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

SHAWN COUCH PAD

G70-D APPLICATION

REV	BY	DATE	DESCRIPTION	FACILITIES REVIEWED	DATE
0			R13-2973	NA	NA
1			R13-2973A	NA	NA
2			R13-2973B	NA	NA
3			R13-2973C	NA	NA
4	TL	3/7/2016	Class I Administrative Update: R13-2973D	NA	NA
5	CM	12/14/2016	Modification: G70-D	AL	12/15/2016

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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. R13-2973D, issued on March 7, 2016. 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:

- Two (2) 145-hp Caterpillar G3306 NA compressor engines have been added to the equipment representation.
- Two (2) 0.5-mmBtu/hr natural gas-fired heater treaters (EU-HT1 and EU-HT2) that were previously authorized have been removed from the equipment representation.
- Three (3) 1.0-mmBtu/hr natural gas-fired GPU burners (EU-GPU3 - EU-GPU5) 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.
- Two (2) condensate tanks have been added to the equipment representation.
- Two (2) produced water tanks that were previously authorized have been removed from the equipment representation.
- The condensate throughput estimate has been revised from 275 bbl/d to 1,998.6 bbl/d.
- The produced water throughput estimate has been revised from 800 bbl/d to 2,494.9 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.

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.

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

STATE

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 three 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 proposed 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: Shawn Couch Pad

Operating Site Physical Address: 665 Harvey Road
If none available, list road, city or town and zip of facility.

City: West Liberty	Zip Code: 26074	County: Ohio

Latitude & Longitude Coordinates (NAD83, Decimal Degrees to 5 digits):
Latitude: 40.14876
Longitude: -80.58397

SIC Code: 1311 NAICS Code: 211111	DAQ Facility ID No. (For existing facilities) 069 – 00130

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: Carla L Suszkowski
Name and Title: Carla Suszkowski Phone: 832-796-1000 Fax: 405-849-3102
Email: Carla_Suszkowski@SWN.com Date:

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 two (2) 0.5-mmBtu/hr natural gas-fired heater treaters (EU-HT1 and EU-HT2) and two (2) 400-bbl produced water tanks and to add two (2) Caterpillar G3306 NA engines (EU-ENG1 and EU-ENG2), three (3) 1.0-mmBtu/hr natural gas-fired GPU burners (EU-GPU3 - EU-GPU5), two (2) 400-bbl condensate tanks, 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: Take Exit 5 (Triadelphia/Elm Grove) from Interstate 70, travel east on US Route 40 (National Road) approximately 7.8 miles to the intersection of US 40 and CR 45 (Atkinson Crossing, GC&P Road) and turn left onto CR 45. Travel 1.17 miles to the intersection of CR 45 and CR 47 (Atkinson Potomac Hill Road) and turn left to stay on CR 45. At 0.87 miles from the CR 45 and CR 47 intersection, CR 45 turns left; continue straight on what is now CR 37 (also GC&P Road). After traveling 1.88 miles from where CR 45 turned left and CR 37 began, turn right on CR 7/3 (Weidman Run Road). Bear right after traveling 0.32 miles onto CR 55 (West Liberty-Harvey Road). Well pad access will be on the left 0.32 miles after turning onto CR 55.	
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): **Clayton Murral: clay_murral@swn.com** ☒$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	

ATTACHMENT A: SINGLE SOURCE DETERMINATION

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

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).

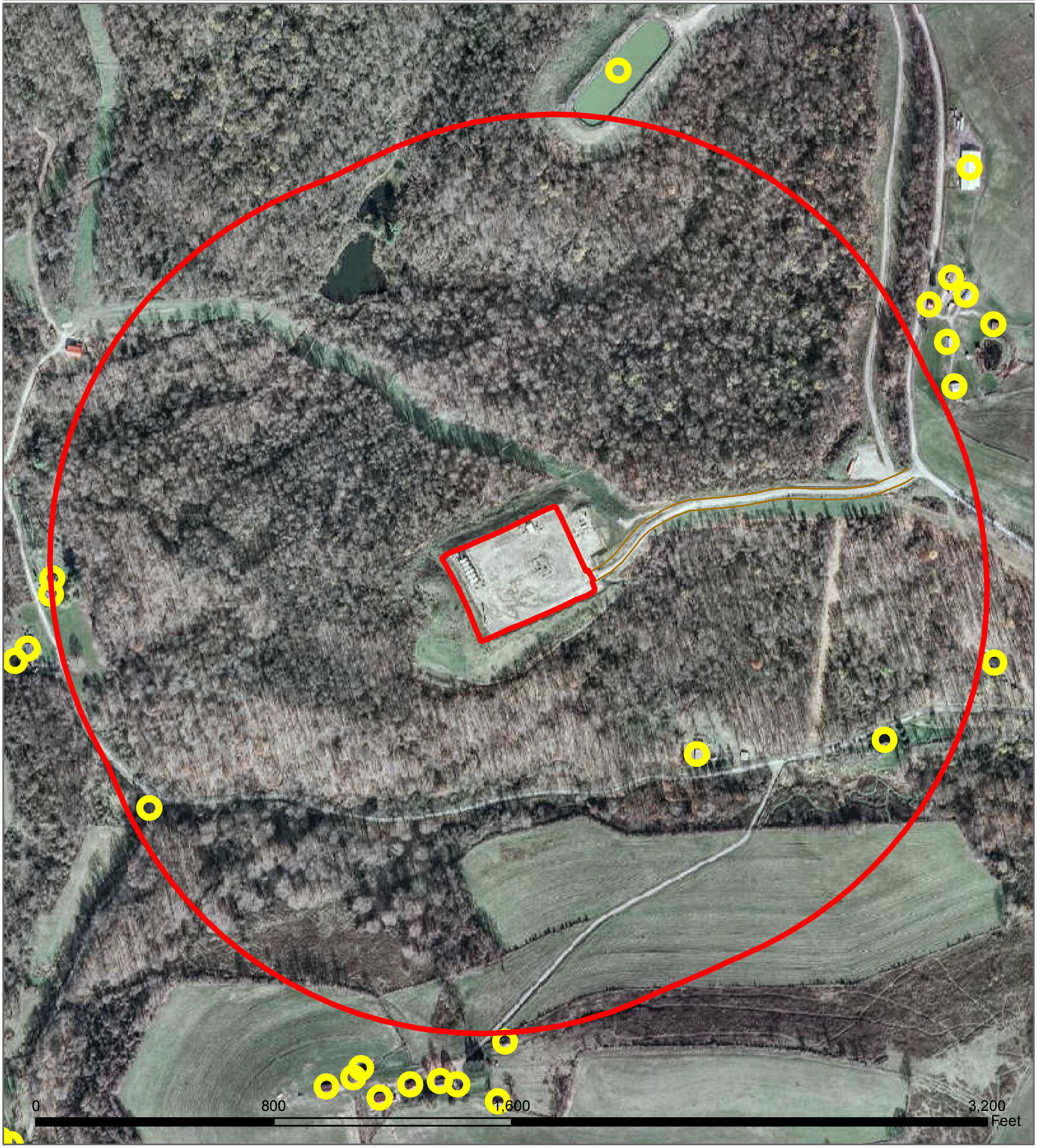
The Source Determination Rule for the oil and gas industry was published in the Federal Register on June 3, 2016 and will become effective on August 2, 2016. EPA defined the term "adjacent" and stated that equipment and activities in the oil and gas sector that are under common control will be considered 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™

SHAWN COUCH-OHI-PAD1

NAD83 UTM Zone 17N
535.015 4,444.253 Kilometers
-80.588904 40.147893 Decimal Degrees

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
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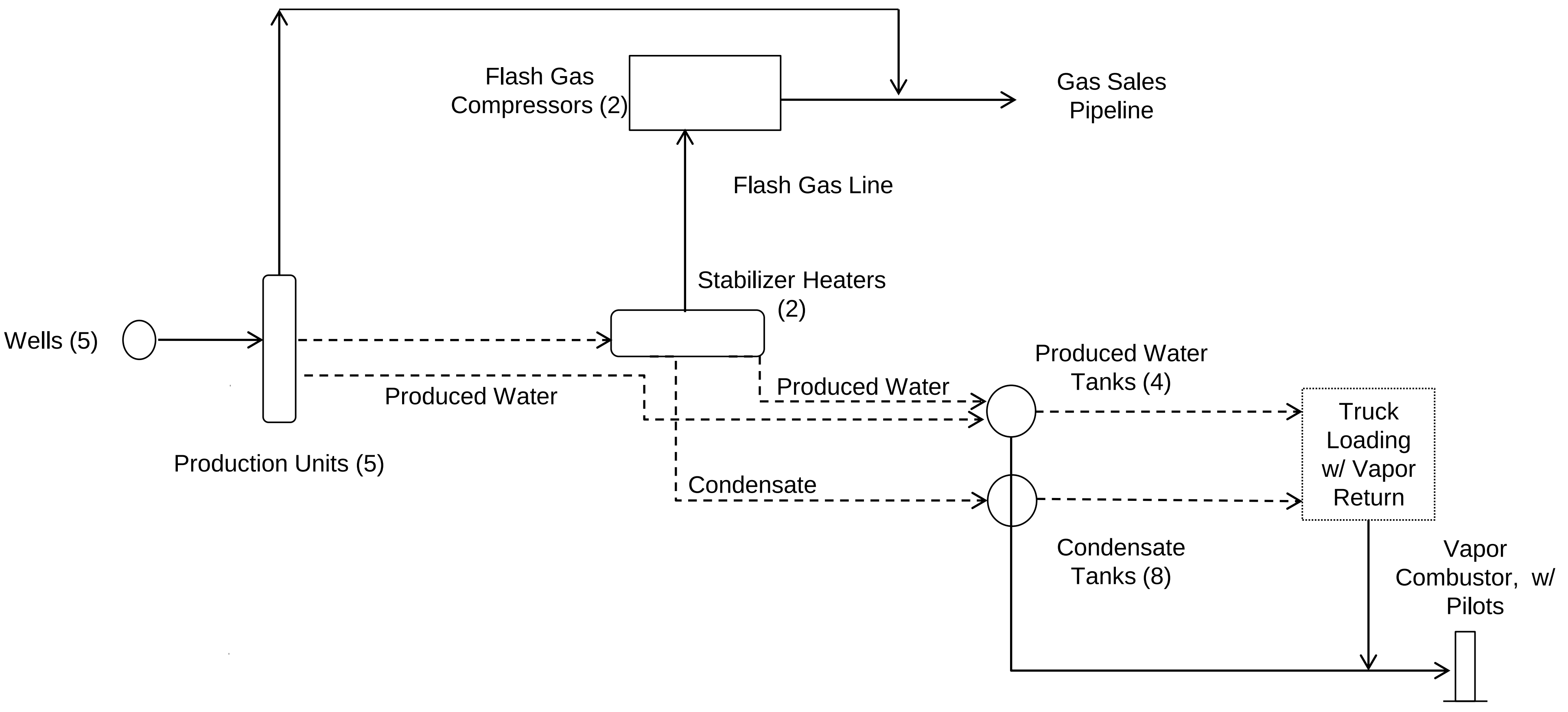
ATTACHMENT D: PROCESS FLOW DIAGRAM



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
Shawn Couch Pad
Attachment D: Process Flow Diagram
December 2016

ATTACHMENT E: PROCESS DESCRIPTION

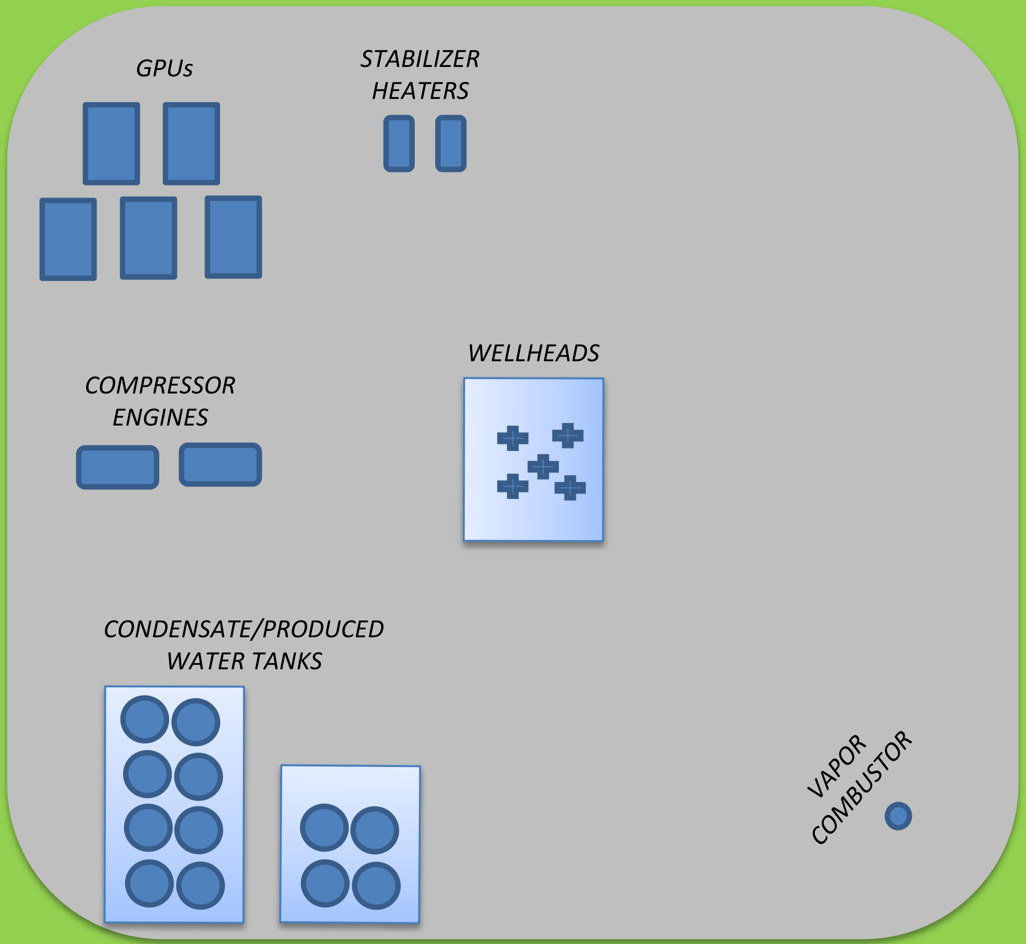
The facility is an oil and natural gas exploration and production facility, responsible for the production of natural gas. Storage of condensate and produced water also occur on-site. A description of the facility process is as follows: Condensate, gas and water come from the five wellheads to the production 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

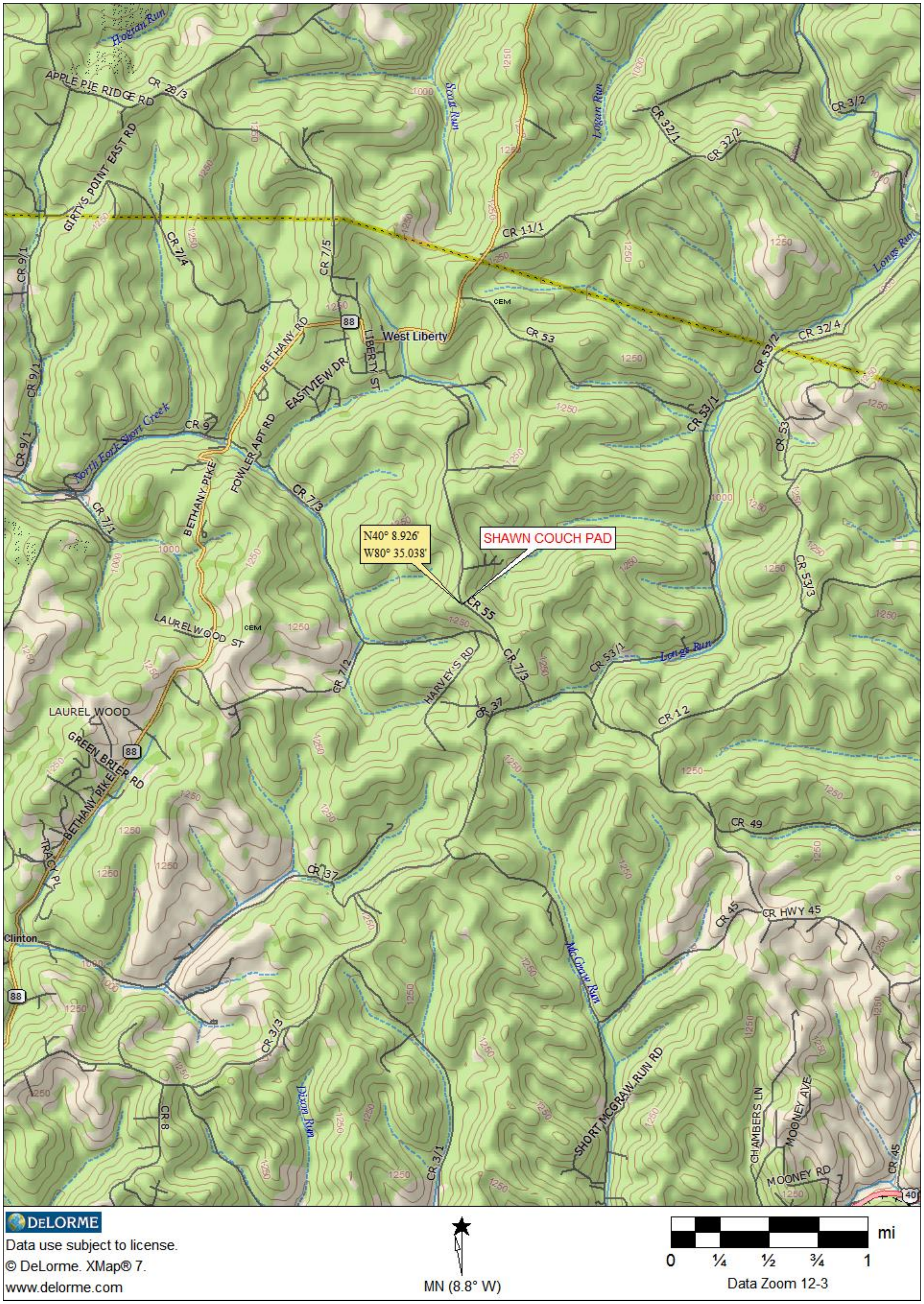
Please note that the simple plot plan provided is only a representation of production/emissions equipment to be installed. Actual location specifications and equipment placement are not to scale.



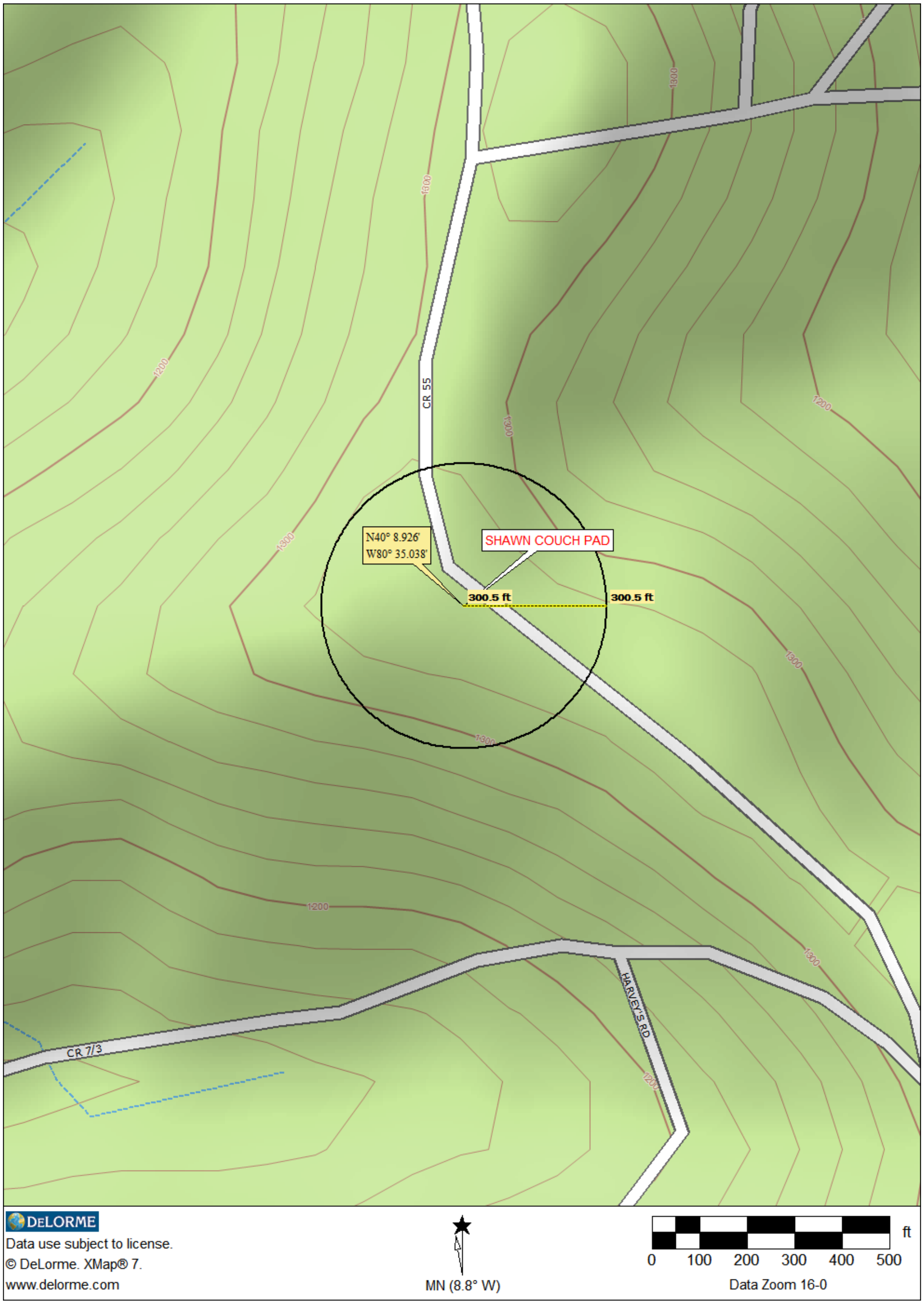
***NOTE*: Image is only a representation of production/emissions equipment to be installed. Actual location specifications and equipment placement are not to scale.**

SWN Production Company, LLC
Shawn Couch Pad
Attachment F: Simple Plot Plan
December 2016

ATTACHMENT G: AREA MAPS



SWN Production Company, LLC
Shawn Couch Pad
Attachment G: Area Map
December 2016



<u>Shawn Couch Pad</u>
Attachment G: Area Map with 300' Radius
Marshall County, West Virginia
December 2016

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 - Add	TBD	TBD	145-hp	New	NSCR	NSCR
EU-ENG2	EP-ENG2	145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	TBD	TBD	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	
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-HT1	EP-HT1	0.50-mmBtu/hr Heater Treater - Remove	2012	N/A	0.50-mmBtu/hr	Removal	N/A	N/A
EU-HT2	EP-HT2	0.50-mmBtu/hr Heater Treater - Remove	2012	N/A	0.50-mmBtu/hr	Removal	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-TANKS-COND	APC-COMB	Eight (8) 400-bbl Condensate Tanks Routed to Vapor Combustor - Revise	2012	N/A	1,998.6-bbl/day	Modification	APC-COMB	APC-COMB
EU-TANKS-PW	APC-COMB	Four (4) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Revise	2012	N/A	2,494.9-bbl/day	Modification	APC-COMB	APC-COMB
EU-LOAD-COND	APC-COMB	Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	2012	N/A	30,638,538 gal/yr	Modification	APC-COMB	APC-COMB
EU-LOAD-PW	APC-COMB	Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	2012	N/A	38,246,817 gal/yr	Modification	APC-COMB	APC-COMB
APC-COMB	APC-COMB	One (1) 30.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Revise	2013	N/A	30-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 - Revise	2012	N/A	N/A	Modification	N/A	N/A
EU-HR	EP-HR	Fugitive Haul Road Emissions - Revise	2012	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:							
	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	89 – gas 100 - LL	EPA	☐ Gas ☐ Liquid ☒ Both	0.94 – gas 2.28 – LL	0.02 – gas 0.20 - LL	50.25 – gas 1.11 - LL	
Safety Relief Valves	☐ Yes ☒ No	33	EPA	☒ Gas ☐ Liquid ☐ Both	0.68	0.01	36.44	
Open Ended Lines	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both				
Sampling Connections	☐ Yes ☐ No			☐ Gas ☐ Liquid ☐ Both				
Connections (Not sampling)	☐ Yes ☒ No	394	EPA	☐ Gas ☒ Liquid ☐ Both	0.75	0.06	0.37	
Compressors	☐ Yes ☒ No	6	EPA	☒ Gas ☐ Liquid ☐ Both	0.12	<0.01	6.63	
Flanges	☐ Yes ☒ No	370	EPA	☒ Gas ☐ Liquid ☐ Both	0.34	0.01	18.11	
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?
470-690-00720	11/14/2012	9/19/2011	Green Completion	N/A
470-690-01050	12/13/2012	6/8/2012	Green Completion	N/A
470-690-02050	TBD	TBD	Green Completion	OOOOa
470-690-02060	TBD	TBD	Green Completion	OOOOa
470-690-02070	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 Eight (8) 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)* 6 in 2012; 2 TBD 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)* Quantity of tanks, 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 Four (4) 400-bbl Condensate 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)* Quantity of tanks, 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-HYDRATE	EXIST	Hydrate Inhibitor	50 gal
EU-TANKS-HYDRATE	EXIST	Hydrate Inhibitor	50 gal
EU-TANKS-HYDRATE	EXIST	Hydrate Inhibitor	50 gal
EU-TANKS-HYDRATE	EXIST	Hydrate Inhibitor	50 gal
EU-TANKS-HYDRATE	EXIST	Hydrate Inhibitor	50 gal
EU-TANKS-HYDRATE	EXIST	Hydrate Inhibitor	50 gal
EU-TANKS-HYDRATE	EXIST	Hydrate Inhibitor	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..........................: 16357 Scf/Sep Bbl
SEPARATOR PRESSURE...............: 390 psig
SEPARATOR TEMPERATURE......: 83 °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	0.513	0.000	0.026	0.008	0.483	0.000
Carbon Dioxide	0.149	0.000	0.013	0.006	0.140	0.000
Methane	71.427	0.000	8.861	3.883	67.513	0.000
Ethane	17.491	4.716	9.965	6.891	17.020	4.589
Propane	6.802	1.887	11.708	8.331	7.109	1.972
Iso-butane	0.668	0.220	2.480	2.097	0.781	0.258
N-butane	1.828	0.581	9.597	7.820	2.314	0.735
2-2 Dimethylpropane	0.008	0.003	0.080	0.079	0.012	0.005
Iso-pentane	0.316	0.117	3.603	3.409	0.522	0.192
N-pentane	0.440	0.161	6.541	6.127	0.822	0.300
2-2 Dimethylbutane	0.005	0.002	0.123	0.133	0.012	0.005
Cyclopentane	0.003	0.001	0.000	0.000	0.003	0.001
2-3 Dimethylbutane	0.009	0.004	0.351	0.372	0.030	0.013
2 Methylpentane	0.065	0.027	2.260	2.425	0.202	0.085
3 Methylpentane	0.038	0.016	1.493	1.575	0.129	0.053
Other Hexanes	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.107	0.044	5.195	5.523	0.425	0.176
Methylcyclopentane	0.008	0.003	0.422	0.386	0.034	0.012
Benzene	0.001	0.000	0.069	0.050	0.005	0.001
Cyclohexane	0.010	0.003	0.744	0.655	0.056	0.019
2-Methylhexane	0.014	0.007	1.868	2.245	0.130	0.061
3-Methylhexane	0.015	0.007	1.690	2.006	0.120	0.055
2,2,4 Trimethylpentane	0.000	0.000	0.000	0.000	0.000	0.000
Other Heptanes	0.013	0.006	0.902	1.015	0.069	0.030
n-Heptane	0.025	0.012	3.836	4.576	0.263	0.123
Methylcyclohexane	0.011	0.004	1.712	1.779	0.117	0.048
Toluene	0.002	0.001	0.328	0.284	0.022	0.008
Other C-8's	0.017	0.008	5.124	6.211	0.336	0.159
n-Octane	0.005	0.003	2.442	3.234	0.157	0.081
Ethylbenzene	0.000	0.000	0.307	0.306	0.019	0.007
M&P-Xylene	0.001	0.000	0.359	0.360	0.023	0.009
O-Xylene	0.000	0.000	0.685	0.673	0.043	0.016
Other C-9's	0.005	0.003	3.105	4.203	0.199	0.105
n-Nonane	0.001	0.001	1.492	2.172	0.094	0.053
Other C10's	0.002	0.001	3.126	4.651	0.197	0.115
n-Decane	0.000	0.000	0.894	1.419	0.056	0.035
Undecanes Plus	0.001	0.001	8.599	15.098	0.539	0.369
TOTAL	100.000	7.837	100.000	100.000	100.000	9.690

TABLE 1-B

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

SEPARATOR GOR..........................: 16357 Scf/Sep Bbl
SEPARATOR PRESSURE...............: 390 psig
SEPARATOR TEMPERATURE......: 83 °F

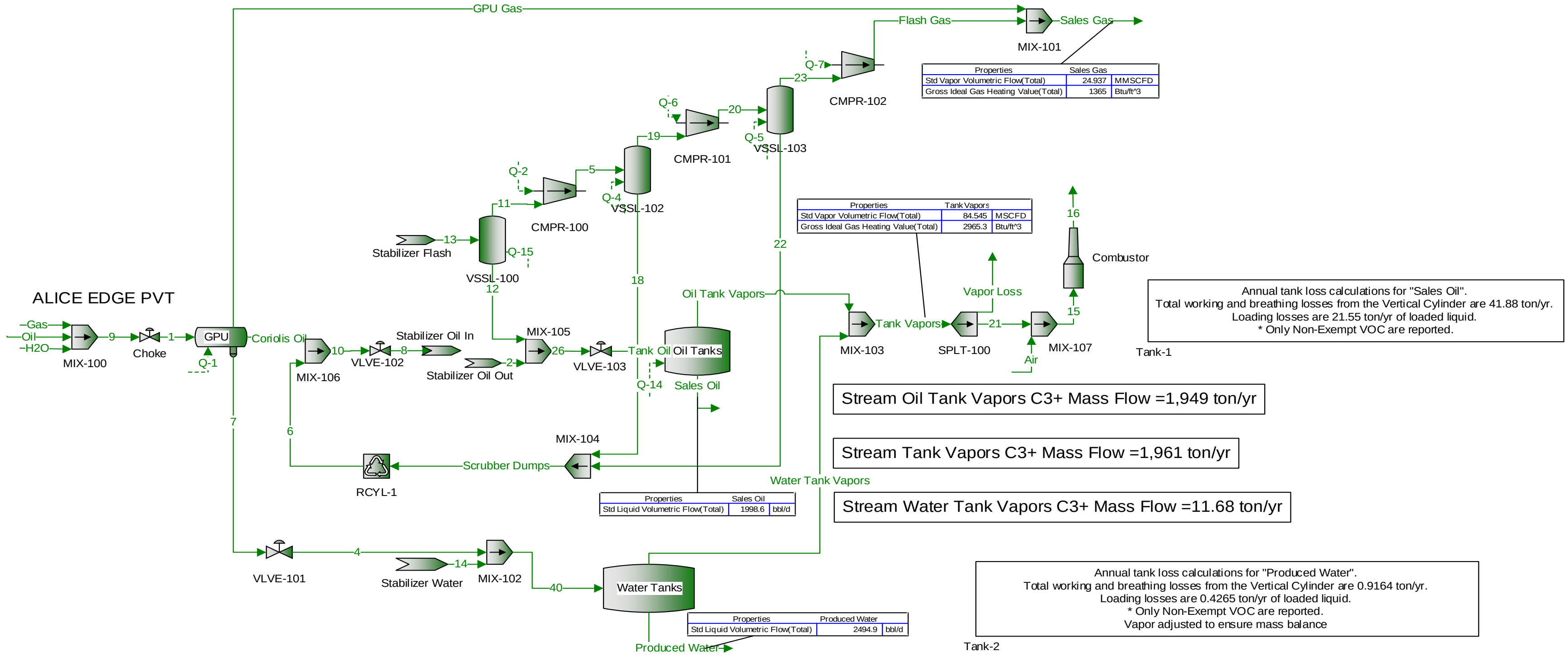
UNDECANES PLUS (C_{11+}) FRACTION CHARACTERISTICS					
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***
Gas	N/A	0.8250	156.000	16.558	8,400
Oil	42.783	0.8119	174.000	14.609	128,920
Wellstream	N/A	0.8119	173.968	14.612	N/A

TOTAL SAMPLE CHARACTERISTICS						
	Specific Gravity		Molecular Weight	Vapor Volume	Gross Heating Value	
					Dry	Saturated
COMPONENT	°API	**	lb/lb-mole	Scf/Gal	***	***
Gas	N/A	0.7718	22.258	127.606	1,352	1,330
Oil	84.980	0.6536	79.788	25.649	N/A	111,577
Wellstream	N/A	0.8928	25.856	46.942	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.


ALICE EDGE PVT
Gas
Oil
H2O
MIX-100
9
Choke
1
GPU
Q-1
Coriolis Oil
7
GPU Gas
Flash Gas
Sales Gas
MIX-101
Properties | Sales Gas
Std Vapor Volumetric Flow(Total) | 24.937 | MMSCFD
Gross Ideal Gas Heating Value(Total) | 1365 | Btu/ft^3
Q-7
23
CMPR-102
Q-6
20
CMPR-101
Q-5
VSSL-103
19
Q-2
5
Q-4
VSSL-102
11
CMPR-100
Stabilizer Flash
13
Q-15
VSSL-100
12
18
22
Properties | Tank Vapors
Std Vapor Volumetric Flow(Total) | 84.545 | MSCFD
Gross Ideal Gas Heating Value(Total) | 2965.3 | Btu/ft^3
16
Combustor
Oil Tank Vapors
Vapor Loss
MIX-103
Tank Vapors
SPLT-100
21
MIX-107
15
Air
Annual tank loss calculations for "Sales Oil".
Total working and breathing losses from the Vertical Cylinder are 41.88 ton/yr.
Loading losses are 21.55 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.
Tank-1
MIX-106
10
VLVE-102
8
Stabilizer Oil In
Stabilizer Oil Out
2
MIX-105
26
VLVE-103
Tank Oil
Oil Tanks
Q-14
Sales Oil
Stream Oil Tank Vapors C3+ Mass Flow =1,949 ton/yr
Stream Tank Vapors C3+ Mass Flow =1,961 ton/yr
Stream Water Tank Vapors C3+ Mass Flow =11.68 ton/yr
6
MIX-104
RCYL-1
Scrubber Dumps
Water Tank Vapors
Properties | Sales Oil
Std Liquid Volumetric Flow(Total) | 1998.6 | bbl/d
VLVE-101
4
Stabilizer Water
14
MIX-102
40
Water Tanks
Properties | Produced Water
Std Liquid Volumetric Flow(Total) | 2494.9 | bbl/d
Produced Water
Annual tank loss calculations for "Produced Water".
Total working and breathing losses from the Vertical Cylinder are 0.9164 ton/yr.
Loading losses are 0.4265 ton/yr of loaded liquid.
* Only Non-Exempt VOC are reported.
Vapor adjusted to ensure mass balance
Tank-2

Process Streams		Gas	Oil	Oil Tank Vapors	Produced Water	Sales Gas	Sales Oil	Tank Oil	Tank Vapors	Vapor Loss	Water Tank Vapors
Composition	Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	From Block:	--	--	Oil Tanks	Water Tanks	MIX-101	Oil Tanks	VLVE-103	MIX-103	SPLT-100	Water Tanks
	To Block:	MIX-100	MIX-100	MIX-103	--	--	--	Oil Tanks	SPLT-100	--	MIX-103
Mass Fraction		%	%	%	%	%	%	%	%	%	%
H2S		0*	0*	0*	0	0	0	0	0	0	0
N2		0.713750*	0.0139177*	0.0002008*	5.71640E-06	0.671328	0.000000	4.74420E-06	0.00938323	0.00938323	0.33498934
CO2		0.311036*	0.0101325*	0.0145388*	0.00156609	0.292713	0.000100	0.000429366	0.0704666	0.0704666	2.0536486
C1		51.2310*	0.967319*	0.245908*	0.00158438	48.1662	0.0006	0.00623247	1.47846	1.47846	45.18436
C2		24.3847*	3.32849*	6.17040*	0.00176197	23.9911	0.0912	0.229824	6.85680	6.85680	31.19607
C3		13.9545*	6.86728*	26.18747*	0.000529440	15.1302	1.3033	1.87060	25.8283	25.8283	13.0927
iC4		1.65096*	1.91078*	7.57956*	3.79822E-05	1.94953	0.90626	1.05841	7.40505	7.40505	1.21703
nC4		4.60227*	7.67058*	27.34690*	0.000147776	5.61394	4.70375	5.22000	26.7067	26.7067	4.0049
2,2-Dimethylbutane		0.0349132*	0.100247*	0.175204*	4.36788E-08	0.0215517	0.1527907	0.153302	0.170516	0.170516	0.004312
iC5		0.857427*	3.33535*	7.36004*	1.58741E-05	1.07720	3.06569	3.16359	7.17368	7.17368	0.56532
nC5		1.22443*	6.38832*	11.56053*	2.89787E-06	1.56315	6.27098	6.39158	11.2516	11.2516	0.2985
2,2-Dimethylpropane		0.0162391*	0.111033*	0.223992*	2.94554E-07	0.0410251	0.0513268	0.0552635	0.218271	0.218271	0.015404
Cyclopentane		0.00947125*	0*	0.02277688*	1.10333E-06	0.00285232	0.01787597	0.0179877	0.0223379	0.0223379	0.0067732
2,3-Dimethylbutane		0.0232755*	0.345644*	0.318875*	4.17756E-07	0.0369852	0.3695480	0.368393	0.310601	0.310601	0.017199
2-Methylpentane		0.182325*	2.62732*	2.28162*	1.04484E-06	0.257125	2.901772	2.88763	2.22103	2.22103	0.07238
3-Methylpentane		0.104740*	1.66244*	1.31803*	3.68865E-06	0.146500	1.858330	1.84601	1.28463	1.28463	0.10009
C6		0.302581*	5.92817*	3.83996*	3.83814E-07	0.402059	6.813830	6.74603	3.73616	3.73616	0.05538
Methylcyclopentane		0.0227310*	0.700613*	0.448348*	3.38265E-06	0.0478149	0.7670498	0.759784	0.437529	0.437529	0.053906
Benzene		0.00351626*	0.0747760*	0.0477743*	0.000231252	0.00514533	0.08443553	0.0835997	0.0475124	0.0475124	0.0382245
Cyclohexane		0.0265195*	0.859704*	0.431420*	1.57686E-05	0.0452746	0.9812466	0.968711	0.422414	0.422414	0.103060
2-Methylhexane		0.0405960*	2.25843*	0.72077*	1.87526E-07	0.0708986	2.6519799	2.60795	0.701440	0.701440	0.016107
3-Methylhexane		0.0405960*	2.05688*	0.60633*	2.34346E-07	0.0584655	2.4456592	2.40372	0.590146	0.590146	0.016324
2,2,4-Trimethylpentane		0*	0*	0*	0	0	0	0	0	0	0
C7		0.117277*	5.76387*	1.33369*	7.39541E-08	0.126428	6.987108	6.85821	1.29748	1.29748	0.01354
Methylcyclohexane		0.0309394*	2.17374*	0.49918*	3.51842E-06	0.0470636	2.5988516	2.55098	0.486968	0.486968	0.053933
Toluene		0.00414768*	0.382960*	0.079910*	0.000245491	0.00756927	0.45605703	0.447481	0.0792105	0.0792105	0.0544239
C8		0.0668470*	10.3205*	0.7936*	6.27381E-09	0.0697037	12.6191485	12.3495	0.771927	0.771927	0.002872
Ethylbenzene		0*	0.455411*	0.032314*	8.24398E-05	0.00282717	0.54904455	0.537263	0.0319535	0.0319535	0.0191730
m-Xylene		0.00477909*	0.474708*	0.031758*	4.56997E-05	0.00277638	0.58667357	0.574022	0.0313734	0.0313734	0.0177495
o-Xylene		0*	0.944269*	0.053966*	0.000204074	0.00466510	1.14234788	1.11753	0.0533722	0.0533722	0.0323164
C9		0.0230940*	7.19261*	0.18260*	2.01304E-09	0.0144719	8.8407927	8.64339	0.177612	0.177612	0.000717
C10		0.00640491*	7.05165*	0.06223*	4.74022E-11	0.00477174	8.65262394	8.45677	0.0605281	0.0605281	0.0000610
C11		0*	5.50801*	0.01608*	1.61005E-11	0.00114657	6.75286240	6.59927	0.0156367	0.0156367	0.0000171
C12		0*	3.78136*	0.00394*	6.24560E-11	0.000263617	4.637745990	4.53210	0.00383447	0.00383447	0.00001553
C13		0*	2.71211*	0.00100*	9.99845E-11	6.48383E-05	3.32677E+00	3.25094	0.000976303	0.000976303	0.000009361
C14		0.00893049*	2.11311*	0.00029*	1.10981E-10	1.80209E-05	2.61777E+00	2.55809	0.000283629	0.000283629	0.000004951
C15		0*	1.25095*	0.00006*	9.15782E-11	3.78517E-06	1.53454E+00	1.49956	6.08096E-05	6.08096E-05	1.94577E-06
C16		0*	0.908243*	0.000018*	1.70417E-10	1.03652E-06	1.11415E+00	1.08875	1.72249E-05	1.72249E-05	1.21398E-06
C17		0*	0.597350*	0.000005*	2.55459E-10	2.81830E-07	7.32778E-01	0.716072	4.75337E-06	4.75337E-06	5.97142E-07
C18		0*	0.437910*	0.000002*	2.66903E-10	8.36069E-08	5.37191E-01	0.524944	1.47632E-06	1.47632E-06	2.36210E-07
C19		0*	0.250546*	0.000000*	1.91511E-10	1.76326E-08	3.07349E-01	0.300341	3.24115E-07	3.24115E-07	5.59228E-08
C20		0*	0.160919*	0.000000*	1.15668E-10	2.92145E-09	1.97402E-01	0.192902	5.87289E-08	5.87289E-08	9.28258E-09
C21		0*	0.0934383*	0.0000000*	6.62568E-11	7.80402E-10	1.14622E-01	0.112009	1.57725E-08	1.57725E-08	2.37308E-09
C22		0*	0.0865663*	0.0000000*	8.24076E-11	3.25849E-10	1.06192E-01	0.103771	6.71624E-09	6.71624E-09	9.38509E-10
C23		0*	0.0472046*	0.0000000*	6.18699E-11	5.21212E-11	5.79067E-02	0.0565865	1.14605E-09	1.14605E-09	1.40410E-10
C24		0*	0.0246221*	0.0000000*	3.22339E-11	9.55663E-12	3.02044E-02	0.0295157	2.20129E-10	2.20129E-10	2.40407E-11
C25		0*	0.0128210*	0.0000000*	2.25694E-11	1.99198E-12	1.57277E-02	0.0153691	4.76206E-11	4.76206E-11	4.72529E-12
C26		0*	0.00888726*	0.00000000*	2.00007E-11	0	0.01090214	0.0106536	1.15868E-11	1.15868E-11	1.01543E-12
C27		0*	0.00922719*	0.00000000*	2.55650E-11	0	0.011319148	0.0110611	3.38635E-12	3.38635E-12	2.55093E-13
C28		0*	0.00956713*	0.00000000*	4.02649E-11	0	0.011736156	0.0114686	1.87578E-12	1.87578E-12	1.31997E-13
C29		0*	0.00495354*	0.00000000*	1.90486E-11	0	0.006076582	0.00593804	4.71456E-13	4.71456E-13	3.05635E-14
C30		0*	0.00512350*	0.00000000*	2.72675E-11	0	0.006285086	0.00614179	0	0	1.07194E-14
H2O		0*	0*	0.008673844*	99.9935	0.127142	0.000071	0.000267241	0.0456948	0.0456948	1.3584472
Oxygen		0*	0*	0*	0	0	0	0	0	0	0

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
H2S	0*	0*	0*	0	0	0	0	0	0	0
N2	417.815*	3.48100*	0.00096*	0.00208063	421.248	0.000	0.000989855	0.0458944	0.000917888	0.044939234
CO2	182.074*	2.53428*	0.06916*	0.570020	183.673	0.020	0.0895850	0.344660	0.00689319	0.27549950
C1	29989.6*	241.939*	1.170*	0.576677	30223.6	0.1	1.30037	7.23131	0.144626	6.061537
C2	14274.3*	832.497*	29.352*	0.641313	15054.1	18.6	47.9516	33.5373	0.670747	4.184992
C3	8168.70*	1717.59*	124.57*	0.192703	9494.00	265.72	390.291	126.329	2.52658	1.75640
iC4	966.437*	477.910*	36.056*	0.0138246	1223.30	184.78	220.832	36.2189	0.724379	0.163267
nC4	2694.08*	1918.51*	130.09*	0.0537868	3522.66	959.04	1089.13	130.625	2.61251	0.53726
2,2-Dimethylbutane	20.4375*	25.0731*	0.8334*	1.58980E-05	13.5234	31.1522	31.9856	0.834015	0.0166803	0.0005785
iC5	501.921*	834.215*	35.011*	0.00577777	675.927	625.057	660.068	35.0873	0.701745	0.075838
nC5	716.758*	1597.80*	54.99*	0.00105476	980.853	1278.579	1333.57	55.0330	1.10066	0.04004
2,2-Dimethylpropane	9.50607*	27.7707*	1.0655*	0.000107210	25.7426	10.4649	11.5304	1.06759	0.0213518	0.0020665
Cyclopentane	5.54428*	0*	0.108348665*	0.000401584	1.78979	3.64470	3.75305	0.109257	0.00218515	0.00090863
2,3-Dimethylbutane	13.6250*	86.4501*	1.5169*	0.000152053	23.2076	75.3464	76.8633	1.51918	0.0303837	0.0023073
2-Methylpentane	106.729*	657.125*	10.854*	0.000380296	161.342	591.637	602.490	10.8633	0.217266	0.009710
3-Methylpentane	61.3125*	415.796*	6.270*	0.00134258	91.9264	378.8913	385.161	6.28324	0.125665	0.013428
C6	177.125*	1482.71*	18.27*	0.000139699	252.286	1389.259	1407.53	18.2740	0.365479	0.007429
Methylcyclopentane	13.3063*	175.232*	2.133*	0.00123120	30.0031	156.3923	158.525	2.14000	0.0428001	0.0072316
Benzene	2.05835*	18.7024*	0.2273*	0.0841700	3.22862	17.21539	17.4427	0.232388	0.00464776	0.00512786
Cyclohexane	15.5240*	215.023*	2.052*	0.00573939	28.4092	200.0645	202.117	2.06607	0.0413215	0.0138257
2-Methylhexane	23.7641*	564.863*	3.429*	6.82551E-05	44.4878	540.7070	544.136	3.43082	0.0686164	0.0021607
3-Methylhexane	23.7641*	514.451*	2.884*	8.52962E-05	36.6863	498.6407	501.525	2.88647	0.0577294	0.0021898
2,2,4-Trimethylpentane	0*	0*	0*	0	0	0	0	0	0	0
C7	68.6518*	1441.62*	6.34*	2.69175E-05	79.3316	1424.5877	1430.93	6.34612	0.126922	0.001817
Methylcyclohexane	18.1113*	543.679*	2.375*	0.00128062	29.5317	529.8748	532.249	2.38182	0.0476363	0.0072352
Toluene	2.42797*	95.7832*	0.3801*	0.0893527	4.74961	92.98458	93.3647	0.387427	0.00774855	0.00730103
C8	39.1309*	2581.28*	3.78*	2.28352E-06	43.7381	2572.8936	2576.67	3.77558	0.0755116	0.0003853
Ethylbenzene	0*	113.904*	0.154*	0.0300061	1.77401	111.94362	112.097	0.156288	0.00312576	0.00257209
m-Xylene	2.79759*	118.730*	0.151*	0.0166336	1.74214	119.61573	119.767	0.153451	0.00306901	0.00238112
o-Xylene	0*	236.174*	0.257*	0.0742779	2.92728	232.91108	233.168	0.261049	0.00522099	0.00433528
C9	13.5188*	1798.96*	0.87*	7.32699E-07	9.08089	1802.53198	1803.40	0.868722	0.0173744	0.0000962
C10	3.74931*	1763.71*	0.30*	1.72533E-08	2.99420	1764.16662	1764.46	0.296050	0.00592100	0.00000819
C11	0*	1377.62*	0.08*	5.86021E-09	0.719458	1376.827947	1376.90	0.0764807	0.00152961	0.00000229
C12	0*	945.765*	0.019*	2.27325E-08	0.165416	945.580987	945.600	0.0187548	0.000375097	0.000002084
C13	0*	678.333*	0.005*	3.63919E-08	0.0406851	678.2877735	678.293	0.00477521	9.55041E-05	1.25585E-06
C14	5.22773*	528.517*	0.001*	4.03944E-08	0.0113078	533.7316489	533.733	0.00138726	2.77452E-05	6.64189E-07
C15	0*	312.878*	0.000*	3.33323E-08	0.00237514	312.87528131	312.876	0.000297426	5.94852E-06	2.61028E-07
C16	0*	227.163*	0.000*	6.20276E-08	0.000650403	227.162338845	227.162	8.42490E-05	1.68498E-06	1.62857E-07
C17	0*	149.405*	0.000*	9.29810E-08	0.000176844	149.404773235	149.405	2.32492E-05	4.64985E-07	8.01073E-08
C18	0*	109.527*	0.000*	9.71464E-08	5.24621E-05	1.09527E+02	109.527	7.22085E-06	1.44417E-07	3.16878E-08
C19	0*	62.6647*	0.0000*	6.97054E-08	1.10642E-05	6.26647E+01	62.6647	1.58528E-06	3.17057E-08	7.50211E-09
C20	0*	40.2479*	0.0000*	4.21003E-08	1.83317E-06	4.02479E+01	40.2479	2.87249E-07	5.74499E-09	1.24527E-09
C21	0*	23.3701*	0.0000*	2.41159E-08	4.89691E-07	2.33701E+01	23.3701	7.71448E-08	1.54290E-09	3.18352E-10
C22	0*	21.6513*	0.0000*	2.99944E-08	2.04466E-07	2.16513E+01	21.6513	3.28499E-08	6.56998E-10	1.25902E-10
C23	0*	11.8065*	0.0000*	2.25191E-08	3.27053E-08	1.18065E+01	11.8065	5.60546E-09	1.12109E-10	1.88361E-11
C24	0*	6.15831*	0.00000*	1.17324E-08	5.99665E-09	6.15831E+00	6.15831	1.07667E-09	2.15335E-11	3.22509E-12
C25	0*	3.20669*	0.00000*	8.21472E-09	1.24994E-09	3.20669E+00	3.20669	2.32918E-10	4.65835E-12	6.33904E-13
C26	0*	2.22282*	0.00000*	7.27976E-09	0	2.222816026	2.22282	5.66725E-11	1.13345E-12	1.36222E-13
C27	0*	2.30784*	0.00000*	9.30506E-09	0	2.307838972	2.30784	1.65630E-11	3.31260E-13	3.42211E-14
C28	0*	2.39286*	0.00000*	1.46555E-08	0	2.392861915	2.39286	9.17464E-12	1.83493E-13	1.77076E-14
C29	0*	1.23894*	0.00000*	6.93323E-09	0	1.238942432	1.23894	2.30594E-12	4.61188E-14	4.10013E-15
C30	0*	1.28145*	0.00000*	9.92471E-09	0	1.281453903	1.28145	0	0	1.43802E-15
H2O	0*	0*	0.041261114*	36395.2	79.7800	0.0145	0.0557584	0.223498	0.00446997	0.18223737
Oxygen	0*	0*	0*	0	0	0	0	0	0	0

Process Streams		Gas	Oil	Oil Tank Vapors	Produced Water	Sales Gas	Sales Oil	Tank Oil	Tank Vapors	Vapor Loss	Water Tank Vapors
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Total	**From Block:**	--	--	Oil Tanks	Water Tanks	MIX-101	Oil Tanks	VLVE-103	MIX-103	SPLT-100	Water Tanks
	To Block:	MIX-100	MIX-100	MIX-103	--	--	--	Oil Tanks	SPLT-100	--	MIX-103
Property	**Units**										
Temperature	°F	90*	90*	95*	60.3460	62.4583	95.0000	87.1512	93.8791	93.8791	60.3460
Pressure	psig	2000*	2000*	0.5*	0.5	150	0.5	0.5*	0.5	0.5	0.5
Molecular Weight	lb/lbmol	22.2142	82.5259	54.7192	18.0157	22.9169	104.4467	102.327	52.6892	52.6892	22.7550
Mass Density	lb/ft^3	11.7827	41.7479	0.1430	62.3646	0.712640	42.893721	8.70457	0.137771	0.137771	0.062274
Mass Flow	lb/h	58538.0	25011.3	475.7	36397.6	62748.5	20388.8	20864.5	489.111	9.78222	13.41512
Vapor Volumetric Flow	ft^3/h	4968.15	599.103	3326.047	583.626	88050.8	475.3	2396.96	3550.17	71.0034	215.4226
Liquid Volumetric Flow	gpm	619.406	74.6934	414.6760	72.7637	10977.8	59.3	298.842	442.619	8.85237	26.85789
Std Vapor Volumetric Flow	MMSCFD	24*	2.76026	0.07918	18.4003	24.9375	1.7779	1.85705	0.0845454	0.00169091	0.00536935
Std Liquid Volumetric Flow	sgpm	332.064	77.175*	1.711165786*	72.7673	349.309	58.292	60.0028	1.78617	0.0357234	0.0750039
Compressibility		0.643921	0.675149	0.976717	0.000786614	0.945208	0.006216	0.0304411	0.978300	0.978300	0.994997
Specific Gravity		0.766997	0.669369	1.889306	0.999930	0.791258	0.687741		1.81922	1.81922	0.78567
API Gravity			75.2357		10.0035		69.26165362				
Enthalpy	Btu/h	-9.60832E+07	-2.41379E+07	-4.50937E+05	-2.48861E+08?	-9.69608E+07	-1.86706E+07	-1.92389E+07	-472912	-9458.25	-21975.94
Mass Enthalpy	Btu/lb	-1641.38	-965.080	-947.951	-6837.29?	-1545.23	-915.73	-922.090	-966.882	-966.882	-1638.147
Mass Cp	Btu/(lb*°F)	0.901961	0.529994	0.413331	0.983059?	0.483689?	0.524124?	0.518356	0.414159	0.414159	0.454987
Ideal Gas CpCv Ratio		1.23182	1.06426	1.09716	1.32630	1.23275	1.05022	1.05192	1.10103	1.10103	1.23864
Net Ideal Gas Heating Value	Btu/ft^3	1207.25	4207.40	2838.23	0.0472203	1241.06	5290.75	5186.19	2734.24	2734.24	1200.88
Net Liquid Heating Value	Btu/lb	20548.7	19173.7	19519.3	-1058.70	20469.9	19044.7	19055.5	19530.6	19530.6	19932.1
Gross Ideal Gas Heating Value	Btu/ft^3	1328.79	4541.57	3076.78	50.3596	1365.05	5701.25	5589.36	2965.33	2965.33	1321.89
Gross Liquid Heating Value	Btu/lb	22625.0	20709.0	21173.2	1.07901	22523.1	20534.6	20549.2	21194.6	21194.6	21950.3
Normal Vapor Volumetric Flow	MMCFD	22.7069	2.61154	0.07491	17.4089	23.5939	1.6821	1.75699	0.0799901	0.00159980	0.00508005

Process Streams	Gas	Oil	Oil Tank Vapors	Produced Water	Sales Gas	Sales Oil	Tank Oil	Tank Vapors	Vapor Loss	Water Tank Vapors
Composition Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Vapor From Block:	--	--	Oil Tanks	Water Tanks	MIX-101	Oil Tanks	VLVE-103	MIX-103	SPLT-100	Water Tanks
To Block:	MIX-100	MIX-100	MIX-103	--	--	--	Oil Tanks	SPLT-100	--	MIX-103
Mass Fraction	%	%	%	%	%	%	%	%	%	%
H2S	0		0		0		0	0	0	0
N2	0.713750		0.000200792		0.671328		0.000348087	0.00938323	0.00938323	0.33498934
CO2	0.311036		0.014538754		0.292713		0.0217431	0.0704666	0.0704666	2.0536486
C1	51.2310		0.245908424		48.1662		0.405374	1.47846	1.47846	45.18436
C2	24.3847		6.170404598		23.9911		8.24477	6.85680	6.85680	31.19607
C3	13.9545		26.18746508		15.1302		28.7893	25.8283	25.8283	13.0927
iC4	1.65096		7.579562676		1.94953		7.52028	7.40505	7.40505	1.21703
nC4	4.60227		27.34690103		5.61394		26.3035	26.7067	26.7067	4.0049
2,2-Dimethylbutane	0.0349132		0.175203615		0.0215517		0.155642	0.170516	0.170516	0.004312
iC5	0.857427		7.360043947		1.07720		6.71229	7.17368	7.17368	0.56532
nC5	1.22443		11.5605328		1.56315		10.4019	11.2516	11.2516	0.2985
2,2-Dimethylpropane	0.0162391		0.223992431		0.0410251		0.211864	0.218271	0.218271	0.015404
Cyclopentane	0.00947125		0.02277688		0.00285232		0.0202658	0.0223379	0.0223379	0.0067732
2,3-Dimethylbutane	0.0232755		0.318875193		0.0369852		0.280265	0.310601	0.310601	0.017199
2-Methylpentane	0.182325		2.281622225		0.257125		1.99258	2.22103	2.22103	0.07238
3-Methylpentane	0.104740		1.318030502		0.146500		1.14874	1.28463	1.28463	0.10009
C6	0.302581		3.839961089		0.402059		3.30483	3.73616	3.73616	0.05538
Methylcyclopentane	0.0227310		0.448347745		0.0478149		0.388787	0.437529	0.437529	0.053906
Benzene	0.00351626		0.047774297		0.00514533		0.0413540	0.0475124	0.0475124	0.0382245
Cyclohexane	0.0265195		0.431420318		0.0452746		0.371282	0.422414	0.422414	0.103060
2-Methylhexane	0.0405960		0.720766898		0.0708986		0.609807	0.701440	0.701440	0.016107
3-Methylhexane	0.0405960		0.606328359		0.0584655		0.510863	0.590146	0.590146	0.016324
2,2,4-Trimethylpentane	0		0		0		0	0	0	0
C7	0.117277		1.333689727		0.126428		1.11560	1.29748	1.29748	0.01354
Methylcyclohexane	0.0309394		0.499180395		0.0470636		0.419051	0.486968	0.486968	0.053933
Toluene	0.00414768		0.079909521		0.00756927		0.0670550	0.0792105	0.0792105	0.0544239
C8	0.0668470		0.793615474		0.0697037		0.645665	0.771927	0.771927	0.002872
Ethylbenzene	0		0.032313938		0.00282717		0.0263725	0.0319535	0.0319535	0.0191730
m-Xylene	0.00477909		0.03175759		0.00277638		0.0258928	0.0313734	0.0313734	0.0177495
o-Xylene	0		0.053966044		0.00466510		0.0438649	0.0533722	0.0533722	0.0323164
C9	0.0230940		0.182601093		0.0144719		0.144103	0.177612	0.177612	0.000717
C10	0.00640491		0.062233381		0.00477174		0.0479799	0.0605281	0.0605281	0.0000610
C11	0		0.016077168		0.00114657		0.0120420	0.0156367	0.0156367	0.0000171
C12	0		0.003942172		0.000263617		0.00288299	0.00383447	0.00383447	0.00001553
C13	0		0.001003572		6.48383E-05		0.000715770	0.000976303	0.000976303	0.000009361
C14	0.00893049		0.000291488		1.80209E-05		0.000203062	0.000283629	0.000283629	0.000004951
C15	0		6.24696E-05		3.78517E-06		4.27683E-05	6.08096E-05	6.08096E-05	1.94577E-06
C16	0		1.76765E-05		1.03652E-06		1.18486E-05	1.72249E-05	1.72249E-05	1.21398E-06
C17	0		4.87058E-06		2.81830E-07		3.20824E-06	4.75337E-06	4.75337E-06	5.97142E-07
C18	0		1.51129E-06		8.36069E-08		9.74197E-07	1.47632E-06	1.47632E-06	2.36210E-07
C19	0		3.31679E-07		1.76326E-08		2.09005E-07	3.24115E-07	3.24115E-07	5.59228E-08
C20	0		6.01233E-08		2.92145E-09		3.65503E-08	5.87289E-08	5.87289E-08	9.28258E-09
C21	0		1.61503E-08		7.80402E-10		9.68230E-09	1.57725E-08	1.57725E-08	2.37308E-09
C22	0		6.87918E-09		3.25849E-10		4.05462E-09	6.71624E-09	6.71624E-09	9.38509E-10
C23	0		1.17441E-09		5.21212E-11		6.71851E-10	1.14605E-09	1.14605E-09	1.40410E-10
C24	0		2.25659E-10		9.55663E-12		1.25948E-10	2.20129E-10	2.20129E-10	2.40407E-11
C25	0		4.88303E-11		1.99198E-12		2.66912E-11	4.76206E-11	4.76206E-11	4.72529E-12
C26	0		1.1885E-11		0		6.32845E-12	1.15868E-11	1.15868E-11	1.01543E-12
C27	0		3.48184E-12		0		1.79221E-12	3.38635E-12	3.38635E-12	0.00000E+00
C28	0		1.92868E-12		0		9.79976E-13	1.87578E-12	1.87578E-12	0.00000E+00
C29	0		4.84751E-13		0		2.42267E-13	4.71456E-13	4.71456E-13	0.00000E+00
C30	0		0		0		9.30594E-14	0	0	0
H2O	0		0.008673844		0.127142		0.0127001	0.0456948	0.0456948	1.3584472
Oxygen	0		0		0		0	0	0	0

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
H2S	0		0		0		0	0	0	0
N2	417.815		0.000955158		421.248		0.000930752	0.0458944	0.000917888	0.044939234
CO2	182.074		0.069160246		183.673		0.0581389	0.344660	0.00689319	0.27549950
C1	29989.6		1.169776086		30223.6		1.08393	7.23131	0.144626	6.061537
C2	14274.3		29.3523566		15054.1		22.0458	33.5373	0.670747	4.184992
C3	8168.70		124.5726761		9494.00		76.9800	126.329	2.52658	1.75640
iC4	966.437		36.05566264		1223.30		20.1086	36.2189	0.724379	0.163267
nC4	2694.08		130.0880644		3522.66		70.3332	130.625	2.61251	0.53726
2,2-Dimethylbutane	20.4375		0.833436268		13.5234		0.416173	0.834015	0.0166803	0.0005785
iC5	501.921		35.01142123		675.927		17.9480	35.0873	0.701745	0.075838
nC5	716.758		54.99297101		980.853		27.8137	55.0330	1.10066	0.04004
2,2-Dimethylpropane	9.50607		1.065522626		25.7426		0.566505	1.06759	0.0213518	0.0020665
Cyclopentane	5.54428		0.108348665		1.78979		0.0541889	0.109257	0.00218515	0.00090863
2,3-Dimethylbutane	13.6250		1.516875957		23.2076		0.749403	1.51918	0.0303837	0.0023073
2-Methylpentane	106.729		10.8535815		161.342		5.32799	10.8633	0.217266	0.009710
3-Methylpentane	61.3125		6.269815973		91.9264		3.07161	6.28324	0.125665	0.013428
C6	177.125		18.2665343		252.286		8.83681	18.2740	0.365479	0.007429
Methylcyclopentane	13.3063		2.132771472		30.0031		1.03958	2.14000	0.0428001	0.0072316
Benzene	2.05835		0.227260335		3.22862		0.110577	0.232388	0.00464776	0.00512786
Cyclohexane	15.5240		2.052248409		28.4092		0.992773	2.06607	0.0413215	0.0138257
2-Methylhexane	23.7641		3.428657988		44.4878		1.63057	3.43082	0.0686164	0.0021607
3-Methylhexane	23.7641		2.884278643		36.6863		1.36600	2.88647	0.0577294	0.0021898
2,2,4-Trimethylpentane	0		0		0		0	0	0	0
C7	68.6518		6.344306253		79.3316		2.98301	6.34612	0.126922	0.001817
Methylcyclohexane	18.1113		2.374580259		29.5317		1.12050	2.38182	0.0476363	0.0072352
Toluene	2.42797		0.380126251		4.74961		0.179299	0.387427	0.00774855	0.00730103
C8	39.1309		3.77519562		43.7381		1.72645	3.77558	0.0755116	0.0003853
Ethylbenzene	0		0.153716052		1.77401		0.0705176	0.156288	0.00312576	0.00257209
m-Xylene	2.79759		0.151069529		1.74214		0.0692349	0.153451	0.00306901	0.00238112
o-Xylene	0		0.256714212		2.92728		0.117291	0.261049	0.00522099	0.00433528
C9	13.5188		0.868625762		9.08089		0.385320	0.868722	0.0173744	0.0000962
C10	3.74931		0.296041592		2.99420		0.128294	0.296050	0.00592100	0.00000819
C11	0		0.076478416		0.719458		0.0321991	0.0764807	0.00152961	0.00000229
C12	0		0.01875275		0.165416		0.00770887	0.0187548	0.000375097	0.000002084
C13	0		0.00477395		0.0406851		0.00191390	0.00477521	9.55041E-05	1.25585E-06
C14	5.22773		0.001386596		0.0113078		0.000542971	0.00138726	2.77452E-05	6.64189E-07
C15	0		0.000297165		0.00237514		0.000114359	0.000297426	5.94852E-06	2.61028E-07
C16	0		8.40861E-05		0.000650403		3.16820E-05	8.42490E-05	1.68498E-06	1.62857E-07
C17	0		2.31691E-05		0.000176844		8.57854E-06	2.32492E-05	4.64985E-07	8.01073E-08
C18	0		7.18916E-06		5.24621E-05		2.60491E-06	7.22085E-06	1.44417E-07	3.16878E-08
C19	0		1.57778E-06		1.10642E-05		5.58861E-07	1.58528E-06	3.17057E-08	7.50211E-09
C20	0		2.86004E-07		1.83317E-06		9.77323E-08	2.87249E-07	5.74499E-09	1.24527E-09
C21	0		7.68265E-08		4.89691E-07		2.58896E-08	7.71448E-08	1.54290E-09	3.18352E-10
C22	0		3.2724E-08		2.04466E-07		1.08417E-08	3.28499E-08	6.56998E-10	1.25902E-10
C23	0		5.58663E-09		3.27053E-08		1.79647E-09	5.60546E-09	1.12109E-10	1.88361E-11
C24	0		1.07345E-09		5.99665E-09		3.36774E-10	1.07667E-09	2.15335E-11	3.22509E-12
C25	0		2.32284E-10		1.24994E-09		7.13698E-11	2.32918E-10	4.65835E-12	6.33904E-13
C26	0		5.65362E-11		0		1.69217E-11	5.66725E-11	1.13345E-12	1.36222E-13
C27	0		1.6563E-11		0		4.79221E-12	1.65630E-11	3.31260E-13	0.00000E+00
C28	0		9.17464E-12		0		2.62037E-12	9.17464E-12	1.83493E-13	0.00000E+00
C29	0		2.30594E-12		0		6.47800E-13	2.30594E-12	4.61188E-14	0.00000E+00
C30	0		0		0		2.48832E-13	0	0	0
H2O	0		0.041261114		79.7800		0.0339588	0.223498	0.00446997	0.18223737
Oxygen	0		0		0		0	0	0	0

Process Streams		Gas	Oil	Oil Tank Vapors	Produced Water	Sales Gas	Sales Oil	Tank Oil	Tank Vapors	Vapor Loss	Water Tank Vapors
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Vapor	**From Block:**	--	--	Oil Tanks	Water Tanks	MIX-101	Oil Tanks	VLVE-103	MIX-103	SPLT-100	Water Tanks
	To Block:	MIX-100	MIX-100	MIX-103	--	--	--	Oil Tanks	SPLT-100	--	MIX-103
Property	**Units**										
Temperature	°F	90		95		62.4583		87.1512	93.8791	93.8791	60.3460
Pressure	psig	2000		0.5		150		0.5	0.5	0.5	0.5
Molecular Weight	lb/lbmol	22.2142		54.71922499		22.9169		52.6098	52.6892	52.6892	22.7550
Mass Density	lb/ft^3	11.7827		0.143021387		0.712640		0.139369	0.137771	0.137771	0.062274
Mass Flow	lb/h	58538.0		475.6958176		62748.5		267.391	489.111	9.78222	13.41512
Vapor Volumetric Flow	ft^3/h	4968.15		3326.046732		88050.8		1918.58	3550.17	71.0034	215.4226
Liquid Volumetric Flow	gpm	619.406		414.6759562		10977.8		239.200	442.619	8.85237	26.85789
Std Vapor Volumetric Flow	MMSCFD	24		0.079176091		24.9375		0.0462897	0.0845454	0.00169091	0.00536935
Std Liquid Volumetric Flow	sgpm	332.064		1.711165786		349.309		0.982785	1.78617	0.0357234	0.0750039
Compressibility		0.643921		0.976716879		0.945208		0.977505	0.978300	0.978300	0.994997
Specific Gravity		0.766997		1.889306381		0.791258		1.81647	1.81922	1.81922	0.78567
API Gravity											
Enthalpy	Btu/h	-9.60832E+07		-450936.539		-9.69608E+07?		-257928	-472912	-9458.25	-21975.94
Mass Enthalpy	Btu/lb	-1641.38		-947.9514479		-1545.23?		-964.609	-966.882	-966.882	-1638.147
Mass Cp	Btu/(lb*°F)	0.901961		0.413330523		0.483689?		0.409539	0.414159	0.414159	0.454987
Ideal Gas CpCv Ratio		1.23182		1.097163968		1.23275		1.10250	1.10103	1.10103	1.23864
Net Ideal Gas Heating Value	Btu/ft^3	1207.25		2838.227945		1241.06		2733.62	2734.24	2734.24	1200.88
Net Liquid Heating Value	Btu/lb	20548.7		19519.2917		20469.9		19555.1	19530.6	19530.6	19932.1
Gross Ideal Gas Heating Value	Btu/ft^3	1328.79		3076.776574		1365.05		2964.69	2965.33	2965.33	1321.89
Gross Liquid Heating Value	Btu/lb	22625.0		21173.24354		22523.1		21221.5	21194.6	21194.6	21950.3
Normal Vapor Volumetric Flow	MMCFD	22.7069		0.074910056		23.5939		0.0437956	0.0799901	0.00159980	0.00508005

Process Streams	Gas	Oil	Oil Tank Vapors	Produced Water	Sales Gas	Sales Oil	Tank Oil	Tank Vapors	Vapor Loss	Water Tank Vapors
Composition Status:	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Light Liquid From Block:	--	--	Oil Tanks	Water Tanks	MIX-101	Oil Tanks	VLVE-103	MIX-103	SPLT-100	Water Tanks
To Block:	MIX-100	MIX-100	MIX-103	--	--	--	Oil Tanks	SPLT-100	--	MIX-103
Mass Fraction	%	%	%	%	%	%	%	%	%	%
H2S		0		0		0	0			
N2		0.0139177		5.71640E-06		1.70175E-07	2.86946E-07			
CO2		0.0101325		0.00156609		0.000100176	0.000152672			
C1		0.967319		0.00158438		0.000640536	0.00105083			
C2		3.32849		0.00176197		0.09122263	0.125774			
C3		6.86728		0.000529440		1.30325734	1.52114			
iC4		1.91078		3.79822E-05		0.906262403	0.974521			
nC4		7.67058		0.000147776		4.703752512	4.94629			
2,2-Dimethylbutane		0.100247		4.36788E-08		0.152790702	0.153271			
iC5		3.33535		1.58741E-05		3.065685321	3.11752			
nC5		6.38832		2.89787E-06		6.270983777	6.33952			
2,2-Dimethylpropane		0.111033		2.94554E-07		0.051326809	0.0532305			
Cyclopentane		0		1.10333E-06		0.017875973	0.0179581			
2,3-Dimethylbutane		0.345644		4.17756E-07		0.36954799	0.369537			
2-Methylpentane		2.62732		1.04484E-06		2.901772262	2.89925			
3-Methylpentane		1.66244		3.68865E-06		1.858330076	1.85506			
C6		5.92817		3.83814E-07		6.813830073	6.79070			
Methylcyclopentane		0.700613		3.38265E-06		0.767049785	0.764600			
Benzene		0.0747760		0.000231252		0.084435527	0.0841481			
Cyclohexane		0.859704		1.57686E-05		0.981246624	0.976467			
2-Methylhexane		2.25843		1.87526E-07		2.651979907	2.63389			
3-Methylhexane		2.05688		2.34346E-07		2.445659218	2.42830			
2,2,4-Trimethylpentane		0		0		0	0			
C7		5.76387		7.39541E-08		6.987107534	6.93276			
Methylcyclohexane		2.17374		3.51842E-06		2.598851595	2.57866			
Toluene		0.382960		0.000245491		0.456057032	0.452420			
C8		10.3205		6.27381E-09		12.6191485	12.5015			
Ethylbenzene		0.455411		8.24398E-05		0.549044548	0.543896			
m-Xylene		0.474708		4.56997E-05		0.586673571	0.581138			
o-Xylene		0.944269		0.000204074		1.142347877	1.13147			
C9		7.19261		2.01304E-09		8.840792668	8.75373			
C10		7.05165		4.74022E-11		8.65262394	8.56593			
C11		5.50801		1.61005E-11		6.752862398	6.68478			
C12		3.78136		6.24560E-11		4.63774599	4.59090			
C13		2.71211		9.99845E-11		3.326765708	3.29313			
C14		2.11311		1.10981E-10		2.617768174	2.59130			
C15		1.25095		9.15782E-11		1.534544477	1.51903			
C16		0.908243		1.70417E-10		1.114152294	1.10288			
C17		0.597350		2.55459E-10		0.732778469	0.725368			
C18		0.437910		2.66903E-10		0.53719109	0.531758			
C19		0.250546		1.91511E-10		0.307348665	0.304240			
C20		0.160919		1.15668E-10		0.197402147	0.195406			
C21		0.0934383		6.62568E-11		0.114622295	0.113463			
C22		0.0865663		8.24076E-11		0.106192239	0.105118			
C23		0.0472046		6.18699E-11		0.057906695	0.0573211			
C24		0.0246221		3.22339E-11		0.030204371	0.0298989			
C25		0.0128210		2.25694E-11		0.015727698	0.0155686			
C26		0.00888726		2.00007E-11		0.01090214	0.0107919			
C27		0.00922719		2.55650E-11		0.011319148	0.0112047			
C28		0.00956713		4.02649E-11		0.011736156	0.0116175			
C29		0.00495354		1.90486E-11		0.006076582	0.00601513			
C30		0.00512350		2.72675E-11		0.006285086	0.00622152			
H2O		0		99.9935		7.11043E-05	0.000105838			
Oxygen		0		0		0	0			

Mass Flow	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h	lb/h
H2S		0		0		0	0			
N2		3.48100		0.00208063		3.46967E-05	5.91027E-05			
CO2		2.53428		0.570020		0.020424738	0.0314460			
C1		241.939		0.576677		0.130597702	0.216441			
C2		832.497		0.641313		18.5992041	25.9058			
C3		1717.59		0.192703		265.7185979	313.311			
iC4		477.910		0.0138246		184.7760742	200.723			
nC4		1918.51		0.0537868		959.0389281	1018.79			
2,2-Dimethylbutane		25.0731		1.58980E-05		31.15219837	31.5695			
iC5		834.215		0.00577777		625.0566026	642.120			
nC5		1597.80		0.00105476		1278.578655	1305.76			
2,2-Dimethylpropane		27.7707		0.000107210		10.46492306	10.9639			
Cyclopentane		0		0.000401584		3.644697269	3.69886			
2,3-Dimethylbutane		86.4501		0.000152053		75.34641922	76.1139			
2-Methylpentane		657.125		0.000380296		591.6366886	597.162			
3-Methylpentane		415.796		0.00134258		378.8912957	382.089			
C6		1482.71		0.000139699		1389.258528	1398.69			
Methylcyclopentane		175.232		0.00123120		156.3922851	157.485			
Benzene		18.7024		0.0841700		17.21539494	17.3321			
Cyclohexane		215.023		0.00573939		200.0644608	201.124			
2-Methylhexane		564.863		6.82551E-05		540.7070124	542.505			
3-Methylhexane		514.451		8.52962E-05		498.6406894	500.159			
2,2,4-Trimethylpentane		0		0		0	0			
C7		1441.62		2.69175E-05		1424.587732	1427.95			
Methylcyclohexane		543.679		0.00128062		529.8747844	531.129			
Toluene		95.7832		0.0893527		92.98457896	93.1854			
C8		2581.28		2.28352E-06		2572.893582	2574.94			
Ethylbenzene		113.904		0.0300061		111.9436223	112.027			
m-Xylene		118.730		0.0166336		119.6157305	119.698			
o-Xylene		236.174		0.0742779		232.9110814	233.051			
C9		1798.96		7.32699E-07		1802.531979	1803.02			
C10		1763.71		1.72533E-08		1764.166624	1764.33			
C11		1377.62		5.86021E-09		1376.827947	1376.87			
C12		945.765		2.27325E-08		945.5809872	945.592			
C13		678.333		3.63919E-08		678.2877735	678.291			
C14		528.517		4.03944E-08		533.7316489	533.732			
C15		312.878		3.33323E-08		312.8752813	312.875			
C16		227.163		6.20276E-08		227.1623388	227.162			
C17		149.405		9.29810E-08		149.4047732	149.405			
C18		109.527		9.71464E-08		109.5268439	109.527			
C19		62.6647		6.97054E-08		62.66471997	62.6647			
C20		40.2479		4.21003E-08		40.2479389	40.2479			
C21		23.3701		2.41159E-08		23.3701162	23.3701			
C22		21.6513		2.99944E-08		21.65132849	21.6513			
C23		11.8065		2.25191E-08		11.80648307	11.8065			
C24		6.15831		1.17324E-08		6.158310391	6.15831			
C25		3.20669		8.21472E-09		3.206689618	3.20669			
C26		2.22282		7.27976E-09		2.222816026	2.22282			
C27		2.30784		9.30506E-09		2.307838972	2.30784			
C28		2.39286		1.46555E-08		2.392861915	2.39286			
C29		1.23894		6.93323E-09		1.238942432	1.23894			
C30		1.28145		9.92471E-09		1.281453903	1.28145			
H2O		0		36395.2		0.014497309	0.0217996			
Oxygen		0		0		0	0			

Process Streams		Gas	Oil	Oil Tank Vapors	Produced Water	Sales Gas	Sales Oil	Tank Oil	Tank Vapors	Vapor Loss	Water Tank Vapors
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved	Solved
Phase: Light Liquid	**From Block:**	--	--	Oil Tanks	Water Tanks	MIX-101	Oil Tanks	VLVE-103	MIX-103	SPLT-100	Water Tanks
	To Block:	MIX-100	MIX-100	MIX-103	--	--	--	Oil Tanks	SPLT-100	--	MIX-103
Property	**Units**										
Temperature	°F		90		60.3460		95	87.1512			
Pressure	psig		2000		0.5		0.5	0.5			
Molecular Weight	lb/lbmol		82.5259		18.0157		104.4467041	103.597			
Mass Density	lb/ft^3		41.7479		62.3646		42.89372126	43.0561			
Mass Flow	lb/h		25011.3		36397.6		20388.80502	20597.1			
Vapor Volumetric Flow	ft^3/h		599.103		583.626		475.3330889	478.378			
Liquid Volumetric Flow	gpm		74.6934		72.7637		59.26230718	59.6420			
Std Vapor Volumetric Flow	MMSCFD		2.76026		18.4003		1.777876925	1.81076			
Std Liquid Volumetric Flow	sgpm		77.175		72.7673		58.29165187	59.0200			
Compressibility			0.675149		0.000786614		0.006216283	0.00623065			
Specific Gravity			0.669369		0.999930		0.687740901	0.690344			
API Gravity			75.2357		10.0035		69.26165362	69.6070			
Enthalpy	Btu/h		-2.41379E+07		-2.48861E+08?		-18670646.16	-1.89810E+07			
Mass Enthalpy	Btu/lb		-965.080		-6837.29?		-915.7302816	-921.538			
Mass Cp	Btu/(lb*°F)		0.529994		0.983059?		0.524123529	0.519769			
Ideal Gas CpCv Ratio			1.06426		1.32630		1.050218153	1.05127			
Net Ideal Gas Heating Value	Btu/ft^3		4207.40		0.0472203		5290.752661	5248.88			
Net Liquid Heating Value	Btu/lb		19173.7		-1058.70		19044.72968	19049.1			
Gross Ideal Gas Heating Value	Btu/ft^3		4541.57		50.3596		5701.252551	5656.45			
Gross Liquid Heating Value	Btu/lb		20709.0		1.07901		20534.60942	20540.4			
Normal Vapor Volumetric Flow	MMCFD		2.61154		17.4089		1.682084299	1.71320			

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-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]		NS		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-C-1, C-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	FUEL SYSTEM:	LPG IMPCO WITH CUSTOMER SUPPLIED AIR FUEL RATIO CONTROL
COMPRESSION RATIO:	10.5:1	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	210	FUEL:	Nat Gas
COOLING SYSTEM:	JW+OC	FUEL PRESSURE RANGE(psig):	1.5-10.0
IGNITION SYSTEM:	MAG	FUEL METHANE NUMBER:	84.8
EXHAUST MANIFOLD:	WC	FUEL LHV (Btu/scf):	905
COMBUSTION:	Catalyst	ALTITUDE(ft):	500
EXHAUST O2 EMISSION LEVEL %:	0.5	MAXIMUM INLET AIR TEMPERATURE(°F):	77
SET POINT TIMING:	30.0	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:
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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:

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

[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)	83.94		
Max. Annual Throughput (1000 gal/yr)	30,638.54		
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)	4.61		
	Annual (ton/yr)	20.20		
Max.HAP Emission Rate	Loading (lb/hr)	0.44		
	Annual (ton/yr)	1.95		
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)		104.79		
Max. Annual Throughput (1000 gal/yr)		38,246.82		
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)	0.09		
	Annual (ton/yr)	0.40		
	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 11,187.5 scfh 268,500 scfd	Maximum Design Heat Input (from mfg. spec sheet) 30 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-6.5-34-268500	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
186.46 (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-6.5-34-268500

Expected Destruction Removal Efficiency (DRE):	98% or Greater of Non-Methane Hydrocarbons
Unit Size:	6.5-foot Diameter 34-Foot Overall Height
Design Heat Input:	30 MMBTU/HR
Design Flow Rates:	268,500 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.

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
Shawn Couch Pad
Summary of Criteria Air Pollutant Emissions

Equipment	Unit ID	Emission Point ID	NOx		CO		Total VOC[1]		SO_2		PM Total	
			lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	*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*
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*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT2*	*EP-HT2*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
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*
Eight (8) 400-bbl Condensate Tanks Routed to Vapor Combustor - Revise	*EU-TANKS-COND*	*APC-COMB*	-	-	-	-	-	-	-	-	-	-
Four (4) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Revise	*EU-TANKS-PW*	*APC-COMB*	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	*EU-LOAD-COND*	*APC-COMB*	-	-	-	-	*4.61*	*20.20*	-	-	-	-
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	*EU-LOAD-PW*	*APC-COMB*	-	-	-	-	*0.09*	*0.40*	-	-	-	-
One (1) 30.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Revise	*APC-COMB*	*APC-COMB*	*4.14*	*18.13*	*8.27*	*36.20*	*9.17*	*40.18*	-	-	*0.09*	*0.37*
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 - Revise	*EU-FUG*	*EP-FUG*	-	-	-	-	*1.17*	*5.10*	-	-	-	-
Fugitive Haul Road Emissions - Revise	*EU-HR*	*EP-HR*	-	-	-	-	-	-	-	-	*3.73*	*12.27*
Total =			**5.67**	**24.85**	**10.29**	**45.09**	**15.58**	**68.25**	**0.01**	**0.03**	**0.20**	**0.88**
Current Permit Allowable Emissions =			**4.48**	**19.63**	**8.55**	**37.46**	**7.26**	**31.79**	**<0.01**	**0.01**	**0.11**	**0.49**
Change in Emissions =			**1.19**	**5.22**	**1.74**	**7.63**	**8.32**	**36.45**	**0.00**	**0.02**	**0.09**	**0.40**

Notes:
[1] Total VOC includes all constituents heavier than Propane (C3+), including hazardous air pollutants (HAP). Speciated HAP presented in following table.

SWN Production Company, LLC
Shawn Couch 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 - Add	*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*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT1*	*-*	*-*	*0.00*	*-*	*0.00*	*-*	*0.00*	*0.00*	*-*	*0.00*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT2*	*-*	*-*	*0.00*	*-*	*0.00*	*-*	*0.00*	*0.00*	*-*	*0.00*
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*
Eight (8) 400-bbl Condensate Tanks Routed to Vapor Combustor - Revise	*EU-TANKS-COND*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Four (4) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Revise	*EU-TANKS-PW*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	*EU-LOAD-COND*	*-*	*-*	*<0.01*	*0.03*	*-*	*-*	*0.31*	*0.02*	*0.08*	*0.44*
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	EU-LOAD-PW	-	-	<0.01	<0.01	-	-	0.01	<0.01	<0.01	0.01
One (1) 30.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Revise	*APC-COMB*	*-*	*-*	*0.01*	*0.05*	*-*	*-*	*0.63*	*0.04*	*0.16*	*0.88*
Vapor Combustor Pilots	EU-PILOTS	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Fugitive Emissions - Revise	*EU-FUG*	*-*	*-*	*<0.01*	*<0.01*	*-*	*-*	*0.05*	*<0.01*	*0.01*	*0.07*
Fugitive Haul Road Emissions - Revise	*EU-HR*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Total =		**0.01**	**0.01**	**0.02**	**0.08**	**0.04**	**0.01**	**1.01**	**0.07**	**0.25**	**1.49**
Current Permit Allowable Emissions =		**0.00**	**0.00**	**<0.01**	**0.03**	**<0.01**	**0.00**	**0.42**	**0.03**	**0.10**	**0.58**
Change in Emissions =		**0.00**	**0.00**	**0.01**	**0.05**	**0.04**	**0.00**	**0.59**	**0.04**	**0.00**	**0.91**

Continued on Next Page

SWN Production Company, LLC
Shawn Couch Pad
Summary of Hazardous Air Pollutants (Continued)

Equipment	Unit ID	Estimated Emissions (TPY)									
		Acetalde-hyde	Acrolein	Benzene	Ethyl-benzene	Formalde-hyde	Methanol	n-Hexane	Toluene	Xylenes	Total HAPs
145-hp Caterpillar G3306 NA Engine w/ Catalytic Converter - Add	*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*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT1*	*-*	*-*	*0.00*	*-*	*0.00*	*-*	*0.00*	*0.00*	*-*	*0.00*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT2*	*-*	*-*	*0.00*	*-*	*0.00*	*-*	*0.00*	*0.00*	*-*	*0.00*
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*
Eight (8) 400-bbl Condensate Tanks Routed to Vapor Combustor - Revise	*EU-TANKS-COND*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Four (4) 400-bbl Produced Water Tanks Routed to Vapor Combustor - Revise	*EU-TANKS-PW*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	*EU-LOAD-COND*	*-*	*-*	*0.02*	*0.11*	*-*	*-*	*1.38*	*0.09*	*0.35*	*1.95*
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	EU-LOAD-PW	-	-	<0.01	<0.01	-	-	0.03	<0.01	0.01	0.04
One (1) 30.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Revise	*APC-COMB*	*-*	*-*	*0.03*	*0.22*	*-*	*-*	*2.74*	*0.18*	*0.69*	*3.87*
Vapor Combustor Pilots	EU-PILOTS	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Fugitive Emissions - Revise	*EU-FUG*	*-*	*-*	*<0.01*	*0.01*	*-*	*-*	*0.22*	*0.01*	*0.05*	*0.30*
Fugitive Haul Road Emissions - Revise	*EU-HR*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Total =		**0.03**	**0.03**	**0.07**	**0.35**	**0.18**	**0.03**	**4.43**	**0.30**	**1.10**	**6.53**
Current Permit Allowable Emissions =		**0.00**	**0.00**	**0.02**	**0.13**	**<0.01**	**0.00**	**1.83**	**0.12**	**0.44**	**2.55**
Change in Emissions =		**0.03**	**0.03**	**0.05**	**0.22**	**0.18**	**0.03**	**2.60**	**0.18**	**0.66**	**3.97**

SWN Production Company, LLC
Shawn Couch 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 - Add	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	616.31
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
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
0.50-mmBtu/hr Heater Treater - Remove	EU-HT2	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 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
Eight (8) 400-bbl Condensate Tanks Routed to Vapor Combustor[2] - Revise	EU-TANKS-COND	-	-	-	-	-	-	-	-	-	-	-	-
Eight (8) 400-bbl Produced Water Tanks Routed to Vapor Combustor[2] - Revise	EU-TANKS-PW	-	-	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	EU-LOAD-COND	<0.01	<0.01	0.04	0.15	0.97	3.84	-	-	-	-	0.97	3.84
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	EU-LOAD-PW	<0.01	<0.01	0.05	0.19	1.21	4.79	-	-	-	-	1.21	4.79
One (1) 30.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Revise	APC-COMB	3,509.31	13,944.14	0.07	0.26	1.65	6.57	0.01	0.03	1.97	7.83	3,512.94	13,958.54
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	10.59	42.11
Fugitive Emissions - Revise	EU-FUG	0.01	0.02	1.03	4.10	25.77	102.40	-	-	-	-	25.78	102.42
Fugitive Haul Road Emissions - Revise	EU-HR	-	-	-	-	-	-	-	-	-	-	-	-
Total =		**4,765.80**	**18,936.74**	**1.21**	**4.80**	**30.18**	**119.92**	**0.01**	**0.04**	**2.67**	**10.60**	**4,798.64**	**19,066.93**
Current Permit Allowable Emissions =		**3,870.83**	**15,380.63**	**0.51**	**2.04**	**12.82**	**50.95**	**0.01**	**0.03**	**2.17**	**8.64**	**3,885.82**	**15,440.21**
Change in Emissions =		**894.96**	**3,556.11**	**0.69**	**2.76**	**17.36**	**68.97**	**0.00**	**0.01**	**0.49**	**1.96**	**912.82**	**3,626.72**

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
Shawn Couch 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 - Add	*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*
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*
0.50-mmBtu/hr Heater Treater - Remove	*EU-HT2*	*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 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*
Eight (8) 400-bbl Condensate Tanks Routed to Vapor Combustor [3] - Revise	*EU-TANKS-COND*	-	-	-	-	-	-	-	-	-	-	-	-
Eight (8) 400-bbl Produced Water Tanks Routed to Vapor Combustor [3] - Revise	*EU-TANKS-PW*	-	-	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	*EU-LOAD-COND*	*<0.01*	*<0.01*	*0.04*	*0.17*	*0.97*	*4.23*	-	-	-	-	*0.97*	*4.23*
Produced Water Truck Loading w/ Vapor Return Routed to Vapor Combustor - Revise	EU-LOAD-PW	<0.01	<0.01	0.05	0.21	1.21	5.28	-	-	-	-	1.21	5.28
One (1) 30.0-mmBtu/hr Vapor Combustor - Tank/Loading Stream - Revise	*APC-COMB*	*3,509.31*	*15,370.78*	*0.07*	*0.29*	*1.65*	*7.24*	*0.01*	*0.03*	*1.97*	*8.63*	*3,512.94*	*15,386.66*
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 - Revise	*EU-FUG*	*0.01*	*0.03*	*1.03*	*4.52*	*25.77*	*112.88*	-	-	-	-	*25.78*	*112.90*
Fugitive Haul Road Emissions - Revise	*EU-HR*	-	-	-	-	-	-	-	-	-	-	-	-
Total =		**4,765.80**	**20,874.18**	**1.21**	**5.29**	**30.18**	**132.19**	**0.01**	**0.04**	**2.67**	**11.68**	**4,798.65**	**21,017.69**
Current Permit Allowable Emissions =		**3,870.83**	**16,954.24**	**0.51**	**2.25**	**12.82**	**56.16**	**0.01**	**0.03**	**2.17**	**9.52**	**3,885.83**	**17,019.92**
Change in Emissions =		**894.96**	**3,919.94**	**0.69**	**3.04**	**17.36**	**76.03**	**0.00**	**0.01**	**0.49**	**2.16**	**912.82**	**3,997.77**

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
Shawn Couch 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
Maunufacture Date:	TBD	TBD
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
Total VOC = NMNEHC + HCHO (g/hp-hr):	0.49	0.49

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
Total VOC = NMNEHC + HCHO (g/hp-hr):	0.76	0.76

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
Total VOC (includes HCHO)	0.16	0.69	0.16	0.69
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
Shawn Couch 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
Total VOC (includes HCHO)	0.24	1.07	0.24	1.07
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

Engine Emissions Calculations - Criteria Air Pollutants (Continued)

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

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. Per NSPS Subpart JJJJ, VOC limit does not include HCHO; therefore, HCHO emissions have been added to the NSPS JJJJ VOC emission rates for demonstration purposes only.

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

SWN Production Company, LLC
Shawn Couch 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
Shawn Couch Pad
Engine Emissions Calculations - Hazardous Air Pollutants (Continued)

AP-42 Emission Factors (lb/mmBtu)

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
Shawn Couch 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): 485

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
Shawn Couch Pad
Gas Production Unit Burner Emissions Calculations - Criteria Air Pollutants

Equipment Information

Unit ID:	**EU-GPU1 - EU-GPU5 (EACH)**
Emission Point ID:	EP-GPU1 - EP-GPU5 (EACH)
Description:	Gas Production Unit Burner
Number of Units:	5
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 - EU-GPU5 (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
Shawn Couch Pad
Gas Production Unit Burner Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Unit ID:	**EU-GPU1 - EU-GPU5 (EACH)**
Emission Point ID:	EP-GPU1 - EP-GPU5 (EACH)
Description:	Gas Production Unit Burner
Number of Units:	5
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 - EU-GPU5 (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
Shawn Couch Pad
Gas Production Unit Burner Emissions Calculations - Greenhouse Gases

Equipment Information

Unit ID:	**EU-GPU1 - EU-GPU5 (EACH)**
Emission Point ID:	EP-GPU1 - EP-GPU5 (EACH)
Description:	Gas Production Unit Burner
Number of Units:	5
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 - EU-GPU5 (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
Shawn Couch Pad
Stabilizer Heater Emissions Calculations - Criteria Air Pollutants

Equipment Information

Unit ID:	**EU-SH1 and EU-SH2 (EACH)**
Emission Point ID:	EP-SH1 and EP-SH2 (EACH)
Description:	Stabilizer Heaters
Number of Units:	2
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 and 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
Shawn Couch Pad
Stabilizer Heater Emissions Calculations - Hazardous Air Pollutants

Equipment Information

Unit ID:	**EU-SH1 and EU-SH2 (EACH)**
Emission Point ID:	EP-SH1 and EP-SH2 (EACH)
Description:	Stabilizer Heaters
Number of Units:	2
Burner Design (mmBtu/hr):	1.50
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	14.52
Annual Operating Hours:	8,760

Hazardous Air Pollutant Emissions

Unit ID: **EU-SH1 and 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
Shawn Couch Pad
Stabilizer Heater Emissions Calculations - Greenhouse Gases

Equipment Information

Unit ID:	**EU-SH1 and EU-SH2 (EACH)**
Emission Point ID:	EP-SH1 and EP-SH2 (EACH)
Description:	Stabilizer Heaters
Number of Units:	2
Burner Design (mmBtu/hr):	1.50
Fuel HHV (Btu/scf):	905
Annual Fuel Use (mmscf):	14.52
Annual Operating Hours:	8,760

Greenhouse Gas (GHG) Emissions[1]

Unit ID: **EU-SH1 and 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
Shawn Couch 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]	8	4
Capacity (bbl) - Per Tank:	400	400
Capacity (gal) - Per Tank:	16,800	16,800
Total Throughput (bbl/yr):	729,489	910,639
Total Throughput (gal/yr):	30,638,538	38,246,817
Total Throughput (bbl/d):	1,998.6	2,494.9
Tank Vapor Control Efficiency:	98%	98%
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, Breathing, and Flashing Losses [3]	445.06	1,991.25	2.67	12.59
Total VOC =	**445.06**	**1,991.25**	**2.67**	**12.59**

SWN Production Company, LLC
Shawn Couch 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**
Flashing Losses	9.09	39.83	0.06	0.25
Total VOC =	**9.09**	**39.83**	**0.06**	**0.25**
Per Tank =	**1.14**	**4.98**	**0.01**	**0.06**

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] Working, breathing, and flashing calculated using Promax process simulation. Reports located in Attachment L. Uncontrolled tank working/breathing/flashing emissions are routed to a vapor combustor with 98% destruction efficiency.

Total Annual Emissions (TPY) = Tank Working + Breathing + Flashing Emissions (TPY) * (1 - Control Efficiency (%))

SWN Production Company, LLC
Shawn Couch 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]	**445.06**	**1,991.25**	**2.67**	**12.59**
n-Hexane	30.33	132.83	0.18	0.80
Benzene	0.38	1.65	<0.01	0.01
Toluene	2.03	8.89	0.01	0.05
Ethylbenzene	2.44	10.70	0.01	0.06
Xylenes	7.70	33.71	0.05	0.20
Total HAPs =	**42.87**	**187.77**	**0.26**	**1.12**

Controlled Storage Tank Emissions

Unit ID:	EU-TANKS-COND		EU-TANKS-PW	
Pollutant	**lb/hr**	**TPY**	**lb/hr**	**TPY**
Total VOC = [1]	**9.09**	**39.83**	**0.06**	**0.25**
n-Hexane	0.61	2.66	<0.01	0.02
Benzene	0.01	0.03	<0.01	<0.01
Toluene	0.04	0.18	<0.01	<0.01
Ethylbenzene	0.05	0.21	<0.01	<0.01
Xylenes	0.15	0.67	<0.01	<0.01
Total HAPs =	**0.86**	**3.76**	**0.01**	**0.02**

SWN Production Company, LLC
Shawn Couch Pad
Storage Tank Emissions - Hazardous Air Pollutants (Continued)

Estimated HAP Composition (% by Weight)[2]

Pollutant	Wt%
n-Hexane	6.814%
Benzene	0.084%
Toluene	0.456%
Ethylbenzene	0.549%
Xylenes	1.729%
Total HAPs =	**9.632%**

Notes:

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

[2] Speciated liquids analysis located in Fugitive Emissions Calculations. HAP weight % from Sales Oil mass fraction in Promax process simulation. All HAP assumed to volatilize from liquids for most conservative emissions estimate.

SWN Production Company, LLC
Shawn Couch Pad
Working, Breathing, and Flashing Emissions - Process Simulation

Promax Results[1]

Pollutant	Weight Fraction	1998.60 bbl/day	
		lb/hr	TPY
Hydrogen Sulfide	0.0000	0.00	0.00
Water	0.0001	0.04	0.18
Carbon Dioxide	0.0001	0.07	0.30
Nitrogen	<0.0001	<0.01	<0.01
Helium	0.0000	0.00	0.00
Oxygen	0.0000	0.00	0.00
Methane	0.0025	1.17	5.12
Ethane	0.0617	29.35	128.56
Propane	0.2619	124.57	545.63
Isobutane	0.0758	36.06	157.92
n-Butane	0.2735	130.09	569.79
Isopentane	0.0736	35.01	153.35
n-Pentane	0.1178	56.06	245.54
Cyclopentane	0.0002	0.11	0.47
n-Hexane	0.0384	18.27	80.01
Cyclohexane	0.0043	2.05	8.99
Other Hexanes	0.0454	21.61	94.64
Heptanes	0.0316	15.03	65.84
Benzene	0.0005	0.23	1.00
Toluene	0.0008	0.38	1.66
Ethylbenzene	0.0003	0.15	0.67
Xylenes	0.0009	0.41	1.79
Octanes	0.0079	3.78	16.54
2,2,4-Trimethylpentane	0.0000	0.00	0.00
Nonanes	0.0018	0.87	3.80
Decanes+	0.0008	0.40	1.74
Total =	**1.0000**	**475.70**	**2,083.55**
Total VOC =	**0.9356**	**445.06**	**1,949.37**
Total HAP =	**0.0409**	**19.44**	**85.13**

SWN Production Company, LLC
Shawn Couch Pad
Working, Breathing, and Flashing Emissions - Process Simulation

Promax Results[1]

Pollutant	Weight Fraction	2494.90 bbl/day	
		lb/hr	TPY
Hydrogen Sulfide	0.0000	0.00	0.00
Water	0.0136	0.18	0.80
Carbon Dioxide	0.0205	0.28	1.21
Nitrogen	0.0033	0.04	0.20
Helium	0.0000	0.00	0.00
Oxygen	0.0000	0.00	0.00
Methane	0.4518	6.06	26.55
Ethane	0.3120	4.18	18.33
Propane	0.1309	1.76	7.69
Isobutane	0.0122	0.16	0.72
n-Butane	0.0400	0.54	2.35
Isopentane	0.0057	0.08	0.33
n-Pentane	0.0031	0.04	0.18
Cyclopentane	0.0001	<0.01	<0.01
n-Hexane	0.0006	0.01	0.03
Cyclohexane	0.0010	0.01	0.06
Other Hexanes	0.0025	0.03	0.15
Heptanes	0.0010	0.01	0.06
Benzene	0.0004	0.01	0.02
Toluene	0.0005	0.01	0.03
Ethylbenzene	0.0002	<0.01	0.01
Xylenes	0.0005	0.01	0.03
Octanes	<0.0001	<0.01	<0.01
2,2,4-Trimethylpentane	0.0000	0.00	0.00
Nonanes	<0.0001	<0.01	<0.01
Decanes+	<0.0001	<0.01	<0.01
Total =	**1.0000**	**13.42**	**58.76**
Total VOC =	**0.1987**	**2.67**	**11.68**
Total HAP =	**0.0022**	**0.03**	**0.13**

SWN Production Company, LLC
Shawn Couch 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):	30,638.54
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	TPY
VOC[3] =	**15.38**	**67.34**
n-Hexane	1.05	4.59
Benzene	0.01	0.06
Toluene	0.07	0.31
Ethylbenzene	0.08	0.37
Xylenes	0.27	1.16
Total HAPs [5] =	**1.48**	**6.49**

SWN Production Company, LLC
Shawn Couch Pad
Condensate Truck Loading Emissions - Criteria and Hazardous Air Pollutants (Continued)

Uncaptured Loading Emissions[2]

Pollutant	Max. lb/hr	TPY
VOC[3] =	**4.61**	**20.20**
n-Hexane	0.31	1.38
Benzene	<0.01	0.02
Toluene	0.02	0.09
Ethylbenzene	0.03	0.11
Xylenes	0.08	0.35
Total HAPs [4] =	**0.44**	**1.95**

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 TPY conversion assuming continuous operation.
[3] Loading losses calculated using Promax process simulation.
[4] Speciated liquids analysis located in Fugitive Emissions Calculations. HAP weight % from Sales Oil mass fraction in Promax process simulation. All HAP assumed to volatilize from liquids for most conservative emissions estimate.

Pollutant	Wt%
n-Hexane	6.814%
Benzene	0.084%
Toluene	0.456%
Ethylbenzene	0.549%
Xylenes	1.729%
Total HAPs =	**9.632%**

SWN Production Company, LLC
Shawn Couch 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):	30.639
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 =	1.84%
Input CO_2 wt% from analysis =	0.01%

Uncontrolled Loading Emissions[3, 4]

Pollutant	Max. lb/hr	Avg. lb/hr	tonnes/yr	tons/yr
CH_4	0.28	0.13	0.51	0.56
CH_4 as CO_2e	6.91	3.22	12.80	14.11
CO_2	<0.01	<0.01	<0.01	<0.01
Total CO_2 + CO_2e =	**6.91**	**3.22**	**12.80**	**14.11**

SWN Production Company, LLC
Shawn Couch 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	0.08	0.04	0.15	0.17
CH_4 as CO_2e	2.07	0.97	3.84	4.23
CO_2	<0.01	<0.01	<0.01	<0.01
Total CO_2 + CO_2e =	**2.07**	**0.97**	**3.84**	**4.23**

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
Shawn Couch 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):	38,246.82
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	TPY
VOC[3] =	**0.30**	**1.33**
n-Hexane	0.02	0.09
Benzene	<0.01	<0.01
Toluene	<0.01	0.01
Ethylbenzene	<0.01	0.01
Xylenes	0.01	0.02
Total HAPs[4] =	**0.03**	**0.13**

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

Uncaptured Loading Emissions[2]

Pollutant	Max. lb/hr	TPY
VOC[3] =	**0.09**	**0.40**
n-Hexane	0.01	0.03
Benzene	<0.01	<0.01
Toluene	<0.01	<0.01
Ethylbenzene	<0.01	<0.01
Xylenes	<0.01	0.01
Total HAPs[4] =	**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 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	6.814%
Benzene	0.084%
Toluene	0.456%
Ethylbenzene	0.549%
Xylenes	1.729%
Total HAPs =	**9.632%**

SWN Production Company, LLC
Shawn Couch 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):	38.247
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 =	1.84%
Input CO_2 wt% from analysis =	0.01%

Uncontrolled Loading Emissions[3, 4]

Pollutant	Max. lb/hr	Avg. lb/hr	tonnes/yr	tons/yr
CH_4	0.28	0.16	0.64	0.70
CH_4 as CO_2e	6.91	4.02	15.98	17.61
CO_2	<0.01	<0.01	<0.01	<0.01
Total CO_2 + CO_2e =	**6.91**	**4.02**	**15.98**	**17.61**

SWN Production Company, LLC
Shawn Couch 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	0.08	0.05	0.19	0.21
CH_4 as CO_2e	2.07	1.21	4.79	5.28
CO_2	<0.01	<0.01	<0.01	<0.01
Total CO_2 + CO_2e =	**2.07**	**1.21**	**4.79**	**5.28**

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
Shawn Couch 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	-	-	-	4.14	18.13
	CO	0.2755	-		-	8.27	36.20
	PM	7.6	-		-	0.09	0.37
	VOC	Mass Balance	458.70	2,051.92	98.00%	9.17	40.18
	n-Hexane	Mass Balance	31.26	136.90	98.00%	0.63	2.74
	Benzene	Mass Balance	0.39	1.70	98.00%	0.01	0.03
	Toluene	Mass Balance	2.09	9.16	98.00%	0.04	0.18
	Ethylbenzene	Mass Balance	2.52	11.03	98.00%	0.05	0.22
	Xylenes	Mass Balance	7.93	34.74	98.00%	0.16	0.69

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 = 30.00 mmBtu/hr Total Heat Input

[2] Total captured emissions are based on 100% 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 loading emission units. Captured emissions from sources controlled by VOC combustor shown in following tables.

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

Source	Captured VOC Emissions	
	lb/hr	TPY
Condensate Storage Tanks	445.06	1,991.25
Produced Water Storage Tanks	2.67	12.59
Condensate Truck Loading	10.76	47.14
Produced Water Truck Loading	0.21	0.93
Total VOC =	**458.70**	**2,051.92**

Source	Captured HAP Emissions (lb/hr)				
	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes
Condensate Storage Tanks	30.33	0.38	2.03	2.44	7.70
Produced Water Storage Tanks	0.18	<0.01	0.01	0.01	0.05
Condensate Truck Loading	0.73	0.01	0.05	0.06	0.19
Produced Water Truck Loading	0.01	<0.01	<0.01	<0.01	<0.01
Total HAP =	**31.26**	**0.39**	**2.09**	**2.52**	**7.93**

Source	Captured HAP Emissions (TPY)				
	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes
Condensate Storage Tanks	132.83	1.65	8.89	10.70	33.71
Produced Water Storage Tanks	0.80	0.01	0.05	0.06	0.20
Condensate Truck Loading	3.21	0.04	0.21	0.26	0.82
Produced Water Truck Loading	0.06	<0.01	<0.01	0.01	0.02
Total HAP =	**136.90**	**1.70**	**9.16**	**11.03**	**34.74**

SWN Production Company, LLC
Shawn Couch 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):	30.00
Total Heat Input (mmBtu/hr):	30.00
Stream HHV (Btu/scf):	2,682
Annual Throughput (mmscf):	97.99
Annual Operating Hours:	8,760

Greenhouse Gas (GHG) Emissions

Pollutant	lb/hr	tonnes/yr	tons/yr
CO_2	3,509.31	13,944.14	15,370.78
CH_4	0.07	0.26	0.29
N_2O	0.01	0.03	0.03
CH_4 as CO_2e	1.65	6.57	7.24
N_2O as CO_2e	1.97	7.83	8.63
Total CO_2 + CO_2e =	**3,512.94**	**13,958.54**	**15,386.66**

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
Shawn Couch 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	NOx	100	0.01	0.04
APC-COMB	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	APC-COMB-TKLD 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] Combustor is equipped with two (2) pilots with a pilot fuel consumption of 50 SCFH per pilot.

SWN Production Company, LLC
Shawn Couch 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	APC-COMB-TKLD 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] Combustor is equipped with two (2) pilots with a pilot fuel consumption of 50 SCFH per pilot.

SWN Production Company, LLC
Shawn Couch 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	APC-COMB-TKLD 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] Combustor is equipped with two (2) pilots with a pilot fuel consumption of 50 SCFH per pilot.

SWN Production Company, LLC
Shawn Couch 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	89	9.92E-03	0.00%	0.88	3.87	24.18%
Flanges - Gas	370	8.60E-04	0.00%	0.32	1.39	24.18%
Compressor Seals - Gas	6	1.94E-02	0.00%	0.12	0.51	24.18%
Relief Valves - Gas	33	1.94E-02	0.00%	0.64	2.80	24.18%
Total TOC (Gas Components) =				**1.96**	**8.57**	-
Valves - Light Oil	100	5.51E-03	0.00%	0.55	2.41	94.29%
Connectors - Light Oil	394	4.63E-04	0.00%	0.18	0.80	94.29%
Total TOC (Liquid Components) =				**0.73**	**3.21**	-

VOC and Greenhouse Gas Emissions

Source Type/Service	VOC		CH_4		CO_2	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Valves - Gas	0.21	0.94	0.46	2.01	<0.01	0.01
Flanges - Gas	0.08	0.34	0.17	0.72	<0.01	<0.01
Compressor Seals - Gas	0.03	0.12	0.06	0.26	<0.01	<0.01
Relief Valves - Gas	0.15	0.68	0.33	1.46	<0.01	0.01
Components in Gas Service =	**0.47**	**2.07**	**1.02**	**4.46**	**0.01**	**0.03**
Valves - Light Oil	0.52	2.28	0.01	0.04	<0.01	<0.01
Connectors - Light Oil	0.17	0.75	<0.01	0.01	<0.01	<0.01
Components in Liquid Service =	**0.69**	**3.03**	**0.01**	**0.06**	**<0.01**	**<0.01**
Total (Gas + Liquid Components) =	**1.17**	**5.10**	**1.03**	**4.52**	**0.01**	**0.03**

SWN Production Company, LLC
Shawn Couch 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
Components in Gas Service =	**0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.00**	**0.01**
Valves - Light Oil	0.03	<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
Components in Liquid Service =	**0.04**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.00**	**0.06**
Total (Gas + Liquid Components) =	**0.05**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**0.00**	**0.07**

Hazardous Air Pollutant (HAP) Emissions (TPY)

Source Type/Service	n-Hexane	Benzene	Toluene	Ethylbenzene	Xylenes	2,2,4-Tri.	Total
Valves - Gas	0.02	<0.01	<0.01	<0.01	<0.01	0.00	0.02
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
Components in Gas Service =	**0.04**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.00**	**0.04**
Valves - Light Oil	0.14	<0.01	0.01	0.01	0.03	0.00	0.20
Connectors - Light Oil	0.05	<0.01	<0.01	<0.01	0.01	0.00	0.06
Components in Liquid Service =	**0.19**	**<0.01**	**0.01**	**0.01**	**0.05**	**0.00**	**0.26**
Total (Gas + Liquid Components) =	**0.22**	**<0.01**	**0.01**	**0.01**	**0.05**	**0.00**	**0.30**

SWN Production Company, LLC
Shawn Couch 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 =	5	5	2	0	2	8	1

SWN Production Company, LLC
Shawn Couch 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	0.1490%	0.0656	0.2946%	-	0.01	0.03
Nitrogen	28.013	0.5130%	0.1437	0.6456%	-	0.01	0.06
Methane	16.042	71.4270%	11.4583	51.4791%	51.9678%	1.02	4.46
Ethane	30.069	17.4910%	5.2594	23.6289%	23.8532%	0.47	2.05
Propane	44.096	6.8020%	2.9994	13.4755%	13.6034%	0.27	1.17
i-Butane	58.122	0.6680%	0.3883	1.7443%	1.7609%	0.03	0.15
n-Butane	58.122	1.8280%	1.0625	4.7734%	4.8187%	0.09	0.41
i-Pentane	72.149	0.3270%	0.2359	1.0600%	1.0700%	0.02	0.09
n-Pentane	72.149	0.4400%	0.3175	1.4262%	1.4398%	0.03	0.12
n-Hexane	86.175	0.1070%	0.0922	0.4143%	0.4182%	0.01	0.04
Other Hexanes	86.175	0.1350%	0.1163	0.5227%	0.5276%	0.01	0.05
Heptanes (as n-Heptane)	100.202	0.0780%	0.0782	0.3511%	0.3545%	0.01	0.03
Benzene	78.114	0.0010%	0.0008	0.0035%	0.0035%	<0.01	<0.01
Toluene	92.141	0.0020%	0.0018	0.0083%	0.0084%	<0.01	<0.01
Ethylbenzene	106.167	0.0002%	0.0002	0.0010%	0.0010%	<0.01	<0.01
Xylenes	106.167	0.0010%	0.0011	0.0048%	0.0048%	<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	0.0220%	0.0251	0.1129%	0.1140%	<0.01	0.01
Nonanes (as n-Nonane)	128.255	0.0060%	0.0077	0.0346	0.0349%	<0.01	<0.01
Decanes (as n-Decane)	142.282	0.0030%	0.0043	0.0192	0.0194%	<0.01	<0.01
	TOTAL =	**100.00%**	**22.26**	**105.32%**	**100.00%**	**1.98**	**8.66**
		TOTAL HC =	**22.05**	**TOTAL VOC =**	**24.18%**	**0.47**	**2.07**
				TOTAL HAP =	**0.44%**	**0.01**	**0.04**

SWN Production Company, LLC
Shawn Couch 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	0.013%	0.006	0.0074%	-	<0.01	<0.01
Nitrogen	28.013	0.026%	0.007	0.0094%	-	<0.01	<0.01
Methane	16.042	8.861%	1.421	1.8359%	1.8362%	0.01	0.06
Ethane	30.069	9.965%	2.996	3.8700%	3.8707%	0.03	0.12
Propane	44.096	11.708%	5.163	6.6680%	6.6692%	0.05	0.21
i-Butane	58.122	2.480%	1.441	1.8617%	1.8620%	0.01	0.06
n-Butane	58.122	9.597%	5.578	7.2043%	7.2055%	0.05	0.23
i-Pentane	72.149	3.683%	2.657	3.4320%	3.4326%	0.03	0.11
n-Pentane	72.149	6.541%	4.719	6.0952%	6.0963%	0.04	0.20
n-Hexane	86.175	5.195%	4.477	5.7821%	5.7830%	0.04	0.19
Other Hexanes	86.175	5.393%	4.647	6.0024%	6.0035%	0.04	0.19
Heptanes (as n-Heptane)	100.202	10.008%	10.028	12.9521%	12.9543%	0.10	0.42
Benzene	78.114	0.069%	0.054	0.0696%	0.0696%	<0.01	<0.01
Toluene	92.141	0.328%	0.302	0.3903%	0.3904%	<0.01	0.01
Ethylbenzene	106.167	0.307%	0.326	0.4210%	0.4210%	<0.01	0.01
Xylenes	106.167	1.044%	1.108	1.4316%	1.4318%	0.01	0.05
2,2,4-Trimethylpentane	114.230	0.000%	0.000	0.0000%	0.0000%	0.00	0.00
Octanes (as n-Octane)	114.229	7.566%	8.643	11.1624%	11.1643%	0.08	0.36
Nonanes (as n-Nonane)	128.255	4.597%	5.896	7.6149%	7.6162%	0.06	0.24
Decanes (as n-Decane)	142.282	12.619%	17.955	23.1895%	23.1934%	0.17	0.75
	TOTAL =	**100.00%**	**77.43**	**100.00%**	**100.00%**	**0.73**	**3.21**
		TOTAL HC =	**77.41**	**TOTAL VOC =**	**94.29%**	**0.69**	**3.03**
				TOTAL HAP =	**8.10%**	**0.06**	**0.26**

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
Shawn Couch 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	11.83	5.91	23.65
Distance per round trip (miles/trip)	0.58	0.58	0.58
Vehicle miles travelled (miles/day)	6.85	3.43	13.71
Number of days operational (days/yr)	365	365	365
Vehicle miles travelled VMT (miles/yr)	2,501.39	1,250.70	5,002.78
Average vehicle speed S (mph)	10	10	10
Average number of round trips/hour/vehicle type	0.66	0.33	1.31
Average number of round trips/year/vehicle type	4,316	2,158	8,632
Estimated maximum number of round trips/hour/vehicle type	3	3	2
Estimated maximum number of round trips/day/vehicle type	6	4	26
Estimated maximum number of round trips/year/vehicle type	2,300	1,533	9,830

190	Average Tanker Volume (bbl)
7,980	Gallons Tanker Volume
2,494.9	bwpd
1,998.6	bopd
23.65	Tanker Trucks per Day
1,100	Length Leased Access Road (ft)
430	Longest Pad Side (ft)
3,060	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)	1.33	VMT/hr	
Total annual fleet vehicle miles travelled (miles/yr)[3]	8,754.87	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
Shawn Couch 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	0.38	2,501.39	1.07	0.16	0.03	3.51	0.53	0.09
Medium Trucks	2.80	0.69	0.07	0.00	0.19	1,250.70	0.53	0.11	0.01	1.75	0.35	0.04
Heavy Trucks	2.80	0.69	0.07	0.00	0.76	5,002.78	2.13	0.12	0.05	7.01	0.41	0.17
Total =				**0.00**	**1.33**	**8,754.87**	**3.73**	**0.39**	**0.09**	**12.27**	**1.29**	**0.30**

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-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	-	-	-	-	4.61	20.20	-	-	-	-	-	-	0.04	0.17	0.97	4.23
EP-LOAD-PW	-	-	-	-	0.09	0.40	-	-	-	-	-	-	0.05	0.21	1.21	5.28
APC-COMB	4.15	18.18	8.27	36.24	9.17	40.18	<0.01	<0.01	0.09	0.38	0.09	0.38	0.07	0.29	3,523.54	15,433.07
TOTAL	5.67	24.85	10.29	45.09	14.42	63.14	0.01	0.03	0.20	0.88	0.20	0.88	0.18	0.77	4,772.87	20,905.15

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-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	0.09	0.03	0.11	0.08	0.35	0.31	1.38	0.44	1.95
EP-LOAD-PW	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.03	0.01	0.04
APC-COMB	<0.01	<0.01	0.01	0.03	0.04	0.18	0.05	0.22	0.16	0.69	0.63	2.74	0.88	3.87
TOTAL	0.04	0.18	0.02	0.07	0.06	0.28	0.08	0.33	0.24	1.05	0.96	4.21	1.42	6.23

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 (Shawn Couch Pad) located in Ohio County, West Virginia. Take Exit 5 (Triadelphia/Elm Grove) from Interstate 70, travel east on US Route 40 (National Road) approximately 7.8 miles to the intersection of US 40 and CR 45 (Atkinson Crossing, GC&P Road) and turn left onto CR 45. Travel 1.17 miles to the intersection of CR 45 and CR 47 (Atkinson Potomac Hill Road) and turn left to stay on CR 45. At 0.87 miles from the CR 45 and CR 47 intersection, CR 45 turns left; continue straight on what is now CR 37 (also GC&P Road). After traveling 1.88 miles from where CR 45 turned left and CR 37 began, turn right on CR 7/3 (Weidman Run Road). Bear right after traveling 0.32 miles onto CR 55 (West Liberty-Harvey Road). Well pad access will be on the left 0.32 miles after turning onto CR 55.

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

Nitrogen Oxides (NOx)	24.85 tons/yr
Carbon Monoxide (CO)	45.09 tons/yr
Volatile Organic Compounds (VOC)	68.25 tons/yr
Sulfur Dioxide (SO_2)	0.03 tons/yr
Particulate Matter (PM)	0.88 tons/yr
Acetaldehyde	0.03 tons/yr
Acrolein	0.03 tons/yr
Benzene	0.07 tons/yr
Ethylbenzene	0.35 tons/yr
Formaldehyde	0.18 tons/yr
Methanol	0.03 tons/yr
n-Hexane	4.43 tons/yr
Toluene	0.30 tons/yr
Xylenes	1.10 tons/yr
Carbon Dioxide	20,874.18 tons/yr
Methane	5.29 tons/yr
Nitrous Oxide	0.04 tons/yr
CO_2 Equivalent	20,017.69 tons/yr

The change in equipment and operations is planned to begin on or about January 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 1227, during normal business hours.

Dated this the 16th of December 2016

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