

RUTH KELLER

G70-D REGISTRATION APPLICATION

1	CM	4/17/2017	G70-D REGISTRATION		
2	CM	8/14/2017	REM: Kubota Engine ADD: GM Vortec Engine	AL	8/14/2017
REV	BY	DATE	DESCRIPTION	FACILITIES REVIEWED	DATE

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INTRODUCTION

SWN Production Company, LLC (SWN), submits this G70-D General Permit modification application for the Ruth Keller Pad, a natural gas production facility in Marshall County currently operating under Permit No. G70-D259, issued on July 6, 2017. With this application, SWN requests authorization to replace the permitted certified Zenith ZPP-644 4.4 L compressor engine with an uncertified GM Vortec 5.7L NA compressor engine. All other emissions remain the same and are not addressed in this application.

Proposed Emissions

Emissions calculations for the facility are presented in Attachment T.

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

Greenhouse gas emissions were calculated with the latest EPA factors and manufacturer data when available. Documents used as references for the emissions calculations, including AP-42 and EPA emission factor references, 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. This project qualifies as a modification since it includes the replacement of a certified engine with an uncertified engine.

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 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 92-hp, four-stroke, rich-burn natural gas-fired flash gas compressor engine is assumed to have been constructed after the June 12, 2006 effective date and manufactured after July 1, 2008; therefore, it will be subject to this Subpart. Although final selection of the engine has not yet been made, it is presumed that the engine was manufactured after January 1, 2011 and 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.

Reciprocating compressors at well sites are not subject to this Subpart.

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.

Reciprocating compressors at well sites are 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 92-hp, four-stroke, rich-burn natural gas-fired flash gas compressor engine is considered a new engine manufactured after January 1, 2011 and will meet the requirements of this Subpart by complying with requirements under NSPS Subpart JJJJ.

SWN Production Company, LLC
Ruth Keller Pad
August 2017

APPLICATION FOR GENERAL PERMIT REGISTRATION



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: Ruth Keller Pad

Operating Site Physical Address: 4025 Glen Dale Heights Rd.
If none available, list road, city or town and zip of facility.

City: Glen Dale

Zip Code: 26038

County: Marshall

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

Latitude: 39.98601

Longitude: -80.69714

SIC Code: 1311

NAICS Code: 211111

DAQ Facility ID No. (For existing facilities)
051-00246

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 Suszkowski

Name and Title: Carla Suszkowski

Phone: 832-796-1000

Fax: 405-849-3102

Email: Carla_Suszkowski@SWN.com

Date: 8-14-17

If applicable:

Authorized Representative Signature:

Name and Title:

Phone:

Fax:

Email:

Date:

If applicable:

Environmental Contact

Name and Title: Clay Murrel

Phone: 304-884-1715

Fax:

Email: Clay_Murrel@SWN.com

Date:

OPERATING SITE INFORMATION	
Briefly describe the proposed new operation and/or any change(s) to the facility: This application is for the replacement of one (1) certified Zenith ZPP-644 4.4 L engine (EU-ENG3) with one (1) non-certified GM Vortec 5.7L NA engine. All other emissions remain the same.	
Directions to the facility: From I-470 east take exit 2 and turn right, (or 470 west, turn left), on CR-91/1 south, (Spruce St), for 0.46 miles to intersection of CR-91/1 and SR-88 (Ridgecrest Road). Turn right on SR-88 south and travel 4.15 miles to junction of SR-88 and SR-86, (Grandview Road), and turn right on SR-86. Travel SR-86 for 1.2 miles with access road on left.	
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).	
<input checked="" type="checkbox"/> Check attached to front of application. <input type="checkbox"/> I wish to pay by electronic transfer. Contact for payment (incl. name and email address): <input type="checkbox"/> I wish to pay by credit card. Contact for payment (incl. name and email address):	
<input checked="" type="checkbox"/> \$500 (Construction, Modification, and Relocation) <input type="checkbox"/> \$300 (Class II Administrative Update) <input checked="" type="checkbox"/> \$1,000 NSPS fee for 40 CFR60, Subpart IIII, JJJJ, OOOO and/or OOOOa ¹ <input type="checkbox"/> \$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. <i>NSPS and NESHAP fees apply to new construction or if the source is being modified.</i>	
<input checked="" type="checkbox"/> Responsible Official or Authorized Representative Signature (if applicable)	
<input type="checkbox"/> Single Source Determination Form (must be completed) – Attachment A	
<input type="checkbox"/> Siting Criteria Waiver (if applicable) – Attachment B	<input checked="" type="checkbox"/> Current Business Certificate – Attachment C
<input type="checkbox"/> Process Flow Diagram – Attachment D	<input checked="" type="checkbox"/> Process Description – Attachment E
<input type="checkbox"/> Plot Plan – Attachment F	<input type="checkbox"/> Area Map – Attachment G
<input checked="" type="checkbox"/> G70-D Section Applicability Form – Attachment H	<input checked="" type="checkbox"/> Emission Units/ERD Table – Attachment I
<input type="checkbox"/> Fugitive Emissions Summary Sheet – Attachment J	
<input type="checkbox"/> Gas Well Affected Facility Data Sheet (if applicable) – Attachment K	
<input type="checkbox"/> 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	
<input type="checkbox"/> Natural Gas Fired Fuel Burning Unit(s) Data Sheet (GPUs, Heater Treaters, In-Line Heaters if applicable) – Attachment M	
<input checked="" type="checkbox"/> Internal Combustion Engine Data Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment N	
<input type="checkbox"/> Tanker Truck/Rail Car Loading Data Sheet (if applicable) – Attachment O	
<input type="checkbox"/> Glycol Dehydration Unit Data Sheet(s) (include wet gas analysis, GRI- GLYCalc™ input and output reports and information on reboiler if applicable) – Attachment P	
<input type="checkbox"/> Pneumatic Controllers Data Sheet – Attachment Q	
<input type="checkbox"/> Pneumatic Pump Data Sheet – Attachment R	
<input type="checkbox"/> Air Pollution Control Device/Emission Reduction Device(s) Sheet(s) (include manufacturer performance data sheet(s) if applicable) – Attachment S	
<input checked="" type="checkbox"/> Emission Calculations (please be specific and include all calculation methodologies used) – Attachment T	
<input checked="" type="checkbox"/> Facility-wide Emission Summary Sheet(s) – Attachment U	
<input checked="" type="checkbox"/> Class I Legal Advertisement – Attachment V	
<input checked="" type="checkbox"/> One (1) paper copy and two (2) copies of CD or DVD with pdf copy of application and attachments	

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

ATTACHMENT 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: **[Signature]**
the West Virginia State Tax Commissioner,
in accordance with Chapter 11, Article 12, of the West Virginia Code.

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

This certificate is not transferrable and must be displayed at the location for which issued.
This certificate shall be permanent until cessation of the business for which the certificate of registration
was granted, or until it is suspended, revoked or cancelled by the Tax Commissioner.

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

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

atL006 v.4
L1180094016

ATTACHMENT D: PROCESS DESCRIPTION

The facility is an oil and natural gas exploration and production facility, responsible for the production of condensate and natural gas. Storage of condensate and produced water also occurs on-site. A description of the facility process is as follows: Condensate, gas and water come from the wellhead to the production unit, where the first stage of separation occurs. Produced water is sent from the production unit to the produced water tanks. Condensate and residual water are sent to the heater treater. The flash from the heater treater is captured via a natural gas-fired engine-driven flash gas compressors. Condensate flows into the low-pressure tower. Flash gases from the low-pressure tower are routed via hard-piping (with 100% capture efficiency) to the inlet of the flash gas compressors to be compressed.

Working, breathing and flashing vapors from the condensate and produced water storage tanks are routed to the vapor combustor with 100% capture efficiency to be burned with at least 98% combustion efficiency. The vapor combustor has one (1) natural gas-fired pilot to ensure a constant flame for combustion.

The natural gas stream from the gas production unit and flash gas compressors is routed to the dehydration unit before exiting the facility. In the dehydration process, gas passes through a contactor vessel where water is absorbed by the glycol. The "rich" glycol-containing water goes to the glycol dehydrator reboiler where heat is used to boil off the water. Still vent vapors from the dehydration unit are controlled by an air-cooled condenser. Non-condensables from the still column overheads are routed to the reboiler for combustion. It was conservatively assumed that the reboiler provides 50% destruction efficiency since the burner on the reboiler is necessary to maintain the temperature and is inherent in the process; therefore, it is appropriate to use 50% efficiency with no monitoring required. The manufacturer guarantees a higher control efficiency. Flash tank off-gases are routed to the heater treater and then recompressed. Flash tank off-gases can also be used as supplemental fuel for the reboiler; therefore, a destruction efficiency of 98% was used in GLYCalc as a conservative measure.

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	
<input checked="" type="checkbox"/> Section 5.0	Gas and Oil Well Affected Facility (NSPS, Subpart OOOO/OOOOa)
<input checked="" type="checkbox"/> Section 6.0	Storage Vessels Containing Condensate and/or Produced Water ¹
<input type="checkbox"/> Section 7.0	Storage Vessel Affected Facility (NSPS, Subpart OOOO/OOOOa)
<input checked="" type="checkbox"/> Section 8.0	Control Devices and Emission Reduction Devices not subject to NSPS Subpart OOOO/OOOOa and/or NESHAP Subpart HH
<input checked="" type="checkbox"/> Section 9.0	Small Heaters and Reboilers not subject to 40CFR60 Subpart Dc
<input type="checkbox"/> Section 10.0	Pneumatic Controllers Affected Facility (NSPS, Subpart OOOO/OOOOa)
<input type="checkbox"/> Section 11.0	Pneumatic Pump Affected Facility (NSPS, Subpart OOOOa)
<input type="checkbox"/> Section 12.0	Fugitive Emissions GHG and VOC Standards (NSPS, Subpart OOOOa)
<input checked="" type="checkbox"/> Section 13.0	Reciprocating Internal Combustion Engines, Generator Engines
<input checked="" type="checkbox"/> Section 14.0	Tanker Truck/Rail Car Loading ²
<input checked="" type="checkbox"/> 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	2017	after 1/1/2011	145-hp	Existing	NSCR	NSCR
EU-ENG2	EP-ENG2	145-hp Caterpillar G3306 NA Engine	2017	after 1/1/2011	145-hp	Existing	NSCR	NSCR
EU-ENG3	EP-ENG3	92-hp GM Vortec 5.7L NA Engine	TBD	after 1/1/2011	92-hp	New	NSCR	NSCR
EU-GPU1	EP-GPU1	1.0-mmBtu/hr GPU Burner	2017	N/A	1.0-mmBtu/hr	Existing	N/A	N/A
EU-HT1	EP-HT1	0.5-mmBtu/hr Heater Treater	2017	N/A	0.5-mmBtu/hr	Existing	N/A	N/A
EU-DEHY1	EP-RB1	24.0-MMSCFD TEG Dehydration Unit	2017	N/A	24.0 MMSCFD	Existing	Condenser and EU-RB1	Condenser and EU-RB1
EU-RB1	EP-RB1	0.75-mmBtu/hr TEG Reboiler	2017	N/A	0.75-mmBtu/hr	Existing	N/A	N/A
EU-TANKS-COND	APC-COMB	Two (2) 400-bbl Condensate Tanks Routed to Vapor Combustor	2017	N/A	400-bbl	Existing	APC-COMB	APC-COMB
EU-TANKS-PW	APC-COMB	Two (2) 400-bbl Produced Water Tanks Routed to Vapor Combustor	2017	N/A	400-bbl	Existing	APC-COMB	APC-COMB
EU-LOAD-COND	APC-COMB	Condensate Truck Loading w/ Vapor Return Routed to Combustor	2017	N/A	6,132,000 gal/yr	Existing	Vapor Return and APC-COMB	Vapor Return and APC-COMB
EU-LOAD-PW	APC-COMB	Produced Water Truck Loading w/ Vapor Return Routed to Combustor	2017	N/A	5,365,500 gal/yr	Existing	Vapor Return and APC-COMB	Vapor Return and APC-COMB
APC-COMB	APC-COMB	15.0-mmBtu/hr Vapor Combustor	2017	N/A	15.0-mmBtu/hr	Existing	N/A	N/A
EU-PILOT	APC-COMB	Vapor Combustor Pilot	2017	N/A	50-scfh	Existing	N/A	N/A
EU-FUG	EP-FUG	Fugitive Emissions	2017	N/A	N/A	Existing	N/A	N/A
EU-HR	EP-HR	Fugitive Haul Road Emissions	2017	N/A	N/A	Existing	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 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		EU-ENG3	
Engine Manufacturer/Model		Caterpillar G3306 NA		Caterpillar G3306 NA		GM Vortec 5.7L NA	
Manufacturers Rated bhp/rpm		145-hp/1,800-rpm		145-hp/1,800-rpm		92-hp/2,200-rpm	
Source Status ²		ES		ES		NS	
Date Installed/ Modified/Removed/Relocated ³		2017		2017		TBD	
Engine Manufactured /Reconstruction Date ⁴		After 1/1/2011		After 1/1/2011		After 1/1/2011	
Check all applicable Federal Rules for the engine (include EPA Certificate of Conformity if applicable) ⁵		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJ <input type="checkbox"/> JJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJ <input type="checkbox"/> JJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources		<input checked="" type="checkbox"/> 40CFR60 Subpart JJJ <input type="checkbox"/> JJJ Certified? <input type="checkbox"/> 40CFR60 Subpart IIII <input type="checkbox"/> IIII Certified? <input checked="" type="checkbox"/> 40CFR63 Subpart ZZZZ <input type="checkbox"/> NESHAP ZZZZ/ NSPS JJJJ Window <input type="checkbox"/> NESHAP ZZZZ Remote Sources	
Engine Type ⁶		4SRB		4SRB		4SRB	
APCD Type ⁷		NSCR		NSCR		NSCR	
Fuel Type ⁸		PQ		PQ		PQ	
H ₂ S (gr/100 scf)		Negligible		Negligible		Negligible	
Operating bhp/rpm		145-hp/1,800-rpm		145-hp/1,800-rpm		92-hp/2,200-rpm	
BSFC (BTU/bhp-hr)		8,625		8,625		8,500	
Hourly Fuel Throughput		1,382	ft ³ /hr gal/hr	1,382	ft ³ /hr gal/hr	864	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	7.57	MMft ³ /yr gal/yr
Fuel Usage or Hours of Operation Metered		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
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	0.20	0.89
MD	CO	0.64	2.80	0.64	2.80	0.41	1.78
MD	VOC	0.31	1.36	0.31	1.36	0.10	0.43
AP	SO ₂	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
AP	PM ₁₀	0.01	0.05	0.01	0.05	0.01	0.03
MD	Formaldehyde	0.09	0.38	0.09	0.38	0.02	0.07
AP	Total HAPs	0.10	0.44	0.10	0.44	0.02	0.11
MD and EPA	GHG (CO ₂ e)	155.19	679.73	155.19	679.73	91.57	401.08

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

**Engine Air Pollution Control Device
(Emission Unit ID# APC-NSCR-ENG-3 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: Miratech	Model #: VXCI-1005-3.5-XC1
Design Operating Temperature: 1,200 °F	Design gas volume: 650 scfm
Service life of catalyst:	Provide manufacturer data? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Volume of gas handled: acfm at °F	Operating temperature range for NSCR/Ox Cat: From 750 °F to 1,250 °F
Reducing agent used, if any:	Ammonia slip (ppm):

Pressure drop against catalyst bed (delta P): 4.0 inches of H₂O

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,

MIRATECH Emissions Control Equipment Specification Summary

Proposal Number: TJ-12-2475

Engine Data

Number of Engines: 1
 Application: Gas Compression
 Engine Manufacturer: General Motors
 Model Number: Vortec 5.7L NA
 Power Output: 92 bhp
 Lubrication Oil: 0.6 wt% sulfated ash or less
 Type of Fuel: Natural Gas
 Exhaust Flow Rate: 650 acfm (cfm)
 Exhaust Temperature: 1,200°F

System Details

Housing Model Number: VXCI-1005-3.5-HSG
 Element Model Number: VX-RE-05XC
 Number of Catalyst Layers: 1
 Number of Spare Catalyst Layers: 1
 System Pressure Loss: 4.0 inches of WC (Fresh)
 Sound Attenuation: 28-32 dBA insertion loss
 Exhaust Temperature Limits: 750 – 1250°F (catalyst inlet); 1350°F (catalyst outlet)

NSCR Housing & Catalyst Details

Model Number: VXCI-1005-3.5-XC1
 Material: Carbon Steel
 Inlet Pipe Size & Connection: 3.5 inch FF Flange, 150# ANSI standard bolt pattern
 Outlet Pipe Size & Connection: 3.5 inch FF Flange, 150# ANSI standard bolt pattern
 Overall Length: 43 inches
 Weight Without Catalyst: 98 lbs
 Weight Including Catalyst: 104 lbs
 Instrumentation Ports: 1 inlet/1 outlet (1/2" NPT)

Emission Requirements

Exhaust Gases	Engine Outputs (g/ bhp-hr)	Reduction (%)	Warranted Converter Outputs (g/ bhp-hr)	Requested Emissions Targets
NOx	14.00	93%	1.00	1 g/bhp-hr
CO	11.00	82%	2.00	2 g/bhp-hr
NMNEHC	0.40	0%	0.70	.7 g/bhp-hr
Oxygen	0.5%			

MIRATECH warrants the performance of the converter, as stated above, per the MIRATECH General Terms and Conditions of Sale.



Buck's Engines

GM Vortec 5.7L Engine

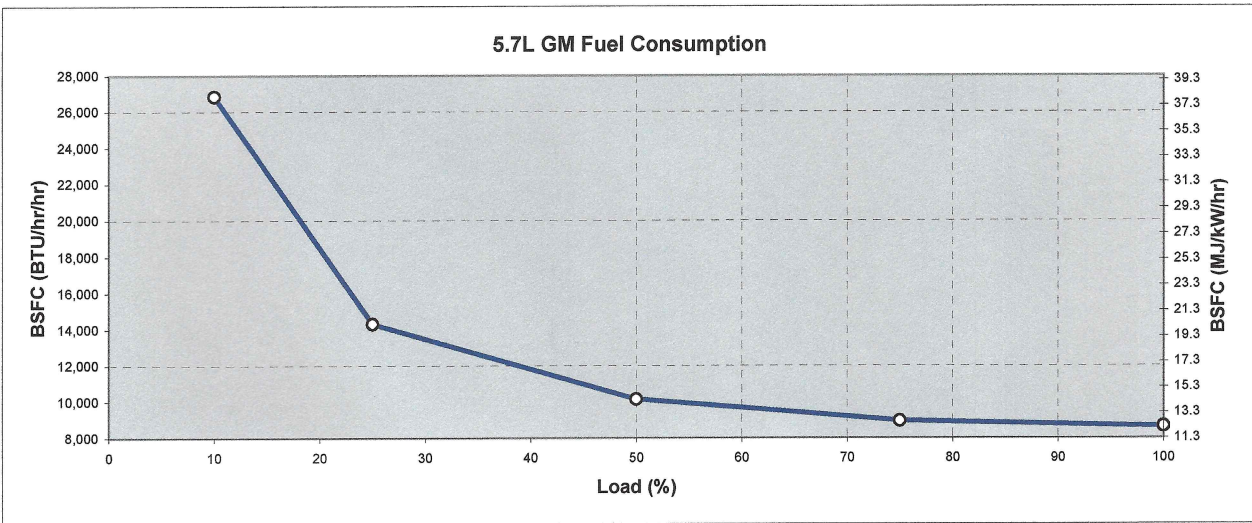
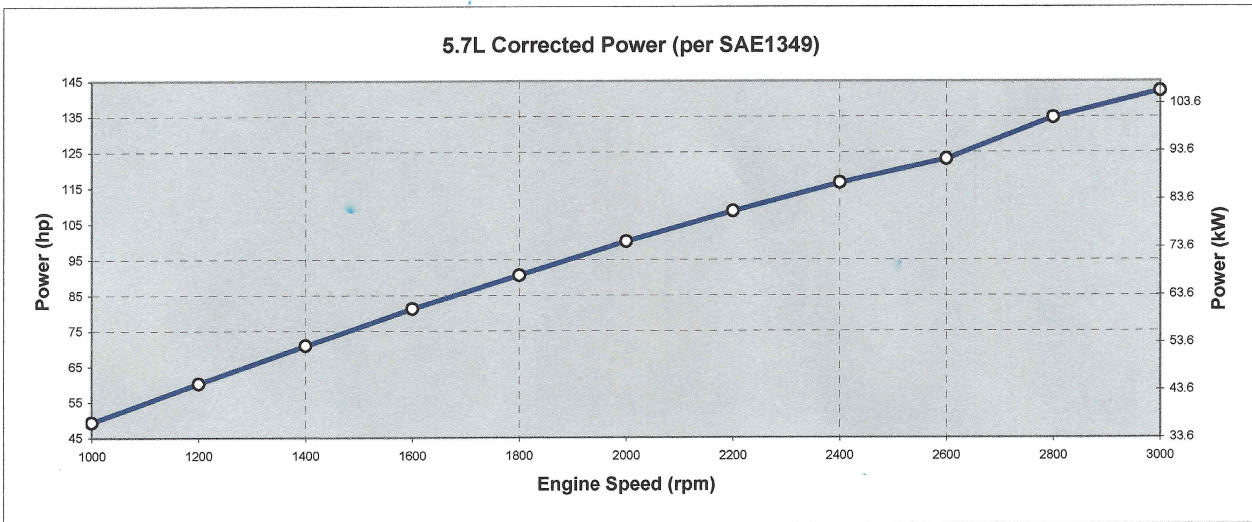
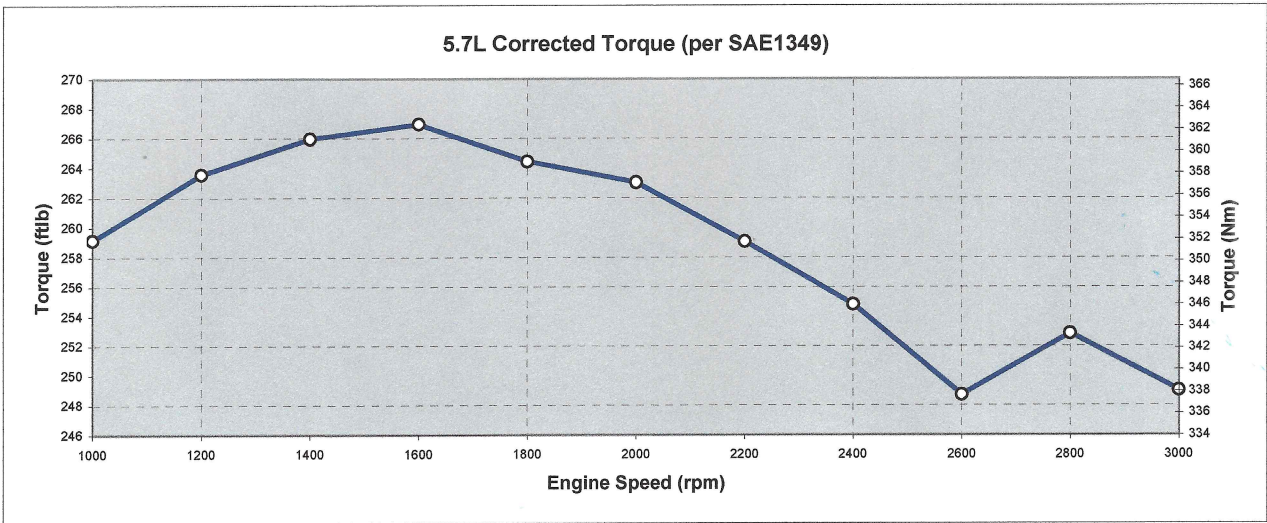


Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN
 ENGINES^a
 (SCC 2-02-002-53)

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 ¹	<1.29 E-05	E
Chloroform ¹	<1.37 E-05	E
Ethane ⁿ	7.04 E-02	C
Ethylbenzene ¹	<2.48 E-05	E
Ethylene Dibromide ¹	<2.13 E-05	E
Formaldehyde ^{1,m}	2.05 E-02	A
Methanol ¹	3.06 E-03	D
Methylene Chloride ¹	4.12 E-05	C
Naphthalene ¹	<9.71 E-05	E
PAH ¹	1.41 E-04	D
Styrene ¹	<1.19 E-05	E
Toluene ¹	5.58 E-04	A
Vinyl Chloride ¹	<7.18 E-06	E
Xylene ¹	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 NO_x 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 ≤ 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/10⁶ 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 CO₂. CO₂ [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO₂,

C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10⁶ scf, and h = heating value of natural gas (assume 1020 Btu/scf at 60°F).

^e Based on 100% conversion of fuel sulfur to SO₂. Assumes sulfur content in natural gas of 2,000 gr/10⁶ scf.

^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 $\leq 1 \mu\text{m}$ 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 T: EMISSIONS CALCULATIONS

**SWN Production Company, LLC
Ruth Keller 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	EU-ENG1	EP-ENG1	0.32	1.40	0.64	2.80	0.31	1.36	<0.01	<0.01	0.02	0.11
145-hp Caterpillar G3306 NA Engine	EU-ENG2	EP-ENG2	0.32	1.40	0.64	2.80	0.31	1.36	<0.01	<0.01	0.02	0.11
92-hp GM Vortec 5.7L NA Engine	EU-ENG3	EP-ENG3	0.20	0.89	0.41	1.78	0.10	0.43	<0.01	<0.01	0.02	0.07
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
0.5-mmBtu/hr Heater Treater	EU-HT1	EP-HT1	0.06	0.24	0.05	0.20	<0.01	0.01	<0.01	<0.01	<0.01	0.02
24.0-MMSCFD TEG Dehydration Unit	EU-DEHY1	EP-RB1	-	-	-	-	2.99	13.09	-	-	-	-
0.75-mmBtu/hr TEG Reboiler	EU-RB1	EP-RB1	0.08	0.36	0.07	0.30	<0.01	0.02	<0.01	<0.01	0.01	0.03
Two (2) 400-bbl Condensate Tanks Routed to Vapor Combustor	EU-TANKS-COND	APC-COMB	-	-	-	-	-	-	-	-	-	-
Two (2) 400-bbl Produced Water Tanks Routed to Vapor Combustor	EU-TANKS-PW	APC-COMB	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-COND	APC-COMB	-	-	-	-	1.52	6.65	-	-	-	-
Produced Water Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-PW	APC-COMB	-	-	-	-	0.01	0.02	-	-	-	-
15.0-mmBtu/hr Vapor Combustor	APC-COMB	APC-COMB	2.07	9.07	4.13	18.10	0.98	4.27	-	-	0.05	0.20
Vapor Combustor Pilot	EU-PILOT	APC-COMB	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fugitive Emissions	EU-FUG	EP-FUG	-	-	-	-	0.68	2.98	-	-	-	-
Fugitive Haul Road Emissions	EU-HR	EP-HR	-	-	-	-	-	-	-	-	0.26	0.86
Total =			3.17	13.87	6.03	26.41	6.90	30.22	<0.01	0.02	0.39	1.42

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
Ruth Keller 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 HAP
145-hp Caterpillar G3306 NA Engine	EU-ENG1	<0.01	<0.01	<0.01	<0.01	0.09	<0.01	-	<0.01	<0.01	0.10
145-hp Caterpillar G3306 NA Engine	EU-ENG2	<0.01	<0.01	<0.01	<0.01	0.09	<0.01	-	<0.01	<0.01	0.10
92-hp GM Vortec 5.7L NA Engine	EU-ENG3	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	-	<0.01	<0.01	0.02
1.0-mmBtu/hr GPU Burner	EU-GPU1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
0.5-mmBtu/hr Heater Treater	EU-HT1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
24.0-MMSCFD TEG Dehydration Unit	EU-DEHY1	-	-	0.11	0.00	-	-	0.12	0.18	0.05	0.46
0.75-mmBtu/hr TEG Reboiler	EU-RB1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Two (2) 400-bbl Condensate Tanks Routed to Vapor Combustor	EU-TANKS-COND	-	-	-	-	-	-	-	-	-	-
Two (2) 400-bbl Produced Water Tanks Routed to Vapor Combustor	EU-TANKS-PW	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-COND	-	-	<0.01	0.01	-	-	0.09	0.01	0.02	0.12
Produced Water Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-PW	-	-	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
15.0-mmBtu/hr Vapor Combustor	APC-COMB	-	-	<0.01	<0.01	-	-	0.06	<0.01	0.01	0.08
Vapor Combustor Pilot	EU-PILOT	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Fugitive Emissions	EU-FUG	-	-	<0.01	<0.01	-	-	0.03	<0.01	0.01	0.04
Fugitive Haul Road Emissions	EU-HR	-	-	-	-	-	-	-	-	-	-
Total =		0.01	0.01	0.12	0.01	0.19	0.01	0.29	0.19	0.10	0.93

Continued on Next Page

SWN Production Company, LLC
Ruth Keller 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 HAP
145-hp Caterpillar G3306 NA Engine	EU-ENG1	0.02	0.01	0.01	<0.01	0.38	0.02	-	<0.01	<0.01	0.44
145-hp Caterpillar G3306 NA Engine	EU-ENG2	0.02	0.01	0.01	<0.01	0.38	0.02	-	<0.01	<0.01	0.44
92-hp GM Vortec 5.7L NA Engine	EU-ENG3	0.01	0.01	0.01	<0.01	0.07	0.01	-	<0.01	<0.01	0.11
1.0-mmBtu/hr GPU Burner	EU-GPU1	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
0.5-mmBtu/hr Heater Treater	EU-HT1	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
24.0-MMSCFD TEG Dehydration Unit	EU-DEHY1	-	-	0.49	0.00	-	-	0.51	0.77	0.24	2.02
0.75-mmBtu/hr TEG Reboiler	EU-RB1	-	-	<0.01	-	<0.01	-	0.01	<0.01	-	0.01
Two (2) 400-bbl Condensate Tanks Routed to Vapor Combustor	EU-TANKS-COND	-	-	-	-	-	-	-	-	-	-
Two (2) 400-bbl Produced Water Tanks Routed to Vapor Combustor	EU-TANKS-PW	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-COND	-	-	<0.01	0.03	-	-	0.38	0.03	0.10	0.54
Produced Water Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-PW	-	-	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
15.0-mmBtu/hr Vapor Combustor	APC-COMB	-	-	<0.01	0.02	-	-	0.25	0.02	0.06	0.35
Vapor Combustor Pilot	EU-PILOT	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01
Fugitive Emissions	EU-FUG	-	-	<0.01	0.01	-	-	0.12	0.01	0.02	0.16
Fugitive Haul Road Emissions	EU-HR	-	-	-	-	-	-	-	-	-	-
Total =		0.04	0.04	0.53	0.05	0.83	0.04	1.29	0.83	0.42	4.07

SWN Production Company, LLC
Ruth Keller 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 ₂ O)		Nitrous Oxide (N ₂ O) 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	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	EU-ENG2	155.04	616.04	<0.01	0.01	0.07	0.27	<0.01	<0.01	0.08	0.33	155.19	616.64
92-hp GM Vortec 5.7L NA Engine	EU-ENG3	91.48	363.48	<0.01	0.01	0.04	0.17	<0.01	<0.01	0.05	0.20	91.57	363.85
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
1.5-mmBtu/hr Line Heater	EU-LH1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.0-MMSCFD TEG Dehydration Unit	EU-DEHY1	<0.01	<0.01	0.41	1.62	10.18	40.45	-	-	-	-	10.18	40.45
0.75-mmBtu/hr TEG Reboiler	EU-RB1	87.73	348.60	<0.01	0.01	0.04	0.16	<0.01	<0.01	0.05	0.20	87.82	348.96
Two (2) 400-bbl Condensate Tanks Routed to Vapor Combustor	EU-TANKS-COND	-	-	-	-	-	-	-	-	-	-	-	-
Two (2) 400-bbl Produced Water Tanks Routed to Vapor Combustor	EU-TANKS-PW	-	-	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-COND	<0.01	<0.01	0.22	0.86	5.42	21.54	-	-	-	-	5.42	21.55
Produced Water Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-PW	<0.01	<0.01	0.19	0.75	4.74	18.85	-	-	-	-	4.75	18.86
15.0-mmBtu/hr Vapor Combustor	APC-COMB	1,754.66	6,972.07	0.03	0.13	0.83	3.28	<0.01	0.01	0.99	3.92	1,756.47	6,979.27
Vapor Combustor Pilot	EU-PILOT	5.29	21.03	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	5.30	21.05
Fugitive Emissions	EU-FUG	<0.01	0.02	0.68	2.72	17.10	67.95	-	-	-	-	17.11	67.97
Fugitive Haul Road Emissions	EU-HR	-	-	-	-	-	-	-	-	-	-	-	-
Total =		2,424.71	9,634.49	1.54	6.13	38.58	153.30	<0.01	0.02	1.35	5.37	2,464.64	9,793.16

Notes:

¹ CO₂ Equivalent = Pollutant times GWP multiplier. 40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO₂ = 1, CH₄ = 25, N₂O = 298

² Per API Compendium (2009) Chapter 5: Because most of the CH₄ and CO₂ 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
Ruth Keller 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 ₂ O)		Nitrous Oxide (N ₂ O) 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	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	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
92-hp GM Vortec 5.7L NA Engine	EU-ENG3	91.48	400.67	<0.01	0.01	0.04	0.19	<0.01	<0.01	0.05	0.23	91.57	401.08
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
0.5-mmBtu/hr Heater Treater	EU-HT1	58.49	256.18	<0.01	<0.01	0.03	0.12	<0.01	<0.01	0.03	0.14	58.55	256.44
24.0-MMSCFD TEG Dehydration Unit	EU-DEHY1	<0.01	0.01	0.41	1.78	10.18	44.58	-	-	-	-	10.18	44.59
0.75-mmBtu/hr TEG Reboiler	EU-RB1	87.73	384.27	<0.01	0.01	0.04	0.18	<0.01	<0.01	0.05	0.22	87.82	384.67
Two (2) 400-bbl Condensate Tanks Routed to Vapor Combustor	EU-TANKS-COND	-	-	-	-	-	-	-	-	-	-	-	-
Two (2) 400-bbl Produced Water Tanks Routed to Vapor Combustor	EU-TANKS-PW	-	-	-	-	-	-	-	-	-	-	-	-
Condensate Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-COND	<0.01	0.01	0.22	0.95	5.42	23.75	-	-	-	-	5.42	23.75
Produced Water Truck Loading w/ Vapor Return Routed to Combustor	EU-LOAD-PW	<0.01	<0.01	0.19	0.83	4.74	20.78	-	-	-	-	4.75	20.78
15.0-mmBtu/hr Vapor Combustor	APC-COMB	1,754.66	7,685.39	0.03	0.14	0.83	3.62	<0.01	0.01	0.99	4.32	1,756.47	7,693.33
Vapor Combustor Pilot	EU-PILOT	5.29	23.18	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	5.30	23.21
Fugitive Emissions	EU-FUG	<0.01	0.02	0.68	3.00	17.10	74.91	-	-	-	-	17.11	74.92
Fugitive Haul Road Emissions	EU-HR	-	-	-	-	-	-	-	-	-	-	-	-
Total =		2,424.71	10,620.21	1.54	6.76	38.58	168.99	<0.01	0.02	1.35	5.92	2,464.64	10,795.11

Notes:

¹ CO₂ Equivalent = Pollutant times GWP multiplier. 40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier (100-Year Time Horizon): CO₂ = 1, CH₄ = 25, N₂O = 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 CH₄ and CO₂ 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
Ruth Keller Pad
Engine Emissions Calculations - Criteria Air Pollutants**

Equipment Information

Unit ID: **EU-ENG3**
 Emission Point ID: EP-ENG3
 Make: GM
 Model: Vortec 5.7L NA
 Design Class: 4S-RB
 Controls: NSCR
 Horsepower (hp): 92.0
 Fuel Use (Btu/hp-hr): 8,500
 Fuel Use (scfh): 864
 Annual Fuel Use (mmscf): 7.57
 Fuel Use (mmBtu/hr): 0.78
 Exhaust Flow (acfm): 650
 Exhaust Temp (°F): 1,200
 Manufacture Date: after 1/1/2011
 Operating Hours: 8,760
 Fuel Heating Value (Btu/scf): 905

Uncontrolled Manufacturer Emission Factors

NOx (g/hp-hr): 14.00
 CO (g/hp-hr): 11.00
 NMNEHC/VOC (g/hp-hr): 0.40

Post-Catalyst Emission Factors

NOx Control Eff. % 93.00%
 CO Control Eff. % 82.00%

 NOx (g/hp-hr): 1.00
 CO (g/hp-hr): 2.00
 NMNEHC/VOC (g/hp-hr): 0.40

Uncontrolled Criteria Air Pollutant Emissions

Unit ID: **EU-ENG3**

Pollutant	lb/hr	TPY
NOx	2.84	12.44
CO	2.23	9.77
NMNEHC/VOC (does not include HCHO)	0.08	0.36
Total VOC (includes HCHO)	0.10	0.43
SO ₂	<0.01	<0.01
PM _{10/2.5}	0.01	0.03
PM _{COND}	0.01	0.03
PM _{TOT}	0.02	0.07

**SWN Production Company, LLC
 Ruth Keller Pad
 Engine Emissions Calculations - Criteria Air Pollutants (Continued)**

Proposed Criteria Air Pollutant Emissions¹

Pollutant	lb/hr	TPY
NOx	0.20	0.89
CO	0.41	1.78
NMNEHC/VOC (does not include HCHO)	0.08	0.36
Total VOC (includes HCHO)	0.10	0.43
SO ₂	<0.01	<0.01
PM _{10/2.5}	0.01	0.03
PM _{COND}	0.01	0.03
PM _{TOT}	0.02	0.07

AP-42 Emission Factors (lb/mmBtu)²

4S-RB

Pollutant	3.2-3 (7/00)
SO ₂	5.88E-04
PM _{10/2.5}	9.50E-03
PM _{COND}	9.91E-03
PM _{TOT}	1.94E-02

Notes:

¹ Post-catalyst emission factors for the GM engine are based on catalyst manufacturer data. 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.

² Per AP-42, all particulate matter (PM) from combustion of natural gas (total, condensable and filterable PM) is presumed <1 micrometer in diameter.

**SWN Production Company, LLC
 Ruth Keller Pad
 Engine Emissions Calculations - Hazardous Air Pollutants**

Equipment Information

Unit ID: **EU-ENG3**
 Emission Point ID: EP-ENG3
 Make: GM
 Model: Vortec 5.7L NA
 Design Class: 4S-RB
 Controls: NSCR
 Horsepower (hp): 92
 Fuel Use (Btu/hp-hr): 8,500
 Fuel Use (scfh): 864
 Annual Fuel Use (mmscf): 7.57
 Fuel Use (mmBtu/hr): 0.78
 Exhaust Flow (acfm): 650
 Exhaust Temp (°F): 1,200
 Operating Hours: 8,760

Unit ID: **EU-ENG3**

Pollutant	lb/hr	TPY
Acetaldehyde	<0.01	0.01
Acrolein	<0.01	0.01
Benzene	<0.01	0.01
Ethylbenzene	<0.01	<0.01
Formaldehyde	0.02	0.07
Methanol	<0.01	0.01
Toluene	<0.01	<0.01
Xylenes	<0.01	<0.01
Total HAP =	0.02	0.11

**SWN Production Company, LLC
Ruth Keller Pad
Engine Emissions Calculations - Hazardous Air Pollutants**

AP-42 Emission Factors (lb/mmBtu)

4S-RB

Pollutant	3.2-3 (7/00)
Acetaldehyde	2.79E-03
Acrolein	2.63E-03
Benzene	1.58E-03
Ethylbenzene	2.18E-05
Formaldehyde	2.05E-02
Methanol	3.06E-03
Toluene	5.58E-04
Xylenes	1.95E-04

**SWN Production Company, LLC
Ruth Keller Pad
Engine Emissions Calculations - Greenhouse Gases**

Equipment Information

Unit ID: **EU-ENG3**
 Emission Point ID: EP-ENG3
 Make: GM
 Model: Vortec 5.7L NA
 Design Class: 4S-RB
 Horsepower (hp): 92
 Fuel Use (Btu/hp-hr): 8,500
 Fuel Use (scfh): 864
 Fuel Use (mmBtu/hr): 0.78
 Exhaust Flow (acfm): 650
 Exhaust Temp (°F): 1,200
 Operating Hours: 8,760

Greenhouse Gas (GHG) Emissions¹

Pollutant	lb/hr	tonnes/yr
CO ₂	91.48	363.48
CH ₄	<0.01	0.01
N ₂ O	<0.01	<0.01
CH ₄ as CO ₂ e	0.04	0.17
N ₂ O as CO ₂ e	0.05	0.20
Total CO₂ + CO₂e =	91.57	363.85

40 CFR 98 Tables Engine Emission Factors (kg/mmBtu)²

Carbon Dioxide (CO ₂)	53.06
Methane (CH ₄)	1.00E-03
Nitrous Oxide (N ₂ O)	1.00E-04

Notes:

¹ Emissions estimated using EPA data. Conversion to short tons (tons) found in site-wide Summary of Greenhouse Gases - Short Tons per Year (tons) table.

² CO₂e = CO₂ equivalent (Pollutant times GWP multiplier):

40 CFR 98 Table A-1, Global Warming Potential (GWP) multiplier: CO₂ = 1, CH₄ = 25, N₂O = 298

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 ₂ e)	
	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	0.31	1.36	<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	0.31	1.36	<0.01	<0.01	0.02	0.11	0.02	0.11	<0.01	0.01	155.19	679.73
EP-ENG3	0.20	0.89	0.41	1.78	0.10	0.43	<0.01	<0.01	0.02	0.07	0.02	0.07	<0.01	0.01	91.57	401.08
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-HT1	0.06	0.24	0.05	0.20	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	58.55	256.44
EP-RB1	0.08	0.36	0.07	0.30	2.99	13.11	<0.01	<0.01	0.01	0.03	0.01	0.03	0.41	1.79	98.00	429.26
EP-LOAD-COND	-	-	-	-	1.52	6.65	-	-	-	-	-	-	0.22	0.95	5.42	23.75
EP-LOAD-PW	-	-	-	-	0.01	0.02	-	-	-	-	-	-	0.19	0.83	4.75	20.78
APC-COMB	2.08	9.09	4.14	18.12	0.98	4.27	<0.01	<0.01	0.05	0.21	0.05	0.21	0.03	0.15	1,761.77	7,716.54
TOTAL	3.17	13.87	6.03	26.41	6.22	27.24	0.00	0.02	0.13	0.57	0.13	0.57	0.86	3.76	2,447.54	10,720.20

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

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 uncombusted emissions from the tanks and loading operations, as well as combustor pilot emissions. EP-RB1 includes emissions from the dehydration unit and TEG reboiler.

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	0.09	0.38	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	0.10	0.44
EP-ENG2	0.09	0.38	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	0.10	0.44
EP-ENG3	0.02	0.07	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	0.02	0.11
EP-GPU1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	0.01	<0.01	0.01
EP-HT1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01
EP-RB1	<0.01	<0.01	0.11	0.49	0.18	0.77	0.00	0.00	0.05	0.24	0.12	0.51	0.46	2.02
EP-LOAD-COND	-	-	<0.01	<0.01	0.01	0.03	0.01	0.03	0.02	0.10	0.09	0.38	0.12	0.54
EP-LOAD-PW	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
APC-COMB	<0.01	<0.01	<0.01	0.01	0.01	0.04	0.01	0.05	0.04	0.16	0.14	0.63	0.20	0.89
TOTAL	0.19	0.83	0.12	0.52	0.19	0.83	0.01	0.05	0.09	0.40	0.27	1.17	0.89	3.91

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

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 uncombusted emissions from the tanks and loading operations, as well as combustor pilot emissions. EP-RB1 includes emissions from the dehydration unit and TEG reboiler.

ATTACHMENT V: 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, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a G70-D General Permit Modification Registration for a natural gas production facility (Ruth Keller Pad) located in Marshall County, West Virginia. From I-470 east take exit 2 and turn right, (or 470 west, turn left), on CR-91/1 south, (Spruce St), for 0.46 miles to intersection of CR-91/1 and SR-88 (Ridgecrest Road). Turn right on SR-88 south and travel 4.15 miles to junction of SR-88 and SR-86, (Grandview Road), and turn right on SR-86. Travel SR-86 for 1.2 miles with access road on left. Latitude/longitude coordinates are: 39.98601, -80.69714.

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

Nitrogen Oxides (NO _x)	13.87 tons/yr
Carbon Monoxide (CO)	26.41 tons/yr
Volatile Organic Compounds (VOC)	30.22 tons/yr
Sulfur Dioxide (SO ₂)	0.02 tons/yr
Particulate Matter (PM)	1.42 tons/yr
Acetaldehyde	0.04 tons/yr
Acrolein	0.04 tons/yr
Benzene	0.53 tons/yr
Ethylbenzene	0.05 tons/yr
Formaldehyde	0.83 tons/yr
Methanol	0.04 tons/yr
n-Hexane	1.29 tons/yr
Toluene	0.83 tons/yr
Xylenes	0.42 tons/yr
Carbon Dioxide	10,620.21 tons/yr
Methane	6.76 tons/yr
Nitrous Oxide	0.02 tons/yr
CO ₂ Equivalent	10,795.11 tons/yr

Operations is planned to begin on or about October 15, 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice. Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the XXth of August 2017

SWN Production Company, LLC

Ruth Keller Pad

August 2017

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