EQT Plaza
625 Liberty Avenue Ste. 1700
Pittsburgh PA 15212
www.eqt.com

March 14, 2017

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 45 Pad
G70 Permit Number G70-A133; Plant ID No. 017-00044

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 and operation of one (1) 400 bbl condensate tank to replace the existing three (3) condensate 210 bbl storage tanks at an existing natural gas production well pad, OXF-45, located in Doddridge County, West Virginia the wellpad. The OXF-45 wellpad is currently authorized under G70-A133. Additionally, based on emissions from the existing operations, EQT has determined that the facility meets permit exemption criteria. As such, EQT requests that the existing permit be rescinded.

EVALUATION OF OXF-45 WELLPAD FOR PERMITTING APPLICABILITY

The OXF-45 wellpad is an existing natural gas production facility. Natural gas and liquids (including water and condensate) are extracted from deposits underneath the surface. Natural gas is transported from the wells to a gas line for additional processing and compression, as necessary. The liquids produced are stored in storage vessels.

The primary sources of air emissions at the OXF-45 wellpad will be:
- One (1) 400 barrel (bbl) storage tank for condensate/water(produced fluids)
- One (1) thermoelectric generators (TEGs) rated at 0.013 MMBtu/hr heat input;
- Produced fluid truck loading; and
- Associated piping and components.

The produced fluid tank is potentially subject to regulation under New Source Performance Standards (NSPS) Subpart OOOOa – Crude Oil and Natural Gas Production, Transmission, and Distribution. However, this storage vessel will have potential VOC emissions less than 6 tons per year and will not be a storage vessel affected facility under the rule, per §60.5365a(e). All other equipment at the facility pre-dates the applicability date of NSPS OOOOa (September 18, 2015) as well as NSPS OOOO (August 23, 2011).

NSPS Subparts K, Ka, and Kb apply to storage tanks of certain sizes constructed, reconstructed, or modified during various time periods. Subpart K applies to storage tanks constructed, reconstructed, or modified prior to 1978, and Subpart Ka applies to those constructed, reconstructed, or modified prior to 1984. Both Subparts K and Ka apply to storage tanks with a capacity greater than 40,000 gallons. Subpart Kb applies to volatile organic liquid (VOL) storage tanks constructed, reconstructed, or modified

after July 23, 1984 with a capacity equal to or greater than 75 m3 (~19,813 gallons). The tank at the wellpad will have a capacity of 16,800 gallons. As such, Subparts K, Ka, and Kb do not apply to the storage tank at the wellpad.

There are no other potentially applicable NSPS standards for the emission sources at the wellpad. There are no potentially applicable Nation Emission Standards for Hazardous Air Pollutants (NEHSAP) for any emission sources at the wellpad.

The facility will not will not exceed the hourly and annual limits, nor the daily limits specified in the stationary source definition under West Virginia Code of State Regulations, Title 45 Series 13, as depicted in Table 1. Based on the emission levels and lack of substantive requirements, the aforementioned equipment at the OXF-45 wellpad is exempt from state air permitting requirements and EQT requests that the permit be rescinded. Detailed emissions calculations are included as an attachment to this determination request.

Table 1 - Comparison of OXF45 Wellpad Potential Emissions to Stationary Source Threshold

Pollutant	Wellpad Potential Emissions		Stationary Source Threshold	
	(tpy)	(lb/hr)	(tpy)	(lb/hr)
Nitrogen Oxides	4.8E-03	1.1E-03	10	6
Carbon Monoxide	4.0E-03	9.1E-04	10	6
Volatile Organic Compounds[1]	2.30	0.09	10	6
Particulate Matter – 10/2.5	3.6E-04	8.3E-05	10	6
Sulfur Dioxide	2.9E-05	6.5E-06	10	6
Individual HAP (n-hexane)[1]	0.36	5.8E-04	5	2
Total HAP[1]	0.42	1.1E-03	5	2

1. Annual emissions include fugitive emissions

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

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-45 Pad

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

211111

4A. MAILING ADDRESS:

625 Liberty Ave, Suite 1700 Pittsburgh PA, 15222

Pittsburgh, PA 15222

4B. PHYSICAL ADDRESS:

West Union, Doddridge County, WV

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

Take Interstate 79 to the Clarksburg Exit 119. Turn onto State Route 50 West and go 31.5 miles to Sunnyside Road. Turn left onto Sunnyside Road and go 1.7 miles to Oxford Road (Rt. 21). Turn left and go 5.3 miles and turn left on Straight Fork Rd. Go 1.5 miles to the lease road on the left. Go 3/10 mile to the first lease road on the left. The wellpad is approximately 1500 ft. up the hill.

5B. NEAREST ROAD:	5C. NEAREST CITY OR TOWN:	5D. COUNTY:
	West Union	Doddridge
5E. UTM NORTHING (KM):	**5F. UTM EASTING (KM):**	**5G. UTM ZONE:**
4,332.241	515.944	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):

017-00044

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

G70-A133

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

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	8.3E-05	3.6E-04
PM_{10}	8.3E-05	3.6E-04
VOCs	0.09	2.30
CO	9.1E-04	4.0E-03
NO_x	1.1E-03	4.8E-03
SO_2	6.52E-06	2.9E-05
Pb		
HAPs (AGGREGATE AMOUNT)	1.1E-03	0.42
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, MIKE GAVIN (*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: Vice President DATE: 3/14/17

** 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

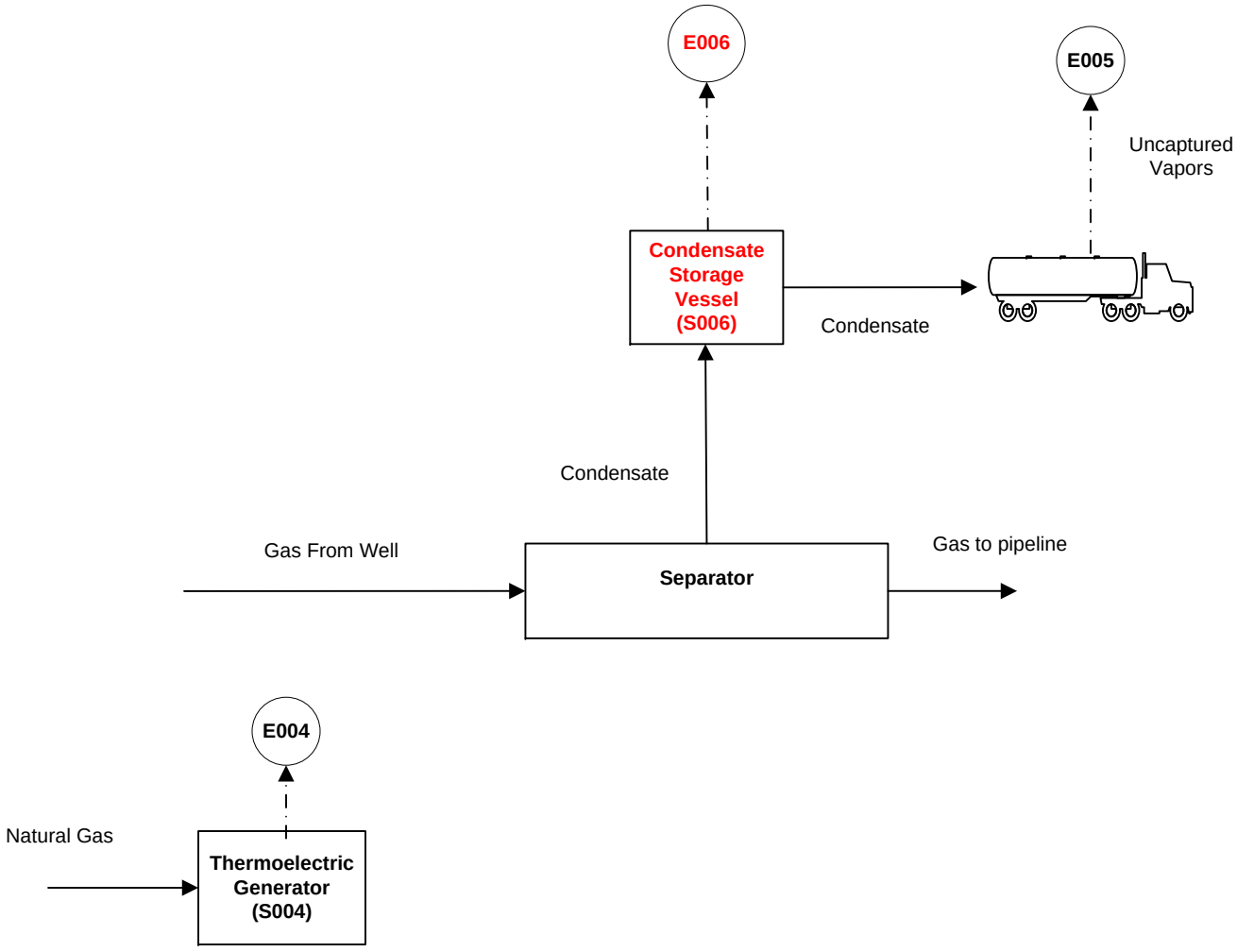
ATTACHMENT A – AREA MAP

ATTACHMENT A

Figure 1 - Map of OXF 45 Location

UTM Northing (KM)	4,332.241
UTM Easting (KM)	515.944
Elevation (ft)	990

ATTACHMENT B – PROCESS FLOW DIAGRAM



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EQT Production

Flow Legend

Gas/Water/Condensate Flow

Stack Emissions

Emission Point

Process Flow Diagram
OXF-45 Wellpad

Trinity Consultants

January 2017

ATTACHMENT C – PROCESS DESCRIPTION

ATTACHMENT C – PROCESS DESCRIPTION

EQT is submitting this determination request for the operation of one (1) 400 bbl condensate tank to replace the existing three (3) condensate 210 bbl storage tanks at the wellpad. The OXF-45 wellpad is currently authorized under G70-A133.

The project involves the operation of support facilities associated with a natural gas production wellpad operation. The OXF45 wellpad consists of one well. The incoming gas/liquid stream from the underground well passes through a line heater to raise/maintain temperature of the stream and prevent hydrate formation. The stream will then pass through a high pressure separator, which will separate gas (natural gas from the separator is sent to the sales line) from liquids (condensate and produced water). The liquids are then transferred to the produced fluids tank.

Once the tank is filled, the contents are loaded into trucks for transport. Electricity is provided by a thermoelectric generator.

A process flow diagram is included as Attachment B.

ATTACHMENT E – EMISSION CALCULATIONS

Company Name: **EQT Production, LLC**
Facility Name: **OXF 45 Pad**
Project Description: **G70D Application**

Facility-Wide Emission Summary - Controlled

Wells	1	
Storage Tanks	1	
Sand Separator Tank	0	
Line Heaters	0	
TEGs	1	
Dehy Reboiler	0	
Glycol Dehy	0	
Dehy Drip Tank	0	
Dehy Combustor	0	
Compressor	0	
High Pressure Separator	1	
Low Pressure Separator	0	
Vapor Recovery Unit	0	
Tank Combustor	0	
Length of lease road	1,584	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}		$PM_{2.5}$		CH_4		CO_2e	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
E006	S006	Storage Vessel	---	---	---	---	0.07	0.31	---	---	---	---	---	---	0.08	0.33	1.91	8.37
E004	S004	TEG	1.1E-03	4.8E-03	9.1E-04	4.0E-03	6.0E-05	2.6E-04	6.5E-06	2.9E-05	8.3E-05	3.6E-04	8.3E-05	3.6E-04	0.00	0.00	1.52	6.64
E005	S005	Uncaptured Liquid Loading	---	---	---	---	0.02	0.01	---	---	---	---	---	---	---	---	---	---
---	---	Fugitives	---	---	---	---	---	1.99	---	---	---	---	---	---	---	1.80	---	45.04
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	0.16	---	0.02	---	---	---	---
Facility Total			1.1E-03	4.8E-03	9.1E-04	4.0E-03	0.09	2.30	6.5E-06	2.9E-05	8.3E-05	0.16	8.3E-05	0.02	0.08	2.14	3.43	60.05
Facility Total (excluding fugitive emissions)			1.1E-03	4.8E-03	9.1E-04	4.0E-03	0.09	0.32	6.5E-06	2.9E-05	8.3E-05	3.6E-04	8.3E-05	3.6E-04	0.08	0.33	3.43	15.01

Company Name: EQT Production, LLC
Facility Name: OXF 45 Pad
Project Description: G70D Application

Facility-Wide Emission Summary - Controlled

Emission Point ID #	Emission Source ID#s	Emission Source Description	Formaldehyde		Benzene		Toluene		Ethylbenzene		Xylenes		n-Hexane		BTEX		Total HAP	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
E006	S006	Storage Vessel	---	---	2.1E-05	9.3E-05	1.2E-04	5.1E-04	2.0E-04	8.7E-04	5.4E-05	2.4E-04	4.4E-04	1.9E-03	3.9E-04	3.6E-03	8.3E-04	3.6E-03
E004	S004	TEG	8.1E-07	3.6E-06	2.3E-08	1.0E-07	3.7E-08	1.6E-07	---	---	---	---	2.0E-05	8.6E-05	6.0E-08	8.6E-05	2.1E-05	9.0E-05
E005	S005	Uncaptured Liquid Loading	---	---	4.0E-06	1.0E-06	2.2E-05	5.8E-06	4.2E-05	1.1E-05	1.5E-05	3.9E-06	1.3E-04	3.3E-05	8.3E-05	5.4E-05	2.1E-04	5.4E-05
---	---	Fugitives	---	---	---	<0.01	---	<0.01	---	<0.01	---	<0.01	---	0.36	<0.01	0.36	---	0.41
---	---	Haul Roads	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Facility Total			8.1E-07	3.6E-06	2.5E-05	9.4E-05	1.4E-04	5.2E-04	2.4E-04	8.8E-04	6.9E-05	2.4E-04	5.8E-04	0.36	4.7E-04	0.37	1.1E-03	0.42
Facility Total (excluding fugitive emissions)			8.1E-07	3.6E-06	2.5E-05	9.4E-05	1.4E-04	5.2E-04	2.4E-04	8.8E-04	6.9E-05	2.4E-04	5.8E-04	2.0E-03	4.7E-04	3.8E-03	1.1E-03	3.8E-03

Company Name: EQT Production, LLC
Facility Name: OXF 45 Pad
Project Description: G70D Application

Produced Fluids Storage Vessels

Potential Throughput

Operational Hours	8,760	hrs/yr
Maximum Condensate Throughput[1]	11	bbl/day
Maximum Produced Water Throughput[1]	98	bbl/day

Overall Control Efficiency of Combustor 0%

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	0.076	0.335	0.076	0.335
Ethane	<0.001	<0.001	<0.001	<0.001	0.012	0.054	0.012	0.054
Propane	1.2E-04	0.001	0.001	0.003	0.031	0.134	0.031	0.138
Isobutane	2.6E-05	1.2E-04	1.6E-04	0.001	0.008	0.034	0.008	0.035
n-Butane	4.2E-05	1.8E-04	2.5E-04	0.001	0.013	0.055	0.013	0.056
Isopentane	2.0E-05	9.0E-05	1.2E-04	0.001	0.006	0.027	0.006	0.028
n-Pentane	1.6E-05	7.0E-05	9.7E-05	4.2E-04	0.005	0.022	0.005	0.023
Benzene	4.3E-08	1.9E-07	2.6E-07	1.1E-06	2.1E-05	9.1E-05	2.1E-05	9.3E-05
Toluene	2.4E-07	1.0E-06	1.4E-06	6.3E-06	1.2E-04	0.001	1.2E-04	0.001
m-Xylene	1.6E-07	6.9E-07	9.6E-07	4.2E-06	5.3E-05	2.3E-04	5.4E-05	2.4E-04
Ethylbenzene	4.4E-07	1.9E-06	2.7E-06	1.2E-05	2.0E-04	0.001	2.0E-04	0.001
n-Hexane	1.3E-06	5.9E-06	8.1E-06	3.6E-05	4.3E-04	0.002	4.4E-04	0.002
n-Heptane	5.4E-06	2.4E-05	3.3E-05	1.4E-04	0.002	0.008	0.002	0.009
n-Octane	5.0E-06	2.2E-05	3.0E-05	1.3E-04	0.002	0.008	0.002	0.008
n-Nonane	3.6E-06	1.6E-05	2.2E-05	9.5E-05	0.001	0.006	0.001	0.006
n-Decane	1.4E-06	6.1E-06	8.5E-06	3.7E-05	0.001	0.002	0.001	0.003
Undecane	4.6E-07	2.0E-06	2.8E-06	1.2E-05	2.0E-04	0.001	2.0E-04	0.001
Dodecane	9.1E-08	4.0E-07	5.5E-07	2.4E-06	4.2E-05	1.8E-04	4.3E-05	1.9E-04
Tridecane	3.1E-08	1.4E-07	1.9E-07	8.3E-07	1.5E-05	6.7E-05	1.5E-05	6.7E-05
Total VOC Emissions:	0.000	0.001	0.001	0.01	0.07	0.30	0.07	0.31
Total HAP Emissions:	2.2E-06	9.74E-06	1.35E-05	5.90E-05	8.13E-04	3.56E-03	8.28E-04	3.63E-03

[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-45 sample from 08/01/2016

Company Name: EQT Production, LLC
Facility Name: OXF 45 Pad
Project Description: G70D Application

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	0.076	0.335	0.076	0.335
Ethane	<0.001	<0.001	<0.001	<0.001	0.012	0.054	0.012	0.054
Propane	1.2E-04	0.001	0.001	0.003	0.031	0.134	0.031	0.138
Isobutane	2.6E-05	1.2E-04	1.6E-04	0.001	0.008	0.034	0.008	0.035
n-Butane	4.2E-05	1.8E-04	2.5E-04	0.001	0.013	0.055	0.013	0.056
Isopentane	2.0E-05	9.0E-05	1.2E-04	0.001	0.006	0.027	0.006	0.028
n-Pentane	1.6E-05	7.0E-05	9.7E-05	4.2E-04	0.005	0.022	0.005	0.023
Benzene	4.3E-08	1.9E-07	2.6E-07	1.1E-06	2.1E-05	9.1E-05	2.1E-05	9.3E-05
Toluene	2.4E-07	1.0E-06	1.4E-06	6.3E-06	1.2E-04	0.001	1.2E-04	0.001
m-Xylene	1.6E-07	6.9E-07	9.6E-07	4.2E-06	5.3E-05	2.3E-04	5.4E-05	2.4E-04
Ethylbenzene	4.4E-07	1.9E-06	2.7E-06	1.2E-05	2.0E-04	0.001	2.0E-04	0.001
n-Hexane	1.3E-06	5.9E-06	8.1E-06	3.6E-05	4.3E-04	0.002	4.4E-04	0.002
n-Heptane	5.4E-06	2.4E-05	3.3E-05	1.4E-04	0.002	0.008	0.002	0.009
n-Octane	5.0E-06	2.2E-05	3.0E-05	1.3E-04	0.002	0.008	0.002	0.008
n-Nonane	3.6E-06	1.6E-05	2.2E-05	9.5E-05	0.001	0.006	0.001	0.006
n-Decane	1.4E-06	6.1E-06	8.5E-06	3.7E-05	0.001	0.002	0.001	0.003
Undecane	4.6E-07	2.0E-06	2.8E-06	1.2E-05	2.0E-04	0.001	2.0E-04	0.001
Dodecane	9.1E-08	4.0E-07	5.5E-07	2.4E-06	4.2E-05	1.8E-04	4.3E-05	1.9E-04
Tridecane	3.1E-08	1.4E-07	1.9E-07	8.3E-07	1.5E-05	6.7E-05	1.5E-05	6.7E-05
Total VOC Emissions:	2.4E-04	0.001	0.001	0.01	0.07	0.30	0.07	0.31
Total HAP Emissions:	2.2E-06	9.7E-06	1.3E-05	5.9E-05	8.1E-04	0.004	0.001	0.004

Company Name:	**EQT Production, LLC**
Facility Name:	**OXF 45 Pad**
Project Description:	**G70D Application**

Thermoelectric Generators

Source Designation:	**S004**
Fuel Used:	Natural Gas
Higher Heating Value (HHV) (Btu/scf):	1,193
Heat Input (MMBtu/hr) [1]	0.013
Fuel Consumption (MMscf/hr):	1.09E-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	1.1E-03	4.8E-03
CO	84	9.1E-04	4.0E-03
VOC	5.5	6.0E-05	2.6E-04
SO_2	0.6	6.5E-06	2.9E-05
PM Total	7.6	8.3E-05	3.6E-04
PM Condensable	5.7	6.2E-05	2.7E-04
PM_{10} (Filterable)	1.9	2.1E-05	9.0E-05
$PM_{2.5}$ (Filterable)	1.9	2.1E-05	9.0E-05
Lead	5.00E-04	5.4E-09	2.4E-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 45 Pad
Project Description: G70D Application

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	2.6E-10	1.1E-09
3-Methylchloranthrene	1.8E-06	2.0E-11	8.6E-11
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.7E-10	7.6E-10
Acenaphthene	1.8E-06	2.0E-11	8.6E-11
Acenaphthylene	1.8E-06	2.0E-11	8.6E-11
Anthracene	2.4E-06	2.6E-11	1.1E-10
Benz(a)anthracene	1.8E-06	2.0E-11	8.6E-11
Benzene	2.1E-03	2.3E-08	1.0E-07
Benzo(a)pyrene	1.2E-06	1.3E-11	5.7E-11
Benzo(b)fluoranthene	1.8E-06	2.0E-11	8.6E-11
Benzo(g,h,i)perylene	1.2E-06	1.3E-11	5.7E-11
Benzo(k)fluoranthene	1.8E-06	2.0E-11	8.6E-11
Chrysene	1.8E-06	2.0E-11	8.6E-11
Dibenzo(a,h) anthracene	1.2E-06	1.3E-11	5.7E-11
Dichlorobenzene	1.2E-03	1.3E-08	5.7E-08
Fluoranthene	3.0E-06	3.3E-11	1.4E-10
Fluorene	2.8E-06	3.0E-11	1.3E-10
Formaldehyde	7.5E-02	8.1E-07	3.6E-06
Hexane	1.8E+00	2.0E-05	8.6E-05
Indo(1,2,3-cd)pyrene	1.8E-06	2.0E-11	8.6E-11
Naphthalene	6.1E-04	6.6E-09	2.9E-08
Phenanthrene	1.7E-05	1.8E-10	8.1E-10
Pyrene	5.0E-06	5.4E-11	2.4E-10
Toluene	3.4E-03	3.7E-08	1.6E-07
Arsenic	2.0E-04	2.2E-09	9.5E-09
Beryllium	1.2E-05	1.3E-10	5.7E-10
Cadmium	1.1E-03	1.2E-08	5.2E-08
Chromium	1.4E-03	1.5E-08	6.7E-08
Cobalt	8.4E-05	9.1E-10	4.0E-09
Manganese	3.8E-04	4.1E-09	1.8E-08
Mercury	2.6E-04	2.8E-09	1.2E-08
Nickel	2.1E-03	2.3E-08	1.0E-07
Selenium	2.4E-05	2.6E-10	1.1E-09
Total HAP		**2.1E-05**	**9.0E-05**

[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 45 Pad
Project Description: G70D Application

Liquid Loading

Throughput 1,657,429 gal/yr
Capture Efficiency 0% non-tested tanker trucks
Control Efficiency 0% Combustor destruction efficiency

Liquid Loading Emissions

	Uncontrolled Emissions		Uncaptured Emissions		Controlled Emissions	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Propane	0.011	0.003	0.011	0.003	0.0E+00	0.0E+00
Isobutane	0.002	0.001	0.002	0.001	0.0E+00	0.0E+00
n-Butane	0.004	0.001	0.004	0.001	0.0E+00	0.0E+00
Isopentane	0.002	0.001	0.002	0.001	0.0E+00	0.0E+00
n-Pentane	0.001	3.9E-04	0.001	3.9E-04	0.0E+00	0.0E+00
Benzene	4.0E-06	1.0E-06	4.0E-06	1.0E-06	0.0E+00	0.0E+00
Toluene	2.2E-05	5.8E-06	2.2E-05	5.8E-06	0.0E+00	0.0E+00
m-Xylene	1.5E-05	3.9E-06	1.5E-05	3.9E-06	0.0E+00	0.0E+00
Ethylbenzene	4.2E-05	1.1E-05	4.2E-05	1.1E-05	0.0E+00	0.0E+00
n-Hexane	1.3E-04	3.3E-05	1.3E-04	3.3E-05	0.0E+00	0.0E+00
n-Heptane	0.001	1.3E-04	0.001	1.3E-04	0.0E+00	0.0E+00
n-Octane	4.7E-04	1.2E-04	4.7E-04	1.2E-04	0.0E+00	0.0E+00
n-Nonane	3.3E-04	8.7E-05	3.3E-04	8.7E-05	0.0E+00	0.0E+00
n-Decane	1.3E-04	3.4E-05	1.3E-04	3.4E-05	0.0E+00	0.0E+00
Undecane	4.4E-05	1.1E-05	4.4E-05	1.1E-05	0.0E+00	0.0E+00
Dodecane	8.6E-06	2.2E-06	8.6E-06	2.2E-06	0.0E+00	0.0E+00
Tridecane	2.9E-06	7.6E-07	2.9E-06	7.6E-07	0.0E+00	0.0E+00
Total VOC Emissions:	0.023	0.006	0.023	0.006	0.00	0.00
Total HAP Emissions:	2.09E-04	5.43E-05	2.09E-04	5.43E-05	0.00	0.00

[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 45 Pad
Project Description: G70D Application

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	2	0.29	1.00	0.21	0.29	0.06
Valves	Gas	0.00597	32	1.82	0.15	0.03	0.27	0.06
Pressure Relief Valves	Gas	0.10400	2	2.01	0.15	0.03	0.30	0.06
Open-Ended Lines	All	0.00170	2	0.02	0.15	0.03	3.7E-03	7.7E-04
Connectors	All	0.00183	134	2.36	0.15	0.03	0.36	0.07
Intermittent Pneumatic Devices[4]	Gas	13.5	5	---	---	---	0.76	0.16
			Emission Totals:	**6.50**	**---**	**---**	**1.99**	**0.41**

[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 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 45 Pad
Project Description: G70D Application

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	2	0.29	0.0E+00	0.0E+00	---	0.0E+00	0.01
Valves	Gas	0.00597	32	1.82	0.0E+00	0.0E+00	---	0.0E+00	0.06
Pressure Relief Valves	Gas	0.10400	2	2.01	0.0E+00	0.0E+00	---	0.0E+00	0.06
Open-Ended Lines	All	0.00170	2	0.02	0.0E+00	0.0E+00	---	0.0E+00	7.7E-04
Connectors	All	0.00183	134	2.36	0.0E+00	0.0E+00	---	0.0E+00	0.07
Intermittent Pneumatic Devices[4]	Gas	13.5	5	---	0.0E+00	0.0E+00	---	0.0E+00	0.16
			Emission Totals:	**6.50**	**0.0E+00**	**0.0E+00**	**---**	**0.0E+00**	**0.36**

[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	2	0.01	2.4E-03	7.1E-06	0.06
Valves	32	0.027	0.13	4.0E-04	3.35
Pressure Relief Devices	2	0.04	0.01	3.8E-05	0.32
Open-Ended Lines	2	0.061	0.01	4.3E-05	0.36
Connectors	134	0.003	0.06	1.9E-04	1.58
Intermittent Pneumatic Devices	5	6	1.58	4.7E-03	39.38
Total			**1.80**	**0.01**	**45.04**

[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: 85% CO_2: 0.09%

[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 45 Pad
Project Description: G70D Application

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	0.30	414	249	0	0.53	0.14	0.01
Employee Vehicles	3	3	3	0.30	200	120	0	0.09	0.02	0.00
Total Potential Emissions								**0.62**	**0.16**	**0.02**

Company Name: **EQT Production, LLC**
Facility Name: **OXF 45 Pad**
Project Description: **G70D Application**

Gas Analysis

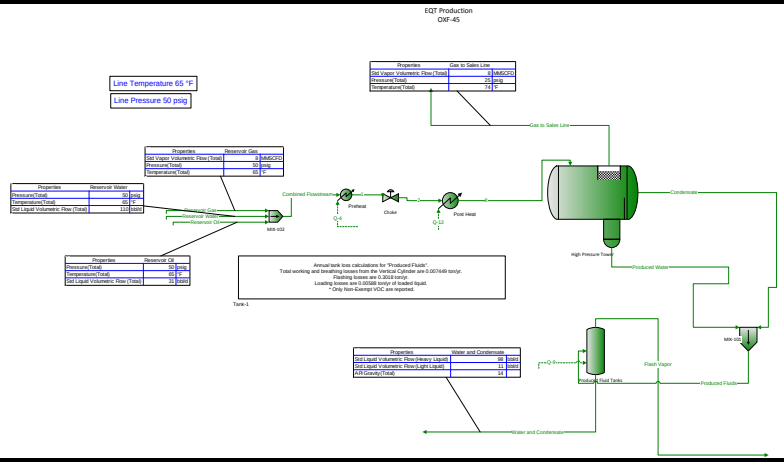
Sample Location: OXF 45 Gas Analysis
Sample Date:
HHV (Btu/scf): 1,193 Note: A conservatively low BTU content of 1,050 was used for calculations.

Constituent	Natural Gas Stream Speciation (Mole %)	Molecular Weight	Molar Weight	Average Weight Fraction	Natural Gas Stream Speciation (Wt. %)
Carbon Dioxide	0.093	44.01	0.04	0.00	0.209
Nitrogen	0.632	28.01	0.18	0.01	0.908
Methane	84.956	16.04	13.63	0.70	69.841
Ethane	9.080	30.07	2.73	0.14	13.993
Propane	2.735	44.10	1.21	0.06	6.182
Isobutane	0.482	58.12	0.28	0.01	1.435
n-Butane	0.771	58.12	0.45	0.02	2.296
Isopentane	0.302	72.15	0.22	0.01	1.117
n-Pentane	0.241	72.15	0.17	0.01	0.892
Cyclopentane	<0.001	70.1	0.0	0.0	0.000
n-Hexane	0.708	86.18	0.61	0.03	3.126
Cyclohexane	<0.001	84.16	0.00	0.00	0.000
Other Hexanes	<0.001	86.18	0.00	0.00	0.000
Heptanes	<0.001	100.21	0.00	0.00	0.000
Methylcyclohexane	<0.001	98.19	0.00	0.00	0.000
2,2,4-Trimethylpentane	<0.001	114.23	0.00	0.00	0.000
Benzene*	<0.001	78.11	0.00	0.00	0.000
Toluene*	<0.001	92.14	0.00	0.00	0.000
Ethylbenzene*	<0.001	106.17	0.00	0.00	0.000
Xylenes*	<0.001	106.16	0.00	0.00	0.000
C8 + Heavies	<0.001	130.80	0.00	0.00	0.000
Totals	100.000		19.51	1.00	100

TOC (Total)	99.27	98.88
VOC (Total)	5.24	15.05
HAP (Total)	0.71	3.13

OXF-45
Plant Schematic

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Connections

	Combined Flowstream	Condensate	Flash Vapor	Gas to Sales Line	Produced Fluids
From Block	MIX-102	High Pressure Tower	Produced Fluid Tanks	High Pressure Tower	MIX-101
To Block	Preheat	MIX-101	--	--	Produced Fluid Tanks

Stream Composition

Mole Fraction	Combined Flowstream	Condensate	Flash Vapor	Gas to Sales Line	Produced Fluids
Methane	0.774689	0.0113122	0.655683	0.844618	0.000170525
Ethane	0.0828036	0.00745864	0.167352	0.0902719	8.51055E-05
Propane	0.02495	0.00856512	0.0705395	0.0271945	8.95901E-05
Isobutane	0.00439808	0.00376516	0.0139274	0.00479166	3.88019E-05
n-Butane	0.00703952	0.00865546	0.0229419	0.00766705	8.91502E-05
Isopentane	0.00276772	0.0090812	0.00948931	0.0030092	9.31717E-05
n-Pentane	0.00221581	0.00957404	0.00770495	0.00240701	9.8132E-05
Nitrogen	0.00577636	2.78953E-05	0.00224062	0.00629784	4.84813E-07
CO2	0.000846637	3.55405E-05	0.00206787	0.000922935	1.56906E-06
Benzene	8.48419E-06	0.000127175	3.04318E-05	9.12541E-06	1.38217E-06
Toluene	4.11628E-05	0.00216925	0.000148062	4.28476E-05	2.25026E-05
m-Xylene	1.83698E-05	0.00318668	6.0947E-05	1.70749E-05	3.27122E-05
Ethylbenzene	6.68906E-05	0.0106573	0.000224855	6.30387E-05	0.000109554
n-Hexane	0.000157976	0.00236415	0.000569344	0.000170052	2.42239E-05
n-Heptane	0.000621478	0.0282524	0.00224638	0.000651454	0.000289466
n-Octane	0.000572345	0.0777727	0.00196289	0.000552077	0.000796822
n-Nonane	0.000476202	0.167214	0.00133762	0.000364519	0.00171319
n-Decane	0.000294745	0.198665	0.000518215	0.000137585	0.00203543
Undecane	0.000214343	0.2054	0.000170414	4.36949E-05	0.00210442
Dodecane	0.000110244	0.12072	3.41591E-05	8.52782E-06	0.00123684
Tridecane	0.000108211	0.124444	1.18112E-05	2.86676E-06	0.00127499
Water	0.0918227	0.000552661	0.0407385	0.0107574	0.989692

Mass Flow	Combined Flowstream lb/h	Condensate lb/h	Flash Vapor lb/h	Gas to Sales Line lb/h	Produced Fluids lb/h
Methane	12057.5	0.149379	0.159741	12057.3	0.219786
Ethane	2415.62	0.184609	0.0764189	2415.41	0.205598
Propane	1067.4	0.310888	0.0472366	1067.08	0.317393
Isobutane	248.008	0.180136	0.0122931	247.826	0.181191
n-Butane	396.959	0.414101	0.0202498	396.542	0.416299
Isopentane	193.737	0.53932	0.0103972	193.196	0.540075
n-Pentane	155.104	0.568589	0.00844208	154.535	0.568828
Nitrogen	156.993	0.000643236	0.000953204	156.992	0.00109114
CO2	36.1496	0.00128749	0.00138204	36.144	0.00554788
Benzene	0.642965	0.00817699	3.6099E-05	0.634291	0.00867399
Toluene	3.67964	0.164522	0.000207174	3.51306	0.166577
m-Xylene	1.8921	0.27848	9.82618E-05	1.61309	0.279019
Ethylbenzene	6.88979	0.931332	0.000362523	5.95536	0.934436
n-Hexane	13.2079	0.1677	0.00074509	13.0402	0.167714
n-Heptane	60.4173	2.33027	0.0034183	58.087	2.33031
n-Octane	63.4296	7.31267	0.00340503	56.1169	7.31269
n-Nonane	59.255	17.6531	0.0026053	41.6019	17.6531
n-Decane	40.687	23.2673	0.00111972	17.4197	23.2673
Undecane	32.5051	26.4275	0.000404519	6.0776	26.4275
Dodecane	18.2187	16.9261	8.8361E-05	1.29259	16.9261
Tridecane	19.3553	18.885	3.30685E-05	0.470307	18.885
Water	1604.91	0.00819548	0.0111455	172.451	1432.46

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Volumetric Flow	Combined Flowstream ft^3/h	Condensate gpm	Flash Vapor ft^3/h	Gas to Sales Line ft^3/h	Produced Fluids gpm
Methane	63740.7	0.000742473	3.95436	107919	0.00108772
Ethane	6637.61	0.00068635	1.00318	11370.4	0.000756692
Propane	1957.03	0.00108217	0.42077	3386.45	0.00110082
Isobutane	337.986	0.000609456	0.082724	590.687	0.000612221
n-Butane	538.251	0.00135746	0.136152	943.213	0.00136314
Isopentane	204.821	0.0017012	0.0560257	365.199	0.00170302
n-Pentane	163.651	0.00177573	0.0454871	292.403	0.0017763
Nitrogen	482.135	1.68292E-06	0.0135594	811.213	2.88374E-06
CO2	68.8742	9.86298E-07	0.0124372	117.189	7.67049E-06
Benzene	0.59771	1.79304E-05	0.000179401	1.10559	1.88587E-05
Toluene	2.46247	0.000371127	0.000868473	5.13247	0.000374927
m-Xylene	0.715692	0.000635197	0.000355265	2.01309	0.000636185
Ethylbenzene	2.70987	0.00212613	0.00131139	7.44148	0.00213179
n-Hexane	10.9806	0.000503991	0.00334445	20.4315	0.000504023
n-Heptane	37.6238	0.00682861	0.0131273	77.2836	0.0068287
n-Octane	24.7646	0.0208069	0.0114164	64.7735	0.0208069
n-Nonane	10.8156	0.0490924	0.00773378	42.163	0.0490925
n-Decane	3.07294	0.0637641	0.0029778	15.6515	0.0637641
Undecane	1.18988	0.0713158	0.000975468	4.93606	0.0713158
Dodecane	0.465903	0.0452153	0.000194427	0.950522	0.0452153
Tridecane	0.431545	0.0501498	6.68776E-05	0.315324	0.0501498
Water	294.512	-2.1017E-05	0.245244	1370.17	2.86936

Stream Properties

Property	Units	Combined Flowstream	Condensate	Flash Vapor	Gas to Sales Line	Produced Fluids
Temperature	°F	56.9377	74.459	85	74.459	74.459
Pressure	psig	50	25	0 *	25	25
Mole Fraction Vapor		0.909873	0	1	1	0
Mole Fraction Light Liquid		0.00158645	1	0	0	0.0102455
Mole Fraction Heavy Liquid		0.088541	0	0	0	0.989755
Molecular Weight	lb/lbmol	19.2256	141.785	23.7572	19.2203	19.2835
Mass Density	lb/ft^3	0.250298	45.6475	0.0600055	0.134241	60.5769
Mass Flow	lb/h	18652.6	116.709	0.360783	17103.3	1549.27
Vapor Volumetric Flow	ft^3/h	74521.4	2.55675	6.0125	127408	25.5753
Liquid Volumetric Flow	gpm	9290.98	0.318764	0.74961	15884.6	3.18861
Std Vapor Volumetric Flow	MMSCFD	8.83618	0.00749685	0.000138311	8.10446	0.731722
Std Liquid Volumetric Flow	sgpm	106.067	0.317773	0.00191597	102.885	3.182
Specific Gravity			0.731894	0.820271	0.663626	0.971266
API Gravity			60.2071			13.8113
Net Liquid Heating Value	Btu/lb	18932.9	18997.5	19800.2	20606.9	452.722
Net Ideal Gas Heating Value	Btu/ft^3	965.828	7157.04	1246.7	1046.4	73.4018

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Connections

	Produced Water	Reservoir Gas	Reservoir Oil	Reservoir Water	Water and Condensate
From Block	High Pressure Tower	--	--	--	Produced Fluid Tanks
To Block	MIX-101	MIX-102	MIX-102	MIX-102	--

Stream Composition

Mole Fraction	Produced Water	Reservoir Gas	Reservoir Oil	Reservoir Water	Water and Condensate
Methane	5.51916E-05	0.855617 *	0.014239 *	0 *	4.65958E-05
Ethane	8.77788E-06	0.0914431 *	0.00490599 *	0 *	5.34826E-05
Propane	1.85514E-06	0.027548 *	0.00317299 *	0 *	7.62711E-05
Isobutane	2.28276E-07	0.00485335 *	0.001428 *	0 *	3.61761E-05
n-Butane	4.7557E-07	0.00776395 *	0.00366399 *	0 *	8.48297E-05
Isopentane	1.31658E-07	0.00304152 *	0.00499299 *	0 *	9.13953E-05
n-Pentane	4.15809E-08	0.0024302 *	0.00554999 *	0 *	9.66938E-05
Nitrogen	2.01072E-07	0.00636807 *	0.00388399 *	0 *	6.12994E-08
CO2	1.2174E-06	0.000934614 *	0.000166 *	0 *	1.17841E-06
Benzene	8.00141E-08	0 *	0.00302099 *	0 *	1.37667E-06
Toluene	2.80482E-07	0 *	0.014657 *	0 *	2.24789E-05
m-Xylene	6.37753E-08	0 *	0.00654099 *	0 *	3.27069E-05
Ethylbenzene	3.67611E-07	0 *	0.023818 *	0 *	0.000109532
n-Hexane	2.00023E-09	0 *	0.0562509 *	0 *	2.41209E-05
n-Heptane	5.63847E-09	0 *	0.221292 *	0 *	0.000289096
n-Octane	2.00687E-09	0 *	0.203797 *	0 *	0.000796601
n-Nonane	1.37018E-09	0 *	0.169563 *	0 *	0.00171326
n-Decane	1.4921E-10	0 *	0.104951 *	0 *	0.00203571
Undecane	4.82521E-11	0 *	0.0763218 *	0 *	0.00210479
Dodecane	3.54083E-11	0 *	0.0392549 *	0 *	0.00123707
Tridecane	2.96101E-11	0 *	0.0385309 *	0 *	0.00127522
Water	0.999931	0 *	0 *	1 *	0.989871

Mass Flow	Produced Water lb/h	Reservoir Gas lb/h	Reservoir Oil lb/h	Reservoir Water lb/h	Water and Condensate lb/h
Methane	0.0704065	12056.9 *	0.622401 *	0 *	0.0600451
Ethane	0.0209883	2415.22 *	0.401945 *	0 *	0.129179
Propane	0.00650492	1067.01 *	0.381228 *	0 *	0.270156
Isobutane	0.00105504	247.781 *	0.226146 *	0 *	0.168898
n-Butane	0.00219799	396.378 *	0.580253 *	0 *	0.396049
Isopentane	0.000755343	192.755 *	0.981545 *	0 *	0.529678
n-Pentane	0.000238557	154.013 *	1.09104 *	0 *	0.560386
Nitrogen	0.000447905	156.696 *	0.296459 *	0 *	0.000137937
CO2	0.00426038	36.1297 *	0.0199055 *	0 *	0.00416584
Benzene	0.000496995	0 *	0.642965 *	0 *	0.00863789
Toluene	0.00205502	0 *	3.67964 *	0 *	0.16637
m-Xylene	0.000538397	0 *	1.8921 *	0 *	0.27892
Ethylbenzene	0.00310341	0 *	6.88979 *	0 *	0.934073
n-Hexane	1.37066E-05	0 *	13.2079 *	0 *	0.166969
n-Heptane	4.49269E-05	0 *	60.4173 *	0 *	2.3269
n-Octane	1.8229E-05	0 *	63.4296 *	0 *	7.30928
n-Nonane	1.3974E-05	0 *	59.255 *	0 *	17.6505
n-Decane	1.68817E-06	0 *	40.687 *	0 *	23.2662
Undecane	5.99745E-07	0 *	32.5051 *	0 *	26.4271
Dodecane	4.79598E-07	0 *	18.2187 *	0 *	16.9261
Tridecane	4.34089E-07	0 *	19.3553 *	0 *	18.885
Water	1432.45	0 *	0 *	1604.91 *	1432.45

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Volumetric Flow	Produced Water gpm	Reservoir Gas ft^3/h	Reservoir Oil ft^3/h	Reservoir Water gpm	Water and Condensate gpm
Methane	0.000345251	64770	0.44261	0	0.000301421
Ethane	7.03415E-05	6753.65	0.0364031	0	0.00048099
Propane	1.86469E-05	1994.69	0.0148305	0	0.000946366
Isobutane	2.76519E-06	345.233	0.00684903	0	0.000576045
n-Butane	5.6882E-06	550.302	0.01655	0	0.00130841
Isopentane	1.81975E-06	210.438	0.0254063	0	0.00168436
n-Pentane	5.7583E-07	168.458	0.0278321	0	0.00176435
Nitrogen	1.20082E-06	488.722	0.302315	0	3.70197E-07
CO2	6.68419E-06	70.02	0.00191678	0	5.78915E-06
Benzene	9.2837E-07	0	0.0114315	0	1.88905E-05
Toluene	3.79974E-06	0	0.066623	0	0.000376638
m-Xylene	9.87407E-07	0	0.0345277	0	0.000639614
Ethylbenzene	5.66129E-06	0	0.125665	0	0.00214334
n-Hexane	3.14445E-08	0	0.318838	0	0.000505643
n-Heptane	9.97091E-08	0	1.41485	0	0.00686834
n-Octane	3.918E-08	0	1.43959	0	0.0209418
n-Nonane	2.9323E-08	0	1.31326	0	0.0494134
n-Decane	3.48629E-09	0	0.888034	0	0.0641747
Undecane	1.22163E-09	0	0.698569	0	0.0717644
Dodecane	9.6691E-10	0	0.387455	0	0.0454944
Tridecane	8.72161E-10	0	0.409307	0	0.0504536
Water	2.86939	0	0	3.21023	2.87448

Stream Properties

Property	Units	Produced Water	Reservoir Gas	Reservoir Oil	Reservoir Water	Water and Condensate
Temperature	°F	74.459	65 *	65 *	65 *	85 *
Pressure	psig	25	50 *	50 *	50 *	0
Mole Fraction Vapor		0	1	0.00320537	0	0
Mole Fraction Light Liquid		1	0	0.996795	1	0.0101115
Mole Fraction Heavy Liquid		0	0	0	0	0.989889
Molecular Weight	lb/lbmol	18.0155	19.0382	119.198	18.0153	19.2827
Mass Density	lb/ft^3	62.2351	0.221932	40.6848	62.3297	60.4541
Mass Flow	lb/h	1432.56	16722.9	324.781	1604.91	1548.91
Vapor Volumetric Flow	ft^3/h	23.0186	75351.5	7.98286	25.7487	25.6213
Liquid Volumetric Flow	gpm	2.86985	9394.48	0.995265	3.21023	3.19434
Std Vapor Volumetric Flow	MMSCFD	0.724225	8 *	0.0248156	0.811362	0.731584
Std Liquid Volumetric Flow	sgpm	2.86423	101.954	0.904167 *	3.20833 *	3.18008
Specific Gravity		0.997853	0.657337		0.99937	0.969298
API Gravity		10.0074			9.99282	13.8005
Net Liquid Heating Value	Btu/lb	-1058.1	20850.4	18994.8	-1059.76	448.216
Net Ideal Gas Heating Value	Btu/ft^3	0.0751447	1048.12	6016.27	0	73.18

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Connections

	1	2	8		
From Block	Preheat	Choke	Post Heat		
To Block	Choke	Post Heat	High Pressure Tower		

Stream Composition

Mole Fraction	1	2	8		
Methane	0.774689	0.774689	0.774689		
Ethane	0.0828036	0.0828036	0.0828036		
Propane	0.02495	0.02495	0.02495		
Isobutane	0.00439808	0.00439808	0.00439808		
n-Butane	0.00703952	0.00703952	0.00703952		
Isopentane	0.00276772	0.00276772	0.00276772		
n-Pentane	0.00221581	0.00221581	0.00221581		
Nitrogen	0.00577636	0.00577636	0.00577636		
CO2	0.000846637	0.000846637	0.000846637		
Benzene	8.48419E-06	8.48419E-06	8.48419E-06		
Toluene	4.11628E-05	4.11628E-05	4.11628E-05		
m-Xylene	1.83698E-05	1.83698E-05	1.83698E-05		
Ethylbenzene	6.68906E-05	6.68906E-05	6.68906E-05		
n-Hexane	0.000157976	0.000157976	0.000157976		
n-Heptane	0.000621478	0.000621478	0.000621478		
n-Octane	0.000572345	0.000572345	0.000572345		
n-Nonane	0.000476202	0.000476202	0.000476202		
n-Decane	0.000294745	0.000294745	0.000294745		
Undecane	0.000214343	0.000214343	0.000214343		
Dodecane	0.000110244	0.000110244	0.000110244		
Tridecane	0.000108211	0.000108211	0.000108211		
Water	0.0918227	0.0918227	0.0918227		

Mass Flow	1 lb/h	2 lb/h	8 lb/h		
Methane	12057.5	12057.5	12057.5		
Ethane	2415.62	2415.62	2415.62		
Propane	1067.4	1067.4	1067.4		
Isobutane	248.008	248.008	248.008		
n-Butane	396.959	396.959	396.959		
Isopentane	193.737	193.737	193.737		
n-Pentane	155.104	155.104	155.104		
Nitrogen	156.993	156.993	156.993		
CO2	36.1496	36.1496	36.1496		
Benzene	0.642965	0.642965	0.642965		
Toluene	3.67964	3.67964	3.67964		
m-Xylene	1.8921	1.8921	1.8921		
Ethylbenzene	6.88979	6.88979	6.88979		
n-Hexane	13.2079	13.2079	13.2079		
n-Heptane	60.4173	60.4173	60.4173		
n-Octane	63.4296	63.4296	63.4296		
n-Nonane	59.255	59.255	59.255		
n-Decane	40.687	40.687	40.687		
Undecane	32.5051	32.5051	32.5051		
Dodecane	18.2187	18.2187	18.2187		
Tridecane	19.3553	19.3553	19.3553		
Water	1604.91	1604.91	1604.91		

Volumetric Flow	1 ft^3/h	2 ft^3/h	8 ft^3/h		
Methane	70518.9	76884	96063.7		
Ethane	7368.01	8048.02	10103.8		

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Volumetric Flow	1 ft^3/h	2 ft^3/h	8 ft^3/h		
Propane	2179.01	2383.8	3005.04		
Isobutane	377.525	413.606	523.488		
n-Butane	601.808	659.555	835.663		
Isopentane	230.465	253.148	322.951		
n-Pentane	184.389	202.545	258.586		
Nitrogen	532.498	579.967	722.8		
CO2	76.3051	83.2593	104.238		
Benzene	0.685696	0.754987	0.976357		
Toluene	3.0053	3.33356	4.51268		
m-Xylene	1.01085	1.13869	1.75281		
Ethylbenzene	3.7891	4.26317	6.48541		
n-Hexane	12.6167	13.905	18.0282		
n-Heptane	45.487	50.4507	67.9364		
n-Octane	33.8486	38.0037	56.5532		
n-Nonane	17.5813	20.0555	36.4482		
n-Decane	5.3442	6.10644	13.5987		
Undecane	1.82393	2.0235	4.64203		
Dodecane	0.581669	0.616154	1.1436		
Tridecane	0.47052	0.481074	0.662201		
Water	484.828	554.67	1164.29		

Stream Properties

Property	Units	1	2	8		
Temperature	°F	66.9377	66.0153	76.0153		
Pressure	psig	45	40	30		
Mole Fraction Vapor		0.911974	0.912299	0.916521		
Mole Fraction Light Liquid		0.0012746	0.00123554	0.000884424		
Mole Fraction Heavy Liquid		0.0867512	0.0864653	0.0825943		
Molecular Weight	lb/lbmol	19.2256	19.2256	19.2256		
Mass Density	lb/ft^3	0.2256	0.206783	0.164605		
Mass Flow	lb/h	18652.6	18652.6	18652.6		
Vapor Volumetric Flow	ft^3/h	82680	90203.7	113317		
Liquid Volumetric Flow	gpm	10308.2	11246.2	14127.9		
Std Vapor Volumetric Flow	MMSCFD	8.83618	8.83618	8.83618		
Std Liquid Volumetric Flow	sgpm	106.067	106.067	106.067		
Specific Gravity						
API Gravity						
Net Liquid Heating Value	Btu/lb	18932.9	18932.9	18932.9		
Net Ideal Gas Heating Value	Btu/ft^3	965.828	965.828	965.828		

Remarks

Energy Stream Report

Client Name:	EQT Production	Job: V1.0
Location:	OXF - 45	
Flowsheet:	OXF-45	

Energy Streams

Energy Stream	Energy Rate	Power	From Block	To Block
Q-4	141285 Btu/h	55.5272 hp	--	Preheat
Q-9	15403.3 Btu/h	6.05371 hp	--	Produced Fluid Tanks
Q-12	183673 Btu/h	72.1862 hp	--	Post Heat

Remarks

Gas Analytical Services

Tulsa, OK

918-827-5770

Customer	: 5115 - EQT PRODUCTION	**Date Sampled**	: 08/01/2016
Station Id	: 510892	**Date Analyzed**	: 08/22/2016
Cylinder Id	: 1	**Effective Date**	: 09/01/2016
Producer	: EQT PRODUCTION	**Line Pressure**	: 0.00000
Lease	: OXF 45 PAD	**Cyl Pressure**	: 22.00000
Area	:	**Temp**	: 75.00000
Sample By	: R MOORE	**Cylinder Type**	: Spot
Property Cd	:	**Formation**	:

COMPONENT		Mole Percent	WT. Percent	Liq Vol Percent
Methane	C1	1.4239	0.1852	0.4554
Ethane	C2	0.4906	0.1196	0.2474
Propane	C3	0.3173	0.1134	0.1649
Iso-Butane	IC4	0.1428	0.0672	0.0880
Normal-Butane	NC4	0.3664	0.1726	0.2178
Iso-Pentane	IC5	0.4993	0.2920	0.3446
Normal-Pentane	NC5	0.5550	0.3246	0.3797
Nitrogen	N2	0.3884	0.0882	0.0806
Carbon-Dioxide	CO2	0.0166	0.0059	0.0049
BENZENE	BENZENE	0.3021	0.1914	0.1594
TOLUENE	TOLUENE	1.4657	1.0950	0.9263
ETHYLBENZENE	E-BENZENE	0.6541	0.5630	0.4763
M-XYLENE/P-XYLENE	M-XYLENE/P-XYLENE	2.3818	2.0503	1.7406
C6's	C6's	5.6251	3.9303	4.3712
C7's	C7's	22.1292	23.4122	23.5396
C8's	C8's	20.3797	18.7337	19.4047
C9's	C9's	16.9563	17.3212	17.3111
C10's	C10's	10.4951	11.4389	11.0081
C11's	C11's	7.6322	8.9358	8.4445
C12's	C12's	3.9255	5.1994	5.0459
C13's	C13's	3.8531	5.7600	5.5889
TOTAL		100.0002	100.0000	100.0000

	Totals
SPECIFIC GRAVITY @ 60 DEG. F. (WATER = 1)	0.7378
MOLECULAR WEIGHT	123.3377
POUNDS/GALLON (ABSOLUTE DENSITY)	6.1512

Comments:

CALC. VAPOR PRESSURE @ 14.65 PSIA, 100 Deg. F.	82.1258
CUFT. VAPOR / GALLON @ 14.65 PSIA, 60 Deg. G.	19.0450
BTU / CUFT. DRY GAS @ 14.65 PSIA, 60 Deg. F.	6,254.6127
BTU / GALLON LIQUID	125,268.3922
BTU / POUND	20,243.4955

Comments:

Gas Analytical Services, Inc.
P.O. Box 1028
Bridgeport, WV 26330-0461
Phone: (304) 623-0020
FAX: (304) 624-8065

Analysis#:	75922
Run Date:	10/7/2010
Run Time:	12:52
Cylinder#:	

FRACTIONAL ANALYSIS

Customer:	Equitable Resources	Sample Date:	10/6/2010
Field:	Component Analysis	Sample Time:	11:30
		Collected By:	Moore
Station:	510842	Effective Date:	10/6/2010
Meter:		Sample Pressure:	75.00 PSIG
Sample Type:	Spot	Sample Temp. (°F):	N/G

Component	MOL%	GPM
Methane	84.9562	
Ethane	9.0796	2.42
Propane	2.7353	0.75
I-Butane	0.4819	0.16
N-Butane	0.7709	0.24
I-Pentane	0.3020	0.11
N-Pentane	0.2413	0.09
Nitrogen	0.6323	
CO2	0.0928	
Oxygen	0.0000	
Hexanes+	0.7077	0.31
Total:	100.0000	4.08

Analytical Results at Base Conditions (Real)	
BTU/SCF (Dry):	1192.8301
BTU/SCF (Saturated):	1173.0021
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99695
Z Factor (Saturated):	0.99691

Analytical Results at Contract Conditions (Real)	
BTU/SCF (Dry):	1192.8301
BTU/SCF (Saturated):	1173.0021
PSIA:	14.7300
Temperature (°F):	60.00
Z Factor (Dry):	0.99694
Z Factor (Saturated):	0.99690

Calculated Specific Gravities			
Ideal Grav.:	0.6754	Real Grav.:	0.6772
Molecular Weight:			19.5637

Gross Heating Values are Based
on GPA 2145-09, 2172, 2261.
Compressibility is Calculated using AGA-8.