EQT Plaza
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Pittsburgh PA 15212
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April 28, 2016

Mr. William F. Durham
Director
WV Department of Environmental Protection
Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Re: Permit Determination Request
EQT Production Company – OXF 160 Pad
R13 Permit Number R13-3011; Plant ID No. 017-00039

Dear Mr. Durham:

EQT Production Company (EQT) is submitting this permit determination request to the West Virginia Department of Environmental Protection (WVDEP) for the installation of a low pressure separator (LPS) and one (1)140 barrel (bbl) sand separator storage tank at the existing wellpad, OXF-160, located in Doddridge County, West Virginia. The OXF-160 pad is currently operating under Permit No. R13-3011, issued on March 29, 2013. Under the recent Consent Order CO-R13-E-2016-04 (Consent Order), EQT anticipated the potential for an additional Vapor Destruction Unit (VDU) for the site, but based upon actual operating conditions an additional VDU is not required. This was discussed in the inspection report, and EQT indicated that an RFD would be provided. This RFD satisfies those obligations and the requirement in Consent Order, in which EQT is required to submit an application and/or RFD to request to remove the requirement for controls. EQT requests that the VDU control requirement be removed.

Project Description

Under the Consent Order EQT has installed latch down hatches and pilot operated valves on the produced liquid tanks at the facility. Additionally, EQT installed a low pressure separator to volatize (flash off) lighter hydrocarbons and separate condensate in the liquid stream. The low pressure separator will be handle liquids separated after the high pressure separator currently on site. Emissions from the low pressure separator will be routed to the existing condensate tanks (S001-S004) at the site, which are controlled by a vapor combustor (C001).

The sand separator storage tank will store sand and produced fluids from the sand separator (vapors from this tank may be controlled by the existing combustor but are not represented as controlled in this permit determination).

Emission Calculations

Emission calculations are included as Attachment E to this package. Working, breathing and flashing emissions of VOC and HAPs from the storage tanks at the facility are calculated using Bryan Research & Engineering ProMax® Software. Controlled calculations assume an overall control efficiency (capture and destruction) of 95%. The throughput for the produced fluids tanks are based on the current liquid permit limit of condensate and produced water at the OXF-160 pad. The composition for the analysis was from a sample taken at OXF-160. Emissions of VOC and HAPs from the sand separator tank are calculated using E&P TANK v2.0.

Regulatory Applicability

As noted in the attached emission calculations, the change in potential emissions as a result of the proposed equipment changes is less than the modification thresholds in 45 CSR 13-2.17 as it results in an emissions increase of less than six (6) pounds per hour, less than ten (10) tons per year, and less than 144 pounds per calendar day, of any regulated air pollutant and less than two (2) pounds per hour and five (5) tons per year of hazardous air pollutants (HAPs).

Potential emissions from the storage tanks will remain below all current permit limits and EQT will comply with the liquid throughput limits in the current permit.

NSPS OOOOa - Crude Oil and Natural Gas Facilities

The proposed sand separator storage vessel at the facility is potentially subject to the requirements of storage vessel affected facilities under 40 CFR Subpart OOOOa – Crude Oil and Natural Gas Facilities. This regulation has yet to be finalized. The sand separator storage vessel has potential VOC emissions less than 6 tpy. As such, per 60.5365a(e), the tanks will not be storage vessel affected facilities under the rule.

Note that the proposed changes to the well pad do not met the definition of modification under 40 CFR 60.5365a(i)(3). Therefore, EQT will not be subject to the leak detection and repair program under OOOOa.

Summary

The proposed equipment at the OXF-160 wellpad does not exceed the hourly and annual limits, nor the daily limits specified in the modification definition of 45 CSR 13 (note that haul roads are not included in applicability determinations). Based on the emission levels and lack of substantive requirements, the proposed equipment at the wellpad are exempt from Rule 13 permitting. EQT will continue to comply with the applicable emission limitations in the OXF-160 pad's current permit.

EQT appreciates WVDEP's review of this permit determination request. If you have any questions or comments about the attached information or have additional information requirements, please feel free to contact me at (412) 395-3699.

Sincerely,

Alex Bosiljevac
EQT Corporation

cc: Robert Keatley
James Robertson

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):

EQT Production Company

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):

OXF-160 Pad

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:

211111

4A. MAILING ADDRESS:

625 Liberty Ave, Suite 1700 Pittsburgh PA, 15222

4B. PHYSICAL ADDRESS:

Upper Run Road, Oxford, WV

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**):

From West Union, take US-50 west for 3 miles. Turn left onto Old U.S. 80 E for 1.9 miles, then turn left to continue onto County Route 21/Oxford Rd for 4.5 miles. Turn left onto South Fork of Hughes River for 3.5 miles, then turn right onto Upper Run. Access road will be on the right after about 0.8 miles.

5B. NEAREST ROAD:	5C. NEAREST CITY OR TOWN:	5D. COUNTY:
	Oxford	Doddridge
5E. UTM NORTHING (KM):	**5F. UTM EASTING (KM):**	**5G. UTM ZONE:**
4,336.958	517.357	17

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:		6B. TITLE:
Alex Bosiljevac		Environmental Coordinator
6C. TELEPHONE:	**6D. FAX:**	**6E. E-MAIL:**
412-395-3699		ABosiljevac@eqt.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):

017-00039

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH **THIS** PROCESS (FOR AN EXISTING FACILITY ONLY):

R13-3011

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

CO-R13-E-2016-04

8A. TYPE OF EMISSION SOURCE (CHECK ONE):

☐ **NEW SOURCE** ☒ **ADMINISTRATIVE UPDATE**

☐ **MODIFICATION** ☐ **OTHER** (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?

☒ **YES** ☐ **NO**

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? ☐ **YES** ☒ **NO**

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:

TBD

10B. DATE OF ANTICIPATED START-UP:

TBD

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B**.

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C**. **Included in cover letter**

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D**. FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR**.**

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY**, PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY**, PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	**HOURLY PTE** (LB/HR)	**YEARLY PTE** (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM	0.00	0.00
PM_{10}	0.00	0.00
VOCs	0.06	0.24
CO	0.00	0.00
NO_x	0.00	0.00
SO_2	0.00	0.00
Pb		
HAPs (AGGREGATE AMOUNT)	0.001	0.003
TAPs (INDIVIDUALLY)*		
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E**.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, KENNETH KIRK (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL*** ** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: _____

TITLE: Executive Vice President DATE: 4 / 28 / 2016

** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

☒ **ATTACHMENT A** ☒ **ATTACHMENT B** ☒ **ATTACHMENT C** ☐ **ATTACHMENT D** ☒ **ATTACHMENT E**

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq

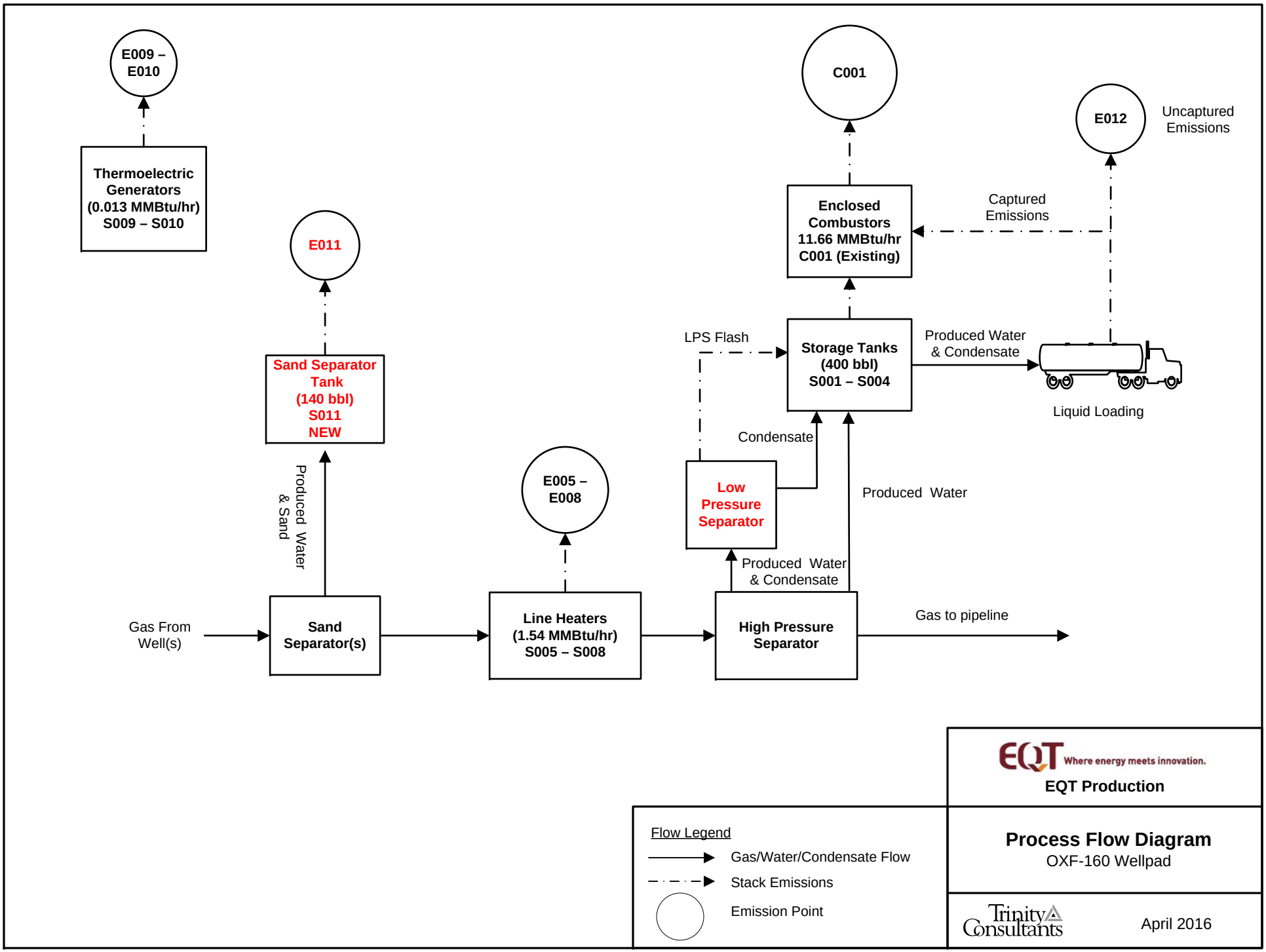
ATTACHMENT A – AREA MAP

ATTACHMENT A: AREA MAP

Figure 1 - Map of OXF-160 Location

UTM Northing (KM):	4,336.958
UTM Easting (KM):	517.357
Elevation:	~1,230 ft

ATTACHMENT B – PROCESS FLOW DIAGRAM


E009 – E010
Thermoelectric Generators (0.013 MMBtu/hr) S009 – S010
E011
Sand Separator Tank (140 bbl) S011 NEW
Produced Water & Sand
C001
E012
Uncaptured Emissions
Enclosed Combustors 11.66 MMBtu/hr C001 (Existing)
Captured Emissions
LPS Flash
Storage Tanks (400 bbl) S001 – S004
Produced Water & Condensate
Liquid Loading
Condensate
E005 – E008
Low Pressure Separator
Produced Water
Produced Water & Condensate
Gas From Well(s)
Sand Separator(s)
Line Heaters (1.54 MMBtu/hr) S005 – S008
High Pressure Separator
Gas to pipeline
EQT Where energy meets innovation.
EQT Production
Flow Legend
Gas/Water/Condensate Flow
Stack Emissions
Emission Point
Process Flow Diagram
OXF-160 Wellpad
Trinity Consultants
April 2016

ATTACHMENT C – PROCESS DESCRIPTION

ATTACHMENT C: PROCESS DESCRIPTION

The application involves the installation of a sand separator storage tank (S011) and a low pressure separator at an existing natural gas production wellpad (OXF-160). The wellpad consists of three (3) wells, each with the same basic operation.

The incoming gas/liquid stream from the underground well will pass through a sand separator, where sand, water, and residual solids are displaced and transferred to the sand separator tank (S011). The gas stream will then pass through a line heater (S005-S008) to raise/maintain temperature. The stream will then pass through the high pressure separators, which will separate gas (natural gas from the separator is sent to the sales line) from liquids (condensate and produced water). The produced water will be sent to the produced fluids tanks and the condensate stream will pass through the low pressure separator, which volatizes (flash off) lighter hydrocarbons and separate condensate in the liquids stream. The flash gas and condensate are then transferred to the produced fluid storage vessels (S001-S004).

Emissions from the storage vessels are controlled by an enclosed combustor (C001). Once the tanks are filled, the contents are loaded into trucks for transport. EQT utilizes vapor balancing in the truck loading operations, which means the vapors displaced by the filling of tanker trucks (S012) are routed back into the battery of tanks and ultimately to the combustor. Facility electricity is provided by thermoelectric generators (S009-S010).

A process flow diagram is included as Attachment B.

ATTACHMENT E – EMISSION CALCULATIONS

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Facility-Wide Emission Summary - Controlled

Wells	3	per pad
Storage Tanks	4	per pad
Sand Separator Tank	1	per pad
Line Heaters	4	per pad
TEGs	2	per pad
Dehy Reboiler	0	per pad
Glycol Dehy	0	per pad
Dehy Drip Tank	0	per pad
Dehy Combustor	0	per pad
Compressor	0	per pad
High Pressure Separator	3	per pad
Low Pressure Separator	1	per pad
Vapor Recovery Unit	0	per pad
Tank Combustor	1	per pad
Length of lease road	1,000	feet

Carbon equivalent emissions (CO_2e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:

CO_2	1
CH_4	25
N_2O	298

Emission Point ID #	Emission Source ID#s	Emission Source Description	NO_x		CO		VOC		SO_2		PM_{10}		$PM_{2.5}$		CO_2e	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001-C002	S001-S004	Storage Vessels	---	---	---	---	5.70	24.96	---	---	---	---	---	---	33.35	146.07
C001-C002	S012	Captured Liquid Loading	---	---	---	---	0.97	0.25	---	---	---	---	---	---	---	---
C001	C001	Tank Combustor	1.15	5.03	0.96	4.22	2.8E-04	1.2E-03	0.01	0.03	0.09	0.38	0.09	0.38	1,371.10	6,005.43
C001	**S001-S004, S012, C001**	**---**	**1.15**	**5.03**	**0.96**	**4.22**	**6.67**	**25.21**	**0.01**	**0.03**	**0.09**	**0.38**	**0.09**	**0.38**	**1,404.45**	**6,151.50**
E005	S005	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E006	S006	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E007	S007	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E008	S008	Line Heater	0.15	0.64	0.12	0.54	0.01	0.04	8.8E-04	3.9E-03	0.01	0.05	0.01	0.05	180.18	789.20
E009	S009	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E010	S010	TEG	1.2E-03	5.4E-03	1.0E-03	4.5E-03	6.8E-05	3.0E-04	7.4E-06	3.2E-05	9.4E-05	4.1E-04	9.4E-05	4.1E-04	1.52	6.64
E011	S011	Sand Separator Tank	---	---	---	---	0.06	0.24	---	---	---	---	---	---	0.53	2.33
E012	S012	Uncaptured Liquid Loading	---	---	---	---	20.85	5.42	---	---	---	---	---	---	---	---
---	---	Fugitives	---	---	---	---	---	10.86	---	---	---	---	---	---	---	142.37
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	0.69	---	0.07	---	---
Facility Total			1.74	7.61	1.46	6.39	27.61	41.87	0.01	0.05	0.13	1.27	0.13	0.65	2,128.74	9,466.26
Facility Total (excluding fugitive emissions)			1.74	7.61	1.46	6.39	6.76	25.59	0.01	0.05	0.13	0.58	0.13	0.58	2,128.74	9,323.89

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Facility-Wide Emission Summary - Controlled

Emission Point ID #	Emission Source ID#s	Emission Source Description	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
C001-C002	S001-S004	Storage Vessels	---	---	5.5E-03	2.4E-02	1.2E-02	5.2E-02	5.8E-04	2.6E-03	6.4E-03	2.8E-02	0.19	0.84	0.26	1.13
C001-C002	S012	Captured Liquid Loading	---	---	7.2E-04	1.9E-04	1.5E-03	3.8E-04	7.6E-05	2.0E-05	1.1E-03	2.9E-04	0.03	0.01	0.04	0.01
C001	C001	Tank Combustor	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C001	**S001-S004, S012, C001**	**---**	---	---	**6.2E-03**	**2.4E-02**	**1.3E-02**	**5.2E-02**	**6.6E-04**	**2.6E-03**	**7.5E-03**	**2.8E-02**	**0.22**	**0.85**	**0.30**	**1.14**
E005	S005	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E006	S006	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E007	S007	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E008	S008	Line Heater	1.1E-04	4.8E-04	3.1E-06	1.3E-05	5.0E-06	2.2E-05	---	---	---	---	2.6E-03	0.01	2.8E-03	0.01
E009	S009	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E010	S010	TEG	9.3E-07	4.1E-06	2.6E-08	1.1E-07	4.2E-08	1.8E-07	---	---	---	---	2.2E-05	9.7E-05	2.3E-05	1.0E-04
E011	S011	Sand Separator Tank	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.0E-03	<0.01	1.0E-03	3.0E-03
E012	S012	Uncaptured Liquid Loading	---	---	0.02	4.0E-03	0.03	0.01	1.6E-03	4.2E-04	2.4E-02	6.3E-03	0.64	0.17	0.84	0.22
---	---	Fugitives	---	---	---	4.4E-03	---	0.01	---	<0.01	---	0.01	---	0.18	---	0.34
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total			4.4E-04	1.9E-03	0.02	0.03	0.04	0.07	2.3E-03	3.0E-03	0.03	0.04	0.87	1.24	1.14	1.74
Facility Total (excluding fugitive emissions)			4.4E-04	1.9E-03	6.2E-03	0.02	1.3E-02	5.2E-02	6.6E-04	2.6E-03	7.5E-03	2.8E-02	0.23	0.90	0.31	1.19

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Produced Fluids Storage Vessels

Potential Throughput

Operational Hours	8,760	hrs/yr
Maximum Condensate Throughput[1]	2,855	bbl/month
Maximum Produced Water Throughput[1]	23,105	bbl/month

[1] Based on the ratio of actual condensate and produced water throughput at the pad multiplied by the current permit limits (13,084,000 gal).

Overall Control Efficiency of Combustor 95%

Storage Tanks - Uncontrolled

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	26.679	116.853	26.679	116.853
Ethane	<0.001	<0.001	<0.001	<0.001	33.666	147.458	33.666	147.458
Propane	0.109	0.476	0.471	2.061	39.275	172.023	39.854	174.561
Isobutane	0.028	0.121	0.119	0.522	10.820	47.391	10.967	48.033
n-Butane	0.063	0.278	0.274	1.201	25.458	111.506	25.796	112.984
Isopentane	0.025	0.109	0.107	0.470	10.144	44.431	10.276	45.010
n-Pentane	0.024	0.107	0.106	0.462	10.130	44.371	10.260	44.940
n-Hexane	0.009	0.038	0.038	0.166	3.804	16.660	3.850	16.865
Cyclohexane	0.001	0.003	0.003	0.012	0.328	1.437	0.331	1.452
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	0.007	0.031	0.031	0.135	3.409	14.930	3.447	15.097
n-Octane	0.003	0.012	0.011	0.050	1.305	5.718	1.320	5.780
n-Nonane	0.001	0.003	0.003	0.014	0.382	1.671	0.385	1.688
n-Decane	0.001	0.003	0.003	0.013	0.372	1.629	0.375	1.645
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	0.013	0.059	0.058	0.256	5.744	25.160	5.816	25.475
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	1.6E-04	0.001	0.001	0.003	0.109	0.479	0.110	0.483
Toluene	3.4E-04	0.002	0.002	0.007	0.233	1.023	0.235	1.031
Ethylbenzene	1.8E-05	8.1E-05	8.8E-05	3.8E-04	0.012	0.051	0.012	0.051
m-Xylene	2.9E-04	0.001	0.001	0.006	0.126	0.551	0.127	0.558
Isooctane	0.002	0.007	0.007	0.032	0.794	3.476	0.803	3.515
Total VOC Emissions:	0.29	1.25	1.24	5.41	112.44	492.51	113.97	499.17
Total HAP Emissions:	1.1E-02	0.05	0.05	0.22	5.08	22.24	5.14	22.50

[1] Uncontrolled emissions calculation using Promax (sum of produced water and condensate). Non-methane emissions are taken from the tank emissions stencil. Methane emissions are taken from the flash stream composition.
[2] Composition of condensate from OXF-160 sample from 7/16/2013.

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Produced Fluids Storage Vessels

Storage Tanks - Controlled

	Breathing		Working		Flashing		Total Emissions	
	lb/hr	tpy			lb/hr	tpy	lb/hr	tpy
Methane	<0.001	<0.001	<0.001	<0.001	1.334	5.843	1.334	5.843
Ethane	<0.001	<0.001	<0.001	<0.001	1.683	7.373	1.683	7.373
Propane	0.005	0.024	0.024	0.103	1.964	8.601	1.993	8.728
Isobutane	0.001	0.006	0.006	0.026	0.541	2.370	0.548	2.402
n-Butane	0.003	0.014	0.014	0.060	1.273	5.575	1.290	5.649
Isopentane	0.001	0.005	0.005	0.024	0.507	2.222	0.514	2.250
n-Pentane	0.001	0.005	0.005	0.023	0.507	2.219	0.513	2.247
n-Hexane	4.4E-04	0.002	0.002	0.008	0.190	0.833	0.193	0.843
Cyclohexane	3.1E-05	1.3E-04	1.3E-04	0.001	0.016	0.072	0.017	0.073
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	3.6E-04	0.002	0.002	0.007	0.170	0.747	0.172	0.755
n-Octane	1.3E-04	0.001	0.001	0.003	0.065	0.286	0.066	0.289
n-Nonane	3.6E-05	1.6E-04	1.6E-04	0.001	0.019	0.084	0.019	0.084
n-Decane	3.4E-05	1.5E-04	1.5E-04	0.001	0.019	0.081	0.019	0.082
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	0.001	0.003	0.003	0.013	0.287	1.258	0.291	1.274
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	8.0E-06	3.5E-05	4.0E-05	1.7E-04	0.005	0.024	0.006	0.024
Toluene	1.7E-05	7.5E-05	8.3E-05	3.6E-04	0.012	0.051	0.012	0.052
Ethylbenzene	9.2E-07	4.0E-06	4.4E-06	1.9E-05	0.001	0.003	0.001	0.003
m-Xylene	1.4E-05	6.3E-05	6.7E-05	2.9E-04	0.006	0.028	0.006	0.028
Isooctane	8.5E-05	3.7E-04	3.7E-04	0.002	0.040	0.174	0.040	0.176
Total VOC Emissions:	1.4E-02	0.06	0.06	0.27	5.62	24.63	5.70	24.96
Total HAP Emissions:	5.6E-04	2.5E-03	2.5E-03	1.1E-02	2.5E-01	1.11	0.26	1.13

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Sand Separator Tank

Throughput Parameter	Value	Units
Tank Capacity	5,880	gallons
Operational Hours	8,760	hrs/yr
Throughput	280	bbl/month
Percent Produced Water	50%	
Total Produced Water Throughput	140	bbl/month

[1] Conservatively assumes 2 turnovers/month of sand and produced water.

Description	Potential Throughput (gal/yr)
Produced Water and Sand	141,120

Sand Separator Tank (140 bbl) - Uncontrolled *(Per tank)* [2, 3]

Constituent	Total Emissions [1] lb/hr	tpy
Methane	0.021	0.093
Ethane	0.030	0.131
Propane	0.027	0.119
Isobutane	0.005	0.024
n-Butane	0.012	0.052
Isopentane	0.004	0.016
n-Pentane	0.003	0.014
Hexanes	0.001	0.004
Heptanes	0.001	0.005
Octane	<0.001	0.001
Nonane	<0.001	<0.001
Decane	<0.001	<0.001
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
n-Hexane	0.001	0.003
2,2,4-Trimethylpentane	<0.001	<0.001
Total HC Emissions:	0.106	0.463
Total VOC Emissions:	0.055	0.240
Total HAP Emissions:	0.001	0.003

[2] E&P TANK 2.0 calculates working, breathing and flashing losses and reports the sum as one total.
[3] E&P TANK v2.0 emission calculations are based on OXF-160 condensate sample from 7/16/2013.

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Sand Separator Tank

Sand Separator Tank (140 bbl) - Controlled *(Per tank)*

Constituent	Total Emissions lb/hr	tpy
Methane	0.021	0.093
Ethane	0.030	0.131
Propane	0.027	0.119
Isobutane	0.005	0.024
n-Butane	0.012	0.052
Isopentane	0.004	0.016
n-Pentane	0.003	0.014
Hexanes	0.001	0.004
Heptanes	0.001	0.005
Octane	<0.001	0.001
Nonane	<0.001	<0.001
Decane	<0.001	<0.001
Benzene	<0.001	<0.001
Toluene	<0.001	<0.001
Ethylbenzene	<0.001	<0.001
Xylenes	<0.001	<0.001
n-Hexane	0.001	0.003
2,2,4-Trimethylpentane	<0.001	<0.001
Total Emissions:	0.106	0.464
Total VOC Emissions:	0.055	0.240
Total HAP Emissions:	0.001	0.003

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Tank Combustor

Source Designation:	**C001**
Pilot Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Pilot Rating (MMBtu/hr)	0.05
Combustor Rating (MMBtu/hr) [1]	11.66
Combustor Rating (Mscfd) [1]	188.38
Combustor Rating (scf/hr)	7849.17
Pilot Fuel Consumption (scf/hr):	50.00
Potential Annual Hours of Operation (hr/yr):	8,760

[1] Maximum heat input for 48" model from Leed Enclosed Combustor Operations Manual

Enclosed Combustor Emissions

Pollutant	Emission Factors [2] (lb/MMBtu)	Combustor (lb/hr)	Combustor (tpy)	Pilot (lb/hr)	Pilot (tpy)	Total (lb/hr)	Total (tpy)
NO_x	0.10	1.14	5.01	5.1E-03	0.02	1.15	5.03
CO	0.08	0.96	4.21	4.3E-03	0.02	0.96	4.22
VOC	5.4E-03	---	---	2.8E-04	1.2E-03	0.00	0.00
SO_2	5.9E-04	0.01	0.03	3.1E-05	1.4E-04	0.01	0.03
PM/PM_{10}	0.01	0.09	0.38	3.9E-04	1.7E-03	0.09	0.38
CO_2	117.00	1364.189	5975.146	6.14	26.90	1370.33	6002.05
CH_4	2.2E-03	---	---	1.2E-04	5.1E-04	0.00	0.00
N_2O	2.2E-04	2.6E-03	0.01	1.2E-05	5.1E-05	2.6E-03	0.01

[2] Emission factors from AP-42 Ch. 1.4 for natural gas combustion were used as they were determined to be most representative of the process. Ch. 5.3 (Natural Gas Processing) was consulted, however, factors contained there are appropriate for amine gas sweetening processes, which is not the case at the wellpad. Also, Ch. 13.5 (Industrial Flares) was consulted, but since the control device in this case is an enclosed combustor vs. an elevated flare, these factors were also determined to be inappropriate.

Combustor Maximum Loading:

$$\frac{7849.17\ \text{scf}}{\text{hr}} \left| \frac{\text{lb-mol}}{379.5\ \text{scf}} \right| \frac{20.43\ \text{lb}}{\text{lb-mol}} = 422.65\ \text{lb/hr}$$

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Line Heaters

Source Designation:	**S005-S008**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr)	1.54
Fuel Consumption (MMscf/hr):	1.47E-03
Potential Annual Hours of Operation (hr/yr):	8,760

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	**Emission Factor (lb/MMscf)[1, 4]**	**Potential Emissions**	
		(lb/hr)[2]	**(tons/yr)[3]**
NO_x	100	0.15	0.64
CO	84	0.12	0.54
VOC	5.5	0.01	0.04
SO_2	0.6	8.8E-04	3.9E-03
PM Total	7.6	0.01	0.05
PM Condensable	5.7	0.01	0.04
PM_{10} (Filterable)	1.9	2.8E-03	0.01
$PM_{2.5}$ (Filterable)	1.9	2.8E-03	0.01
Lead	5.00E-04	7.3E-07	3.2E-06
CO_2	117.0	180.00	788.38
CH_4	2.21E-03	3.4E-03	1.5E-02
N_2O	2.21E-04	3.4E-04	1.5E-03

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Line Heaters

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[1]	Potential Emissions (lb/hr)[2]	Potential Emissions (tons/yr)[3]
HAPs:			
2-Methylnaphthalene	2.4E-05	3.5E-08	1.5E-07
3-Methylchloranthrene	1.8E-06	2.6E-09	1.2E-08
7,12-Dimethylbenz(a)anthracene	1.6E-05	2.3E-08	1.0E-07
Acenaphthene	1.8E-06	2.6E-09	1.2E-08
Acenaphthylene	1.8E-06	2.6E-09	1.2E-08
Anthracene	2.4E-06	3.5E-09	1.5E-08
Benz(a)anthracene	1.8E-06	2.6E-09	1.2E-08
Benzene	2.1E-03	3.1E-06	1.3E-05
Benzo(a)pyrene	1.2E-06	1.8E-09	7.7E-09
Benzo(b)fluoranthene	1.8E-06	2.6E-09	1.2E-08
Benzo(g,h,i)perylene	1.2E-06	1.8E-09	7.7E-09
Benzo(k)fluoranthene	1.8E-06	2.6E-09	1.2E-08
Chrysene	1.8E-06	2.6E-09	1.2E-08
Dibenzo(a,h) anthracene	1.2E-06	1.8E-09	7.7E-09
Dichlorobenzene	1.2E-03	1.8E-06	7.7E-06
Fluoranthene	3.0E-06	4.4E-09	1.9E-08
Fluorene	2.8E-06	4.1E-09	1.8E-08
Formaldehyde	7.5E-02	1.1E-04	4.8E-04
Hexane	1.8E+00	2.6E-03	1.2E-02
Indo(1,2,3-cd)pyrene	1.8E-06	2.6E-09	1.2E-08
Naphthalene	6.1E-04	8.9E-07	3.9E-06
Phenanthrene	1.7E-05	2.5E-08	1.1E-07
Pyrene	5.0E-06	7.3E-09	3.2E-08
Toluene	3.4E-03	5.0E-06	2.2E-05
Arsenic	2.0E-04	2.9E-07	1.3E-06
Beryllium	1.2E-05	1.8E-08	7.7E-08
Cadmium	1.1E-03	1.6E-06	7.1E-06
Chromium	1.4E-03	2.1E-06	9.0E-06
Cobalt	8.4E-05	1.2E-07	5.4E-07
Manganese	3.8E-04	5.6E-07	2.4E-06
Mercury	2.6E-04	3.8E-07	1.7E-06
Nickel	2.1E-03	3.1E-06	1.3E-05
Selenium	2.4E-05	3.5E-08	1.5E-07
Total HAP		**2.8E-03**	**1.2E-02**

[1] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3
[2] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).
[3] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).
[4] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Thermoelectric Generators

Source Designation:	**S009-S010**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,050
Heat Input (MMBtu/hr) [1]	0.013
Fuel Consumption (MMscf/hr):	1.23E-05
Potential Annual Hours of Operation (hr/yr):	8,760

[1] Global Themorelectric specification sheet states 311 ft^3/day at 1000 BTU/ft^3.

Criteria and Manufacturer Specific Pollutant Emission Rates:

Pollutant	Emission Factor (lb/MMscf)[2, 5]	Potential Emissions (lb/hr)[3]	Potential Emissions (tons/yr)[4]
NO_x	100	1.2E-03	0.01
CO	84	1.0E-03	4.5E-03
VOC	5.5	6.8E-05	3.0E-04
SO_2	0.6	7.4E-06	3.2E-05
PM Total	7.6	9.4E-05	4.1E-04
PM Condensable	5.7	7.0E-05	3.1E-04
PM_{10} (Filterable)	1.9	2.3E-05	1.0E-04
$PM_{2.5}$ (Filterable)	1.9	2.3E-05	1.0E-04
Lead	5.00E-04	6.2E-09	2.7E-08
CO_2	116.9	1.51	6.64
CH_4	2.21E-03	2.9E-05	1.3E-04
N_2O	2.21E-04	2.9E-06	1.3E-05

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Thermoelectric Generators

Hazardous Air Pollutant (HAP) Potential Emissions:

Pollutant	Emission Factor (lb/MMscf)[2]	Potential Emissions (lb/hr)[3]	Potential Emissions (tons/yr)[4]
HAPs:			
2-Methylnaphthalene	2.4E-05	3.0E-10	1.3E-09
3-Methylchloranthrene	1.8E-06	2.2E-11	9.7E-11
7,12-Dimethylbenz(a)anthracene	1.6E-05	2.0E-10	8.6E-10
Acenaphthene	1.8E-06	2.2E-11	9.7E-11
Acenaphthylene	1.8E-06	2.2E-11	9.7E-11
Anthracene	2.4E-06	3.0E-11	1.3E-10
Benz(a)anthracene	1.8E-06	2.2E-11	9.7E-11
Benzene	2.1E-03	2.6E-08	1.1E-07
Benzo(a)pyrene	1.2E-06	1.5E-11	6.5E-11
Benzo(b)fluoranthene	1.8E-06	2.2E-11	9.7E-11
Benzo(g,h,i)perylene	1.2E-06	1.5E-11	6.5E-11
Benzo(k)fluoranthene	1.8E-06	2.2E-11	9.7E-11
Chrysene	1.8E-06	2.2E-11	9.7E-11
Dibenzo(a,h) anthracene	1.2E-06	1.5E-11	6.5E-11
Dichlorobenzene	1.2E-03	1.5E-08	6.5E-08
Fluoranthene	3.0E-06	3.7E-11	1.6E-10
Fluorene	2.8E-06	3.5E-11	1.5E-10
Formaldehyde	7.5E-02	9.3E-07	4.1E-06
Hexane	1.8E+00	2.2E-05	9.7E-05
Indo(1,2,3-cd)pyrene	1.8E-06	2.2E-11	9.7E-11
Naphthalene	6.1E-04	7.5E-09	3.3E-08
Phenanthrene	1.7E-05	2.1E-10	9.2E-10
Pyrene	5.0E-06	6.2E-11	2.7E-10
Toluene	3.4E-03	4.2E-08	1.8E-07
Arsenic	2.0E-04	2.5E-09	1.1E-08
Beryllium	1.2E-05	1.5E-10	6.5E-10
Cadmium	1.1E-03	1.4E-08	5.9E-08
Chromium	1.4E-03	1.7E-08	7.6E-08
Cobalt	8.4E-05	1.0E-09	4.5E-09
Manganese	3.8E-04	4.7E-09	2.1E-08
Mercury	2.6E-04	3.2E-09	1.4E-08
Nickel	2.1E-03	2.6E-08	1.1E-07
Selenium	2.4E-05	3.0E-10	1.3E-09
Total HAP		**2.3E-05**	**1.0E-04**

[2] Emission factors from AP-42 Section 1.4 "Natural Gas Combustion" Tables 1.4-1, 1.4-2, & 1.4-3

[3] Emission Rate (lb/hr) = Rated Capacity (MMscf/hr) × Emission Factor (lb/MMscf).

[4] Annual Emissions $(tons/yr)_{Potential}$ = $(lb/hr)_{Emissions}$ × (Maximum Allowable Operating Hours, 8760 hr/yr) × (1 ton/2000 lb).

[5] GHG Emission factors from Tables C-1 and C-2, 40 CFR 98, Subpart C.

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Liquid Loading

Throughput 13,084,000 gal/yr
Capture Efficiency 70% non-tested tanker trucks
Control Efficiency 98% Combustor destruction efficiency

Liquid Loading Emissions

	Uncontrolled Emissions		Uncaptured Emissions		Controlled Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Propane	26.468	6.882	7.940	2.064	0.371	0.096
Isobutane	6.696	1.741	2.009	0.522	0.094	0.024
n-Butane	15.421	4.010	4.626	1.203	0.216	0.056
Isopentane	6.035	1.569	1.810	0.471	0.084	0.022
n-Pentane	5.931	1.542	1.779	0.463	0.083	0.022
n-Hexane	2.133	0.555	0.640	0.166	0.030	0.008
Cyclohexane	0.150	0.039	0.045	0.012	0.002	0.001
Methylcyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Heptane	1.737	0.452	0.521	0.135	0.024	0.006
n-Octane	0.645	0.168	0.194	0.050	0.009	0.002
n-Nonane	0.177	0.046	0.053	0.014	0.002	0.001
n-Decane	0.163	0.042	0.049	0.013	0.002	0.001
n-Undecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dodecane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Triethylene Glycol	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyclopentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isohexane	3.280	0.853	0.984	0.256	0.046	0.012
3-Methylpentane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Neohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,3-Dimethylbutane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methylcyclohexane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Decane, 2-Methyl-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	0.051	0.013	0.015	0.004	0.001	0.000
Toluene	0.105	0.027	0.031	0.008	0.001	0.000
Ethylbenzene	0.005	0.001	0.002	0.000	0.000	0.000
m-Xylene	0.081	0.021	0.024	0.006	0.001	0.000
Isooctane	0.412	0.107	0.124	0.032	0.006	0.001
Total VOC Emissions:	69.492	18.068	20.848	5.420	0.973	0.253
Total HAP Emissions:	2.788	0.725	0.836	0.217	0.039	0.010

[1] Uncontrolled emissions calculation using Promax (sum of produced water and condensate).
[2] Hourly emissions assume two hours of loading per day, five days per week.

Company Name: **EQT Production, LLC**
Facility Name: **OXF 160 Wellpad**
Project Description: **Permit Determination**

Fugitive Emissions

Fugitive Emissions from Component Leaks

Facility Equipment Type[1]	Valves	Connectors	Open-Ended Lines	Pressure Relief Devices
Wellhead	8	38	0.5	0
Separators	1	6	0	0
Meters/Piping	12	45	0	0
Compressors	12	57	0	0
In-line heaters	14	65	2	1
Dehydrators	24	90	2	2

[1] Table W-1B to Subpart W of Part 98 —Default Average Component Counts for Major Onshore Natural Gas Production

Fugitive VOC/Total Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Annual Fugitive Emissions (tpy)	Weight Fraction VOC	Weight Fraction HAP	VOC Emissions[3] (tpy)	HAP Emissions[3] (tpy)
Pumps	Light Liquid	0.01990	8	1.44	1.00	0.03	1.44	0.04
Compressor	Gas	0.22800	0	---	0.17	0.01	---	---
Valves	Gas	0.00597	180	10.38	0.17	0.01	1.72	0.05
Pressure Relief Valves	Gas	0.10400	16	16.07	0.17	0.01	2.67	0.08
Open-Ended Lines	All	0.00170	15	0.25	0.17	0.01	0.04	1.3E-03
Connectors	All	0.00183	800	14.13	0.17	0.01	2.34	0.07
Intermittent Pneumatic Devices[4]	Gas	13.5	15	---	---	---	2.64	0.08
			Emission Totals:	**42.26**	**---**	**---**	**10.86**	**0.34**

[1] U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates.* Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMI factors were used as it was representative of natural gas liquids extraction. The pneumatic controller value is from 40 CFR 98 Subpart W, Table W-1A (units of scf/hr/component). Pneumatic assumes operation 1/3 of the year.

[2] Assumes one pump for each tank and one meter per wellhead. Pressure relief valves count includes one Emergency Pressure Relief valve and one lock-down hatch for each storage tank. Pneumatic devices assume 5 per well. A 50% compliance margin is added to the component counts based on Subpart W counts.

[3] Potential emissions VOC/HAP (tpy) = Emission factor (kg/hr/source) * Number of Sources * Weight % VOC/HAP x 2.2046 (lb/kg) x 8,760 (hr/yr) ÷ 2,000 (lb/ton)

[4] Potential emissions VOC/HAP (tpy) = Gas volume vented (scf/yr) * Molar weight of natural gas (lb/lb-mol) * Weight % VOC/HAP ÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Fugitive Emissions

Fugitive Specific HAP Emissions from Component Leaks

Equipment Type	Service	Emission Factors[1] (kg/hr/source)	Facility Equipment Count[2] (units)	TOC Annual Fugitive Emissions (tpy)	Benzene Emissions[3] (tpy)	Toluene Emissions[3] (tpy)	Ethylbenzene Emissions[3] (tpy)	Xylene Emissions[3] (tpy)	n-Hexane Emissions[4] (tpy)
Pumps	Light Liquid	0.01990	8	1.44	1.1E-04	2.6E-04	<0.01	1.5E-04	4.4E-03
Compressor	Gas	0.22800	0	---	---	---	---	---	---
Valves	Gas	0.00597	180	10.38	7.9E-04	1.9E-03	<0.01	1.1E-03	0.03
Pressure Relief Valves	Gas	0.10400	16	16.07	1.2E-03	2.9E-03	<0.01	1.7E-03	0.05
Open-Ended Lines	All	0.00170	15	0.25	1.9E-05	4.4E-05	<0.01	2.6E-05	7.6E-04
Connectors	All	0.00183	800	14.13	1.1E-03	2.5E-03	<0.01	1.5E-03	0.04
Intermittent Pneumatic Devices[4]	Gas	13.5	15	---	1.2E-03	2.9E-03	<0.01	1.7E-03	0.05
			Emission Totals:	**42.26**	**4.4E-03**	**0.01**	**<0.01**	**0.01**	**0.18**

[1] U.S. EPA. Office of Air Quality Planning and Standards. *Protocol for Equipment Leak Emission Estimates.* Table 2-1. (Research Triangle Park, NC: U.S. EPA EPA-453/R-95-017, 1995). SOCMI factors were used as it was representative of natural gas liquids extraction. The pneumatic controller value is from 40 CFR 98 Subpart W, Table W-1A. Pneumatic assumes operation 1/3 of the year.

[2] Assumes one pump for each tank and one meter per wellhead. Pressure relief valves count includes one Emergency Pressure Relief valve and one lock-down hatch for each storage tank. Pneumatic devices assume 5 per well. A 50% compliance margin is added to the component counts based on Subpart W counts.

[3] Potential emissions HAP (tpy) = Emission factor (kg/hr/source) * Number of Sources * Weight % HAP x 2.2046 (lb/kg) x 8,760 (hr/yr) ÷ 2,000 (lb/ton)

[4] Potential emissions HAP (tpy) = Gas volume vented (scf/yr) * Molar weight of natural gas (lb/lb-mol) * Weight % HAP ÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)

GHG Fugitive Emissions from Component Leaks

Component	Component Count	GHG Emission Factor[1] (scf/hr/component)	CH_4 Emissions[2,3] (tpy)	CO_2 Emissions[2,3] (tpy)	CO_2e Emissions[4] (tpy)
Pumps	8	0.01	0.01	7.4E-05	0.27
Compressor	0	4.17	---	---	---
Valves	180	0.027	0.71	4.8E-03	17.79
Pressure Relief Devices	16	0.04	0.09	6.3E-04	2.34
Open-Ended Lines	15	0.061	0.13	9.1E-04	3.35
Connectors	800	0.003	0.35	2.4E-03	8.78
Intermittent Pneumatic Devices	15	6	4.39	0.03	109.83
Total			**5.69**	**0.04**	**142.37**

[1] Population emission factors for gas service in the Eastern U.S. from *Table W-1A of Subpart W - Default Whole Gas Emission Factors for Onshore Production* , 40 CFR 98, Subpart W (table W-6 for compressor). Pneumatic assumes operation 1/3 of the year.

[2] Calculated in accordance with Equations W-32a, W-35 and W-36 in Subpart W of 40 CFR 98. See footnote 4 above for sample calculation.

[3] Potential emissions VOC/HAP (tpy) = Gas volume vented (scf/yr) * Molar weight of natural gas (lb/lb-mol) * Weight % VOC/HAP÷ 100 ÷ 379 (scf/lb-mol) ÷ 2,000 (lb/ton)
Mole fractions of CH_4 and CO_2 based on gas analysis:
CH_4: 79% CO_2: 0.20%

[4] Carbon equivalent emissions (CO_2e) are based on the following Global Warming Potentials (GWP) from 40 CFR Part 98, Table A-1:
Carbon Dioxide (CO_2): 1
Methane (CH_4): 25

Company Name: EQT Production, LLC
Facility Name: OXF 160 Wellpad
Project Description: Permit Determination

Haul Roads

Estimated Potential Road Fugitive Emissions

Unpaved Road Emissions

Unpaved Roads: $E\ (lb/VMT) = k(s/12)^a(W/3)^b*[(365-p)/365]$

	PM	PM_{10}	$PM_{2.5}$	
k Factor (lb/VMT)	4.9	1.5	0.15	AP-42 Table 13.2.2-2 (Final, 11/06)
Silt content, s	4.8 %			AP-42 Table 13.2.2-1 (11/06), for Sand and Gravel Processing
Number of Rain Days, p	150			AP-42 Figure 13.2.1-2
a	0.7	0.9	0.9	AP-42 Table 13.2.2-2 (Final, 11/06)
b	0.45	0.45	0.45	AP-42 Table 13.2.2-2 (Final, 11/06)

Description	Weight of Empty Truck (tons)	Weight of Truck w/ Max Load (tons)	Mean Vehicle Weight (tons)	Length of Unpaved Road Traveled (mile)	Trips Per Year	Mileage Per Year	Control (%)	Emissions (tpy) PM	PM_{10}	$PM_{2.5}$
Liquids Hauling	20	40	30	0.19	3,271	1,239	0	2.65	0.68	0.07
Employee Vehicles	3	3	3	0.19	200	76	0	0.06	0.01	0.00
Total Potential Emissions								**2.71**	**0.69**	**0.07**

Company Name: **EQT Production, LLC**
Facility Name: **OXF 160 Wellpad**
Project Description: **Permit Determination**

Gas Analysis

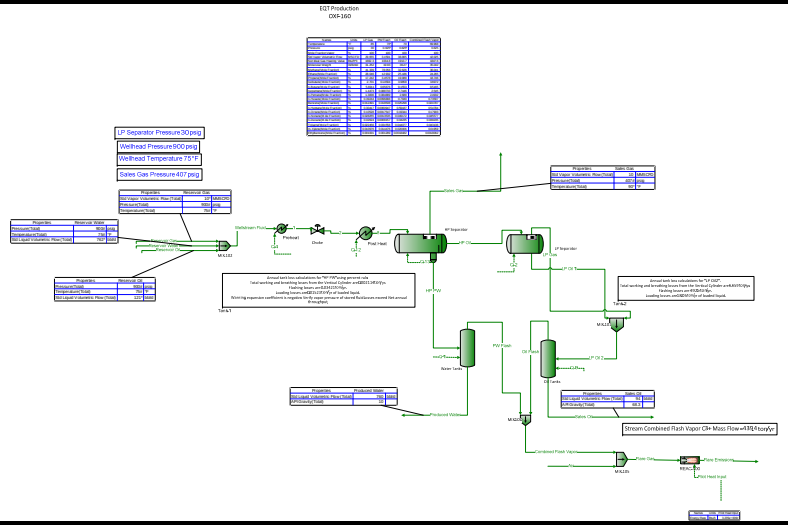
Sample Location: OXF 121 Gas Analysis - 512425
Sample Date: 5/20/2013
HHV (Btu/scf): 1,240 Note: A conservatively low BTU content of 1,050 was used for calculations.

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.195	44.01	0.09	0.00	0.420
Nitrogen	0.532	28.01	0.15	0.01	0.729
Methane	78.965	16.04	12.67	0.62	61.983
Ethane	13.780	30.07	4.14	0.20	20.278
Propane	4.195	44.10	1.85	0.09	9.053
Isobutane	0.507	58.12	0.29	0.01	1.442
n-Butane	1.013	58.12	0.59	0.03	2.881
Isopentane	0.249	72.15	0.18	0.01	0.879
n-Pentane	0.239	72.15	0.17	0.01	0.844
Cyclopentane	<0.001	70.1	0.0	0.0	0.000
n-Hexane	0.073	86.18	0.06	0.00	0.308
Cyclohexane	0.011	84.16	0.01	0.00	0.045
Other Hexanes	0.113	86.18	0.10	0.00	0.477
Heptanes	0.079	100.21	0.08	0.00	0.387
Methylcyclohexane	<0.001	98.19	0.00	0.00	0.000
2,2,4-Trimethylpentane	0.031	114.23	0.04	0.00	0.173
Benzene*	0.002	78.11	0.00	0.00	0.008
Toluene*	0.004	92.14	0.00	0.00	0.018
Ethylbenzene*	<0.001	106.17	0.00	0.00	0.000
Xylenes*	0.002	106.16	0.00	0.00	0.010
C8 + Heavies	0.010	130.80	0.01	0.00	0.064
Totals	100.000		20.43	1.00	100

TOC (Total)	99.27	98.85
VOC (Total)	6.53	16.59
HAP (Total)	0.11	0.52

OXF-160
Plant Schematic

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	
Flowsheet:	OXF-160	



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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Connections

	Combined Flash Vapor	HP PW	LP Oil 2	Produced Water	Reservoir Gas
From Block	MIX-100	HP Separator	MIX-101	Water Tanks	--
To Block	MIX-105	Water Tanks	Oil Tanks	--	MIX-102

Stream Composition

Mass Flow	Combined Flash Vapor lb/h	HP PW lb/h	LP Oil 2 lb/h	Produced Water lb/h	Reservoir Gas lb/h
Nitrogen	0.120188	0.0288257	0.0922995	0.00064408	163.727 *
Methane	26.6788	4.54509	22.5837	0.201643	13917.1 *
CO2	0.62245	0.537275	0.359658	0.263472	94.2808 *
Ethane	33.6662	1.42218	34.5775	0.0734016	4552.09 *
Propane	38.142	0.561711	47.8178	0.0328377	2032.22 *
Isobutane	9.91534	0.0300573	16.8385	0.000654934	323.737 *
n-Butane	22.8402	0.139371	45.7451	0.00696559	646.835 *
Isopentane	8.47252	0.0229528	31.8484	0.00074665	197.365 *
n-Pentane	8.30024	0.0219413	39.0944	0.000697242	189.439 *
n-Hexane	2.92606	0.00293564	40.6295	3.95625E-05	69.1112 *
Methylcyclopentane	0	0	0	0	0 *
Benzene	0.0893397	0.0401635	1.20642	0.0351489	1.71628 *
Cyclohexane	0.254811	0.00360312	4.39549	0.000597256	10.1704 *
n-Heptane	2.53295	0.00215194	107.709	3.36473E-05	24.2182 *
n-Octane	0.943637	0.000702309	132.532	7.05771E-06	3.76477 *
n-Nonane	0.269726	0.000621909	122.176	1.97962E-05	5.63608 *
n-Decane	0.257584	0.000463074	375.934	1.11567E-05	4.68935 *
n-Undecane	0	0	0	0	0 *
Dodecane	0	0	0	0	0 *
Water	0.294193	11081.1	0.150258	11081	0 *
Triethylene Glycol	0	0	0	0	0 *
Oxygen	0	0	0	0	0 *
Argon	0	0	0	0	0 *
Carbon Monoxide	0	0	0	0	0 *
Cyclopentane	0	0	0	0	0 *
Isohexane	4.48428	0.00499395	45.6898	7.32015E-05	106.98 *
3-Methylpentane	0	0	0	0	0 *
Neohexane	0	0	0	0	0 *
2,3-Dimethylbutane	0	0	0	0	0 *
Methylcyclohexane	0	0	0	0	0 *
Isooctane	0.593048	8.31574E-05	23.2793	1.39373E-07	38.9026 *
Decane, 2-Methyl-	0	0	0	0	0 *
Toluene	0.183392	0.0704266	8.38665	0.0603414	4.04896 *
m-Xylene	0.0959669	0.0374068	17.1719	0.0320762	2.33267 *
Ethylbenzene	0.0088479	0.00316085	1.32007	0.0026862	0 *

Volumetric Flow	Combined Flash Vapor ft^3/h	HP PW gpm	LP Oil 2 ft^3/h	Produced Water gpm	Reservoir Gas ft^3/h
Nitrogen	1.60155	7.83066E-05	0.430439	1.72023E-06	41.4407
Methane	617.775	0.0225475	176.254	0.000985508	5015.8
CO2	5.23532	0.000851824	0.946957	0.000412125	9.96737
Ethane	411.96	0.00481009	116.972	0.000245365	501.744
Propane	315.729	0.0016231	71.0282	9.39206E-05	65.2689
Isobutane	61.8626	7.93657E-05	11.17	1.71296E-06	0.50334
n-Butane	142.256	0.000363308	23.6926	1.79897E-05	-6.29253
Isopentane	42.2304	5.56796E-05	6.42169	1.79535E-06	-5.64759
n-Pentane	41.3154	5.33242E-05	6.33706	1.67981E-06	-6.1393
n-Hexane	12.0862	6.77872E-06	2.46989	9.05965E-08	-3.36908
Methylcyclopentane	0	0	0	0	0
Benzene	0.410047	7.54622E-05	0.0698052	6.55504E-05	-0.0716379
Cyclohexane	1.08164	7.33498E-06	0.221987	1.20663E-06	-0.464229

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Volumetric Flow	Combined Flash Vapor ft^3/h	HP PW gpm	LP Oil 2 ft^3/h	Produced Water gpm	Reservoir Gas ft^3/h
n-Heptane	8.92803	4.80623E-06	3.67381	7.4545E-08	-1.46905
n-Octane	2.89307	1.51886E-06	3.42012	1.51434E-08	-0.252936
n-Nonane	0.729558	1.31299E-06	2.83234	4.14706E-08	-0.422503
n-Decane	0.622833	9.62103E-07	8.35991	2.30016E-08	-0.375743
n-Undecane	0	0	0	0	0
Dodecane	0	0	0	0	0
Water	6.0566	22.2506	0.96256	22.1838	0
Triethylene Glycol	0	0	0	0	0
Oxygen	0	0	0	0	0
Argon	0	0	0	0	0
Carbon Monoxide	0	0	0	0	0
Cyclopentane	0	0	0	0	0
Isohexane	18.5547	1.15492E-05	3.39485	1.67868E-07	-4.66318
3-Methylpentane	0	0	0	0	0
Neohexane	0	0	0	0	0
2,3-Dimethylbutane	0	0	0	0	0
Methylcyclohexane	0	0	0	0	0
Isooctane	1.83122	1.78023E-07	0.767363	2.95968E-10	-2.03912
Decane, 2-Methyl-	0	0	0	0	0
Toluene	0.707203	0.000130955	0.237703	0.000111398	-0.226377
m-Xylene	0.318476	6.89845E-05	0.356014	5.87369E-05	-0.149632
Ethylbenzene	0.0293958	5.79801E-06	0.0279171	4.89273E-06	0

Mole Fraction	Combined Flash Vapor	HP PW	LP Oil 2	Produced Water	Reservoir Gas	
Nitrogen	0.00092982	1.67193E-06	0.000251702	3.73785E-08	0.00532303	*
Methane	0.360411	0.000460335	0.107542	2.04343E-05	0.7901	*
CO2	0.00306521	1.98359E-05	0.000624304	9.73273E-06	0.00195111	*
Ethane	0.242648	7.68489E-05	0.0878469	3.96856E-06	0.137879	*
Propane	0.187461	2.06976E-05	0.0828413	1.21067E-06	0.0419739	*
Isobutane	0.0369716	8.40253E-07	0.0221317	1.8319E-08	0.00507289	*
n-Butane	0.0851649	3.89612E-06	0.0601249	1.94833E-07	0.0101358	*
Isopentane	0.0254499	5.16904E-07	0.0337219	1.68242E-08	0.00249142	*
n-Pentane	0.0249324	4.94125E-07	0.0413941	1.57109E-08	0.00239136	*
n-Hexane	0.00735872	5.53506E-08	0.0360173	7.4636E-10	0.000730416	*
Methylcyclopentane	0	0	0	0	0	*
Benzene	0.000247874	8.35443E-07	0.00117987	7.31547E-07	2.00114E-05	*
Cyclohexane	0.000656172	6.95629E-08	0.00398985	1.15373E-08	0.000110063	*
n-Heptane	0.00547838	3.48945E-08	0.0821164	5.4591E-10	0.000220125	*
n-Octane	0.00179033	9.98978E-09	0.0886337	1.00447E-10	3.00171E-05	*
n-Nonane	0.000455775	7.8787E-09	0.0727722	2.50931E-10	4.00228E-05	*
n-Decane	0.000392349	5.28816E-09	0.201844	1.27477E-10	3.00171E-05	*
n-Undecane	0	0	0	0	0	*
Dodecane	0	0	0	0	0	*
Water	0.0035391	0.999412	0.000637161	0.999962	0	*
Triethylene Glycol	0	0	0	0	0	*
Oxygen	0	0	0	0	0	*
Argon	0	0	0	0	0	*
Carbon Monoxide	0	0	0	0	0	*
Cyclopentane	0	0	0	0	0	*
Isohexane	0.0112775	9.41593E-08	0.0405031	1.38097E-09	0.00113064	*
3-Methylpentane	0	0	0	0	0	*
Neohexane	0	0	0	0	0	*
2,3-Dimethylbutane	0	0	0	0	0	*
Methylcyclohexane	0	0	0	0	0	*
Isooctane	0.00112517	1.18285E-09	0.0155686	1.98358E-12	0.000310177	*
Decane, 2-Methyl-	0	0	0	0	0	*
Toluene	0.000431362	1.24193E-06	0.00695345	1.06469E-06	4.00228E-05	*
m-Xylene	0.000195904	5.72495E-07	0.0123563	4.91189E-07	2.00114E-05	*

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Mole Fraction	Combined Flash Vapor	HP PW	LP Oil 2	Produced Water	Reservoir Gas
Ethylbenzene	1.80618E-05	4.83755E-08	0.000949876	4.11342E-08	0 *

Stream Properties

Property	Units	Combined Flash Vapor	HP PW	LP Oil 2	Produced Water	Reservoir Gas
Temperature	°F	69.9677	90	85	70	75 *
Pressure	psig	0.625	407	30	0.625	900 *
Mole Fraction Vapor		1	0	0.248736	0	1
Mole Fraction Light Liquid		0	1	0.751264	1	0
Mole Fraction Heavy Liquid		0	0	0	0	0
Molecular Weight	lb/lbmol	35.0421	18.0168	85.5247	18.0158	20.3905
Mass Density	lb/ft^3	0.0954376	62.0461	2.54413	62.2745	3.99567
Mass Flow	lb/h	161.692	11088.6	1119.54	11081.7	22388.3
Vapor Volumetric Flow	ft^3/h	1694.21	178.715	440.047	177.949	5603.14
Liquid Volumetric Flow	gpm	211.227	22.2814	54.863	22.1858	698.574
Std Liquid Volumetric Flow	sgpm	0.723402	22.1949	3.42928	22.1545	132.362
Specific Gravity		1.20991	0.994823		0.998485	0.704027
API Gravity			10.0593		10.0153	
Net Ideal Gas Heating Value	Btu/ft^3	1847.6	0.621623	4356.89	0.0384522	1115.28
Net Liquid Heating Value	Btu/lb	19875.9	-1045.99	19177.3	-1058.89	20699.5
Std Vapor Volumetric Flow	MMSCFD	0.0420245	5.60535	0.119221	5.60219	10 *

Remarks

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Connections

	Reservoir Oil	Reservoir Water	Sales Gas	Sales Oil	
From Block	--	--	HP Separator	Oil Tanks	
To Block	MIX-102	MIX-102	--	--	

Stream Composition

Mass Flow	Reservoir Oil lb/h	Reservoir Water lb/h	Sales Gas lb/h	Sales Oil lb/h	
Nitrogen	0 *	0 *	163.606	0.00029284	
Methane	23.9844 *	0 *	13913.9	0.248377	
CO2	0.45199 *	0 *	93.8359	0.0110114	
Ethane	34.3028 *	0 *	4550.4	2.26006	
Propane	43.0878 *	0 *	2026.92	10.2047	
Isobutane	14.8845 *	0 *	321.753	6.95256	
n-Butane	41.2968 *	0 *	642.248	23.0373	
Isopentane	29.3797 *	0 *	194.874	23.3981	
n-Pentane	36.5971 *	0 *	186.92	30.8154	
n-Hexane	39.3098 *	0 *	67.7886	37.7063	
Methylcyclopentane	0 *	0 *	0	0	
Benzene	1.41693 *	0 *	1.88663	1.12209	
Cyclohexane	0 *	0 *	5.77131	4.14369	
n-Heptane	153.042 *	0 *	69.5488	105.179	
n-Octane	159.915 *	0 *	31.1474	131.589	
n-Nonane	127.137 *	0 *	10.596	121.907	
n-Decane	383.954 *	0 *	12.7091	375.677	
n-Undecane	0 *	0 *	0	0	
Dodecane	0 *	0 *	0	0	
Water	0 *	11117.7 *	36.3998	0.00491934	
Triethylene Glycol	0 *	0 *	0	0	
Oxygen	0 *	0 *	0	0	
Argon	0 *	0 *	0	0	
Carbon Monoxide	0 *	0 *	0	0	
Cyclopentane	0 *	0 *	0	0	
Isohexane	39.5857 *	0 *	100.871	41.2104	
3-Methylpentane	0 *	0 *	0	0	
Neohexane	0 *	0 *	0	0	
2,3-Dimethylbutane	0 *	0 *	0	0	
Methylcyclohexane	0 *	0 *	0	0	
Isooctane	0.36566 *	0 *	15.9888	22.6864	
Decane, 2-Methyl-	0 *	0 *	0	0	
Toluene	8.93443 *	0 *	4.52631	8.21335	
m-Xylene	17.8137 *	0 *	2.93704	17.0813	
Ethylbenzene	1.58596 *	0 *	0.262728	1.31169	

Volumetric Flow	Reservoir Oil gpm	Reservoir Water gpm	Sales Gas ft^3/h	Sales Oil gpm	
Nitrogen	0	0	84.9103	8.97926E-07	
Methane	0.152111	0	11674.1	0.00139294	
CO2	0.000665277	0	26.7725	1.22334E-05	
Ethane	0.146547	0	1720.34	0.00900661	
Propane	0.160974	0	446.77	0.0368427	
Isobutane	0.0519042	0	47.207	0.0239349	
n-Butane	0.139854	0	88.37	0.0769594	
Isopentane	0.0934402	0	18.0171	0.0743897	
n-Pentane	0.115585	0	16.6715	0.0971716	
n-Hexane	0.117868	0	3.77204	0.113757	
Methylcyclopentane	0	0	0	0	
Benzene	0.00314603	0	0.139694	0.0024895	
Cyclohexane	0	0	0.357725	0.0106	

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Volumetric Flow	Reservoir Oil gpm	Reservoir Water gpm	Sales Gas ft^3/h	Sales Oil gpm	
n-Heptane	0.443216	0	2.17895	0.308175	
n-Octane	0.447065	0	0.463722	0.373504	
n-Nonane	0.345935	0	-0.00108128	0.337656	
n-Decane	1.02601	0	-0.144753	1.02406	
n-Undecane	0	0	0	0	
Dodecane	0	0	0	0	
Water	0	22.2567	26.0107	-7.84607E-06	
Triethylene Glycol	0	0	0	0	
Oxygen	0	0	0	0	
Argon	0	0	0	0	
Carbon Monoxide	0	0	0	0	
Cyclopentane	0	0	0	0	
Isohexane	0.119889	0	6.05266	0.125705	
3-Methylpentane	0	0	0	0	
Neohexane	0	0	0	0	
2,3-Dimethylbutane	0	0	0	0	
Methylcyclohexane	0	0	0	0	
Isooctane	0.00103441	0	0.438389	0.0654124	
Decane, 2-Methyl-	0	0	0	0	
Toluene	0.0200203	0	0.201559	0.0185833	
m-Xylene	0.0399931	0	0.0727383	0.0389273	
Ethylbenzene	0.00355017	0	0.00701598	0.00298593	

Mole Fraction	Reservoir Oil	Reservoir Water	Sales Gas	Sales Oil	
Nitrogen	0 *	0 *	0.00530984	1.18483E-06	
Methane	0.11209 *	0 *	0.788547	0.00175481	
CO2	0.00077 *	0 *	0.00193852	2.83585E-05	
Ethane	0.08553 *	0 *	0.137587	0.00851902	
Propane	0.07326 *	0 *	0.0417918	0.0262298	
Isobutane	0.0192 *	0 *	0.00503303	0.0135579	
n-Butane	0.05327 *	0 *	0.0100464	0.044924	
Isopentane	0.03053 *	0 *	0.00245568	0.0367571	
n-Pentane	0.03803 *	0 *	0.00235545	0.0484093	
n-Hexane	0.0342 *	0 *	0.000715191	0.049593	
Methylcyclopentane	0 *	0 *	0	0	
Benzene	0.00136 *	0 *	2.19593E-05	0.00162818	
Cyclohexane	0 *	0 *	6.23476E-05	0.0055805	
n-Heptane	0.11451 *	0 *	0.000631048	0.118971	
n-Octane	0.10496 *	0 *	0.000247911	0.130567	
n-Nonane	0.07432 *	0 *	7.51132E-05	0.107732	
n-Decane	0.20232 *	0 *	8.1211E-05	0.299264	
n-Undecane	0 *	0 *	0	0	
Dodecane	0 *	0 *	0	0	
Water	0 *	1 *	0.00183699	3.09496E-05	
Triethylene Glycol	0 *	0 *	0	0	
Oxygen	0 *	0 *	0	0	
Argon	0 *	0 *	0	0	
Carbon Monoxide	0 *	0 *	0	0	
Cyclopentane	0 *	0 *	0	0	
Isohexane	0.03444 *	0 *	0.00106422	0.0542018	
3-Methylpentane	0 *	0 *	0	0	
Neohexane	0 *	0 *	0	0	
2,3-Dimethylbutane	0 *	0 *	0	0	
Methylcyclohexane	0 *	0 *	0	0	
Isooctane	0.00024 *	0 *	0.00012726	0.0225102	
Decane, 2-Methyl-	0 *	0 *	0	0	
Toluene	0.00727 *	0 *	4.46634E-05	0.0101034	
m-Xylene	0.01258 *	0 *	2.51522E-05	0.0182359	

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Mole Fraction	Reservoir Oil	Reservoir Water	Sales Gas	Sales Oil
Ethylbenzene	0.00112 *	0 *	2.24995E-06	0.00140036

Stream Properties

Property	Units	Reservoir Oil	Reservoir Water	Sales Gas	Sales Oil
Temperature	°F	75 *	75 *	90 *	70 *
Pressure	psig	900 *	900 *	407 *	0.625
Mole Fraction Vapor		0	0	1	0
Mole Fraction Light Liquid		1	1	0	1
Mole Fraction Heavy Liquid		0	0	0	0
Molecular Weight	lb/lbmol	86.7479	18.0153	20.4155	109.347
Mass Density	lb/ft^3	42.0715	62.2777	1.5855	43.8736
Mass Flow	lb/h	1157.05	11117.7	22454.9	964.76
Vapor Volumetric Flow	ft^3/h	27.5019	178.518	14162.7	21.9895
Liquid Volumetric Flow	gpm	3.42881	22.2567	1765.74	2.74155
Std Liquid Volumetric Flow	sgpm	3.52917 *	22.225 *	132.492	2.74631
Specific Gravity		0.674558	0.998535	0.704892	0.703451
API Gravity		75.8676	9.90292		68.3142
Net Ideal Gas Heating Value	Btu/ft^3	4418.74	0	1114.73	5538.61
Net Liquid Heating Value	Btu/lb	19174.9	-1059.76	20661.9	19063.4
Std Vapor Volumetric Flow	MMSCFD	0.121478	5.62053	10.0174	0.0803556

Remarks

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Energy Stream Report

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	
Flowsheet:	OXF-160	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Pilot Heat Input	3.23518E+06 * Btu/h	1271.47 * hp	--	REAC-100

Remarks

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Flowsheet Environment
SRK Environment

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		
Flowsheet:	OXF-160		

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	0.01

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	Dodecane	False	False
Methane	False	False	Water	False	True
CO2	False	False	Triethylene Glycol	False	True
Ethane	False	False	Oxygen	False	False
Propane	False	False	Argon	False	False
Isobutane	False	False	Carbon Monoxide	False	False
n-Butane	False	False	Cyclopentane	False	False
Isopentane	False	False	Isohexane	False	False
n-Pentane	False	False	3-Methylpentane	False	False
n-Hexane	False	False	Neohexane	False	False
Methylcyclopentane	False	False	2,3-Dimethylbutane	False	False
Benzene	False	False	Methylcyclohexane	False	False
Cyclohexane	False	False	Isooctane	False	False
n-Heptane	False	False	Decane, 2-Methyl-	False	False
n-Octane	False	False	Toluene	False	False
n-Nonane	False	False	m-Xylene	False	False
n-Decane	False	False	Ethylbenzene	False	False
n-Undecane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

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Environments Report

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	IG Ref Pressure	14.6959 psia
IG Ref Temperature	60 °F	IG Ref Volume	379.485 ft^3/lbmol
Liq Ref Temperature	60 °F		

Environment [SRK Environment]

Environment Settings

Number of Poynting Intervals	0	Freeze Out Temperature Threshold Difference	10 °F
Gibbs Excess Model Evaluation Temperature	77 °F	Phase Tolerance	0.01

Components

Component Name	Henry`s Law Component	Phase Initiator	Component Name	Henry`s Law Component	Phase Initiator
Nitrogen	False	False	Dodecane	False	False
Methane	False	False	Water	False	True
CO2	False	False	Triethylene Glycol	False	True
Ethane	False	False	Oxygen	False	False
Propane	False	False	Argon	False	False
Isobutane	False	False	Carbon Monoxide	False	False
n-Butane	False	False	Cyclopentane	False	False
Isopentane	False	False	Isohexane	False	False
n-Pentane	False	False	3-Methylpentane	False	False
n-Hexane	False	False	Neohexane	False	False
Methylcyclopentane	False	False	2,3-Dimethylbutane	False	False
Benzene	False	False	Methylcyclohexane	False	False
Cyclohexane	False	False	Isooctane	False	False
n-Heptane	False	False	Decane, 2-Methyl-	False	False
n-Octane	False	False	Toluene	False	False
n-Nonane	False	False	m-Xylene	False	False
n-Decane	False	False	Ethylbenzene	False	False
n-Undecane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	SRK
Stability Calculation	SRK	Vapor Package	SRK
Light Liquid Package	SRK	Heavy Liquid Package	SRK

Remarks

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Calculator Report

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	

Heat Input Required

Source Code

CV1 = HV*FV

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!QStreams!Pilot Heat Input!Energy Rate
Value	3.23518E+06
Unit	Btu/h

Measured Variable [FV]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Combined Flash Vapor!Phases!Vapor!Properties!Std Vapor Volumetric Flow
Value	1751.02
Unit	scf/h

Measured Variable [HV]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Combined Flash Vapor!Analyses!Combustion Analysis 1!Properties!Volumetric Net Ideal Gas Heating Value
Value	1847.6
Unit	Btu/ft^3

Remarks

Oxygen Required

Source Code

CV1 = O2Reqd * 3.0 / O2Frac

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Air!Phases!Total!Properties!Molar Flow
Value	264.63
Unit	lbmol/h

Measured Variable [O2Reqd]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Combined Flash Vapor!Analyses!Combustion Analysis 1!Properties!Required Combustion Oxygen
Value	18.4774
Unit	lbmol/h

Measured Variable [O2Frac]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Air!Phases!Total!Composition!Mole Fraction!Oxygen
Value	0.20947
Unit	

Remarks

Reservoir Oil Temperature

Source Code

CV1 = Tin

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Oil!Phases!Total!Properties!Temperature

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Calculator Report

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	

Value	75
Unit	°F

Measured Variable [Tin]

SourceMoniker	ProMax:ProMax!Project!User Value Sets!Variables!Wellhead Temperature!Properties!Parameter
Value	75
Unit	°F

Remarks

Reservoir Oil Pressure

Source Code

CV1 = Pin

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Oil!Phases!Total!Properties!Pressure
Value	900
Unit	psig

Measured Variable [Pin]

SourceMoniker	ProMax:ProMax!Project!User Value Sets!Variables!Wellhead Pressure!Properties!Parameter
Value	900
Unit	psig

Remarks

Simple Specifier 1

Source Code

CV1 = MV1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Water!Phases!Total!Properties!Pressure
Value	900
Unit	psig

Measured Variable [MV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Oil!Phases!Total!Properties!Pressure
Value	900
Unit	psig

Remarks

Simple Specifier 2

Source Code

CV1 = MV1

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Calculator Report

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Gas!Phases!Total!Properties!Pressure
Value	900
Unit	psig

Measured Variable [MV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Oil!Phases!Total!Properties!Pressure
Value	900
Unit	psig

Remarks

Simple Specifier 3

Source Code

CV1 = MV1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Gas!Phases!Total!Properties!Temperature
Value	75
Unit	°F

Measured Variable [MV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Oil!Phases!Total!Properties!Temperature
Value	75
Unit	°F

Remarks

Simple Specifier 4

Source Code

CV1 = MV1

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Water!Phases!Total!Properties!Temperature
Value	75
Unit	°F

Measured Variable [MV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Reservoir Oil!Phases!Total!Properties!Temperature
Value	75
Unit	°F

Remarks

Simple Specifier 5

Source Code

CV1 = Pout

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Calculator Report

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!Sales Gas!Phases!Total!Properties!Pressure
Value	407
Unit	psig

Measured Variable [Pout]

SourceMoniker	ProMax:ProMax!Project!User Value Sets!Variables!Sales Pressure!Properties!Parameter
Value	407
Unit	psig

Remarks

Simple Specifier 6

Source Code

CV1 = LPout

Calculated Variable [CV1]

SourceMoniker	ProMax:ProMax!Project!Flowsheets!OXF-160!PStreams!LP Oil 1!Phases!Total!Properties!Pressure
Value	30
Unit	psig

Measured Variable [LPout]

SourceMoniker	ProMax:ProMax!Project!User Value Sets!Variables!LP Separator Pressure!Properties!Parameter
Value	30
Unit	psig

Remarks

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User Value Sets Report

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		

Cn+ Flow/Frac.55

User Value [CnPlusSum]

* Parameter	439.358	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

Remarks
This User Value Set was programmatically generated. GUID={6F8309F1-C05A-4942-A867-311E1532159F}

Tank-1

User Value [BlockReady]

* Parameter	1	fractional	Upper Bound		fractional
Lower Bound		fractional	* Enforce Bounds	False	

User Value [ShellLength]

* Parameter	20	ft	Upper Bound		ft
* Lower Bound	0	ft	* Enforce Bounds	False	

User Value [ShellDiam]

* Parameter	12	ft	Upper Bound		ft
* Lower Bound	0	ft	* Enforce Bounds	False	

User Value [BreatherVP]

* Parameter	0.875	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [BreatherVacP]

* Parameter	-0.03125	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [DomeRadius]

Parameter		ft	Upper Bound		ft
Lower Bound		ft	* Enforce Bounds	False	

User Value [OpPress]

* Parameter	0	psig	Upper Bound		psig
Lower Bound		psig	* Enforce Bounds	False	

User Value [AvgPercentLiq]

* Parameter	50	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [MaxPercentLiq]

* Parameter	90	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [AnnNetTP]

* Parameter	1747.15	bbl/day	Upper Bound		bbl/day
* Lower Bound	0	bbl/day	* Enforce Bounds	False	

User Value [OREff]

* Parameter	0	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

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User Value Sets Report

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		

User Value [MaxAvgT]

* Parameter	65.5	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [MinAvgT]

* Parameter	44	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [BulkLiqT]

* Parameter	59.09	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [AvgP]

* Parameter	14.2535	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [Therml]

* Parameter	1123	Btu/ft^2/day	Upper Bound		Btu/ft^2/day
Lower Bound		Btu/ft^2/day	* Enforce Bounds	False	

User Value [AvgWindSpeed]

* Parameter	6.3	mi/h	Upper Bound		mi/h
Lower Bound		mi/h	* Enforce Bounds	False	

User Value [MaxHourlyLoadingRate]

* Parameter	72.798	bbl/hr	Upper Bound		bbl/hr
* Lower Bound	0	bbl/hr	* Enforce Bounds	False	

User Value [EntrainedOilFrac]

* Parameter	1	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [TurnoverRate]

* Parameter	879.308	fractional	Upper Bound		fractional
Lower Bound		fractional	* Enforce Bounds	False	

User Value [LLossSatFactor]

* Parameter	1.45	fractional	Upper Bound		fractional
Lower Bound		fractional	* Enforce Bounds	False	

User Value [AtmPressure]

* Parameter	14.2535	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [TVP]

* Parameter	35.9432	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [AvgLiqSurfaceT]

* Parameter	65.0762	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [MaxLiqSurfaceT]

* Parameter	75.9425	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

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User Value Sets Report

Client Name:	EQT Production LLC	Job:
Location:	OXF 160 Wellpad	

User Value [TotalLosses]

* Parameter	0.00211447	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WorkingLosses]

* Parameter	0.00105724	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [StandingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	0.0152285	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	1.71066	lb/hr	Upper Bound	lb/hr
Lower Bound		lb/hr	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	0.0342071	ton/yr	Upper Bound	ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0452108	kg/mol	Upper Bound	kg/mol
Lower Bound		kg/mol	* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={CD5C9195-3500-4E42-B96E-63A6AFFC66A5}

Tank-2

User Value [BlockReady]

* Parameter	1	fractional	Upper Bound	fractional
Lower Bound		fractional	* Enforce Bounds	False

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User Value Sets Report

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		

User Value [ShellLength]

*	Parameter	20 ft		Upper Bound	ft
*	Lower Bound	0 ft	*	Enforce Bounds	False

User Value [ShellDiam]

*	Parameter	12 ft		Upper Bound	ft
*	Lower Bound	0 ft	*	Enforce Bounds	False

User Value [BreatherVP]

*	Parameter	0.875 psig		Upper Bound	psig
	Lower Bound	psig	*	Enforce Bounds	False

User Value [BreatherVacP]

*	Parameter	-0.0375 psig		Upper Bound	psig
	Lower Bound	psig	*	Enforce Bounds	False

User Value [DomeRadius]

	Parameter	ft		Upper Bound	ft
	Lower Bound	ft	*	Enforce Bounds	False

User Value [OpPress]

*	Parameter	0 psig		Upper Bound	psig
	Lower Bound	psig	*	Enforce Bounds	False

User Value [AvgPercentLiq]

*	Parameter	50 %		Upper Bound	%
	Lower Bound	%	*	Enforce Bounds	False

User Value [MaxPercentLiq]

*	Parameter	90 %		Upper Bound	%
	Lower Bound	%	*	Enforce Bounds	False

User Value [AnnNetTP]

*	Parameter	223.548 bbl/day		Upper Bound	bbl/day
*	Lower Bound	0 bbl/day	*	Enforce Bounds	False

User Value [OREff]

*	Parameter	0 %		Upper Bound	%
	Lower Bound	%	*	Enforce Bounds	False

User Value [MaxAvgT]

*	Parameter	65.5 °F		Upper Bound	°F
	Lower Bound	°F	*	Enforce Bounds	False

User Value [MinAvgT]

*	Parameter	44 °F		Upper Bound	°F
	Lower Bound	°F	*	Enforce Bounds	False

User Value [BulkLiqT]

*	Parameter	59.09 °F		Upper Bound	°F
	Lower Bound	°F	*	Enforce Bounds	False

User Value [AvgP]

*	Parameter	14.2535 psia		Upper Bound	psia
	Lower Bound	psia	*	Enforce Bounds	False

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User Value Sets Report

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		

User Value [ThermI]

* Parameter	1123	Btu/ft^2/day	Upper Bound		Btu/ft^2/day
Lower Bound		Btu/ft^2/day	* Enforce Bounds	False	

User Value [AvgWindSpeed]

* Parameter	6.3	mi/h	Upper Bound		mi/h
Lower Bound		mi/h	* Enforce Bounds	False	

User Value [MaxHourlyLoadingRate]

* Parameter	9.31449	bbl/hr	Upper Bound		bbl/hr
* Lower Bound	0	bbl/hr	* Enforce Bounds	False	

User Value [EntrainedOilFrac]

* Parameter	1	%	Upper Bound		%
Lower Bound		%	* Enforce Bounds	False	

User Value [TurnoverRate]

* Parameter	112.507	fractional	Upper Bound		fractional
Lower Bound		fractional	* Enforce Bounds	False	

User Value [LLossSatFactor]

* Parameter	1.45	fractional	Upper Bound		fractional
Lower Bound		fractional	* Enforce Bounds	False	

User Value [AtmPressure]

* Parameter	14.2535	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [TVP]

* Parameter	5.47472	psia	Upper Bound		psia
Lower Bound		psia	* Enforce Bounds	False	

User Value [AvgLiqSurfaceT]

* Parameter	65.0762	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [MaxLiqSurfaceT]

* Parameter	75.9425	°F	Upper Bound		°F
Lower Bound		°F	* Enforce Bounds	False	

User Value [TotalLosses]

* Parameter	6.6593	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [WorkingLosses]

* Parameter	2.70493	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [StandingLosses]

* Parameter	0.624722	ton/yr	Upper Bound		ton/yr
Lower Bound		ton/yr	* Enforce Bounds	False	

User Value [RimSealLosses]

* Parameter	0	ton/yr	Upper Bound		ton/yr

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User Value Sets Report

Client Name:	EQT Production LLC	Job:	
Location:	OXF 160 Wellpad		

User Value [RimSealLosses]

Lower Bound	ton/yr	* Enforce Bounds	False

User Value [WithdrawalLoss]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [LoadingLosses]

* Parameter	18.0537 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [MaxHourlyLoadingLoss]

* Parameter	4.12186 lb/hr	Upper Bound	lb/hr
Lower Bound	lb/hr	* Enforce Bounds	False

User Value [DeckFittingLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [DeckSeamLosses]

* Parameter	0 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [FlashingLosses]

* Parameter	492.473 ton/yr	Upper Bound	ton/yr
Lower Bound	ton/yr	* Enforce Bounds	False

User Value [GasMoleWeight]

* Parameter	0.0558967 kg/mol	Upper Bound	kg/mol
Lower Bound	kg/mol	* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={68087608-DC54-401D-9B2F-6D64C0B62ABA}

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```
**********************************************************************************
******
*     Project Setup Information
    *
**********************************************************************************
******
Project File              : \\tsclient\Z\Client\EQT Corporation\West Virginia\WV
Wells\163901.0058 WV Wells 2016\OXF 160\03 Draft\20160310_OXF-160 G70-B
Application\Att S Emission Calcs\01 E&P TANK\20160310_EQT_OXF160_Sand Separator
Tank.ept
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : RVP Distillation
Control Efficiency        : 0.0%
Known Separator Stream    : Low Pressure Oil
Entering Air Composition  : No

Filed Name                : OXF-160 Wellpad
Well Name                 : Sand Separator Tank
Well ID                   : Condensate Analysis from OXF-160
Date                      : 2016.03.10


**********************************************************************************
******
*     Data Input
    *
**********************************************************************************
******

Separator Pressure        : 407.00[psig]
Separator Temperature     : 60.00[F]
Ambient Pressure          : 14.70[psia]
Ambient Temperature       : 55.00[F]
C10+ SG                   : 0.8004
C10+ MW                   : 206.984

-- Low Pressure Oil
------------------------------------------------------------------------
   No.    Component             mol %
   1      H2S                    0.0000
   2      O2                     0.0000
   3      CO2                    0.0770
   4      N2                     0.0000
   5      C1                    11.2090
   6      C2                     8.5530
   7      C3                     7.3260
   8      i-C4                   1.9200
   9      n-C4                   5.3270
   10     i-C5                   3.0530
   11     n-C5                   3.8030
   12     C6                     3.4440
   13     C7                    11.4510
   14     C8                    10.4960
   15     C9                     7.4320
   16     C10+                  20.2320
   17     Benzene                0.1360
   18     Toluene                0.7270
   19     E-Benzene              0.1120
   20     Xylenes                1.2580
   21     n-C6                   3.4200
   22     224Trimethylp          0.0240
```

-- Sales Oil

Production Rate : 0.1[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 59.11
Reid Vapor Pressure : 10.60[psia]

****
******
* Calculation Results *
****
******

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
Page 1				E&P TANK
Total HAPs	0.000	0.000	0.000	0.000
Total HC	0.463	0.106	0.463	0.106
VOCs, C2+	0.371	0.085	0.371	0.085
VOCs, C3+	0.240	0.055	0.240	0.055

Uncontrolled Recovery Info.

Vapor	30.6200 x1E-3	[MSCFD]
HC Vapor	30.5400 x1E-3	[MSCFD]
GOR	306.20	[SCF/bbl]

-- Emission Composition

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
1	H2S	0.000	0.000	0.000	0.000
2	O2	0.000	0.000	0.000	0.000
3	CO2	0.002	0.000	0.002	0.000
4	N2	0.000	0.000	0.000	0.000
5	C1	0.093	0.021	0.093	0.021
6	C2	0.131	0.030	0.131	0.030
7	C3	0.119	0.027	0.119	0.027
8	i-C4	0.024	0.005	0.024	0.005
9	n-C4	0.052	0.012	0.052	0.012
10	i-C5	0.016	0.004	0.016	0.004
11	n-C5	0.014	0.003	0.014	0.003
12	C6	0.004	0.001	0.004	0.001
13	C7	0.005	0.001	0.005	0.001
14	C8	0.001	0.000	0.001	0.000
15	C9	0.000	0.000	0.000	0.000
16	C10+	0.000	0.000	0.000	0.000
17	Benzene	0.000	0.000	0.000	0.000
18	Toluene	0.000	0.000	0.000	0.000
19	E-Benzene	0.000	0.000	0.000	0.000
20	Xylenes	0.000	0.000	0.000	0.000
21	n-C6	0.003	0.001	0.003	0.001
22	224Trimethylp	0.000	0.000	0.000	0.000
	Total	0.464	0.106	0.464	0.106

-- Stream Data

No.	Component	MW	LP Oil	Flash Oil	Sale Oil	Flash Gas	W&S Gas

Total Emissions

			mol %	mol %	mol %	mol %	mol %	mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0770	0.0059	0.0000	0.2698	0.2496	0.2686
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	11.2090	0.2680	0.0000	40.8883	11.3545	39.1114
6	C2	30.07	8.5530	1.3068	0.1435	28.2096	49.4331	29.4865
7	C3	44.10	7.3260	3.4365	2.9127	17.8768	25.1133	18.3122
8	i-C4	58.12	1.9200	1.5837	1.5460	2.8322	3.1435	2.8509
9	n-C4	58.12	5.3270	5.0689	5.0335	6.0271	6.5353	6.0576
10	i-C5	72.15	3.0530	3.6399	3.6903	1.4610	1.5547	1.4666
11	n-C5	72.15	3.8030	4.7160	4.7958	1.3264	1.4132	1.3317
12	C6	86.16	3.4440	4.5810	4.6824	0.3596	0.3865	0.3613
13	C7	100.20	11.4510	15.5442	15.9108	0.3475	0.3781	0.3493
14	C8	114.23	10.4960	14.3336	14.6777	0.0859	0.0949	0.0865
15	C9	128.28	7.4320	10.1651	10.4103	0.0180	0.0217	0.0182
16	C10+	206.98	20.2320	27.6903	28.3596	0.0001	0.0001	0.0001
17	Benzene	78.11	0.1360	0.1824	0.1865	0.0102	0.0110	0.0102
18	Toluene	92.13	0.7270	0.9902	1.0138	0.0130	0.0143	0.0131
19	E-Benzene	106.17	0.1120	0.1531	0.1568	0.0006	0.0006	0.0006
20	Xylenes	106.17	1.2580	1.7198	1.7612	0.0054	0.0060	0.0054
21	n-C6	86.18	3.4200	4.5820	4.6858	0.2679	0.2890	0.2692
22	224Trimethylp	114.24	0.0240	0.0326	0.0334	0.0006	0.0006	0.0006
	MW		98.67	123.54	125.63	31.22	36.74	31.55
	Stream Mole Ratio		1.0000	0.7307	0.7134	0.2693	0.0172	0.2866
	Heating Value	[BTU/SCF]				1818.91	2117.27	1836.86
	Gas Gravity	[Gas/Air]				1.08	1.27	1.09
	Bubble Pt. @ 100F	[psia]	438.80	29.37	13.19			

	RVP @ 100F	[psia]	107.09	16.29	10.94			

Spec. Gravity @ 100F	0.660	0.689	0.691

LAFAYETTE AREA LABORATORY
4790 N.E. EVANGELINE THRUWAY
CARENCRO, LA 70520
PHONE (337) 896-3055
FAX (337) 896-3077

Certificate of Analysis : 13070241-001A

Company: Gas Analytical Services
Well: 513173 OXF 160 Pad
Field: EQT Production
Sample of: Liquid-Spot
Conditions: 407 @ N.G.
Sampled by: RM-GAS
Sample date: 7/16/2013
Remarks: Cylinder No.: GAS
Remarks:

For: Gas Analytical Services
Alan Ball
PO Box 1028

Bridgeport, WV, 26330

Report Date: 8/1/2013

Analysis: (*GPA 2186M*)	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	0.000	28.013	0.000	0.8094	0.000
Methane	11.209	16.043	1.819	0.3000	4.208
Carbon Dioxide	0.077	44.010	0.034	0.8180	0.029
Ethane	8.553	30.070	2.602	0.3562	5.064
Propane	7.326	44.097	3.268	0.5070	4.468
Iso-butane	1.920	58.123	1.129	0.5629	1.391
N-butane	5.327	58.123	3.132	0.5840	3.720
Iso-pentane	3.053	72.150	2.228	0.6244	2.475
N-pentane	3.803	72.150	2.776	0.6311	3.051
i-Hexanes	3.444	86.177	2.968	0.6795	3.109
n-Hexane	3.420	85.701	2.983	0.6640	3.096
2,2,4 trimethylpentane	0.024	114.231	0.028	0.6967	0.028
Benzene	0.136	78.114	0.091	0.8846	0.084
Heptanes	11.451	98.096	11.403	0.7017	11.277
Toluene	0.727	92.141	0.580	0.8719	0.542
Octanes	10.496	107.788	11.657	0.7511	10.759
E-benzene	0.112	106.167	0.050	0.8718	0.096
M-,O-,P-xylene	1.258	106.167	1.348	0.8731	1.082
Nonanes	7.432	122.846	9.540	0.7596	8.810
Decanes Plus	20.232	206.984	42.364	0.8004	36.711
	100.000		100.000		100.000

Calculated Values	Total Sample	Decanes Plus
Specific Gravity at 60 °F	0.6936	0.8004
Api Gravity at 60 °F	72.508	45.286
Molecular Weight	98.853	206.984
Pounds per Gallon (in Vacuum)	5.783	6.673
Pounds per Gallon (in Air)	5.777	6.666
Cu. Ft. Vapor per Gallon @ 14.73 psia	22.251	12.207

Brian Gaspard

Southern Petroleum Laboratories, Inc.

LAFAYETTE AREA LABORATORY
4790 N.E. EVANGELINE THRUWAY
CARENCRO, LA 70520
PHONE (337) 896-3055
FAX (337) 896-3077

Certificate of Analysis : 13070241-001A

Company:	Gas Analytical Services	**For:**	Gas Analytical Services
Well:	513173 OXF 160 Pad		Alan Ball
Field:	EQT Production		PO Box 1028
Sample of:	Liquid-Spot		
Conditions:	407 @ N.G.		Bridgeport, WV, 26330
Sampled by:	RM-GAS		
Sample date:	7/16/2013	**Report Date:**	8/1/2013
Remarks:	Cylinder No.: GAS		
Remarks:			

Analysis: (*GPA 2103M*)	**Mol. %**	**MW**	**Wt. %**	**Sp. Gravity**	**L.V. %**
Nitrogen	0.000	28.013	0.000	0.8094	0.000
Methane	11.209	16.043	1.819	0.3000	4.208
Carbon Dioxide	0.077	44.010	0.034	0.8180	0.029
Ethane	8.553	30.070	2.602	0.3562	5.064
Propane	7.326	44.097	3.268	0.5070	4.468
Iso-butane	1.920	58.123	1.129	0.5629	1.391
N-butane	5.327	58.123	3.132	0.5840	3.720
Iso-pentane	3.053	72.150	2.228	0.6244	2.475
N-pentane	3.803	72.150	2.776	0.6311	3.051
Hexanes	6.864	85.701	5.951	0.6653	6.205
Heptanes Plus	51.868	98.096	77.061	0.7017	69.389
	100.000		100.000		100.000

Calculated Values	**Total Sample**	**Heptanes Plus**
Specific Gravity at 60 °F	0.6936	0.7720
Api Gravity at 60 °F	72.508	51.783
Molecular Weight	98.853	146.867
Pounds per Gallon (in Vacuum)	5.783	6.437
Pounds per Gallon (in Air)	5.777	6.430
Cu. Ft. Vapor per Gallon @ 14.73 psia	22.251	16.670
Standing-Katz Density (lb. / ft^3)		

Brian Gaspard

Southern Petroleum Laboratories, Inc.

Certificate of Analysis

Number: 2030-13070241-001A

Carencro Laboratory
4790 NE Evangeline Thruway
Carencro, LA 70520

Alan Ball
Gas Analytical Services
PO Box 1028
Bridgeport, WV 26330

July 31, 2013

Station Name: 513173 OXF 160 Pad
Station Location: EQT Production
Sample Point: Wellhead
Cylinder No: GAS

Sampled By: RM-GAS
Sample Of: Liquid Spot
Sample Date: 07/16/2013 09:15
Sample Conditions: 407 psig

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Color Visual	Proprietary	L STRAW			AR	07/30/2013
API Gravity @ 60° F	ASTM D-5002	60.54	°		AR	07/30/2013
Specific Gravity @ 60/60° F	ASTM D-5002	0.7368			AR	07/30/2013
Density @ 60° F	ASTM D-5002	0.7361	g/ml		AR	07/30/2013
Shrinkage Factor	Proprietary	0.8882			AR	07/30/2013
Flash Factor	Proprietary	252.7311	Cu. Ft./S.T. Bbl		AR	07/30/2013

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.