

PStreams "Oil Tank Flash"/"Sales Oil" Benzene EF= 0.002004 lb/bbl

PStreams "Oil Tank Flash"/"Sales Oil" Toluene EF= 0.002773 lb/bbl

PStreams "Oil Tank Flash"/"Sales Oil" Ethylbenzene EF= 0.0009167 lb/bbl

PStreams "Oil Tank Flash"/"Sales Oil" Xylenes EF= 0.001334 lb/bbl

PStreams "Oil Tank Flash"/"Sales Oil" n-Hexane EF= 0.1433 lb/bbl

"Sales Gas" VOCs = 27.63 %

Water Tanks TL W&B

Annual tank loss calculations for "40" using percent rule.
Total working and breathing losses from the Vertical Cylinder are 0.7768 ton/yr.
Loading losses are 0.4665 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.
Vapor adjusted to ensure mass balance

"Water Tank Flash" VOCs = 120.5 ton/yr

"Water Tank Flash" HAPs = 6.307 ton/yr

PStreams "Water Tank Flash"/"Produced Water" VOCs EF= 0.2203 lb/bbl

PStreams "Water Tank Flash"/"Produced Water" VOCs EF= 1.486 SCF/bbl

PStreams "Water Tank Flash"/"Produced Water" Benzene EF= 0.0002238 lb/bbl

PStreams "Water Tank Flash"/"Produced Water" Toluene EF= 0.0003483 lb/bbl

PStreams "Water Tank Flash"/"Produced Water" Ethylbenzene EF= 0.0001469 lb/bbl

PStreams "Water Tank Flash"/"Produced Water" Xylenes EF= 0.0002262 lb/bbl

PStreams "Water Tank Flash"/"Produced Water" n-Hexane EF= 0.01058 lb/bbl

Process Streams		Flash Gas	Gas	GPU Gas	Oil Tank Flash	Tank Vapors	Water Tank Flash	40
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	CMPR-102	--	GPUs	Oil Tanks	MIX-103	Water Tanks	MIX-102
	To Block:	MIX-101	MIX-100	MIX-101	MIX-103	MIX-107	MIX-103	Water Tanks
Mass Fraction		%	%	%	%	%	%	%
H2S		0	0*	0	0	0	0	0
N2		0.0838518	1.48838*	1.43660	0.000500531	0.197956	1.07657	0.00203711
CO2		0.112347	0.231279*	0.224974	0.0163180	0.152080	0.756183	0.00205045
C1		8.66206	49.6494*	47.8869	0.308583	7.63980	40.2616	0.0769886
C2		23.5190	24.7139*	24.3747	8.49545	11.1848	23.1516	0.0448608
C3		34.0476	14.5343*	15.0757	32.3371	28.9995	14.1481	0.0272638
iC4		5.69468	1.66182*	1.85451	7.84050	6.75860	1.94447	0.00375794
nC4		17.4972	4.83275*	5.38716	26.8546	23.0999	6.39272	0.0124669
2,2-Dimethylbutane		0.0405868	0.0115136*	0.0142118	0.0963403	0.0854825	0.0371688	7.84364E-05
iC5		3.09406	0.758314*	0.940543	5.83554	5.05741	1.59496	0.00319908
nC5		4.61596	1.13426*	1.42144	9.23174	8.04101	2.74264	0.00554202
2,2-Dimethylpropane		0.190777	0*	0.0586115	0.316113	0.271459	0.0727631	0.000141646
Cyclopentane		0.00903844	0.0124937*	0.00294762	0.0199665	0.0178307	0.00832692	1.87739E-05
2,3-Dimethylbutane		0.0893757	0.0191894*	0.0338700	0.235523	0.212358	0.109279	0.000241452
2-Methylpentane		0.573007	0.168867*	0.220099	1.55187	1.40671	0.760780	0.00170304
3-Methylpentane		0.305768	0.0921091*	0.123055	0.871501	0.796026	0.460182	0.00105906
C6		0.841992	0.287841*	0.364997	2.65320	2.46182	1.61023	0.00385891
Methylcyclopentane		0.101834	0.0224886*	0.0454667	0.328519	0.304500	0.197623	0.000476835
Benzene		0.0123471	0.00347876*	0.00515499	0.0371016	0.0365423	0.0340538	0.000306764
Cyclohexane		0.0868027	0.0262367*	0.0425685	0.306267	0.290642	0.221117	0.000597396
2-Methylhexane		0.0856769	0.0357005*	0.0596848	0.434822	0.430829	0.413059	0.00125451
3-Methylhexane		0.0675162	0.0401631*	0.0499241	0.367356	0.367115	0.366041	0.00115967
2,2,4-Trimethylpentane		0	0*	0	0	0	0	0
C7		0.125368	0.111564*	0.113802	0.835706	0.855967	0.946120	0.00341313
Methylcyclohexane		0.0440841	0.0306095*	0.0414374	0.308145	0.315477	0.348103	0.00124010
Toluene		0.00774725	0.00410345*	0.00692395	0.0513309	0.0516382	0.0530056	0.000461820
C8		0.0187830	0.0763087*	0.0616943	0.459603	0.510573	0.737375	0.00579903
Ethylbenzene		0.000727950	0*	0.00225341	0.0169702	0.0179574	0.0223501	0.000292477
m-Xylene		0.000674184	0.00472813*	0.00240420	0.0180754	0.0194724	0.0256889	0.000303724
o-Xylene		0.000200102	0*	0.000876948	0.00663031	0.00701782	0.00874209	0.000148140
C9		0.000538758	0.0228477*	0.0138917	0.107880	0.123417	0.192554	0.00435083
C10		1.78505E-05	0.0253464*	0.00426614	0.0327272	0.0370026	0.0560268	0.00397205
C11		2.69437E-07	0*	0.00108758	0.00849288	0.00944723	0.0136938	0.00330670
C12		4.68561E-09	0*	0.000300880	0.00238928	0.00260662	0.00357375	0.00274584
C13		8.58755E-11	0*	8.80847E-05	0.000690635	0.000737460	0.000945816	0.00237302
C14		1.70299E-12	0*	2.60282E-05	0.000203753	0.000213316	0.000255868	0.00200681
C15		3.23378E-14	0*	7.81583E-06	6.04026E-05	6.23610E-05	7.10756E-05	0.00168920
C16		7.60700E-16	0*	2.33896E-06	1.79269E-05	1.81890E-05	1.93553E-05	0.00135796
C17		2.19161E-17	0*	6.99343E-07	5.24944E-06	5.24340E-06	5.21655E-06	0.00100150
C18		0	0*	2.69811E-07	2.03149E-06	1.99828E-06	1.85049E-06	0.000961955
C19		0	0*	8.66804E-08	6.49912E-07	6.29438E-07	5.38335E-07	0.000847534
C20		0	0*	1.74856E-08	1.33804E-07	1.27095E-07	9.72459E-08	0.000665592
C21		0	0*	5.14865E-09	3.85658E-08	3.62647E-08	2.60256E-08	0.000431509
C22		0	0*	2.15649E-09	1.59337E-08	1.48065E-08	9.79103E-09	0.000408878
C23		0	0*	5.89255E-10	4.38464E-09	4.01643E-09	2.37801E-09	0.000384859
C24		0	0*	1.03764E-10	7.70999E-10	6.97940E-10	3.72846E-10	0.000195530
C25		0	0*	2.04981E-11	1.51787E-10	1.36094E-10	6.62639E-11	9.77416E-05
C26		0	0*	1.16653E-11	8.61955E-11	7.64690E-11	3.31886E-11	0.000169382
C27		0	0*	1.45638E-12	1.09314E-11	9.59566E-12	3.65221E-12	8.20683E-05
C28		0	0*	1.11903E-12	8.23826E-12	7.18784E-12	2.51378E-12	0.000121560
C29		0	0*	4.31925E-13	3.15166E-12	2.73361E-12	8.73433E-13	0.000100703
C30		0	0*	9.90896E-13	7.22242E-12	6.22222E-12	1.77163E-12	0.000647738
H2O		0.0704520	0*	0.127784	0.0121970	0.236037	1.23206	99.7714
Oxygen		0	0*	0	0	0	0	0

Process Streams	Flash Gas	Gas	GPU Gas	Oil Tank Flash	Tank Vapors	Water Tank Flash	40
Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
H2S	0	0*	0	0	0	0	0
N2	1.26057	513.724*	514.215	0.00182850	0.885671	0.883843	0.892736
CO2	1.68894	79.8274*	80.5272	0.0596116	0.680421	0.620810	0.898580
C1	130.219	17136.8*	17140.6	1.12729	34.1811	33.0539	33.7392
C2	353.567	8530.16*	8724.67	31.0348	50.0418	19.0070	19.6596
C3	511.847	5016.60*	5396.21	118.131	129.746	11.6153	11.9480
iC4	85.6097	573.589*	663.803	28.6422	30.2386	1.59637	1.64687
nC4	263.040	1668.05*	1928.28	98.1027	103.351	5.24828	5.46346
2,2-Dimethylbutane	0.610153	3.97400*	5.08697	0.351942	0.382457	0.0305147	0.0343737
iC5	46.5139	261.737*	336.658	21.3179	22.6273	1.30942	1.40195
nC5	69.3930	391.496*	508.789	33.7246	35.9762	2.25164	2.42871
2,2-Dimethylpropane	2.86800	0*	20.9794	1.15480	1.21453	0.0597370	0.0620745
Cyclopentane	0.135877	4.31226*	1.05507	0.0729399	0.0797761	0.00683622	0.00822743
2,3-Dimethylbutane	1.34361	6.62333*	12.1234	0.860392	0.950107	0.0897157	0.105813
2-Methylpentane	8.61417	58.2853*	78.7821	5.66917	6.29375	0.624583	0.746334
3-Methylpentane	4.59670	31.7920*	44.0463	3.18369	3.56149	0.377799	0.464119
C6	12.6579	99.3500*	130.647	9.69245	11.0144	1.32197	1.69111
Methylcyclopentane	1.53090	7.76207*	16.2743	1.20012	1.36236	0.162244	0.208966
Benzene	0.185618	1.20072*	1.84517	0.135536	0.163494	0.0279574	0.134435
Cyclohexane	1.30493	9.05575*	15.2370	1.11883	1.30036	0.181532	0.261801
2-Methylhexane	1.28800	12.3222*	21.3635	1.58845	1.92757	0.339113	0.549772
3-Methylhexane	1.01499	13.8625*	17.8698	1.34199	1.64250	0.300512	0.508210
2,2,4-Trimethylpentane	0	0*	0	0	0	0	0
C7	1.88469	38.5070*	40.7344	3.05293	3.82967	0.776744	1.49576
Methylcyclohexane	0.662728	10.5650*	14.8321	1.12569	1.41147	0.285785	0.543455
Toluene	0.116467	1.41633*	2.47836	0.187518	0.231034	0.0435164	0.202386
C8	0.282370	26.3384*	22.0828	1.67898	2.28435	0.605368	2.54134
Ethylbenzene	0.0109435	0*	0.806585	0.0619939	0.0803428	0.0183489	0.128174
m-Xylene	0.0101352	1.63194*	0.860558	0.0660315	0.0871214	0.0210900	0.133103
o-Xylene	0.00300819	0*	0.313894	0.0242213	0.0313983	0.00717707	0.0649201
C9	0.00809930	7.88602*	4.97239	0.394098	0.552180	0.158083	1.90669
C10	0.000268351	8.74847*	1.52702	0.119556	0.165553	0.0459968	1.74070
C11	4.05052E-06	0*	0.389288	0.0310254	0.0422678	0.0112423	1.44911
C12	7.04402E-08	0*	0.107697	0.00872830	0.0116623	0.00293397	1.20333
C13	1.29099E-09	0*	0.0315290	0.00252297	0.00329946	0.000776495	1.03995
C14	2.56015E-11	0*	0.00931652	0.000744332	0.000954393	0.000210062	0.879457
C15	4.86143E-13	0*	0.00279760	0.000220657	0.000279009	5.83515E-05	0.740267
C16	1.14358E-14	0*	0.000837204	6.54889E-05	8.13793E-05	1.58903E-05	0.595109
C17	3.29471E-16	0*	0.000250323	1.91768E-05	2.34595E-05	4.28267E-06	0.438892
C18	0	0*	9.65760E-05	7.42126E-06	8.94047E-06	1.51921E-06	0.421564
C19	0	0*	3.10263E-05	2.37420E-06	2.81616E-06	4.41961E-07	0.371420
C20	0	0*	6.25878E-06	4.88800E-07	5.68636E-07	7.98367E-08	0.291687
C21	0	0*	1.84290E-06	1.40885E-07	1.62251E-07	2.13664E-08	0.189103
C22	0	0*	7.71894E-07	5.82074E-08	6.62456E-08	8.03822E-09	0.179185
C23	0	0*	2.10918E-07	1.60176E-08	1.79699E-08	1.95229E-09	0.168659
C24	0	0*	3.71412E-08	2.81655E-09	3.12264E-09	3.06098E-10	0.0856882
C25	0	0*	7.33708E-09	5.54494E-10	6.08895E-10	5.44012E-11	0.0428339
C26	0	0*	4.17549E-09	3.14882E-10	3.42129E-10	2.72471E-11	0.0742292
C27	0	0*	5.21297E-10	3.99335E-11	4.29318E-11	2.99838E-12	0.0359653
C28	0	0*	4.00545E-10	3.00953E-11	3.21590E-11	2.06376E-12	0.0532720
C29	0	0*	1.54603E-10	1.15134E-11	1.22304E-11	7.17070E-13	0.0441318
C30	0	0*	3.54681E-10	2.63843E-11	2.78388E-11	1.45447E-12	0.283862
H2O	1.05912	0*	45.7388	0.0445568	1.05605	1.01149	43723.4
Oxygen	0	0*	0	0	0	0	0

Process Streams		Flash Gas	Gas	GPU Gas	Oil Tank Flash	Tank Vapors	Water Tank Flash	40
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Total**	From Block:	CMPR-102	--	GPUs	Oil Tanks	MIX-103	Water Tanks	MIX-102
	To Block:	MIX-101	MIX-100	MIX-101	MIX-103	MIX-107	MIX-103	Water Tanks
Property	**Units**							
Temperature	°F	137.810	90*	60*	80*	75.8483	60.2544	60.2544
Pressure	psig	150.304*	2000*	150	0.5	0.5	0.5	0.5
Mole Fraction Vapor	%	100	100	100	100	100	100	0.135098
Mole Fraction Light Liquid	%	0	0	0	0	0	0	0.00477521
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	99.8601
Molecular Weight	lb/lbmol	37.8827	22.4539	22.8700	51.4671	43.0970	25.0032	18.0311
Mass Density	lb/ft^3	1.09024	11.9785	0.714578	0.138137	0.115812	0.0685024	23.0659
Molar Flow	lbmol/h	39.6837	1537.18	1565.11	7.09795	10.3814	3.28349	2430.45
Mass Flow	lb/h	1503.33	34515.6	35793.9	365.311	447.409	82.0978	43823.6
Vapor Volumetric Flow	ft^3/h	1378.89	2881.46	50091.0	2644.55	3863.23	1198.47	1899.94
Liquid Volumetric Flow	gpm	171.914	359.247	6245.11	329.710	481.650	149.419	236.875
Std Vapor Volumetric Flow	MMSCFD	0.361424	14*	14.2544	0.0646454	0.0945502	0.0299047	22.1356
Std Liquid Volumetric Flow	sgpm	6.56822	194.173	199.037	1.35717	1.78652	0.429355	87.8902
Compressibility		0.894160	0.640227	0.945164	0.977587	0.983973	0.994064	0.00212901
Specific Gravity		1.30799	0.775272	0.789638	1.77702	1.48802	0.863294	
API Gravity								
Enthalpy	Btu/h	-1.66115E+06	-5.57999E+07	-5.49622E+07?	-356142?	-479760	-123618?	-2.99103E+08
Mass Enthalpy	Btu/lb	-1104.99	-1616.66	-1535.52?	-974.902?	-1072.31	-1505.73?	-6825.15
Mass Cp	Btu/(lb*°F)	0.479481	0.900660	0.481444?	0.405796?	0.412507?	0.447454?	0.981879?
Ideal Gas CpCv Ratio		1.13217	1.23058	1.23478	1.10611	1.12682	1.21707	1.32596
Dynamic Viscosity	cP	0.0101555	0.0213030	0.0103236	0.00795214	0.00847892	0.00991634	
Kinematic Viscosity	cSt	0.581512	0.111024	0.901905	3.59379	4.57052	9.03700	
Thermal Conductivity	Btu/(h*ft*°F)	0.0149264	0.0332786	0.0163732?	0.00989203?	0.0113776?	0.0152133?	
Surface Tension	lbf/ft							
Net Ideal Gas Heating Value	Btu/ft^3	1997.71	1210.73	1230.17	2677.58	2247.10	1316.54	2.17166
Net Liquid Heating Value	Btu/lb	19866.6	20386.1	20332.3	19580.6	19634.9	19876.7	-1011.87
Gross Ideal Gas Heating Value	Btu/ft^3	2176.03	1332.31	1353.18	2904.70	2443.28	1445.84	52.6150
Gross Liquid Heating Value	Btu/lb	21652.8	22440.8	22373.3	21255.0	21362.1	21838.9	49.7610

Process Streams		Flash Gas	Gas	GPU Gas	Oil Tank Flash	Tank Vapors	Water Tank Flash	40
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Vapor**	From Block:	CMPR-102	--	GPUs	Oil Tanks	MIX-103	Water Tanks	MIX-102
	To Block:	MIX-101	MIX-100	MIX-101	MIX-103	MIX-107	MIX-103	Water Tanks
Mass Fraction		%	%	%	%	%	%	%
H2S		0	0	0	0	0	0	0
N2		0.0838518	1.48838	1.43660	0.000500531	0.197956	1.07657	1.07657
CO2		0.112347	0.231279	0.224974	0.0163180	0.152080	0.756183	0.756183
C1		8.66206	49.6494	47.8869	0.308583	7.63980	40.2616	40.2616
C2		23.5190	24.7139	24.3747	8.49545	11.1848	23.1516	23.1516
C3		34.0476	14.5343	15.0757	32.3371	28.9995	14.1481	14.1481
iC4		5.69468	1.66182	1.85451	7.84050	6.75860	1.94447	1.94447
nC4		17.4972	4.83275	5.38716	26.8546	23.0999	6.39272	6.39272
2,2-Dimethylbutane		0.0405868	0.0115136	0.0142118	0.0963403	0.0854825	0.0371688	0.0371688
iC5		3.09406	0.758314	0.940543	5.83554	5.05741	1.59496	1.59496
nC5		4.61596	1.13426	1.42144	9.23174	8.04101	2.74264	2.74264
2,2-Dimethylpropane		0.190777	0	0.0586115	0.316113	0.271459	0.0727631	0.0727631
Cyclopentane		0.00903844	0.0124937	0.00294762	0.0199665	0.0178307	0.00832692	0.00832692
2,3-Dimethylbutane		0.0893757	0.0191894	0.0338700	0.235523	0.212358	0.109279	0.109279
2-Methylpentane		0.573007	0.168867	0.220099	1.55187	1.40671	0.760780	0.760780
3-Methylpentane		0.305768	0.0921091	0.123055	0.871501	0.796026	0.460182	0.460182
C6		0.841992	0.287841	0.364997	2.65320	2.46182	1.61023	1.61023
Methylcyclopentane		0.101834	0.0224886	0.0454667	0.328519	0.304500	0.197623	0.197623
Benzene		0.0123471	0.00347876	0.00515499	0.0371016	0.0365423	0.0340538	0.0340538
Cyclohexane		0.0868027	0.0262367	0.0425685	0.306267	0.290642	0.221117	0.221117
2-Methylhexane		0.0856769	0.0357005	0.0596848	0.434822	0.430829	0.413059	0.413059
3-Methylhexane		0.0675162	0.0401631	0.0499241	0.367356	0.367115	0.366041	0.366041
2,2,4-Trimethylpentane		0	0	0	0	0	0	0
C7		0.125368	0.111564	0.113802	0.835706	0.855967	0.946120	0.946120
Methylcyclohexane		0.0440841	0.0306095	0.0414374	0.308145	0.315477	0.348103	0.348103
Toluene		0.00774725	0.00410345	0.00692395	0.0513309	0.0516382	0.0530056	0.0530056
C8		0.0187830	0.0763087	0.0616943	0.459603	0.510573	0.737375	0.737375
Ethylbenzene		0.000727950	0	0.00225341	0.0169702	0.0179574	0.0223501	0.0223501
m-Xylene		0.000674184	0.00472813	0.00240420	0.0180754	0.0194724	0.0256889	0.0256889
o-Xylene		0.000200102	0	0.000876948	0.00663031	0.00701782	0.00874209	0.00874209
C9		0.000538758	0.0228477	0.0138917	0.107880	0.123417	0.192554	0.192554
C10		1.78505E-05	0.0253464	0.00426614	0.0327272	0.0370026	0.0560268	0.0560268
C11		2.69437E-07	0	0.00108758	0.00849288	0.00944723	0.0136938	0.0136938
C12		4.68561E-09	0	0.000300880	0.00238928	0.00260662	0.00357375	0.00357375
C13		8.58755E-11	0	8.80847E-05	0.000690635	0.000737460	0.000945816	0.000945816
C14		1.70299E-12	0	2.60282E-05	0.000203753	0.000213316	0.000255868	0.000255868
C15		0	0	7.81583E-06	6.04026E-05	6.23610E-05	7.10756E-05	7.10756E-05
C16		0	0	2.33896E-06	1.79269E-05	1.81890E-05	1.93553E-05	1.93553E-05
C17		0	0	6.99343E-07	5.24944E-06	5.24340E-06	5.21655E-06	5.21655E-06
C18		0	0	2.69811E-07	2.03149E-06	1.99828E-06	1.85049E-06	1.85049E-06
C19		0	0	8.66804E-08	6.49912E-07	6.29438E-07	5.38335E-07	5.38335E-07
C20		0	0	1.74856E-08	1.33804E-07	1.27095E-07	9.72459E-08	9.72459E-08
C21		0	0	5.14865E-09	3.85658E-08	3.62647E-08	2.60256E-08	2.60256E-08
C22		0	0	2.15649E-09	1.59337E-08	1.48065E-08	9.79103E-09	9.79103E-09
C23		0	0	5.89255E-10	4.38464E-09	4.01643E-09	2.37801E-09	2.37801E-09
C24		0	0	1.03764E-10	7.70999E-10	6.97940E-10	3.72846E-10	3.72846E-10
C25		0	0	2.04981E-11	1.51787E-10	1.36094E-10	6.62639E-11	6.62639E-11
C26		0	0	1.16653E-11	8.61955E-11	7.64690E-11	3.31886E-11	3.31886E-11
C27		0	0	1.45638E-12	1.09314E-11	9.59566E-12	3.65221E-12	3.65221E-12
C28		0	0	1.11903E-12	8.23826E-12	7.18784E-12	2.51378E-12	2.51378E-12
C29		0	0	0	3.15166E-12	2.73361E-12	8.73433E-13	8.73433E-13
C30		0	0	9.90896E-13	7.22242E-12	6.22222E-12	1.77163E-12	1.77163E-12
H2O		0.0704520	0	0.127784	0.0121970	0.236037	1.23206	1.23206
Oxygen		0	0	0	0	0	0	0

Process Streams	Flash Gas	Gas	GPU Gas	Oil Tank Flash	Tank Vapors	Water Tank Flash	40
Mass Flow	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**	**lb/h**
H2S	0	0	0	0	0	0	0
N2	1.26057	513.724	514.215	0.00182850	0.885671	0.883843	0.883843
CO2	1.68894	79.8274	80.5272	0.0596116	0.680421	0.620810	0.620810
C1	130.219	17136.8	17140.6	1.12729	34.1811	33.0539	33.0539
C2	353.567	8530.16	8724.67	31.0348	50.0418	19.0070	19.0070
C3	511.847	5016.60	5396.21	118.131	129.746	11.6153	11.6153
iC4	85.6097	573.589	663.803	28.6422	30.2386	1.59637	1.59637
nC4	263.040	1668.05	1928.28	98.1027	103.351	5.24828	5.24828
2,2-Dimethylbutane	0.610153	3.97400	5.08697	0.351942	0.382457	0.0305147	0.0305147
iC5	46.5139	261.737	336.658	21.3179	22.6273	1.30942	1.30942
nC5	69.3930	391.496	508.789	33.7246	35.9762	2.25164	2.25164
2,2-Dimethylpropane	2.86800	0	20.9794	1.15480	1.21453	0.0597370	0.0597370
Cyclopentane	0.135877	4.31226	1.05507	0.0729399	0.0797761	0.00683622	0.00683622
2,3-Dimethylbutane	1.34361	6.62333	12.1234	0.860392	0.950107	0.0897157	0.0897157
2-Methylpentane	8.61417	58.2853	78.7821	5.66917	6.29375	0.624583	0.624583
3-Methylpentane	4.59670	31.7920	44.0463	3.18369	3.56149	0.377799	0.377799
C6	12.6579	99.3500	130.647	9.69245	11.0144	1.32197	1.32197
Methylcyclopentane	1.53090	7.76207	16.2743	1.20012	1.36236	0.162244	0.162244
Benzene	0.185618	1.20072	1.84517	0.135536	0.163494	0.0279574	0.0279574
Cyclohexane	1.30493	9.05575	15.2370	1.11883	1.30036	0.181532	0.181532
2-Methylhexane	1.28800	12.3222	21.3635	1.58845	1.92757	0.339113	0.339113
3-Methylhexane	1.01499	13.8625	17.8698	1.34199	1.64250	0.300512	0.300512
2,2,4-Trimethylpentane	0	0	0	0	0	0	0
C7	1.88469	38.5070	40.7344	3.05293	3.82967	0.776744	0.776744
Methylcyclohexane	0.662728	10.5650	14.8321	1.12569	1.41147	0.285785	0.285785
Toluene	0.116467	1.41633	2.47836	0.187518	0.231034	0.0435164	0.0435164
C8	0.282370	26.3384	22.0828	1.67898	2.28435	0.605368	0.605368
Ethylbenzene	0.0109435	0	0.806585	0.0619939	0.0803428	0.0183489	0.0183489
m-Xylene	0.0101352	1.63194	0.860558	0.0660315	0.0871214	0.0210900	0.0210900
o-Xylene	0.00300819	0	0.313894	0.0242213	0.0313983	0.00717707	0.00717707
C9	0.00809930	7.88602	4.97239	0.394098	0.552180	0.158083	0.158083
C10	0.000268351	8.74847	1.52702	0.119556	0.165553	0.0459968	0.0459968
C11	4.05052E-06	0	0.389288	0.0310254	0.0422678	0.0112423	0.0112423
C12	7.04402E-08	0	0.107697	0.00872830	0.0116623	0.00293397	0.00293397
C13	1.29099E-09	0	0.0315290	0.00252297	0.00329946	0.000776495	0.000776495
C14	2.56015E-11	0	0.00931652	0.000744332	0.000954393	0.000210062	0.000210062
C15	0	0	0.00279760	0.000220657	0.000279009	5.83515E-05	5.83515E-05
C16	0	0	0.000837204	6.54889E-05	8.13793E-05	1.58903E-05	1.58903E-05
C17	0	0	0.000250323	1.91768E-05	2.34595E-05	4.28267E-06	4.28267E-06
C18	0	0	9.65760E-05	7.42126E-06	8.94047E-06	1.51921E-06	1.51921E-06
C19	0	0	3.10263E-05	2.37420E-06	2.81616E-06	4.41961E-07	4.41961E-07
C20	0	0	6.25878E-06	4.88800E-07	5.68636E-07	7.98367E-08	7.98367E-08
C21	0	0	1.84290E-06	1.40885E-07	1.62251E-07	2.13664E-08	2.13664E-08
C22	0	0	7.71894E-07	5.82074E-08	6.62456E-08	8.03822E-09	8.03822E-09
C23	0	0	2.10918E-07	1.60176E-08	1.79699E-08	1.95229E-09	1.95229E-09
C24	0	0	3.71412E-08	2.81655E-09	3.12264E-09	3.06098E-10	3.06098E-10
C25	0	0	7.33708E-09	5.54494E-10	6.08895E-10	5.44012E-11	5.44012E-11
C26	0	0	4.17549E-09	3.14882E-10	3.42129E-10	2.72471E-11	2.72471E-11
C27	0	0	5.21297E-10	3.99335E-11	4.29318E-11	2.99838E-12	2.99838E-12
C28	0	0	4.00545E-10	3.00953E-11	3.21590E-11	2.06376E-12	2.06376E-12
C29	0	0	0	1.15134E-11	1.22304E-11	7.17070E-13	7.17070E-13
C30	0	0	3.54681E-10	2.63843E-11	2.78388E-11	1.45447E-12	1.45447E-12
H2O	1.05912	0	45.7388	0.0445568	1.05605	1.01149	1.01149
Oxygen	0	0	0	0	0	0	0

Process Streams		Flash Gas	Gas	GPU Gas	Oil Tank Flash	Tank Vapors	Water Tank Flash	40
Properties	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: **Vapor**	From Block:	CMPR-102	--	GPUs	Oil Tanks	MIX-103	Water Tanks	MIX-102
	To Block:	MIX-101	MIX-100	MIX-101	MIX-103	MIX-107	MIX-103	Water Tanks
Property	**Units**							
Temperature	°F	137.810	90	60	80	75.8483	60.2544	60.2544
Pressure	psig	150.304	2000	150	0.5	0.5	0.5	0.5
Mole Fraction Vapor	%	100	100	100	100	100	100	100
Mole Fraction Light Liquid	%	0	0	0	0	0	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0	0	0
Molecular Weight	lb/lbmol	37.8827	22.4539	22.8700	51.4671	43.0970	25.0032	25.0032
Mass Density	lb/ft^3	1.09024	11.9785	0.714578	0.138137	0.115812	0.0685024	0.0685024
Molar Flow	lbmol/h	39.6837	1537.18	1565.11	7.09795	10.3814	3.28349	3.28349
Mass Flow	lb/h	1503.33	34515.6	35793.9	365.311	447.409	82.0978	82.0978
Vapor Volumetric Flow	ft^3/h	1378.89	2881.46	50091.0	2644.55	3863.23	1198.47	1198.47
Liquid Volumetric Flow	gpm	171.914	359.247	6245.11	329.710	481.650	149.419	149.419
Std Vapor Volumetric Flow	MMSCFD	0.361424	14	14.2544	0.0646454	0.0945502	0.0299047	0.0299047
Std Liquid Volumetric Flow	sgpm	6.56822	194.173	199.037	1.35717	1.78652	0.429355	0.429355
Compressibility		0.894160	0.640227	0.945164	0.977587	0.983973	0.994064	0.994064
Specific Gravity		1.30799	0.775272	0.789638	1.77702	1.48802	0.863294	0.863294
API Gravity								
Enthalpy	Btu/h	-1.66115E+06	-5.57999E+07	-5.49622E+07?	-356142?	-479760?	-123618?	-123618?
Mass Enthalpy	Btu/lb	-1104.99	-1616.66	-1535.52?	-974.902?	-1072.31?	-1505.73?	-1505.73?
Mass Cp	Btu/(lb*°F)	0.479481	0.900660	0.481444?	0.405796?	0.412507?	0.447454?	0.447454?
Ideal Gas CpCv Ratio		1.13217	1.23058	1.23478	1.10611	1.12682	1.21707	1.21707
Dynamic Viscosity	cP	0.0101555	0.0213030	0.0103236	0.00795214	0.00847892	0.00991634	0.00991634
Kinematic Viscosity	cSt	0.581512	0.111024	0.901905	3.59379	4.57052	9.03700	9.03700
Thermal Conductivity	Btu/(h*ft*°F)	0.0149264	0.0332786	0.0163732?	0.00989203?	0.0113776?	0.0152133?	0.0152133?
Surface Tension	lbf/ft							
Net Ideal Gas Heating Value	Btu/ft^3	1997.71	1210.73	1230.17	2677.58	2247.10	1316.54	1316.54
Net Liquid Heating Value	Btu/lb	19866.6	20386.1	20332.3	19580.6	19634.9	19876.7	19876.7
Gross Ideal Gas Heating Value	Btu/ft^3	2176.03	1332.31	1353.18	2904.70	2443.28	1445.84	1445.84
Gross Liquid Heating Value	Btu/lb	21652.8	22440.8	22373.3	21255.0	21362.1	21838.9	21838.9

ATTACHMENT M: NATURAL GAS FIRED FUEL BURNING UNITS DATA SHEET

AP-42 EMISSION FACTORS

ATTACHMENT M – SMALL HEATERS AND REBOILERS NOT SUBJECT TO 40CFR60 SUBPART DC DATA SHEET						
Complete this data sheet for each small heater and reboiler not subject to 40CFR60 Subpart Dc at the facility. ***The Maximum Design Heat Input (MDHI) must be less than 10 MMBTU/hr.***						
Emission Unit ID#[1]	**Emission Point ID#[2]**	**Emission Unit Description (manufacturer, model #)**	**Year Installed/ Modified**	**Type[3] and Date of Change**	**Maximum Design Heat Input (MMBTU/hr)[4]**	**Fuel Heating Value (BTU/scf)[5]**
EU-GPU1	EP-GPU1	Gas Production Unit Burner	2012	Existing	1.0	905
EU-GPU2	EP-GPU2	Gas Production Unit Burner	2012	Existing	1.0	905
EU-GPU3	EP-GPU3	Gas Production Unit Burner	TBD	New	1.0	905
EU-GPU4	EP-GPU4	Gas Production Unit Burner	TBD	New	1.0	905
EU-GPU5	EP-GPU5	Gas Production Unit Burner	TBD	New	1.0	905
EU-GPU6	EP-GPU6	Gas Production Unit Burner	TBD	New	1.0	905
EU-SH1	EP-SH1	Stabilizer Heater	TBD	New	1.5	905
EU-SH2	EP-SH2	Stabilizer Heater	TBD	New	1.5	905

[1] Enter the appropriate Emission Unit (or Source) identification number for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S…or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

[2] Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treaters should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E…or other appropriate designation.

[3] New, modification, removal

[4] Enter design heat input capacity in MMBtu/hr.

[5] Enter the fuel heating value in BTU/standard cubic foot.

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 1b/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 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

CAS No.	Pollutant	Emission Factor (lb/10^6 scf)	Emission Factor Rating
91-57-6	2-Methylnaphthalene[b, c]	2.4E-05	D
56-49-5	3-Methylchloranthrene[b, c]	<1.8E-06	E
	7,12-Dimethylbenz(a)anthracene[b,c]	<1.6E-05	E
83-32-9	Acenaphthene[b,c]	<1.8E-06	E
203-96-8	Acenaphthylene[b,c]	<1.8E-06	E
120-12-7	Anthracene[b,c]	<2.4E-06	E
56-55-3	Benz(a)anthracene[b,c]	<1.8E-06	E
71-43-2	Benzene[b]	2.1E-03	B
50-32-8	Benzo(a)pyrene[b,c]	<1.2E-06	E
205-99-2	Benzo(b)fluoranthene[b,c]	<1.8E-06	E
191-24-2	Benzo(g,h,i)perylene[b,c]	<1.2E-06	E
205-82-3	Benzo(k)fluoranthene[b,c]	<1.8E-06	E
106-97-8	Butane	2.1E+00	E
218-01-9	Chrysene[b,c]	<1.8E-06	E
53-70-3	Dibenzo(a,h)anthracene[b,c]	<1.2E-06	E
25321-22-6	Dichlorobenzene[b]	1.2E-03	E
74-84-0	Ethane	3.1E+00	E
206-44-0	Fluoranthene[b,c]	3.0E-06	E
86-73-7	Fluorene[b,c]	2.8E-06	E
50-00-0	Formaldehyde[b]	7.5E-02	B
110-54-3	Hexane[b]	1.8E+00	E
193-39-5	Indeno(1,2,3-cd)pyrene[b,c]	<1.8E-06	E
91-20-3	Naphthalene[b]	6.1E-04	E
109-66-0	Pentane	2.6E+00	E
85-01-8	Phenanathrene[b,c]	1.7E-05	D

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
74-98-6	Propane	1.6E+00	E
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	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 $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

ATTACHMENT N: INTERNAL COMBUSTION ENGINE DATA SHEETS

ENGINE SPECIFICATION SHEETS

AP-42 AND EPA EMISSION FACTORS

ATTACHMENT N – INTERNAL COMBUSTION ENGINE DATA SHEET

Complete this data sheet for each internal combustion engine at the facility. Include manufacturer performance data sheet(s) or any other supporting document if applicable. Use extra pages if necessary. *Generator(s) and microturbine generator(s) shall also use this form.*

Emission Unit ID#[1]	EU-ENG1	EU-ENG2	
Engine Manufacturer/Model	Caterpillar G3306 NA	Caterpillar G3306 NA	
Manufacturers Rated bhp/rpm	145-hp/1,800-rpm	145-hp/1,800-rpm	
Source Status[2]	ES	NS	
Date Installed/ Modified/Removed/Relocated[3]	TBD	TBD	
Engine Manufactured /Reconstruction Date[4]	TBD	TBD	
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable)[5]	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☒40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☒40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources	☐40CFR60 Subpart JJJJ ☐JJJJ Certified? ☐40CFR60 Subpart IIII ☐IIII Certified? ☐40CFR63 Subpart ZZZZ ☐ NESHAP ZZZZ/ NSPS JJJJ Window ☐ NESHAP ZZZZ Remote Sources
Engine Type[6]	4SRB	4SRB	
APCD Type[7]	NSCR	NSCR	
Fuel Type[8]	PQ	PQ	
H_2S (gr/100 scf)	Negligible	Negligible	
Operating bhp/rpm	145-hp/1,800-rpm	145-hp/1,800-rpm	
BSFC (BTU/bhp-hr)	8,625	8,625	
Hourly Fuel Throughput	1,382 ft^3/hr gal/hr	1,382 ft^3/hr gal/hr	ft^3/hr gal/hr
Annual Fuel Throughput (Must use 8,760 hrs/yr unless emergency generator)	12.11 MMft^3/yr gal/yr	12.11 MMft^3/yr gal/yr	MMft^3/yr gal/yr
Fuel Usage or Hours of Operation Metered	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☐

Calculation Methodology[9]	**Pollutant**[10]	**Hourly PTE (lb/hr)**[11]	**Annual PTE (tons/year)**[11]	**Hourly PTE (lb/hr)**[11]	**Annual PTE (tons/year)**[11]	**Hourly PTE (lb/hr)**[11]	**Annual PTE (tons/year)**[11]
MD	NO_x	0.32	1.40	0.32	1.40		
MD	CO	0.64	2.80	0.64	2.80		
MD	VOC	0.24	1.07	0.24	1.07		
AP	SO_2	<0.01	<0.01	<0.01	<0.01		
AP	PM_{10}	0.01	0.05	0.01	0.05		
MD	Formaldehyde	0.02	0.09	0.02	0.09		
AP	Total HAPs	0.03	0.15	0.03	0.15		
MD and EPA	GHG (CO_2e)	155.19	679.73	155.19	679.73		

1 Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion engine/generator engine located at the well site. Multiple engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. Microturbine generator engines should be designated MT-1, MT-2, MT-3 etc. If more than three (3) engines exist, please use additional sheets.

2 Enter the Source Status using the following codes:

NS	Construction of New Source (installation)	ES	Existing Source
MS	Modification of Existing Source	RS	Relocated Source
REM	Removal of Source		

3 Enter the date (or anticipated date) of the engine's installation (construction of source), modification, relocation or removal.

4 Enter the date that the engine was manufactured, modified or reconstructed.

5 Is the engine a certified stationary spark ignition internal combustion engine according to 40CFR60 Subpart IIII/JJJJ? If so, the engine and control device must be operated and maintained in accordance with the manufacturer's emission-related written instructions. You must keep records of conducted maintenance to demonstrate compliance, but no performance testing is required. If the certified engine is not operated and maintained in accordance with the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine and you must demonstrate compliance as appropriate.

Provide a manufacturer's data sheet for all engines being registered.

6 Enter the Engine Type designation(s) using the following codes:

2SLB	Two Stroke Lean Burn	4SRB	Four Stroke Rich Burn
4SLB	Four Stroke Lean Burn		

7 Enter the Air Pollution Control Device (APCD) type designation(s) using the following codes:

A/F	Air/Fuel Ratio	IR	Ignition Retard
HEIS	High Energy Ignition System	SIPC	Screw-in Precombustion Chambers
PSC	Prestratified Charge	LEC	Low Emission Combustion
NSCR	Rich Burn & Non-Selective Catalytic Reduction	OxCat	Oxidation Catalyst
SCR	Lean Burn & Selective Catalytic Reduction		

8 Enter the Fuel Type using the following codes:

PQ	Pipeline Quality Natural Gas	RG	Raw Natural Gas /Production Gas	D	Diesel

9 Enter the Potential Emissions Data Reference designation using the following codes. Attach all reference data used.

MD	Manufacturer's Data	AP	AP-42	
GR	GRI-HAPCalc™	OT	Other	(please list)

10 Enter each engine's Potential to Emit (PTE) for the listed regulated pollutants in pounds per hour and tons per year. PTE shall be calculated at manufacturer's rated brake horsepower and may reflect reduction efficiencies of listed Air Pollution Control Devices. Emergency generator engines may use 500 hours of operation when calculating PTE. PTE data from this data sheet shall be incorporated in the *Emissions Summary Sheet*.

11 PTE for engines shall be calculated from manufacturer's data unless unavailable.

Engine Air Pollution Control Device (Emission Unit ID# APC-NSCR-ENG-1, ENG-2, use extra pages as necessary)		
Air Pollution Control Device Manufacturer's Data Sheet included? Yes ☒ No ☐		
☒ NSCR	☐ SCR	☐ Oxidation Catalyst
Provide details of process control used for proper mixing/control of reducing agent with gas stream:		
Manufacturer: N/A	Model #: N/A	
Design Operating Temperature: 1,101 ºF	Design gas volume: 678 scfm	
Service life of catalyst:	Provide manufacturer data? ☒Yes ☐ No	
Volume of gas handled: acfm at ºF	Operating temperature range for NSCR/Ox Cat: From 600 ºF to 1,250 ºF	
Reducing agent used, if any:	Ammonia slip (ppm):	
Pressure drop against catalyst bed (delta P): inches of H_2O		
Provide description of warning/alarm system that protects unit when operation is not meeting design conditions:		
Is temperature and pressure drop of catalyst required to be monitored per 40CFR63 Subpart ZZZZ? ☐ Yes ☒ No		
How often is catalyst recommended or required to be replaced (hours of operation)?		
How often is performance test required? ☒ Initial ☐ Annual ☐ Every 8,760 hours of operation ☐ Field Testing Required ☐ No performance test required. If so, why (please list any maintenance required and the applicable sections in NSPS/GACT,		

G3306 NA

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED (rpm):	1800
COMPRESSION RATIO:	10.5:1
JACKET WATER OUTLET (°F):	210
COOLING SYSTEM:	JW+OC
IGNITION SYSTEM:	MAG
EXHAUST MANIFOLD:	WC
COMBUSTION:	Catalyst
EXHAUST O2 EMISSION LEVEL %:	0.5
SET POINT TIMING:	30.0

FUEL SYSTEM: LPG IMPCO
WITH CUSTOMER SUPPLIED AIR FUEL RATIO CONTROL

SITE CONDITIONS:

FUEL:	Nat Gas
FUEL PRESSURE RANGE(psig):	1.5-10.0
FUEL METHANE NUMBER:	84.8
FUEL LHV (Btu/scf):	905
ALTITUDE(ft):	500
MAXIMUM INLET AIR TEMPERATURE(°F):	77
NAMEPLATE RATING:	145 bhp@1800rpm

			MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING	**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(1)	bhp	145	145	109	72
INLET AIR TEMPERATURE		°F	77	77	77	77
ENGINE DATA						
FUEL CONSUMPTION (LHV)	(2)	Btu/bhp-hr	7775	7775	8318	9509
FUEL CONSUMPTION (HHV)	(2)	Btu/bhp-hr	8625	8625	9227	10548
AIR FLOW	(3)(4)	lb/hr	922	922	739	556
AIR FLOW WET (77°F, 14.7 psia)	(3)(4)	scfm	208	208	167	125
INLET MANIFOLD PRESSURE	(5)	in Hg(abs)	26.2	26.2	21.8	17.6
EXHAUST STACK TEMPERATURE	(6)	°F	1101	1101	1067	1037
EXHAUST GAS FLOW (@ stack temp, 14.5 psia)	(7)(4)	ft3/min	678	678	532	393
EXHAUST GAS MASS FLOW	(7)(4)	lb/hr	978	978	784	590
EMISSIONS DATA						
NOx (as NO2)	(8)	g/bhp-hr	13.47	13.47	12.15	9.76
CO	(8)	g/bhp-hr	13.47	13.47	11.44	9.56
THC (mol. wt. of 15.84)	(8)	g/bhp-hr	2.20	2.20	2.49	3.22
NMHC (mol. wt. of 15.84)	(8)	g/bhp-hr	0.33	0.33	0.37	0.48
NMNEHC (VOCs) (mol. wt. of 15.84)	(8)(9)	g/bhp-hr	0.22	0.22	0.25	0.32
HCHO (Formaldehyde)	(8)	g/bhp-hr	0.27	0.27	0.31	0.33
CO2	(8)	g/bhp-hr	485	485	525	601
EXHAUST OXYGEN	(10)	% DRY	0.5	0.5	0.5	0.5
HEAT REJECTION						
HEAT REJ. TO JACKET WATER (JW)	(11)	Btu/min	6049	6049	5237	4455
HEAT REJ. TO ATMOSPHERE	(11)	Btu/min	751	751	602	459
HEAT REJ. TO LUBE OIL (OC)	(11)	Btu/min	990	990	857	729
HEAT EXCHANGER SIZING CRITERIA						
TOTAL JACKET WATER CIRCUIT (JW+OC)	(12)	Btu/min	7842			

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.
Max. rating is the maximum capability 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.

PREPARED BY:
Data generated by Gas Engine Rating Pro Version 3.04.00
Ref. Data Set DM5053-07-000, Printed 31Jan2011

EMIT TECHNOLOGIES

772 Airfield Lane
Sheridan, WY 82801
Office: 307.673.0883
EST@emittechnologies.com

Prepared For:
Jason Stinson
MIDCON COMPRESSION, LP

MANUFACTURED ON OR AFTER 1/1/2011

INFORMATION PROVIDED BY CATERPILLAR

Engine:	G3306 NA
Horsepower:	145
RPM:	1800
Compression Ratio:	10.5:1
Exhaust Flow Rate:	678 CFM
Exhaust Temperature:	1101 °F
Reference:	DM5053-07
Fuel:	Natural Gas
Annual Operating Hours:	8760

Uncontrolled Emissions

NOx:	13.47 g/bhp-hr
CO:	13.47 g/bhp-hr
THC:	2.20 g/bhp-hr
NMHC:	0.33 g/bhp-hr
NMNEHC:	0.22 g/bhp-hr
HCHO:	0.27 g/bhp-hr
Oxygen:	0.50 %

POST CATALYST EMISSIONS

NOx:	<1.0 g/bhp-hr
CO:	<2.0 g/bhp-hr
VOC:	<0.7 g/bhp-hr

CONTROL EQUIPMENT

Catalytic Converter

Model:	**EAH-1200T-0404F-21CEE**
Catalyst Type:	NSCR, Precious group metals
Manufacturer:	EMIT Technologies, Inc.
Element Size:	Round 12 x 3.5
Catalyst Elements:	1
Housing Type:	2 Element Capacity
Catalyst Installation:	Accessible Housing
Construction:	10 gauge Carbon Steel
Sample Ports:	6 (0.5" NPT)
Inlet Connections:	4" Flat Face Flange
Outlet Connections:	4" Flat Face Flange
Configuration:	End In / End Out
Silencer:	Integrated
Silencer Grade:	Hospital
Insertion Loss:	35-40 dBA

Air Fuel Ratio Controller

Model:	**ENG-S-075-T**
Manufacturer:	EMIT Technologies, Inc.
Description:	EDGE NG Air Fuel Ratio Controller 4-Wire Narrowband O2 Sensor Digital Power Valve O2 Sensor Weldment Wiring Harness (2) 25' Type K Thermocouple
Digital Power Valve Size:	0.75" NPT

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES[a]
(SCC 2-02-002-53)

Pollutant	Emission Factor (lb/MMBtu)[b] (fuel input)	Emission Factor Rating
Criteria Pollutants and Greenhouse Gases		
NO_x[c] 90 - 105% Load	2.21 E+00	A
NO_x[c] <90% Load	2.27 E+00	C
CO[c] 90 - 105% Load	3.72 E+00	A
CO[c] <90% Load	3.51 E+00	C
CO_2[d]	1.10 E+02	A
SO_2[e]	5.88 E-04	A
TOC[f]	3.58 E-01	C
Methane[g]	2.30 E-01	C
VOC[h]	2.96 E-02	C
PM10 (filterable)[i,j]	9.50 E-03	E
PM2.5 (filterable)[j]	9.50 E-03	E
PM Condensable[k]	9.91 E-03	E
Trace Organic Compounds		
1,1,2,2-Tetrachloroethane[l]	2.53 E-05	C
1,1,2-Trichloroethane[l]	<1.53 E-05	E
1,1-Dichloroethane	<1.13 E-05	E
1,2-Dichloroethane	<1.13 E-05	E
1,2-Dichloropropane	<1.30 E-05	E
1,3-Butadiene[l]	6.63 E-04	D
1,3-Dichloropropene[l]	<1.27 E-05	E
Acetaldehyde[l,m]	2.79 E-03	C
Acrolein[l,m]	2.63 E-03	C
Benzene[l]	1.58 E-03	B
Butyr/isobutyraldehyde	4.86 E-05	D
Carbon Tetrachloride[l]	<1.77 E-05	E

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES (Concluded)

Pollutant	Emission Factor (lb/MMBtu)[b] (fuel input)	Emission Factor Rating
Chlorobenzene[l]	<1.29 E-05	E
Chloroform[l]	<1.37 E-05	E
Ethane[n]	7.04 E-02	C
Ethylbenzene[l]	<2.48 E-05	E
Ethylene Dibromide[l]	<2.13 E-05	E
Formaldehyde[l,m]	2.05 E-02	A
Methanol[l]	3.06 E-03	D
Methylene Chloride[l]	4.12 E-05	C
Naphthalene[l]	<9.71 E-05	E
PAH[l]	1.41 E-04	D
Styrene[l]	<1.19 E-05	E
Toluene[l]	5.58 E-04	A
Vinyl Chloride[l]	<7.18 E-06	E
Xylene[l]	1.95 E-04	A

[a] Reference 7. Factors represent uncontrolled levels. For NO_x, CO, and PM-10, “uncontrolled” means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, “uncontrolled” means no oxidation control; the data set may include units with control techniques used for NOx control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM10 = Particulate Matter $\leq$ 10 microns (μm) aerodynamic diameter. A “<“ sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

$$\text{lb/hp-hr} = (\text{lb/MMBtu})\,(\text{heat input, MMBtu/hr})\,(\text{1/operating HP, 1/hp})$$

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to CO_2. CO_2 [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO_2,

C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10^6 scf, and h = heating value of natural gas (assume 1020 Btu/scf at 60°F).

[e] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content in natural gas of 2,000 gr/10^6scf.

[f] Emission factor for TOC is based on measured emission levels from 6 source tests.

[g] Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor.

[h] VOC emission factor is based on the sum of the emission factors for all speciated organic compounds. Methane and ethane emissions were not measured for this engine category.

[i] No data were available for uncontrolled engines. PM10 emissions are for engines equipped with a PCC.

[j] Considered ≤ 1 μm in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).

[k] No data were available for condensable emissions. The presented emission factor reflects emissions from 4SLB engines.

[l] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

[m] For rich-burn engines, no interference is suspected in quantifying aldehyde emissions. The presented emission factors are based on FTIR and CARB 430 emissions data measurements.

[n] Ethane emission factor is determined by subtracting the VOC emission factor from the NMHC emission factor.

ATTACHMENT O: TANKER TRUCK LOADING DATA SHEET

ATTACHMENT O – TANKER TRUCK/RAIL CAR LOADING DATA SHEET

Complete this data sheet for each new or modified bulk liquid transfer area or loading rack at the facility. This is to be used for bulk liquid transfer operations to tanker trucks/rail cars. Use extra pages if necessary.

Truck/Rail Car Loadout Collection Efficiencies

The following applicable capture efficiencies of a truck/rail car loadout are allowed:

- For tanker trucks/rail cars passing the MACT level annual leak test – 99.2%
- For tanker trucks/rail cars passing the NSPS level annual leak test – 98.7%
- For tanker trucks/rail cars not passing one of the annual leak tests listed above – 70%

Compliance with this requirement shall be demonstrated by keeping records of the applicable MACT or NSPS Annual Leak Test certification for ***every*** truck and railcar loaded/unloaded. This requirement can be satisfied if the trucking/rail car company provided certification that its entire fleet was compliant. This certification must be submitted in writing to the Director of the DAQ. These additional requirements must be noted in the Registration Application.

Emission Unit ID#: EU-LOAD-COND	Emission Point ID#: EP-LOAD-COND/APC-COMB	Year Installed/Modified: 2012
Emission Unit Description: Condensate Truck Loading Emissions		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks/rail cars loading at one (1) time: 1
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. Vapors are collected and routed to a vapor combustor.		
Are any of the following truck/rail car loadout systems utilized? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

Projected Maximum Operating Schedule (for rack or transfer point as a whole)				
Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	24	24	24	24
Days/week	5	5	5	5

Bulk Liquid Data (use extra pages as necessary)			
Liquid Name	Condensate		
Max. Daily Throughput (1000 gal/day)	68.628		
Max. Annual Throughput (1000 gal/yr)	25,049.22		
Loading Method[1]	SUB		
Max. Fill Rate (gal/min)	125		
Average Fill Time (min/loading)	Approx. 60		
Max. Bulk Liquid Temperature (°F)	Refer to Promax		
True Vapor Pressure[2]	Refer to Promax		
Cargo Vessel Condition[3]	U		
Control Equipment or Method[4]	O = Vapor Return/ Combustion Controls		

Max. Collection Efficiency (%)		70%		
Max. Control Efficiency (%)		98%		
Max.VOC Emission Rate	Loading (lb/hr)	12.17		
	Annual (ton/yr)	27.08		
Max.HAP Emission Rate	Loading (lb/hr)	0.97		
	Annual (ton/yr)	2.16		
Estimation Method[5]		O = Promax process simulation		

Emission Unit ID#: EU-LOAD-PW	Emission Point ID#: EP-LOAD-PW/APC-COMB	Year Installed/Modified: 2012
Emission Unit Description: Condensate Truck Loading Emissions		
Loading Area Data		
Number of Pumps: 1	Number of Liquids Loaded: 1	Max number of trucks/rail cars loading at one (1) time: 1
Are tanker trucks/rail cars pressure tested for leaks at this or any other location? ☐ Yes ☒ No ☐ Not Required If Yes, Please describe:		
Provide description of closed vent system and any bypasses. Vapors are collected and routed to a vapor combustor.		
Are any of the following truck/rail car loadout systems utilized? ☐ Closed System to tanker truck/rail car passing a MACT level annual leak test? ☐ Closed System to tanker truck/rail car passing a NSPS level annual leak test? ☐ Closed System to tanker truck/rail car not passing an annual leak test and has vapor return?		

Projected Maximum Operating Schedule (for rack or transfer point as a whole)				
Time	Jan – Mar	Apr - Jun	Jul – Sept	Oct - Dec
Hours/day	24	24	24	24
Days/week	5	5	5	5

Bulk Liquid Data (use extra pages as necessary)				
Liquid Name		Produced Water		
Max. Daily Throughput (1000 gal/day)		105		
Max. Annual Throughput (1000 gal/yr)		38,325		
Loading Method[1]		SUB		
Max. Fill Rate (gal/min)		125		
Average Fill Time (min/loading)		Approx. 60		
Max. Bulk Liquid Temperature (°F)		Refer to Promax		
True Vapor Pressure[2]		Refer to Promax		
Cargo Vessel Condition[3]		U		
Control Equipment or Method[4]		O = Vapor Return/ Combustion Controls		
Max. Collection Efficiency (%)		70%		
Max. Control Efficiency (%)		98%		
Max.VOC Emission Rate	Loading (lb/hr)	0.12		
	Annual (ton/yr)	0.45		
	Loading (lb/hr)	0.01		

Max.HAP Emission Rate	Annual (ton/yr)	0.04		
Estimation Method[5]		O = Promax process simulation		

1 BF Bottom Fill SP Splash Fill SUB Submerged Fill
2 At maximum bulk liquid temperature
3 B Ballasted Vessel C Cleaned U Uncleaned (dedicated service)
O Other (describe)
4 List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets)
CA Carbon Adsorption VB Dedicated Vapor Balance (closed system)
ECD Enclosed Combustion Device F Flare
TO Thermal Oxidization or Incineration
5 EPA EPA Emission Factor in AP-42 MB Material Balance
TM Test Measurement based upon test data submittal O Other (describe)

ATTACHMENT Q: PNEUMATIC CONTROLLERS DATA SHEET

ATTACHMENT Q – PNEUMATIC CONTROLLERS DATA SHEET

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

Are there any continuous bleed natural gas driven pneumatic controllers at this facility with a bleed rate greater than 6 standard cubic feet per hour that are required based on functional needs, including but not limited to response time, safety and positive actuation that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list approximate number.

ATTACHMENT R: PNEUMATIC PUMP DATA SHEET

ATTACHMENT R – PNEUMATIC PUMP DATA SHEET

Are there any natural gas-driven diaphragm pumps located at a well site that commenced construction, modification or reconstruction after September 18, 2015?

☐ Yes ☒ No

Please list.

Source ID #	Date	Pump Make/Model	Pump Size

ATTACHMENT S: AIR POLLUTION CONTROL DEVICE/EMISSION REDUCTION DEVICES SHEETS

VAPOR COMBUSTION

AP-42 EMISSION FACTORS

ATTACHMENT S – AIR POLLUTION CONTROL DEVICE / EMISSION REDUCTION DEVICE SHEETS	
Complete the applicable air pollution control device sheets for each flare, vapor combustor, thermal oxidizer, condenser, adsorption system, vapor recovery unit, BTEX Eliminator, Reboiler with and without Glow Plug, etc. at the facility. Use extra pages if necessary. Emissions calculations must be performed using the most conservative control device efficiency.	
The following five (5) rows are only to be completed if registering an alternative air pollution control device.	
Emission Unit ID:	Make/Model:
Primary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No
Secondary Control Device ID:	Make/Model:
Control Efficiency (%):	APCD/ERD Data Sheet Completed: ☐ Yes ☐ No

VAPOR COMBUSTION
(Including Enclosed Combustors)

General Information

Control Device ID#: APC-COMB	Installation Date: 2013 ☐ New ☒ Modified ☐ Relocated	
Maximum Rated Total Flow Capacity 7,457.08 scfh 178,970 scfd	Maximum Design Heat Input (from mfg. spec sheet) 20 MMBTU/hr	Design Heat Content 2,682 BTU/scf

Control Device Information

Type of Vapor Combustion Control?
☒ Enclosed Combustion Device ☐ Elevated Flare ☐ Ground Flare
☐ Thermal Oxidizer

Manufacturer: MRW Technologies Model: TBF-6.0-34-178970	Hours of operation per year? 8,760

List the emission units whose emissions are controlled by this vapor control device (Emission Point ID#)

Emission Unit ID#	Emission Source Description	Emission Unit ID#	Emission Source Description
EU-TANKS-COND	Condensate Tanks	EU-LOAD-COND	Condensate Truck Loading
EU-TANKS-PW	Produced Water Tanks	EU-LOAD-PW	Produced Water Truck Loading

If this vapor combustor controls emissions from more than six (6) emission units, please attach additional pages.

Assist Type (Flares only)	Flare Height	Tip Diameter	Was the design per §60.18?
☐ Steam ☐ Air ☐ Pressure ☒ Non	34 feet	6.5 feet	☐ Yes ☒ No Provide determination.

Waste Gas Information

Maximum Waste Gas Flow Rate	Heat Value of Waste Gas Stream	Exit Velocity of the Emissions Stream
124 (scfm)	2,682 BTU/ft^3	(ft/s)

Provide an attachment with the characteristics of the waste gas stream to be burned.

Pilot Gas Information

Number of Pilot Lights	Fuel Flow Rate to Pilot Flame per Pilot	Heat Input per Pilot	Will automatic re-ignition be used?
2	50 scfh	45,250 BTU/hr	☒ Yes ☐ No

If automatic re-ignition is used, please describe the method. If the pilot flame is lost, the control system will automatically attempt to relight the pilot. If the re-ignition attempt fails, the pilot solenoid valve will automatically close and a local remote alarm signal will be generated to indicate loss of pilot flame.

Is pilot flame equipped with a monitor to detect the presence of the flame? ☒ Yes ☐ No	If Yes, what type? ☐ Thermocouple ☐ Infrared ☐ Ultraviolet ☐ Camera ☒ Other: flame rod

Describe all operating ranges and maintenance procedures required by the manufacturer to maintain the warranty. *(If unavailable, please indicate).*

Additional information attached? ☒ Yes ☐ No
Please attach copies of manufacturer's data sheets, drawings, flame demonstration per §60.18 or §63.11(b) and performance testing.

Tank Battery Combustor Specification Sheet
MRW Technologies, Inc.
Combustor Model Number: TBF-6.0-34-178970

Expected Destruction Removal Efficiency (DRE):	98% or Greater of Non-Methane Hydrocarbons
Unit Size:	6-foot Diameter 34-Foot Overall Height
Design Heat Input:	20 MMBTU/HR
Design Flow Rates:	178,970 SCFD
Design Heat Content:	2682 BTU/SCF
Waste Gas Flame Arrestor:	Enardo
Pilot Type:	MRW Electric Ignition
Pilot Operation (Continuous/Intermittent):	Two (2) Continuous
Pilot Fuel Consumption:	100 SCFH or Less Total (50 SCFH per Pilot)
Pilot Monitoring Device:	Flame Rod
Automatic Re-Ignition:	Included
Remote Alarm Indication:	Included

Description of Control Scheme:

The Combustor pilots are monitored via flame rod. If one of the pilot flames are lost, the control system will automatically attempt to relight the pilot. If the re-ignition attempt fails, the pilot solenoid valve will automatically close and a local & remote alarm signal will be generated to indicate loss of pilot flame.

COMBUSTION SYSTEMS
2301 West 171st Street S., Glenpool, OK 74033 • tel: 918.827.6030 • fax: 918.827.6034 • email: mrw@mrw-tech.com

Since flares do not lend themselves to conventional emission testing techniques, only a few attempts have been made to characterize flare emissions. Recent EPA tests using propylene as flare gas indicated that efficiencies of 98 percent can be achieved when burning an offgas with at least 11,200 kJ/m^3 (300 Btu/ft^3). The tests conducted on steam-assisted flares at velocities as low as 39.6 meters per minute (m/min) (130 ft/min) to 1140 m/min (3750 ft/min), and on air-assisted flares at velocities of 180 m/min (617 ft/min) to 3960 m/min (13,087 ft/min) indicated that variations in incoming gas flow rates have no effect on the combustion efficiency. Flare gases with less than 16,770 kJ/m^3 (450 Btu/ft^3) do not smoke.

Table 13.5-1 presents flare emission factors, and Table 13.5-2 presents emission composition data obtained from the EPA tests.[1] Crude propylene was used as flare gas during the tests. Methane was a major fraction of hydrocarbons in the flare emissions, and acetylene was the dominant intermediate hydrocarbon species. Many other reports on flares indicate that acetylene is always formed as a stable intermediate product. The acetylene formed in the combustion reactions may react further with hydrocarbon radicals to form polyacetylenes followed by polycyclic hydrocarbons.[2]

In flaring waste gases containing no nitrogen compounds, NO is formed either by the fixation of atmospheric nitrogen (N) with oxygen (O) or by the reaction between the hydrocarbon radicals present in the combustion products and atmospheric nitrogen, by way of the intermediate stages, HCN, CN, and OCN.[2] Sulfur compounds contained in a flare gas stream are converted to SO_2 when burned. The amount of SO_2 emitted depends directly on the quantity of sulfur in the flared gases.

Table 13.5-1 (English Units). EMISSION FACTORS FOR FLARE OPERATIONS[a]

EMISSION FACTOR RATING: B

Component	Emission Factor ($lb/10^6$ Btu)
Total hydrocarbons[b]	0.14
Carbon monoxide	0.37
Nitrogen oxides	0.068
Soot[c]	0 - 274

[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.

ATTACHMENT T: EMISSIONS CALCULATIONS

SWN Production Company, LLC
Brooke County Parks Pad
Summary of Criteria Air Pollutant Emissions

Equipment	Unit ID	Emission Point ID	NOx		CO		Total VOC[1]		SO_2		PM Total[2]	
			lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter	EU-ENG1	EP-ENG1	0.32	1.40	0.64	2.80	0.24	1.07	<0.01	<0.01	0.02	0.11
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	*EU-ENG2*	*EP-ENG2*	*0.32*	*1.40*	*0.64*	*2.80*	*0.24*	*1.07*	*<0.01*	*<0.01*	*0.02*	*0.11*
1.0-mmBtu/hr GPU Burner	EU-GPU1	EP-GPU1	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04
1.0-mmBtu/hr GPU Burner	EU-GPU2	EP-GPU2	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU3*	*EP-GPU3*	*0.11*	*0.48*	*0.09*	*0.41*	*0.01*	*0.03*	*<0.01*	*<0.01*	*0.01*	*0.04*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU4*	*EP-GPU4*	*0.11*	*0.48*	*0.09*	*0.41*	*0.01*	*0.03*	*<0.01*	*<0.01*	*0.01*	*0.04*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU5*	*EP-GPU5*	*0.11*	*0.48*	*0.09*	*0.41*	*0.01*	*0.03*	*<0.01*	*<0.01*	*0.01*	*0.04*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU6*	*EP-GPU6*	*0.11*	*0.48*	*0.09*	*0.41*	*0.01*	*0.03*	*<0.01*	*<0.01*	*0.01*	*0.04*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH1*	*EP-SH1*	*0.17*	*0.73*	*0.14*	*0.61*	*0.01*	*0.04*	*<0.01*	*<0.01*	*0.01*	*0.06*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH2*	*EP-SH2*	*0.17*	*0.73*	*0.14*	*0.61*	*0.01*	*0.04*	*<0.01*	*<0.01*	*0.01*	*0.06*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT1*	*EP-HT1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH1*	*EP-LH1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH2*	*EP-LH2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Six (6) 400-bbl Condensate Tanks Routed to Vapor Combustor - Modify	*EU-TANKS-COND*	*APC-COMB*	-	-	-	-	-	-	-	-	-	-
Six (6) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Modify	*EU-TANKS-PW*	*APC-COMB*	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-COND*	*APC-COMB*	-	-	-	-	*6.18*	*27.08*	-	-	-	-
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-PW*	*APC-COMB*	-	-	-	-	*0.10*	*0.45*	-	-	-	-
One (1) 20.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Modify	*APC-COMB*	*APC-COMB*	*2.76*	*12.09*	*5.51*	*24.13*	*7.82*	*34.26*	-	-	*0.06*	*0.25*
Vapor Combustor Pilots	EU-PILOTS	APC-COMB	0.01	0.04	0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fugitive Emissions - Modify	*EU-FUG*	*EP-FUG*	-	-	-	-	*1.15*	*5.04*	-	-	-	-
Fugitive Haul Road Emissions - Modify	*EU-HR*	*EP_HR*	-	-	-	-	-	-	-	-	*5.66*	*18.59*
Post-Modification Allowable Emissions =			**4.40**	**19.29**	**7.63**	**33.43**	**15.80**	**69.20**	**0.01**	**0.03**	**5.84**	**19.38**
Current Permit Allowable Emissions =			**3.71**	**16.23**	**6.67**	**29.19**	**6.55**	**28.68**	**<0.01**	**0.02**	**5.12**	**16.95**
Net Allowable Emissions =			**0.69**	**3.05**	**0.96**	**4.24**	**9.25**	**40.52**	**0.00**	**0.01**	**0.72**	**2.44**

Notes:

[1] Total VOC includes all constituents heavier than Propane (C3+), including hazardous air pollutants (HAP). Speciated HAP presented in following table. Also note that engine manufacturer data for VOC does not include formaldehyde; therefore, total VOC emissions presented here are different than VOC emissions as defined and calculated in the engine calculations.

SWN Production Company, LLC
Brooke County Parks Pad
Summary of Hazardous Air Pollutants

Equipment	Unit ID	Estimated Emissions (lb/hr)									
		Acetalde-hyde	Acrolein	Benzene	Ethyl-benzene	Formalde-hyde	Methanol	n-Hexane	Toluene	Xylenes	Total HAPs
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter	EU-ENG1	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	-	<0.01	<0.01	0.03
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	EU-ENG2	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	-	<0.01	<0.01	0.03
1.0-mmBtu/hr GPU Burner	EU-GPU1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr GPU Burner	EU-GPU2	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr GPU Burner - Add	EU-GPU3	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr GPU Burner - Add	EU-GPU4	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr GPU Burner - Add	EU-GPU5	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.0-mmBtu/hr GPU Burner - Add	EU-GPU6	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.5-mmBtu/hr Stabilizer Heater - Add	EU-SH1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
1.5-mmBtu/hr Stabilizer Heater - Add	EU-SH2	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
0.50-mmBtu/hr Heater Treater - Remove	EU-HT1	-	-	0.00	-	0.00	-	0.00	0.00	-	0.00
1.5-mmBtu/hr Line Heater - Remove	EU-LH1	-	-	0.00	-	0.00	-	0.00	0.00	-	0.00
1.5-mmBtu/hr Line Heater - Remove	EU-LH2	-	-	0.00	-	0.00	-	0.00	0.00	-	0.00
Six (6) 400-bbl Condensate Tanks Routed to Vapor Combustor - Modify	EU-TANKS-COND	-	-	-	-	-	-	-	-	-	-
Six (6) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Modify	EU-TANKS-PW	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	EU-LOAD-COND	-	-	<0.01	0.02	-	-	0.34	0.02	0.10	0.49
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	EU-LOAD-PW	-	-	<0.01	<0.01	-	-	0.01	<0.01	<0.01	0.01
One (1) 20.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Modify	APC-COMB	-	-	0.01	0.03	-	-	0.43	0.03	0.13	0.62
Vapor Combustor Pilots	EU-PILOTS	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Fugitive Emissions - Modify	EU-FUG	-	-	<0.01	<0.01	-	-	0.05	<0.01	0.01	0.06
Fugitive Haul Road Emissions - Modify	EU-HR	-	-	-	-	-	-	-	-	-	-
Post-Modification Allowable Emissions =		**0.01**	**0.01**	**0.01**	**0.05**	**0.04**	**0.01**	**0.84**	**0.05**	**0.25**	**1.27**
Current Permit Allowable Emissions =		**<0.01**	**<0.01**	**0.01**	**0.02**	**0.02**	**<0.01**	**0.35**	**0.02**	**0.10**	**0.54**
Net Allowable Emissions =		**(<0.01)**	**(<0.01)**	**<0.01**	**0.03**	**0.02**	**(<0.01)**	**0.49**	**0.03**	**0.15**	**0.73**

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SWN Production Company, LLC
Brooke County Parks Pad
Summary of Hazardous Air Pollutants (Continued)

Equipment	Unit ID	Estimated Emissions (TPY)									
		Acetaldehyde	Acrolein	Benzene	Ethylbenzene	Formaldehyde	Methanol	n-Hexane	Toluene	Xylenes	Total HAPs
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter	EU-ENG1	0.02	0.01	0.01	<0.01	0.09	0.02	-	<0.01	<0.01	0.15
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	EU-ENG2	0.02	0.01	0.01	<0.01	0.09	0.02	-	<0.01	<0.01	0.15
1.0-mmBtu/hr GPU Burner	EU-GPU1	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
1.0-mmBtu/hr GPU Burner	EU-GPU2	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU3*	-	-	*<0.01*	-	*<0.01*	-	*0.01*	*<0.01*	-	*0.01*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU4*	-	-	*<0.01*	-	*<0.01*	-	*0.01*	*<0.01*	-	*0.01*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU5*	-	-	*<0.01*	-	*<0.01*	-	*0.01*	*<0.01*	-	*0.01*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU6*	-	-	*<0.01*	-	*<0.01*	-	*0.01*	*<0.01*	-	*0.01*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH1*	-	-	*<0.01*	-	*<0.01*	-	*0.01*	*<0.01*	-	*0.01*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH2*	-	-	*<0.01*	-	*<0.01*	-	*0.01*	*<0.01*	-	*0.01*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT1*	-	-	*0.00*	-	*0.00*	-	*0.00*	*0.00*	-	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH1*	-	-	*0.00*	-	*0.00*	-	*0.00*	*0.00*	-	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH2*	-	-	*0.00*	-	*0.00*	-	*0.00*	*0.00*	-	*0.00*
Six (6) 400-bbl Condensate Tanks Routed to Vapor Combustor - Modify	*EU-TANKS-COND*	-	-	-	-	-	-	-	-	-	-
Six (6) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Modify	*EU-TANKS-PW*	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-COND*	-	-	*0.02*	*0.10*	-	-	*1.50*	*0.10*	*0.45*	*2.16*
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-PW*	-	-	*<0.01*	*<0.01*	-	-	*0.02*	*<0.01*	*0.01*	*0.04*
One (1) 20.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Modify	*APC-COMB*	-	-	*0.02*	*0.12*	-	-	*1.89*	*0.12*	*0.57*	*2.73*
Vapor Combustor Pilots	*EU-PILOTS*	-	-	*<0.01*	-	*<0.01*	-	*<0.01*	*<0.01*	-	*<0.01*
Fugitive Emissions - Modify	*EU-FUG*	-	-	*<0.01*	*0.01*	-	-	*0.20*	*0.01*	*0.04*	*0.27*
Fugitive Haul Road Emissions - Modify	*EU-HR*	-	-	-	-	-	-	-	-	-	-
Post-Modification Allowable Emissions =		**0.03**	**0.03**	**0.06**	**0.23**	**0.18**	**0.03**	**3.70**	**0.24**	**1.08**	**5.58**
Current Permit Allowable Emissions =		**0.02**	**0.01**	**0.03**	**0.09**	**0.09**	**0.02**	**1.54**	**0.10**	**0.44**	**2.34**
Net Allowable Emissions =		**0.01**	**0.02**	**0.03**	**0.14**	**0.09**	**0.01**	**2.16**	**0.14**	**0.64**	**3.24**

SWN Production Company, LLC
Brooke County Parks Pad
Summary of Greenhouse Gas Emissions - Metric Tons per Year (Tonnes)

Equipment	Unit ID	Carbon Dioxide (CO_2)		Methane (CH_4)		Methane (CH_4) as $CO_{2\ Eq.}$		Nitrous Oxide (N_2O)		Nitrous Oxide (N_2O) as $CO_{2\ Eq.}$		Total CO_2 + $CO_{2\ Eq.}$ [1]	
		lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr	lb/hr	tonnes/yr
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter	EU-ENG1	155.04	616.04	<0.01	0.01	0.07	0.27	<0.01	<0.01	0.08	0.33	155.19	616.64
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	EU-ENG2	155.04	616.04	<0.01	0.01	0.07	0.27	<0.01	<0.01	0.08	0.33	155.19	616.64
1.0-mmBtu/hr GPU Burner	EU-GPU1	116.98	464.80	<0.01	0.01	0.06	0.22	<0.01	<0.01	0.07	0.26	117.10	465.28
1.0-mmBtu/hr GPU Burner	EU-GPU2	116.98	464.80	<0.01	0.01	0.06	0.22	<0.01	<0.01	0.07	0.26	117.10	465.28
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU3*	*116.98*	*464.80*	*<0.01*	*0.01*	*0.06*	*0.22*	*<0.01*	*<0.01*	*0.07*	*0.26*	*117.10*	*465.28*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU4*	*116.98*	*464.80*	*<0.01*	*0.01*	*0.06*	*0.22*	*<0.01*	*<0.01*	*0.07*	*0.26*	*117.10*	*465.28*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU5*	*116.98*	*464.80*	*<0.01*	*0.01*	*0.06*	*0.22*	*<0.01*	*<0.01*	*0.07*	*0.26*	*117.10*	*465.28*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU6*	*116.98*	*464.80*	*<0.01*	*0.01*	*0.06*	*0.22*	*<0.01*	*<0.01*	*0.07*	*0.26*	*117.10*	*465.28*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH1*	*175.47*	*697.21*	*<0.01*	*0.01*	*0.08*	*0.33*	*<0.01*	*<0.01*	*0.10*	*0.39*	*175.65*	*697.93*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH2*	*175.47*	*697.21*	*<0.01*	*0.01*	*0.08*	*0.33*	*<0.01*	*<0.01*	*0.10*	*0.39*	*175.65*	*697.93*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Six (6) 400-bbl Condensate Tanks Routed to Vapor Combustor - Modify [2]	*EU-TANKS-COND*	-	-	-	-	-	-	-	-	-	-	-	-
Six (6) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Modify [2]	*EU-TANKS-PW*	-	-	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-COND*	*<0.01*	*<0.01*	*0.03*	*0.10*	*0.65*	*2.60*	-	-	-	-	*0.65*	*2.60*
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-PW*	*<0.01*	*<0.01*	*0.04*	*0.16*	*1.00*	*3.98*	-	-	-	-	*1.00*	*3.98*
One (1) 20.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Modify	*APC-COMB*	*2,339.54*	*9,296.09*	*0.04*	*0.18*	*1.10*	*4.38*	*<0.01*	*0.02*	*1.31*	*5.22*	*2,341.96*	*9,305.69*
Vapor Combustor Pilots	*EU-PILOTS*	*10.59*	*42.06*	*<0.01*	*<0.01*	*<0.01*	*0.02*	*<0.01*	*<0.01*	*0.01*	*0.02*	*10.60*	*42.11*
Fugitive Emissions - Modify	*EU-FUG*	*0.01*	*0.02*	*1.03*	*4.09*	*25.72*	*102.21*	-	-	-	-	*25.73*	*102.23*
Fugitive Haul Road Emissions - Modify	*EU-HR*	-	-	-	-	-	-	-	-	-	-	-	-
Post-Modification Allowable Emissions =		**3,713.01**	**14,753.50**	**1.16**	**4.63**	**29.12**	**115.71**	**0.01**	**0.03**	**2.08**	**8.25**	**3,744.20**	**14,877.45**
Current Permit Allowable Emissions =		**3,146.29**	**12,501.67**	**0.57**	**2.28**	**12.07**	**47.84**	**0.01**	**0.02**	**1.83**	**7.29**	**3,160.19**	**12,556.80**
Net Allowable Emissions =		**566.72**	**2,251.83**	**0.59**	**2.35**	**17.05**	**67.87**	**<0.01**	**0.01**	**0.25**	**0.96**	**584.01**	**2,320.65**

Notes:
[1] CO_2 Equivalent = Pollutant times GWP multiplier. 40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298
[2] Per API Compendium (2009) Chapter 5: Because most of the CH_4 and CO_2 emissions from storage tanks occur as a result of flashing (which is controlled by the vapor combustor in this case), working and breathing loss emissions of these gases are very small in production and virtually non-existent in the downstream segments. Vapors from the tanks are routed to the vapor combustor at this site. Therefore, GHG emissions from the condensate and produced water tanks are assumed to be negligible.

SWN Production Company, LLC
Brooke County Parks Pad
Summary of Greenhouse Gas Emissions - Short Tons per Year (Tons)

Equipment	Unit ID	Carbon Dioxide (CO_2)		Methane (CH_4)		Methane (CH_4) as $CO_{2\ Eq.}$		Nitrous Oxide (N_2O)		Nitrous Oxide (N_2O) as $CO_{2\ Eq.}$		Total CO_2 + $CO_{2\ Eq.}$ [1]	
		lb/hr	tons/yr[2]	lb/hr	tons/yr[2]	lb/hr	tons/yr	lb/hr	tons/yr[2]	lb/hr	tons/yr	lb/hr	tons/yr
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter	EU-ENG1	155.04	679.06	<0.01	0.01	0.07	0.30	<0.01	<0.01	0.08	0.36	155.19	679.73
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	EU-ENG2	155.04	679.06	<0.01	0.01	0.07	0.30	<0.01	<0.01	0.08	0.36	155.19	679.73
1.0-mmBtu/hr GPU Burner	EU-GPU1	116.98	512.36	<0.01	0.01	0.06	0.24	<0.01	<0.01	0.07	0.29	117.10	512.89
1.0-mmBtu/hr GPU Burner	EU-GPU2	116.98	512.36	<0.01	0.01	0.06	0.24	<0.01	<0.01	0.07	0.29	117.10	512.89
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU3*	*116.98*	*512.36*	*<0.01*	*0.01*	*0.06*	*0.24*	*<0.01*	*<0.01*	*0.07*	*0.29*	*117.10*	*512.89*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU4*	*116.98*	*512.36*	*<0.01*	*0.01*	*0.06*	*0.24*	*<0.01*	*<0.01*	*0.07*	*0.29*	*117.10*	*512.89*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU5*	*116.98*	*512.36*	*<0.01*	*0.01*	*0.06*	*0.24*	*<0.01*	*<0.01*	*0.07*	*0.29*	*117.10*	*512.89*
1.0-mmBtu/hr GPU Burner - Add	*EU-GPU6*	*116.98*	*512.36*	*<0.01*	*0.01*	*0.06*	*0.24*	*<0.01*	*<0.01*	*0.07*	*0.29*	*117.10*	*512.89*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH1*	*175.47*	*768.54*	*<0.01*	*0.01*	*0.08*	*0.36*	*<0.01*	*<0.01*	*0.10*	*0.43*	*175.65*	*769.33*
1.5-mmBtu/hr Stabilizer Heater - Add	*EU-SH2*	*175.47*	*768.54*	*<0.01*	*0.01*	*0.08*	*0.36*	*<0.01*	*<0.01*	*0.10*	*0.43*	*175.65*	*769.33*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH1*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
1.5-mmBtu/hr Line Heater - Remove	*EU-LH2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Six (6) 400-bbl Condensate Tanks Routed to Vapor Combustor - Modify [3]	*EU-TANKS-COND*	-	-	-	-	-	-	-	-	-	-	-	-
Six (6) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Modify [3]	*EU-TANKS-PW*	-	-	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-COND*	*<0.01*	*<0.01*	*0.03*	*0.11*	*0.65*	*2.86*	-	-	-	-	*0.65*	*2.87*
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Modify	*EU-LOAD-PW*	*<0.01*	*<0.01*	*0.04*	*0.18*	*1.00*	*4.38*	-	-	-	-	*1.00*	*4.39*
One (1) 20.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Modify	*APC-COMB*	*2,339.54*	*10,247.19*	*0.04*	*0.19*	*1.10*	*4.83*	*<0.01*	*0.02*	*1.31*	*5.76*	*2,341.96*	*10,257.77*
Vapor Combustor Pilots	*EU-PILOTS*	*10.59*	*46.37*	*<0.01*	*<0.01*	*<0.01*	*0.02*	*<0.01*	*<0.01*	*0.01*	*0.03*	*10.60*	*46.42*
Fugitive Emissions - Modify	*EU-FUG*	*0.01*	*0.02*	*1.03*	*4.51*	*25.72*	*112.67*	-	-	-	-	*25.73*	*112.69*
Fugitive Haul Road Emissions - Modify	*EU-HR*	-	-	-	-	-	-	-	-	-	-	-	-
Post-Modification Allowable Emissions =		**3,713.01**	**16,262.95**	**1.16**	**5.10**	**29.12**	**127.54**	**0.01**	**0.03**	**2.08**	**9.09**	**3,744.20**	**16,399.58**
Current Permit Allowable Emissions =		**3,146.29**	**13,780.73**	**0.57**	**2.51**	**12.07**	**52.73**	**0.01**	**0.02**	**1.83**	**8.04**	**3,160.19**	**13,841.50**
Net Allowable Emissions =		**566.72**	**2,482.22**	**0.59**	**2.59**	**17.05**	**74.81**	**<0.01**	**0.01**	**0.25**	**1.05**	**584.01**	**2,558.08**

Notes:

[1] CO_2 Equivalent = Pollutant times GWP multiplier. 40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO_2 = 1, CH_4 = 25, N_2O = 298

[2] EPA and API GHG calculation methodologies calculate emissions in metric tons (tonnes). These values have been converted to short tons for consistency with permitting threshold units.

[3] Per API Compendium (2009) Chapter 5: Because most of the CH_4 and CO_2 emissions from storage tanks occur as a result of flashing (which is controlled by the vapor combustor in this case), working and breathing loss emissions of these gases are very small in production and virtually non-existent in the downstream segments. Vapors from the tanks are routed to the vapor combustor at this site. Therefore, GHG emissions from the condensate and produced water tanks are assumed to be negligible.

SWN Production Company, LLC
Brooke County Parks Pad
Engine Emissions Calculations - Criteria Air Pollutants

Equipment Information

Unit ID:	EU-ENG1	EU-ENG2
Emission Point ID:	EP-ENG1	EP-ENG2
Make:	Caterpillar	Caterpillar
Model:	G3306 NA	G3306 NA
Design Class:	4S-RB	4S-RB
Controls:	NSCR	NSCR
Horsepower (hp):	145	145
Fuel Use (Btu/hp-hr):	8,625	8,625
Fuel Use (scfh):	1,382	1,382
Annual Fuel Use (mmscf):	12.11	12.11
Fuel Use (mmBtu/hr):	1.25	1.25
Exhaust Flow (acfm):	678	678
Exhaust Temp (°F):	1,101	1,101
Serial Number:	To be determined	To be determined
Manufacture Date:	after 1/1/2011	After 1/1/2011
Operating Hours:	8,760	8,760
Fuel Heating Value (Btu/scf):	905	905

Uncontrolled Manufacturer Emission Factors [1]

NOx (g/hp-hr):	13.47	13.47
CO (g/hp-hr):	13.47	13.47
NMNEHC/VOC (g/hp-hr):	0.22	0.22

Post-Catalyst Emission Factors

NOx Control Eff. %	92.58%	92.58%
CO Control Eff. %	85.15%	85.15%
VOC Control Eff. %	0.00%	0.00%
NOx (g/hp-hr):	1.00	1.00
CO (g/hp-hr):	2.00	2.00
NMNEHC/VOC (g/hp-hr):	0.70	0.70

Uncontrolled Criteria Air Pollutant Emissions

Unit ID:	EU-ENG1		EU-ENG2	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
NOx	4.31	18.86	4.31	18.86
CO	4.31	18.86	4.31	18.86
NMNEHC/VOC (does not include HCHO)	0.07	0.31	0.07	0.31
SO_2	<0.01	<0.01	<0.01	<0.01
$PM_{10/2.5}$	0.01	0.05	0.01	0.05
PM_{COND}	0.01	0.05	0.01	0.05
PM_{TOT}	0.02	0.11	0.02	0.11

SWN Production Company, LLC
Brooke County Parks Pad
Engine Emissions Calculations - Criteria Air Pollutants (Continued)

Proposed Criteria Air Pollutant Emissions[2]

Unit ID:	EU-ENG1		EU-ENG2	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
NOx	0.32	1.40	0.32	1.40
CO	0.64	2.80	0.64	2.80
NMNEHC/VOC (does not include HCHO)	0.22	0.98	0.22	0.98
SO_2	<0.01	<0.01	<0.01	<0.01
$PM_{10/2.5}$	0.01	0.05	0.01	0.05
PM_{COND}	0.01	0.05	0.01	0.05
PM_{TOT}	0.02	0.11	0.02	0.11

AP-42 Emission Factors (lb/mmBtu)[3]

	4S-RB
Pollutant	**3.2-3 (7/00)**
SO_2	5.88E-04
$PM_{10/2.5}$	9.50E-03
PM_{COND}	9.91E-03
PM_{TOT}	1.94E-02

Notes:

[1] Uncontrolled emission factors based on engine manufacturer data. Per Caterpillar, NMNEHC emission factor does not include formaldehyde (HCHO); therefore, NMNEHC and HCHO factors have been added to demonstrate total uncontrolled VOC.

[2] Post-catalyst emission factors based on catalyst manufacturer data and/or NSPS Subpart JJJJ limits, if applicable.

[3] Per AP-42, all particulate matter (PM) from combustion of natural gas (total, condensable and filterable PM) is presumed <1 micrometer in diameter.

SWN Production Company, LLC
Brooke County Parks Pad
Engine Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Unit ID:	**EU-ENG1**	**EU-ENG2**
Emission Point ID:	EP-ENG1	EP-ENG2
Make:	Caterpillar	Caterpillar
Model:	G3306 NA	G3306 NA
Design Class:	4S-RB	4S-RB
Controls:	NSCR	NSCR
Horsepower (hp):	145	145
Fuel Use (Btu/hp-hr):	8,625	8,625
Fuel Use (scfh):	1,382	1,382
Annual Fuel Use (mmscf):	12.11	12.11
Fuel Use (mmBtu/hr):	1.25	1.25
Exhaust Flow (acfm):	678	678
Exhaust Temp (°F):	1,101	1,101
Operating Hours:	8,760	8,760

Uncontrolled HAP Emissions

Unit ID:	**EU-ENG1**		**EU-ENG2**	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Acetaldehyde	<0.01	0.02	<0.01	0.02
Acrolein	<0.01	0.01	<0.01	0.01
Benzene	<0.01	0.01	<0.01	0.01
Ethylbenzene	<0.01	<0.01	<0.01	<0.01
Formaldehyde	0.09	0.38	0.09	0.38
Methanol	<0.01	0.02	<0.01	0.02
Toluene	<0.01	<0.01	<0.01	<0.01
Xylenes	<0.01	<0.01	<0.01	<0.01
Total HAPs =	**0.10**	**0.44**	**0.10**	**0.44**

Proposed HAP Emissions[1]

Unit ID:	**EU-ENG1**		**EU-ENG2**	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Acetaldehyde	<0.01	0.02	<0.01	0.02
Acrolein	<0.01	0.01	<0.01	0.01
Benzene	<0.01	0.01	<0.01	0.01
Ethylbenzene	<0.01	<0.01	<0.01	<0.01
Formaldehyde	0.02	0.09	0.02	0.09
Methanol	<0.01	0.02	<0.01	0.02
Toluene	<0.01	<0.01	<0.01	<0.01
Xylenes	<0.01	<0.01	<0.01	<0.01
Total HAPs =	**0.03**	**0.15**	**0.03**	**0.15**

SWN Production Company, LLC
Brooke County Parks Pad
Engine Emissions Calculations - Hazardous Air Pollutants (Continued)

AP-42 Emission Factors (lb/mmBtu)

4S-RB

Pollutant	3.2-3 (7/00)
Acetaldehyde	2.79E-03
Acrolein	2.63E-03
Benzene	1.58E-03
Ethylbenzene	2.18E-05
Methanol	3.06E-03
Toluene	5.58E-04
Xylenes	1.95E-04

Notes:
[1] For conservative estimate, no reduction taken for any HAP other than formaldehyde.
Manuf. data for uncontrolled formaldehyde emissions (g/hp-hr): 0.27
Controlled (76% Control Efficiency) = 0.06

SWN Production Company, LLC
Brooke County Parks Pad
Engine Emissions Calculations - Greenhouse Gases

Equipment Information

Unit ID:	**EU-ENG1**	**EU-ENG2**
Emission Point ID:	EP-ENG1	EP-ENG2
Make:	Caterpillar	Caterpillar
Model:	G3306 NA	G3306 NA
Design Class:	4S-RB	4S-RB
Controls:	NSCR	NSCR
Horsepower (hp):	145	145
Fuel Use (Btu/hp-hr):	8,625	8,625
Fuel Use (scfh):	1,382	1,382
Fuel Use (mmBtu/hr):	1.25	1.25
Exhaust Flow (acfm):	678	678
Exhaust Temp (°F):	1,101	1,101
Operating Hours:	8,760	8,760

Manufacturer data used to calculate CO_2 emissions (g/hp-hr):

Greenhouse Gas (GHG) Emissions[1]

Unit ID:	**EU-ENG1**		**EU-ENG2**	
Pollutant	**lb/hr**	**tonnes/yr**	**lb/hr**	**tonnes/yr**
CO_2	155.04	616.04	155.04	616.04
CH_4	<0.01	0.01	<0.01	0.01
N_2O	<0.01	<0.01	<0.01	<0.01
CH_4 as CO_2e	0.07	0.27	0.07	0.27
N_2O as CO_2e	0.08	0.33	0.08	0.33
Total CO_2 + CO_2e =	**155.19**	**616.64**	**155.19**	**616.64**

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)[2]

Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Notes:
[1] Conversion to short tons (tons) found in site-wide Summary of Greenhouse Gases - Short Tons per Year (tons) table.
[2] CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298

SWN Production Company, LLC
Brooke County Parks Pad
Gas Production Unit Burner Emissions Calculations - Criteria Air Pollutants

Equipment Information

Unit ID:	**EU-GPU1 to EU-GPU6 (EACH)**
Emission Point ID:	EP-GPU1 to EP-GPU6 (EACH)
Description:	Gas Production Unit Burner
Number of Units:	6
Burner Design (mmBtu/hr):	1.00
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	9.68
Annual Operating Hours:	8,760

Criteria Air Pollutant Emissions

Unit ID: **EU-GPU1 to EU-GPU6 (EACH)**

Pollutant	lb/hr	TPY
NOx	0.11	0.48
CO	0.09	0.41
VOC	0.01	0.03
SO_2	<0.01	<0.01
$PM_{10/2.5}$	0.01	0.03
PM_{COND}	<0.01	0.01
PM_{TOT}	0.01	0.04

AP-42 Emission Factors for Units <100 mmBtu/hr (lb/mmscf)[1]

Pollutant	1.4-1, -2 (7/98)
NOx	100.0
CO	84.0
VOC	5.5
SO_2	0.6
$PM_{10/2.5}$	5.7
PM_{COND}	1.9
PM_{TOT}	7.6

Notes:
[1] All PM (total, condensable and filterable) is assumed to be <1 micrometer in diameter. Total PM is the sum of filterable PM and condensable PM.

SWN Production Company, LLC
Brooke County Parks Pad
Gas Production Unit Burner Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Unit ID:	**EU-GPU1 to EU-GPU6 (EACH)**
Emission Point ID:	EP-GPU1 to EP-GPU6 (EACH)
Description:	Gas Production Unit Burner
Number of Units:	6
Burner Design (mmBtu/hr):	1.00
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	9.68
Annual Operating Hours:	8,760

Hazardous Air Pollutant Emissions

Unit ID: **EU-GPU1 to EU-GPU6 (EACH)**

Pollutant	lb/hr	TPY
n-Hexane	<0.01	0.01
Formaldehyde	<0.01	<0.01
Benzene	<0.01	<0.01
Toluene	<0.01	<0.01
Total HAPs =	**<0.01**	**0.01**

AP-42 Emission Factors (lb/mmscf)

Pollutant	1.4-3 (7/98)
n-Hexane	1.80E+00
Formaldehyde	7.50E-02
Benzene	2.10E-03
Toluene	3.40E-03

SWN Production Company, LLC
Brooke County Parks Pad
Gas Production Unit Burner Emissions Calculations - Greenhouse Gases

Equipment Information

Unit ID:	**EU-GPU1 to EU-GPU6 (EACH)**
Emission Point ID:	EP-GPU1 to EP-GPU6 (EACH)
Description:	Gas Production Unit Burner
Number of Units:	6
Burner Design (mmBtu/hr):	1.00
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	9.68
Annual Operating Hours:	8,760

Greenhouse Gas (GHG) Emissions[1]

Unit ID: **EU-GPU1 to EU-GPU6 (EACH)**

Pollutant	lb/hr	tonnes/yr
CO_2	116.98	464.80
CH_4	<0.01	0.01
N_2O	<0.01	<0.01
CH_4 as CO_2e	0.06	0.22
N_2O as CO_2e	0.07	0.26
Total CO_2 + CO_2e =	**117.10**	**465.28**

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)[2]

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Notes:
[1] Conversion to short tons (tons) found in site-wide Summary of Greenhouse Gases - Short Tons per Year (tons) table.
[2] CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298

SWN Production Company, LLC
Brooke County Parks Pad
Stabilizer Heater Emissions Calculations - Criteria Air Pollutants

Equipment Information

Unit ID:	**EU-SH1 - EU-SH2 (EACH)**
Emission Point ID:	EP-SH1 - EP-SH2
Description:	Stabilizer Heater
Number of Units:	1
Burner Design (mmBtu/hr):	1.50
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	14.52
Annual Operating Hours:	8,760

Criteria Air Pollutant Emissions

Unit ID: **EU-SH1 - EU-SH2 (EACH)**

Pollutant	lb/hr	TPY
NOx	0.17	0.73
CO	0.14	0.61
VOC	0.01	0.04
SO_2	<0.01	<0.01
$PM_{10/2.5}$	0.01	0.04
PM_{COND}	<0.01	0.01
PM_{TOT}	0.01	0.06

AP-42 Emission Factors for Units <100 mmBtu/hr (lb/mmscf)[1]

Pollutant	1.4-1, -2 (7/98)
NOx	100.0
CO	84.0
VOC	5.5
SO_2	0.6
$PM_{10/2.5}$	5.7
PM_{COND}	1.9
PM_{TOT}	7.6

Notes:
[1] All PM (total, condensable and filterable) is assumed to be <1 micrometer in diameter. Total PM is the sum of filterable PM and condensable PM.

SWN Production Company, LLC
Brooke County Parks Pad
Stabilizer Heater Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Unit ID:	**EU-SH1 - EU-SH2 (EACH)**
Emission Point ID:	EP-SH1 - EP-SH2
Description:	Stabilizer Heater
Number of Units:	1
Burner Design (mmBtu/hr):	1.5
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	14.52
Annual Operating Hours:	8760

Hazardous Air Pollutant Emissions

Unit ID: **EU-SH1 - EU-SH2 (EACH)**

Pollutant	lb/hr	TPY
n-Hexane	<0.01	0.01
Formaldehyde	<0.01	<0.01
Benzene	<0.01	<0.01
Toluene	<0.01	<0.01
Total HAPs =	**<0.01**	**0.01**

AP-42 Emission Factors (lb/mmscf)

Pollutant	1.4-3 (7/98)
n-Hexane	1.80E+00
Formaldehyde	7.50E-02
Benzene	2.10E-03
Toluene	3.40E-03

SWN Production Company, LLC
Brooke County Parks Pad
Stabilizer Heater Emissions Calculations - Greenhouse Gases

Equipment Information

Unit ID:	**EU-SH1 - EU-SH2 (EACH)**
Emission Point ID:	EP-SH1 - EP-SH2
Description:	Stabilizer Heater
Number of Units:	1
Burner Design (mmBtu/hr):	1.5
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	14.52
Annual Operating Hours:	8760

Greenhouse Gas (GHG) Emissions[1]

Unit ID: **EU-SH1 - EU-SH2 (EACH)**

Pollutant	lb/hr	tonnes/yr
CO_2	175.47	697.21
CH_4	<0.01	0.01
N_2O	<0.01	<0.01
CH_4 as CO_2e	0.08	0.33
N_2O as CO_2e	0.10	0.39
Total CO_2 + CO_2e =	**175.65**	**697.93**

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)[2]

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Notes:
[1] Conversion to short tons (tons) found in site-wide Summary of Greenhouse Gases - Short Tons per Year (tons) table.
[2] CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298

SWN Production Company, LLC
Brooke County Parks Pad
Storage Tank Emissions - Criteria Air Pollutants

Tank Information

Unit ID:	EU-TANKS-COND	EU-TANKS-PW
Emission Point ID:	APC-COMB	APC-COMB
Contents: [1]	Condensate	Produced Water
Number of Tanks: [2]	6	6
Capacity (bbl) - Per Tank:	400	400
Capacity (gal) - Per Tank:	16,800	16,800
Total Throughput (bbl/yr):	596,410	912,500
Total Throughput (gal/yr):	25,049,220	38,325,000
Total Throughput (bbl/d):	1,634.0	2,500.0
Tank Flashing Emission Factor (lb/bbl):	4.9244	0.2203
Working Losses Per Tank (lb/yr): [3]	13,530.66	194.24
Breathing Losses Per Tank (lb/yr): [3]	9,329.86	64.71
Tank Vapor Capture Efficiency:	100%	100%
Captured Vapors Routed to:	Vapor Combustor	Vapor Combustor

Uncontrolled Storage Tank Emissions

Unit ID:	EU-TANKS-COND		EU-TANKS-PW	
Emissions	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Working Losses	9.27	40.59	0.13	0.58
Breathing Losses	6.39	27.99	0.04	0.19
Flashing Losses	333.04	1,458.73	27.52	120.54
Total VOC =	**348.70**	**1,527.31**	**27.70**	**121.32**

SWN Production Company, LLC
Brooke County Parks Pad
Storage Tank Emissions - Criteria Air Pollutants (Continued)

Controlled Storage Tank Emissions

Unit ID:	EU-TANKS-COND		EU-TANKS-PW	
Emissions	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Working Losses	0.19	0.81	<0.01	0.01
Breathing Losses	0.13	0.56	<0.01	<0.01
Flashing Losses	6.66	29.17	0.55	2.41
Total VOC =	**6.97**	**30.55**	**0.55**	**2.43**
Per Tank =	**1.16**	**5.09**	**0.09**	**0.40**

Notes:

[1] Produced water tanks assumed to contain 99% produced water and 1% condensate.

[2] SWN requests to combine working, breathing and flashing emissions from each tank type to be combined into one emissions point with a total throughput limit rather than an individual tank limit.

[3] Tank working, breathing, and flashing emissions were calculated using Promax process simulation. Reports located in Attachment L. Uncontrolled tank working/breathing/flashing emissions are routed to a vapor combustor with 100% capture efficiency.

SWN Production Company, LLC
Brooke County Parks Pad
Storage Tank Emissions - Hazardous Air Pollutants

Uncontrolled Storage Tank Emissions

Unit ID:	EU-TANKS-COND		EU-TANKS-PW	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Total VOC = [1]	**348.70**	**1,527.31**	**27.70**	**121.32**
n-Hexane	19.26	84.36	1.53	6.70
Benzene	0.24	1.06	0.02	0.08
Toluene	1.25	5.50	0.10	0.44
Ethylbenzene	1.24	5.45	0.10	0.43
Xylenes	5.82	25.47	0.46	2.02
Total HAPs =	**27.82**	**121.83**	**2.21**	**9.68**

Controlled Storage Tank Emissions

Unit ID:	EU-TANKS-COND		EU-TANKS-PW	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Total VOC = [1]	**6.97**	**30.55**	**0.55**	**2.43**
n-Hexane	0.39	1.69	0.03	0.13
Benzene	<0.01	0.02	<0.01	<0.01
Toluene	0.03	0.11	<0.01	0.01
Ethylbenzene	0.02	0.11	<0.01	0.01
Xylenes	0.12	0.51	0.01	0.04
Total HAPs =	**0.56**	**2.44**	**0.04**	**0.19**

SWN Production Company, LLC
Brooke County Parks Pad
Storage Tank Emissions - Hazardous Air Pollutants (Continued)

Estimated HAP Composition (% by Weight)[3]

Pollutant	Wt%
n-Hexane	5.523%
Benzene	0.069%
Toluene	0.360%
Ethylbenzene	0.357%
Xylenes	1.668%
Total HAPs =	**7.977%**

Notes:

[1] VOC emissions calculated in Criteria Air Pollutant calculations.

[2] Uncontrolled tank working/breathing/flashing emissions are routed to a vapor combustor with 100% capture efficiency.

[3] Speciated liquids analysis located in Fugitive Emissions Calculations. HAP weight % calculated as % of total hydrocarbons in the sample. All HAP assumed to volatilize from liquids for most conservative emissions estimate.

SWN Production Company, LLC
Brooke County Parks Pad
Condensate Truck Loading Emissions - Criteria and Hazardous Air Pollutants

Loading Information

Unit ID:	**EU-LOAD-COND**
Emission Point ID:	APC-COMB
Fill Method:	Submerged
Type of Service:	Dedicated
Mode of Operation:	Normal
Saturation Factor:	0.6
Throughput (1000 gal):	25,049.22
Control Type:	Vapor Return/Combustion
Vapor Capture Efficiency: [1]	70%
Average Fill Rate (gal/hr):	7,500
Captured Vapors Routed to:	Vapor Combustor

Uncontrolled Loading Emissions[2]

Pollutant	Max. lb/hr	Avg. lb/hr	TPY
VOC[3] =	**40.57**	**20.61**	**90.25**
n-Hexane	2.24	1.14	4.98
Benzene	0.03	0.01	0.06
Toluene	0.15	0.07	0.32
Ethylbenzene	0.14	0.07	0.32
Xylenes	0.68	0.34	1.51
Total HAPs [4] =	**3.24**	**1.64**	**7.20**

SWN Production Company, LLC
Brooke County Parks Pad
Condensate Truck Loading Emissions - Criteria and Hazardous Air Pollutants (Continued)

Uncaptured Loading Emissions[2]

Pollutant	Max. lb/hr	Avg. lb/hr	TPY
VOC[3] =	**12.17**	**6.18**	**27.08**
n-Hexane	0.67	0.34	1.50
Benzene	0.01	<0.01	0.02
Toluene	0.04	0.02	0.10
Ethylbenzene	0.04	0.02	0.10
Xylenes	0.20	0.10	0.45
Total HAPs [4] =	**0.97**	**0.49**	**2.16**

Notes:

[1] Uncontrolled emissions that are captured by the collection system are routed to a vapor combustor. Per AP-42 5.2-6, 70% capture efficiency can be assumed for trucks not subject to NSPS. Uncaptured emissions shown represent those not captured by the collection system or controlled by the vapor combustor.

[2] Maximum lb/hr based on average hourly truck loading rate. Average lb/hr based on TPY conversion assuming continuous operation.

[3] Loading losses calculated using Promax process simulation.

[4] Speciated liquids analysis located in Fugitive Emissions Calculations. HAP weight % calculated as % of total hydrocarbons in the sample. All HAP assumed to volatilize from liquids for most conservative emissions estimate.

Pollutant	Wt%
n-Hexane	5.523%
Benzene	0.069%
Toluene	0.360%
Ethylbenzene	0.357%
Xylenes	1.668%
Total HAPs =	**7.977%**

SWN Production Company, LLC
Brooke County Parks Pad
Condensate Truck Loading Emissions - Greenhouse Gases

Loading Information

Unit ID:	**EU-LOAD-COND**
Emission Point ID:	APC-COMB
Fill Method:	Submerged
Type of Service:	Dedicated
Mode of Operation:	Normal
TOC Em. Factor (tonne/10^6 gal): [1]	0.91
Throughput (10^6 gal):	25.049
Control Type:	Vapor Return/Combustion
Vapor Capture Efficiency: [2]	70.00%
Average Fill Rate (gal/hr):	7,500
Captured Vapors Routed to:	Vapor Combustor

Input CH_4 from analysis =	1.52%
Input CO_2 from analysis =	0.0425%

Uncontrolled Loading Emissions[3, 4]

Pollutant	Max. lb/hr	Avg. lb/hr	tonnes/yr	tons/yr
CH_4	0.23	0.09	0.35	0.38
CH_4 as CO_2e	5.72	2.18	8.66	9.55
CO_2	0.01	<0.01	0.01	0.01
Total CO_2 + CO_2e =	**5.72**	**2.18**	**8.67**	**9.56**

SWN Production Company, LLC
Brooke County Parks Pad
Condensate Truck Loading Emissions - Greenhouse Gases (Continued)

Uncaptured Loading Emissions[3, 4]

Pollutant	Max. lb/hr	Avg. lb/hr	tonnes/yr	tons/yr
CH_4	0.07	0.03	0.10	0.11
CH_4 as CO_2e	1.72	0.65	2.60	2.86
CO_2	<0.01	<0.01	<0.01	<0.01
Total CO_2 + CO_2e =	**1.72**	**0.65**	**2.60**	**2.87**

API Compendium Table 5-12

Loading Type	Emission Factor (tonne TOC/10^6 gal)
Rail/Truck - Submerged Loading - Dedicated Normal Service	0.91
Rail/Truck - Submerged Loading - Vapor Balance Service	1.51
Rail/Truck - Splash Loading - Dedicated Normal Service	2.20
Rail/Truck - Splash Loading - Vapor Balance Service	1.51
Marine Loading - Ships/Ocean Barges	0.28
Marine Loading - Barges	0.45

Notes:

1 API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry, Table 5-12.

2 Uncontrolled emissions that are captured by the collection system are routed to a vapor combustor. Per AP-42 5.2-6, 70% capture efficiency can be assumed for trucks not subject to NSPS. Uncaptured emissions shown represent those not captured by the collection system or controlled by the vapor combustor.

3 Maximum lb/hr based on average hourly truck loading rate. Average lb/hr based on TPY conversion assuming continuous operation.

4 CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298

SWN Production Company, LLC
Brooke County Parks Pad
Produced Water Truck Loading Emissions - Criteria and Hazardous Air Pollutants

Loading Information

Unit ID:	**EU-LOAD-PW**
Emission Point ID:	APC-COMB
Fill Method:	Submerged
Type of Service:	Dedicated
Mode of Operation:	Normal
Saturation Factor:	0.6
Throughput (1000 gal):	38,325
Control Type:	Vapor Return/Combustion
Vapor Capture Efficiency: [1]	70%
Average Fill Rate (gal/hr):	7,500
Captured Vapors Routed to:	Vapor Combustor

Uncontrolled Loading Emissions[2]

Pollutant	Max. lb/hr	Avg. lb/hr	TPY
VOC[3] =	**0.41**	**0.34**	**1.49**
n-Hexane	0.02	0.02	0.08
Benzene	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	0.01
Ethylbenzene	<0.01	<0.01	0.01
Xylenes	0.01	0.01	0.02
Total HAPs[4] =	**0.03**	**0.03**	**0.12**

SWN Production Company, LLC
Brooke County Parks Pad
Produced Water Truck Loading Emissions - Criteria and Hazardous Air Pollutants (Continued)

Uncaptured Loading Emissions[2]

Pollutant	Max. lb/hr	Avg. lb/hr	TPY
VOC[3] =	**0.12**	**0.10**	**0.45**
n-Hexane	0.01	0.01	0.02
Benzene	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01
Ethylbenzene	<0.01	<0.01	<0.01
Xylenes	<0.01	<0.01	0.01
Total HAPs[4] =	**0.01**	**0.01**	**0.04**

Notes:

[1] Uncontrolled emissions that are captured by the collection system are routed to a vapor combustor. Per AP-42 5.2-6, 70% capture efficiency can be assumed for trucks not subject to NSPS. Uncaptured emissions shown represent those not captured by the collection system or controlled by the vapor combustor.

[2] Maximum lb/hr based on average hourly truck loading rate. Average lb/hr based on TPY conversion assuming continuous operation.

[3] Loading losses calculated using Promax process simulation.

[4] Speciated liquids analysis located in Fugitive Emissions Calculations. HAP weight % calculated as % of total hydrocarbons in the sample. All HAP assumed to volatilize from liquids for most conservative emissions estimate.

Pollutant	Wt%
n-Hexane	5.523%
Benzene	0.069%
Toluene	0.360%
Ethylbenzene	0.357%
Xylenes	1.668%
Total HAPs =	**7.977%**

SWN Production Company, LLC
Brooke County Parks Pad
Produced Water Truck Loading Emissions - Greenhouse Gases

Loading Information

Unit ID:	**EU-LOAD-PW**
Emission Point ID:	APC-COMB
Fill Method:	Submerged
Type of Service:	Dedicated
Mode of Operation:	Normal
TOC Em. Factor (tonne/10^6 gal): [1]	0.91
Throughput (10^6 gal):	38.325
Control Type:	Vapor Return/Combustion
Vapor Capture Efficiency: [2]	70.00%
Average Fill Rate (gal/hr):	7,500
Captured Vapors Routed to:	Vapor Combustor

Input CH_4 wt% from analysis =	1.52%
Input CO_2 wt% from analysis =	0.0425%

Uncontrolled Loading Emissions[3, 4]

Pollutant	Max. lb/hr	Avg. lb/hr	tonnes/yr	tons/yr
CH_4	0.23	0.13	0.53	0.58
CH_4 as CO_2e	5.72	3.34	13.25	14.61
CO_2	0.01	<0.01	0.01	0.02
Total CO_2 + CO_2e =	**5.72**	**3.34**	**13.27**	**14.63**

SWN Production Company, LLC
Brooke County Parks Pad
Produced Water Truck Loading Emissions - Greenhouse Gases (Continued)

Uncaptured Loading Emissions[3, 4]

Pollutant	Max. lb/hr	Avg. lb/hr	tonnes/yr	tons/yr
CH_4	0.07	0.04	0.16	0.18
CH_4 as CO_2e	1.72	1.00	3.98	4.38
CO_2	<0.01	<0.01	<0.01	<0.01
Total CO_2 + CO_2e =	**1.72**	**1.00**	**3.98**	**4.39**

API Compendium Table 5-12

Loading Type	Emission Factor (tonne TOC/10^6 gal)
Rail/Truck - Submerged Loading - Dedicated Normal Service	0.91
Rail/Truck - Submerged Loading - Vapor Balance Service	1.51
Rail/Truck - Splash Loading - Dedicated Normal Service	2.20
Rail/Truck - Splash Loading - Vapor Balance Service	1.51
Marine Loading - Ships/Ocean Barges	0.28
Marine Loading - Barges	0.45

Notes:

[1] API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry, Table 5-12.

[2] Uncontrolled emissions that are captured by the collection system are routed to a vapor combustor. Per AP-42 5.2-6, 70% capture efficiency can be assumed for trucks not subject to NSPS. Uncaptured emissions shown represent those not captured by the collection system or controlled by the vapor combustor.

[3] Maximum lb/hr based on average hourly truck loading rate. Average lb/hr based on TPY conversion assuming continuous operation.

[4] CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298

SWN Production Company, LLC
Brooke County Parks Pad
Tanks/Loading Vapor Combustor Emissions Calculations - Criteria and Hazardous Air Pollutants

Criteria and Hazardous Air Pollutant Emissions

Unit ID	Pollutant	Emission Factors[1]	Total Captured Emissions[2]		Combustor Destruction Efficiency	Total Controlled Emissions (Post-Capture and Combustion)	
			lb/hr	TPY	%	lb/hr	TPY
APC-COMB	NOx	0.138	-	-	-	2.76	12.09
	CO	0.2755	-		-	5.51	24.13
	PM	7.6	-		-	0.06	0.25
	VOC	Mass Balance	391.06	1,712.85	98.00%	7.82	34.26
	n-Hexane	Mass Balance	21.60	94.60	98.00%	0.43	1.89
	Benzene	Mass Balance	0.27	1.18	98.00%	0.01	0.02
	Toluene	Mass Balance	1.41	6.16	98.00%	0.03	0.12
	Ethylbenzene	Mass Balance	1.40	6.12	98.00%	0.03	0.12
	Xylenes	Mass Balance	6.52	28.56	98.00%	0.13	0.57

Notes:

[1] Although a vapor combustor is not considered a flare by design, the function is consistent in that it combusts a waste stream for the purpose of reducing emissions; therefore, flare emission factors for NOx and CO were used to provide the most accurate emissions estimates. Although the combustor is designed to be smokeless, PM emissions have been estimated using AP-42 Table 1.4-1 factor (lb/mmscf) for a conservative estimate.

Hours per Year:	8,760	
Number of Combustors:	1	
NOx and CO emission factors (lb/mmBtu): *TCEQ Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers:* High Btu waste streams (>1,000 Btu/scf) based on heat input to each combustor =	20.00	mmBtu/hr per Combustor
	20.00	mmBtu/hr Total Heat Input

[2] Total captured emissions are based on 98% capture efficiency from storage tanks and 70% capture efficiency from truck loading with 98% destruction efficiency from the vapor combustor based on 8,760 hours of operation per year. Uncaptured vapors reported at tanks and loading emission units. Captured emissions from sources controlled by VOC combustor shown in following tables.

SWN Production Company, LLC
Brooke County Parks Pad
Tanks/Loading Vapor Combustor Emissions Calculations - Criteria and Hazardous Air Pollutants (Continued)

Source	Captured VOC Emissions	
	lb/hr	TPY
Condensate Storage Tanks	348.70	1,527.31
Produced Water Storage Tanks	27.70	121.32
Condensate Truck Loading	14.42	63.18
Produced Water Truck Loading	0.24	1.04
Total VOC =	**391.06**	**1,712.85**

Source	Captured HAP Emissions (lb/hr)				
	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes
Condensate Storage Tanks	19.26	0.24	1.25	1.24	5.82
Produced Water Storage Tanks	1.53	0.02	0.10	0.10	0.46
Condensate Truck Loading	0.80	0.01	0.05	0.05	0.24
Produced Water Truck Loading	0.01	<0.01	<0.01	<0.01	<0.01
Total HAP =	**21.60**	**0.27**	**1.41**	**1.40**	**6.52**

Source	Captured HAP Emissions (TPY)				
	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes
Condensate Storage Tanks	84.36	1.06	5.50	5.45	25.47
Produced Water Storage Tanks	6.70	0.08	0.44	0.43	2.02
Condensate Truck Loading	3.49	0.04	0.23	0.23	1.05
Produced Water Truck Loading	0.06	<0.01	<0.01	<0.01	0.02
Total HAP =	**94.60**	**1.18**	**6.16**	**6.12**	**28.56**

SWN Production Company, LLC
Brooke County Parks Pad
Tanks/Loading Vapor Combustor Emissions Calculations - Greenhouse Gases

Equipment Information

Unit ID:	**APC-COMB**
Description:	Vapor Combustor
Number of Combustors:	1
Burner Design Capacity (mmBtu/hr):	20.00
Stream HHV (Btu/scf):	2,682
Annual Throughput (mmscf):	65.32
Annual Operating Hours:	8,760

Greenhouse Gas (GHG) Emissions

Pollutant	lb/hr	tonnes/yr	tons/yr
CO_2	2,339.54	9,296.09	10,247.19
CH_4	0.04	0.18	0.19
N_2O	<0.01	0.02	0.02
CH_4 as CO_2e	1.10	4.38	4.83
N_2O as CO_2e	1.31	5.22	5.76
Total CO_2 + CO_2e =	**2,341.96**	**9,305.69**	**10,257.77**

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)[1]

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Notes:
[1] CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298

SWN Production Company, LLC
Brooke County Parks Pad
Vapor Combustor Pilot Emissions Calculations - Criteria Air Pollutants

Criteria Air Pollutant Emissions

Unit ID	Pollutant	Emission Factors [1] (lb/mmscf)	Emissions lb/hr	Emissions TPY
EU-PILOTS APC-COMB	NOx	100	0.01	0.04
	CO	84	0.01	0.04
	VOC	5.5	<0.01	<0.01
	SO_2	0.6	<0.01	<0.01
	PM	7.6	<0.01	<0.01

905	Pilot Stream Heat Content (Btu/SCF)
8,760	Pilot Hours/Yr
100	Total Pilot Gas Flow Rate (SCFH)[2]
90,500	Total Pilot Gas Fuel Use (Btu/hr)
0.88	Total Annual Fuel Use (MMSCF)

Notes:
[1] AP-42 Table 1.4-1, -2 (7/98)
[2] Vapor combustor is equipped with two (2) pilots with a pilot fuel consumption of 50 SCFH per pilot.

SWN Production Company, LLC
Brooke County Parks Pad
Vapor Combustor Pilot Emissions Calculations - Hazardous Air Pollutants

Hazardous Air Pollutant Emissions

Unit ID	Pollutant	Emission Factors [1] (lb/mmscf)	Emissions lb/hr	Emissions TPY
EU-PILOTS APC-COMB	n-Hexane	1.8	<0.01	<0.01
	Formaldehyde	0.075	<0.01	<0.01
	Benzene	0.0021	<0.01	<0.01
	Toluene	0.0034	<0.01	<0.01
		Total HAPs =	**<0.01**	**<0.01**

905	Pilot Stream Heat Content (Btu/SCF)
8,760	Pilot Hours/Yr
100	Total Pilot Gas Flow Rate (SCFH)[2]
90,500	Total Pilot Gas Fuel Use (Btu/hr)
0.88	Total Annual Fuel Use (MMSCF)

Notes:
[1] AP-42 Table 1.4-3 (7/98)
[2] Vapor combustor is equipped with two (2) pilots with a pilot fuel consumption of 50 SCFH per pilot.

SWN Production Company, LLC
Brooke County Parks Pad
Vapor Combustor Pilot Emissions Calculations - Greenhouse Gases

Greenhouse Gas (GHG) Emissions

Unit ID	Pollutant	Emissions		
		lb/hr	tonnes/yr	tons/yr
EU-PILOTS	CO_2	10.59	42.06	46.37
APC-COMB	CH_4	<0.01	<0.01	<0.01
	N_2O	<0.01	<0.01	<0.01
	CH_4 as CO_2e	<0.01	0.02	0.02
	N_2O as CO_2e	0.01	0.02	0.03
	Total CO_2 + CO_2e =	**10.60**	**42.11**	**46.42**

905	Pilot Stream Heat Content (Btu/SCF)
8,760	Pilot Hours/Yr
100	Total Pilot Gas Flow Rate (SCFH)[2]
90,500	Total Pilot Gas Fuel Use (Btu/hr)
0.88	Total Annual Fuel Use (MMSCF)

40 CFR 98 Tables C-1 and C-2 Emission Factors (kg/mmBtu)[1]

Carbon Dioxide (CO_2)	53.06
Methane (CH_4)	1.00E-03
Nitrous Oxide (N_2O)	1.00E-04

Notes:
[1] CO_2e = CO_2 equivalent (Pollutant times GWP multiplier):
40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO_2 = 1, CH_4 = 25, N_2O = 298
[2] Vapor combustor is equipped with two (2) pilots with a pilot fuel consumption of 50 SCFH per pilot.

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Emissions Calculations - Criteria and Hazardous Air Pollutants and Greenhouse Gases

Equipment Information

Source Type/Service	Number of Sources[1]	Em. Factor (lb/hr/source)[2]	Control Efficiency	TOC lb/hr	TOC TPY	VOC Wt %
Valves - Gas	100	9.92E-03	0.00%	0.99	4.35	27.42%
Flanges - Gas	398	8.60E-04	0.00%	0.34	1.50	27.42%
Compressor Seals - Gas	6	1.94E-02	0.00%	0.12	0.51	27.42%
Relief Valves - Gas	33	1.94E-02	0.00%	0.64	2.80	27.42%
Open-Ended Lines - Gas	0	4.41E-03	0.00%	0.00	0.00	27.42%
			Total TOC (Gas Components) =	**2.09**	**9.16**	-
Valves - Light Oil	81	5.51E-03	0.00%	0.45	1.96	97.19%
Connectors - Light Oil	318	4.63E-04	0.00%	0.15	0.64	97.19%
Pump Seals - Light Oil	0	2.87E-02	0.00%	0.00	0.00	97.19%
Other - Light Oil	0	1.65E-02	0.00%	0.00	0.00	97.19%
			Total TOC (Liquid Components) =	**0.59**	**2.60**	-

VOC and Greenhouse Gas Emissions

Source Type/Service	VOC		CH_4		CO_2	
	lb/hr	**TPY**	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Valves - Gas	0.27	1.19	0.49	2.13	<0.01	0.01
Flanges - Gas	0.09	0.41	0.17	0.73	<0.01	<0.01
Compressor Seals - Gas	0.03	0.14	0.06	0.25	<0.01	<0.01
Relief Valves - Gas	0.18	0.77	0.31	1.37	<0.01	0.01
Open-Ended Lines - Gas	0.00	0.00	0.00	0.00	0.00	0.00
Components in Gas Service =	**0.57**	**2.51**	**1.02**	**4.49**	**0.01**	**0.02**
Valves - Light Oil	0.43	1.90	<0.01	0.01	<0.01	<0.01
Connectors - Light Oil	0.14	0.63	<0.01	<0.01	<0.01	<0.01
Pump Seals - Light Oil	0.00	0.00	0.00	0.00	0.00	0.00
Other - Light Oil	0.00	0.00	0.00	0.00	0.00	0.00
Components in Liquid Service =	**0.58**	**2.53**	**<0.01**	**0.02**	**<0.01**	**<0.01**
Total (Gas + Liquid Components) =	**1.15**	**5.04**	**1.03**	**4.51**	**0.01**	**0.02**

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Emissions Calculations (Continued)

Hazardous Air Pollutant (HAP) Emissions (lb/hr)

Source Type/Service	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes	2,2,4-Tri.	Total
Valves - Gas	0.01	<0.01	<0.01	<0.01	<0.01	0.00	0.01
Flanges - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	<0.01
Compressor Seals - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	<0.01
Relief Valves - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	<0.01
Open-Ended Lines - Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Components in Gas Service =	**0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.00**	**0.01**
Valves - Light Oil	0.02	<0.01	<0.01	<0.01	0.01	0.00	0.04
Connectors - Light Oil	0.01	<0.01	<0.01	<0.01	<0.01	0.00	0.01
Pump Seals - Light Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other - Light Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Components in Liquid Service =	**0.03**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.00**	**0.05**
Total (Gas + Liquid Components) =	**0.05**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.00**	**0.06**

Hazardous Air Pollutant (HAP) Emissions (TPY)

Source Type/Service	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes	2,2,4-Tri.	Total
Valves - Gas	0.03	<0.01	<0.01	<0.01	<0.01	0.00	0.03
Flanges - Gas	0.01	<0.01	<0.01	<0.01	<0.01	0.00	0.01
Compressor Seals - Gas	<0.01	<0.01	<0.01	<0.01	<0.01	0.00	<0.01
Relief Valves - Gas	0.02	<0.01	<0.01	<0.01	<0.01	0.00	0.02
Open-Ended Lines - Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Components in Gas Service =	**0.06**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.00**	**0.06**
Valves - Light Oil	0.11	<0.01	0.01	0.01	0.03	0.00	0.16
Connectors - Light Oil	0.04	<0.01	<0.01	<0.01	0.01	0.00	0.05
Pump Seals - Light Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other - Light Oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Components in Liquid Service =	**0.14**	**<0.01**	**0.01**	**0.01**	**0.04**	**0.00**	**0.21**
Total (Gas + Liquid Components) =	**0.20**	**<0.01**	**0.01**	**0.01**	**0.04**	**0.00**	**0.27**

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Emissions Calculations (Continued)

Typical Component Count per Equipment Type based on Representative Facility[3]

Source Type/Service	WH	GPU	HT	LPT	FGC	OT	TT-O
Valves - Gas	12	3	2	5	5	0	0
Flanges - Gas	37	15	9	24	33	3	2
Compressor Seals - Gas	0	0	0	0	3	0	0
Relief Valves - Gas	1	3	1	1	1	1	1
Open-Ended Lines - Gas	0	0	0	0	0	0	0
Valves - Light Oil	0	5	6	12	3	6	9
Connectors - Light Oil	0	20	24	48	12	24	30
Pump Seals - Light Oil	0	0	0	0	0	0	0
Other - Light Oil	0	0	0	0	0	0	0

Equipment Type	WH	GPU	HT	LPT	FGC	OT	TT-O
Number of Each Type On Pad =	6	6	0	0	2	6	1

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Emissions Calculations (Continued)

Speciated Gas Analysis[4]

Component	Molecular Weight	Mole %	Equiv. Wt. Basis	Weight %	HC Weight %	lb/hr	TPY
Hydrogen Sulfide	34.082	0.0000%	0.0000	0.0000%	-	0.00	0.00
Carbon Dioxide	44.010	0.1310%	0.0577	0.2510%	-	0.01	0.02
Nitrogen	28.013	0.5440%	0.1524	0.6635%	-	0.01	0.06
Methane	16.042	69.5060%	11.1502	48.5496%	48.9978%	1.02	4.49
Ethane	30.069	17.8450%	5.3658	23.3637%	23.5793%	0.49	2.16
Propane	44.096	7.4600%	3.2896	14.3233%	14.4555%	0.30	1.32
i-Butane	58.122	0.7250%	0.4214	1.8348%	1.8517%	0.04	0.17
n-Butane	58.122	2.2300%	1.2961	5.6435%	5.6956%	0.12	0.52
i-Pentane	72.149	0.3940%	0.2843	1.2377%	1.2492%	0.03	0.11
n-Pentane	72.149	0.6140%	0.4430	1.9289%	1.9467%	0.04	0.18
n-Hexane	86.175	0.1770%	0.1525	0.6641%	0.6703%	0.01	0.06
Other Hexanes	86.175	0.1990%	0.1715	0.7467%	0.7536%	0.02	0.07
Heptanes (as n-Heptane)	100.202	0.1240%	0.1243	0.5410%	0.5460%	0.01	0.05
Benzene	78.114	0.0020%	0.0016	0.0068%	0.0069%	<0.01	<0.01
Toluene	92.141	0.0030%	0.0028	0.0120%	0.0121%	<0.01	<0.01
Ethylbenzene	106.167	0.0010%	0.0011	0.0046%	0.0047%	<0.01	<0.01
Xylenes	106.167	0.0020%	0.0021	0.0092%	0.0093%	<0.01	<0.01
2,2,4-Trimethylpentane	114.230	0.0000%	0.0000	0.0000%	0.0000%	0.00	0.00
Octanes (as n-Octane)	114.229	0.0350%	0.0400	0.1741%	0.1757%	<0.01	0.02
Nonanes (as n-Nonane)	128.255	0.0070%	0.0090	0.0391%	0.0395%	<0.01	<0.01
Decanes (as n-Decane)	142.282	0.0010%	0.0014	0.0062%	0.0063%	<0.01	<0.01
	TOTAL =	**100.00%**	**22.97**	**100.00%**	**100.00%**	**2.11**	**9.24**
		TOTAL HC =	**22.76**	**TOTAL VOC =**	**27.42%**	**0.57**	**2.51**
				TOTAL HAP =	**0.70%**	**0.01**	**0.06**

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Emissions Calculations (Continued)

Speciated Liquids Analysis[4]

Component	Molecular Weight	Mole %	Equiv. Wt. Basis	Weight %	HC Weight %	lb/hr	TPY
Hydrogen Sulfide	34.082	0.000%	0.000	0.0000%	-	0.00	0.00
Carbon Dioxide	44.010	0.015%	0.007	0.0073%	-	<0.01	<0.01
Nitrogen	28.013	0.016%	0.004	0.0050%	-	<0.01	<0.01
Methane	16.042	4.241%	0.680	0.7525%	0.7526%	<0.01	0.02
Ethane	30.069	6.176%	1.857	2.0540%	2.0543%	0.01	0.05
Propane	44.096	8.547%	3.769	4.1686%	4.1691%	0.02	0.11
i-Butane	58.122	1.876%	1.090	1.2060%	1.2062%	0.01	0.03
n-Butane	58.122	8.305%	4.827	5.3390%	5.3397%	0.03	0.14
i-Pentane	72.149	3.379%	2.438	2.6965%	2.6968%	0.02	0.07
n-Pentane	72.149	6.936%	5.004	5.5350%	5.5357%	0.03	0.14
n-Hexane	86.175	5.794%	4.993	5.5226%	5.5232%	0.03	0.14
Other Hexanes	86.175	5.761%	4.965	5.4911%	5.4918%	0.03	0.14
Heptanes (as n-Heptane)	100.202	11.190%	11.213	12.4019%	12.4034%	0.07	0.32
Benzene	78.114	0.080%	0.062	0.0691%	0.0691%	<0.01	<0.01
Toluene	92.141	0.353%	0.325	0.3598%	0.3598%	<0.01	0.01
Ethylbenzene	106.167	0.304%	0.323	0.3570%	0.3570%	<0.01	0.01
Xylenes	106.167	1.420%	1.508	1.6675%	1.6677%	0.01	0.04
2,2,4-Trimethylpentane	114.230	0.000%	0.000	0.0000%	0.0000%	0.00	0.00
Octanes (as n-Octane)	114.229	9.004%	10.285	11.3761%	11.3775%	0.07	0.30
Nonanes (as n-Nonane)	128.255	5.630%	7.221	7.9866%	7.9876%	0.05	0.21
Decanes (as n-Decane)	142.282	20.972%	29.839	33.0043%	33.0084%	0.20	0.86
	TOTAL =	**100.00%**	**90.41**	**100.00%**	**100.00%**	**0.59**	**2.60**
		TOTAL HC =	**90.40**	**TOTAL VOC =**	**97.19%**	**0.58**	**2.53**
				TOTAL HAP =	**7.98%**	**0.05**	**0.21**

Notes:

[1] Component counts taken by equipment type at representative facility and made site-specific according to the number of each equipment type at this site.

[2] Emission Factor Source: EPA-453/R-95-017. TOC multiplied by pollutant content of streams (weight %) to obtain pollutant emissions.

[3] Equipment Type Key: WH = Well Head, GPU = Gas Production Unit, HT = Heater Treater, LPT = Low-Pressure Tower, FGC = Flash Gas Compressor, OT = Oil Tank, TT-O = Tank Truck - Oil

[4] Analyses located in Attachment L.

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Unpaved Haul Road Emissions Calculations

Facility Data [1]

Vehicle Type	Light Vehicles (Pick-ups and Cars)	Medium Trucks (Service Trucks)	Heavy Trucks (Tanker Trucks)[2]
Average vehicle weight ((empty + full)/2) (tons)	2	15	23.5
Number of wheels per vehicle type (w)	4	10	18
Average number of round trips/day/vehicle type	10.88	5.44	21.76
Distance per round trip (miles/trip)	0.95	0.95	0.95
Vehicle miles travelled (miles/day)	10.38	5.19	20.77
Number of days operational (days/yr)	365	365	365
Vehicle miles travelled VMT (miles/yr)	3,790.32	1,895.16	7,580.65
Average vehicle speed S (mph)	10	10	10
Average number of round trips/hour/vehicle type	0.60	0.30	1.21
Average number of round trips/year/vehicle type	3,971	1,985	7,942
Estimated maximum number of round trips/hour/vehicle type	3	3	2
Estimated maximum number of round trips/day/vehicle type	6	4	24
Estimated maximum number of round trips/year/vehicle type	2,300	1,533	9,105

190	Average Tanker Volume (bbl)
7,980	Gallons Tanker Volume
2,500	bwpd
1,634	bopd
21.76	Tanker Trucks per Day
2,000	Length Leased Access Road (ft)
520	Longest Pad Side (ft)
5,040	Total Round Trip Feet

Formula & Calculation Inputs

$E=k(s/12)^a * (W/3)^b * ((365-P) / 365)$

Reference : AP-42, Section 13.2.2 (11/06), Equation 1a and 2

where:	**Rate**	**Units**	**Comment**
Days per year	365		
Annual average hours per day of road operations	18		
k = PM Particle Size Multiplier	4.90	lb/VMT	AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 (PM)
k = PM10 Particle Size Multiplier	1.50	lb/VMT	AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 (PM_{10})
k = PM2.5 Particle Size Multiplier	0.15	lb/VMT	AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 ($PM_{2.5}$)
s = Surface Material Silt Content	3.9	%	State Default Data from AP-42 Data (1999 NEI Data)
P = Number of days > 0.01 inch of rain	150	days/year	AP-42 Section 13.2.2 (11/06), Figure 13.2.2-1
a = PM Constant	0.70	unitless	AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 (PM)
a = PM10 & PM2.5 Constant	0.90	unitless	AP-42 Section 13.2.2 (11/06), Table 13.2.2-2 (PM_{10} & $PM_{2.5}$)
b = PM, PM10, & PM2.5 Constant	0.45	unitless	AP-42 Section 13.2.2 (11/06), Table 13.2.2-2
Total hourly fleet vehicle miles travelled (miles/hr)	2.02	VMT/hr	
Total annual fleet vehicle miles travelled (miles/yr)[3]	13,266.13	VMT/yr	
Average wheels[4]	13		
Average vehicle weight of the fleet (W)[5]	16.1	tons	
Moisture Ratio	1.00		Estimated based on 0.2% uncontrolled surface water content assuming no watering — EPA - BID Document 13.2.2 - 1998
Control Efficiency (CF)	0.00	%	Based on Moisture Ratio and Figure 13.2.2-2 Control

Continued on Next Page

SWN Production Company, LLC
Brooke County Parks Pad
Fugitive Unpaved Haul Road Emissions Calculations

Emission Calculations

Vehicle Type	Emission Factors			Control Efficiency	Total Vehicle Miles Travelled		Uncontrolled Emission Rates			Uncontrolled Emission Rates		
	PM	PM_{10}	$PM_{2.5}$				Total PM	Total PM_{10}	$PM_{2.5}$	Total PM	Total PM_{10}	$PM_{2.5}$
	(lbs/VMT)	(lbs/VMT)	(lbs/VMT)	(%)	(VMT/hr)	(VMT/yr)	(lb/hr)	(lb/hr)	(lb/hr)	(tons/yr)	(tons/yr)	(tons/yr)
Light Vehicles	2.80	0.69	0.07	0.00	0.58	3,790.32	1.62	0.17	0.04	5.31	0.55	0.13
Medium Trucks	2.80	0.69	0.07	0.00	0.29	1,895.16	0.81	0.14	0.02	2.66	0.46	0.06
Heavy Trucks	2.80	0.69	0.07	0.00	1.15	7,580.65	3.23	-0.12	0.08	10.62	-0.40	0.26
			Total =	**0.00**	**2.02**	**13,266.13**	**5.66**	**0.19**	**0.14**	**18.59**	**0.61**	**0.45**

Notes:

1) Facility vehicle data based on estimates, GP5.1 and AP-42 13.2.2-2 defaults for industrial unpaved roads
2) Tank trucker average vehicle weight as $(W_{(empty)}+W_{(full)})/2 = (7 + 40)/2 = 23.7$ tons
3) Average vehicle miles travelled (VMT/yr) as (No. of round trip/vehicle * No. of vehicles/type * Roundtrip miles/trip)* 365 days/yr * No. of vehicle type)
4) Average wheels calculated as average of (No. of wheels per vehicle type * No. of vehicle/type)
5) Average vehicle fleet calculated as (Average weight of vehicle type * Percentage of each vehicle type on unpaved surface). Percentage of each vehicle type= $VMT_{vehicle\ type}/VMT$
6) Minimum one-per-day average pick-up trucks and service trucks even if tanker not required every day.
7) Per EPA BID calculations, all emissions based on average trips. Estimated maximum hourly, daily and yearly trips provided for information only.

Calculation of Emission Factors (AP-42, 13.2.2)

Equation 1a: $EF = k(s/12)^a (W/3)^b$ *where k, a, and b are empirical constants and*

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

s = surface material silt content %

W = mean vehicle weight (tons)

Equation 2: $EF_{ext} = EF*((365-P)/365)$ *where:*

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

EF = emission factor from Equation 1a

P = number of days in a year with at least 0.01 inches of precipitation

Calculation of Emissions

$E = EF_{ext} * VMT/yr * ((1-CF)/100) * 1\ ton/2000\ lbs$ *where:*

E = annual emissions (tons/yr)

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

CF = control efficiency (%)

ATTACHMENT U: FACILITY-WIDE EMISSION SUMMARY SHEETS

ATTACHMENT U – FACILITY-WIDE CONTROLLED EMISSIONS SUMMARY SHEET																
List all sources of emissions in this table. Use extra pages if necessary.																
Emission Point ID #	NO_X		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CH_4		GHG (CO_2e)	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-ENG1	0.32	1.40	0.64	2.80	0.24	1.07	<0.01	<0.01	0.02	0.11	0.02	0.11	<0.01	0.01	155.19	679.73
EP-ENG2	0.32	1.40	0.64	2.80	0.24	1.07	<0.01	<0.01	0.02	0.11	0.02	0.11	<0.01	0.01	155.19	679.73
EP-GPU1	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04	0.01	0.04	<0.01	0.01	117.10	512.89
EP-GPU2	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04	0.01	0.04	<0.01	0.01	117.10	512.89
EP-GPU3	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04	0.01	0.04	<0.01	0.01	117.10	512.89
EP-GPU4	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04	0.01	0.04	<0.01	0.01	117.10	512.89
EP-GPU5	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04	0.01	0.04	<0.01	0.01	117.10	512.89
EP-GPU6	0.11	0.48	0.09	0.41	0.01	0.03	<0.01	<0.01	0.01	0.04	0.01	0.04	<0.01	0.01	117.10	512.89
EP-SH1	0.17	0.73	0.14	0.61	0.01	0.04	<0.01	<0.01	0.01	0.06	0.01	0.06	<0.01	0.01	175.65	769.33
EP-SH2	0.17	0.73	0.14	0.61	0.01	0.04	<0.01	<0.01	0.01	0.06	0.01	0.06	<0.01	0.01	175.65	769.33
EP-LOAD-COND	-	-	-	-	6.18	27.08	-	-	-	-	-	-	0.03	0.11	0.65	2.87
EP-LOAD-PW	-	-	-	-	0.10	0.45	-	-	-	-	-	-	0.04	0.18	1.00	4.39
APC-COMB	2.77	12.13	5.52	24.17	7.82	34.26	<0.01	<0.01	0.06	0.25	0.06	0.25	0.04	0.19	2,352.56	10,304.19
TOTAL	4.40	19.29	7.63	33.43	14.65	64.16	0.01	0.03	0.18	0.80	0.18	0.80	0.14	0.59	3,718.47	16,286.89

Annual emissions shall be based on 8,760 hours per year of operation for all emission units.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

Note that the emissions from the APC-COMB includes uncombusted emissions from the tanks and loading operations, as well as combustor pilot emissions.

ATTACHMENT U – FACILITY-WIDE HAP CONTROLLED EMISSIONS SUMMARY SHEET

List all sources of emissions in this table. Use extra pages if necessary.

Emission Point ID #	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		Hexane		Total HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
EP-ENG1	0.02	0.09	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	0.03	0.15
EP-ENG2	0.02	0.09	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	0.03	0.15
EP-GPU1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-GPU2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-GPU3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-GPU4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-GPU5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-GPU6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-SH1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-SH2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-LOAD-COND	-	-	<0.01	0.02	0.02	0.10	0.02	0.10	0.10	0.45	0.34	1.50	0.49	2.16
EP-LOAD-PW	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.02	0.01	0.04
APC-COMB	<0.01	<0.01	0.01	0.02	0.03	0.12	0.03	0.12	0.13	0.57	0.43	1.89	0.62	2.73
TOTAL	0.04	0.18	0.01	0.06	0.05	0.23	0.05	0.22	0.24	1.03	0.80	3.49	1.21	5.31

Annual emissions shall be based on 8,760 hours per year of operation for all emission units.

According to 45CSR14 Section 2.43.e, fugitive emissions are not included in the major source determination because it is not listed as one of the source categories in Table 1. Therefore, fugitive emissions shall not be included in the PTE above.

Note that the emissions from the APC-COMB includes uncombusted emissions from the tanks and loading operations, as well as combustor pilot emissions.

ATTACHMENT V: CLASS I LEGAL ADVERTISEMENT

Note: Affidavit of Publication will be submitted upon receipt by SWN from the publisher.

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that SWN Production Company, LLS. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit Registration for a natural gas production facility (Brooke County Parks Pad) located in Brooke County, West Virginia. From I-70 exit onto SR-2 north. Travel SR-2 north for 15.7 miles to SR-27 or 10st in Wellsburg. Turn right on SR-27 and travel 4.2 miles to Brooke Hills Park Road. Turn right on Brooke Hill Park road and travel .5 miles to a wye in the road. Bear right and travel.3 miles to access road on right. Lat/Long: 40.26472, -80.54794.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Nitrogen Oxides (NOx)	19.29 tons/yr
Carbon Monoxide (CO)	33.43 tons/yr
Volatile Organic Compounds (VOC)	69.20 tons/yr
Sulfur Dioxide (SO_2)	0.03 tons/yr
Particulate Matter (PM)	19.38 tons/yr
Acetaldehyde	0.03 tons/yr
Acrolein	0.03 tons/yr
Benzene	0.06 tons/yr
Ethylbenzene	0.23 tons/yr
Formaldehyde	0.18 tons/yr
Methanol	0.03 tons/yr
n-Hexane	3.70 tons/yr
Toluene	0.24 tons/yr
Xylenes	1.08 tons/yr
Carbon Dioxide	16,262.95 tons/yr
Methane	5.10 tons/yr
Nitrous Oxide	0.03 tons/yr
CO_2 Equivalent	16,399.58 tons/yr

The change in equipment and operations is planned to begin on or about March 30, 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice. Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 18th of January 2017

By: SWN Production Company, LLC
Carla Suszkowski, P.E.
Regulatory Manager – West Virginia Division
10000 Energy Drive
Spring, TX 77389