TITAN Engineering, Inc.
Environmental Consulting and Management

August 30, 2012

Air Permits Initial Review Team (APIRT) Section, MC 161
Texas Commission on Environmental Quality
12100 Park 35 Circle, Building C, Third Floor
Austin, Texas 78753

via FedEx

Subject: Oil and Gas Standard Permit Registration
Burlington Resources Oil & Gas Company LP
Borgfeld Unit A1 and Culpepper Unit A1
DeWitt County, Texas
CN602989436, RN106486327

Dear Mr. Johnny Bowers:

On behalf of Burlington Resources Oil & Gas Company LP (Burlington), TITAN Engineering, Inc. (TITAN) is submitting this Oil and Gas Standard Permit (SP) Registration to the Texas Commission on Environmental Quality (TCEQ) for operations at Borgfeld Unit A1 and Culpepper Unit A1 (the Site) located near Yorktown in DeWitt County, TX. Upon authorization, this standard permit will authorize the following project:

- Six (6) controlled atmospheric condensate storage tanks and associated loading;
- Two (2) controlled atmospheric produced water storage tanks and associated loading;
- One (1) flare combustion control device; and,
- Piping and fugitive components.

TITAN and Burlington Resources believe that the Site and its associated air emissions meet the requirements of the TCEQ Non-Rule Standard Permit for Oil and Gas Handling and Production Facilities and 30 TAC §116.610, §116.611, §116.614, and §116.615. This Standard Permit Registration has been prepared in accordance with TCEQ guidance and includes the following attachments:

- Attachment 1 presents a process description, area map, receptor map, process flow diagram, and plot plan;
- Attachment 2 contains the applicable TCEQ forms and tables;
- Attachment 3 presents emission rate calculations;
- Attachment 4 describes how the Site qualifies for Standard Permit;
- Attachment 5 includes an impacts evaluation; and
- Attachment 6 includes supporting documentation.

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TCEQ
FIELD OPS/REGION 14

TITAN and Burlington would like to collectively thank you in advance for your review and concurrence with this Oil and Gas Standard Permit Registration. If you have any questions regarding the information presented in this letter and attachments, please do not hesitate to contact Mr. James Woodall at 832-486-6508 or james.woodall@conocophillips.com or me at 469-365-1168 or cchermak@titanengineering.com.

Sincerely,
TITAN Engineering, Inc.

Christina Chermak
Project Manager

Attachments

cc: Ms. Rosario Torres, TCEQ Region 14 –Corpus Christi
Mr. James Woodall, Sr. Environmental Specialist, ConocoPhillips Company
TCEQ Revenue Section, MC-214, Bldg. A, Third Floor, Austin, Texas 78753 (Form PI-1S, CORE Data form, and fee only)

OIL AND GAS STANDARD PERMIT REGISTRATION

CN602989436
RN106486327

Burlington Resources Oil & Gas Company LP
Borgfeld Unit A1 and Culpepper Unit A1
DeWitt County, Texas

Project No. 84800507-72.004

August 2012

TITAN ENGINEERING, INC.

ATTACHMENT 1
PROCESS/PROJECT DESCRIPTION

OIL AND GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 1
PROCESS/PROJECT DESCRIPTION

This Standard Permit registration is being submitted to authorize six (6) controlled atmospheric condensate storage tanks and associated loading, two (2) controlled atmospheric produced water storage tanks and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. Figure 1-1 is an area map showing the location of the Site and the surrounding area and Figure 1-2 is a map demonstrating the nearest receptor. Figure 1-3 is a process flow diagram for the Site and Figure 1-4 is a plot-plan of the site demonstrating the location of various equipment components.

Normal Operations

The Site has two (2) wells which will produce high pressure gas and liquids (condensate and water). The mixture extracted from the wells will first pass through a high pressure (HP) separator where the high pressure gas will be collected and sent to pipeline. Liquids from the HP separator will then pass to a low pressure (LP) separator. Low pressure gas off of the LP separator will go to sales as well, via a low pressure pipeline.

Pressurized liquids from the LP separator will be divided into both produced water and condensate streams. Condensate is routed to the condensate storage tanks (FINs [Facility Identification Number] TK-01, TK-02, TK-03, TK-04, TK-05 and TK-06) and water is routed to the produced water tanks (FIN TK-07 and TK-08). The emissions associated with the flash from the pressure change as well as the working/breathing emissions from all tanks are routed to a flare (FIN FL-1) and are captured and controlled at a 98% efficiency. As demonstrated in the calculations, assist gas is sent to the flare to ensure that the waste gas stream can sustain combustion.

The condensate and produced water tanks are loaded out periodically (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the flare (FIN FL-1). The Site will also emit emissions due to equipment component leaks (FIN FUG).

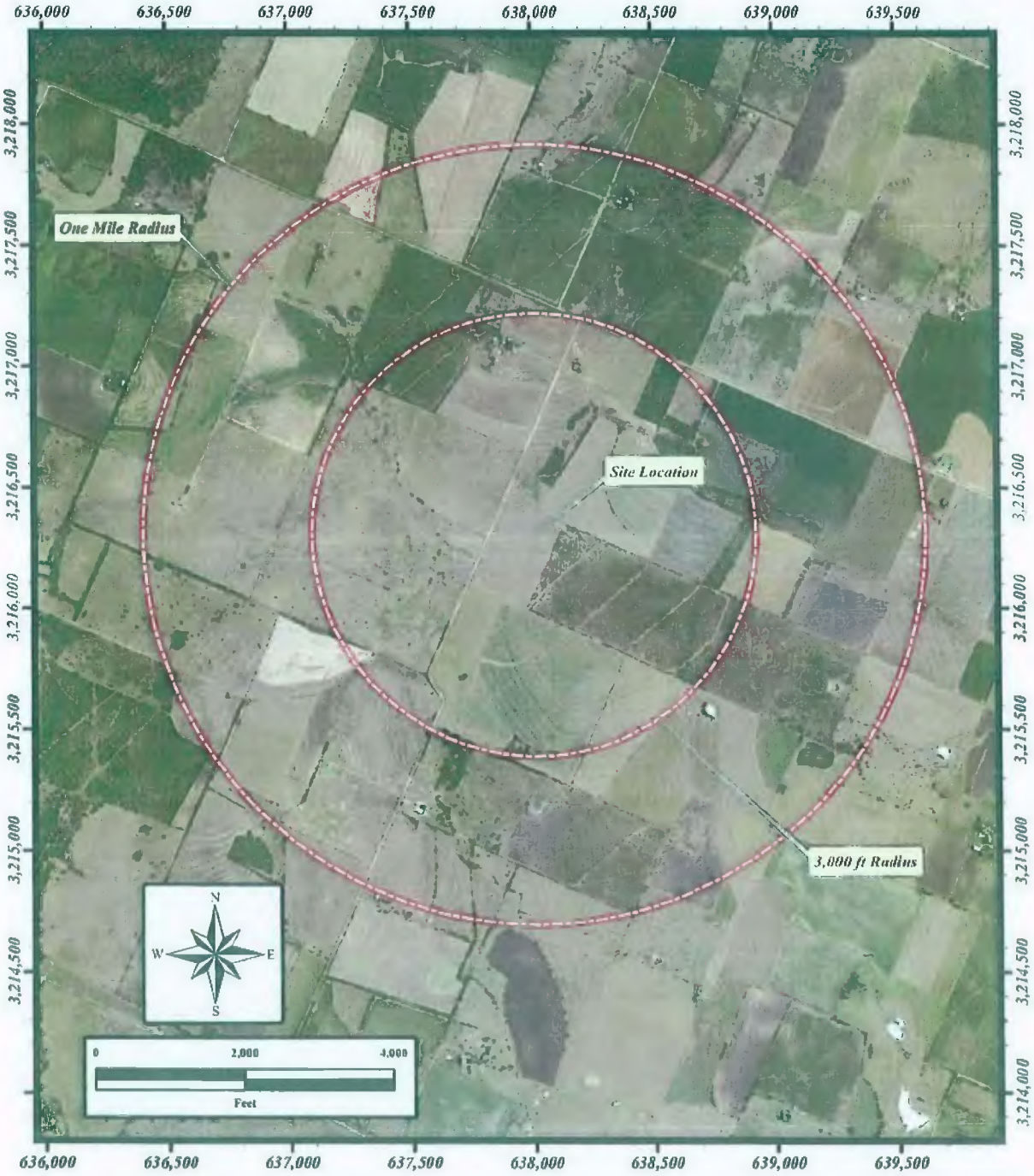
Scheduled Maintenance Startup and Shutdown Events

In accordance with TCEQ guidance and the non-rule Oil & Gas Standard Permit, a representation of planned Maintenance, Startup and Shutdown events are included in this Standard Permit registration in addition to the normal operating scenario.

It is conservatively planned that the flare will be down for maintenance 2% of the year. During this time, the well would be shut in and therefore gas and liquids would not be producing, but any liquids previously in storage tanks (FINs TK-01, TK-02, TK-03, TK-04, TK-05, TK-06, TK-07 and TK-08) would have standing losses emitted to atmosphere.

Additionally, during engine maintenance events at downstream sites the LP separator gas (FIN SEP-GAS) is sent to the flare (FIN FL-1) for combustion. This scenario is conservatively predicted to occur 6% of the year.

Attachment 3 contains emission rate calculations for the air emission sources and a summary of the Site's emission rates.



Grid Presented is UTM Zone 14, NAD 1983

TITAN Engineering, Inc.
2801 Network Boulevard, Suite 200
Frisco, Texas 75034
Phone: (469) 365-1100 Fax: (469) 365-1199
www.titanengineering.com y www.apexcos.com
A Division of Apex Companies, LLC

FIGURE 1-1 AREA MAP

Burlington Resources Oil & Gas Company LP
Standard Permit Registration
Borgfeld Unit A1 and Culpepper Unit A1
TITAN Project No. 84800507-72.004
August 2012
from USGS Quadrangle New Davey, Texas
Ground Condition Depicted October 2011
Digital Data Courtesy of ESRI Online Datasets

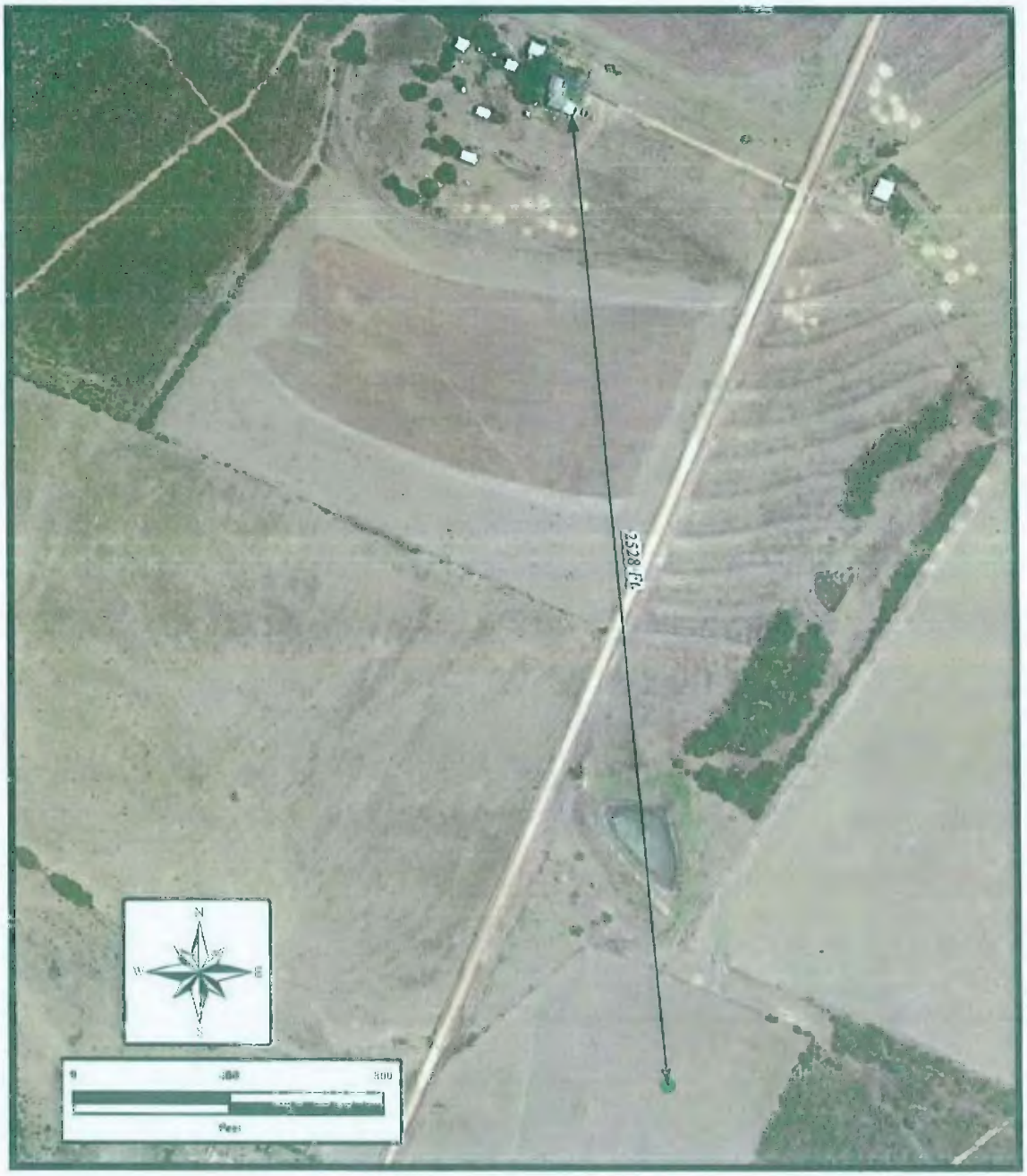


FIGURE 1-2 RECEPTOR MAP

Burlington Resources Oil & Gas Company LP
Standard Permit Registration
Borgfeld Unit A1 and Culpepper Unit A1
TITAN Project No. 84800507-72.004
August 2012

from USGS Quadrangle New Davey, Texas
Ground Condition Depicted October 2011
Digital Data Courtesy of ESRI Online Datasets

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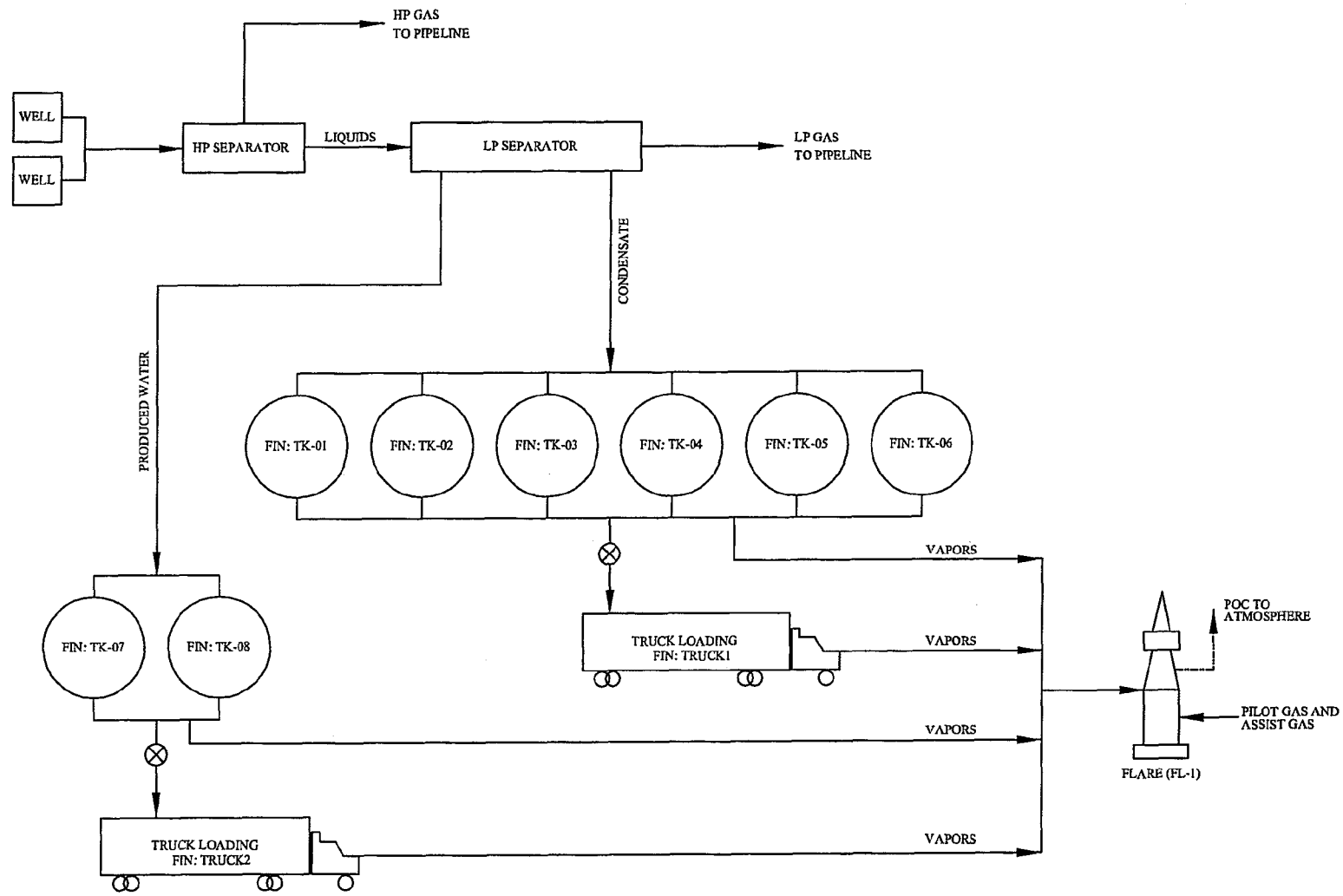

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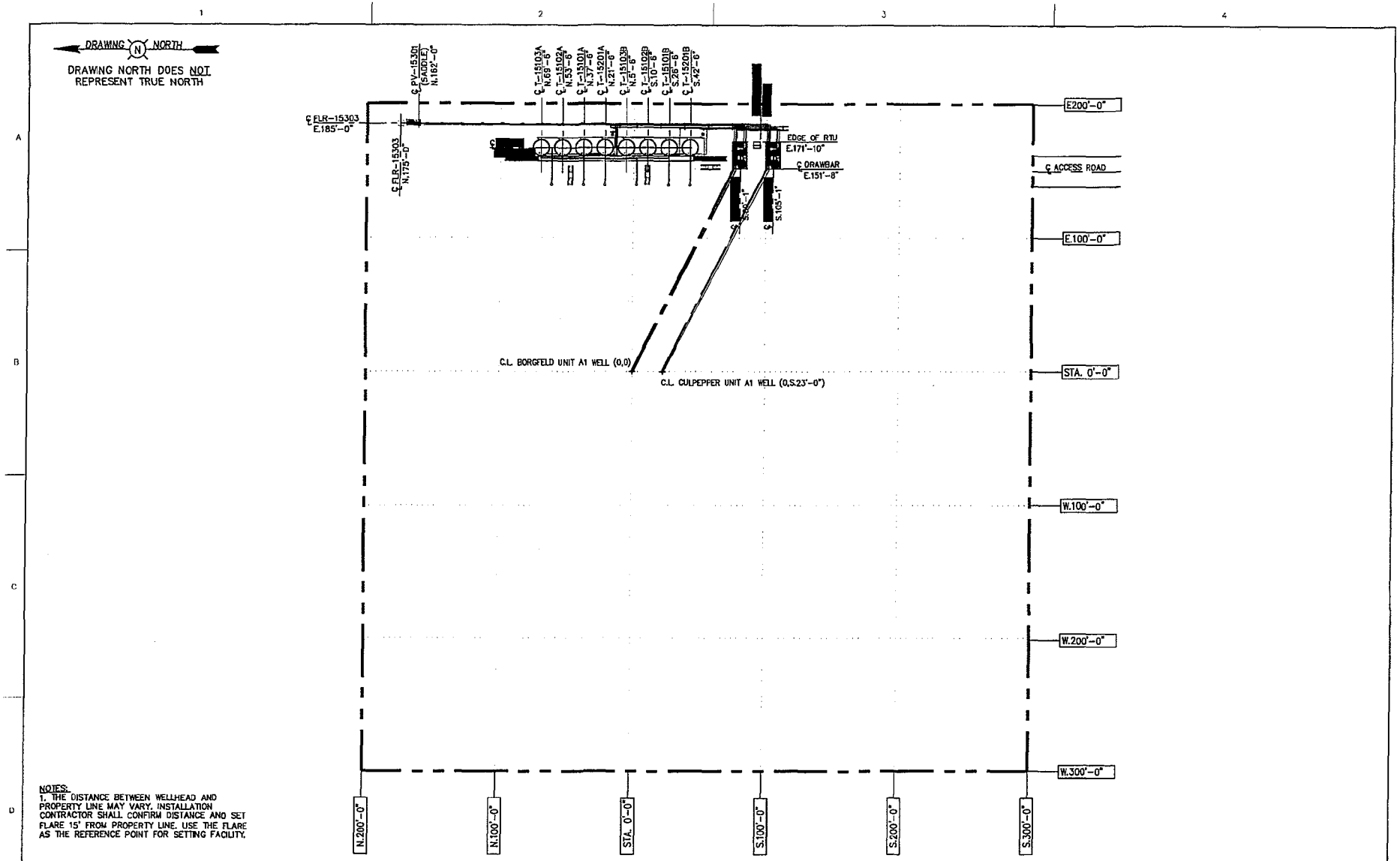
FIGURE 1-3
SIMPLIFIED PROCESS FLOW DIAGRAM

Burlington Resources Oil & Gas Company LP
Borgfeld Unit A1 and Culpepper Unit A1
Standard Permit Registration

DESIGNED BY:	DETAILED BY:	CHECKED BY:
Burlington	LLA	VC
FILE NAME: T:\ConocoPhillips\84800507-72.004 \Report\ATT1		
DATE: August /2012	PROJECT NO.: 84800507-72.004	PLOT SCALE: NTS
DRAWING NO.: TEI-0000	REVISION: 2	FIGURE: 1-3

EFSCOP00002199



NOTES:
1. THE DISTANCE BETWEEN WELLHEAD AND PROPERTY LINE MAY VARY. INSTALLATION CONTRACTOR SHALL CONFIRM DISTANCE AND SET FLARE 15' FROM PROPERTY LINE. USE THE FLARE AS THE REFERENCE POINT FOR SETTING FACILITY.

REFERENCE DRAWINGS:

NO.	DATE	REVISION	DRW.	DES.	CHK.	APP.
1	04/04/12	AS BUILT	DCM	WJL		
0	01/26/12	ISSUED FOR CONSTRUCTION	HTN	WJL	CP	CP

ConocoPhillips
EAGLE FORD

BORGFELD UNIT A1/CULPEPPER UNIT A1 FACILITY

OVERALL PLOT PLAN
FIGURE 1-4

SCALE: 1/32"=1'-0" | PLOT SCALE: 1=1
AFE: | LOCATION: DEWITT COUNTY
DWG. NO: BFA1_CPA1-30000A | REV. 1

EFSCOP00002200

ATTACHMENT 2
TCEQ FORMS AND TABLES

OIL AND GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TCEQ

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission *(If other is checked please describe in space provided)*

☑ New Permit, Registration or Authorization *(Core Data Form should be submitted with the program application)*

☐ Renewal *(Core Data Form should be submitted with the renewal form)* ☐ Other

2. Attachments **Describe Any Attachments:** *(ex. Title V Application, Waste Transporter Application, etc.)*

☑ Yes ☐ No Oil and Gas Standard Permit Registration

3. Customer Reference Number *(if issued)*	Follow this link to search for CN or RN numbers in Central Registry**	4. Regulated Entity Reference Number *(if issued)*
CN 602989436		RN 106486327

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)

6. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check only one of the following:*

☐ Owner ☐ Operator ☑ Owner & Operator
☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

7. General Customer Information

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐ Change in Legal Name (Verifiable with the Texas Secretary of State) ☑ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:	☐ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name *(If an individual, print last name first: ex: Doe, John)*	*If new Customer, enter previous Customer below*	*End Date:*

10. Mailing Address:

City		State		ZIP		ZIP + 4	

11. Country Mailing Information *(if outside USA)*	12. E-Mail Address *(if applicable)*

13. Telephone Number	14. Extension or Code	15. Fax Number *(if applicable)*

16. Federal Tax ID *(9 digits)*	17. TX State Franchise Tax ID *(11 digits)*	18. DUNS Number *(if applicable)*	19. TX SOS Filing Number *(if applicable)*

20. Number of Employees

☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

21. Independently Owned and Operated?

☐ Yes ☐ No

SECTION III: Regulated Entity Information

22. General Regulated Entity Information *(If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☑ Update to Regulated Entity Information ☐ No Change** *(See below)*

If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.

23. Regulated Entity Name *(name of the site where the regulated action is taking place)*

Borgfeld Unit A1 and Culpepper Unit A1

24. Street Address of the Regulated Entity: (No P.O. Boxes)								
	City		State		ZIP		ZIP + 4	
25. Mailing Address:	600 N Dairy Ashford							
	Westlake 3, #15012							
	City	Houston	State	TX	ZIP	77079	ZIP + 4	

26. E-Mail Address:	james.woodall@conocophillips.com

27. Telephone Number	28. Extension or Code	29. Fax Number (if applicable)
(832) 486-6508		832-486-6431

30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)	33. Secondary NAICS Code (5 or 6 digits)
1311		211111	

34. What is the Primary Business of this entity? (Please do not repeat the SIC or NAICS description.)

Natural Gas Production

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	From the intersection of TX-119 and US-72 in Yorktown, TX, travel north on TX-119 for 7.1 miles. Turn right onto Co. Rd. 3019/H Koopmann Rd. and continue for 1.6 miles. Lease entrance will be on the right.

36. Nearest City	County	State	Nearest ZIP Code
Yorktown	DeWitt	TX	78164

37. Latitude (N) In Decimal:			38. Longitude (W) In Decimal:		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
29	4	3	97	34	56

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☑ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
☐ Stormwater	☐ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	James Woodall	41. Title:	Sr. Environmental Specialist

42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(832) 486-6508	N/A		james.woodall@conocophillips.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Burlington Resources Oil & Gas Company LP	Job Title:	Manager of Production Operations-GCBU
Name(In Print) :	Randy Black	Phone:	(832) 486-6508
Signature:	RB	Date:	8/23/12

Texas Commission on Environmental Quality
Form PI-1S
Registrations for Air Standard Permit
(Page 1)

I. Registrant Information			
A. Is a TCEQ Core Data Form (TCEQ Form No. 10400) attached? Core Data Form required for Standard Permits 6004, 6006, 6007, 6008, and 6013.			☒ YES ☐ NO
Customer Reference Number (CN): CN602989436			
Regulated Entity Number (RN): RN106486327			
B. Company or Other Legal Customer Name (must be same as Core Data "Customer"): Burlington Resources Oil & Gas Company LP			
Company Official Contact Name: Randy Black			
Title: Manager of Production Operations- GCBU			
Mailing Address: 600 N Dairy Ashford, Westlake 3, #15012			
City: Houston	State: TX	ZIP Code: 77079	
Phone No.: 832-486-6508	Fax No.: 832-486-6431	E-mail Address: randy.c.black@conocophillips.com	
C. Technical Contact Name: James Woodall			
Title: Sr. Environmental Specialist			
Mailing Address: 600 N Dairy Ashford, Westlake 3, #15012			
City: Houston	State: TX	ZIP Code: 77079	
Phone No.: 832-486-6508	Fax No.: 832-486-6431	E-mail Address: james.woodall@conocophillips.com	
D. Facility Location Information (Street Address):			
If no street address, provide clear driving directions to the site in writing:			
From the intersection of TX-119 and US-72 in Yorktown, TX, travel north on TX-119 for 7.1 miles. Turn right onto Co. Rd. 3019/H Koopmann Rd. and continue for 1.6 miles. Lease entrance will be on the right.			
City: Yorktown	County: DeWitt	ZIP Code: 78164	
Latitude (nearest second): 29°4'3"N	Longitude (nearest second): 97°34'56"W		
II. Facility and Site Information			
A. Name and Type of Facility: Borgfeld Unit A1 and Culpepper Unit A1			☒ Permanent ☐ Portable
B. Type of Action:	☒ Initial Application	☐ Renewal	☐ Change to Registration
	Registration No.: 104974		☐ Expiration Date:
C. List the Standard Permit Claimed: 6002			
Description: Oil and Gas Facilities			
D. Concrete Batch Plant Standard Permit: *(Check one)*			
☐ Central Mix ☐ Ready Mix ☐ Specialty Mix ☐ Enhanced Controls for Concrete Batch Plants			

Texas Commission on Environmental Quality
Registrations for Air Standard Permit
PI-1S
(Page 2)

II.	**Facility and Site Information** ***(continued)***	
E.	Proposed Start of Construction: NA	Length of Time at the Site:
F.	Is there a previous Standard Exemption or Permit by Rule for the facilities in this registration? *(Attach details regarding changes)*	☐ YES ☒ NO
If "YES," list Permit No.:		
G.	Are there any other facilities at this site which are authorized by an air Standard Permit?	☐ YES ☒ NO
If "YES," list Permit No.:		
H.	Are there any other air preconstruction permits at this site?	☐ YES ☒ NO
If "YES," list Permit No.:		
Are there any other air preconstruction permits at this site that would be directly associated with this project?		☐ YES ☒ NO
If "YES," list Permit No.:		
I.	TCEQ Account Identification Number (if known):	
J.	Is this facility located at a site which is required to obtain a federal operating permit pursuant to 30 TAC Chapter 122?	☐ YES ☒ NO ☐ To Be Determined
K.	Identify the requirements of 30 TAC Chapter 122 that will be triggered if this Form PI-1S application is approved.	
☐ Application for an FOP	☐ FOP Significant Revision	☐ FOP Minor
☐ Operational Flexibility/Off-Permit Notification	☐ Streamlined Revision for GOP	
☐ To Be Determined	☒ None	
L.	Identify the type(s) issued and/or FOP application(s) submitted/pending for the site. *(check all that apply)*	
☐ SOP ☐ GOP	☐ GOP Application/Revision Application: Submitted or Under APD Review	
☐ SOP Application Review Application: Submitted or Under APD Review		☒ N/A
III.	**Fee Information**	
A.	Is a copy of the check or money order attached?	☒ YES ☐ NO
Check/Money Order/Transaction Number		
Company name on Check: TITAN Engineering, Inc.		
Fee Amount: $850.00		

Texas Commission on Environmental Quality
Registrations for Air Standard Permit

PI-1S
(Page 3)

IV.	**Public Notice *(If* Applicable*)***	
A.	Is the plant located at a site contiguous or adjacent to the public works project?	☐ YES ☐ NO
B.	Name of Public Place:	
Physical Address:		
City:	County:	
C.	Small Business Classification:	☐ YES ☐ NO
D.	Concrete batch plants with enhanced controls, permanent rock crushers, and animal carcass incinerators shall place a copy of the technically complete application at the appropriate TCEQ regional office only.	
E.	Please furnish the names of the state legislators who represent the area where the facility site is located:	
State Senator:		
State Representative:		
F.	For Concrete Batch Plants, name of the County Judge for this facility site:	
County Judge:		
Mailing Address:		
City:	State:	ZIP Code:
G.	For Concrete Batch Plants, is the facility located in a municipality and/or extraterritorial jurisdiction of a municipality?	☐ YES ☐ NO
If "YES," list the name(s) of the Presiding Officer(s) for the municipality and/or extraterritorial jurisdiction:		
Title:		
Mailing Address:		
City:	State:	ZIP Code:
V.	**Technical Information Including State and Federal Regulatory Requirements** ***Registrants must be in compliance with all applicable state and federal regulations and standards to claim a Standard Permit.***	
A.	Is confidential information submitted and properly marked with this registration?	☐ YES ☒ NO
B.	Is a process flow diagram and a process description attached?	☒ YES ☐ NO
C.	Is a plot plan attached?	☒ YES ☐ NO
D.	Are emissions data and calculations for this claim attached?	☒ YES ☐ NO
E.	Is information attached showing how the general requirements and applicability (30 TAC § 116.610 and 116.615) are met?	☒ YES ☐ NO
F.	Is information attached showing how the specific requirements are met?	☒ YES ☐ NO

Texas Commission on Environmental Quality
Form PI-1S
General Application for Air Permit Renewals
(Page 4)

VI. Signature Requirements
The signature below indicates that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7, Texas Clean Air Act (TCAA), as amended, or any of the air quality rules and regulations of the Texas Commission on Environmental Quality or any local governmental ordinance or resolution enacted pursuant to the TCAA. I further state that I have read and understand TWC §§ 7.177 7.183, which defines ***Criminal Offenses*** for certain violations, including intentionally or knowingly making or causing to be made false material statements or representations in this application, and TWC §§ 7.187, pertaining to ***Criminal Penalties***.
Name: Randy Black *Print Full Name*
Signature: R Black *Original Signature Required*
Date: 8/23/12

CASH ONLY IF ALL CheckLock™ SECURITY FEATURES LISTED ON BACK INDICATE NO TAMPERING OR COPYING

TITAN ENGINEERING, INC.
2801 NETWORK BLVD, SUITE 200
FRISCO, TX 75034

BANK OF TEXAS, NA
DALLAS, TX
32-1432/1110

24947

8/27/2012

PAY TO THE ORDER OF TCEQ $ **850.00

Eight Hundred Fifty and 00/100********** DOLLARS

Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

VOID AFTER 90 DAYS

MEMO Agency Fee: 84800507-72.004

⑈024947⑈ ⑆111014325⑆ ⑈8092671152⑈

Details on Back

Intuit® CheckLock™ Secure Check

TITAN ENGINEERING, INC. 24947

TCEQ 8/27/2012

Date	Type	Reference	Original Amt.	Balance Due	Discount	Payment
8/27/2012	Bill	84800507-72.004	850.00	850.00		850.00
				Check Amount		850.00

Bank of Texas Operati Agency Fee: 84800507-72.004 850.00

Texas Commission on Environmental Quality

OGS New Project Notification for New Registration

Site Information (Regulated Entity)

What is the name of the site to be authorized?	Borgfeld Unit A1 & Culpepper Unit A1
Does the site have a physical address?	
County	DEWITT
Latitude (N) (##.######)	29.067527
Longitude (W) (-###.######)	-97.582127
Primary SIC Code	1311
Secondary SIC Code	
Primary NAICS Code	211111
Secondary NAICS Code	
Regulated Entity Site Information	
What is the Regulated Entity's Number (RN)?	
What is the name of the Regulated Entity (RE)?	Borgfeld Unit A1 & Culpepper Unit A1
Does the RE site have a physical address?	No
Because there is no physical address, describe how to locate this site:	From the intersection of TX-119 and US-72 in Yorktown, TX., Travel north on TX 119 for 7.1 miles. Turn right onto Co. Rd. 3019/H Koopmann Rd and continue for 1.6 miles. Lease entrance will be on the right.
City	Yorktown
State	TX
ZIP	78164
County	DEWITT
Latitude (N) (##.######)	29.067527
Longitude (W) (-###.######)	-97.582127
What is the primary business of this entity?	Natural Gas Production

Burling-Customer (Applicant) Information

How is this applicant associated with this site?	Owner Operator
What is the applicant's Customer Number (CN)?	CN602989436
Type of Customer	Corporation
Full legal name of the applicant:	
Legal Name	Burlington Resources Oil & Gas Company LP
Texas SOS Filing Number	14500511
Federal Tax ID	
State Franchise Tax ID	32003073841
DUNS Number	131117566
Number of Employees	501+

Independently Owned and Operated?	Yes
I certify that the full legal name of the entity applying for this permit has been provided and is legally authorized to do business in Texas.	Yes
Responsible Authority Contact	
Organization Name	Burlington Resources Oil & Gas Company LP
Prefix	MR
First	James
Middle	
Last	Woodall
Suffix	
Title	Sr. Environmental Specialist
Responsible Authority Mailing Address	
Enter new address or copy one from list:	
Address Type	Domestic
Mailing Address (include Suite or Bldg. here, if applicable)	600 N DAIRY ASHFORD ST
Routing (such as Mail Code, Dept., or Attn:)	Westlake 3, #15012
City	HOUSTON
State	TX
ZIP	77079
Phone (###-###-####)	8324866508
Extension	
Alternate Phone (###-###-####)	
Fax (###-###-####)	8324866431
E-mail	james.woodall@conocophillips.com

Responsible Official Contact

Person TCEQ should contact for questions about this application:	
Same as another contact?	
Organization Name	Burlington Resources Oil & Gas Company LP
Prefix	MR
First	Randy
Middle	
Last	Black
Suffix	
Title	Manager of Puduction Operations- GCBU
Enter new address or copy one from list:	Burlington Resources Oil & Gas Company LP
Mailing Address	
Address Type	Domestic
Mailing Address (include Suite or Bldg. here, if applicable)	600 N DAIRY ASHFORD ST
Routing (such as Mail Code, Dept., or Attn:)	Westlake 3, #15012

City	HOUSTON
State	TX
ZIP	77079
Phone (###-###-####)	8324866508
Extension	
Alternate Phone (###-###-####)	
Fax (###-###-####)	8324866431
E-mail	randy.c.black@conocophillips.com

Technical Contact

Person TCEQ should contact for questions about this application:	
Same as another contact?	Burlington Resources Oil & Gas Company LP
Organization Name	Burlington Resources Oil & Gas Company LP
Prefix	MR
First	James
Middle	
Last	Woodall
Suffix	
Title	Sr. Environmental Specialist
Enter new address or copy one from list:	Burlington Resources Oil & Gas Company LP
Mailing Address	
Address Type	Domestic
Mailing Address (include Suite or Bldg. here, if applicable)	600 N DAIRY ASHFORD ST
Routing (such as Mail Code, Dept., or Attn:)	Westlake 3, #15012
City	HOUSTON
State	TX
ZIP	77079
Phone (###-###-####)	8324866508
Extension	
Alternate Phone (###-###-####)	
Fax (###-###-####)	8324866431
E-mail	james.woodall@conocophillips.com

OGS New Project Notification

1) Select the authorization this site or changes to this site will most likely be authorized under based on expected worst-case operations (including planned MSS activities if MSS emissions are being registered with this project).	6002 - NON RULE 2011-FEB-27
2) What is the lease name submitted to the	NA

Railroad Commission (RRC)? If there are well(s) co-located with the site, include the well number(s) assigned by the RRC.	
3) Provide a brief process description for this site or description of changes to this site.	The production site extracts natural gas from the wellhead and sends down the pipeline. Hydrocarbon Liquids are collected and sent off site periodically.
4) What is the site's latitude? (North)	29.067527
5) What is the site's longitude? (West)	-97.582127
6) What method was used to determine the site's latitude and longitude?	Map
7) Does this business qualify as a small business, non-profit organization, or small government entity?	No

Signature

The signature below indicates to the best of my knowledge that the information submitted is true and complete, and that I have signature authority to submit this application on behalf of the regulated entity.

1. I am James Woodall, the owner of the STEERS account ER020324.
2. I have the authority to sign this data on behalf of the applicant named above.
3. I have personally examined the foregoing and am familiar with its content and the content of any attachments, and based upon my personal knowledge and/or inquiry of any individual responsible for information contained herein, that this information is true, accurate, and complete.
4. I further certify that I have not violated any term in my TCEQ STEERS participation agreement and that I have no reason to believe that the confidentiality or use of my password has been compromised at any time.
5. I understand that use of my password constitutes an electronic signature legally equivalent to my written signature.
6. I also understand that the attestations of fact contained herein pertain to the implementation, oversight and enforcement of a state and/or federal environmental program and must be true and complete to the best of my knowledge.
7. I am aware that criminal penalties may be imposed for statements or omissions that I know or have reason to believe are untrue or misleading.
8. I am knowingly and intentionally signing OGS New Project Notification for New Registration.
9. My signature indicates that I am in agreement with the information on this form, and authorize its submittal to the TCEQ.

OWNER OPERATOR Signature: James Woodall OWNER OPERATOR

Account Number:	ER020324
Signature IP Address:	138.32.80.20
Signature Date:	2012-07-31
Signature Hash:	AA06BD67D3B72ED49336BE1B65B794CDB78BFA0ECB7C0D5E82BDCEE54CEC562C
Form Hash Code at time of Signature:	ABF993DAF0014DADC3E68F4CD06DC44D36DEB8D82FF6D68B35C5607C88C4BD0D

Fee Payment

Transaction by:	The application fee payment transaction was

	made by ER025071/Christina I Chermak
Paid by:	The application fee was paid by CHRISTINA CHERMAK
Fee Amount:	50
Paid Date:	The application fee was paid on 2012-08-08
Transaction/Voucher number:	The transaction number is 582EA000125718 and the voucher number is 159576

Submission

Reference Number:	The application reference number is 52612
Submitted by:	The application was submitted by ER025071/Christina I Chermak
Submitted Timestamp:	The application was submitted on 2012-08-08 at 17:28:13 CDT
Submitted From:	The application was submitted from IP address 12.237.12.100
Confirmation Number:	The confirmation number is 58645
Steers Version:	The STEERS version is 5.80

Additional Information

Application Creator: This account was created by Christina I Chermak

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emissions Point Summary

Permit Number:	104974	RN Number:	RN106486327	Date:	August 2012
Company Name:	Burlington Resources Oil & Gas Company LP				

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA						EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate		4. UTM Coordinates of Emission Point			5. Building Height (ft)	Source						
										6. Height Above Ground (ft)	7. Stack Exit Data			8. Fugitives		
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)	Zone	East (meters)	North (meters)			Diameter (ft) (A)	Velocity (fps) (B)	Tempera-ture (°F) (C)	Length (ft) (A)	Width (ft) (B)	Axis Degrees (C)
Normal Operations																
FUG	FUG	Site Fugitives	VOC	1.06	4.66	14	--	--	--	3.0	--	--	--	--	--	--
			Benzene	0.004	0.01											
			H_2S	0.0004	0.001											
FL-1	TK-01	Controlled Condensate Tank Emissions	VOC	4.14	11.43	14	--	--	--	30.0	--	--	--	--	--	--
	TK-02		Benzene	0.01	0.02											
	TK-03		H_2S	0.001	0.003											
	TK-04															
	TK-05															
	TK-06															
FL-1	TK-07	Controlled PW Tank Emissions	VOC	0.09	0.34	14	--	--	--	30.0	--	--	--	--	--	--
	TK-08		Benzene	0.0002	0.001											
			H_2S	0.00002	0.0001											
FL-1	TRUCK1	Controlled Condensate Truck Loading	VOC	0.99	0.94	14	--	--	--	30.0	--	--	--	--	--	--
			Benzene	0.003	0.002											
FL-1	TRUCK2	Controlled Produced Water Truck Loading	VOC	0.48	0.19	14	--	--	--	30.0	--	--	--	--	--	--
			Benzene	0.001	0.0004											
FL-1	FL-1	Flare Combustion (normal operations waste gas, assist, and pilot)	CO	2.99	7.71	14	--	--	--	30.0	--	--	--	--	--	--
			NO_X	1.50	3.85											
			SO_2	0.09	0.42											
			H_2S	0.002	0.01											
			VOC	0.01	0.04											
			Benzene	0.000003	0.00001											

EFSCOP00002214

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emissions Point Summary

Permit Number:	104974	RN Number:	RN106486327	Date:	August 2012
Company Name:	Burlington Resources Oil & Gas Company LP				

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA						EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate		4. UTM Coordinates of Emission Point			5. Building Height (ft)	Source						
										6. Height Above Ground (ft)	7. Stack Exit Data			8. Fugitives		
EPN (A)	FIN (B)	NAME (C)		Pounds per Hour (A)	TPY (B)	Zone	East (meters)	North (meters)			Diameter (ft) (A)	Velocity (fps) (B)	Tempera-ture (°F) (C)	Length (ft) (A)	Width (ft) (B)	Axis Degrees (C)
Scheduled Maintenance Startup and Shutdown Events																
FL-1	SEP-GAS	Low Pressure Separator Gas to Flare	VOC	97.06	25.51	14	--	--	--	30.0	--	--	--	--	--	--
			Benzene	0.35	0.09											
			H_2S	0.06	0.02											
FL-1	FL-1	Flare Combustion (lp separator waste gas)	CO	57.45	15.10	14	--	--	--	30.0	--	--	--	--	--	--
			NO_X	28.78	7.56											
			SO_2	5.42	1.81											
			H_2S	0.06	0.02											
TK-01	TK-01	Uncontrolled Condensate Tank Standing Loss Emissions (during flare downtime)	VOC	7.82	0.69	14	--	--	--	25.0	--	--	--	--	--	--
TK-02	TK-02		Benzene	0.02	0.002											
TK-03	TK-03															
TK-04	TK-04															
TK-05	TK-05															
TK-06	TK-06															
TK-07	TK-07	Uncontrolled PW Tank Standing Loss Emissions (during flare downtime)	VOC	0.002	0.0002	14	--	--	--	25.0	--	--	--	--	--	--
TK-08	TK-08		Benzene	0.000004	0.0000004											

2-14

ATTACHMENT 3
EMISSION RATE CALCULATIONS

OIL AND GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TABLE 3-1
SUMMARY OF PROPOSED ALLOWABLE EMISSION RATES
OIL & GAS STANDARD PERMIT REGISTRATION
BORGFELD UNIT A1 AND CULPEPPER UNIT A1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

			Proposed Allowable Hourly and Annual Emission Rates													
			CO		NO_X		$PM/PM_{10}/PM_{2.5}$		SO_2		VOC		Benzene		H_2S	
EPN	FIN	Description	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Normal Operations																
FUG	FUG	Site Fugitives	--	--	--	--	--	--	--	--	1.06	4.66	0.004	0.01	0.0004	0.001
FL-1	TK-01 TK-02 TK-03 TK-04 TK-05 TK-06	Controlled Condensate Tank Emissions	--	--	--	--	--	--	--	--	4.14	11.43	0.01	0.02	0.001	0.003
FL-1	TK-07 TK-08	Controlled PW Tank Emissions	--	--	--	--	--	--	--	--	0.09	0.34	0.0002	0.001	0.00002	0.0001
FL-1	TRUCK1	Controlled Condensate Truck Loading	--	--	--	--	--	--	--	--	0.99	0.94	0.003	0.002	--	--
FL-1	TRUCK2	Controlled Produced Water Truck Loading	--	--	--	--	--	--	--	--	0.48	0.19	0.001	0.0004	--	--
FL-1	FL-1	Flare Combustion (normal operations waste gas, assist, and pilot)	2.99	7.71	1.50	3.85	--	--	0.09	0.42	0.01	0.04	0.000003	0.00001	0.002	0.01
Scheduled Maintenance, Startup and Shutdown Events																
FL-1	SEP-GAS	Low Pressure Separator Gas to Flare	--	--	--	--	--	--	--	--	97.06	25.51	0.35	0.09	0.06	0.02
FL-1	FL-1	Flare Combustion (lp separator waste gas)	57.45	15.10	28.78	7.56	--	--	5.42	1.81	--	--	--	--	0.06	0.02
TK-01 TK-02 TK-03 TK-04 TK-05 TK-06	TK-01 TK-02 TK-03 TK-04 TK-05 TK-06	Uncontrolled Condensate Tank Standing Loss Emissions (during flare downtime)	--	--	--	--	--	--	--	--	7.82	0.69	0.02	0.002	--	--
TK-07 TK-08	TK-07 TK-08	Uncontrolled PW Tank Standing Loss Emissions (during flare downtime)	--	--	--	--	--	--	--	--	0.002	0.0002	0.000004	0.0000004	--	--
		Site-Wide Emissions:	**60.44**	**22.81**	**30.28**	**11.41**	**0.00**	**0.00**	**5.51**	**2.23**	**111.65**	**43.80**	**0.39**	**0.13**	**0.12**	**0.05**

EFSCOP00002217

CALCULATION OF SITE FUGITIVES (FIN FUG) POTENTIAL TO EMIT

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Component	Number of Components	Emission Factors [a] (lb/hr-component)	Annual Operating Hours (hr/yr)	Maximum VOC[a] (wt%)	Maximum Benzene[a] (wt%)	Maximum H_2S (wt%)	Reduction Credit [a] (%)	PTE VOC		PTE Benzene		PTE H_2S	
								Hourly [b] (lb/hr)	Annual [c] (T/yr)	Hourly [b] (lb/hr)	Annual [c] (T/yr)	Hourly [b] (lb/hr)	Annual [c] (T/yr)
Valves													
Gas Streams	86	0.00992	8,760	50%	0.18%	0.03%	0%	0.43	1.87	0.002	0.01	0.0003	0.001
Light Oil	74	0.0055	8,760	100%	0.26%	--	0%	0.41	1.78	0.001	0.00	--	--
Water/Light Oil	85	0.000216	8,760	--	0.02%	--	0%	0.02	0.08	0.000004	0.00002	--	--
Pumps													
Water/Light Oil	1	0.000052	8,760	--	0.02%	--	0%	0.0001	0.0002	0.00000001	0.00000005	--	--
Flanges													
Gas Streams	144	0.00086	8,760	50%	0.18%	0.03%	0%	0.06	0.27	0.0002	0.001	0.00004	0.0002
Light Oil	76	0.000243	8,760	100%	0.26%	--	0%	0.02	0.08	0.00005	0.0002	--	--
Water/Light Oil	16	0.000006	8,760	--	0.02%	--	0%	0.0001	0.0004	0.00000002	0.0000001	--	--
Connectors													
Gas Streams	157	0.00044	8,760	50%	0.18%	0.03%	0%	0.03	0.15	0.0001	0.001	0.00002	0.0001
Light Oil	138	0.000463	8,760	100%	0.26%	--	0%	0.06	0.28	0.0002	0.001	--	--
Water/Light Oil	141	0.000243	8,760	--	0.02%	--	0%	0.03	0.15	0.00001	0.00003	--	--
							TOTAL:	1.06	4.66	0.004	0.01	0.0004	0.001

[a] Fugitive Emission Factors and Reduction Credits are per TCEQ Technical Guidance Document for Equipment Leak Fugitives, dated October 2000. The emission factors are for total hydrocarbon, except for the emission factors associated with Water/Light Oil. As indicated on page 6 of 55 in the mentioned Guidance document, these factors are based off of a known stream constituency of 50%-99% water, and remainder VOC. Therefore, applying a VOC wt % would be double counting for the reduction due to water.

[b] Hourly VOC emission rates are calculated as follows:
(86 components) * (0.00992 lb/hr-component) * (50% VOC) * (100% - 0% reduction credit) = 0.43 lb/hr

[c] Annual VOC emission rates are calculated as follows:
(86 components) * (0.00992 lb/hr-component) * (8,760 hr/yr) * (50% VOC) * (100% - 0% reduction credit) / (2,000 lb/T) = 1.87 T/yr

EFSCOP00002218

SUMMARY OF TANKS SENT TO FLARE POTENTIAL TO EMIT

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

			VOC Emissions								Benzene Emissions								H_2S Emissions[c]			
			Flash Emissions[a]		WB Emissions[b]		Uncontrolled Total		Controlled Total[d]		Flash Emissions[a]		WB Emissions[b]		Uncontrolled Total		Controlled Total[d]		Uncontrolled Total		Controlled Total[d]	
EPN	FIN	Description	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)	Hourly (lb/hr)	Annual (T/yr)
FL-1	TK-01 TK-02 TK-03 TK-04 TK-05 TK-06	500 bbl Condensate Storage Tanks	118.39	518.55	88.46	53.13	206.85	571.68	4.14	11.43	0.17	0.74	0.23	0.14	0.40	0.88	0.01	0.02	0.03	0.13	0.001	0.003
FL-1	TK-07 TK-08	500 bbl Produced Water Storage Tanks	3.82	16.73	0.89	0.03	4.71	16.76	0.09	0.34	0.01	0.04	0.002	0.0001	0.01	0.04	0.0002	0.001	0.001	0.004	0.00002	0.0001

Notes:

[a] VOC and Benzene Flash Emissions are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs and emissions reports.

[b] The Working/Breathing emissions are calculated using AP 42 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

[c] The Ideal Gas Law was used to estimate the H2S emission rates using the maximum sulfur concentration in the gas coming off the tanks (200 ppm). An example calculation for hourly H2S emissions from FIN TK-07 and TK-08 follows:

H_2S (lb/hr) = (% Vol H_2S in stream) * (Total Volumetric Flow of Gas, scf/hr) * (1 atm STP) * (34.0798 lb/lb-mol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

H_2S (lb/hr) = (200 ppm /10^6) * (59.96 scf/hr) * (1 atm) * (34.0789 lb/lbmol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

H_2S (lb/hr) = 0.001 lb/hr

[d] All VOC tank emissions are routed to the flare control device with a capture and control efficiency of 98%. H_2S emissions are captured at 98% and then 98% converted to SO_2 during combustion.

EFSCOP00002219

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L_T	total loss = Ls + Lw	Ton/yr	See Table
L_S	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
L_W	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
L_H	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	12.26
ΔPb	Breather vent pressure range	psi	0.06
I	Solar insolation factor	Btu/ft2-day	1521
P_A	Atmospheric Pressure	psia	14.7
Mv	Vapor Molecular Weight	lb/lb-mol	37
T	Annual Average Temperature	°F	72.1
T_{AX}	Daily Maximum Ambient Temperature	°R	541.6
T_{AN}	Daily Minimum Ambient Temperature	°R	522.5
ΔT_A	Daily average ambient temperature range	°R	19.1
Kp	Product factor		1

		Tank Specifications							Material Specifications																	VOC		Benzene	
		V/H	D	H/L	Capacity	Color		α	Mv	P_{MAX}	Q^2		ΔTv	Hvo	Vv	T_{LA}	P_{VA}	Wv	ΔPv	Ko	Ks	Kn	L_S	L_W	L_T	L_H	L_T	L_H
Material	No. of Tanks	Tank Type	Tank Diameter (ft)	Tank Height/ Length (ft)	Tank Capacity (bbl)	Paint Color	Paint Conditions	Paint Solar Absorbance Factor	Vapor Molecular Weight	Reid Vapor Pressure (psia)	Max. Hourly Thruput (bbl/hr)	Annual Thruput (bbl)	Daily Vapor Temp. Range °F	Vapor Space Outage (ft)	Vapor Space Volume (ft3)	Daily Average Liquid Surface Temp °R	Average Vapor Pressure (psia)	Vapor Density (lb/ft3)	Daily Vapor Pressure Range	Vapor Space Expan. Factor	Vented Vapor Sat. Factor	Turnover Factor	Standing Loss per tank (lb/yr)	Working Loss per tank (lb/yr)	Total Loss (lb/hr)	Total Loss (T/yr)	Total Loss (lb/hr)	Total Loss (T/yr)
Condensate	6	V	12	25	500	Gray	Good	0.54	37	12.26	195	365,000	36.75	12.63	1428.4	539.8	13.313	0.08504	3.53719	2.5751	0.10	0.21	68,504.20	37,756.33	86.46	53.13	0.23	0.14
PW	2	V	12	25	500	Gray	Good	0.54	37	0.123	195	146,000	36.75	12.63	1428.4	539.8	0.036	0.00023	0.02227	0.9662	0.98	0.27	16	52.51	0.89	0.03	0.002	0.0001

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

EFSCOP00002220

CALCULATION OF TRUCK LOADING POTENTIAL TO EMIT

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Sample Calculations for condensate:

Loading Loss (lb/Mgal) = 12.46 * S * P * M / T (AP-42 Section 5.2)
Maximum Loading Loss = 12.46 * 0.60 * 12.260 * 37 / 560 = 6.056 lb/Mgal

Annual Emissions = (Annual Throughput, Mgal/yr) * (Average Loading Loss, lb/Mgal) * (1 - Control Efficiency) / (2000 lb/T)
Annual Emissions = (15330.00 Mgal/yr) * (6.149 lb/Mgal) * (1 - 0.98) / (2000 lb/T) = 0.94 T/yr

Hourly PTE = (Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (1 - Control Efficiency)
Hourly PTE = (8.19 Mgal/yr) * (6.056 lb/Mgal) * (1 - 0.98) = 0.99 lb/hr

												VOC		Benzene	
FIN	EPN	Facility Name	S	P @ 560 °R (psia)	P @531.7 °R (psia)	M	Maximum Loading Loss (lb/Mgal)	Average Loading Loss (lb/Mgal)	Hourly Throughput (Mgal/hr)	Annual Throughput (Mgals/yr)	Capture and Control Efficiency	Hourly PTE (lb/hr)	Annual PTE (T/yr)	Hourly PTE (lb/hr)	Annual PTE (T/yr)
TRUCK1	FL-1	Condensate Truck Loading	0.60	12.26	11.820	37	6.056	6.149	8.19	15,330.00	0.98	0.99	0.94	0.003	0.002
TRUCK2	FL-1	Produced Water Truck Loading	0.60	0.12	0.026	37	0.059	0.062	8.19	6,132.00	0.98	0.48	0.19	0.001	0.0004

Daily maximum and daily minimum ambient temperature from Tanks 4.09d for this area's annual averages (81.6 and 62.5, for average of 72.1).

Annual Average Condensate Vapor Pressure at T_{LA}:
P = exp{ [(2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82}
exp{ [(2799/(72.1+459.6) - 2.227]log10(12.26) - 7261/(72.1+459.6) + 12.82}
11.820 psia

Annual Average Produced Water Vapor Pressure at T_{LA}:
P = exp{ [(2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82}
exp{ [(2799/(72.1+459.6) - 2.227]log10(12.26*.01) - 7261/(72.1+459.6) + 12.82}
0.026 psia

EFSCOP00002221

SUMMARY OF PROCESS FLARE FUEL GAS COMBUSTION AND
WASTE GAS COMBUSTION POTENTIAL TO EMIT- NORMAL OPERATIONS

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	CO		NO_X		SO_2		H_2S		VOC		Benzene	
			(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
FL-1	FL-1	Pilot Gas Combustion	0.01	0.04	0.003	0.01	0.001	0.002	0.0000002	0.000001	0.0001	0.0004	0.00000003	0.0000001
FL-1	FL-1	Flare Assist Gas Combustion	0.44	1.93	0.22	0.96	0.04	0.18	0.00001	0.00004	0.01	0.04	0.000003	0.00001
FL-1	FL-1	Waste Gas Combustion	2.54	5.74	1.28	2.88	0.05	0.24	0.002	0.01	--	--	--	--
		Totals:	**2.99**	**7.71**	**1.50**	**3.85**	**0.09**	**0.42**	**0.002**	**0.01**	**0.01**	**0.04**	**0.000003**	**0.00001**

NOTE: Pilot Gas Combustion and Flare Assist Gas Combustion calculations are shown on the following page. Waste Gas Combustion shown here is the combined sum of the waste gas from the Condensate and Produced Water tanks and loading operations shown on subsequent pages.

EFSCOP00002222

CALCULATION OF FLARE PILOT GAS and FLARE ASSIST GAS POTENTIAL TO EMIT

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV (Btu/scf)	Heat Release scf/hr	Operating Hours (hr/yr)	Pollutant	Emission Factors	Units	Emission Rates Hourly [a] (lb/hr)	Emission Rates Annual [b] (T/yr)
FL-1	FL-1	Flare 1- Process Pilot Gas Combustion	1,292	15	8,760	CO	0.2755	lb/MMBtu	0.01	0.04
						NO_X	0.138	lb/MMBtu	0.003	0.01
						$PM/PM_{10}/PM_{2.5}$	-- [c]	--	--	--
						SO_2	200	ppm H_2S	0.0005	0.002
						H_2S	200	ppm H_2S	0.0000002	0.000001
						VOC	5.5	lb/MMscf	0.0001	0.0004
						Benzene	0.0021	lb/MMscf	0.00000003	0.0000001
FL-1	FL-1	Flare 1- Process Flare Assist Gas Combustion	1,292	1,250	8,760	CO	0.2755	lb/MMBtu	0.44	1.93
						NO_X	0.138	lb/MMBtu	0.22	0.96
						$PM/PM_{10}/PM_{2.5}$	-- [c]	--	--	--
						SO_2	200	ppm H_2S	0.04	0.18
						H_2S	200	ppm H_2S	0.00001	0.00004
						VOC	5.5	lb/MMscf	0.01	0.04
						Benzene	0.0021	lb/MMscf	0.000003	0.00001

[a] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for other high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1 follows:

CO (lb/hr) = (Heat Release, scf/hr) * (Lower Heating Value, Btu/scf) * ($MM/10^6$)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (15 scf/hr) * (1,292 Btu/scf) * (MM/10^6)*(0.2755 lb/MMBtu)

= 0.01 lb/hr CO

The Emission Factors for VOC and Benzene were based upon AP-42 Table 1.4-2 and 1.4-3 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (lb/hr) = (Heat Release, scf/hr) * ($MM/10^6$) * (Emission Factor, lb/MMscf)

VOC (lb/hr) = (15 scf/hr) * (MM/10^6) * (5.5 lb/MMscf)

= 0.0001 lb/hr VOC

A material balance approach was used to estimate the SO_2 and H_2S emission rates using the maximum sulfur concentration in the natural gas. As shown in Figure 5-1, H_2S concentration at the site is conservatively represented at 150 ppm. When used as a pilot gas or flare assist gas, 98% of this concentration will be converted to SO_2, and 2% will remain uncombusted and unconverted. An example calculation for hourly SO_2 emissions for the pilot gas of EPN FL-01 follows:

SO_2 (lb/hr) = Heat Release (scf/hr)*(Sulfur Content, ppmv)*(98% conversion to SO_2)*(1 lb-mol/379 scf)*(34.065 lb H2S/lb-mol)*(64.06 lb SO_2/34.065 lb H2S)

SO_2 (lb/hr) = (15 scf/hr)*((200 ppm H2S)/(10^6 scf gas))*(98% converted to SO2)*(1 lb-mol/379 scf)*(34.065 lb H2S/lb-mol)*(64.06 lb SO2/34.065 lb H2S)

= 0.0005 lb/hr SO_2

[b] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Hourly Emissions, lb/hr)*(Annual Operating Hours, hr/yr)*(1 T/2,000 lb)

CO (T/yr) = (0.01 lb/hr)*(8,760 hr/yr)*(1 T/2,000 lb)

CO (T/yr) = 0.04 T/yr CO

[c] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

EFSCOP00002223

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS
OIL & GAS STANDARD PERMIT REGISTRATION
BORGFELD UNIT A1 AND CULPEPPER UNIT A1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV[a] (Btu/scf)	Waste Gas Flow Rate Hourly (MMBtu/hr)	Waste Gas Flow Rate Annual (MMBtu/yr)	Pollutant	Emission Factors	Units	Potential to Emit Hourly[b] (lb/hr)	Potential to Emit Annual[c] (T/yr)
FL-1	FL-1	Process Flare	1,925	8.30	40,012.84	CO	0.2755	lb/MMBtu	2.29	5.51
		Condensate Tanks and Loading				NO_X	0.1380	lb/MMBtu	1.15	2.76
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[e]	--	0.05	0.23
						H_2S	--[e]	--	0.001	0.003
FL-1	FL-1	Process Flare	1,895	0.91	1,684.69	CO	0.2755	lb/MMBtu	0.25	0.23
		Produced Water Tank and Loading				NO_X	0.1380	lb/MMBtu	0.13	0.12
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[e]	--	0.002	0.01
						H_2S	--[e]	--	0.001	0.003

[a] Waste gas stream lower heating value was taken from WinSim calculated stream value.

[b] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for other high-Btu flares. An example calculation for hourly CO emissions for EPN Fl-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (8.30 MMBtu/hr)*(0.2755 lb/MMBtu)

= 2.29 lb/hr CO

[c] H_2S emissions are routed from the tanks to the flare and from the seperator to the flare and then converted to SO_2. SO_2 emission rates were determined based on the combustion efficiency of 98% H_2S converted to SO_2. H_2S emitted at the flare is 2% of the stream not converted by combustion. An example calculation for hourly SO_2 emissions for EPN FL-1 follows:

SO_2 (lb/hr) = (Source H_2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO_2 at combustion) * (1 mol H_2S/34.07 lb H_2S) * (64.06 lb SO2/1 mol SO_2)

SO_2 (lb/hr) = (0.030 lb/hr H2S at Condensate Tanks)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)

= 0.05 lb/hr SO_2

[d] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, lb/MMBtu) * (1 T / 2,000 lb)

CO (T/yr) = (40,012.84 MMBtu/yr) * (0.2755 lb/MMBtu) * (1 T / 2,000 lb)

= 5.51 T/yr CO

[e] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

EFSCOP00002224

CALCULATION OF FLARE FEED RATES FROM FINs TK-01 THROUGH TK-06, and TRUCK1

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-01 through TK-06 and TRUCK1 Total Emissions:[a]

VOC Emissions (lb/hr):	256.35
VOC Emissions (TPY):	618.68
Hydrocarbon Emissions (lb/hr):	395.42
Hydrocarbon Emissions (TPY):	954.31

Constituent	Heating Value[b] (Btu/lb)	Condensate Tanks Flash Gas Weight (%)	TK-01 through TK-06 and TRUCK1 Emissions[c] Hourly (lb/hr)	TK-01 through TK-06 and TRUCK1 Emissions[c] Annual (T/yr)	Flare Feed Rate[d] Hourly (MMBtu/hr)	Flare Feed Rate[d] Annual (MMBtu/yr)
Methane	23,861	10.93%	43.22	104.31	1.01	4,878.32
Ethane	22,304	22.13%	87.51	211.19	1.91	9,232.35
Propane	21,646	29.01%	114.71	276.85	2.43	11,745.68
I-Butane	21,242	6.53%	25.82	62.32	0.54	2,594.65
N-Butane	21,293	14.95%	59.12	142.67	1.23	5,954.23
I-Pentane	21,025	4.62%	18.27	44.09	0.38	1,816.90
N-Pentane	21,072	4.68%	18.51	44.66	0.38	1,844.51
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	2.60%	10.28	24.81	0.21	1,017.68
Cyclohexane	20,195	0.25%	0.99	2.39	0.02	94.60
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.07%	4.23	10.21	0.09	416.74
Octanes	20,747	0.34%	1.34	3.24	0.03	131.75
Nonanes	20,687	0.10%	0.40	0.95	0.01	38.52
Decanes Plus	20,638	0.32%	1.27	3.05	0.03	123.37
Benzene	18,172	0.09%	0.36	0.86	0.01	30.63
Toluene	18,422	0.15%	0.59	1.43	0.01	51.63
Ethylbenzene	18,658	0.02%	0.08	0.19	0.001	6.95
Xylene	18,438	0.10%	0.40	0.95	0.01	34.33
	VOC	64.83%				
				Total:	**8.30**	**40,012.84**

[a] Total VOC Emissions were determined by adding the Uncontrolled Streams for FINs TK-01 through TK-06 on the Tank Summary table with the uncontrolled emissions from the Condensate Truck Loading FIN TRUCK1. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (256.35 lb/hr) * (1 / 64.83%)

Total HC (lb/hr) = 395.42 lb/hr

[b] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[c] Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the WinSim program.

[d] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = (23,861 Btu/lb) * (43.22 lb/hr) * 98% / (10^6)

MMBtu/hr Methane = 1.01 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = (23,861 Btu/lb) * (104.31 T/yr) * (2,000 lb/T) * 98% / (10^6)

MMBtu/yr Methane = 4,878.32 MMBtu/yr

CALCULATION OF FLARE FEED RATES FROM FINs TK-07, TK-08, and TRUCK2

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-07, TK-08 and TRUCK2 Total Emissions:[a]

VOC Emissions (lb/hr):	28.71
VOC Emissions (TPY):	26.26
Hydrocarbon Emissions (lb/hr):	44.28
Hydrocarbon Emissions (TPY):	40.50

Constituent	Heating Value[b] (Btu/lb)	Produced Water Tanks Flash Gas Weight (%)	TK-07, TK-08 and TRUCK2 Emissions[c] Hourly (lb/hr)	TK-07, TK-08 and TRUCK2 Emissions[c] Annual (T/yr)	Flare Feed Rate[d] Hourly (MMBtu/hr)	Flare Feed Rate[d] Annual (MMBtu/yr)
Methane	23,861	10.62%	4.70	4.30	0.11	201.10
Ethane	22,304	21.70%	9.61	8.79	0.21	384.26
Propane	21,646	28.75%	12.73	11.64	0.27	493.84
I-Butane	21,242	6.57%	2.91	2.66	0.06	110.75
N-Butane	21,293	15.06%	6.67	6.10	0.14	254.58
I-Pentane	21,025	4.66%	2.06	1.89	0.04	77.89
N-Pentane	21,072	4.72%	2.09	1.91	0.04	78.89
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	2.62%	1.16	1.06	0.02	43.48
Cyclohexane	20,195	0.25%	0.11	0.10	0.002	3.96
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.08%	0.48	0.44	0.01	17.96
Octanes	20,747	0.34%	0.15	0.14	0.003	5.69
Nonanes	20,687	0.10%	0.04	0.04	0.001	1.62
Decanes Plus	20,638	0.32%	0.14	0.13	0.003	5.26
Benzene	18,172	0.09%	0.04	0.04	0.001	1.42
Toluene	18,422	0.15%	0.07	0.06	0.001	2.17
Ethylbenzene	18,658	0.02%	0.01	0.01	0.0002	0.37
Xylene	18,438	0.11%	0.05	0.04	0.001	1.45
	VOC	64.84%				
				Total:	0.91	1684.69

[a] Total VOC Emissions were determined by adding the Uncontrolled Streams for FINs TK-07 and TK-08 on the Tank Summary table and the uncontrolled emissions associated with the produced water loading, FIN TRUCK2. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (28.71 lb/hr) * (1/ 64.84%)

Total HC (lb/hr) = 44.28 lb/hr

[b] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[c] Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

[d] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = (23,861 Btu/lb) * (4.70 lb/hr) * 98% / (10^6)

MMBtu/hr Methane = 0.11 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = (23,861 Btu/lb) * (4.30 T/yr) * (2,000 lb/T) * 98% / (10^6)

MMBtu/yr Methane = 201.10 MMBtu/yr

EFSCOP00002226

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT DURING FLARE DOWNTIME -SMS!

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Description	Units	Value
L_T	total loss = Ls + Lw	Ton/yr	See Table
L_S	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
L_W	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
L_H	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	12.26
ΔPb	Breather vent pressure range	psi	0.06
I	Solar insolation factor	Btu/ft2-day	1521
P_A	Atmospheric Pressure	psia	14.7
Mv	Vapor Molecular Weight	lb/lb-mol	37
T	Annual Average Temperature	°F	72.1
T_{AX}	Daily Maximum Ambient Temperature	°R	541.6
T_{AN}	Daily Minimum Ambient Temperature	°R	522.5
ΔT_A	Daily average ambient temperature range	°R	19.1
Kp	Product factor		1

		Tank Specifications							Material Specifications													VOC		Benzene	
		V/H	D	H/L	Capacity	Color		α	Mv	P_{MAX}	Q^2	ΔTv	Hvo	T_{LA}	P_{VA}	Wv	ΔPv	Ke	Ks	L_S	L_T	L_H	L_T	L_H
Material	No. of Tanks	Tank Type	Tank Diameter (ft)	Tank Height/ Length (ft)	Tank Capacity (bbl)	Paint Color	Paint Conditions	Paint Solar Absorbance Factor	Vapor Molecular Weight	Reid Vapor Pressure (psia)	Max. Hourly Storage (bbl/hr)	Daily Vapor Temp. Range °F	Vapor Space Outage (ft)	Average Liquid Surface Temp °R	Average Vapor Pressure (psia)	Vapor Density (lb/ft3)	Daily Vapor Pressure Range	Vapor Space Expan. Factor	Vented Vapor Sat. Factor	Standing Loss per tank (lb/yr)	Total Loss (lb/hr)	Total Loss (T/yr)	Total Loss (lb/hr)	Total Loss (T/yr)
Condensate	6	V	12	25	500	Gray	Good	0.54	37	12.26	500	36.75	12.63	539.8	13.313	0.08504	3.53719	2.5751	0.10	1,370.08	7.82	0.69	0.02	0.002
PW	2	V	12	25	500	Gray	Good	0.54	37	0.123	500	36.75	12.63	539.8	0.036	0.00023	0.02227	0.0662	0.98	0.3	0.002	0.0002	0.000004	0.0000004

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

The emissions shown are due to flare maintenance occuring 2% of the year. During the flare downtime the wellheads would be shut in. Therefore, there would be no condensate or produced water liquids flowing to the tanks; however, any liquid already in the tanks would remain and have breathing (standing losses) emissions. These emissions would not be controlled, as the flare is down for maintenance. The calculations shown demonstrate this alternative operating scenario regarding flare maintenance and downtime. Based on 2% downtime, this scenario is being shown to occur for 175.2 hours in a year.

As shown on the summary page representing the Tank Emission sent to Flare, H_2S emissions are represented as occuring when the liquid streams flash during the change from a pressurized flow to the atmospheric tank. Due to the chemical properties of H_2S the most conservative approach is to represent that all H_2S in the liquid will immediately flash, and there will be no H_2S emitted during working and breathing while the liquids are stored. Since there will be no liquid flow during the flare downtime, there are no flash emissions and therefore no H_2S emissions from the standing loss of the tanks.

EFSCOP00002227

CALCULATION OF SEPARATOR GAS ROUTED TO FLARE POTENTIAL TO EMIT - SMSS

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

											Potential to Emit (PTE)					
											VOC		Benzene		H_2S	
Facility identification Number (FIN)	Gas Throughput at Site (MSCF/day)	Gas Throughput (MSCF/hr)	Percentage of Year Separator Stream to Flare	Number of Hours per Year sent to Flare	Gas Volume Sent to Flare (MSCF/yr)	Gas Stream Molecular Weight (lb/lb-mol)	Max VOC Percentage in Gas (wt%)	Max Benzene Percentage in Gas (wt%)	Max H_2S Percentage in Gas (wt%)	Capture and Control Efficiency on Flare (%)	Hourly Emission Rate[b] (lb/hr)	Annual Emission Rate[c] (T/yr)	Hourly Emission Rate[b] (lb/hr)	Annual Emission Rate[c] (T/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (T/yr)
SEP-GAS	3000	125.00	6%	525.6	65.700	29.43	50%	0.18%	0.03%	98%	97.06	25.51	0.35	0.09	0.06	0.02

[a] During engine maintenance at other downstream sites, the low pressure separator gas at this site may be routed to flare 6% of the year.

[b] Hourly VOC emission rates are calculated as follows:

(Gas Throughput, MSCF/hr) / (379 scf/lb-mol) * (Gas Stream MW, lb/lb-mol) * (Maximum VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) = (VOC Emissions, lb/hr)

(125.00 MSCF/hr) / (379 scf/lb-mol) * (29.43 lb/lb-mol) * (50%) * (100% - 98%) * (1000 scf/Mscf) = 97.06 lb/hr

[c] Annual VOC emission rates are calculated as follows:

(Gas Throughput at Site, MSCF/yr) / (379 scf/lb-mol) * (Gas Stream MW, lb/lb-mol) * (Max VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) * (1000 scf/Mscf) / (2000 lb/T) = (VOC Emissions, T/yr)

(65.700 MSCF/yr) / (379 scf/lb-mol) * (29.43 lb/lb-mol) * (50%) * (100% - 98%) * (1000 scf/Mscf) / (2000 lb/T) = 25.51 T/yr

EFSCOP00002228

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS - SMSS
OIL & GAS STANDARD PERMIT REGISTRATION
BORGFELD UNIT A1 AND CULPEPPER UNIT A1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

EPN	FIN	Description	LHV[a] (Btu/scf)	Waste Gas Flow Rate Hourly (MMBtu/hr)	Waste Gas Flow Rate Annual (MMBtu/yr)	Pollutant	Emission Factors	Units	Potential to Emit Hourly[b] (lb/hr)	Potential to Emit Annual[c] (T/yr)
FL-1	FL-1	Process Flare	1,674	208.54	109,608.05	CO	0.2755	lb/MMBtu	57.45	15.10
		LP Separator Gas to Flare Event				NO_X	0.1380	lb/MMBtu	28.78	7.56
						$PM/PM_{10}/PM_{2.5}$	--[e]	--	--	--
						SO_2	--[e]	--	5.42	1.81
						H_2S	--[e]	--	0.06	0.02

[a] Waste gas stream lower heating value was taken from the inlet gas analysis.

[b] Emission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for other high-Btu flares. An example calculation for hourly CO emissions for EPN Fl-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (208.54 MMBtu/hr)*(0.2755 lb/MMBtu)

= 57.45 lb/hr CO

[c] H_2S emissions are routed from the separator to the flare and then converted to SO_2. SO_2 emission rates were determined based on the combustion efficiency of 98% H_2S converted to SO_2. H_2S emitted at the flare is 2% of the captured stream not converted by combustion. An example calculation for hourly SO_2 emissions for EPN FL-1 follows:

SO_2 (lb/hr) = (Source H_2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO_2 at combustion) * (1 mol H_2S/34.07 lb H_2S) * (64.06 lb SO2/1 mol SO_2)

SO_2 (lb/hr) = (3.000 lb/hr H2S off Separator)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)

= 5.42 lb/hr SO_2

[d] An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, lb/MMBtu) * (1 T / 2,000 lb)

CO (T/yr) = (109,608.05 MMBtu/yr) * (0.2755 lb/MMBtu) * (1 T / 2,000 lb)

= 15.10 T/yr CO

[e] The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

EFSCOP00002229

CALCULATION OF FLARE FEED RATES FROM LP SEPARATOR - SMSS

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Max BD Volume (Mscf/hr)	125.00
Max BD Volume (Mscf/yr)	65,700
Gas Density (lb/scf)	0.0781

Constituent	Heating Value[a] (Btu/lb)	Inlet Gas Weight (%)	Separator BD Emissions[b] Hourly (lb/hr)	Separator BD Emissions[b] Annual (T/yr)	Flare Feed Rate[c] Hourly (MMBtu/hr)	Flare Feed Rate[c] Annual (MMBtu/yr)
Methane	23,861	28.16%	2,749.12	722.47	64.28	33,788.16
Ethane	22,304	21.30%	2,079.41	546.47	45.45	23,889.40
Propane	21,646	20.53%	2,004.24	526.71	42.52	22,346.28
I-Butane	21,242	4.87%	475.43	124.94	9.90	5,201.79
N-Butane	21,293	9.92%	968.44	254.51	20.21	10,621.79
I-Pentane	21,025	3.71%	362.19	95.18	7.46	3,922.27
N-Pentane	21,072	3.60%	351.45	92.36	7.26	3,814.57
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	1.40%	136.68	35.92	2.80	1,473.40
Cyclohexane	20,195	0.46%	44.91	11.80	0.89	467.07
Other Hexanes	20,928	2.43%	237.23	62.34	4.87	2,557.12
Heptanes	20,825	0.99%	96.65	25.40	1.97	1,036.75
Octanes	20,747	0.11%	10.74	2.82	0.22	114.67
Nonanes	20,687	0.05%	4.88	1.28	0.10	51.90
Decanes Plus	20,638	0.00%	0.00	0.00	0.00	0.00
Benzene	18,172	0.12%	11.72	3.08	0.21	109.70
Toluene	18,422	0.19%	18.55	4.87	0.33	175.84
Ethylbenzene	18,658	0.01%	0.98	0.26	0.02	9.51
Xylene	18,438	0.03%	2.93	0.77	0.05	27.83
				Totals:	**208.54**	**109,608.05**

[a] Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

[b] Constituent Emission Rates were calculated from the known maximum blowdown volumes and density then proportioned using the Inlet Gas stream constituents weight percents. An example calculation for Methane emissions is as follows:

Methane (lb/hr) = Maximum BD Volume (Mscf/hr) * Gas Density (lb/scf) * Inlet Gas Weight % * 1000
Methane (lb/hr) = (125.00 Mscf/hr) * (0.0781 lb/scf) * 28.16% * 1,000
Methane (lb/hr) = 2,749.12 lb/hr

[c] An example calculation for the hourly flare feed rate for Methane is demonstrated.

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6
MMBtu/hr Methane = (23,861 Btu/lb) * (2,749.12 lb/hr) * 98% / (10^6)
MMBtu/hr Methane = 64.28 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

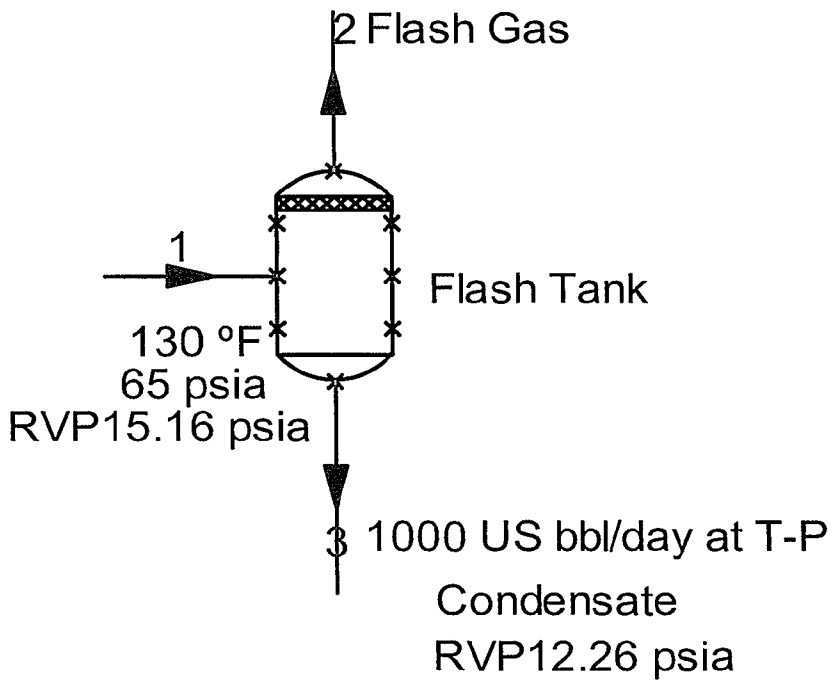
MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6
MMBtu/yr Methane = (23,861 Btu/lb) * (722.47 T/yr) * (2,000 lb/T) * 98% / (10^6)
MMBtu/yr Methane = 33,788.16 MMBtu/yr

DESIGN II for Windows

CONDENSATE SUMMAY REPORT

Simulation Result: SOLUTION REACHED

Problem:
Project:
Task:
By:
At: 23-Jan-12 8:40 AM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods						
	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Vapor Visc:	NBS81	Vapor ThC:	NBS81	Vapor Den:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.077806	0.047989	0.029816	0	0.082998	117.254
49 : CARBON DIOXIDE	0.050621	0.011407	0.039213	0	0.053998	21.1925
2 : METHANE	1.36019	0.563769	0.796424	0	1.45096	51.5698
3 : ETHANE	2.15606	0.283865	1.8722	0	2.29993	11.0458
4 : PROPANE	4.02621	0.18874	3.83747	0	4.29487	3.58309
5 : ISOBUTANE	1.44081	0.031551	1.40926	0	1.53695	1.63103
6 : N-BUTANE	4.30462	0.074008	4.23061	0	4.59186	1.27442
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.887809
7 : ISOPENTANE	2.86287	0.020679	2.84219	0	3.05391	0.530044
8 : N-PENTANE	3.6953	0.021917	3.67338	0	3.94188	0.434665
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.263313
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.20289
52 : 2-METHYLPENTANE	0	0	0	0	0	0.188093
53 : 3-METHYLPENTANE	0	0	0	0	0	0.170455
10 : N-HEXANE	5.69669	0.012326	5.68436	0	6.07682	0.157976
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.129156
40 : BENZENE	0.236229	0.000475	0.235754	0	0.251992	0.146904
38 : CYCLOHEXANE	0.724624	0.001206	0.723418	0	0.772977	0.121466
79 : 2-METHYLHEXANE	0	0	0	0	0	0.06631
80 : 3-METHYLHEXANE	0	0	0	0	0	0.064389
11 : N-HEPTANE	6.64348	0.005395	6.63808	0	7.08679	0.059211
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.049502
41 : TOLUENE	1.26176	0.000819	1.26095	0	1.34596	0.047314
12 : N-OCTANE	5.90854	0.00182	5.90672	0	6.30281	0.022445
45 : ETHYL BENZENE	0.42465	0.000123	0.424527	0	0.452986	0.021089
43 : M-XYLENE	2.41573	0.000602	2.41512	0	2.57692	0.018158
42 : O-XYLENE	0	0	0	0	0	0.009846
13 : N-NONANE	4.88957	0.000584	4.88899	0	5.21584	0.008699
14 : N-DECANE	45.5688	0.00209	45.5667	0	48.6095	0.003341
62 : WATER	0	0	0	0	0	0.034402
Total	93.7446	1.26937	92.4752	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	2.1796	1.34434	0.835257	0	0.020729
49 : CARBON DIOXIDE	2.22775	0.502016	1.72573	0	0.021187
2 : METHANE	21.8216	9.04454	12.777	0	0.207532
3 : ETHANE	64.8284	8.53525	56.2932	0	0.616546
4 : PROPANE	177.532	8.3223	169.209	0	1.6884
5 : ISOBUTANE	83.7399	1.83374	81.9062	0	0.796403
6 : N-BUTANE	250.185	4.30133	245.883	0	2.37936
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	206.545	1.4919	205.053	0	1.96433
8 : N-PENTANE	266.601	1.58123	265.02	0	2.53549
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	490.895	1.06218	489.833	0	4.66862
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	18.4514	0.037132	18.4143	0	0.175481
38 : CYCLOHEXANE	60.9814	0.101506	60.8799	0	0.57996
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	665.663	0.540587	665.123	0	6.33075
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	116.251	0.075451	116.176	0	1.1056
12 : N-OCTANE	674.898	0.20787	674.69	0	6.41857
45 : ETHYL BENZENE	45.0809	0.013046	45.0678	0	0.428739
43 : M-XYLENE	256.453	0.063906	256.39	0	2.43898
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	627.087	0.074868	627.013	0	5.96387
14 : N-DECANE	6483.35	0.297305	6483.05	0	61.6594
62 : WATER	0	0	0	0	0
Total	10514.8	39.4305	10475.3	0	100

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	4.66662	4.58651	0.080118	0	1.26192
49 : CARBON DIOXIDE	1.19559	1.09022	0.105368	0	0.323304
2 : METHANE	56.0214	53.8814	2.14003	0	15.149
3 : ETHANE	32.1606	27.1299	5.03069	0	8.69668
4 : PROPANE	28.35	18.0385	10.3115	0	7.66624
5 : ISOBUTANE	6.80219	3.01544	3.78676	0	1.83941
6 : N-BUTANE	18.4411	7.07318	11.3679	0	4.98672
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	9.61348	1.97635	7.63713	0	2.59962
8 : N-PENTANE	11.9653	2.09469	9.87057	0	3.23557
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	16.4522	1.17807	15.2742	0	4.44892
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.678918	0.045435	0.633483	0	0.183589
38 : CYCLOHEXANE	2.05914	0.115277	1.94386	0	0.55682
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	18.3525	0.515637	17.8369	0	4.96278
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	3.46649	0.078267	3.38823	0	0.937388
12 : N-OCTANE	16.0456	0.173929	15.8717	0	4.33896
45 : ETHYL BENZENE	1.15247	0.011745	1.14073	0	0.311645
43 : M-XYLENE	6.5471	0.057533	6.48956	0	1.77043
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	13.1928	0.055792	13.137	0	3.56751
14 : N-DECANE	122.64	0.199714	122.44	0	33.1635
62 : WATER	0	0	0	0	0
Total	369.803	121.318	248.486	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	18.2277	18.2111	0.016598	0	2.53568
49 : CARBON DIOXIDE	4.36249	4.32883	0.033662	0	0.606871
2 : METHANE	214.624	213.941	0.683216	0	29.8566
3 : ETHANE	110.254	107.722	2.53254	0	15.3376
4 : PROPANE	76.9711	71.6236	5.34746	0	10.7075
5 : ISOBUTANE	14.3061	11.9731	2.33303	0	1.99014
6 : N-BUTANE	34.8351	28.0847	6.75042	0	4.84595
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	13.1114	7.84729	5.26415	0	1.82395
8 : N-PENTANE	15.0506	8.31716	6.73341	0	2.0937
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	16.5061	4.67763	11.8284	0	2.29618
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.514218	0.180404	0.333814	0	0.071533
38 : CYCLOHEXANE	1.70369	0.457718	1.24597	0	0.237002
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	17.5446	2.04739	15.4973	0	2.44065
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	2.44748	0.310768	2.13672	0	0.340472
12 : N-OCTANE	15.9933	0.6906	15.3027	0	2.22485
45 : ETHYL BENZENE	0.875654	0.046635	0.829019	0	0.121813
43 : M-XYLENE	4.96053	0.22844	4.73209	0	0.690064
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	14.1496	0.221529	13.9281	0	1.96837
14 : N-DECANE	142.412	0.792983	141.619	0	19.811
62 : WATER	0	0	0	0	0
Total	718.85	481.703	237.147	0	100

Properties

Temperature	F	130
Pressure	psia	64.696
Enthalpy	Btu/hr	-1128223
Entropy	Btu/hr/R	-1050.962
Vapor Fraction		0.013540677

		Total	Vapor	Liquid 1
Flowrate	lbmol/hr	93.7446	1.2694	92.4752
Flowrate	lb/hr	10514.7702	39.4305	10475.3397
Mole Fraction		1	0.013541	0.986459
Mass Fraction		1	0.00375	0.99625
Molecular Weight		112.164	31.0632	113.2773
Enthalpy	Btu/lbmol	-12035.0693	1211.1444	-12216.894
Enthalpy	Btu/lb	-107.2988	38.9897	-107.8495
Entropy	Btu/lbmol/R	-11.2109	2.6422	-11.4011
Entropy	Btu/lb/R	-0.099951	0.085059	-0.100647
Cp	Btu/lbmol/R		14.2671	60.3206
Cp	Btu/lb/R		0.4593	0.5325
Cv	Btu/lbmol/R		12.0867	52.8342
Cv	Btu/lb/R		0.3891	0.4664
Cp/Cv			1.1804	1.1417
Density	lb/ft3		0.325019	42.1567
Z-Factor			0.977251	0.027475
Flowrate (T-P)	ft3/s		0.033699	
Flowrate (T-P)	gal/min			30.982
Flowrate (STP)	MMSCFD		0.011561	
Flowrate (STP)	gal/min			29.5664
Specific Gravity	GPA STP			0
Viscosity	cP		0.01139	0.461242
Thermal Conductivity	Btu/hr/ft/R		0.016448	0.068162
Surface Tension	dyne/cm			17.1421
Reid Vapor Pressure (ASTM-A	psia			15.16
True Vapor Pressure at 100 F	psia			78.74
Critical Temperature (Cubic E	F	594.8472		
Critical Pressure (Cubic EOS)	psia	476.3904		
Dew Point Temperature	F	417.088		
Bubble Point Temperature	F	63.7562		
Water Dew Point Temperature could not be calculated				
Stream Vapor Pressure	psia	91.6561		
Latent Heat of Vaporization (N	Btu/lb	111.7666		
Latent Heat of Vaporization (P	Btu/lb	284.729		
Vapor Sonic Velocity	ft/s	1030.2		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	6107.15		
Heating Value (net)	Btu/SCF	5670.27		
Wobbe Number	Btu/SCF	2932.94		
Average Hydrogen Atoms		17.367		
Average Carbon Atoms		7.8782		
Hydrogen to Carbon Ratio		2.2044		

EFSCOP00002234

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Vapor Visc:	NBS81	Vapor ThC:	NBS81	Vapor Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.075098	0.075098	0.00003048	0	1.529	501.596
49 : CARBON DIOXIDE	0.039197	0.039197	0.000129	0	0.798054	62.0591
2 : METHANE	1.24339	1.24339	0.001315	0	25.3154	192.529
3 : ETHANE	1.34402	1.34402	0.009141	0	27.3644	29.9354
4 : PROPANE	1.20142	1.20142	0.031799	0	24.4609	7.69238
5 : ISOBUTANE	0.204981	0.204981	0.013912	0	4.17343	2.99992
6 : N-BUTANE	0.469686	0.469686	0.04317	0	9.56285	2.21515
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE	0.117024	0.117024	0.03091	0	2.38261	0.770817
8 : N-PENTANE	0.118491	0.118491	0.040264	0	2.41249	0.599162
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.210746
10 : N-HEXANE	0.055126	0.055126	0.063507	0	1.12238	0.176732
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.002173	0.002173	0.002635	0	0.044233	0.167879
38 : CYCLOHEXANE	0.005364	0.005364	0.008097	0	0.109201	0.13487
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.019568	0.019568	0.074566	0	0.398398	0.053429
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.002987	0.002987	0.01417	0	0.060807	0.042912
12 : N-OCTANE	0.005375	0.005375	0.066452	0	0.109426	0.016467
45 : ETHYL BENZENE	0.000378	0.000378	0.004776	0	0.007693	0.016108
43 : M-XYLENE	0.001797	0.001797	0.027174	0	0.036597	0.013468
42 : O-XYLENE	0	0	0	0	0	0.007514
13 : N-NONANE	0.001408	0.001408	0.055026	0	0.028676	0.005211
14 : N-DECANE	0.004096	0.004096	0.512926	0	0.083399	0.001626
62 : WATER	0	0	0	0	0	0.024719
Total	4.91158	4.91158	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	2.10374	2.10374	0.000007	0	1.15222
49 : CARBON DIOXIDE	1.72501	1.72501	0.000049	0	0.944786
2 : METHANE	19.9476	19.9476	0.000181	0	10.9253
3 : ETHANE	40.4121	40.4121	0.002363	0	22.1336
4 : PROPANE	52.9753	52.9753	0.01206	0	29.0144
5 : ISOBUTANE	11.9135	11.9135	0.006952	0	6.52501
6 : N-BUTANE	27.2982	27.2982	0.02157	0	14.9512
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	8.4428	8.4428	0.01917	0	4.62411
8 : N-PENTANE	8.54867	8.54867	0.02498	0	4.68209
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	4.75036	4.75036	0.04705	0	2.60176
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.169691	0.169691	0.001769	0	0.09294
38 : CYCLOHEXANE	0.451371	0.451371	0.005858	0	0.247215
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	1.96064	1.96064	0.06424	0	1.07384
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.275167	0.275167	0.01122	0	0.150709
12 : N-OCTANE	0.613904	0.613904	0.06526	0	0.336234
45 : ETHYL BENZENE	0.040114	0.040114	0.004359	0	0.02197
43 : M-XYLENE	0.19082	0.19082	0.0248	0	0.104511
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.180633	0.180633	0.06068	0	0.098932
14 : N-DECANE	0.582795	0.582795	0.6274	0	0.319195
62 : WATER	0	0	0	0	0
Total	182.582	182.582	1	0	100
	Total VOC	118.393965			

EFSCOP00002235

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	28.7356	28.7356	0	0	1.529
49 : CARBON DIOXIDE	14.9984	14.9984	0	0	0.798054
2 : METHANE	475.773	475.773	0	0	25.3154
3 : ETHANE	514.281	514.281	0	0	27.3644
4 : PROPANE	459.713	459.713	0	0	24.4609
5 : ISOBUTANE	78.4346	78.4346	0	0	4.17344
6 : N-BUTANE	179.722	179.722	0	0	9.56285
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	44.7783	44.7783	0	0	2.38261
8 : N-PENTANE	45.3398	45.3398	0	0	2.41249
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	21.0937	21.0937	0	0	1.12238
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.8313	0.8313	0	0	0.044233
38 : CYCLOHEXANE	2.0523	2.0523	0	0	0.109201
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.48741	7.48741	0	0	0.398398
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.1428	1.1428	0	0	0.060807
12 : N-OCTANE	2.05654	2.05654	0	0	0.109426
45 : ETHYL BENZENE	0.144585	0.144585	0	0	0.007693
43 : M-XYLENE	0.687789	0.687789	0	0	0.036597
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.538932	0.538932	0	0	0.028676
14 : N-DECANE	1.56739	1.56739	0	0	0.083399
62 : WATER	0	0	0	0	0
Total	1879.38	1879.38	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	28.4984	28.4984	0	0	1.529
49 : CARBON DIOXIDE	14.8746	14.8746	0	0	0.798054
2 : METHANE	471.845	471.845	0	0	25.3154
3 : ETHANE	510.034	510.034	0	0	27.3644
4 : PROPANE	455.917	455.917	0	0	24.4609
5 : ISOBUTANE	77.787	77.787	0	0	4.17343
6 : N-BUTANE	178.238	178.238	0	0	9.56285
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	44.4086	44.4086	0	0	2.38261
8 : N-PENTANE	44.9654	44.9654	0	0	2.41249
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	20.9196	20.9196	0	0	1.12238
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.824436	0.824436	0	0	0.044233
38 : CYCLOHEXANE	2.03536	2.03536	0	0	0.109201
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.42559	7.42559	0	0	0.398398
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.13336	1.13336	0	0	0.060807
12 : N-OCTANE	2.03956	2.03956	0	0	0.109426
45 : ETHYL BENZENE	0.143391	0.143391	0	0	0.007693
43 : M-XYLENE	0.68211	0.68211	0	0	0.036597
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.534482	0.534482	0	0	0.028676
14 : N-DECANE	1.55445	1.55445	0	0	0.083399
62 : WATER	0	0	0	0	0
Total	1863.86	1863.86	0	0	100

EFSCOP00002236

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	2614.254	
Entropy	Btu/hr/R	22.72829	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	4.9116	4.9116
Flowrate	lb/hr	182.5824	182.5824
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		37.1739	37.1739
Enthalpy	Btu/lbmol	532.2637	532.2637
Enthalpy	Btu/lb	14.3182	14.3182
Entropy	Btu/lbmol/R	4.6275	4.6275
Entropy	Btu/lb/R	0.124482	0.124482
Cp	Btu/lbmol/R		15.3742
Cp	Btu/lb/R		0.4136
Cv	Btu/lbmol/R		13.309
Cv	Btu/lb/R		0.358
Cp/Cv			1.1552
Density	lb/ft3		0.09715
Z-Factor			0.989704
Flowrate (T-P)	ft3/s		0.522049
Flowrate (STP)	MMSCFD		0.044733
Viscosity	cP		0.009251
Thermal Conductivity	Btu/hr/ft/R		0.012145
Critical Temperature (Cubic E	F	189.2306	
Critical Pressure (Cubic EOS)	psia	1184.431	
Dew Point Temperature	F	70.0076	
Bubble Point Temperature	F	-273.2523	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	937.226	
Vapor Sonic Velocity	ft/s	894.11	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	2097.32	
Heating Value (net)	Btu/SCF	1925.01	
Wobbe Number	Btu/SCF	1839.5	
Average Hydrogen Atoms		6.8501	
Average Carbon Atoms		2.4634	
Hydrogen to Carbon Ratio		2.7808	
Methane Number		40.55	
Motor Octane Number		98.31	

EFSCOP00002237

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	NBS81	Liquid 2 ThC:	NBS81	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.002708	0	0.002708	0	0.003048	
49 : CARBON DIOXIDE	0.011424	0	0.011424	0	0.01286	
2 : METHANE	0.116806	0	0.116806	0	0.131489	
3 : ETHANE	0.812037	0	0.812037	0	0.914117	
4 : PROPANE	2.82479	0	2.82479	0	3.17989	
5 : ISOBUTANE	1.23583	0	1.23583	0	1.39118	
6 : N-BUTANE	3.83494	0	3.83494	0	4.31702	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	2.74585	0	2.74585	0	3.09102	
8 : N-PENTANE	3.57681	0	3.57681	0	4.02644	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	5.64156	0	5.64156	0	6.35075	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.234057	0	0.234057	0	0.263479	
38 : CYCLOHEXANE	0.71926	0	0.71926	0	0.809677	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	6.62391	0	6.62391	0	7.45659	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	1.25878	0	1.25878	0	1.41702	
12 : N-OCTANE	5.90317	0	5.90317	0	6.64524	
45 : ETHYL BENZENE	0.424272	0	0.424272	0	0.477607	
43 : M-XYLENE	2.41393	0	2.41393	0	2.71738	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	4.88816	0	4.88816	0	5.50264	
14 : N-DECANE	45.5647	0	45.5647	0	51.2926	
62 : WATER	0	0	0	0	0	
Total	88.833	0	88.833	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.075856	0	0.075856	0	0.000734
49 : CARBON DIOXIDE	0.502737	0	0.502737	0	0.004866
2 : METHANE	1.87391	0	1.87391	0	0.018137
3 : ETHANE	24.4163	0	24.4163	0	0.236313
4 : PROPANE	124.556	0	124.556	0	1.20552
5 : ISOBUTANE	71.8264	0	71.8264	0	0.695171
6 : N-BUTANE	222.886	0	222.886	0	2.1572
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	198.102	0	198.102	0	1.91733
8 : N-PENTANE	258.053	0	258.053	0	2.49756
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	486.145	0	486.145	0	4.70515
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	18.2817	0	18.2817	0	0.176939
38 : CYCLOHEXANE	60.5301	0	60.5301	0	0.58584
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	663.703	0	663.703	0	6.42364
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	115.976	0	115.976	0	1.12248
12 : N-OCTANE	674.284	0	674.284	0	6.52605
45 : ETHYL BENZENE	45.0408	0	45.0408	0	0.435927
43 : M-XYLENE	256.263	0	256.263	0	2.48024
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	626.907	0	626.907	0	6.06751
14 : N-DECANE	6482.77	0	6482.77	0	62.7434
62 : WATER	0	0	0	0	0
Total	10332.2	0	10332.2	0	100

EFSCOP00002238

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.007128	0	0.007128	0	0.003048
49 : CARBON DIOXIDE	0.030071	0	0.030071	0	0.01286
2 : METHANE	0.307475	0	0.307475	0	0.131489
3 : ETHANE	2.13758	0	2.13758	0	0.914117
4 : PROPANE	7.43588	0	7.43588	0	3.17989
5 : ISOBUTANE	3.25315	0	3.25315	0	1.39118
6 : N-BUTANE	10.0949	0	10.0949	0	4.31702
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	7.22807	0	7.22807	0	3.09102
8 : N-PENTANE	9.41546	0	9.41546	0	4.02644
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	14.8506	0	14.8506	0	6.35075
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.616122	0	0.616122	0	0.263479
38 : CYCLOHEXANE	1.89335	0	1.89335	0	0.809677
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	17.4365	0	17.4365	0	7.45659
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	3.31356	0	3.31356	0	1.41702
12 : N-OCTANE	15.5393	0	15.5393	0	6.64524
45 : ETHYL BENZENE	1.11684	0	1.11684	0	0.477607
43 : M-XYLENE	6.35433	0	6.35433	0	2.71738
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	12.8674	0	12.8674	0	5.50264
14 : N-DECANE	119.943	0	119.943	0	51.2926
62 : WATER	0	0	0	0	0
Total	233.841	0	233.841	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.001507	0	0.001507	0	0.000649
49 : CARBON DIOXIDE	0.009806	0	0.009806	0	0.004222
2 : METHANE	0.100202	0	0.100202	0	0.043144
3 : ETHANE	1.09845	0	1.09845	0	0.472962
4 : PROPANE	3.93631	0	3.93631	0	1.69486
5 : ISOBUTANE	2.04592	0	2.04592	0	0.880911
6 : N-BUTANE	6.11907	0	6.11907	0	2.63469
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	5.08571	0	5.08571	0	2.18976
8 : N-PENTANE	6.55639	0	6.55639	0	2.82299
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	11.7394	0	11.7394	0	5.05462
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.331411	0	0.331411	0	0.142696
38 : CYCLOHEXANE	1.23881	0	1.23881	0	0.533395
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	15.4642	0	15.4642	0	6.65841
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	2.13304	0	2.13304	0	0.918425
12 : N-OCTANE	15.2935	0	15.2935	0	6.58493
45 : ETHYL BENZENE	0.828521	0	0.828521	0	0.356737
43 : M-XYLENE	4.72974	0	4.72974	0	2.03649
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	13.9257	0	13.9257	0	5.996
14 : N-DECANE	141.612	0	141.612	0	60.9741
62 : WATER	0	0	0	0	0
Total	232.25	0	232.25	0	100

EFSCOP00002239

Properties

Temperature	F	70
Pressure	psia	14.7
Enthalpy	Btu/hr	-1434814
Entropy	Btu/hr/R	-1603.578
Vapor Fraction		0

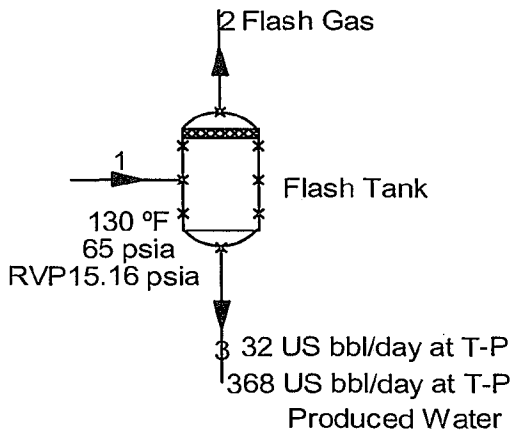
		Total	Liquid 1
Flowrate	lbmol/hr	88.833	88.833
Flowrate	lb/hr	10332.1878	10332.1878
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		116.3102	116.3102
Enthalpy	Btu/lbmol	-16151.8127	-16151.8127
Enthalpy	Btu/lb	-138.8684	-138.8684
Entropy	Btu/lbmol/R	-18.0516	-18.0516
Entropy	Btu/lb/R	-0.155202	-0.155202
Cp	Btu/lbmol/R		57.7007
Cp	Btu/lb/R		0.4961
Cv	Btu/lbmol/R		50.7677
Cv	Btu/lb/R		0.4365
Cp/Cv			1.1366
Density	lb/ft3		44.1847
Z-Factor			0.006809
Flowrate (T-P)	gal/min		29.156
Flowrate (STP)	gal/min		28.9558
Specific Gravity	GPA STP		0.71332
Viscosity	cP		0.516953
Thermal Conductivity	Btu/hr/ft/R		0.065894
Surface Tension	dyne/cm		21.0904
Reid Vapor Pressure (ASTM-A	psia		12.26
True Vapor Pressure at 100 F	psia		19.89
Critical Temperature (Cubic E	F	600.8938	
Critical Pressure (Cubic EOS)	psia	434.0501	
Dew Point Temperature	F	310.8082	
Bubble Point Temperature	F	69.9786	
Water Dew Point Temperature could not be calculated			
Stream Vapor Pressure	psia	14.7	
Latent Heat of Vaporization (N	Btu/lb	129.6966	
Latent Heat of Vaporization (P	Btu/lb	261.028	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6328.86	
Heating Value (net)	Btu/SCF	5877.35	
Wobbe Number	Btu/SCF	2970.05	
Average Hydrogen Atoms		17.9484	
Average Carbon Atoms		8.1776	
Hydrogen to Carbon Ratio		2.1948	

EFSCOP00002240

DESIGN II for Windows

Simulation Result: SOLUTION REACHED

Problem:
Project:
Task:
By:
At: 26-Apr-12 11:52 AM



EFSCOP00002241

Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods						
	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Vapor Visc:	NBS81	Vapor ThC:	NBS81	Vapor Den:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.002494	0.000984	0.001036	0.000474	0.00083	117.325
49 : CARBON DIOXIDE	0.001623	0.00006096	0.000355	0.001207	0.00054	21.191
2 : METHANE	0.043602	0.010016	0.023971	0.009616	0.81451	51.591
3 : ETHANE	0.069114	0.005296	0.05917	0.004648	0.023	11.0524
4 : PROPANE	0.129063	0.003559	0.122515	0.00299	0.04295	3.58666
5 : ISOBUTANE	0.046186	0.000599	0.045259	0.000328	0.01537	1.63351
6 : N-BUTANE	0.137988	0.001404	0.135815	0.00077	0.04592	1.27521
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.887809
7 : ISOPENTANE	0.091772	0.000392	0.091165	0.000215	0.03054	0.531056
8 : N-PENTANE	0.118456	0.000416	0.117812	0.000228	0.03942	0.435489
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.263313
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.20289
52 : 2-METHYLPENTANE	0	0	0	0	0	0.188093
53 : 3-METHYLPENTANE	0	0	0	8	0	0.170455
10 : N-HEXANE	0.182612	0.000234	0.18225	0.000128	0.06077	0.158368
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.129159
40 : BENZENE	0.007573	0.000009001	0.007559	0.000004934	0.00252	0.147035
38 : CYCLOHEXANE	0.023228	0.00002285	0.023193	0.00001253	0.00773	0.121641
79 : 2-METHYLHEXANE	0	0	0	0	0	0.06631
80 : 3-METHYLHEXANE	0	0	0	0	0	0.054389
11 : N-HEPTANE	0.212962	0.000102	0.212803	0.00005612	0.07087	0.059394
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.049502
41 : TOLUENE	0.040447	0.00001551	0.040423	0.000008505	0.01346	0.047388
12 : N-OCTANE	0.189403	0.00003455	0.189349	0.00001894	0.06303	0.022529
45 : ETHYL BENZENE	0.013612	0.000002328	0.013609	0.000001276	0.00453	0.021125
43 : M-XYLENE	0.077438	0.00001141	0.07742	0.000006255	0.02577	0.018107
42 : O-XYLENE	0	0	0	0	0	0.009846
13 : N-NONANE	0.156739	0.00001109	0.158722	0.00000608	0.05218	0.008738
14 : N-DECANE	1.46074	0.00003973	1.46068	0.00002178	0.48611	0.003358
15 : N-UNDECANE	0	0	0	0	0	0.000907
16 : N-DODECANE	0	0	0	0	0	0.000324
17 : N-TRIDECANE	0	0	0	0	0	0.000111
18 : N-TETRADECANE	0	0	0	0	0	0.00004239
19 : N-PENTADECANE	0	0	0	0	0	0.0000149
20 : N-HEXADECANE	0	0	0	0	0	0.00000589
21 : N-HEPTADECANE	0	0	0	0	0	0.000001754
91 : N-OCTADECANE	0	0	0	0	0	0.000001013
92 : N-NONADECANE	0	0	0	0	0	5.249E-07
93 : N-EICOSANE	0	0	0	0	0	1.063E-07
3200 : N-HENEICOSANE	0	0	0	0	0	7.42E-08
3201 : N-DOCOSANE	0	0	0	0	0	2.893E-08
3202 : N-TRICOSANE	0	0	0	0	0	1.022E-08
3203 : N-TETRACOSANE	0	0	0	0	0	5.101E-09
3204 : N-PENTACOSANE	0	0	0	0	0	2.027E-09
3205 : N-HEXACOSANE	0	0	0	0	0	9.28E-10
3206 : N-HEPTACOSANE	0	0	0	0	0	3.411E-10
3207 : N-OCTACOSANE	0	0	0	0	0	8.414E-11
3208 : N-NONACOSANE	0	0	0	0	0	3.763E-11
3209 : N-TRIACONTANE	0	8	0	0	0	7.213E-12
62 : WATER	297.491	0.000839	0.008217	297.482	99	12.6127
Total	300.496	0.024048	2.96932	297.503	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.069869	0.027576	0.029021	0.013272	0.001227
49 : CARBON DIOXIDE	0.071412	0.002683	0.015632	0.053097	0.001254
2 : METHANE	0.699506	0.160681	0.384558	0.154266	0.01228
3 : ETHANE	2.07812	0.159254	1.77913	0.139741	0.036481
4 : PROPANE	5.69091	0.156923	5.40216	0.131828	0.099902
5 : ISOBUTANE	2.68435	0.0348	2.63047	0.019078	0.047123
6 : N-BUTANE	8.01686	0.081587	7.89354	0.044727	0.140787
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	6.62095	0.028288	6.57715	0.015508	0.116229
8 : N-PENTANE	8.5461	0.029978	8.49969	0.016435	0.150025
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	15.736	0.020143	15.7048	0.011043	0.276242
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.591473	0.000703	0.590385	0.000385	0.010383
38 : CYCLOHEXANE	1.95481	0.001923	1.95183	0.001054	0.034316
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	8	0	0	0
11 : N-HEPTANE	21.3383	0.010257	21.3225	0.005623	0.374589
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	3.72653	0.001429	3.72431	0.000784	0.065418
12 : N-OCTANE	21.6343	0.003946	21.6282	0.002163	0.379785
45 : ETHYL BENZENE	1.4451	0.000247	1.44472	0.000135	0.025368
43 : M-XYLENE	8.22081	0.001211	8.21893	0.000664	0.144314
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	20.1018	0.001422	20.0996	0.00078	0.352881
14 : N-DECANE	207.829	0.005652	207.82	0.003098	3.64838
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	8	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	8
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	5359.41	0.015121	0.148028	5359.24	94.083
Total	5696.47	0.743827	335.864	5359.86	100

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Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.096873	0.893957	0.002777	0.000139	0.099542
49 : CARBON DIDXIDE	0.007124	0.005819	0.000952	0.000353	0.00732
2 : METHANE	1.02306	0.95598	0.064265	0.002814	1.05124
3 : ETHANE	0.665536	0.50554	0.158636	0.00136	0.683671
4 : PRDPANE	0.669022	0.339685	0.328462	0.008875	0.687453
5 : ISOBUTANE	0.178588	0.057151	0.12134	0.00009606	0.183508
6 : N-BUTANE	0.498333	0.133988	0.36412	0.000225	0.512061
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISDPENTANE	0.281901	0.037425	0.244413	0.00006291	0.289667
8 : N-PENTANE	0.355583	0.039661	0.315856	0.00006666	0.365379
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.510962	0.022312	0.488612	0.0000375	0.525038
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.021125	0.000859	0.820265	0.000001444	0.021707
39 : CYCLOHEXANE	0.064365	0.002181	0.062181	0.000003666	0.066138
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.580314	0.00977	0.570527	0.00081642	0.596301
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.109857	0.001481	0.108374	0.000002489	0.112883
12 : N-OCTANE	0.51095	0.003298	0.507647	0.000005543	0.525026
45 : ETHYL BENZENE	0.036708	0.000222	0.036485	3.735E-07	0.037719
43 : M-XTLENE	0.208655	0.001089	0.207564	0.000001831	0.214403
42 : O-XYLENE	0	0	0	0	0
13 : N-NIDNANE	0.421232	0.001059	0.420172	0.000001779	0.432837
14 : N-DECANE	3.91989	0.003792	3.91609	0.000006373	4.02788
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NIDNADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCDSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACDSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NDNACDSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	87.1589	0.080113	0.022029	87.0567	89.56
Total	97.3189	2.29538	7.96077	87.0628	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.374395	0.373555	0.000577	0.000264	0.364641
48 : CARBON DIDXIDE	0.024475	0.023134	0.000305	0.001036	0.023837
2 : METHANE	3.82959	3.80078	0.820563	0.008249	3.72982
3 : ETHANE	2.09625	2.00992	0.08004	0.006287	2.04164
4 : PRDPANE	1.52541	1.35052	0.170722	0.004166	1.48566
5 : ISDBUTANE	0.302692	0.227222	0.074927	0.000543	0.294806
6 : N-BUTANE	0.750643	0.532708	0.216707	0.001228	0.731086
9 : 2,2-DIMETHYLPRDP	0	0	0	0	0
7 : ISDPENTANE	0.316043	0.148795	0.16885	0.000398	0.309757
9 : N-PENTANE	0.374056	0.157685	0.215953	0.000418	0.36431
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.468211	0.088707	0.379238	0.000267	0.456013
37 : METHYLCYCLDPENTA	0	0	0	0	0
40 : BENZENE	0.014125	0.003416	0.010703	0.000006987	0.013757
38 : CYCLOHEXANE	0.048639	0.008671	0.039946	0.00002157	0.047371
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.535788	0.038845	0.49681	0.000131	0.521827
38 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TDLUENE	0.0744	0.005887	0.068498	0.00001441	0.072461
12 : N-OCTANE	0.503713	0.013111	0.490553	0.00004907	0.490589
45 : ETHYL BENZENE	0.027462	0.008884	0.028575	0.000002493	0.026746
43 : M-XYLENE	0.156036	0.00433	0.151694	0.00001226	0.151971
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.450705	0.004209	0.446479	0.00001732	0.438963
14 : N-DECANE	4.55485	0.015075	4.53971	0.00006768	4.43618
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICDSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DDCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	88.2455	0.318514	0.002373	85.9246	83.9986
Total	102.675	9.12596	7.60122	85.9478	100

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Properties

Temperature	F	130
Pressure	psia	64.696
Enthalpy	Btu/hr	-5272528
Entropy	Btu/hr/R	-8351.197
Vapor Fraction		6.00289E-05

		Total	Vapor	Liquid 1	Liquid 2
Flowrate	lbmol/hr	300.4963	0.024046	2.9693	297.503
Flowrate	lb/hr	5696.4657	0.743827	335.8644	5359.8574
Mole Fraction		1	0.00008003	0.009881	0.990039
Mass Fraction		1	0.0001306	0.05896	0.940909
Molecular Weight		18.9569	30.9304	113.1115	18.0161
Enthalpy	Btu/lbmol	-17546.0586	1202.4185	-12222.6127	-17600.7044
Enthalpy	Btu/lb	-925.5785	38.875	-108.0599	-976.9405
Entropy	Btu/lbmol/R	-27.7913	2.8271	-11.3991	-27.9574
Entropy	Btu/lb/R	-1.466	0.091402	-0.100777	-1.5518
Cp	Btu/lbmol/R		14.2245	60.6783	17.9901
Cp	Btu/lb/R		0.4599	0.5364	0.9986
Cv	Btu/lbmol/R		12.0359	53.1882	17.226
Cv	Btu/lb/R		0.3891	0.4702	0.9561
Cp/Cv			1.1818	1.1408	1.0444
Density	lb/ft3		0.324054	42.1899	61.5631
Z-Factor			0.975972	0.027414	0.002992
Flowrate (T-P)	ft3/s		0.0006376		
Flowrate (T-P)	gal/min			0.992575	10.8553
Flowrate (STP)	MMSCFD		0.000219		
Flowrate (STP)	gal/min			0.947685	10.7156
Specific Gravity	GPA STP			0.999923	0
Viscosity	cP		0.011249	0.496634	0.508842
Thermal Conductivity	Btu/hr/ft/R		0.016295	0.068388	0.37486
Surface Tension	dyne/cm			17.3133	67.197
Reid Vapor Pressure (ASTM-/	psia			15.16	
True Vapor Pressure at 100 F	psia			62.52	
Critical Temperature (Cubic E	F	695.2822			
Critical Pressure (Cubic EOS)	psia	3260.7231			
Dew Point Temperature	F	294.9285			
Bubble Point Temperature	F	105.1859			
Water Dew Point	F	296.777			
Liquid 2 Freezing Point	F	31.9383			
Stream Vapor Pressure	psia	75.9603			
Latent Heat of Vaporization (h	Btu/lb	875.145			
Latent Heat of Vaporization (P	Btu/lb	1037.296			
Vapor Sonic Velocity	ft/s	1031.64			
CO2 Freeze Up		No			
Heating Value (gross)	Btu/SCF	61.07			
Heating Value (net)	Btu/SCF	56.7			
Wobbe Number	Btu/SCF	74.87			
Average Hydrogen Atoms		2.1537			
Average Carbon Atoms		0.0788			
Hydrogen to Carbon Ratio		27.3362			

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.002354	0.002354	0.00002993	0	1.50162	501.715
49 : CARBON DIOXIDE	0.000629	0.000629	0.00006463	0	0.401017	62.0515
2 : METHANE	0.038288	0.038288	0.001269	8	24.428	192.569
3 : ETHANE	0.041731	0.041731	0.008893	8	26.6246	29.9394
4 : PROPANE	0.037698	0.037698	8.031262	0	24.0514	7.69345
5 : ISOBUTANE	0.006535	0.006535	0.013894	8	4.16923	3.00065
6 : N-BUTANE	0.014979	0.014979	0.043133	0	9.5564	2.21555
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	1.46838
7 : ISOPENTANE	0.003735	0.003735	0.030909	8	2.38302	0.77099
8 : N-PENTANE	0.003782	0.003782	0.048267	8	2.41298	0.599252
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360989
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE	0	0	0	0	0	0.218746
10 : N-HEXANE	0.00176	0.00176	0.063527	0	1.12308	0.176736
37 : METHYLCYCLOPENTA	0	0	0	0	0	0.154099
40 : BENZENE	0.00006934	0.00006934	0.002636	0	0.044238	0.167844
38 : CYCLOHEXANE	0.000171	0.000171	0.0061	0	0.109238	0.13467
79 : 2-METHYLHEXANE	0	0	0	0	0	0.065603
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11 : N-HEPTANE	0.000625	0.000625	0.074565	0	0.398698	0.053448
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE	0.00009534	0.00009534	0.014176	0	0.060829	0.04291
12 : N-OCTANE	0.000172	0.000172	0.06648	0	0.109524	0.016475
45 : ETHYL BENZENE	0.00001206	0.00001206	0.004778	0	8.007696	0.016107
43 : M-XYLENE	0.00005739	0.00005739	0.027185	0	0.036613	0.013468
42 : O-XYLENE	0	8	0	0	0	0.007514
13 : N-NONANE	0.00004499	0.00004499	0.05505	0	0.028706	8.005215
14 : N-DECANE	8.000131	0.000131	0.513145	0	0.083492	0.001627
15 : N-UNDECANE	8	0	0	0	0	0.000392
16 : N-DODECANE	0	0	0	0	0	0.000112
17 : N-TRIDECANE	0	0	0	0	0	0.00003037
18 : N-TETRADECANE	0	0	0	0	0	0.000009518
19 : N-PENTADECANE	0	0	0	0	0	0.000002656
20 : N-HEXADECANE	0	0	0	0	0	8.709E-07
21 : N-HEPTADECANE	0	0	0	0	0	1.916E-07
91 : N-OCTADECANE	0	0	0	0	0	1.046E-07
92 : N-NONADECANE	0	0	0	0	0	4.872E-08
93 : N-EICOSANE	0	0	0	0	0	6.316E-09
3208 : N-HENEICOSANE	0	0	0	0	8	4.79E-09
3281 : N-DOCOSANE	0	8	0	0	0	1.46E-09
3282 : N-TRICOSANE	0	0	0	0	0	3.885E-10
3283 : N-TETRACOSANE	0	8	0	0	0	1.756E-10
3284 : N-PENTACOSANE	0	0	0	0	0	6.254E-11
3205 : N-HEXACOSANE	0	0	0	0	0	2.573E-11
3206 : N-HEPTACOSANE	0	0	0	0	0	7.613E-12
3207 : N-OCTACOSANE	8	0	0	0	0	9.576E-13
3208 : N-NONACOSANE	0	0	0	0	0	4.182E-13
3209 : N-TRIACONTANE	0	0	0	0	0	3.437E-14
62 : WATER	0.003671	0.003671	0.000606	0	2.46969	40.7407
Total	0.15674	0.15674	1	0	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.065934	0.065934	0.000007	0	1.1404
49 : CARBON DIOXIDE	0.027662	0.027662	0.000024	0	0.478445
2 : METHANE	0.614261	0.614261	0.000175	0	10.6244
3 : ETHANE	1.25478	1.25478	0.002299	8	21.7029
4 : PROPANE	1.66226	1.66226	0.01185	0	28.7507
5 : ISOBUTANE	0.379806	0.379806	0.006942	0	6.56918
6 : N-BUTANE	0.870563	0.870563	0.02155	0	15.0574
9 : 2,2-DIMETHYLPROP	0	0	0	0	8
7 : ISOPENTANE	8.269476	0.269476	8.01917	0	4.66091
8 : N-PENTANE	0.272864	0.272864	0.02467	0	4.7195
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	8
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.15169	0.15169	0.04706	0	2.62365
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.005416	0.005416	0.00177	0	0.093674
38 : CYCLONEXANE	0.014409	0.014409	0.00586	0	0.249224
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	8	0	0	0	0
11 : N-HEPTANE	0.062616	0.062616	0.06425	0	1.08301
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.006784	0.008784	0.01123	0	0.151936
12 : N-OCTANE	0.019609	0.019609	0.06528	0	0.339154
45 : ETHYL BENZENE	0.001281	0.001281	0.00436	0	0.02215
43 : M-XYLENE	0.006092	0.006092	0.02481	0	0.105374
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.00577	0.00577	0.05069	0	0.099806
14 : N-DECANE	0.018619	0.018819	0.6276	8	0.322039
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	8	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	8	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	8
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	8	0	0
62 : WATER	0.069737	0.069737	0.000094	0	1.20619
Total	5.78163	5.78163	1	8	100
	Total VOC	3.818992			

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Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.900416	0.900416	0	0	1.50162
49 : CARBON DIOXIDE	0.240461	0.240461	0	0	0.401017
2 : METHANE	14.6477	14.6477	0	0	24.428
3 : ETHANE	15.9648	15.9648	0	0	26.6246
4 : PROPANE	14.4219	14.4219	0	0	24.0514
5 : ISOBUTANE	2.49999	2.49999	0	0	4.16923
6 : N-BUTANE	5.73029	5.73029	0	0	9.5564
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.42893	1.42893	0	0	2.38302
8 : N-PENTANE	1.44689	1.44689	0	0	2.41299
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.67343	0.67343	0	0	1.12308
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.026526	0.026526	0	0	0.044238
38 : CYCLOHEXANE	0.065502	0.065502	0	0	0.109239
79 : 2-METHYLHEXANE	0	0	0	0	0
88 : 3-METHYLHEXANE	0	0	0	8	0
11 : N-HEPTANE	0.239071	0.239071	0	0	0.398698
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.036475	0.036475	0	0	0.060829
12 : N-OCTANE	8.065674	0.065674	0	0	0.109524
45 : ETHYL BENZENE	0.004615	0.004615	0	0	0.007696
43 : M-XYLENE	0.021954	0.021954	0	0	0.036613
42 : O-XYLENE	8	0	0	0	0
13 : N-NONANE	0.017213	0.017213	0	0	0.028706
14 : N-DECANE	0.050064	0.050064	0	0	0.083492
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	D	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	D	8	0	0	0
20 : N-HEXADECANE	D	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	8	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	1.4809	1.4809	0	0	2.46969
Total	59.9628	59.9628	0	0	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.89317	0.89317	0	0	1.50162
49 : CARBON DIOXIDE	0.238526	0.238526	0	0	0.401017
2 : METHANE	14.5298	14.5298	0	0	24.428
3 : ETHANE	15.8364	15.8364	0	D	26.6246
4 : PROPANE	14.3058	14.3058	0	0	24.0514
5 : ISOBUTANE	2.47967	2.47967	D	0	4.16923
6 : N-BUTANE	5.68417	5.68417	0	0	9.5564
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	1.41743	1.41743	0	0	2.38302
8 : N-PENTANE	1.43525	1.43525	0	0	2.41299
54 : 2,2-DIMETHYLBUTA	0	D	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.66801	D.66801	0	0	1.12308
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.026313	0.026313	0	0	0.044238
38 : CYCLOHEXANE	0.064975	0.064975	0	0	0.109238
79 : 2-METHYLHEXANE	0	0	0	0	0
88 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.237147	0.237147	0	0	0.398698
39 : METHYLCYCLOHEXAN	0	0	D	0	0
41 : TOLUENE	0.036181	0.036181	0	0	0.060829
12 : N-OCTANE	0.065145	0.065145	0	0	0.109524
45 : ETHYL BENZENE	0.004578	D.004578	0	0	0.007696
43 : M-XYLENE	0.021778	0.021778	0	0	0.036613
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.017074	0.017074	0	0	0.028706
14 : N-DECANE	D.049661	D.049661	0	0	0.083492
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	D	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	D	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	D
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	D	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	D	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	1.46898	1.46898	0	0	2.46969
Total	59.4802	59.4802	0	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	62.87522	
Entropy	Btu/hr/R	0.7450368	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	0.15674	D.15674
Flowrate	lb/hr	5.7818	5.7818

Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		36.8867	36.8867
Enthalpy	Btu/lbmol	528.743	528.743
Enthalpy	Btu/lb	14.3342	14.3342
Entropy	Btu/lbmol/R	4.7533	4.7533
Entropy	Btu/lb/R	0.128863	0.128863
Cp	Btu/lbmol/R		15.2957
Cp	Btu/lb/R		0.4147
Cv	Btu/lbmol/R		13.2292
Cv	Btu/lb/R		0.3586
Cp/Cv			1.1562
Density	lb/ft3		0.09642
Z-Factor			0.989496
Flowrate (T-P)	ft3/s		0.016856
Flowrate (STP)	MMSCFD		0.001428
Viscosity	cP		0.009183
Thermal Conductivity	Btu/hr/ft/R		0.012089
Critical Temperature (Cubic E	F	198.8514	
Critical Pressure (Cubic EOS)	psia	1207.4657	
Dew Point Temperature	F	69.9999	
Bubble Point Temperature	F	-273.6593	
Water Dew Point	F	69.49	
Stream Vapor Pressure	psia	927.8977	
Vapor Sonic Velocity	ft/s	867.78	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	2064.72	
Heating Value (net)	Btu/SCF	1895.26	
Wobbe Number	Btu/SCF	1817.71	
Average Hydrogen Atoms		6.7661	
Average Carbon Atoms		2.4231	
Hydrogen to Carbon Ratio		2.8005	
Methane Number		40.69	
Motor Octane Number		98.52	

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Details for Stream 3

Stream 3 (Produced Water)

Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD

Flowrates

Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 lbmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00014	0	0.00008519	0.00005528	0.00004677	
49 : CARBON DIOXIDE	0.000994	0	0.000184	0.00081	0.000331	
2 : METHANE	0.005314	0	0.003611	0.001703	0.001769	
3 : ETHANE	0.027383	0	0.025312	0.00207	0.009117	
4 : PROPANE	0.091365	0	0.088984	0.002381	0.030421	
5 : ISOBUTANE	0.039651	0	0.039549	0.000102	0.013202	
6 : N-BUTANE	0.123009	0	0.122774	0.000235	0.040957	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	0.088036	0	0.087978	0.00005858	0.029312	
8 : N-PENTANE	0.114874	0	0.114614	0.00005932	0.038181	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.180851	0	0.180824	0.00002761	0.060216	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.007503	0	0.007502	0.000001087	0.002498	
38 : CYCLOHEXANE	0.023057	0	0.023054	0.000002685	0.007677	
79 : 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	0.212337	0	0.212327	0.000009801	0.070699	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.040351	0	0.04035	0.000001495	0.013435	
12 : N-OCTANE	0.189231	0	0.189228	0.000002692	0.063006	
45 : ETHYL BENZENE	0.0136	0	0.0136	1.892E-07	0.004528	
43 : M-XYLENE	0.07738	0	0.07738	0.0000009	0.025764	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE	0.156694	0	0.156693	7.057E-07	0.052172	
14 : N-DECANE	1.46061	0	1.46061	0.000002052	0.48632	
15 : N-UNDECANE	0	0	0	0	0	
16 : N-DODECANE	0	0	0	0	0	
17 : N-TRIDECANE	0	0	0	0	0	
18 : N-TETRADECANE	0	0	0	0	0	
19 : N-PENTADECANE	0	0	0	0	0	
28 : N-HEXADECANE	0	0	0	0	0	
21 : N-HEPTADECANE	0	0	0	0	0	
91 : N-OCTADECANE	0	0	0	0	0	
92 : N-NONADECANE	0	0	0	0	0	
93 : N-EICOSANE	0	0	0	0	0	
3200 : N-HENEICOSANE	0	0	0	0	0	
3201 : N-DOCOSANE	0	0	0	0	0	
3202 : N-TRICOSANE	0	0	0	0	0	
3203 : N-TETRACOSANE	0	0	0	0	0	
3204 : N-PENTACOSANE	0	0	0	0	0	
3205 : N-HEXACOSANE	0	0	0	0	0	
3206 : N-HEPTACOSANE	0	0	0	0	0	
3207 : N-OCTACOSANE	0	0	0	0	0	
3208 : N-NONACOSANE	0	0	0	0	0	
3209 : N-TRIACONTANE	0	0	0	0	0	
62 : WATER	297.487	0	0.001725	297.486	99.0503	
Total	300.34	0	2.84638	297.493	100	

Flowrates

Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %
46 : NITROGEN	0.003935	0	0.002387	0.001549	0.00006915
49 : CARBON DIOXIDE	0.04375	0	0.008095	0.035655	0.000769
2 : METHANE	0.085246	0	0.057927	0.027319	0.001498
3 : ETHANE	0.823345	0	0.761094	0.06225	0.014468
4 : PROPANE	4.02865	0	3.92366	0.104994	0.070794
5 : ISOBUTANE	2.30454	0	2.29858	0.005957	0.040497
6 : N-BUTANE	7.14929	0	7.13564	0.013653	0.125632
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	6.35147	0	6.34725	0.004226	0.111612
8 : N-PENTANE	8.27324	0	8.26896	0.004279	0.145382
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	15.5843	0	15.5819	0.002379	0.273857
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.586057	0	0.585972	0.00008494	0.010299
38 : CYCLOHEXANE	1.9404	0	1.94017	0.000226	0.034098
78 : 2-METHYLHEXANE	0	0	0	0	0
88 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	21.2757	0	21.2747	0.000982	0.373869
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	3.71774	0	3.7176	0.000138	0.06533
12 : N-OCTANE	21.6147	0	21.6144	0.000308	0.379827
45 : ETHYL BENZENE	1.44382	0	1.4438	0.00002008	0.025372
43 : M-XYLENE	8.21471	0	8.21462	0.00009555	0.144354
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	20.096	0	20.0959	0.0000905	0.353138
14 : N-DECANE	207.81	0	207.81	0.000292	3.65176
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	5359.34	0	0.031085	5359.31	94.1774
Total	5690.68	0	331.113	5359.57	100

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Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.00024	0	0.000224	0.00001598	0.000257
49 : CARBON DIOXIDE	0.000718	0	0.000484	0.000234	0.000768
2 : METHANE	0.009996	0	0.009503	0.000492	0.010689
3 : ETHANE	0.067221	0	0.066622	0.000599	0.071883
4 : PROPANE	0.234894	0	0.234205	0.000689	0.251184
5 : ISOBUTANE	0.104122	0	0.104093	0.00002964	0.111343
6 : N-BUTANE	0.32321	0	0.323142	0.00006793	0.345624
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.231574	0	0.231558	0.00001694	0.247634
8 : N-PENTANE	0.301682	0	0.301664	0.00001715	0.322603
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.475936	0	0.475928	0.000007983	0.508941
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.019746	0	0.019745	3.145E-07	0.021115
38 : CYCLOHEXANE	0.06068	0	0.060679	7.765E-07	0.064888
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.558847	0	0.558844	0.000002834	0.597602
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.106201	0	0.106201	4.324E-07	0.113566
12 : N-OCTANE	0.49885	0	0.498849	7.785E-07	0.532589
45 : ETHYL BENZENE	0.035796	0	0.035796	5.471E-08	0.038278
43 : M-XYLENE	0.203663	0	0.203663	2.603E-07	0.217787
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.412416	0	0.412416	0.000000204	0.441017
14 : N-DECANE	3.84432	0	3.84432	5.935E-07	4.11092
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	86.0256	0	0.004541	86.021	91.9913
Total	93.5149	0	7.49168	86.0232	100

Flowrates

Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.0000782	0	0.00004743	0.00003077	0.00003375
49 : CARBON DIOXIDE	0.000353	0	0.000158	0.000195	0.000314
2 : METHANE	0.004558	0	0.003097	0.001461	0.004382
3 : ETHANE	0.037041	0	0.03424	0.002801	0.039569
4 : PROPANE	0.127316	0	0.123998	0.003318	0.136347
5 : ISOBUTANE	0.065643	0	0.065473	0.00017	0.070299
6 : N-BUTANE	0.196275	0	0.1959	0.000375	0.210198
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	0.163056	0	0.162948	0.000108	0.174623
8 : N-PENTANE	0.2102	0	0.210091	0.000109	0.225111
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.376328	0	0.376271	0.00005745	0.403024
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.010624	0	0.010623	0.00000154	0.011378
38 : CYCLOHEXANE	0.039712	0	0.039708	0.000004625	0.042529
79 : 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.495721	0	0.495698	0.00002288	0.530885
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.068377	0	0.068374	0.000002534	0.073227
12 : N-OCTANE	0.490247	0	0.49024	0.000006975	0.525023
45 : ETHYL BENZENE	0.026559	0	0.026559	3.695E-07	0.028443
43 : M-XYLENE	0.151616	0	0.151614	0.000001753	0.162371
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.4464	0	0.446398	0.00000201	0.478066
14 : N-DECANE	4.53949	0	4.53949	0.000006379	4.86151
15 : N-UNDECANE	0	0	0	0	0
16 : N-DODECANE	0	0	0	0	0
17 : N-TRIDECANE	0	0	0	0	0
18 : N-TETRADECANE	0	0	0	0	0
19 : N-PENTADECANE	0	0	0	0	0
20 : N-HEXADECANE	0	0	0	0	0
21 : N-HEPTADECANE	0	0	0	0	0
91 : N-OCTADECANE	0	0	0	0	0
92 : N-NONADECANE	0	0	0	0	0
93 : N-EICOSANE	0	0	0	0	0
3200 : N-HENEICOSANE	0	0	0	0	0
3201 : N-DOCOSANE	0	0	0	0	0
3202 : N-TRICOSANE	0	0	0	0	0
3203 : N-TETRACOSANE	0	0	0	0	0
3204 : N-PENTACOSANE	0	0	0	0	0
3205 : N-HEXACOSANE	0	0	0	0	0
3206 : N-HEPTACOSANE	0	0	0	0	0
3207 : N-OCTACOSANE	0	0	0	0	0
3208 : N-NONACOSANE	0	0	0	0	0
3209 : N-TRIACONTANE	0	0	0	0	0
62 : WATER	85.9261	0	0.000498	85.9256	92.0214
Total	93.3762	0	7.44142	85.9348	100

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Properties

Temperature	F	70
Pressure	psia	14.7
Enthalpy	Btu/hr	-5604274
Entropy	Btu/hr/R	-8943.322
Vapor Fraction		0

		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	300.3396	2.8464	297.4932
Flowrate	lb/hr	5690.6841	331.1135	5359.5706
Mole Fraction		1	0.009477	0.990523
Mass Fraction		1	0.058185	0.941815
Molecular Weight		18.9475	116.3277	18.0158
Enthalpy	Btu/lbmol	-18659.7894	-16158.7937	-18683.7187
Enthalpy	Btu/lb	-984.8155	-138.9075	-1037.0755
Entropy	Btu/lbmol/R	-29.7774	-18.0535	-29.8895
Entropy	Btu/lb/R	-1.5716	-0.155195	-1.6591
Cp	Btu/lbmol/R		57.703	17.9991
Cp	Btu/lb/R		0.496	0.9991
Cv	Btu/lbmol/R		50.7686	17.8638
Cv	Btu/lb/R		0.4364	0.9916
Cp/Cv			1.1366	1.0076
Density	lb/ft3		44.1975	62.3038
Z-Factor			0.006808	0.0007479
Flowrate (T-P)	gal/min		0.934088	10.7257
Flowrate (STP)	gal/min		0.927761	10.714
Specific Gravity	GPA STP		0.713459	1
Viscosity	cP		0.557069	0.975963
Thermal Conductivity	Btu/hr/ft/R		0.069922	0.346918
Surface Tension	dyne/cm		21.1389	72.5713
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		20.51	
Critical Temperature (Cubic E	F	695.5232		
Critical Pressure (Cubic EOS)	psia	3256.2708		
Dew Point Temperature	F	211.5512		
Bubble Point Temperature	F	70.3062		
Water Dew Point Temperature could not be calculated				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (h	Btu/lb	925.5943		
Latent Heat of Vaporization (P	Btu/lb	1063.078		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.03		
Heating Value (net)	Btu/SCF	55.74		
Wobbe Number	Btu/SCF	73.61		
Average Hydrogen Atoms		2.1513		
Average Carbon Atoms		0.0776		
Hydrogen to Carbon Ratio		27.7362		

EFSCOP00002250

ATTACHMENT 4
REGULATORY APPLICABILITY

OIL AND GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 4
REGULATORY APPLICABILITY

Burlington Resources Oil & Gas Company LP (Burlington) is submitting this Oil and Gas Standard Permit (SP) Registration to authorize Borgfeld Unit A1 and Culpepper Unit A1 (the Site). The Site will include six (6) controlled atmospheric condensate storage tanks and associated loading, two (2) controlled atmospheric produced water storage tanks and associated loading, one (1) flare combustion control device, and piping and fugitive components. The following paragraphs address the Site's compliance with each of the applicable SP requirements. A copy of this SP is located in Attachment 6 of this SP registration.

Non-Rule Air Quality Standard Permit for Oil and Gas Handling and Production Facilities, effective February 27, 2011.

SP (a)(1)

This rule states that the requirements in paragraphs (a)-(k) of this standard permit are applicable to projects located in the Barnett Shale (Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise Counties) on or after April 1, 2011. For all other projects and dependent facilities, 30 TAC 116.620 is applicable.

The Site is located in DeWitt County and is therefore not required to meet this SP. However, Burlington has opted to meet the Non-Rule Air Quality Standard Permit voluntarily.

SP (a)(2)

This rule states that only one Air Quality Standard Permit for Oil and Gas Handling and Production Facilities for an oil and gas site (OGS) may be registered for a combination of dependent facilities, and may not be used if operationally dependent facilities are authorized by the permit by rule in 30 TAC 106.352 or 116.111. Existing authorized facilities which are not changing certified character or quantity of emissions must only meet subsections (i) and (k) of this standard permit.

All facilities at the Site are included in this SP registration, in accordance with this rule.

SP (a)(3)

This rule does not relieve the owner or operator from complying with any other applicable provision of the Texas Health and Safety Code, Texas Water Code, rules of the Texas Commission on Environmental Quality (TCEQ), or any additional local, state, or federal regulations.

Burlington will comply with the applicable provisions of these regulations.

SP (a)(4)

This rule states that emissions from upsets, emergencies, or malfunctions are not authorized by this standard permit. This standard permit does not regulate methane, ethane, or carbon dioxide.

EFSCOP00002252

This SP registration does not include emissions from upset, emergency, or malfunction events. If any such emission events occur, Burlington Resources will manage them in accordance with 30 TAC Chapter 101.

SP (b)(1)-(8)

These rules state the definitions and scope of a Facility, Receptors, and OGS. The rules also state that the definitions of 30 TAC §122.10 relating to the Federal Operating Permits program apply. A project is defined as any new facility or group of operationally dependent facilities at an OGS or physical or operational changes to existing authorized facilities which increase the potential to emit over previously certified limits and must meet all requirements of this standard permit prior to construction or implementation of changes, including an impacts analysis as specified in paragraph (k) of this SP.

This permit application was completed according to the definitions and scope laid out in these rules.

SP (c)(1)

This rule states that existing OGS which are authorized by previous versions of this Standard Permit require registration unless the Project can meet exceptions listed in this requirement.

This Site was not authorized under a previous SP; therefore, this rule does not apply.

SP (c)(2)(A)

This rule states that new, changed, or replacement facilities shall not exceed the thresholds for major source or major modification as defined in 30 TAC §116.12 (Nonattainment and Prevention of Significant Deterioration Review Definitions), and in Federal Clean Air Act, §112(g) or §112(j);

The Site is located in DeWitt County which is an attainment county. The Site is a new project and emission totals for the Site do not exceed the thresholds for a major source. Therefore the requirements of this rule have been met.

SP (c)(2)(B)

This rule states that all facilities shall comply with all applicable 40 Code of Federal Regulations (CFR), Parts 60, 61, and 63 requirements for New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and Maximum Achievable Control Technology (MACT).

NSPS Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced after July 23, 1984 does not apply to the Site's storage tanks due to their capacities and since the condensate is only stored prior to custody transfer.

NSPS KKK – Standards of Performance for Equipment Leaks of VOC From Onshore Natural Gas Processing Plants do not apply since the Site is not a natural gas processing plant.

NSPS LLL – Standards of Performance for Onshore Natural Gas Processing: SO_2 Emissions does not apply since the Site does not have a sweetening unit or sweetening unit followed by a sulfur recovery unit.

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The Site is not subject to any Hazardous Air Pollutant (HAP) control requirements listed in 40 CFR Part 61. The Site is not subject to any maximum achievable control requirements listed in 40 CFR Part 63.

SP (c)(2)(D)

This rule states that all facilities shall comply with all applicable requirements of 30 TAC Chapters 111 (Control of Air Pollution from Visible Emissions and Particulate Matter), 112 (Control of Air Pollution from Sulfur Compounds), 113 (Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants), 115 (Control of Air Pollution from Volatile Organic Compounds), and 117 (Control of Air Pollution from Nitrogen Compounds).

Explanations of compliance are provided for all applicable rules.

30 TAC Chapter 111 - Control of Air Pollution from Visible Emissions and Particulate Matter Flare control devices found at the site will meet the visible emission requirements listed in 30 TAC 111.111(a)(4). This includes stipulations on visible emissions allowed during periods of time during normal operations.

30 TAC Chapter 112 - Control of Air Pollution from Sulfur Compounds regulates controls needed on emissions related to sulfur compounds. The liquids and gases handled on site do not emit over the prescribed rates.

30 TAC Chapter 113 - Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants addresses the control of hazardous air pollutant (HAP) emissions from designated facilities defined within this chapter including municipal solid waste landfills (MSWLFs), medical waste incinerators, and certain other processes/emissions regulated under 40 CFR Parts 61 and 63. The Site will not generate radionuclide emissions and will not include a MSWLF or medical waste incinerator. Consequently, Subchapters B and D are not applicable. The applicability of Subchapter C of this rule, which implements 40 CFR Part 63 by regulating HAP emissions released from source categories, is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC Chapter 115 - Control of Air Pollution from Volatile Organic Compounds regulates VOC emissions according to source type and Site location (county). The Site is located in DeWitt County which is considered a covered attainment county. However, the equipment at the Site is exempt from this rule because it does not meet the requirements set forth for applicability for covered attainment counties.

30 TAC Chapter 117 - Control of Air Pollution from Nitrogen Compounds includes regulations for major sources of NO_X in ozone nonattainment areas. The Site is located in DeWitt County, which is not listed in the counties of interest as mentioned in this rule text. NOx emitting sources at the Site are exempt from this rule and it's requirements.

SP (c)(3)

This rule states that in order to be eligible for this Standard Permit, an applicant:
(A) shall meet all applicable requirements as set forth in this standard permit;
(B) shall not misrepresent all relevant facts in obtaining the permit; and
(C) shall not be indebted to the state for failure to make payment of penalties or taxes imposed by the commission's jurisdiction.

EFSCOP00002254

Burlington will comply with the requirements listed in this rule.

SP (c)(4)(A-D)

All facilities related to the operation of any OGS, under any version of this standard permit (or co-located at a site with an OGS standard permit), previously authorized by permit by rule under 30 TAC Chapter 106 must be incorporated into this standard permit (previous authorizations will be voided), meet all emission limits established by this standard permit and review in accordance with paragraph (b)(8), and meet the requirements of paragraphs (e), (i), and (j) of this standard permit. The requirements in paragraph (h) (BACT) of this standard permit must be met if facilities are changed to increase the potential to emit.

The Site was not previously authorized under any Standard Permits and will meet the requirements of this rule.

SP (d)

This rule lists the specific facilities that have been evaluated for standard permit registration, as well as facilities that are not authorized under standard permit.

The Site does not include any of the facilities listed in the exclusions list of this rule. Additionally, all the facilities located at the Site are listed in the approved facilities list of this rule. Therefore, the requirements of this rule will be met.

SP (e)(1)

All facilities which have the potential to emit air contaminants must be maintained in good working order and operated properly during facility operations. Each operator shall establish and maintain a program to replace, repair, and/or maintain facilities to keep them in good working order. The minimum requirements of this program shall include:

(A) Compliance with manufacturer's specifications and recommended programs;
(B) cleaning and routine inspection of all equipment; and
(C) replacement and repair of equipment on schedules which prevent equipment failures and maintain performance.

Burlington will comply with the requirements of this rule.

SP (e)(2)

This rule states that any facility shall be operated at least 50 feet from any property line or receptor (whichever is closer to the facility). This distance limitation does not apply to the following:

(A) any fugitive components that are used for isolation and/or safety purposes may be located at 1/2 of the width of any applicable easement;
(B) any facility at a location for which the distance requirements were satisfied at the time this section is claimed, registered, or certified (provided that the authorization was maintained) regardless of whether a receptor is subsequently built or put to use 50 feet from any OGS facility; or
(C) existing facilities which are located less than 50 feet from a property line or receptor when constructed and previously authorized. If modified or replaced the operator shall consider, to the

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extent that good engineering practice will permit, moving these facilities to meet the 50-foot requirement. Replacement facilities must meet all other requirements of this section.

The Site will satisfy the 50-foot requirement.

SP (e)(3)

This rule states that engines and turbines shall meet the emission and performance standards listed in Table 6 and the following requirements:

(A) liquid fueled engines used for back-up power generation and periodic power needs at the OGS are authorized if the fuel has no more than 0.05% sulfur and the engine is operated less than 876 hours per rolling 12-month period;

(B) engines and turbines used for electric generation more than 876 hours per rolling 12-month period are authorized if no reliable electric service is readily available and 30 TAC §106.352(m) Table 6 is met. In all other circumstances, electric generators must meet the technical requirements of the Air Quality Standard Permit for Electric Generating Unit (EGU) and the emissions shall be included in the registration under this section;

(C) all applicable requirements of Chapter 117 of this title (relating to Control of Air Pollution from Nitrogen Compounds);

(D) all applicable requirements of 40 CFR Parts 60 and 63; and

(E) compression ignition engines that are rated less than 225 kilowatts (300 hp) and emit less than or equal to the emission tier for an equivalent-sized model year 2008 non-road compression ignition engine located at 40 CFR §89.112, Table 1 are authorized.

This Site does not include any engines or turbines; therefore, this rule does not apply.

SP (e)(4)

This rule states that open-topped tanks or ponds containing VOCs or H_2S are allowed up to a potential to emit equal to 1.0 tpy of VOC and 0.1 tpy of H_2S.

This Site does not involve open-topped tanks or ponds containing VOCs or H_2S. Therefore, this rule does not apply.

SP (e)(5)

All process equipment and storage facilities individually must meet the requirements of BACT listed in Table 10 in paragraph (m). Any combination of process equipment and storage facilities with an uncontrolled PTE of equal to or greater than 25 tpy of VOC must also meet the requirements of Table 10, row titled "Combined Control Requirements". All of the following streams and facilities must be included for this site-wide assessment:

(A) For any gaseous vent stream with a concentration of 1% VOC must be considered for capture and control requirements;

(B) For any liquid stream with a potential to emit of equal to or greater than 1 tpy VOC for each vessel or storage facility.

The equipment at the Site will meet the requirements of this rule.

SP (e)(6)

EFSCOP00002256

This rule includes requirements for fugitive components based upon the total site fugitive emissions. If the site is subject to LDAR control program, the requirements outlined in Table 9 must be followed.

The emissions represented in this application are done so in accordance with this rule. This Site is not required to utilize the LDAR control program.

SP (e)(7)

This rule states requirements for tanks and vessels that use a paint color to minimize the effects of solar heating. Solar absorptance should be 0.43 or less, as referenced in AP-42 Table 7.1 – 6 and paint shall be applied in sufficient quantity as to be considered solar resistant. Paint coatings shall be maintained in good condition and will not compromise tank integrity. Minimal amounts of rust may be present not to exceed 10% of the external surface area of the roof or walls of the tank and in no way may compromise tank integrity.

The Site includes a number of liquid storage tanks which will comply with the requirements of this rule.

SP (e)(8)

This rule states that all emission estimation methods including computer programs must be used with monitoring data generated in accordance with Table 8 in section (m). All emission estimation methods must also be used in a way that are consistent with protocols established by the commission or promulgated in federal regulations (NSPS, NESHAPS). Where control is relied upon to meet paragraph (k) (emission limits based on impact evaluation), control monitoring is required.

The Site will comply with all applicable monitoring and record demonstration requirements, and all emission estimation methods will comply with the requirements of this rule.

SP (e)(9)

This rule states that process reboilers, heaters, and furnaces that are also used for control of waste gas streams:

(A) may claim 50% to 99% destruction efficiency for VOCs and H_2S depending on the design and level of monitoring applied. The 90% destruction may be claimed where the waste gas is delivered to the flame zone or combustion fire box with basic monitoring as specified in 30 TAC §106.352(j). Any value greater than 90% and up to 99% destruction efficiency may be claimed where enhanced monitoring and/or testing are applied as specified in 30 TAC §106.352(j);
(B) if the waste gas is premixed with the primary fuel gas and used as the primary fuel in the device through the primary fuel burners, 99% destruction may be claimed with basic monitoring as specified in 30 TAC §106.352(j);
(C) in systems where the combustion device is designed to cycle on and off, records of run time and enhanced monitoring are required to claim any run time beyond 50%.

There are no heaters at the Site; therefore, this rule does not apply.

SP (e)(10)

This rule states that Vapor Recovery Systems (VRSs) may claim up to 100% control. The VRUs must meet the appropriate design, monitoring, and recordkeeping in subsection (m) Table 7 and Table 8.

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The Site does not involve the use of a VRU; therefore, this rule does not apply.

SP (e)(11)

This rule includes design parameters that are required of flare combustion control devices in order to be able to claim a 98% destruction efficiency of 98% for VOCs and H2S and 99% for VOCs containing no more than three carbon atoms that contain no elements other than carbon and hydrogen.

The Site has a flare combustion control device and is claiming a destruction efficiency of 98%. The Site will meet the design parameters required for this destruction efficiency.

SP (e)(12)

This rule establishes the design destruction efficiency that thermal oxidation and vapor combustion control devices may claim, depending on the design and level of monitoring applied, variability of waste gas streams to control, and stack testing.

The Site does not involve the use of thermal oxidizers; therefore, this rule does not apply.

SP (f)(1)

This rule states that for all previous claims of this standard permit (or previous version of this standard permit) existing authorized facilities, or group of facilities, are not required to meet the requirements of this standard permit, with the exception of planned MSS, until a renewal under the standard permit is submitted after December 31, 2015.

The Site is not an existing authorized facility under a previous version of the SP; therefore, this rule does not apply.

SP (f)(2)

This rule states that if no other changes, except for authorizing planned MSS, occur at an existing site under this standard permit, or any previous version of this standard permit, paragraph (b)(7) applies.
(A) Records demonstrating compliance Paragraph (i) must be kept;
(B) If the OGS must certify emissions to establish nonapplicability of prevention of significant deterioration (PSD), nonattainment new source review (NNSR), or the federal operating permits program, this certification may be filed using form APD-CERT. No fee is required for this certification;
(C) Planned MSS shall be incorporated at the next revision or update to a registration under this standard permit after January 5, 2012, and no later than any renewal submitted after December 31, 2015.

The Site is not an existing authorized facility under this SP or a previous version of the SP; therefore, this rule does not apply.

SP (f)(3)

This rule states that facilities, groups of facilities or planned MSS from facilities registered under this standard permit cannot be authorized by a permit under 30 TAC 116.111, General Application.

This registration includes planned MSS emissions authorized under the Non-Rule Oil & Gas Standard Permit.

EFSCOP00002258

SP (f)(4)

This rule states that prior to construction or implementation of changes for any project which meets this standard permit, a notification shall be submitted through the ePermits system (or hard copy). This notification shall include the following:
(A) Identifying information (Core Data) and a general description of the project.
(B) A fee of $25 for small businesses as defined in 30 TAC §106.50 (Registration Fees for Permits by Rule), or $50 for all others.

An initial notification meeting these requirements was submitted to the TCEQ via the ePermits system on August 8, 2012.

SP (f)(5)

This rule states that for any registration which meets the emission limitations of this standard permit must meet the following:
(A) Within 90 days after start of operation or implemented changes (whichever occurs first), the facilities must be registered with a PI-1S Standard Permit Application.
(B) Include a detailed summary of maximum emissions estimates based on representative gas and liquid analysis, equipment design specifications and operations, material type and throughput, other parameters for determining emissions, and documentation demonstrating compliance with applicable requirements.
(C) Pay registration fee of $475 for small businesses, or $850 for all others.
(D) Construction may begin any time after receipt of written notification to the executive director. Operations may continue after receipt of registration if there are no objections or 45 days after receipt by the executive director of the registration, whichever occurs first.

This SP registration is being submitted in accordance with these requirements.

SP (f)(6)

This rule states that if an OGS emissions increase, either through a change in production or addition of facilities, the site may change authorization (Level 1 or Level 2 PBR in 30 TAC §106.352 or Standard Permit) within 90 days from the initial notification of construction of an oil and gas facility or within 90 days of the change of production or installation of additional equipment, by submitting an initial registration or revision to the PBR or Standard Permit.

At the time of this registration, Burlington maintains that the Site should be permitted under the SP level, as reflected in the initial notification.

SP (f)(7)

This rule states that all registrations, registration revisions, and renewals shall be submitted to the commission through a PI-1S Standard Permit Registration Form. Fee requirements do not apply when there are changes in representations with no increase in emissions within 6-months after a standard permit registration has been issued.

A PI-1S Standard Permit Registration Form is part of this initial SP registration; therefore, the requirements of this rule will be met.

SP (g)

EFSCOP00002259

This rule states that any claim under this standard permit must comply with all applicable requirements of 30 TAC §116.610; §116.611, Registration to Use a Standard Permit; §116.614, Standard Permit Fees; and §116.615, General Conditions. This standard permit supersedes: the notification requirements of 30 TAC §116.615, General Conditions; and the emission limitations of 30 TAC §116.610(a)(1), Applicability.

This SP registration complies with all applicable requirements as listed in this rule and discussed later in this section; therefore, the requirements of this rule will be met.

SP (h)

Total maximum estimated registered or certified emissions shall meet the most stringent of the following:
(1) The applicable limits for a major stationary source or major modification for PSD and NNSR as specified in 30 TAC §116.12.
(2) Paragraph (k) of this standard permit.
(3) The limits set forth by Paragraph (h)(3).

The Site complies with this rule. Refer to Attachment 5 for the Impacts Evaluation.

SP (i)(1)

This rule states that prior to January 5, 2012, representations and registration of planned MSS is voluntary, but if represented must meet the applicable limits of the standard permit. After January 5, 2012, all emissions from planned MSS activities and facilities must be considered for compliance with applicable limits of the standard permit unless otherwise stated in (b)(7). This section may not be used at a site or for facilities authorized under §116.111 of this title if planned MSS has already been authorized under that permit.

The Site has not been previously authorized under §116.111. Burlington has voluntarily included MSS activities in this SP registration submittal as opposed to the delayed compliance date. Therefore, the requirements of this rule will be met.

SP (i)(2)

This rule states that releases of air contaminants during, or as result of, planned MSS must be quantified and meet the emission limits in this standard permit, as applicable. This analysis must include:
(A) alternate operational scenarios or redirection of vent streams;
(B) pigging, purging, and blowdowns;
(C) temporary facilities if used for degassing or purging of tanks, vessels, or other facilities;
(D) degassing or purging of tanks, vessels, or other facilities; and
(E) management of sludge from pits, ponds, sumps, and water conveyances.

This submittal includes emissions representations for alternate operational scenarios during maintenance events. The first scenario occurs when the well is shut in and not producing so that the flare on site may be taken down for maintenance. Emissions related to the standing losses of the liquids already in the storage tanks at the time of shut in are represented in this application as an MSS event. Working losses and flash emissions will not occur as the liquid levels would not be changing.

The second scenario occurs when engines located at sites downstream from this one go down for maintenance. This Site would in turn send all low pressure gas from the separator to flare. The proposed site emissions include this maintenance event and the resulting combustion emissions.

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All other MSS activities listed in this rule do not apply to the Site.

SP (i)(3)

This rule states that other planned MSS activities authorized by this standard permit are limited to the following. These planned MSS activities require only recordkeeping of the activity.
(A) Routine engine component maintenance including filter changes, oxygen sensor replacements, compression checks, overhauls, lubricant changes, spark plug changes, and emission control system maintenance.
(B) Boiler refractory replacements and cleanings.
(C) Heater and heat exchanger cleanings.
(D) Turbine hot standard permit swaps.
(E) Pressure relief valve testing, calibration of analytical equipment; instrumentation/analyzer maintenance; replacement of analyzer filters and screens.

Burlington will maintain records for the planned MSS activities listed in this SP registration; therefore, the requirements of this rule are met.

SP (i)(4)

This rule states that engine and compressor startups associated with preventative system shutdown activities have the option to be authorized as part of typical operations if:
(A) prior to operation, alternative operating scenarios to divert gas or liquid streams are registered and certified with all supporting documentation;
(B) engine/compressor shutdowns shall result in no greater than 4 lb/hr of natural gas emissions; and
(C) emissions which result from the subsequent compressor startup activities are controlled to a minimum of 98% efficiency for VOC and H_2S.

There are no engine startups at the Site; therefore, this rule does not apply.

SP (j)

This rule states requirements for sampling, monitoring, and records. The following records shall be maintained at the facility site (or an office within Texas having day-to-day operational control of the plant site) in written or electronic form and be readily available to the agency or local air pollution control program with jurisdiction upon request.
(1) Sampling and demonstrations of compliance shall include the requirements listed in Paragraph (m) Table 7.
(2) Monitoring and records for demonstrations of compliance shall include the requirements listed in Paragraph (m) Table 8.

Burlington will perform the sampling and monitoring activities and maintain the appropriate records as required in Paragraph (m) Tables 7 and 8; therefore, the requirements of this rule will be met.

SP (k)(1)-(2)

This rule states all impacts evaluations must be completed on a contaminant-by-contaminant basis for any net emissions increases resulting from a project and must meet the following as appropriate:

EFSCOP00002261

(A) Compliance with state or federal ambient air standards for nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and H_2S shall be demonstrated using the shortest distance from any emission point, vent, or fugitive component to the nearest property-line within 1 mile of a project.
(B) Compliance with hourly and annual ESLs for benzene shall be demonstrated using the shortest distance from any emission point, vent, or fugitive component to the nearest receptor within 1 mile of a project.

Impacts analyses were conducted in accordance with this rule. Please refer to attachment 5 for the impacts evaluation.

SP (k)(3)

This rule states that impacts evaluations are not required under the following cases:
(A) If there is no receptor within 1 mile of a registration, no further ESL review is required.
(B) If there is no property line within 1 mile of a registration, no further ambient air quality standard review is required.
(C) If the project total emissions are less than 0.039 lb/hr benzene, 0.025 lb/hr H_2S, 2 lb/hr SO_2, or 4 lb/hr NO_2, no additional analysis or demonstration of the specified air contaminant is required.

The Site is within 1/2 mile of the nearest receptor. Hourly total emissions for Benzene, SO_2, NO_x, and H_2S exceed the limits in subsection (C). Therefore, impact evaluations are required for each of these contaminants and are included in Attachment 5.

SP (k)(4)

This rule states that emission evaluations shall meet the following:
(A) For all evaluations of NO_X to NO_2, a conversion factor of 0.20 for 4-stroke rich and lean-burn engines and 0.50 for 2-stroke lean-burn engines may be used.
(B) The maximum predicted concentration or rate at the property boundary or receptor, whichever is appropriate, must not exceed a state or federal ambient air standard or ESL.

There are no engines on the Site. As shown in Attachment 5, the maximum predicted concentrations at the property boundary or receptor were below the state or federal ambient air standard.

SP (k)(5)(A)

This rule states that the following shall be met for ESL reviews:
(i) If a project's air contaminant maximum predicted concentrations are equal to or less than 10% of the appropriate ESL, no further review is required.
(ii) If a project's air contaminant maximum predicted concentrations combined with project increases for that contaminant over a 60-month period after the effective date of this revised section are equal to or less than 25% of the appropriate ESL, no further review is required.
(iii) In all other cases, all facility emissions at an OGS, regardless of authorization type, located within 1 mile of a project requiring registration under this section shall be evaluated.

Burlington has evaluated all Site emissions for impacts analysis purposes. Refer to Attachment 5 for modeling results.

SP (k)(5)(B)

EFSCOP00002262

This rule states that the following shall be met for state and federal ambient air quality standard reviews:
(i) If a project's air contaminant maximum predicted concentrations are equal to or less than the significant impact level (also known as de minimis impact in Chapter 101 of this title (relating to General Air Quality Rules)), no further review is required;
(ii) In all other cases, all facility emissions at an OGS, regardless of authorization type, located within 1 mile of a project requiring registration under this section shall be evaluated.

Please refer to Attachment 5.

SP (k)(6)

This rule states that evaluation must comply with one of the methods listed with no changes or exceptions.
(A) Emission impact Tables 2 - 5F in Paragraph (m) may be used in accordance with the limits and descriptions in Paragraph (m) Table 1.
(B) A screening model may be used to demonstrate acceptable emissions from an OGS under this section if all of the parameters in the screening modeling protocol provided by the commission are met.
(C) A refined dispersion model may be used to demonstrate acceptable emissions from an OGS if all of the parameters in the refined dispersion modeling protocol provided by the commission are met.

Screen modeling was used to satisfy the requirements of this rule for the NOx and SO_2 emissions impacts analysis. The TCEQ provided impact Tables were utilized for Benzene and H_2S. These results are provided in Attachment 5.

SP (l)

This paragraph states that 30 TAC §116.620 is applicable for existing unchanged facilities and new or changing facilities as specified in paragraph (a)(1) of this standard permit.

Burlington has voluntarily elected to comply with paragraphs (a) through (k) of this Non-Rule SP. Therefore, paragraph (l) of this rule is not applicable.

<u>30 TAC §116.610. Applicability, effective February 1, 2006</u>

30 TAC §116.610(a)(1)

This paragraph of the TCEQ standard permit applicability rules requires that any project with a net increase in any air contaminant other than carbon dioxide, water, nitrogen, methane, ethane, hydrogen, oxygen, or those for which a National Ambient Air Quality Standard (NAAQS) has been established must meet the emission limitations of 30 TAC §106.261(2) or (3) or §106.262(2), unless otherwise specified by a particular standard permit.

The Site is electing to comply with the requirements of the Non-Rule Air Quality Standard Permit for Oil and Gas Handling and Production Facilities effective February 27, 2011, which supersedes the emission limitations of this rule. Therefore, this rule does not apply.

30 TAC §116.610(a)(2)

This rule states that a project authorized by standard permit must meet the conditions of the standard permit in effect at the time construction or operation is commenced.

The Site will meet the requirements of the Non-Rule Air Quality SP for Oil and Gas Handling and Production Applicability effective February 27, 2011. Should another SP come into effect prior to TCEQ concurrence with this SP authorization, Burlington will comply with the requirements of that version of the SP.

30 TAC §116.610(a)(3)

This rule requires that the project comply with applicable provisions of the Federal Clean Air Act (FCAA), §111 (concerning New Source Performance Standards (NSPS), as listed under 40 Code of Federal Regulations (CFR) Part 60.

The applicability of this rule is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC §116.610(a)(4)

This rule requires that the proposed project comply with the applicable provisions of the FCAA, §112 concerning Hazardous Air Pollutants (HAPs), as listed under 40 CFR Part 61.

The applicability of this rule is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC §116.610(a)(5)

This rule states that the project must comply with applicable maximum achievable control technology (MACT) standards listed under 40 CFR Part 63 or 30 TAC Chapter 113, Subchapter C relating to National Emissions Standards for Hazardous Air Pollutants.

The applicability of this rule is discussed above under section (c)(2)(B) of the Non-Rule SP.

30 TAC §116.610(a)(6)

This rule applies to facilities that are subject to the Mass Emissions Cap and Trade requirements listed in 30 TAC Chapter 101, Subchapter H, Division 3.

These requirements do not apply to the Site, which is located in DeWitt County, Texas.

30 TAC §116.610(b)

This rule states that any project, except those authorized under 30 TAC §116.617 of this title (relating to Standard Permits for Pollution Control Permits), which constitute a new major source or major modification under the new source review requirements of the FCAA, Part C or Part D is subject to the requirements of 30 TAC §116.110 rather than 30 TAC Chapter 116 Subchapter F.

The Site is not a major source of air pollutants, with respect to Prevention of Significant Deterioration (PSD) permitting regulations. The Site is located in DeWitt County, which is an attainment county; therefore, the Site is not required to be evaluated for nonattainment permitting requirements.

30 TAC §116.610(c)

EFSCOP00002264

This rule prohibits circumvention of the requirements of 30 TAC §116.110 by artificial limitations.

Burlington is not taking any artificial limitations on the Site's emissions. Therefore, the condition of this rule has been met.

30 TAC §116.610(d)

This rule states that any project involving a proposed affected facility (as defined in §116.15(1) of this title (relating to Section 112(g) Definitions)) shall comply with all applicable requirements under Subchapter C of this chapter (relating to Hazardous Air Pollutants: Regulations Governing Constructed and Reconstructed Major Sources (FCAA, §112(g), 40 CFR Part 63)).

The Site is not subject to FCAA §112(g), 40 CFR Part 63 requirements, referenced in 30 TAC Chapter 116 Subchapter C.

30 TAC §116.611. Registration to Use a Standard Permit, effective December 11, 2002

This rule states that, if required, registration to use a standard permit shall be sent by certified mail, return receipt requested, or hand delivered to the executive director, the appropriate commission regional office, and any local air pollution program with jurisdiction, before a standard permit can be issued. The registration, at a minimum, must include the basis of the air emission estimates, quantification of all emission increases and decreases associated with the project, sufficient information to demonstrate the project's compliance with §116.610(b), information describing efforts to minimize emissions increases that will result from the project, a description of the project and related processes, and a description of any equipment installed. A certified registration must be submitted to avoid applicability of Chapter 122 and be maintained in accordance with §116.115.

A certified registration for this Site is being submitted to the appropriate state and local entities using the required forms and including all appropriate demonstrations of compliance with the requirements of this rule.

30 TAC §116.614. Standard Permit Fees, effective October 20, 2002

This rule states that any person who registers to use a standard permit or an amended standard permit, or to renew a registration to use a standard permit shall remit at the time of registration, a flat fee of $900 for each standard permit being registered. All standard permit fees will be remitted in the form of a check, certified check, electronic funds transfer, or money order made payable to the TCEQ and delivered with the permit registration.

A fee of $850.00 for this SP is being remitted to the TCEQ with the SP registration. A fee of $50.00 was submitted with the initial notification on August 8, 2012.

30 TAC §116.615. General Conditions, effective March 15, 2007

30 TAC §116.615(1)

EFSCOP00002265

This condition states that emissions from the facility must comply with all applicable rules and regulations adopted under Texas Health and Safety Code, Chapter 382, and with the intent of the Texas Clean Air Act (TCAA), including protection of health and property of the public.

The Site emissions will comply with all TCEQ rules and regulations as well as with the intent of the TCAA, including protection of the health and property of the people near the Site.

30 TAC §116.615(2)

This condition states that all representations with regard to construction plans, operating procedures, and maximum emission rates in any registration package become conditions upon which the facility, or changes thereto, must be constructed and operated.

The Site will be operated as represented in this SP. If any representation changes occur, Burlington will verify that the emission sources remain eligible for a SP and notify the executive director of any changes no later than 30 days after the change, in accordance with this condition.

30 TAC §116.615(3)

This condition states that all changes authorized under standard permit to a facility previously authorized under 30 TAC §116.110 shall be incorporated into that permit at such time as the permit is amended or renewed.

The Site was not previously authorized under 30 TAC §116.110; therefore, this condition does not apply.

30 TAC §116.615(4)

This condition states that start of construction, construction interruptions exceeding 45 days, and completion of construction shall be reported to the appropriate regional office not later than 15 working days after occurrence of the event, unless otherwise specified in the standard permit.

Burlington will comply with the reporting requirements listed in this condition.

30 TAC §116.615(5)

This condition lists requirements associated with start-up notification to the appropriate air program regional office and any other air pollution control program having jurisdiction.

This rule is not applicable for sites subject to the Non-Rule Air Quality SP for Oil and Gas Handling and Production Facilities Applicability sections (a)-(k).

30 TAC §116.615(6)

This condition contains requirements associated with stacks or process vents required to perform sampling operations.

Burlington will continue to conduct sampling required by this SP, as applicable. Should the TCEQ request stack sampling of other sources authorized by this SP, Burlington will comply with this section.

EFSCOP00002266

30 TAC §116.615(7)

This condition requires that the standard permit holder demonstrate or otherwise justify the equivalency of emission control methods, sampling or other emission testing methods, and monitoring methods proposed as alternatives to methods indicated in the conditions of the standard permit.

Burlington is not proposing alternative emission control methods, sampling or other emission testing methods, or monitoring methods at this time. Should Burlington elect to propose such alternatives, Burlington will do so in accordance with this condition.

30 TAC §116.615(8)

This condition contains the recordkeeping requirements associated with the standard permit.

Burlington will retain a copy of the SP along with information and data sufficient to demonstrate applicability of, and compliance with, the SP and will be made available at the request of representatives of the executive director, the EPA, or any air pollution control program having jurisdiction.

30 TAC §116.615(9)

This condition requires that facilities covered by the standard permit not be operated unless all air pollution emission capture and abatement equipment is maintained in good working order and operating properly during normal facility operations.

Equipment will not be operated unless the air emissions control equipment is operating properly during normal facility operations. Any emission events that are not included in this SP will be reported in accordance with 30 TAC §101.201 and §101.211.

30 TAC §116.615(10)

This condition states that registration of a standard permit by a standard permit applicant constitutes an acknowledgement and agreement that the holder will comply with all rules, regulations, and orders of the commission issued in conformity with the TCAA and the conditions precedent to the claiming of the standard permit.

Burlington will comply with all applicable rules, regulations, and orders of the commission.

30 TAC §116.615(11)

This condition states that if a standard permit for a facility requires a distance, setback, or buffer from other property or structures as a condition of the permit, the determination of whether the distance, setback, or buffer is satisfied shall be made on the basis of conditions existing at the earlier of:

(A) the date new construction, expansion, or modification of a facility begins; or
(B) the date any application or notice of intent is first filed with the commission to obtain approval for the construction or operation of the facility.

Burlington will comply with the distance determination requirements stated in this rule, as applicable.

EFSCOP00002267

Air Quality Standard Permits (SP)
General Requirements Checklist
Title 30 Texas Administrative Code §§116.610-116.615

Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the rule number. The SP forms, tables, checklists, and guidance documents are available from the TCEQ, Air Permits Division web site at: www.tceq.state.tx.us/permitting/air/nav/standard.html.

Most Standard Permits require registration with the commission's Office of Permitting, Remediation, and Registration in Austin. The facilities and/or changes to facilities can be registered by completing a **Form PI-1S**, "Registration for Air Standard Permit." This checklist should accompany the registration form to expedite any registration review.

CHECK THE MOST APPROPRIATE ANSWERS AND FILL IN THE REQUESTED INFORMATION

Rule	Questions/Description	Information	Response
116.610 (a)(1)	Are there net emissions increases associated with this registration?	Attach emissions summary & calculations	☑ YES ☐ NO
	If "YES," will net emission increases of air contaminants from the project, other than those for which a National Ambient Air Quality Standard (NAAQS) has been established, meet the emission limits of § 106.261 or § 106.262?		☐ YES ☑ NO
	If "NO," does the specific standard permit exempt emissions from this limit?		☑ YES ☐ NO
116.610 (a)(3)	Do any of the Title 40 Code of Federal Regulations Part (CFR) 60, New Source Performance Standards apply to this registration? *If "YES," list subparts*	List subparts:	☐ YES ☑ NO
116.610 (a)(4)	Do any Hazardous Air Pollutant requirements apply to this registration? *If "YES," list subparts*	List subparts:	☐ YES ☑ NO
116.610 (a)(5)	Do any maximum achievable control technology (MACT) standards as listed under 40 CFR Part 63 or Chapter 113, Subchapter C (National Emissions Standard for Hazardous Air for Source Categories) apply to this registration? *If "YES," list subparts*	List subparts:	☐ YES ☑ NO
116.610 (a)(6)	Will additional emission allowances under Chapter 101, Subchapter H, Division 3, Emissions Banking and Trading, need to be obtained following this registration?		☐ YES ☑ NO

Air Quality Standard Permits (SP)
General Requirements Checklist
Title 30 Texas Administrative Code §§116.610-116.615

CHECK THE MOST APPROPRIATE ANSWERS AND FILL IN THE REQUESTED INFORMATION			
Rule	**Questions/Description**	**Information**	**Response**
116.611 (a) (1-6)	Is the following documentation included with this registration:		☑ YES ☐ NO
	Emissions calculations including the basis of the calculations?		☑ YES ☐ NO
	Quantification of all emission increases and/or decreases associated with this project?		☑ YES ☐ NO
	Sufficient information demonstrating that this project does not trigger PSD or NNSR review?		☑ YES ☐ NO
	Description of efforts to minimize collateral emissions increases associated with this project?		☑ YES ☐ NO
	Process descriptions including related processes?		☑ YES ☐ NO
	Description of any equipment being installed?		☑ YES ☐ NO
116.614	Are the required fee and a copy of the check or money order provided with the application?		☑ YES ☐ NO
116.615 (1)	Will emissions from the facility comply with all applicable rules and regulations of the commission adopted under Texas Health and Safety Code, Chapter 382, and with the intent of the Texas Clean Air Act?		☑ YES ☐ NO
116.615 (2)	Do you understand that all representations with regard to construction plans, operating procedures, and maximum emission rates in this registration become conditions upon which the facility will be constructed and operated?		☑ YES ☐ NO
116.615 (3)	Do you understand that all changes authorized by this registration need to be incorporated into the facility's permit if the facility is currently permitted under §116.110 (relating to Applicability)?	*List all related permit numbers:* 104974	☑ YES ☐ NO
116.615 (9) 617 (e)(1)	Will all air pollution emission capture and abatement equipment be maintained in good working order?		☑ YES ☐ NO
116.615 (10)	Will the facility comply with all applicable rules and regulations of the TCEQ, the Texas Health and Safety Code, Chapter 382, and the Texas Clean Air Act?		☑ YES ☐ NO

ATTACHMENT 5
IMPACTS EVALUATION

OIL AND GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

SUMMARY OF NO_X SCREEN3 MODELING RESULTS

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

FIN	EPN	Description	$PTE_{(NOx,HR)}$[a] (lb/hr)	$C_{(NOx,HR)}$[b] ($\mu g/m^3$)	$GLC_{(NOx,HR)}$[c] ($\mu g/m^3$)	$R_{(NO_2/NO_X)}$[d] (lb NO_2/lb NO_X)	$GLC_{(NO_2,HR)}$[e] ($\mu g/m^3$)	Annual Conversion Factor (CF)	$GLC_{(NOx,YR)}$[d] ($\mu g/m^3$)
Normal Operations									
FL-1	FL-1	Flare Combustion (normal operations pilot)	0.003	152.30	0.46	0.75	0.34	0.08	0.03
FL-1	FL-1	Flare Combustion (normal operations assist gas)	0.22	12.48	2.75	0.75	2.06	0.08	0.16
FL-1	FL-1	Flare Combustion (normal operations waste gas condensate)	1.15	3.22	3.70	0.75	2.78	0.08	0.22
FL-1	FL-1	Flare Combustion (normal operations waste gas produced water)	0.13	19.73	2.56	0.75	1.92	0.08	0.15
Maintenance, Startup, and Shutdown									
FL-1	FL-1	Flare Combustion (lp separator waste gas)	28.78	0.15	4.32	0.75	3.24	0.08	0.26
						Total Engine NO_2 Concentration ($\mu g/m^3$):	**10.34**		**0.83**
						DeWitt County NO_2 Background Concentration ($\mu g/m^3$)[g]:	**70.00**		**20.00**
						Total Off-Property Concentration ($\mu g/m^3$):	**80.34**		**20.83**
						NO_2 NAAQS ($\mu g/m^3$):	**188**		**100**

[a] $PTE_{(NOx,HR)}$ = Hourly PTE NO_X.

[b] $C_{(NOx,HR)}$ = Hourly NO_X concentration predicted by SCREEN3 model, using a nominal 1 lb/hr NO_X emission rate.

[c] $GLC_{(NOx,HR)}$ = Hourly ground level concentration of NO_X.
An example calculation for hourly NO_X ground level concentration for FIN FL-1 (normal operations pilot) follows:

$GLC_{(NOx,HR)} = PTE_{(NOx,HR)} * C_{(NOx,HR)}$

$GLC_{(NOx,HR)} = 0.003$ lb/hr * 152.3 $\mu g/m^3$/1 lb/hr

$GLC_{(NOx,HR)} = 0.46\ \mu g/m^3\ NO_X$

[d] $R_{(NO_2/NO_X)}$ NO_2/NO_X ratio from TCEQ guidance (attached).

[e] $GLC_{(NO_2,HR)}$ = Hourly ground level concentration of NO_2.
An example calculation for hourly NO_2 ground level concentration for FIN FL-1 follows:

$GLC_{(NO_2,HR)} = GLC_{(NOx,HR)} * R_{(NO_2/NO_X)}$

$GLC_{(NO_2,HR)} = 0.46\ \mu g/m^3 * 0.75$ lb NO_2/lb NO_X

$GLC_{(NO_2,HR)} = 0.34\ \mu g/m^3\ NO_2$

[f] $GLC_{(NO_2,YR)}$ = Annual ground level concentration of NO_2.
An example calculation for annual NO_2 ground level concentration for FIN FL-1 follows:

$GLC_{(NO_2,YR)} = GLC_{(NO_2,HR)} * CF$

$GLC_{(NO_2,YR)} = 0.34\ \mu g/m^3 * 0.08$

$GLC_{(NO_2,YR)} = 0.03\ \mu g/m^3\ NO_2$

[g] The hourly and annual NO_2 background concentration is based on TCEQ Guidance.

Maximum concentrations are shown for each stream sent to the Flare. Note that, the maximum distance is not the same for each stream, but representing all at the maximum concentration is the most conservative approach. Additionally, not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the emissions shown are conservatively represented.

EFSCOP00002271

SUMMARY OF SO_2 SCREEN3 MODELING RESULTS
OIL & GAS STANDARD PERMIT REGISTRATION
BORGFELD UNIT A1 AND CULPEPPER UNIT A1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

FIN	EPN	Description	$PTE_{(SO2,HR)}$[a] (lb/hr)	$C_{(SO2,HR)}$[b] ($\mu g/m^3$)	$GLC_{(SO_2,HR)}$[c] ($\mu g/m^3$)	Annual Conversion Factor (CF)	$GLC_{(SO2,YR)}$[d] ($\mu g/m^3$)
Normal Operations							
FL-1	FL-1	Flare Combustion (normal operations pilot)	0.0005	152.30	0.08	0.08	0.01
FL-1	FL-1	Flare Combustion (normal operations assist gas)	0.04	12.48	0.50	0.08	0.04
FL-1	FL-1	Flare Combustion (normal operations waste gas condensate)	0.05	3.22	0.16	0.08	0.01
FL-1	FL-1	Flare Combustion (normal operations waste gas produced water)	0.002	19.73	0.04	0.08	0.003
Maintenance, Startup, and Shutdown							
FL-1	FL-1	Flare Combustion (lp separator waste gas)	5.42	0.15	0.81	0.08	0.07
				Total SO_2 Concentration ($\mu g/m^3$):	**1.59**		**0.13**
				DeWitt County SO_2 Background Concentration ($\mu g/m^3$)[e]:	**50.00**		**8.00**
				Total Off-Property Concentration ($\mu g/m^3$):	**51.59**		**8.13**
				SO_2 NAAQS ($\mu g/m^3$):	**196**		**80**

[a] $PTE_{(SO2,HR)}$ Hourly PTE SO2.

[b] $C_{(SO2,HR)}$ = Hourly SO2 concentration predicted by SCREEN3 model, using a nominal 1 lb/hr SO2 emission rate.

[c] $GLC_{(SO2,HR)}$ = Hourly ground level concentration of SO2.
An example calculation for hourly SO2 ground level concentration for FIN FL-1 (normal operations pilot) follows:
$GLC_{(SO2,HR)}$ = PTE(SO2,HR) * C(SO2,HR)
$GLC_{(SO2,HR)}$ = (0.0005 lb/hr) * (152.30 µg/m3/1 lb/hr)
$GLC_{(SO2,HR)}$ = 0.08 µg/m3 SO2

[d] $GLC_{(SO_2,YR)}$ = Annual ground level concentration of SO_2.
An example calculation for annual SO_2 ground level concentration for FIN FL-1 follows:
$GLC_{(SO_2,YR)}$ = GLC(SO2,HR) * CF
$GLC_{(SO_2,YR)}$ = (0.08 µg/m3) * (0.08)
$GLC_{(SO_2,YR)}$ = 0.01 µg/m3 SO2

[e] The hourly and annual SO_2 background concentration is based on TCEQ Guidance.

Maximum concentrations are shown for each stream sent to the Flare. Note that, the maximum distance is not the same for each stream, but representing all at the maximum concentration is the most conservative approach. Additionally, not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the emissions shown are conservatively represented.

EFSCOP00002272

BENZENE EMISSION IMPACT ANALYSIS
OIL AND GAS STANDARD PERMIT REGISTRATION
BORGFELD UNIT A1 AND CULPEPPER UNIT A1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

Hourly ESL (µg/m3): 170
Annual ESL (µg/m3): 4.5

		Benzene Emissions		Stack Parameters		G	WR		Calculated Health Effects Review	
				Distance	Height					
EPN	FIN	(lb/hr)	(tpy)	(ft)	(ft)	(µg/m³/lb/hr)	(hourly)	(annual)	(lb/hr)	(tpy)
Normal Operations										
FUG	FUG	0.004	0.01	2528	3	64	1.03%	7.97%	0.03	0.31
	TK-01									
	TK-02									
FL-1	TK-03	0.01	0.02	2528	30	22	2.58%	15.95%	0.20	1.79
	TK-04									
	TK-05									
	TK-06									
FL-1	TK-07	0.0002	0.001	2528	30	22	0.05%	0.80%	0.004	0.09
	TK-08									
FL-1	TRUCK1	0.003	0.002	2528	30	22	0.77%	1.59%	0.06	0.18
FL-1	TRUCK2	0.001	0.0004	2528	30	22	0.26%	0.32%	0.02	0.04
FL-1	FL-1	0.000003	0.00001	2528	30	22	0.001%	0.01%	0.0001	0.001
Maintenance, Startup, and Shutdown										
FL-1	SEP-GAS	0.35	0.09	2528	30	22	90.16%	71.76%	6.97	8.04
TK-01	TK-01									
TK-02	TK-02									
TK-03	TK-03	0.02	0.002	2528	25	74	5.15%	1.59%	0.12	0.05
TK-04	TK-04									
TK-05	TK-05									
TK-06	TK-06									
TK-07	TK-07	0.000004	0.0000004	2528	25	74	0.001%	0.0003%	0.00002	0.00001
TK-08	TK-08									
	Total	**0.39**	**0.13**						**7.40**	**10.49**

Impacts Analysis:

	Hourly	Annual
Calculated Benzene Emissions (lb/hr):	**0.39**	**0.13**
Calculated Benzene Health Effects Review (lb/hr):	**7.40**	**10.49**

Per the non-Rule Oil and Gas Standard Permit (k)(4)(B), the site's air contaminant maximum predicted concentrations are less than the appropriate ESL. Therefore the impacts analysis meets the requirements of the Oil and Gas Standard Permit.

Health Effects Calculations and Impact factors G and WR, and equations from Air Quality Standard Permit for Oil and Gas Handling and Production Facilities (k) and Tables

Table 1: Emission Impact Tables Limits and Descriptions
Table 2: Fugitives and Process Vents Table
Table 3: Flares and Thermal Destruction Devices
Short-Term ESL 170 µg/m³ and Long-Term ESL 4.5 µg/m³ per TCEQ Development Support Document Benzene CAS #: 71-43-2, dated October 15, 2007

NOTE: Not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the analysis shown is conservatively represented.

EFSCOP00002273

H_2S EMISSION IMPACT ANALYSIS
OIL AND GAS STANDARD PERMIT REGISTRATION
BORGFELD UNIT A1 AND CULPEPPER UNIT A1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

State Property Line Standard (µg/m3): 108

EPN	FIN	H_2S Emissions (lb/hr)	Stack Parameters Distance (ft)	Stack Parameters Height (ft)	G (µg/m³/lb/hr)	WR (hourly)	Calculated Health Effects Review (lb/hr)
Normal Operations							
FUG	FUG	0.0004	50	3	4375	0.32%	0.0001
FL-1	TK-01 TK-02 TK-03 TK-04 TK-05 TK-06	0.001	50	30	43	0.81%	0.02
FL-1	TK-07 TK-08	0.00002	50	30	43	0.016%	0.0004
FL-1	FL-1	0.002	50	30	43	1.62%	0.04
Maintenance, Startup, and Shutdown							
FL-1	SEP-GAS	0.06	50	30	43	48.61%	1.22
FL-1	FL-1	0.06	50	30	43	48.61%	1.22
	Total	**0.12**					**2.50**

Impacts Analysis:

	Hourly
Calculated H_2S Emissions (lb/hr):	**0.12**
Calculated H_2S Health Effects Review (lb/hr):	**2.50**

Per the non-Rule Oil and Gas Standard Permit (k)(4)(B), the site's air contaminant maximum predicted concentrations are less than the appropriate ESL. Therefore the impacts analysis meets the requirements of the Oil and Gas Standard Permit.

Health Effects Calculations and Impact factors G and WR, and equations from Air Quality Standard Permit for Oil and Gas Handling and Production Facilities (k) and Tables

Table 1: Emission Impact Tables Limits and Descriptions
Table 2: Fugitives and Process Vents Table
Table 3: Flares and Thermal Destruction Devices
State Property Line Standard 108 µg/m³ per 30 TAC Ch 112 and TCEQ Modeling Guidance

NOTE: Not all events shown here would occur at the same time (MSS events would not occur during normal operations events), therefore the analysis shown is conservatively represented.

EFSCOP00002274

06/28/12
15:24:54

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Borgfeld Unit A1 and Culpepper Unit A1 Flare Normal Ops Pilot


 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE              =        FLARE
    EMISSION RATE (G/S)      =      .125800
    FLARE STACK HEIGHT (M)   =       9.1440
    TOT HEAT RLS (CAL/S)     =      1356.00
    RECEPTOR HEIGHT (M)      =        .0000
    URBAN/RURAL OPTION       =        RURAL
    EFF RELEASE HEIGHT (M)   =       9.2873
    BUILDING HEIGHT (M)      =        .0000
    MIN HORIZ BLDG DIM (M)   =        .0000
    MAX HORIZ BLDG DIM (M)   =        .0000

 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


 BUOY. FLUX =     .022 M**4/S**3;  MOM. FLUX =     .014 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
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DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	10.75	.45	.26	NO
100.	152.2	3	1.0	1.0	320.0	10.75	12.47	7.45	NO
200.	136.1	4	1.0	1.0	320.0	10.75	15.57	8.51	NO
300.	98.61	4	1.0	1.0	320.0	10.75	22.61	12.10	NO
400.	69.47	4	1.0	1.0	320.0	10.75	29.46	15.27	NO
500.	50.93	4	1.0	1.0	320.0	10.75	36.15	18.30	NO
600.	49.21	6	1.0	1.0	10000.0	16.25	21.33	9.89	NO
700.	50.41	6	1.0	1.0	10000.0	16.25	24.54	11.11	NO
800.	48.61	6	1.0	1.0	10000.0	16.25	27.71	12.14	NO
900.	45.99	6	1.0	1.0	10000.0	16.25	30.84	13.13	NO
1000.	43.07	6	1.0	1.0	10000.0	16.25	33.94	14.09	NO
1100.	40.09	6	1.0	1.0	10000.0	16.25	37.02	14.95	NO
1200.	37.28	6	1.0	1.0	10000.0	16.25	40.06	15.78	NO
1300.	34.68	6	1.0	1.0	10000.0	16.25	43.09	16.59	NO
1400.	32.29	6	1.0	1.0	10000.0	16.25	46.09	17.37	NO
1500.	30.12	6	1.0	1.0	10000.0	16.25	49.07	18.14	NO
1600.	28.14	6	1.0	1.0	10000.0	16.25	52.03	18.89	NO
1700.	26.35	6	1.0	1.0	10000.0	16.25	54.98	19.62	NO
1800.	24.72	6	1.0	1.0	10000.0	16.25	57.90	20.33	NO
1900.	23.23	6	1.0	1.0	10000.0	16.25	60.81	21.03	NO
2000.	21.88	6	1.0	1.0	10000.0	16.25	63.71	21.72	NO
2100.	20.68	6	1.0	1.0	10000.0	16.25	66.59	22.30	NO
2200.	19.59	6	1.0	1.0	10000.0	16.25	69.45	22.87	NO
2300.	18.59	6	1.0	1.0	10000.0	16.25	72.31	23.42	NO
2400.	17.67	6	1.0	1.0	10000.0	16.25	75.15	23.97	NO
2500.	16.82	6	1.0	1.0	10000.0	16.25	77.97	24.51	NO

2600.	16.04	6	1.0	1.0	10000.0	16.25	80.79	25.03	NO
2700.	15.32	6	1.0	1.0	10000.0	16.25	83.59	25.55	NO
2800.	14.65	6	1.0	1.0	10000.0	16.25	86.39	26.06	NO
2900.	14.02	6	1.0	1.0	10000.0	16.25	89.17	26.56	NO
3000.	13.44	6	1.0	1.0	10000.0	16.25	91.94	27.05	NO
3500.	11.16	6	1.0	1.0	10000.0	16.25	105.67	29.05	NO
4000.	9.469	6	1.0	1.0	10000.0	16.25	119.19	30.90	NO
4500.	8.180	6	1.0	1.0	10000.0	16.25	132.52	32.63	NO
5000.	7.169	6	1.0	1.0	10000.0	16.25	145.68	34.26	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

102.	152.3	3	1.0	1.0	320.0	10.75	12.81	7.66	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

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*** SUMMARY OF SCREEN MODEL RESULTS ***
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CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	152.3	102.	0.

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** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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06/29/12
14:43:07

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Borgfeld Unit A1 and Culpepper Unit A1 Flare Assist


 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE              =        FLARE
    EMISSION RATE (G/S)      =      .125800
    FLARE STACK HEIGHT (M)   =       9.1440
    TOT HEAT RLS (CAL/S)     =      113048.
    RECEPTOR HEIGHT (M)      =        .0000
    URBAN/RURAL OPTION       =        RURAL
    EFF RELEASE HEIGHT (M)   =      10.3309
    BUILDING HEIGHT (M)      =        .0000
    MIN HORIZ BLDG DIM (M)   =        .0000
    MAX HORIZ BLDG DIM (M)   =        .0000

 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


 BUOY. FLUX =    1.874 M**4/S**3;  MOM. FLUX =    1.143 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
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 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
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DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	44.57	.91	.83	NO
100.	10.86	1	3.0	3.0	960.0	21.75	27.05	14.32	NO
200.	12.48	3	3.5	3.5	1120.0	20.11	23.78	14.30	NO
300.	11.65	3	2.0	2.0	640.0	27.44	34.64	20.91	NO
400.	10.91	4	3.0	3.0	960.0	21.72	29.63	15.61	NO
500.	10.30	4	2.5	2.5	800.0	23.99	36.36	18.71	NO
600.	9.635	4	2.0	2.0	640.0	27.41	43.00	21.77	NO
700.	8.887	4	1.5	1.5	480.0	33.10	49.62	24.90	NO
800.	8.375	4	1.5	1.5	480.0	33.10	55.95	27.56	NO
900.	7.752	4	1.5	1.5	480.0	33.10	62.22	30.18	NO
1000.	7.164	4	1.0	1.0	320.0	44.48	68.82	33.54	NO
1100.	6.830	4	1.0	1.0	320.0	44.48	74.95	35.49	NO
1200.	6.481	4	1.0	1.0	320.0	44.48	81.03	37.39	NO
1300.	6.134	4	1.0	1.0	320.0	44.48	87.07	39.23	NO
1400.	5.798	4	1.0	1.0	320.0	44.48	93.06	41.04	NO
1500.	5.478	4	1.0	1.0	320.0	44.48	99.02	42.80	NO
1600.	5.267	6	1.0	1.0	10000.0	40.56	52.71	20.67	NO
1700.	5.445	6	1.0	1.0	10000.0	40.56	55.61	21.34	NO
1800.	5.585	6	1.0	1.0	10000.0	40.56	58.51	22.00	NO
1900.	5.691	6	1.0	1.0	10000.0	40.56	61.39	22.65	NO
2000.	5.767	6	1.0	1.0	10000.0	40.56	64.26	23.29	NO
2100.	5.778	6	1.0	1.0	10000.0	40.56	67.11	23.83	NO
2200.	5.772	6	1.0	1.0	10000.0	40.56	69.96	24.36	NO
2300.	5.753	6	1.0	1.0	10000.0	40.56	72.79	24.89	NO
2400.	5.723	6	1.0	1.0	10000.0	40.56	75.61	25.40	NO
2500.	5.683	6	1.0	1.0	10000.0	40.56	78.42	25.91	NO

2600.	5.636	6	1.0	1.0	10000.0	40.56	81.23	26.40	NO
2700.	5.583	6	1.0	1.0	10000.0	40.56	84.02	26.90	NO
2800.	5.524	6	1.0	1.0	10000.0	40.56	86.80	27.38	NO
2900.	5.461	6	1.0	1.0	10000.0	40.56	89.57	27.86	NO
3000.	5.395	6	1.0	1.0	10000.0	40.56	92.33	28.33	NO
3500.	4.991	6	1.0	1.0	10000.0	40.56	106.00	30.24	NO
4000.	4.609	6	1.0	1.0	10000.0	40.56	119.48	32.02	NO
4500.	4.260	6	1.0	1.0	10000.0	40.56	132.78	33.70	NO
5000.	3.945	6	1.0	1.0	10000.0	40.56	145.93	35.28	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

200.	12.48	3	3.5	3.5	1120.0	20.11	23.78	14.30	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

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*** SUMMARY OF SCREEN MODEL RESULTS ***
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CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	12.48	200.	0.

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** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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08/10/12
13:37:03

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Borgfeld Unit A1 and Culpepper Unit A1 - Cond TK Gas


SIMPLE TERRAIN INPUTS:
   SOURCE TYPE            =        FLARE
   EMISSION RATE (G/S)    =      .125800
   FLARE STACK HEIGHT (M) =       9.1440
   TOT HEAT RLS (CAL/S)   =      581379.
   RECEPTOR HEIGHT (M)    =        .0000
   URBAN/RURAL OPTION     =        RURAL
   EFF RELEASE HEIGHT (M) =      11.7404
   BUILDING HEIGHT (M)    =        .0000
   MIN HORIZ BLDG DIM (M) =        .0000
   MAX HORIZ BLDG DIM (M) =        .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


BUOY. FLUX =    9.639 M**4/S**3;  MOM. FLUX =    5.878 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
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*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
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DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	127.64	1.46	1.41	NO
100.	.4304	3	10.0	10.2	3200.0	23.27	12.63	7.72	NO
200.	3.110	3	10.0	10.2	3200.0	23.27	23.85	14.41	NO
300.	3.104	3	8.0	8.1	2560.0	26.16	34.54	20.74	NO
400.	2.834	3	5.0	5.1	1600.0	34.81	45.13	27.25	NO
500.	2.730	4	8.0	8.2	2560.0	26.04	36.38	18.75	NO
600.	2.549	4	8.0	8.2	2560.0	26.04	42.91	21.60	NO
700.	2.407	4	5.0	5.1	1600.0	34.62	49.62	24.91	NO
800.	2.303	4	5.0	5.1	1600.0	34.62	55.96	27.57	NO
900.	2.170	4	4.5	4.6	1440.0	37.17	62.31	30.35	NO
1000.	2.048	4	4.0	4.1	1280.0	40.35	68.62	33.12	NO
1100.	1.924	4	4.0	4.1	1280.0	40.35	74.76	35.09	NO
1200.	1.818	4	3.5	3.6	1120.0	44.43	80.98	37.28	NO
1300.	1.721	4	3.5	3.6	1120.0	44.43	87.02	39.13	NO
1400.	1.633	4	3.0	3.1	960.0	49.88	93.19	41.32	NO
1500.	1.561	4	3.0	3.1	960.0	49.88	99.14	43.07	NO
1600.	1.489	4	3.0	3.1	960.0	49.88	105.06	44.78	NO
1700.	1.421	4	3.0	3.1	960.0	49.88	110.94	46.46	NO
1800.	1.448	5	1.0	1.1	10000.0	73.82	88.76	36.01	NO
1900.	1.497	5	1.0	1.1	10000.0	73.82	93.05	36.96	NO
2000.	1.539	5	1.0	1.1	10000.0	73.82	97.33	37.90	NO
2100.	1.565	5	1.0	1.1	10000.0	73.82	101.59	38.74	NO
2200.	1.585	5	1.0	1.1	10000.0	73.82	105.83	39.56	NO
2300.	1.601	5	1.0	1.1	10000.0	73.82	110.06	40.38	NO
2400.	1.613	5	1.0	1.1	10000.0	73.82	114.28	41.18	NO
2500.	1.621	5	1.0	1.1	10000.0	73.82	118.48	41.98	NO

2600.	1.626	5	1.0	1.1	10000.0	73.82	122.66	42.76	NO
2700.	1.628	5	1.0	1.1	10000.0	73.82	126.83	43.53	NO
2800.	1.627	5	1.0	1.1	10000.0	73.82	130.99	44.30	NO
2900.	1.624	5	1.0	1.1	10000.0	73.82	135.14	45.05	NO
3000.	1.619	5	1.0	1.1	10000.0	73.82	139.27	45.80	NO
3500.	1.635	6	1.0	1.1	10000.0	62.71	106.65	32.43	NO
4000.	1.651	6	1.0	1.1	10000.0	62.71	120.06	34.10	NO
4500.	1.645	6	1.0	1.1	10000.0	62.71	133.30	35.68	NO
5000.	1.624	6	1.0	1.1	10000.0	62.71	146.40	37.18	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

231.	3.219	3	10.0	10.2	3200.0	23.27	27.28	16.40	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

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*** SUMMARY OF SCREEN MODEL RESULTS ***
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CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	3.219	231.	0.

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** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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08/10/12
13:40:55

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Borgfeld Unit A1 and Culpepper Unit A1 PW TK


 SIMPLE TERRAIN INPUTS:
    SOURCE TYPE            =        FLARE
    EMISSION RATE (G/S)    =      .125800
    FLARE STACK HEIGHT (M) =       9.1440
    TOT HEAT RLS (CAL/S)   =      63741.6
    RECEPTOR HEIGHT (M)    =        .0000
    URBAN/RURAL OPTION     =        RURAL
    EFF RELEASE HEIGHT (M) =      10.0466
    BUILDING HEIGHT (M)    =        .0000
    MIN HORIZ BLDG DIM (M) =        .0000
    MAX HORIZ BLDG DIM (M) =        .0000

 THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
 THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


 BUOY. FLUX =    1.057 M**4/S**3;  MOM. FLUX =     .644 M**4/S**2.

 *** FULL METEOROLOGY ***

 **********************************
 *** SCREEN AUTOMATED DISTANCES ***
 **********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
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DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.0	320.0	32.37	.79	.70	NO
100.	17.24	1	2.0	2.0	640.0	21.21	27.04	14.31	NO
200.	19.69	3	2.0	2.0	640.0	21.21	23.83	14.39	NO
300.	18.09	3	1.5	1.5	480.0	24.93	34.55	20.77	NO
400.	17.18	4	2.0	2.0	640.0	21.20	29.63	15.60	NO
500.	16.18	4	1.5	1.5	480.0	24.92	36.40	18.78	NO
600.	14.79	4	1.5	1.5	480.0	24.92	42.93	21.63	NO
700.	13.91	4	1.0	1.0	320.0	32.36	49.60	24.87	NO
800.	13.02	4	1.0	1.0	320.0	32.36	55.94	27.53	NO
900.	11.99	4	1.0	1.0	320.0	32.36	62.21	30.15	NO
1000.	10.96	4	1.0	1.0	320.0	32.36	68.42	32.72	NO
1100.	10.01	4	1.0	1.0	320.0	32.36	74.58	34.72	NO
1200.	9.162	4	1.0	1.0	320.0	32.36	80.69	36.65	NO
1300.	8.413	4	1.0	1.0	320.0	32.36	86.75	38.53	NO
1400.	7.826	6	1.0	1.0	10000.0	35.15	46.60	18.69	NO
1500.	8.054	6	1.0	1.0	10000.0	35.15	49.55	19.40	NO
1600.	8.210	6	1.0	1.0	10000.0	35.15	52.49	20.10	NO
1700.	8.306	6	1.0	1.0	10000.0	35.15	55.41	20.79	NO
1800.	8.351	6	1.0	1.0	10000.0	35.15	58.31	21.47	NO
1900.	8.355	6	1.0	1.0	10000.0	35.15	61.20	22.13	NO
2000.	8.324	6	1.0	1.0	10000.0	35.15	64.08	22.79	NO
2100.	8.225	6	1.0	1.0	10000.0	35.15	66.94	23.34	NO
2200.	8.113	6	1.0	1.0	10000.0	35.15	69.79	23.88	NO
2300.	7.991	6	1.0	1.0	10000.0	35.15	72.63	24.42	NO
2400.	7.862	6	1.0	1.0	10000.0	35.15	75.46	24.94	NO
2500.	7.727	6	1.0	1.0	10000.0	35.15	78.28	25.46	NO

2600.	7.588	6	1.0	1.0	10000.0	35.15	81.08	25.96	NO
2700.	7.448	6	1.0	1.0	10000.0	35.15	83.88	26.46	NO
2800.	7.306	6	1.0	1.0	10000.0	35.15	86.66	26.95	NO
2900.	7.165	6	1.0	1.0	10000.0	35.15	89.44	27.44	NO
3000.	7.024	6	1.0	1.0	10000.0	35.15	92.20	27.91	NO
3500.	6.318	6	1.0	1.0	10000.0	35.15	105.90	29.85	NO
4000.	5.706	6	1.0	1.0	10000.0	35.15	119.38	31.66	NO
4500.	5.179	6	1.0	1.0	10000.0	35.15	132.70	33.35	NO
5000.	4.726	6	1.0	1.0	10000.0	35.15	145.85	34.95	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

208.	19.73	3	2.0	2.0	640.0	21.21	24.80	14.95	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

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****************************************
*** SUMMARY OF SCREEN MODEL RESULTS ***
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```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	19.73	208.	0.

```
*****************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
*****************************************************
```

08/10/12
13:44:13

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

Borgfeld Unit A1 and Culpepper Unit A1 - MSS LP Sep to FLR


SIMPLE TERRAIN INPUTS:
   SOURCE TYPE            =        FLARE
   EMISSION RATE (G/S)    =      .125800
   FLARE STACK HEIGHT (M) =       9.1440
   TOT HEAT RLS (CAL/S)   =      .146073E+08
   RECEPTOR HEIGHT (M)    =        .0000
   URBAN/RURAL OPTION     =        RURAL
   EFF RELEASE HEIGHT (M) =      21.2675
   BUILDING HEIGHT (M)    =        .0000
   MIN HORIZ BLDG DIM (M) =        .0000
   MAX HORIZ BLDG DIM (M) =        .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.


BUOY. FLUX =  242.194 M**4/S**3;  MOM. FLUX =  147.685 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.0000	1	1.0	1.1	1011.7	1010.69	3.99	3.97	NO
100.	.4950E-02	6	1.0	1.5	10000.0	155.15	38.47	38.32	NO
200.	.6127E-02	5	1.0	1.3	10000.0	190.92	49.85	48.87	NO
300.	.6628E-02	5	1.0	1.3	10000.0	190.92	51.33	49.25	NO
400.	.7186E-02	5	1.0	1.3	10000.0	190.92	53.24	49.66	NO
500.	.1261E-01	4	20.0	22.4	6400.0	64.77	37.02	19.98	NO
600.	.5610E-01	1	3.0	3.2	960.0	351.07	147.53	166.75	NO
700.	.9902E-01	1	3.0	3.2	960.0	351.07	168.06	224.84	NO
800.	.1121	1	3.0	3.2	960.0	351.07	188.16	293.46	NO
900.	.1180	1	2.0	2.1	640.0	515.98	228.12	384.36	NO
1000.	.1419	1	1.5	1.6	681.9	680.88	275.73	488.31	NO
1100.	.1496	1	1.5	1.6	681.9	680.88	295.03	586.40	NO
1200.	.1487	1	1.5	1.6	681.9	680.88	309.15	693.68	NO
1300.	.1436	1	1.5	1.6	681.9	680.88	323.50	812.98	NO
1400.	.1387	4	20.0	22.4	6400.0	64.77	93.50	42.02	NO
1500.	.1374	4	20.0	22.4	6400.0	64.77	99.44	43.74	NO
1600.	.1352	4	20.0	22.4	6400.0	64.77	105.34	45.43	NO
1700.	.1326	4	20.0	22.4	6400.0	64.77	111.21	47.09	NO
1800.	.1296	4	20.0	22.4	6400.0	64.77	117.04	48.71	NO
1900.	.1263	4	20.0	22.4	6400.0	64.77	122.85	50.31	NO
2000.	.1229	4	20.0	22.4	6400.0	64.77	128.63	51.89	NO
2100.	.1194	4	20.0	22.4	6400.0	64.77	134.39	53.44	NO
2200.	.1160	4	20.0	22.4	6400.0	64.77	140.12	54.96	NO
2300.	.1125	4	20.0	22.4	6400.0	64.77	145.82	56.47	NO
2400.	.1091	4	20.0	22.4	6400.0	64.77	151.50	57.95	NO
2500.	.1057	4	20.0	22.4	6400.0	64.77	157.16	59.41	NO

2600.	.1024	4	20.0	22.4	6400.0	64.77	162.79	60.86	NO
2700.	.9927E-01	4	20.0	22.4	6400.0	64.77	168.40	62.28	NO
2800.	.9621E-01	4	20.0	22.4	6400.0	64.77	173.99	63.69	NO
2900.	.9324E-01	4	20.0	22.4	6400.0	64.77	179.56	65.08	NO
3000.	.9136E-01	4	15.0	16.8	4800.0	81.80	185.49	67.49	NO
3500.	.8204E-01	4	15.0	16.8	4800.0	81.80	212.93	73.65	NO
4000.	.7510E-01	2	1.5	1.6	681.9	680.88	559.98	534.52	NO
4500.	.7241E-01	2	1.5	1.6	681.9	680.88	614.44	599.58	NO
5000.	.7285E-01	5	3.0	3.9	10000.0	138.90	221.43	65.06	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

1135.	.1501	1	1.5	1.6	681.9	680.88	299.80	621.51	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

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****************************************
*** SUMMARY OF SCREEN MODEL RESULTS ***
****************************************
```

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.1501	1135.	0.

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***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
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Oil and Gas Standard Permit and Permit By Rule Refined-Screening Modeling Guidelines

The modeling tables in the Oil and Gas Standard Permit and Permit by Rule (PBR) are only one tool the applicant may use to demonstrate emissions from Oil and Gas Site (OGS) located in the Barnett Shale are acceptable under the Standard Permit and PBR. The modeling performed to create the modeling tables demonstrates the Standard Permit and PBR are protective anywhere in the Barnett Shale. In order to make the demonstration, the modeling is based on reasonably conservative assumptions and modeling techniques. If the modeling tables are too conservative for a specific OGS, the applicant may use a more refined screening modeling approach to demonstrate acceptable emissions from an OGS under the Standard Permit and PBR. The following information provides the requirements and guidance if an applicant chooses to conduct the refined screening approach. The applicant should follow the approach exactly and should not modify the approach on a case-by-case basis. However, the commission could modify the modeling guidance to resolve technical issues, clarify instructions, or allow the use of other refined dispersion models.

There are two refined screening options for demonstrating acceptable emission impacts. The first is a screening approach using the SCREEN3 model and the second is a refined screening approach using Industrial Source Complex (ISC) model. It is possible, and acceptable, that some sites may utilize a combination of SCREEN3 and ISC when completing the impacts review.

SCREEN3 Model Setup Guidelines

The information contained in this section will provide guidance for applicants utilizing SCREEN3 in the protectiveness reviews for the Oil and Gas PBR and Standard Permit. If any of the conditions outlined in this guidance cannot be met, then this approach cannot be used.

Control Options

- The Regulatory default option must be selected.
- The Flat terrain choice must be used.
- Rural or urban dispersion options may be used based on the land use in the vicinity of the sources to be permitted.
- A land use analysis must be conducted to determine the majority land-use type within 3 kilometers (km) of the sources to be permitted.
- If the land-use designation is clear (about 70 percent or more of the total land-use is either urban or rural), then no further refinement is required and the model should be run with the appropriate land-use designation.
- If the land-use designation is not clear, the model should be run twice, once with each option and the higher of the two predicted concentrations should be reported.

Source Options

- Emissions can be represented as either point sources, point source using pseudo point parameters, area source, or as a flare.
- Use a point source with pseudo-point parameters for individual fugitive sources and for any sources that do not release to the atmosphere through standard stacks (such as stacks or vents with rain caps, horizontal releases).

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- Use area source to characterize emissions from fugitive sources and for any sources that do not release to the atmosphere through standard stacks. The area and release height must represent sources or activities that occur at the same time and height. The ratio of length to width for the area source cannot be greater than 10:1. Multiple area sources can be used as applicable to meet area and release height restrictions.
- Flares may be modeled using the flare source type in SCREEN3 or by calculating the effective stack diameter and using the parameters listed in the ISC model setup guideline. The SCREEN3 flare option assumes an effective stack gas exit velocity (vs) of 20 m/s and an effective stack gas exit temperature (Ts) of 1,273 Kelvin, and calculates an effective stack diameter based on the heat release rate. Enclosed vapor combustion units should not be modeled with the preceding parameters but instead with stack parameters that reflect the physical characteristics of the unit.

Meteorology

- The SCREEN3 model defaults of full meteorology, 10-meter anemometer height, and regulatory mixing height are required.

Receptors

- Model receptors should be placed to meet the definitions listed in 30 TAC §106.352(b)(2), 30 TAC §106.352(k), and sections (b)(2) and (k) of the standard permit.
- The distance to the nearest receptor should be used to demonstrate compliance for the health effects analysis.
- The starting receptor for the state property line and NAAQS analyses should be placed at the nearest property line. The ending receptor should be located at a 1/4 mile, 1/2 mile, or 1 mile from a project for PBR level 1, PBR Level 2, or the standard permit, respectively.

Downwash

- Downwash is generally not applicable for OGS located in rural areas. Downwash may be appropriate for OGS that could be affected by large buildings located in urban areas. Generally, small tanks, storage sheds, and engines are not large enough to cause downwash effects and should not be considered in the analysis.

Output

- The maximum predicted concentration must be used to compare against the applicable ESL, NAAQS, or state ambient air standard.

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- The following conversion factors can be used to convert 1-hour concentrations from SCREEN3 to averaging times greater than 1-hour:

Averaging Time	Multiplying Factor
3 hour	0.9
24 hour	0.4
Annual	0.08

ISC Model Setup Guidelines

The information contained in this section will provide guidance for applicants utilizing ISC in the protectiveness reviews for the Oil and Gas PBR and Standard Permits. The latest version of ISC-Prime must be used in the analysis. If any of the conditions outlined in this guidance cannot be met, then this approach cannot be used.

Control Options

- The Regulatory default option must be selected.
- The Flat terrain choice must be used.
- Plume depletion and deposition options are not allowed
- Rural or urban dispersion options may be used based on the land use in the vicinity of the sources to be permitted.
- A land use analysis must be conducted to determine the majority land-use type within 3 km of the sources to be permitted.
- If the land-use designation is clear (about 70 percent or more of the total land-use is either urban or rural), then no further refinement is required and the model should be run with the appropriate land-use designation.
- If the land-use designation is not clear, the model should be run twice, once with each option and the higher of the two predicted concentrations should be reported.

Source Options

- Emissions can be represented as either point sources, point source using pseudo point parameters, area source, or as a flare.
- Use a point source with pseudo-point parameters for individual fugitive sources and for any sources that do not release to the atmosphere through standard stacks (such as stacks or vents with rain caps, horizontal releases).
- Use area source to characterize emissions from fugitive sources and for any sources that do not release to the atmosphere through standard stacks. The area and release height must represent sources or activities that occur at the same time and height. The ratio of length to width for the area source cannot be greater than 10:1. Multiple area sources can be used as applicable to meet area and release height restrictions.

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- Flares should be modeled with the following parameters: effective stack exit velocity of 20 meters per second; effective stack exit temperature of 1273 Kelvin; actual height of the flare tip. The effective stack diameter (in meters) should be calculated using the following equation: $D = \sqrt{(10\text{-}6qn)}$ and $qn = q(1 - 0.048\sqrt{MW})$ Where: q = gross heat release in cal/sec; qn = net heat release in cal/sec; and MW = weighted (by volume) average molecular weight of the compound being flared.

Meteorology

- The ADMT prepared meteorological data sets available at www.tceq.state.tx.us/permitting/air/modeling/admtmet.html must be used in the modeling analysis.
- The following table lists the meteorological data sets that should be used for projects located in the corresponding County

Counties	Surface Data	Upper-air Data
Cooke, Dallas, Denton, Ellis, Hood, Johnson, Parker, Somervell, Tarrant, Wise	Dallas-Fort Worth	Stephenville
Archer, Clay, Montague	Wichita Falls	Stephenville
Bosque, Coryell, Hill	Waco	Stephenville
Comanche, Hamilton	San Angelo	Stephenville
Eastland, Erath, Jack, Palo Pinto, Shackelford, Stephens	Abilene	Stephenville

- The required year is 1988 when using one year of meteorology data,
- Only one year of data is required. However, the entire five year data set may be used for NAAQS pollutants.
- The actual anemometer height must be used for each airport location. Anemometer heights can be found at the following URL: www.tceq.state.tx.us/assets/public/permitting/air/memos/anemom96.pdf

Receptors

- Model receptors should be placed to meet the definitions listed in 30 TAC §106.352(b)(2), 30 TAC §106.352(k), and sections (b)(2) and (k) of the standard permit.
- Model receptors should be placed at all locations defined as a receptor within a 1/4 mile, 1/2 mile, or 1 mile from a project for PBR level 1, PBR Level 2, or the standard permit, respectively, to demonstrate compliance with the health effects analysis.
- In addition to meeting the requirements in 30 TAC §106.352(b)(2), 30 TAC §106.352(k), and sections (b)(2) and (k) of the standard permit, the following

receptor grid design should be used when conducting a NAAQS or state property line analysis:

PBR Level 1

- Tight receptors - receptors beginning at the property line and spaced 50 feet apart extending out to a distance of 1/4 mile (1320 feet) from the property line

PBR Level 2

- Tight receptors - receptors beginning at the property line and spaced 50 feet apart extending out to a distance of 1/4 mile (1320 feet) from the property line
- Fine receptors - receptors spaced 300 feet apart beginning at 1/4 mile (1320 feet) from the property line and extending out to a distance of 1/2 mile (2640 feet) from the property line

Standard Permit

- Tight receptors - receptors beginning at the property line and spaced 50 feet apart extending out to a distance of 1/4 mile (1320 feet) from the property line
- Fine receptors - receptors spaced 300 feet apart beginning at 1/4 mile (1320 feet) from the property line and extending out to a distance of 1/2 mile (2640 feet) from the property line
- Medium receptors - receptors spaced 1500 feet apart beginning at 1/2 mile (2640 feet) from the property line and extending out to a distance of extending out to a distance of 1 mile (5280 feet)

Downwash

- Downwash is generally not applicable for OGS located in rural areas. Downwash may be appropriate for OGS that could be affected by large buildings located in urban areas. Generally, small tanks, storage sheds, and engines are not large enough to cause downwash effects and should not be considered in the analysis.
- The latest version of BPIP-Prime should be used to calculate downwash parameters if downwash is appropriate.

Coordinate System

- Enter receptor locations, source locations, and building location (if necessary) in UTM coordinates
- UTM coordinates in datum NAD27 or NAD83 must be used. Make certain that all of the coordinates originated in, or are converted to, the same horizontal datum. Applicable UTM zone for the Barnett Shale is zone 14 (between 102 and 96 degrees longitude).
- Coordinate systems based on plant coordinates, applicant-developed coordinate systems, or polar grids will not be accepted.

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Output

- The maximum predicted concentration must be used to compare against the applicable ESL, NAAQS, or state ambient air standard when using one year of meteorological data.
- The *high*, second high may be used when modeling with 5 years of meteorology data for the SO_2 3-hr, SO_2 24-hr, SO_2 annual, and NO_2 annual NAAQS.
- The form of the standard may be used be used when modeling with 5 years of meteorology data for the SO_2 and NO_2 1-hr NAAQS.
- The modeling form of the standard for the 1-hr NO_2 NAAQS is based on the 5-year average of the annual 98th percentile of the daily maximum 1-hour concentrations.
- The modeling form of the standard for the 1-hr SO_2 is based on the 5-year average of the annual 99th percentile of the daily maximum 1-hour concentrations.

Review Type Guidelines

The following section contains the required procedures necessary to complete a health effects, NAAQS, and state property line evaluations. The applicant should follow the steps exactly and should not modify the approach on a case-by-case basis. However, the commission could modify the guidance to resolve technical issues, clarify instructions, or allow the use of more refined models.

In addition to following the approaches below, the evaluations must meet the requirements listed in 30 TAC §106.352(k) and section (k) of the standard permit, as appropriate.

Health Effects Analysis

- Compliance with the hourly ESL for benzene and annual ESL for benzene must be demonstrated at receptors within 1/4 mile, 1/2 mile, or 1 mile of a project for PBR Level 1, PBR Level 2, or the standard permit, respectively
- Model all new and modified sources -- the project.
- If the project's air contaminant maximum predicted concentration is equal to or less than 10% of the appropriate ESL, no further review is required.
- If a project's air contaminant maximum predicted concentration is greater than 10% of the appropriate ESL, compare the project's air contaminant maximum predicted concentration combined with project increases for that contaminant over a 60-month period to 25% of the appropriate ESL. If the resulting concentration is less than 25% of the appropriate ESL, no further review is required.
- A site wide analysis, including all sources emitting the regulated contaminant, must be conducted if the above requirements are not met. Multiple scenarios may be necessary to represent sources that may not operate simultaneously.
- All sources must be modeled at the maximum allowable emission rate.
- The maximum predicted concentration at each receptor should be compared to the ESL and included in the modeling report.

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State Property Line Analysis

- Compliance with the state ambient air standard for SO_2 and H_2S must be demonstrated at any property line within 1/4 mile, 1/2 mile, or 1 mile of a project for PBR level 1, PBR Level 2, or the standard permit, respectively
- Model all new and modified sources-- the project.
- Compare the maximum predicted concentration from the project to the appropriate de minimis level. Compliance with the state property line standards is demonstrated if the maximum predicted concentration from the project is less than or equal to de minimis listed in the following table:

Pollutant	Averaging Time	Location	De Minimis ($\mu g/m^3$)
SO_2	1-hr	All locations	20
H_2S	1-hr	If property is residential, recreational, business, or commercial	2
H_2S	1-hr	If property is other than residential, recreational, business, or commercial	3

- If the maximum predicted concentration from the project is greater than de minimis, a site wide analysis must be conducted.
- Model the allowable emission rate of all sources on site that emit the regulated pollutant.
- Compliance with the state property line standard is demonstrated if the maximum predicted site-wide concentration is less than or equal to the state property line standards listed in the following table:

Pollutant	Averaging Time	Location	State Property Line Standard ($\mu g/m^3$)
SO_2	1-hr	All Locations	1021
H_2S	1-hr	If property is residential, recreational, business, or commercial	108
H_2S	1-hr	If property is other than residential, recreational, business, or commercial	162

EFSCOP00002291

NAAQS Analysis

- Compliance with federal ambient air standards for NO_2 and SO_2 must be demonstrated at any property line within 1/4 mile, 1/2 mile, or 1 mile of a project for PBR Level 1, PBR Level 2, or the standard permit, respectively
- Model all new and modified sources-- the project.
- Compare the maximum predicted concentration from the project to the appropriate de minimis level. Compliance with the NAAQS is demonstrated if the maximum predicted concentration from the project is less than or equal to the de minimis level listed in the following table:

Pollutant	Averaging Time	De Minimis ($\mu g/m^3$)
SO_2	1-hr	7.8
SO_2	3-hr	25
SO_2	24-hr	5
SO_2	Annual	1
NO_2	1-hr	7.5
NO_2	Annual	1

- If the maximum predicted concentration from the project is greater than de minimis, a site wide analysis must be conducted.
- Model the allowable emission rate of all sources on site that emit the regulated pollutant
- The maximum predicted concentration must be used when modeling with one year of meteorology data.
- The *high*, second high may be used when modeling with 5 years of meteorology data for the SO_2 3-hr, SO_2 24-hr, SO2 annual, and NO_2 annual NAAQS.
- The form of the standard may be used be used when modeling with 5 years of meteorology data for the SO_2 and NO_2 1-hr NAAQS.

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- Add a background concentration to the predicted site wide concentration and compare the total concentration to the NAAQS. Compliance with the NAAQS is demonstrated if the total concentration is less than NAAQS listed in the following table:

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)
SO_2	1-hr	196
SO_2	3-hr	1300
SO_2	24-hr	365
SO_2	Annual	80
NO_2	1-hr	188
NO_2	Annual	100

- Screening background concentration values can be found at www.tceq.texas.gov/permitting/air/memos/interim_guidance_naaqs.html
- If the screening background concentration values are too conservative, contact the Air Dispersion Modeling Team at 512-239-1250 for further guidance. The applicant should be prepared to present and discuss alternative background concentrations.

Streamlining Techniques

The following section contains approaches that may be used to streamline the modeling required to demonstrate compliance with the health effects, NAAQS, or state property line analysis. The streamlining techniques are **NOT** required, but may be used to streamline the analyses.

Controlling Concentrations

Short-term standards are usually the controlling concentrations; that is, if the standard is met for the shortest time period, standards for longer averaging periods will also be met. Therefore, if the predicted concentrations from the maximum 1-hour emissions for a NAAQS or applicable state standard are at or lower than the concentrations from a longer averaging period, the demonstration is complete. For example, if the predicted 1-hour SO_2 concentration is 150 $\mu g/m^3$, the demonstration for all SO_2 NAAQS and state standards except the annual NAAQS is complete. However, the screening conversion factor of 0.08 can be used to convert the hourly concentration to an annual concentration, and in this case, the annual NAAQS will not be exceeded. Document the use of this technique in the modeling report.

Collocation of Emission Points

Collocating stacks may be appropriate for both screening and refined analyses if the individual emission points emit the same pollutant(s); have stack heights, volumetric flow rates, or stack gas exit temperatures that do not differ by more than about 20 percent; and are within about 100 meters of each other.

- Use the following equation to determine the worst-case stack: $M = (h_s V T_s)/Q$
- Where:
  - M = a parameter that accounts for the relative influence of stack height, plume rise, and emission rate on concentrations;
  - h_s = the physical stack height in meters;
  - $V = (\pi/4)d^2 v_s$ = the stack gas flow rate in cubic meters per second.
  - Π = pi
  - d = inside stack diameter in meters;
  - v_s = stack gas exit velocity in meters per second;
  - T_s = the stack gas exit temperature in Kelvin;
  - Q = pollutant emission rate in grams per second.
- The stack that has the lowest value of M is used as a representative stack.
- The sum of the emissions from all stacks is assumed to be emitted from the representative stack.

Generic Modeling Approach

This technique uses a unit emission rate (1 pound per hour) to determine if the maximum contribution from each permitted source when added together, independent of time and space, could exceed a standard or ESL. This is a conservative procedure since the maximum concentration from all sources modeled concurrently cannot be more than the sum of the maximum concentration from each source modeled separately.

- Determine a generic impact for each source by modeling each source with a unit emission rate of 1 pound per hour; the source's actual location; and the source's proposed stack parameters represented in the permit application.
- In ISC this is done by setting up a separate source group for each source.
- The SCREEN3 model can also be used for this demonstration with a separate SCREEN3 model run for each source.
- Multiply the predicted generic impact by the proposed pollutant specific emission rate for each source to calculate a maximum predicted concentration for each source.
- Sum the maximum predicted concentration for each source to get a total predicted concentration for each pollutant.
- The sum of the maximum concentrations (for each pollutant, independent of time and space) is then compared with the threshold of concern for each pollutant.

Reporting Requirements

Once the modeling exercise is complete, the modeling approach and results should be summarized in a modeling report. The modeling report should be sent to the TCEQ permit reviewer and include a CD with all modeling input files, plot files, output files and all other files of supporting information used in the modeling demonstration.

Interim 1-Hour NO_2 NAAQS Guidance for Engines Authorized under §106.512

Disclaimer: Any actions may be affected by EPA written guidance.

Background

EPA has established a new 1-hour National Ambient Air Quality Standard (NAAQS) for NO_2 at 188 micrograms per cubic meter ($\mu g/m^3$) that became effective on Monday, April 12, 2010. Any project application that has new NOx/NO_2 emissions or any increases (regardless of decreases also proposed in the project) must demonstrate compliance with both the 1-hour and annual (100 $\mu g/m^3$) standards. An exception would be if the project is an identical replacement at the same location with the same NO_2 emissions and dispersion characteristics.

The oil and gas projects for the following registrations must evaluate compliance with this new hourly standard, because their specific requirements discuss a demonstration of compliance with standards:

- §106.512 Engines and Turbines (not any associated §106.352 small combustion devices or §106.492 Flares at this time)
- §116.620 Oil and Gas Production Standard Permit (only with engines which are using 106.512 per the standard permit requirements)

Compliance Demonstration

If a 1-hour NO_2 NAAQS demonstration for the project needs to be performed, it shall be done using method (A), (B), or (C) of 30 TAC 106.512 Condition 6. If method (A) is used, modeling may be done using one of the following nitrogen dioxide (NO_2)/NOx ratios:

- a default value of 0.75, or
- the appropriate value given in Figure 1 of 30 TAC 106.512(6)(A), or
- a ratio derived from actual test data.

If the applicant chooses to use a ratio derived from test data, appropriate documentation shall be provided to demonstrate its validity.

Modeling Guidance

The applicant may choose to do modeling using SCREEN3 or ISC3-PRIME. Regardless of the method chosen, the applicant should:

1. Model the project increase and compare the result to the de minimis value. The agency will use an interim de minimis value of 10 $\mu g/m^3$. If the project increase is less than or equal to the de minimis value, no further review is needed.

2. If the project increase exceeds the de minimis value of 10 $\mu g/m^3$, then add the modeled concentration from the project increase to a conservative background value for the appropriate region/county (contact agency staff to obtain background values) and compare the sum to the hourly standard of 188 $\mu g/m^3$. Applicants may contact the Air Dispersion Modeling Team at 512-239-1250 to determine if a more representative background value is available, based on the location of the facility.

3. If doing SCREEN3 modeling, either of the following approaches may be employed:

- Combine all facilities together at the closest property line using the facility with the "worst-case" dispersion parameters and run the model using a maximum hourly emission rate to obtain the combined 1-hour concentration; or

- Run the model with "overlapping" receptor grids -- one run for each facility using the maximum hourly emission rate. Sum the predicted concentrations at and beyond the property line and determine the maximum concentration.

4. If the applicant decides to do full scale dispersion modeling, the following procedure should be followed:

- The applicant will have to call the Air Dispersion Modeling Team 512-239-1250 to schedule a pre-modeling meeting. The modeling guidelines checklist can be found at http://www.tceq.state.tx.us/assets/public/permitting/air/Guidance/NewSourceReview/gd_chk.pdf

- During the pre-modeling meeting, all NOx emissions associated with the project will be discussed and a Table 1A will need to be provided.

- After the checklist is approved, the applicant can then submit the modeling results to Rule Registrations Section reviewer and the Air Dispersion Modeling Team.

- Upon acceptance of the modeling results, the applicant may submit (for PBR using Form PI-7-CERT and for Standard Permits Form PI-1S) to **certify** the project and the modeling results.

Options for Applicants

If an applicant cannot meet the 1-hour standard using one of the methods described above, they have the following options (in order of preference):

1. The applicant can review and revise as appropriate their inputs, emission factors, etc. Example: If an applicant originally used 2.0 g as their NOx factor but later discovered

they could use 0.5 g and revise their calculations to meet the new standard, then they will need to **certify**. An example of an appropriate use of this option would be site-specific testing which demonstrated a lower emission factor than the vendor-supplied value.

2. The applicant can reduce or eliminate the NOx increase by installing controls, increasing stack height, leasing more land to increase the property line distance, etc.

Interim 1-Hour Nitrogen Dioxide (NO_2) NAAQS Implementation Guidance
July 22, 2010

The New 1-Hour NO_2 National Ambient Air Quality Standards (NAAQS)

The U.S. Environmental Protection Agency (EPA) promulgated a new 1-hour National Ambient Air Quality Standard (NAAQS) for NO_2 (February 9, 2010) that became effective April 12, 2010. The 1-hour NO_2 standard is 100 parts per billion (ppb) or 188 micrograms per cubic meter ($\mu g/m^3$) at 25° Celsius (C) and 760 millimeters of mercury (mm Hg). EPA retained the annual standard (100 $\mu g/m^3$, 53 ppb) and annual increment (25 $\mu g/m^3$).[1] EPA is currently conducting a separate review of the secondary NO_2 NAAQS jointly with a review of the secondary SO_2 NAAQS.

The EPA retained the annual primary and secondary standards and did not propose a change to the significant emission rate (SER) or significant monitoring concentration (SMC) and did not propose a 1-hour significant impact limit (SIL). The EPA is reviewing secondary standards and plans to propose secondary standards for NO_2 in July 2011.

In addition, in the notice EPA explains

- the state's responsibility to develop and implement a state implementation plan (SIP) that contains state measures necessary to achieve the air quality standards in each area (page 6521) and

- that minor new source review (NSR) programs must meet the statutory requirements in section 110(a)(2)(C) of the federal clean air act (CAA) which requires * * * regulation of the modification and construction of any stationary source * * * as necessary to assure that the [NAAQS] are achieved (page 6525).

TCEQ's General Air Permitting Authority

The TCEQ implements the NSR program through statutory authority for air permitting contained in Chapter 382 of the Texas Health and Safety Code -- the Texas Clean Air Act (TCAA). The current SIP and SIP-approved portions of Title 30, Texas Administrative Code (TAC) Chapters 106 and 116 implement the requirements of the TCAA and provide the basis to regulate 1-hour NO_2 for major and minor sources.[2]

[1] 75Federal Register 6474, Primary National Ambient Air Quality Standards for Nitrogen Dioxide, Final Rule, February 9, 2010.

[2] 30 TAC Section 116.110 requires an authorization to construct or modify a facility. Section 116.111 requires an applicant to demonstrate control technology and protectiveness before a permit can be issued. Computer modeling may be required as part of the demonstration. These rules apply to minor

In addition, the TCAA directs the commission to comply with the federal Clean Air Act (FCAA). The FCAA requires the state to develop a SIP that includes an air permit program. The program must regulate the construction and modification of any stationary source to assure the NAAQS are achieved; bring nonattainment areas into and maintain attainment of the NAAQS; and to prevent significant deterioration of air quality. The EPA has developed a NSR program that encompasses the statutory and regulatory programs that regulate the construction and modification of stationary sources as provided under FCAA section 110(a)(2)(C), FCAA Title I, parts C and D, and 40 Code of Federal Regulations (CFR) Sections 51.160 through 51.166.

- As of April 12, 2010, applicants must demonstrate compliance with the 1-hour NAAQS.
  - Applies to new and modified facilities with increases of nitrogen oxide (NOx)/NO_2.Applies to major and minor sources.
  - Any permit and standard permit/PBR registration under technical review that specifically requires a NAAQS or NO_2 NAAQS compliance demonstration[3] must demonstrate compliance with the 1-hour NO_2 standard.
  - The Air Permits Division (APD) will evaluate all standard permits and permits by rule (PBRs) to determine whether an hourly NO_2 NAAQS analysis would be appropriate and needed to confirm claims or amend these permitting tiers.
- Major source applicability is the first part of the permit technical review. The significance level remains at 40 tons per year.
  - If projects "net out" of major NSR review, minor NSR review is still required for facilities with new or increased emissions.

EPA Guidance

On June 29, 2010, EPA released guidance concerning implementation of the 1-hour NO_2 NAAQS for the NSR PSD program.[4] While the EPA focuses its discussion on the

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and major sources. Additional requirements are contained in Sections 116.150-151 and 116.160-163 for major sources and major modifications. At this time: 30 TAC §106.512.Stationary Engines and Turbines (not any associated §106.352 small combustion devices or §106.492 Flares at this time); 30 TAC §116.617 State Pollution Control Project Standard Permit; 30 TAC §116.620 Installation and/Modification of Oil and Gas Facilities (only with engines which are using §106.512 per the standard permit requirements).

[3] At this time: 30 TAC §106.512.Stationary Engines and Turbines (not any associated §106.352 small combustion devices or §106.492 Flares at this time); 30 TAC §116.617 State Pollution Control Project Standard Permit; 30 TAC §116.620 Installation and/Modification of Oil and Gas Facilities (only with engines which are using §106.512 per the standard permit requirements).

[4] http://www.epa.gov/nsr/documents/20100629no2guidance.pdf

prevention of significant deterioration (PSD) portion of the NSR program, the TCEQ continues to base implementation of the state minor source program on EPA's major source guidance as applicable.

- Stephen D. Page Memorandum, June 29, 2010, Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program (Page Memo).

- Anna Marie Wood Memorandum, June 28, 2010, General Guidance for Implementing the 1-hour NO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour NO_2 Significant Impact Level (Wood Memo.)

- Tyler Fox Memorandum, June 28, 2010, Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard (Fox Memo).

In addition, on July 15, 2010, EPA conducted a webinar that discussed the guidance contained in the memorandum and answered questions e-mailed from participants.[5]

Air Permits Division (APD) Interpretation of EPA Guidance

The APD will apply the EPA guidance on a case-by-case basis. There are many areas that require technical judgment and coordination with EPA. Following are some general comments permit reviewers and applicants should be aware of concerning EPA's interim guidance and APD's interim implementation:

Page Memo

Pages 1-2. EPA focuses the discussion on PSD and does not directly refer to minor NSR. To meet TCAA and FCAA requirements and ensure consistency with the current permitting process, the APD continues to consider EPA's major source guidance as applicable to implement the state minor NSR program.

Wood Memo

Page 3. Introduction. The EPA explains that as of April 12, 2010, applicants must demonstrate that proposed emissions increase will not cause or contribute to a NAAQS violation. Applicants and reviewers must evaluate new and increased NOx/ NO_2

[5] http://www.epa.gov/apti/webinars/WEBINAR-NO2%20Policy%20Guidance_7-15-2010.pdf and http://www.epa.gov/apti/webinars/WEBINAR-Part2_NO2_ModelingGuidance_15July2010.pdf

emissions associated with a project to satisfy this requirement. Air dispersion modeling may be required as applicable to support the evaluation. Modeling procedures for major or minor projects must be preapproved through development and review of a modeling checklist or protocol with the applicant, permit reviewer and modeling staff. Applicants must send major source (PSD) modeling protocols to EPA Region 6 as well.

Page 5. Air Quality Based Emission Limitations. The TCEQ's three-tier best available control technology (BACT) process is equivalent to EPA's top-down process. APD is currently updating pollution control guidance and will provide a draft to stakeholders for comment.

Pages 5-6.

- Demonstrating Compliance...Cause or Contribute. APD will use the EPA 1-hour interim NO_2 SIL to determine when a project would cause or contribute to a modeled NAAQS violation. However, if the model predicts a violation but the project is not significant, the APD may request that the applicant provide the sources that were predicted to cause the violation if this information was not included in the modeling output.

- Mitigating Violations with Air Quality "Offsets." While EPA refers to "offsets" the emission reductions required for PSD in 40 CFR 165(b)(3) are not the same as the mandatory offsets required for nonattainment review. See 30 TAC Section 116.161. Applicants can mitigate modeled adverse impacts by such actions as direct emissions reductions, emission reductions through enhanced control, enforceable permit conditions, and increasing stack height according to Good Engineering Practice.

Pages 10-11. Significant Emissions Rate (SER). The SER is used to determine applicability of major NSR to new or modified sources of NO_2. While projects can net out of major NSR, they must be evaluated under TCEQ rules for minor NSR. This would include a BACT and impacts evaluation.

Pages 11-13. Interim 1-hour SIL (also referred to as de minimis impact). The APD will use the EPA interim 1-hour NO_2 SIL of 4 ppb. This value equates to 7.5 $\mu g/m^3$ at 25° C and 760 mm Hg. Before EPA provided its SIL, the APD advised applicants to use the SIL developed by NESCAUM (Northeast States for Coordinated Air Use Management). However, any modeling already submitted or in progress based on that SIL (10 $\mu g/m^3$) will not need to be reaccomplished. For the public record applicants can refer to EPA's and APD's guidance in their air quality analysis to justify the use of an interim SIL.

Page 12. Use of the Interim SIL. Results from the SCREEN3 model may be used for major and minor projects. For minor NSR, the applicant may compare the interim de minimis to

- the highest modeled 1-hour NO_2 concentration predicted across all receptors based on 1-year of APD designated meteorological dataset for the project, or

- the highest of the 5-year average of the maximum modeled 1-hour NO_2 concentration predicted each year at each receptor based on the APD designated 5-year meteorological dataset for the project.

If the project is less than or equal to the de minimis, no further review is needed. If the project concentrations exceed the de minimis value, a site-wide NO_2 NAAQS analysis must be performed.

Fox Memo

Page 14. Introduction. EPA provides general guidance in 40 CFR Part 51 Appendix W on how to conduct an air quality analysis. In the Fox memo, EPA clarifies guidance contained in Appendix W that does not specifically address procedures for the 1-hour NO_2 NAAQS, and provides selected interim implementation guidance. In general

- For major NSR, follow EPA guidance contained in the referenced EPA memoranda as annotated by APD.

- Do not back calculate from an annual concentration to obtain a 1-hour concentration.

- Design the size of the receptor grid to be large enough to show that concentrations are decreasing from the site.

- Include nearby off-property emissions in the inventory, as applicable. Obtain a short-term 1-hour NO_2 retrieval from the PSDB to a maximum distance of 50 kilometers from the site. For PSD, include any technically complete (sent to 2nd Public Notice) or recently issued permits, as applicable.

- Provide air quality data in the area near the proposed facility. The air quality is the ambient background concentration that is added to the maximum predicted

concentration. It is the applicant's burden to determine the air quality data to be used in the air quality analysis and demonstrate its representativeness.

- The division will provide interim background concentrations for screening purposes. Applicants should contact the modeling staff for assistance regarding refined background concentrations.

- Use conservative screening background concentrations for projects that exceed the de minimis concentration.

  - For PBR / standard permit demonstrations, as applicable. Add the screening background concentration for the county/region to the predicted concentration from the project. If the project plus background is less than or equal to 188 μg/m³, the demonstration is complete.

  - For case-by-case minor source permitting. Follow the procedure for PBR / standard permits with prior approval. The applicant must demonstrate that the procedure is appropriate based on factors such as

    - Total NO_2 emissions at the site

    - Facility location and dispersion parameters

    - Previous approved modeling results

- Round concentrations to be compared to the NAAQS[6] to the nearest whole number or 1 ppb (decimals 0.5 and greater are rounded up to the nearest whole number, and any decimal lower than 0.5 is rounded down to the nearest whole number).

- Ratio method. Adjust predicted concentrations from site wide 1-hour emissions from other pollutants of combustion. For example, 1-hour SO_2 or CO concentrations used as a surrogate for 1-hour NO_2 concentrations.

  - Develop appropriate ratios.[7] Example, [$NO_2\ \chi = (NO_2\ Q)\ (SO_2\ \chi) \div (SO_2\ Q)$].

  - Add NO_2 background concentrations to the adjusted SO_2 or CO maximum surrogate concentration. If the project plus background is less than or equal to 188 μg/m³, the demonstration is complete.

[6] 40 CFR 50 Appendix S, 4.2 Rounding Conventions for the 1-hour Primary NO_2 NAAQS
[7] Q = emissions; χ = concentrations.

- Use of nearby ambient monitored data -- Planned maintenance, startup, shutdown (MSS).
    - The site cannot be new and all facilities must have been operating.
    - Applicants must demonstrate that the hourly NO_2 emission rate being requested for the planned MSS maximum allowable emission rate table (MAERT) is a value that actually occurred (within approximately plus or minus 10%).
    - Applicants can identify the closest NO_2 ambient air monitor to the site.
        - If a monitor is within approximately 10 kilometers (~ 6 miles), the applicant must obtain and provide the highest 1-hour NO_2 concentration within at least the most recent three years of complete data, as well as the period of time the emissions actually occurred.
        - If the highest concentration exceeds the 1-hour NO_2 NAAQS, or a monitor is not within approximately 10 kilometers (~ 6 miles), the applicant must coordinate with the permit reviewer to request a modeling meeting or conference call with the permit reviewer and modeling staff to determine an alternative approach to demonstrate compliance. This approach may require refining the monitored data to account for the form of the standard, obtaining representative monitoring data from another location, and/or modeling.
- Uses of nearby ambient monitored data -- PBR/standard permit Production/Operation.
    - The site cannot be new and all facilities must have been operating.
    - Applicants can identify the closest NO_2 ambient air monitor to the site.
        - If a monitor is within approximately 10 kilometers (~6 miles), the applicant must obtain and provide the highest 1-hour NO_2 concentration within at least the most recent three years of complete data, as well as the period of time the emissions actually occurred.
        - If the highest concentration exceeds the 1-hour NO_2 NAAQS, or a monitor is not within approximately 10 kilometers (~ 6 miles), the applicant must coordinate with the air dispersion modeling team to request a modeling meeting or conference call with modeling staff to determine an alternative approach to demonstrate compliance. This approach may require refining the monitored data to account for the form of the standard, obtaining representative monitoring data from another location, and/or modeling.

Page 15. SCREEN3 can be used for major and minor projects. APD must preapprove the use of SCREEN3 for multiple facilities if the applicant proposes non-standard modeling techniques.[8] The Industrial Source Complex model with Plume Rise Model Enhancements (ISC-PRIME) can be used for minor projects.

Page 15. Tier 2. The NOx / NO_2 conversion factor of 75% may be used for PSD and minor source screening (SCREEN3) or refined modeling (ISC-PRIME or AERMOD, as applicable).

Page 15. Tier 3. Applicants must submit protocols and APD and EPA must preapprove the use of the ozone limiting method (OLM) or the Plume Volume Molar Ratio Method (PVMRM). This requirement applies to major and minor projects.

Page 18. Emission Inventories. Applicants can obtain 1-hour NO_2 emission rates for off-property sources from the Point Source Database (PSDB). Permit reviewers can advise applicants to include emission rates from authorized facilities that are not included in the PSDB as applicable.

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[8] Some standard techniques: use the stack with the worst-case dispersion as a representative stack. Assume project maximum emissions are emitted from the representative stack. Or, one run for each facility using the maximum hourly emission rate and 1) sum the predicted concentrations from overlapping grids or 2) sum the highest concentration anywhere on the grid from each run to determine the maximum concentration. Use the following equation to determine the worst-case stack: M = hs V Ts ÷ Q where

M = a parameter that accounts for the relative influence of stack height, plume rise, and emission rate on concentrations;

hs = the physical stack height in meters;

$V = (\pi/4)\, d_s^2\, v_s$ = stack gas flow rate in cubic meters per second;

ds = inside stack diameter in meters;

vs = stack gas exit velocity in meters per second;

Ts = the stack gas exit temperature in Kelvin; and,

Q = pollutant emission rate in grams per second.

The stack that has the lowest value of M is used as a representative stack. The sum of the emissions from all stacks is assumed to be emitted from the representative stack; that is, the stack whose parameters resulted in the lowest value of M.

Interim 1-Hour NO_2 Screening Background Concentrations in micrograms per cubic meter ($\mu g/m^3$)[1]			
Region / Specific County[2]	Screening Background	Region / Specific County	Screening Background
1	70	10	70
		Jefferson	90
		Orange	70
2	70		
3	70	11	70
		Travis	85
4	70	12	70
Dallas	104	Brazoria	75
Ellis	85	Galveston	75
Tarrant	107	Harris	120
		Montgomery	75
5	70	13	70
Titus	90	Bexar	100
Rusk	90		
6	70	14	70
El Paso	124	Nueces	90
7	70	15	70
		Hildalgo	100
8	70	16	70
		Webb	100
9	70		
Freestone	90		
Limestone	90		

These values are conservative and based on available ambient monitoring design values (2007-2009) and may change as more research is conducted and/or data obtained.

If a value is too conservative, contact the Air Dispersion Modeling Team to determine if a more refined background concentration is available.

[1] Use the value for the region the project will be located in, or county if listed
[2] NAAQS in 188 $\mu g/m^3$ converted from parts per billion based on standard temperature and pressure

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

TO: NSRPD Staff **DATE:** August 3, 1998

FROM: Dom Ruggeri, Team Leader
Air Dispersion Modeling Team (ADMT)

SUBJECT: Modeling Guidance for Exemption 106.512 (Formerly SE 6)

If an applicant meets the general requirements to claim an exemption under this rule, the applicant must demonstrate that emissions from an exempted source will not cause or contribute to a violation of the NO_2 NAAQS [106.512(6)]. One of the methods to show compliance with the NO_2 NAAQS involves dispersion modeling [106.512(6)(A)]. The applicant can use the following procedure to conduct the modeling demonstration:

Step 1. *Determine the long-term hourly emission rate for each source.*
Use the applicable NO_2/NO_x ratio in Figure 1: 30 TAC §106.512(6)(A) to adjust the hourly rate for each source.

Step 2. *Determine if the NO_2 de minimis is exceeded.*
Use EPA's SCREEN3 or ISCST3 model to determine if the new or modified sources' emissions will exceed the NO_2 de minimis of 1 $\mu g/m^3$. If the predicted concentration is $\leq$ 1 $\mu g/m^3$, the demonstration is complete. If not, go to Step 3.

Step 3. *Determine the background concentration from the Screening Background Concentrations table (attached).* If the predicted concentration plus background is $\leq$ 100 $\mu g/m^3$, the demonstration is complete. If not, a full state NAAQS analysis may be required if the screening background concentration cannot be refined to a more representative value. Go to Step 4.

Step 4. *Determine if there is a NO_2 monitor in the county.* If not, go to Step 5.
Obtain a background concentration from a representative monitor in the county. Use the most recent annual concentration from the Aerometric Information Retrieval System (AIRS) [www.epa.gov/airsweb/monreps.htm] that is based on at least 6570 hours of observations.

Convert the concentration from ppm to $\mu g/m^3$ by multiplying the AIRS concentration by 1887. If the predicted concentration plus the monitored background concentration is $\leq$ 100 $\mu g/m^3$, the demonstration is complete. If not, a full state NAAQS analysis may be required. Contact the ADMT staff for modeling guidance.

Step 5. *Contact the ADMT staff for assistance in developing a representative background concentration.* If the predicted concentration plus a representative background concentration is $\leq$ 100 $\mu g/m^3$, the demonstration is complete. If not, a full state NAAQS analysis may be required. Contact the ADMT staff for modeling guidance.

Attachment

EFSCOP00002307

SCREENING BACKGROUND CONCENTRATIONS
NO_2
August, 1998

Note: Use regional values unless concentrations for a specific county are provided.

Regional Background / Specific County Background - Annual Concentration ($\mu g/m^3$)							
Region 1 20	Region 2 20	Region3 20	Region 4 20	Region 5 20	Region 6 20	Region 7 20	Region 8 20
Potter 25	Lubbock 25	Wichita 25	Collin 25	Rusk 30	El Paso 70	Ector 35	
			Dallas 55	Smith 25			
			Denton 25	Titus 30			
			Ellis 25				
			Tarrant 40				

Regional Background / Specific County Background - Annual Concentration ($\mu g/m^3$)							
Region 9 20	Region 10 20	Region 11 20	Region 12 20	Region 13 20	Region 14 20	Region 15 20	Region 16 20
Bell 40	Jefferson 35	Fayette 30	Brazoria 35	Bexar 50	Nueces 35	Cameron 30	Webb 25
Limestone 25	Orange 35	Travis 45	Chambers 25		Victoria 25	Hidalgo 30	
McLennan 30		Williamson 25	Ft. Bend 35				
Robertson 35			Galveston 30				
			Harris 60				
			Montgomery 25				

EFSCOP00002308

Appendix B

Screening Factors and Ratio Techniques

Screening Factors. For averaging times greater than one hour, the maximum concentration will generally be less than the 1-hour value. Use the factors in Table B-1 to convert point and volume source related concentrations (EPA, 1992a and ADMT memo on the ADMT Internet page for lead modeling). Do not use the multiplying factors to obtain concentrations from area sources for averaging times greater than one hour. Concentrations close to an area source will not vary as much as those for point and volume sources in response to varying wind directions, and the meteorological conditions which are likely to give maximum 1-hour concentration can persist for several hours. Therefore, to be conservative, ADMT recommends that the maximum 1-hour concentrations for area sources be assumed to apply for averaging periods out to 24 hours.

Table B - 1. Multiplying Factors to Convert 1-Hour Point and Volume Source Concentrations to Other Averaging Times

Averaging Time	Multiplying Factor
3-Hour	0.9
8-Hour	0.7
24-Hour	0.4*
Quarterly	0.2*
Annual	0.08*

* Can be used for area sources.

Ratio Technique 1. This technique uses a unit emission rate (1 pound per hour or 1 gram per second) to determine if the maximum contribution from each permitted source when added together, independent of time and space, could exceed a standard or ESL. This is a conservative procedure since the maximum concentration from all sources modeled concurrently cannot be more than the sum of the maximum concentration from each source modeled separately.

Each source is evaluated separately with a unit emission rate, such as 1 pound per hour or 1 gram per second; the source's actual location; and the source's proposed stack parameters represented in the permit application. In the ISC models this is done by setting up a separate source group for

each source. The SCREEN model can also be used for this demonstration with a separate SCREEN model run for each source.

The maximum predicted concentration for each source is then multiplied by the appropriate emission rate factor for each source and for each pollutant. The emission rate factor is the ratio of the approved emission rate divided by the unit emission rate.

The sum of the maximum concentrations (for each pollutant, independent of time and space) is then compared with the threshold of concern for each pollutant. If the sum for any pollutant is greater than that value, then refined modeling may be required and if so, enter the emission rate for each source for this pollutant into the model for additional evaluation so that time and space are considered.

Determining individual source contributions to the ALL source group maximum concentration in the ISC model is not appropriate unless there is only one source or the pollutants are emitted in exactly the same amount for all sources, or pollutants are emitted in exactly the same ratio for all sources.

Ratio Technique 2. One pollutant is modeled for all sources with TNRCC approved emission rates and stack parameters. Other TNRCC approved pollutant emission rates are then compared with the modeled pollutant emission rate to determine the source which has the maximum ratio. This maximum ratio is then multiplied by the predicted maximum off-property concentration for the pollutant modeled. If the resulting maximum concentration exceeds a value of concern, then additional refined modeling may be needed and, if so, enter the emission rate for each source of this pollutant into the model.

Ambient Ratio Method. The EPA adopted a new method to predict annual NO_2 concentrations [GAQM, Section 6.2.3 (EPA, 1995a)] that can be applied during screening modeling or refined modeling. This method consists of two approaches. One approach applies a conversion factor to the emission rate, and the other applies a conversion factor to the predicted concentration. The process is outlined in the following steps that do not need to be applied in sequence.

Step 1: Assume total conversion of NO_X to NO_2. Use the NO_X emission rate as a surrogate for the NO_2 emission rate. Conduct screening or refined modeling, as applicable. This approach is conservative but is not realistic. If the concentration exceeds the de minimis or NAAQS (with background concentration added), go to Step 2.

Step 2: Apply a conversion factor to the predicted concentration.

Step 2a: Assume limited conversion of NO_X to NO_2. Multiply the predicted annual NO_X concentration by the national default of 0.75. This approach is conservative. If additional refinement is needed, go to Step 2b if applicable.

Step 2b: Obtain a representative factor for conversion of NO_X to NO_2. Multiply the predicted annual NO_X concentration by a measured NO_2 / NO_X ratio obtained from a site-specific or representative regional air monitor.

Step 3: Apply a conversion factor to the emission rate.

Step 3a: Assume limited conversion of NO_X to NO_2. Multiply the NO_X emission rate by the national default of 0.75. This approach is conservative. Conduct screening or refined modeling, as applicable. If additional refinement is needed, go to Step 3b, if applicable.

Step 3b: Obtain a representative factor for conversion of NO_X to NO_2. Multiply the emission rate by a measured NO_2 / NO_X ratio obtained from a site-specific or representative regional monitor. Conduct screening or refined modeling, as applicable.

http://www.epa.gov/air/criteria.html
Last updated on Tuesday, November 08, 2011

Air and Radiation

You are here: EPA Home Air and Radiation National Ambient Air Quality Standards (NAAQS)

National Ambient Air Quality Standards (NAAQS)

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (40 CFR part 50) for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of national ambient air quality standards. ***Primary standards*** provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. ***Secondary standards*** provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

EPA has set National Ambient Air Quality Standards for six principal pollutants, which are called "criteria" pollutants. They are listed below. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air (μg/m^3).

Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 μg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution [71 FR 61144, Oct 17, 2006]	$PM_{2.5}$	primary and secondary	Annual	15 μg/m^3	annual mean, averaged over 3 years
			24-hour	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

as of October 2011

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 μg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

See historical tables of NAAQS standards

- Carbon Monoxide
- Lead
- Nitrogen Dioxide
- Ozone
- Particle Pollution
- Sulfur Dioxide

Interim 1-Hour SO_2 Screening Background Concentrations in micrograms per cubic meter (μg/m3)[1]			
Region/Specific County[2]	Screening Background	Region/Specific County	Screening Background
1	50	5	50
Hutchinson	Cannot be used	Titus	Cannot be used
Potter	Cannot be used	Rusk	Cannot be used
Gray	Cannot be used	Harrison	Cannot be used
Moore	150	Smith	150
Carson	Cannot be used	Cass	150
Parmer	Cannot be used	Gregg	Cannot be used
2	50	Henderson	Cannot be used
Lamb	Cannot be used	Bowie	150
Hockley	80	Anderson	Cannot be used
Bailey	Cannot be used	Morris	Cannot be used
3	50	Panola	Cannot be used
Wilbarger	150	Camp	Cannot be used
Wichita	80	Franklin	Cannot be used
Nolan	80	6	50
4	50	El Paso	80
Dallas	Cannot be used	7	50
Tarrant	Cannot be used	Howard	150
Ellis	Cannot be used	Ector	80
Collin	80	Midland	80
Navarro	Cannot be used	8	50
Denton	80	Crockett	80
Kaufman	50	Coke	80

[1] The NAAQS is 196 μg/m3 converted from parts per billion based on standard temperature and pressure
[2] Use the value for the region the project will be located in, or county if listed

Interim 1-Hour SO_2 Screening Background Concentrations in micrograms per cubic meter (μg/m3)			
Region/Specific County	Screening Background	Region/Specific County	Screening Background
9	50	12	50
Freestone	Cannot be used	Fort Bend	Cannot be used
Milam	Cannot be used	Harris	Cannot be used
Limestone	Cannot be used	Galveston	150
Grimes	Cannot be used	Brazoria	150
Robertson	150	Matagorda	150
McLennan	80	Colorado	Cannot be used
Brazos	Cannot be used	13	50
Bosque	80	Bexar	150
Leon	Cannot be used	Atascosa	Cannot be used
Falls	150	Comal	80
10	50	Wilson	150
Jefferson	Cannot be used	14	50
Orange	Cannot be used	Goliad	Cannot be used
11	50	Nueces	Cannot be used
Fayette	Cannot be used	Calhoun	150
Travis	80	Aransas	150
Hays	80	Bee	150
Williamson	80	Victoria	Cannot be used
Caldwell	80	Lavaca	80
Bastrop	80	Live Oak	80
Lee	Cannot be used	15	50
		16	50
		McMullen	Cannot be used

These values are conservative and based on available ambient monitoring design values (2007-2009), emissions inventory data, and permit allowable rates. However, the screening values cannot be used if more recent data indicates a higher value than in the tables. The values may change as more research is conducted and/or data obtained. It is the applicant's responsibility to determine the appropriate air quality concentrations to use for the source impact and air quality demonstration.

If a value is overly conservative, contact the Air Dispersion Modeling Team to determine if a more refined background concentration is available. For counties where the screening background values cannot be used, if the project's impact is greater than EPA's interim significance value, 7.8 $\mu g/m^3$, then a more refined analysis is required.

Texas Natural Resource Conservation Commission

INTEROFFICE MEMORANDUM

TO: NSRPD Technical Staff **DATE:** September 4, 1998

FROM: Dom Ruggeri, Team Leader
Air Dispersion Modeling Team (ADMT)

SUBJECT: Screening Background Concentrations

The concentrations in the attached tables were developed for use with the Modeling Request Flowchart. They were determined based on a statewide review of: the highest monitored values during 1992-1997 for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}), lead (Pb), and carbon monoxide (CO); countywide point source emissions; and population, as a surrogate for non-point source emissions. These concentrations are meant to be conservative, since they were developed for use primarily in the screening modeling process.

The tables contain the highest background concentrations expected within a TNRCC region. For some projects, additional refinement of screening background concentrations may be appropriate, particularly in areas with multiple ambient air monitors. ADMT staff can assist in the determination of more refined screening background concentrations on a case-by-case basis.

Attachments

EFSCOP00002316

SCREENING BACKGROUND CONCENTRATIONS ($\mu g/m^3$)
September, 1998

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
1-	0.1	4000	1000	60	20	20	130	36	8
Carson				161	25		260	75	12
Gray		14000	7000						
Hutchinson		18000	9000	75	25		1040	275	40
Moore		14000	7000						
Potter	0.4	10000	5000	90	30	25	975	240	36

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
2-	0.1	4000	1000	60	20	20	130	36	8
Lamb	0.4			75	25		975	240	36
Lubbock		10000	5000	164	37	25	260	75	12

EFSCOP00002317

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
3-	0.1	4000	1000	60	20	20	130	36	8
Mitchell							520	150	20
Taylor		10000	5000						
Wichita		10000	5000	90	30	25			
Wilbarger							520	150	20

	Pollutant / Averaging Period / Standard / Background Concentration								
Region / Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
4-	0.1	4000	1000	60	20	20	130	36	8
Collin	1.0	10000	5000	90	30	25	260	75	12
Dallas	0.4	18000	9000	120	40	55			
Denton		10000	5000	90	30	25			
Ellis	0.5	10000	5000	116	50	25	975	240	36
Hood							260	75	12
Kaufman	0.5								
Navarro							260	75	12
Palo Pinto							260	75	12
Tarrant		16000	8000	105	35	40			
	Pollutant / Averaging Period / Standard / Background Concentration								

EFSCOP00002318

Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
5-	0.1	4000	1000	60	20	20	130	36	8
Cass		10000	5000				520	150	20
Gregg		10000	5000						
Harrison				75	25		910	220	32
Hopkins							780	200	24
Morris	0.4						260	75	12
Rusk		10000	5000	105	35	30	1040	275	40
Smith		10000	5000	75	25	25			
Titus				98	35	30	1040	275	40

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
6-	0.1	4000	1000	60	20	20	130	36	8
El Paso	0.4	28000	14000	256	63	70	910	240	36

EFSCOP00002319

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
7-	0.1	4000	1000	60	20	20	130	36	8
Crane							520	150	20
Ector		10000	5000	126	26	35			
Howard		14000	7000				520	150	20
Midland		10000	5000						
Pecos							260	75	12
Ward							520	150	20
Winkler							780	200	24

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
8-	0.1	4000	1000	60	20	20	130	36	8
Tom Green		10000	5000						

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
9-	0.1	4000	1000	60	20	20	130	36	8
Bell		10000	5000	75	25	40			
Brazos		10000	5000						
Freestone				90	30				
Grimes							780	200	24
Limestone				75	25	25	1040	275	40
McClennen		10000	5000	75	25	30	260	75	12
Milam		14000	7000	75	25		1040	275	40
Robertson	0.4			90	30	35	1040	275	40

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
10-	0.1	4000	1000	60	20	20	130	36	8
Angelina	0.4	10000	5000	75	25				
Hardin				75	25				
Jefferson	0.1	14000	7000	113	33	35	1040	275	40
Orange	0.4	14000	7000	75	25	35	780	200	24

EFSCOP00002321

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
11-	0.1	4000	1000	60	20	20	130	36	8
Fayette				90	30	30	1040	275	40
Travis		14000	8000	90	30	45	520	150	20
Williamson		10000	5000	75	25	25			

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
12-	0.1	4000	1000	60	20	20	130	36	8
Austin				135	45				
Brazoria		10000	5000	98	33	35	1040	275	40
Chambers		10000	5000			25	260	75	12
Fort Bend		10000	5000	98	33	35	1040	275	40
Galveston		14000	7000	116	30	30	780	275	40
Harris		20000	9800	143	47	60	1040	275	40
Montgomery	0.4			75	25	25			

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 33400	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
13-	0.1	4000	1000	60	20	20	130	36	8
Atascosa							780	200	24
Bexar	0.4	20000	9800	120	40	50	1040	275	40
Comal				75	25				

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
14-	0.1	4000	1000	60	20	20	130	36	8
Aransas		10000	5000				260	75	12
Calhoun				75	25		260	75	12
Goliad							910	220	32
Nueces		14000	7000	105	35	35	910	220	32
Victoria		10000	5000			25			

	Pollutant / Averaging Period / Standard / Background Concentration								
Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
15-	0.1	4000	1000	60	20	20	130	36	8
Cameron		14000	7000	128	33	30			
Hildalgo		14000	7000	128	33	30			

	Pollutant / Averaging Period / Standard / Background Concentration								
Pollutant Standard/ Region/ Specific County	Pb Quarter 1.5	CO 1-Hour 40000	CO 8-Hour 10000	PM_{10} 24-Hour 150	PM_{10} Annual 50	NO_2 Annual 100	SO_2 3-Hour 1300	SO_2 24-Hour 365	SO_2 Annual 80
16-	0.1	4000	1000	60	20	20	130	36	8
Maverick		10000	5000	75	25				
Val Verde		10000	5000						
Webb		16000	8000	186	42	25			

EFSCOP00002324

ATTACHMENT 6
SUPPORTING DOCUMENTATION

OIL AND GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Description **Page**

Air Quality Standard Permit for Oil and Gas Handling and Production Facilities 6-1

30 TAC §116.610: Applicability 6-57

30 TAC §116.611: Registration to Use a Standard Permit 6-58

30 TAC §116.614: Standard Permit Fees 6-60

30 TAC §116.615: General Conditions 6-60

TCEQ Facility/Compound Specific Fugitive Emission Factors Table from Air Permit Technical Guidance for Chemical Sources: Equipment Fugitive Leaks, dated October 2000 6-63

TCEQ Guidance on Loading Operations 6-66

TCEQ Table 4: Flare Factors from Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers, dated June 1998 6-70

AP-42 Table 1.4-2: Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion 6-71

AP-42 Table 1.4-3: Emission Factors for Speciated Organic Compounds from Natural Gas Combustion 6-72

Site Data 6-74

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H2S Representative Reading 6-86

Air Quality Standard Permit for Oil and Gas Handling and Production Facilities

(a) **Applicability**. This standard permit applies to all stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water with the following conditions.

(1) The requirements in paragraphs (a)-(k) of this standard permit are applicable in only for new projects and dependent facilities located in the Barnett Shale (Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise counties) on or after April 1, 2011. For all other new projects and dependent facilities in all other counties of the state, paragraph (l) of this standard permit is applicable.

(2) Only one Air Quality Standard Permit for Oil and Gas Handling and Production Facilities for an oil and gas site (OGS) may be registered for a combination of dependent facilities and authorizes all facilities in sweet or sour service. This standard permit may not be used if operationally dependent facilities are authorized by the permit by rule in Title 30, Texas Administrative Code (30 TAC) §106.352, Oil and Gas Handling and Production Facilities, or a permit under 30 TAC §116.111,General Application. Existing authorized facilities, or groups of facilities, at an OGS under this standard permit which are not changing certified character or quantity of emissions must only meet subsections (i) and (k) of this standard permit (protectiveness review and planned maintenance, startup, and shutdown (MSS) requirements) and otherwise retain their existing authorization. Other facilities which are not covered under this standard permit may be authorized by other authorizations at an OGS if (b)(6) and (k) of this standard permit are met.

(3) This standard permit does not relieve the owner or operator from complying with any other applicable provision of the Texas Health and Safety Code, Texas Water Code, rules of the Texas Commission on Environmental Quality (TCEQ), or any additional local, state or federal regulations. Emissions that exceed the limits in this standard permit are not authorized and are violations.

(4) Emissions from upsets, emergencies, or malfunctions are not authorized by this standard permit. This standard permit does not regulate methane, ethane, or carbon dioxide.

(b) **Definitions and Scope.**

(1) Facility is a discrete or identifiable structure, device, item, equipment, or enclosure that constitutes or contains a stationary source. Stationary sources associated with a mine, quarry, or well test lasting less than 72 hours are not considered facilities.

(2) Receptor includes any building which is in use as a single or multi-family residence, school, day-care, hospital, business, or place of worship at the time this standard permit is registered. A residence is a structure primarily used as a permanent dwelling. A business is a structure

that is occupied for at least 8 hours a day, 5 days a week, and does not include businesses who are handling or processing materials as described in subsection (a). This term does not include structures occupied or used solely by the owner or operator of the oil and gas facility, or the mineral rights owner of the property upon which the facility is located. All measurements of distance to receptors shall be taken from the emission release point at the oil and gas facility that is nearest to the point on the building that is nearest to the oil and gas facility.

(3) An OGS is defined as all facilities which meet the following:
   (A) Located on contiguous or adjacent properties;
   (B) Under common control of the same person (or persons under common control); and
   (C) Designated under same 2-digit standard industrial classification (SIC) codes.

(4) For purposes of determining applicability of 30 TAC Chapter 122, Federal Operating Permits, the definitions of 30 TAC §122.10, General Definitions, apply.

(5) A project under this standard permit is defined as the following and must meet all requirements of this standard permit prior to construction or implementation of changes.
   (A) Any new facility or new group of operationally dependent facilities at an OGS; or
   (B) Physical changes to existing authorized facilities or group of facilities at an OGS which increase the potential to emit over previously registered emission limits; or
   (C) Operational changes to existing authorized facilities or group of facilities at an OGS which increase the potential to emit over previously registered emission limits.

(6) For purposes of registration under this standard permit, the following facilities shall be included:
   (A) All facilities or groups of facilities at an OGS which are operationally dependent on each other;
   (B) Facilities must be located within a 1/4 mile of a project emission point, vent, or fugitive component, except for those components excluded in (b)(6)(C) of this standard permit;
   (C) If piping or fugitive components are the only connection between facilities and the distance between facilities exceeds 1/4 mile, then the facilities are considered separate for purposes of this registration;
   (D) The boundaries of the registration become fixed at the time this standard permit is registered. No individual facility may be authorized under more than one registration;
   (E) Any facility or group of facilities authorized under an existing standard permit registration which is operationally dependent on a project must be revised to incorporate the project; and
   (F) A registration may include facilities which are claiming 30 TAC § 116.620, Installation and/or Modification of Oil and Gas Facilities as well as projects which are claiming this standard permit. Existing authorized facilities, or group of facilities, at an OGS under this standard permit which are not changing registered and certified character or quantity of emissions must only meet paragraphs (i) and (k) of this standard permit (the protectiveness review and planned maintenance, startup, and shutdown (MSS) requirements) until the registration is renewed after December 31, 2015, after which paragraphs (a) – (k) of this standard permit apply.

(7) For purposes of all previous claims of this standard permit (or any previous version of this standard permit) where no project is occurring:
   (A) Existing authorized facilities, or group of facilities, which have not registered planned MSS activity emissions prior to the effective dates in (a)(1) of this standard permit must

meet paragraph (i) of this standard permit (planned MSS) no later than January 5, 2012; or

(B) Existing authorized facilities, or group of facilities, which have registered planned MSS activity emissions and compliance with 30 TAC § 116.620(a)(1) has been demonstrated prior to the effective dates in (a)(1) of this standard permit, must meet paragraph (i) of this standard permit (planned MSS) no later than the registration renewal submitted after December 31, 2015.

(8) For purposes of ensuring protection of public health and welfare and demonstrating compliance with applicable ambient air standards and effects screening levels, the impacts analysis as specified in paragraph (k) of this standard permit must be completed.

(A) All impacts analysis must be done on a contaminant-by-contaminant basis for any net project increases. If a claim under this standard permit is only for planned MSS under paragraph (i) of this standard permit, the analysis shall evaluate planned MSS scenarios only.

(B) Hourly and annual emissions shall be limited based on the most stringent of paragraphs (h) or (k) of this standard permit.

(c) **Authorized Facilities, Changes and Activities.**

(1) For existing OGS which are authorized by previous versions of this standard permit:

(A) A project requires registration unless otherwise specified.

(B) The following projects do not require registration, but must comply with best management practices in paragraph (e) of this standard permit, compliance demonstrations in paragraphs (i) and (j) of this standard permit and must be incorporated into the registration at the next revision or certification:

(i) Addition of any piping, fugitive components, any other new facilities that increase registered emissions less than or equal to 1.0 tpy volatile organic compounds (VOC), 5.0 tpy nitrogen oxides (NOx), 0.01 tpy benzene, and 0.05 tpy hydrogen sulfide (H_2S) over a rolling 12-month period;

(ii) Changes to any existing facilities that increase registered emissions less than or equal to 1.0 tpy VOC, 5.0 tpy nitrogen oxides (NOx), 0.01 tpy benzene, and 0.05 tpy H_2S over a rolling 12-month period; or

(ii) Total increases over a rolling 60-month period that are less than or equal to 5.0 tpy VOC or NO_X, 0.05 tpy benzene, or 0.1 tpy H_2S; or

(iv) Addition of any new engine rated less than 100 horsepower (hp); or

(v) Replacement of any facility if the new facility does not increase the previous registered emissions.

(C) In lieu of registering proposed changes under this standard permit, incremental emissions increases associated with construction of new facilities or changes to existing facilities may be authorized by 30 TAC §106.261, Facilities (Emission Limitations) or §106.262, Facilities (Emissions and Distance Limitations), if the maximum worst-case emissions also meet the limitations established by paragraphs (b)(8) and (k) of this standard permit for all air contaminants with proposed increases.

(2) All authorizations under this standard permit shall meet the following:

(A) New, changed, or replacement facilities shall not exceed the thresholds for major source or major modification as defined in 30 TAC §116.12, Nonattainment and Prevention of Significant Deterioration Review Definitions, and in Federal Clean Air Act §112(g) or §112(j);

(B) All facilities shall comply with all applicable 40 Code of Federal Regulations (CFR), Parts 60, 61, and 63 requirements for New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and Maximum Achievable Control Technology (MACT); and

(D) All facilities shall comply with all applicable requirements of 30 TAC Chapters 111, Control of Air Pollution from Visible Emissions and Particulate Matter, 112, Control of Air Pollution from Sulfur Compounds, 113, Standards of Performance for Hazardous Air Pollutants and for Designated Facilities and Pollutants, 115, Control of Air Pollution from Volatile Organic Compounds), and 117, Control of Air Pollution from Nitrogen Compounds.

(3) To be eligible for this standard permit an applicant:

(A) shall meet all applicable requirements as set forth in this standard permit;

(B) shall not misrepresent or fail to fully disclose all relevant facts in obtaining the permit; and

(C) shall not be indebted to the state for failure to make payment of penalties or taxes imposed by the statutes or rules within the commission's jurisdiction.

(6) All facilities related to the operation of any OGS, under any version of this standard permit (or co-located at a site with an OGS standard permit), previously authorized by, and continuing to meet, the conditions of a permit by rule under 30 TAC Chapter 106, Permits by Rule (or any historical version) must:

(A) Be incorporated into this standard permit in any initial registration, revision, or renewal for this standard permit. These facilities will become authorized by this standard permit and previous authorizations will be voided.

(B) Meet all emission limits established by this standard permit and review in accordance with paragraph (b)(8) of this standard permit.

(C) Meet requirements of paragraphs (e), (i), and (j) of this standard permit for Best Management Practices and Minimum Requirements, Planned MSS, and associated Records, Sampling and Monitoring of this standard permit.

(D) Only if facilities or groups of facilities are changed in such a way as to increase the potential to emit, production processing capacity, or registered emission rate, the requirements in paragraph (h) (BACT) of this standard permit are required to be met. In all other cases, these facilities are not required to meet paragraph (h) of this standard permit.

(d) **Facilities and Exclusions**

(1) Only the following specific facilities and groups of facilities have been evaluated for this standard permit, along with supporting infrastructure equipment and facilities, and may be included in a registration:

(A) Fugitive components, including valves, pressure relief valves, pipe flanges and connectors, pumps, compressors, stuffing boxes, instrumentation and meters, natural gas driven pneumatic pumps, and other similar devices with seals that separate process and waste material from the atmosphere and the associated piping;

(B) Separators, including all gas, oil and water physical separation units;

(C) Treatment and processing equipment, including heater-treaters, methanol injection, glycol dehydrators, molecular or mole sieves, amine sweeteners, H_2S scavenger chemical reaction vessels for sulfur removal, and iron sponge units;
(D) Cooling towers and associated heat exchangers;
(E) Gas recovery units, including cryogenic expansion, absorption, adsorption, heat exchangers and refrigeration units;
(F) Combustion units, including engines, turbines, boilers, reboilers, and heaters;
(G) Storage tanks for crude oil, condensate, produced water fuels, treatment chemicals, slop and sump oils and pressure tanks with liquified petroleum gases;
(H) Surface facilities associated with underground storage of gas or liquids;
(I) Truck loading equipment;
(J) Control equipment, including vapor recovery systems, glycol and amine reboiler condensers, flares, vapor combustors, and thermal oxidizers; and
(K) Temporary facilities used for planned maintenance, and temporary control devices for planned start-ups and shutdowns

(2) **Exclusions.** The following are not authorized under this standard permit:
(A) Sour water strippers or sulfur recovery units;
(B) Carbon dioxide hot carbonates processing units;
(C) Water injection facilities (these facilities may otherwise authorized by 30 TAC §106.351, Salt Water Disposal);
(D) Liquefied petroleum gases, crude oil, or condensate transfer or loading into or from railcars, ships, or barges. These facilities may otherwise be authorized by 30 TAC §106.261, Facilities (Emission Limitations)) and §106.262, Facilities (Emissions and Distance Limitations);
(E) Incinerators for solid waste destruction;
(F) Remediation of petroleum contaminated water and soil. These facilities may otherwise authorized by 30 TAC §106.533, Remediation; and
(G) Cooling Towers and heat exchangers with direct contact with gaseous or liquid process streams containing VOC, H_2S, halogens or halogen compounds, cyanide compounds, inorganic acids, or acid gases.

(e) **Best Management Practices (BMP) and Best Available Control Technology (BACT) Requirements**. For any project, and any associated emission control equipment registered under this standard permit this paragraph shall be met as applicable. These requirements are not applicable to existing, unchanging facilities until any renewal submitted after December 31, 2015.

(1) All facilities which have the potential to emit air contaminants must be maintained in good working order and operated properly during facility operations. Each operator shall establish and maintain a program to replace, repair, and/or maintain facilities to keep them in good working order. The minimum requirements of this program shall include:
(A) Compliance with manufacturer's specifications and recommended programs applicable to equipment performance and effect on emissions, or alternatively, an owner or operator developed maintenance plan for such equipment that is consistent with good air pollution control practices.
(B) Cleaning and routine inspection of all equipment; and
(C) Replacement and repair of equipment on schedules which prevent equipment failures and maintain performance.

(2) Any OGS facility shall be operated at least 50 feet from any property line or receptor (whichever is closer to the facility). This distance limitation does not apply to the following:
   (A) Any fugitive components that are used for isolation and or safety purposes may be located at one-half of the width of any applicable easement;
   (B) Any facility at a location for which the distance requirements were satisfied at the time this standard permit is registered (provided that the authorization was maintained) regardless of whether a receptor is subsequently built or put to use 50 feet from any OGS facility; or
   (C) Existing facilities which are located less than 50 feet from a property line or receptor when constructed and previously authorized. If modified or replaced, the operator shall consider, to the extent that good engineering practice will permit, moving these facilities to meet the 50 foot requirement. Replacement facilities must meet all other requirements of this standard permit.

(3) Engines and turbines shall meet the emission and performance standards listed in Table 6 in paragraph (m) and the following requirements:
   (A) Liquid fueled engines used for back-up power generation and periodic power needs at the OGS are authorized if the fuel has no more than 0.05% sulfur and the engine is operated less than 876 hours per rolling 12-month period.
   (B) Engines and turbines used for electric generation more than 876 hours per rolling 12-month period are authorized if no reliable electric service is readily available. In all other circumstances, electric generators must meet the technical requirements of the Air Quality Standard Permit for Electric Generating Unit (EGU) (not including the EGU standard permit registration requirements) and the emissions shall be included in the registration under this standard permit;
   (C) All applicable requirements of 30 TAC Chapter 117; and
   (D) All applicable requirements of 40 CFR Part 60 and 40 CFR Part 63.
   (E) Compression ignition engines that are rated less than 225 kW (300 hp) and emit less than or equal to the emission tier for an equivalent sized model year 2008 non-road compression ignition engine located at 40 CFR § 89.112, Table 1 are authorized.

(4) Open-topped tanks or ponds containing VOCs or H_2S are allowed up to a PTE equal to 1 tpy of VOC and 0.1 tpy of H_2S.

(5) All process equipment and storage facilities individually must meet the requirements of BACT listed in Table 10 in paragraph (m). Any combination of process equipment and storage facilities with an uncontrolled PTE of equal to or greater than 25 tpy of VOC must also meet the requirements of Table 10, row titled "Combined Control Requirements". All of the following streams and facilities must be included for this site-wide assessment:
   (A) For any gaseous vent stream with a concentration of 1% VOC must be considered for capture and control requirements;
   (B) For any liquid stream with a potential to emit of equal to or greater than 1 tpy VOC for each vessel or storage facility.

(6) The following shall apply to all fugitive components associated with the project:
   (A) All seals and gaskets in VOC or H_2S service shall be installed, checked, and properly maintained to prevent leaking. All components shall be physically inspected quarterly for leaks.

(B) New and replaced fugitive components and instrumentation in gas or liquid service with the uncontrolled potential to emit equal to or greater than 10 tpy VOC or 1 tpy H_2S are subject to a leak detection and repair (LDAR) program as specified in Table 9 in paragraph (m). Additional requirements are applicable where uncontrolled potential to emit equal to or greater than 25 tpy VOC or 5 tpy H_2S as specified in Table 9. Planned MSS from fugitive components must also meet the requirements of Table 9.

(C) All components found to be leaking shall be repaired. Every reasonable effort shall be made to repair a leaking component. All leaks not repaired immediately shall be tagged or noted in a log. At manned sites, leaks shall be repaired no later than 30 days after the leak is found. At unmanned sites, leaks shall be repaired no later than 60 days after the leak is found. If the repair of a component would require a unit shutdown, which would create more emissions than the repair would eliminate, the repair may be delayed until the next shutdown.

(D) Tank hatches, not designed to be completely sealed, shall remain closed (but not completely sealed in order to maintain safe design functionality) except for sampling, gauging, loading, unloading, or planned maintenance activities.

(E) To the extent that good engineering practices will permit, new and reworked valves and piping connections shall be located in a place that is reasonably accessible for leak checking during plant operation and underground process pipelines shall contain no buried valves such that fugitive emission monitoring is rendered impractical.

(7) Tanks and vessels must utilize a paint color that minimizes the effects of solar heating (including, but not limited to, white or aluminum). To meet this requirement the solar absorptance should be 0.43 or less, as referenced in Table 7.1-6 in Compilation of Air Pollutant Emission Factors (AP-42). Paint shall be applied according to paint producers recommended application requirements if provided and in sufficient quantity as to be considered solar resistant. Paint shall be maintained in good condition and will not compromise tank integrity. Minimal amounts of rust may be present not to exceed 10% of the external surface area of the roof or walls of the tank and in no way may compromise tank integrity. Additionally, up to 10% of the external surface area of the roof or walls of the tank or vessel may be painted with other colors to allow for identification and/or aesthetics. For tanks and vessels purposefully darkened to create the process reaction and help condense liquids from being entrained in the vapor or are in an area whereby a local, state, federal law, ordinance, or private contract predating this standard permit's effective date establishes in writing tank and vessel colors other than white, these requirements do not apply.

(8) All emission estimation methods including but not limited to computer programs such as GRI-GLYCalc, AmineCalc, E&P Tanks, and Tanks 4.0, must be used with monitoring data generated in accordance with Table 8 in subsection (m) of this section where monitoring is required. All emission estimation methods must also be used in a way that is consistent with protocols established by the commission or promulgated in federal regulations (NSPS, NESHAPS). Where control of emissions is relied upon to meet subsection (k) of this section, control monitoring is required.

(9) Process reboilers, heaters, and furnaces that are also used for control of waste gas streams may claim 50 to 99% destruction efficiency for VOCs and H_2S depending on the design and level of monitoring applied. The 90% destruction may be claimed where the waste gas is delivered to the flame zone or combustion fire box with basic monitoring as specified in paragraph (j). Any value greater than 90% and up to 99% destruction efficiency may be claimed where

enhanced monitoring and/or testing are applied as specified in paragraph (j). If the waste gas is premixed with the primary fuel gas and used as the primary fuel in the device through the primary fuel burners, 99% destruction may be claimed with basic monitoring as specified in paragraph (j). In systems where the combustion device is designed to cycle on and off to maintain the designed heating parameters, and may not fully utilize the waste gas stream, records of run time and enhanced monitoring is required to claim any run time beyond 50%.

(10) Vapor recovery Systems (VRSs) may claim up to 100% control. The control efficiency is based on whether it is a mechanical VRU (mVRU) or a liquid VRU (lVRU). The VRUs must meet the appropriate design, monitoring and record-keeping in Table 7 and Table 8 in paragraph (m).

(11) Flares used for control of emissions from production, planned MSS, emergency, or upset events may claim design destruction efficiency of 98% for VOCs and H_2S and 99% for VOCs containing no more than three carbon atoms that contain no elements other than carbon and hydrogen. All flares must be designed and operated in accordance with the following:

- (A) Meet specifications for minimum heating values of waste gas, maximum tip velocity, and pilot flame monitoring found in 40 CFR §60.18;
- (B) If necessary to ensure adequate combustion, sufficient gas shall be added to make the gases combustible;
- (C) An infrared monitor is considered equivalent to a thermocouple for flame monitoring purposes;
- (D) An automatic ignition system may be used in lieu of a continuous pilot;
- (E) Flares must be lit at all times when gas streams are present;
- (F) Fuel for all flares shall be sweet gas or liquid petroleum gas except where only field gas is available and it is not sweetened at the site; and
- (G) Flares shall be designed for and operated with no visible emissions, except for periods not to exceed at total of 5 minutes during any 2 consecutive hours. Acid gas flares which must comply with opacity limits and records in accordance with 30 TAC §111.111(a)(4), Requirements for Specified Sources, regarding gas flares, are exempt from this visible emission limitation.
- (H) Flares may be designed with steam or air assist to help reduce visible emissions from the flare but must meet the appropriate requirements in 40 CFR 60.18.
- (I) At no time shall minimum heating values fall below the associated minimum heating value in 60.18

(12) Thermal oxidation and vapor combustion control devices may claim design destruction efficiency from 90 to 99.9% for VOCs and H_2S depending on the design and the level of monitoring and testing applied. A device designed for the variability of the waste gas streams it controls with basic monitoring to indicate oxidation or combustion is occurring when waste gas is directed to the device may claim 90% destruction efficiency. Devices with intermediate monitoring, designed for the variability of the waste gas streams they control, with a fire box or fire tube designed to maintain a temperature above 1,400 degrees Fahrenheit (F) for 0.5 seconds, residence time; or designed to meet the parameters of a flare with minimum heating values of waste gas, maximum tip velocity, and pilot flame monitoring as found in 40 CFR § 60.18, but within a full or partial enclosure may claim a design destruction efficiency of 90 to 98%. Devices with enhanced monitoring and ports and platforms to allow stack testing may

claim a 99% efficiency where the devices are designed for the variability of the waste gas streams they control, with a fire box or fire tube designed to maintain a temperature above 1,400 degrees F for 0.5 seconds, residence time. The devices that can claim 99% destruction efficiency may claim 99.9% destruction efficiency if stack testing is conducted and confirms the efficiency and the enhanced monitoring is adjusted to ensure the continued efficiency. Temperature and residence time requirements may be modified if stack testing is conducted to confirm efficiencies.

(f) **Registration, Revision, and Renewal Requirements**

(1) For all previous claims of this standard permit (or any previous version of this standard permit) existing authorized facilities, or group of facilities, are not required to meet the requirements of this standard permit, with the exception of planned MSS, until a renewal under the standard permit is submitted after December 31, 2015.

(2) If no other changes except for authorizing planned MSS occurs at an existing OGS under this standard permit, or any previous version of this standard permit, (b)(7) applies.
   (A) Records demonstrating compliance with paragraph (i) must be kept;
   (B) If the OGS must certify emissions to establish nonapplicability of prevention of significant deterioration (PSD), nonattainment new source review (NNSR), or the federal operating permit programs, this certification may be filed using Form APD-CERT. No fee is required for this certification.
   (C) Planned MSS shall be incorporated at the next revision or update to a registration under this standard permit after January 5, 2012, and no later than any renewal submitted after December 31, 2015.

(3) Facilities, groups of facilities or planned MSS from facilities registered under this standard permit cannot also be authorized by a permit under 30 TAC §116.111, General Application.

(4) Prior to construction or implementation of changes for any project which meets this standard permit a notification shall be submitted through the e-Permits system. This notification shall include the following:
   (A) Identifying information (Core Data) and a general description of the project must be submitted through e-Permits (or if not available, hard-copy) using the "APD OGS New Project Notification."
   (B) A fee of $25 for small businesses as defined in 30 TAC §106.50, or $50 for all others must be submitted through the commission's e-Pay system.

(5) For any registration which meets the emission limitations of this standard permit must meet the following:
   (A) Within 90 days after start of operation or implemented changes (whichever occurs first), the facilities must be registered with a PI-1S Standard Permit Application.
   (B) This registration shall include a detailed summary of maximum emissions estimates based on: site-specific or defined representative gas and liquid analysis; equipment design specifications and operations; material type and throughput; and other actual parameters essential for accuracy for determining emissions and compliance with all applicable requirements of this standard permit.

(C) The fee for this registration shall be $475 for small businesses, or $850 for all others.

(D) Construction may begin any time after receipt of written notification to the executive director. Operations may continue after receipt of registration if there are no objections or 45 days after receipt by the executive director of the registration, whichever occurs first.

(6) If an OGS emissions increase, either through a change in production or addition of facilities, the site may change authorization (Level 1 or Level 2 PBR in 30 TAC §106.352 or Standard Permit) in the following circumstances:

(A) Within 90 days from the initial notification of construction of an oil and gas facility, a registration can update the authorization mechanism by submitting an initial registration or revision to the PBR or Standard Permit.

(B) Within 90 days of the change of production or installation of additional equipment, by submitting an initial registration or revision to the PBR or Standard Permit.

(7) All registrations, registration revisions, and renewals shall be submitted to the commission through a PI-1S Standard Permit Registration Form. Fee requirements do not apply when there are changes in representations with no increase in emissions within 6-months after a standard permit registration has been issued.

(g) Any claim under this standard permit must comply with all applicable requirements of 30 TAC §116.610; §116.611, Registration to Use a Standard Permit; §116.614, Standard Permit Fees; and §116.615, General Conditions. This standard permit supersedes: the notification requirements of 30 TAC §116.615, General Conditions; and the emission limitations of 30 TAC §116.610(a)(1), Applicability.

(h) **Emission Limitations.** Total maximum estimated registered or certified emissions shall meet the most stringent of the following. All emissions estimates must be based on representative worst-case operations and planned MSS activities.

(1) Total maximum estimated annual emissions of any air contaminant shall not exceed the applicable limits for a major stationary source or major modification for PSD and NNSR as specified in 30 TAC §116.12.

(2) Emissions must meet the limitations established in paragraph (k) of this standard permit.

(3) Maximum emissions are limited to less than the following after any operator limitations or controls:

Air contaminant	steady-state or < 30 psig periodic releases lb/hr	≥ 30 psig periodic lb/hr up to 600 hr/yr	Total tpy
Total VOC*			250
Total crude oil or condensate VOC*	145	318	
Total natural gas VOC*	750	1635	
Benzene	7	15.4	10.2
Hydrogen sulfide	10.8	9.8	47
Sulfur dioxide	93.2		250
Nitrogen oxides	121		250
Carbon monoxide	104		250
PM10 and PM2.5	28		15

* VOC is defined in 101.1(115) and does not include methane and ethane

(i) **Planned Maintenance, Start-ups and Shutdowns (MSS).** For any facility, group of facilities or site using this standard permit or previous versions of this standard permit, the following shall apply:

(1) Prior to January 5, 2012, representations and registration of planned MSS is voluntary, but if represented must meet the applicable limits of this standard permit. After January 5, 2012, all emissions from planned MSS activities and facilities must be considered for compliance with applicable limits of this standard permit unless otherwise specified in (b)(7). This standard permit may not be used at a site or for facilities authorized under 30 TAC §116.111 if planned MSS has already been authorized under that permit.

(2) As specified, releases of air contaminants during, or as result of, planned MSS must be quantified and meet the emission limits in this standard permit, as applicable. This analysis must include:

(A) Alternate operational scenarios or redirection of vent streams;
(B) Pigging, purging, and blowdowns;
(C) Temporary facilities if used for degassing or purging of tanks, vessels, or other facilities;
(D) Degassing or purging of tanks, vessels, or other facilities; and
(E) Management of sludge from pits, ponds, sumps, and water conveyances.

(3) Other planned MSS activities authorized by this standard permit are limited to the following. These planned MSS activities require only recordkeeping of the activity.

(A) Routine engine component maintenance including filter changes, oxygen sensor replacements, compression checks, overhauls, lubricant changes, spark plug changes, and emission control system maintenance.
(B) Boiler refractory replacements and cleanings.
(C) Heater and heat exchanger cleanings.
(D) Turbine hot standard permit swaps.

(E) Pressure relief valve testing, calibration of analytical equipment; Instrumentation/analyzer maintenance; replacement of analyzer filters and screens.

(4) Engine/compressor start-ups associated with preventative system shutdown activities have the option to be authorized as part of typical operations if:
   (A) Prior to operation, alternative operating scenarios to divert gas or liquid streams are registered and certified with all supporting documentation;
   (B) Engine/compressor shutdowns shall result in no greater than 4 lbs/hr of natural gas emissions; and
   (C) Emissions which result from subsequent compressor start-up activities are controlled to a minimum of 98% efficiency for VOC and H_2S.

(j) **Records, Sampling and Monitoring**. The following records shall be maintained at a site in written or electronic form and be readily available to the agency or local air pollution control program with jurisdiction upon request. All required records must be kept at the facility site. If the facility normally operates unattended, records must be maintained at an office within Texas having day-to-day operational control of the plant site. Other requirements, including but not limited to, federal recordkeeping or testing requirements, can be used to demonstrate compliance if the other requirements are at least as stringent as the associated requirements in the table below. Any documentation that is already being kept for other purposes will suffice for demonstrating requirements. If a control or method is not relied upon to meet this standard permit, then the associated sampling, monitoring, and records are not applicable.
   (1) Sampling and demonstrations of compliance shall include the requirements listed in Table 7 in paragraph (m) of this standard permit.
   (2) Monitoring and records for demonstrations of compliance shall include the requirements listed in Table 8 in paragraph (m) of this standard permit.

(k) **Emission Limits Based on Impacts Evaluation**.

(1) All impacts evaluations must be completed on a contaminant-by-contaminant basis for only any net emissions increases resulting from a project and must meet the following as appropriate:
   (A) Compliance with state or federal ambient air standards shall be demonstrated for NO_2, SO_2, and H_2S at any property-line within 1 mile of a project.
   (B) Compliance with hourly effects screening levels (ESLs) for benzene and annual ESL for benzene, shall be demonstrated at the nearest receptor within 1 mile of a project.

(2) Distance measurements shall be determined using the following:
   (A) For each facility or group of facilities, the shortest corresponding distance from any emission point, vent, or fugitive component to the nearest receptor must be used with the appropriate compliance determination method with the published ESLs as found through the commissioner's internet webpage.
   (B) For each facility or group of facilities, the shortest corresponding distance from any emission point, vent, or fugitive component to the nearest property line must be used with the appropriate compliance determination method with any applicable state or federal ambient air quality standard.

(3) Impacts evaluations are not required under the following cases:
(A) If there is no receptor within 1 mile of a registration no further ESL review is required.
(B) If there is no property line within 1 mile of a registration no further ambient air quality review is required.
(C) If the project total emissions are less than any of the following rates, no additional analysis or demonstration of the specified air contaminant is required:

Air contaminant	**lb/hr**
Benzene	0.039
Hydrogen sulfide	0.025
Sulfur dioxide	2
Nitrogen oxides	4

(4) Evaluation of emissions shall meet the following.
(A) For all evaluations of NO_X to NO_2 a conversion factor of 0.20 for 4-stroke rich and lean burn engines and 0.50 for 2-stroke engines may be used.
(B) The maximum predicted concentration or rate at the property boundary or receptor, whichever is appropriate, must not exceed a state or federal ambient air standard or ESL.

(5) The impacts analysis shall be based on the following facility emissions:
(A) The following shall be met for ESL reviews:
(i) If a project's air contaminant maximum predicted concentrations are equal to or less than 10% of the appropriate ESL, no further review is required;
(ii) If a project's air contaminant maximum predicted concentrations combined with project increases for that contaminant over a rolling 60-month period after the effective date of this revised standard permit are equal to or less than 25% of the appropriate ESL, no further review is required.
(iii) In all other cases, all facility emissions at an OGS, regardless of authorization type, located within 1 mile of a project requiring registration under this standard permit shall be evaluated.
(B) The following shall be met for state and federal ambient air quality standard reviews:
(i) If a project's air contaminant maximum predicted concentrations are equal to or less than 10% the significant impact level (SIL) (also known as de minimis impact in 30 TAC 101, General Rules), no further review is required;
(ii) In all other cases, all facility emissions at an OGS, regardless of authorization type, located within 1 mile of a project requiring registration under this standard permit shall be evaluated.

(6) Evaluation must comply with one of the methods listed with no changes or exceptions:
(A) Tables.
(i)Emission impact Tables 2 – 5F in paragraph (m) of this standard permit may be used in accordance with the limits and descriptions in Table 1 in paragraph (m).

(ii) Values in Tables 2 - 5F in paragraph (m) of this standard permit may be used with linear interpolation between height and distance points. A distance of less than 50 feet or greater than 5,500 feet may not be used. Release heights may not be extrapolated beyond the limits of any table and instead the minimum or maximum height will be used. If distances and release heights are not interpolated, the next lowest height and lesser distances shall be used for determination of maximum acceptable emissions. All facilities exempted from the distance to the property line restriction in paragraph (e)(2) of this standard permit must use 50 feet as the distance to the property line for those ambient standards based on property line.

(B) **Screening Modeling.** A screening model may be used to demonstrate acceptable emissions from an OGS under this standard permit if all of the parameters in the screening modeling protocol provided by the commission are met.

(C) **Dispersion Modeling.** A refined dispersion model may be used to demonstrate acceptable emissions from an OGS under this standard permit if all of the parameters in the refined dispersion modeling protocol provided by the commission are met.

(l) **Existing, Unchanged Facilities and Projects Before Effective Date.** The requirements in 30 TAC §116.620 are applicable to existing unchanged facilities and new or changing facilities as specified in paragraph (a)(1) of this standard permit.

(m) The following Tables shall be used as required by this standard permit.

Table 1 Emission Impact Tables Limits and Descriptions;
Table 2 Generic Modeling Results for Fugitives & Process Vents;
Table 3 Generic Modeling Results for Flares and Thermal Destruction Devices
Table 4 Generic Modeling Results for Blowdowns, Purging, and Pigging
Table 5A Generic Modeling Results for Engines Less Than or Equal to 250 hp
Table 5B Generic Modeling Results for Engines Greater Than 250 hp to Less Than or Equal to 500 hp
Table 5C Generic Modeling Results for Engines Greater Than 500 hp to Less Than or Equal to 1000 hp
Table 5D Generic Modeling Results for Engines Greater Than 1000 hp to Less Than or Equal to 1500 hp
Table 5E Generic Modeling Results for Engines Greater Than 1500 hp to Less Than or Equal to 2000 hp
Table 5F Generic Modeling Results for Engines Greater Than 2000 hp
Table 6 Engine and Turbine Emission and Operational Standards
Table 7 Sampling and Demonstrations of Compliance;
Table 8 Monitoring and Records Demonstrations;
Table 9 Fugitive Component Leak Detection and Repair (LDAR) Control Program ; and
Table 10 Best Available Control Technology (BACT) Requirements

Table 1 Emission Impact Tables Limits and Descriptions

Topic	Description	Details
Variables	$E_{MAX\ HOURLY}$	the maximum acceptable hourly (lb/hr) emissions for a specific air contaminant
	$E_{MAX\ ANNUAL}$	the maximum acceptable annual (tpy) emissions for a specific air contaminant
	P	ambient air standard for a specific air contaminant ($\mu g/m^3$)
	ESL	current published effects screening level for a specific air contaminant ($\mu g/m^3$)
	G	the most stringent of any applicable generic value from the Generic Modeling Results Tables at the emission point's release height and distance to property line ($\mu g/m^3$/lb/hr)
	WR_{EPNx}=	weighted ratio of emissions of a specific air contaminant for each EPN divided by the sum of total emissions for all EPNs that emit that contaminant or (E_{EPNx}/E_{total})
Single releases or co-located groups of similar releases	hourly ambient air standard	emissions are determined by: $E_{MAX\ HOURLY} = P/G$
	hourly health effects review	emissions are determined by: $E_{MAX\ HOURLY} = ESL/G$
	annual ambient air standard	emissions are determined by: $E_{MAX\ ANNUAL} = (8760/2000)\ P/(0.08*G)$
	annual health effects review	emissions are determined by: $E_{MAX\ ANNUAL} = (8760/2000)\ ESL/(0.08*G)$
Multiple release points	Limits	If weighted ratios are not used, the total quantity of emissions shall be assumed to be released from the most conservative applicable G value at the site.
	hourly ambient air standard	emissions are determined by: $E_{MAX\ HOURLY} = (WR_{EPN1})\ (P / G_{EPN1}) + (WR_{EPN2})\ (P / G_{EPN2}) + \ldots (WR_{EPNx})\ (P / G_{EPNx})$
	hourly health effects review	emissions are determined by: $E_{MAX\ HOURLY} = (WR_{EPN1})\ (ESL / G_{EPN1}) + (WR_{EPN2})\ (ESL/G_{EPN2}) + \ldots\ldots (WR_{EPNx})\ (ESL / G_{EPNx})$
	annual ambient air standard	emissions are determined by: $E_{MAX\ ANNUAL} = (8760/2000)\ [(WR_{EPN1})\ (P / 0.08*G_{EPN1}) + (WR_{EPN2})\ (P / 0.08*G_{EPN2}) + \ldots\ (WR_{EPNx})\ (P / 0.08*G_{EPNx})]$
	annual health effects review	emissions are determined by: $E_{MAX\ ANNUAL} = (8760/2000)\ [(WR_{EPN1})\ (ESL / 0.08*G_{EPN1}]) + (WR_{EPN2})\ (ESL/0.08*G_{EPN2}) + \ldots (WR_{EPNx})\ (ESL / 0.08*G_{EPNx})]$

Table 2 Fugitives and Process Vents Table

Table 2: Fugitives and Process Vents

Distance	Fugitive 3ft height	Loading 10 ft height	Tank Vents 20 ft height	Process Vessel 10 ft Vent	Process Vessel 20 ft Vent	Process Vessel 30 ft Vent	Process Vessel 40 ft Vent	Process Vessel 50 ft Vent	Process Vessel 60 ft Vent
(ft)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)
50	4375	1232	305	469	168	90	70	65	28
100	4375	1232	305	469	168	90	70	65	28
150	3907	1232	305	469	168	90	70	65	28
200	3089	1232	305	440	168	90	70	65	28
300	1911	1193	294	412	168	90	70	65	28
400	1269	1048	291	319	168	90	70	65	28
500	901	858	274	243	157	90	70	65	28
600	674	698	271	189	138	89	70	65	28
700	525	574	271	150	120	88	70	65	28
800	423	479	261	124	105	85	70	65	28
900	349	406	244	105	93	81	70	65	28
1000	293	348	226	91	84	77	69	65	26
1100	250	302	208	90	77	72	67	63	25
1200	217	264	191	89	70	68	64	61	24
1300	189	233	176	88	65	64	61	58	24
1400	167	208	161	87	61	60	58	55	24
1500	149	186	149	84	57	57	55	53	24
1600	134	168	137	82	54	53	52	50	23
1700	121	153	127	79	51	51	49	47	23
1800	110	139	117	76	50	48	47	45	22
1900	100	128	109	73	49	46	44	43	22
2000	92	117	102	70	49	44	42	41	21
2100	85	108	95	67	48	42	41	39	21
2200	78	101	89	64	47	40	39	38	20

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Table 2: Fugitives and Process Vents(continued)

Distance	Fugitive 3ft height	Loading 10 ft height	Tank Vents 20 ft height	Process Vessel 10 ft Vent	Process Vessel 20 ft Vent	Process Vessel 30 ft Vent	Process Vessel 40 ft Vent	Process Vessel 50 ft Vent	Process Vessel 60 ft Vent
(ft)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)
2300	73	94	83	61	46	39	37	36	19
2400	68	88	78	59	45	37	36	35	19
2500	64	82	74	56	43	36	35	34	18
2600	60	77	70	54	42	34	33	32	18
2700	56	73	66	52	41	33	32	31	17
2800	53	69	63	50	40	32	31	30	17
2900	50	65	60	48	39	31	30	29	16
3000	48	62	57	46	37	30	29	28	16
3500	37	49	46	38	32	26	25	25	14
4000	30	40	38	32	28	24	23	22	12
4500	25	33	32	28	25	21	20	20	11
5000	22	28	27	24	22	19	18	18	10
5500	19	25	24	21	19	17	17	16	9

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Table 3: Flares and Thermal Destruction Devices Table

Table 3: Flares and Thermal Destruction Devices					
Generic Modeling Results					
Distance	20 ft height	30 ft height	40 ft height	50 ft height	60 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
50	58	43	26	25	23
100	58	43	26	25	23
150	58	43	26	25	23
200	58	43	26	25	23
300	58	43	26	25	23
400	58	43	26	25	23
500	58	43	26	25	23
600	56	43	26	25	23
700	52	43	26	25	23
800	47	43	26	25	23
900	45	43	26	25	23
1000	44	43	26	25	23
1100	42	41	25	24	23
1200	40	40	24	24	22
1300	38	38	23	23	21
1400	36	36	23	21	21
1500	34	34	23	21	20
1600	32	32	22	21	20
1700	31	31	22	21	20
1800	29	29	22	20	20
1900	28	28	22	20	20
2000	26	26	21	20	19
2100	25	25	21	20	19
2200	24	24	20	20	19

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Table 3: Flares and Thermal Destruction Devices (continued)					
Generic Modeling Results					
Distance	20 ft height	30 ft height	40 ft height	50 ft height	60 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
2300	23	23	20	19	19
2400	22	22	20	19	18
2500	22	22	19	18	18
2600	21	21	19	18	17
2700	20	20	18	17	17
2800	19	19	18	17	16
2900	19	19	17	16	16
3000	18	18	17	16	16
3500	16	16	15	14	14
4000	14	14	13	12	12
4500	13	13	12	11	11
5000	11	11	11	10	10
5500	11	11	10	9	9

EFSCOP00002344

Table 4: Blowdowns, Purging, and Pigging Generic Modeling Results Table

Table 4: Blowdowns, Purging, and Pigging Generic Modeling Results					
Distance	< 30 psig; 3 ft height	< 30 psig; 10 ft height	< 30 psig; 20 ft height	≥ 30 psig; 6 ft height	≥ 30 psig; 10 ft height
(ft)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)
50	4304	791	244	51	25
100	4304	791	244	51	25
150	4250	777	244	51	25
200	3621	763	244	51	25
300	2367	750	225	51	25
400	1607	737	225	51	25
500	1156	671	224	51	25
600	871	581	218	48	25
700	682	498	212	44	25
800	551	427	210	40	24
900	456	368	204	36	23
1000	384	320	194	33	21
1100	328	281	182	30	20
1200	284	248	170	28	18
1300	249	221	159	27	17
1400	220	198	147	27	16
1500	196	178	137	27	15
1600	176	162	127	27	14
1700	159	147	118	27	13
1800	145	135	110	27	13
1900	132	124	103	27	13
2000	121	114	96	27	13
2100	112	106	90	27	13
2200	103	98	85	27	13
2300	96	91	80	27	13

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Table 4: Blowdowns, Purging, and Pigging Generic Modeling Results (continued)					
Distance	< 30 psig; 3 ft height	< 30 psig; 10 ft height	< 30 psig; 20 ft height	≥ 30 psig; 6 ft height	≥ 30 psig; 10 ft height
(ft)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)
2400	90	86	75	27	13
2500	84	81	71	27	13
2600	79	76	68	27	13
2700	74	72	64	26	13
2800	70	68	61	26	13
2900	67	64	58	26	13
3000	63	61	55	25	13
3500	50	48	45	23	13
4000	40	39	37	21	13
4500	34	33	31	19	13
5000	29	28	27	17	12
5500	25	24	23	16	11

EFSCOP00002346

Table 5A Engines Less Than or Equal to 250 hp

Table 5A Engines Less Than or Equal to 250 hp											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
50	97	85	83	81	81	71	58	44	43	36	26
100	97	85	83	81	81	71	58	44	43	36	26
150	97	85	83	81	81	71	58	44	43	36	26
200	93	85	83	81	81	71	58	44	43	36	26
300	92	85	83	81	81	71	58	44	43	36	26
400	91	85	83	81	81	71	58	44	43	36	26
500	88	85	83	81	81	71	58	44	43	36	26
600	80	79	78	78	78	70	56	44	43	36	26
700	78	77	76	76	71	68	52	44	43	36	26
800	76	75	74	74	64	63	47	44	43	36	26
900	74	73	72	72	58	58	45	44	43	36	26
1000	72	71	71	71	53	53	44	43	43	36	26
1100	69	69	69	69	49	49	42	42	41	35	25
1200	66	66	66	65	45	45	40	40	40	35	24
1300	62	62	62	62	42	42	38	38	38	33	23
1400	59	59	59	59	39	39	36	36	36	32	23
1500	56	56	56	56	37	37	34	34	34	30	23
1600	53	53	53	53	35	35	32	32	32	29	22
1700	50	50	50	50	33	33	31	31	31	28	22
1800	48	48	48	48	31	31	29	29	29	26	22
1900	46	46	46	46	30	30	28	28	28	25	22
2000	44	44	44	44	28	28	26	26	26	24	21

Table 5A Engines Less Than or Equal to 250 hp (continued)											
Generic Modeling Results											
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
2100	42	42	42	42	27	27	25	25	25	23	21
2200	40	40	40	40	26	26	24	24	24	22	20
2300	38	38	38	38	25	25	23	23	23	21	20
2400	37	37	37	37	24	24	22	22	22	20	20
2500	36	36	36	36	23	23	22	22	22	20	19
2600	34	34	34	34	22	22	21	21	21	19	19
2700	33	33	33	33	21	21	20	20	20	18	18
2800	32	32	32	32	21	21	19	19	19	18	18
2900	31	31	31	31	20	20	19	19	19	17	17
3000	30	30	30	30	19	19	18	18	18	17	17
3500	26	26	26	26	17	17	16	16	16	15	15
4000	23	23	23	23	15	15	14	14	14	13	13
4500	21	21	21	21	13	13	13	13	13	12	12
5000	19	19	19	19	12	12	11	11	11	11	11
5500	17	17	17	17	11	11	11	11	11	10	10

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Table 5B: Engines Greater Than 250 and Less Than or Equal to 500 hp

Table 5B: Engines Greater Than 250 and Less Than or Equal to 500 hp

Generic Modeling Results

Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)
50	60	59	54	43	43	34	34	24	21	20	17
100	60	59	54	43	43	34	34	24	21	20	17
150	60	59	54	43	43	34	34	24	21	20	17
200	60	59	54	43	43	34	34	24	21	20	17
300	60	59	54	43	43	34	34	24	21	20	17
400	60	59	54	43	43	34	34	24	21	20	17
500	60	59	54	43	43	34	34	24	21	20	17
600	57	57	52	41	41	34	34	24	21	20	17
700	52	52	47	38	38	31	31	24	21	20	17
800	47	47	43	34	34	28	28	24	21	20	17
900	42	42	39	31	31	26	26	23	20	20	17
1000	39	39	35	28	28	23	23	21	20	20	17
1100	37	36	32	26	26	23	23	20	20	19	17
1200	35	35	30	25	24	23	23	20	20	18	17
1300	34	34	28	24	23	23	23	20	20	18	16
1400	32	32	26	24	23	23	23	20	20	17	16
1500	31	31	24	23	23	23	23	20	20	16	16
1600	29	29	23	23	23	23	23	19	19	16	16
1700	28	28	23	23	23	23	22	19	19	16	15
1800	27	27	22	22	22	22	22	19	19	16	15
1900	25	25	22	22	22	21	21	18	18	16	15
2000	24	24	22	22	22	21	21	17	17	16	15
2100	23	23	21	21	21	20	20	17	17	16	15

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Table 5B: Engines Greater Than 250 and Less Than or Equal to 500 hp (continued)											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
2200	22	22	21	21	21	19	19	17	17	15	15
2300	21	21	20	20	20	19	19	17	16	15	14
2400	21	21	20	20	20	19	18	16	16	15	14
2500	20	20	19	19	19	18	18	16	16	14	14
2600	19	19	19	19	19	18	17	16	16	14	13
2700	18	18	18	18	18	17	17	15	15	14	13
2800	18	18	18	18	18	17	16	15	15	13	13
2900	17	17	17	17	17	16	16	15	15	13	13
3000	17	17	17	17	17	16	15	15	15	13	13
3500	15	15	15	15	15	14	14	13	13	12	11
4000	13	13	13	13	13	13	12	12	12	11	10
4500	12	12	12	12	12	11	11	10	10	10	9
5000	11	11	11	11	11	10	10	10	10	9	9
5500	10	10	10	10	10	9	9	9	9	8	8

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Table 5C: Engines Greater Than 500 and Less Than or Equal to 1,000 hp

Table 5C: Engines Greater Than 500 and Less Than or Equal to 1,000 hp											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
50	26	25	25	25	18	18	17	13	11	11	10
100	26	25	25	25	18	18	17	13	11	11	10
150	26	25	25	25	18	18	17	13	11	11	10
200	26	25	25	25	18	18	17	13	11	11	10
300	26	25	25	25	18	18	17	13	11	11	10
400	26	25	25	25	18	18	17	13	11	11	10
500	26	25	25	25	18	18	17	13	11	11	10
600	26	25	25	25	18	18	17	13	11	11	10
700	26	25	25	25	18	18	17	13	11	11	10
800	24	24	24	24	18	18	17	13	11	11	10
900	23	23	23	23	18	18	17	13	11	11	10
1000	21	21	21	21	17	17	17	13	11	11	10
1100	20	20	20	20	17	17	16	13	11	11	10
1200	18	18	18	18	16	16	16	12	11	11	10
1300	17	17	17	17	15	15	15	12	11	10	10
1400	17	17	17	17	14	14	14	11	11	10	10
1500	17	17	16	16	13	13	13	11	11	10	9
1600	17	17	16	16	13	13	13	11	11	10	9
1700	16	16	15	15	13	12	12	11	11	9	9
1800	16	16	15	15	13	12	12	11	11	9	9
1900	15	15	14	14	13	12	12	11	10	9	9
2000	15	15	14	14	13	12	12	11	10	9	9

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Table 5C: Engines Greater Than 500 and Less Than or Equal to 1,000 hp (continued)

Generic Modeling Results

Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)	G_{hourly} (μg/m³)/(lb/hr)
2100	14	14	13	13	12	12	12	11	10	9	9
2200	14	14	13	13	12	12	12	10	10	9	9
2300	13	13	12	12	12	11	11	10	10	9	8
2400	13	13	12	12	12	11	11	10	9	9	8
2500	12	12	12	12	11	11	11	10	9	9	8
2600	12	12	11	11	11	11	11	10	9	9	8
2700	12	12	11	11	11	10	10	10	9	8	8
2800	11	11	11	11	11	10	10	9	9	8	8
2900	11	11	10	10	10	10	10	9	9	8	8
3000	11	11	10	10	10	10	10	9	9	8	8
3500	9	9	9	9	9	9	9	8	8	7	7
4000	8	8	8	8	8	8	8	7	7	7	6
4500	7	7	7	7	7	7	7	7	6	6	6
5000	7	7	7	7	6	6	6	6	6	6	5
5500	6	6	6	6	6	6	6	6	5	5	5

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Table 5D: Engines Greater Than 1,000 and Less Than or Equal to 1,500 hp

Table 5D: Engines Greater Than 1,000 and Less Than or Equal to 1,500 hp											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
50	17	13	12	10	10	10	10	9	8	8	7
100	17	13	12	10	10	10	10	9	8	8	7
150	17	13	12	10	10	10	10	9	8	8	7
200	17	13	12	10	10	10	10	9	8	8	7
300	17	13	12	10	10	10	10	9	8	8	7
400	17	13	11	10	10	10	10	9	8	8	7
500	17	13	11	10	10	10	10	9	8	8	7
600	17	12	11	10	10	10	10	9	8	8	7
700	17	11	11	10	10	10	10	9	8	8	7
800	17	11	11	10	10	10	10	9	8	8	7
900	17	11	11	10	10	10	10	9	8	8	7
1000	17	11	11	10	10	10	10	9	8	8	7
1100	16	11	11	10	10	10	10	9	8	8	7
1200	15	10	10	10	9	9	9	9	8	7	7
1300	15	10	10	10	9	9	9	8	8	7	7
1400	14	10	10	10	9	9	8	8	8	7	7
1500	13	10	10	10	8	8	8	8	8	7	6
1600	12	10	10	10	8	8	8	8	8	7	6
1700	12	10	10	10	8	8	8	8	8	7	6
1800	11	10	10	10	8	8	8	8	8	7	6
1900	11	10	9	9	8	8	8	7	7	7	6

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Table 5D: Engines Greater Than 1,000 and Less Than or Equal to 1,500 hp (continued)											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
2000	10	9	9	9	8	8	8	7	7	7	6
2100	10	9	9	9	8	8	8	7	7	6	6
2200	10	9	9	9	8	8	8	7	7	6	6
2300	9	9	8	8	8	8	8	7	7	6	6
2400	9	9	8	8	7	7	7	7	7	6	6
2500	9	8	8	8	7	7	7	7	6	6	5
2600	8	8	8	8	7	7	7	7	6	6	5
2700	8	8	8	8	7	7	7	7	6	6	5
2800	8	8	7	7	7	7	7	6	6	6	5
2900	8	7	7	7	7	7	7	6	6	6	5
3000	7	7	7	7	7	7	6	6	6	5	5
3500	7	6	6	6	6	6	6	6	5	5	5
4000	6	6	6	6	5	5	5	5	5	4	4
4500	5	5	5	5	5	5	5	5	4	4	4
5000	5	5	5	5	5	5	4	4	4	4	4
5500	5	4	4	4	4	4	4	4	4	4	3

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Table 5E: Engines Greater Than 1,500 and Less Than or Equal to 2,000 hp

Table 5E: Engines Greater Than 1,500 and Less Than or Equal to 2,000 hp											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
50	10	9	8	8	8	7	7	7	6	5	5
100	10	9	8	8	8	7	7	7	6	5	5
150	10	9	8	8	8	7	7	7	6	5	5
200	10	9	8	8	8	7	7	7	6	5	5
300	10	9	8	8	8	7	7	7	6	5	5
400	10	9	8	8	8	7	7	7	6	5	5
500	10	9	8	8	8	7	7	7	6	5	5
600	10	9	8	8	8	7	7	7	6	5	5
700	9	8	8	8	8	7	7	7	6	5	5
800	9	8	8	8	8	7	7	7	6	5	5
900	9	8	8	8	8	7	7	7	6	5	5
1000	9	8	8	8	8	7	7	7	6	5	5
1100	9	8	8	8	8	7	7	7	6	5	5
1200	8	8	7	7	7	7	7	7	6	5	5
1300	8	8	7	7	7	7	7	6	6	5	5
1400	8	8	7	7	7	7	7	6	6	5	5
1500	8	8	7	7	7	7	7	6	5	5	5
1600	8	8	7	7	7	7	7	6	5	5	5
1700	8	8	7	7	7	7	7	6	5	5	5
1800	8	8	7	7	7	7	7	6	5	5	5
1900	7	7	7	7	7	7	6	6	5	5	5
2000	7	7	7	7	7	7	6	6	5	5	5

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Table 5E: Engines Greater Than 1,500 and Less Than or Equal to 2,000 hp (continued)											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
2100	7	7	6	6	6	6	6	6	5	5	5
2200	7	7	6	6	6	6	6	6	5	5	4
2300	7	7	6	6	6	6	6	6	5	5	4
2400	7	7	6	6	6	6	6	5	5	5	4
2500	6	6	6	6	6	6	6	5	5	4	4
2600	6	6	6	6	6	6	5	5	5	4	4
2700	6	6	6	6	6	5	5	5	5	4	4
2800	6	6	6	6	5	5	5	5	4	4	4
2900	6	6	5	5	5	5	5	5	4	4	4
3000	6	5	5	5	5	5	5	5	4	4	4
3500	5	5	5	5	5	4	4	4	4	4	3
4000	4	4	4	4	4	4	4	4	4	3	3
4500	4	4	4	4	4	4	4	3	3	3	3
5000	4	4	4	3	3	3	3	3	3	3	3
5500	3	3	3	3	3	3	3	3	3	3	3

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Table 5F: Engines Greater Than 2,000 hp

Table 5F: Engines Greater Than 2,000 hp											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
50	7	6	6	6	5	5	5	5	4	4	4
100	7	6	6	6	5	5	5	5	4	4	4
150	7	6	6	6	5	5	5	5	4	4	4
200	7	6	6	6	5	5	5	5	4	4	4
300	7	6	6	6	5	5	5	5	4	4	4
400	7	6	6	6	5	5	5	5	4	4	4
500	7	6	6	6	5	5	5	5	4	4	4
600	7	6	6	6	5	5	5	5	4	4	4
700	7	6	6	6	5	5	5	5	4	4	4
800	6	6	6	6	5	5	5	5	4	4	4
900	6	6	6	6	5	5	5	5	4	4	4
1000	6	6	6	6	5	5	5	5	4	4	4
1100	6	6	6	6	5	5	5	5	4	4	4
1200	6	6	6	6	5	5	5	5	4	4	4
1300	6	6	6	6	5	5	5	5	4	4	4
1400	6	6	6	6	5	5	5	5	4	4	4
1500	6	6	6	6	5	5	5	5	4	4	4
1600	6	6	6	6	5	5	5	5	4	4	4
1700	6	6	6	6	5	5	5	5	4	4	4
1800	6	6	6	6	5	5	5	5	4	4	4
1900	6	6	6	5	5	5	5	5	4	4	4
2000	6	6	6	5	5	5	5	5	4	4	3

Table 5F: Engines Greater Than 2,000 hp (continued)											
Generic Modeling Results											
Distance	8 ft height	10 ft height	12 ft height	14 ft height	16 ft height	18 ft height	20 ft height	25 ft height	30 ft height	35 ft height	40 ft height
(ft)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)	G_{hourly} (µg/m³)/(lb/hr)
2100	5	5	5	5	5	5	5	5	4	4	3
2200	5	5	5	5	5	5	5	4	4	4	3
2300	5	5	5	5	5	5	4	4	4	4	3
2400	5	5	5	5	5	5	4	4	4	4	3
2500	5	5	5	5	4	4	4	4	4	4	3
2600	5	5	5	5	4	4	4	4	4	3	3
2700	5	5	5	5	4	4	4	4	4	3	3
2800	5	5	5	4	4	4	4	4	4	3	3
2900	4	4	4	4	4	4	4	4	4	3	3
3000	4	4	4	4	4	4	4	4	3	3	3
3500	4	4	4	4	4	4	3	3	3	3	3
4000	3	3	3	3	3	3	3	3	3	3	3
4500	3	3	3	3	3	3	3	3	3	2	2
5000	3	3	3	3	3	3	3	2	2	2	2
5500	3	3	3	3	3	2	2	2	2	2	2

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Table 6 Engine and Turbine Emission and Operational Standards

Engine Type	Engine Size	Manufacture Date	NOx (g/bhp-hr)	CO (g/bhp-hr)	VOC (g/bhp-hr)
Rich Burn, Non-emergency, Spark-ignited	less than 100 hp	All dates	no standard	no standard	no standard
	greater than or equal to 100 hp	Before January 1, 2011	2	3	no standard
	greater than or equal to 100 hp	After January 1, 2011	1	3	1
	After January 1, 2015, regardless of manufacture date, no rich burn engine greater than or equal to 240 hp authorized by this permit shall emit NOx in excess of 0.5 g/bhp-hr. After January 1, 2018, regardless of manufacture date, no rich burn engine greater than or equal to 100 hp authorized by this permit shall emit NOx in excess of 0.5 g/bhp-hr. If an authorization or authorizations is issued for a spark ignited rich burn engine under this standard permit after the applicable date of January 1, 2015 or January 1, 2018, NOx emissions from that engine shall not exceed 0.5 g/bhp-hr, except that the standard permit holder shall have a one year grace period from the date of the initial authorization under this standard permit to comply with the limit of 0.5 g/bhp-hr for NOx. The commission reserves the right to re-evaluate the upgrade requirement if EPA promulgates any standards for existing engines.				
Lean Burn, 2SLB Non-emergency, Spark-ignited	less than 500 hp	All dates	no standard	no standard	no standard
	greater than or equal to 500 hp	Before September 23, 1982	8	3	no standard
		Before June 18, 1992 and rated less than 825 hp	8	3	no standard
		After September 23, 1982, but prior to June 18, 1992 and rated 825 hp or greater	5	3	no standard
		After June 18, 1992 but prior to July 1, 2010	2.0 except under reduced speed, 80-100% of full torque conditions may be 5.0	3	no standard
		On or after July 1, 2010	1	3	1
Lean Burn, 4SLB, Non-emergency, Spark-ignited, and Dual-fuel	less than 500 hp	Before July 1, 2008	no standard	no standard	no standard
		On or after July 1, 2008	2	3	1
	greater than or equal to 500 hp	Before September 23, 1982	5.0 except under reduced speed, 80-100% of full torque conditions may be 8.0	3	no standard
		Before June 18, 1992 and rated less than 825 hp	5.0 except under reduced speed, 80-100% of full torque conditions may be 8.0	3	no standard
		After September 23, 1982, but prior to June 18, 1992 and rated 825 hp or greater	5	3	no standard
		After June 18, 1992 but prior to July 1, 2010	2.0 except under reduced speed, 80-100% of full torque conditions, may be 5.0	3	no standard
		On or after July 1, 2010	1	3	1
	After January 1, 2020, no spark ignited 4-stroke lean burn engine authorized by this standard permit that existed on-site on January 1, 2012, shall emit NOx in excess of 2.0 g/bhp-hr. If an oil and gas standard permit authorization or authorizations are is issued for a spark ignited 4-stroke lean burn engine after January 1, 2012, NOx emissions from that engine shall not exceed 2.0 g/bhp-hr after January 1, 2015. However, if the date of the initial authorization is after January 1, 2015, the standard permit holder shall have a three year grace period from the date of the initial authorization under the oil and gas standard permit to comply with the limit of 2.0 g/bhp-hr for NOx. The commission reserves the right to re-evaluate the upgrade requirement if EPA promulgates any standards for existing engines.				
Turbines	Turbines shall not emit greater than 25 ppmvd @ 15% O2 for NOX and 50 ppmvd @ 15% O2 for CO.				

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Table 7 Sampling and Demonstrations of Compliance

Category	Description	Specifications and Expectations
Exclusions	Control Systems	Control device monitoring and records are required only where the device is necessary for the site to meet emission rate limits
Sampling General	When Applicable Ports & Platforms, Methods, Notifications and Timing	(A)If necessary, sampling ports and platforms shall be incorporated into the design of all exhaust stacks according to the specifications set forth in "Chapter 2, Stack Sampling Facilities." Engines and other facilities which are physically incapable of having platforms are excluded from this requirement. For control devices with effectiveness requirements only, appropriate sampling ports shall also be installed upstream of the inlet to control devices or controlled recovery systems with control efficiency requirements. Alternate sampling facility designs may be submitted for written approval by the Texas Commission on Environmental Quality (TCEQ) Regional Director or his designee. (B) Where stack testing is required, Sampling shall be conducted within 180 days of the change that required the registration, in accordance with the appropriate procedures of the TCEQ Sampling Procedures Manual and in accordance with the appropriate EPA Reference Methods. Unless otherwise specified, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. Where appropriate, sampling shall occur as three one-hour test runs and then averaged to demonstrate compliance with the limits of this authorization. Any deviations from those procedures must be approved in writing by the TCEQ Regional Director or his designee prior to sampling. (C) The Regional Office shall be afforded the opportunity to observe all such sampling. (D) The holder of this authorization is responsible for providing sampling and testing facilities and conducting the sampling and testing operations at his expense. (E) The TCEQ Regional Office that has jurisdiction over the site shall be contacted as soon as any testing is scheduled, but not less than 30 days prior to sampling. The region shall have discretion to amend the 30 day prior notification. Except for engine testing and liquid/gas analysis sampling, all other sampling shall include an opportunity for the appropriate regional office to schedule a pretest meeting. The notice shall include: (i) Date for pretest meeting, if required; (ii)Date sampling will occur; (iii) Name of firm conducting sampling; (iv)Type of sampling equipment to be used; (v) Method or procedure to be used in sampling; (vi)Procedure used to determine operating rates or other relevant parameters during the sampling period; (vii) parameters to be documented during the sampling event; (viii) any proposed deviations to the prescribed sampling methods. If held, the purpose of the pretest meeting is to review the necessary sampling and testing procedures, to provide the proper data forms for recording pertinent data, and to review the format procedures for submitting the test reports. (F) Within 60 days after the completion of the testing and sampling required herein, one original and one copy of the sampling reports shall be sent to the Regional Office. (G) When sampling is required, all Quality Assurance/Quality Control shall follow 30 TAC Ch 25 National Environmental Laboratory Accreditation Conference accreditation requirements.
Fugitive monitoring and LDAR	Analyzers	An approved gas analyzer or other approved detection monitoring device used for the volatile organic compound fugitive inspection and repair requirement is a device that conforms to the requirements listed in Title 40 CFR §60.485(a) and (b), or is otherwise approved by the Environmental Protection Agency as a device to monitor for VOC fugitive emission leaks. Approved gas analyzers shall conform to requirements listed in Method 21 of 40 CFR Part 60, Appendix A. The gas analyzer shall be calibrated with methane. In addition, the response factor of the instrument for a specific VOC of interest shall be determined and meet the requirements of Standard permit 8 of Method 21. If a mixture of VOCs is being monitored, the response factor shall be calculated for the average composition of the process fluid. If a response factor less than 10 cannot be achieved using methane, then the instrument may be calibrated with one of the VOC to be measured or any other VOC so long as the instrument has a response factor of less than 10 for each of the VOC to be measured. In lieu of using a hydrocarbon gas analyzer and EPA Method 21, the owner or operator may use the Alternative Work Practice in 40 CFR Part 60, §60.18(g) - (i). The optical gas imaging instrument must meet all requirements specified in 40 CFR §60.18(g) - (i), except the annual Test Method 21 requirement in 40 CFR §60.18(h)(7) and the reporting requirement in 40 CFR §60.18(i)(5) do not apply.

Table 7 Sampling and Demonstrations of Compliance (continued)

Category	Description	Specifications and Expectations
Verify composition of materials	All site-specific gas or liquid analyses	Reports necessary to verify composition (including hydrogen sulfide (H_2S) at any point in the process. All analyses shall be site specific or a representative sample may be used to estimate emissions if all of the parameters in the gas and liquid analysis protocol provided by the commission are met. A site-specific or define representative analysis shall be performed within 90 days of initial start of operation or implementation of a change which requires registration. When new streams are added to the site and the character or composition of the streams change and cause an increase in authorized emissions, or upon request of the appropriate Regional office or local air pollution control program with jurisdiction, a new analysis will need to be performed. Analysis techniques may include, but are not limited to, Gas Chromatography (GC), Tutweiler, stain tube analysis, and sales oil/condensate reports. These records will document the following: (A) H_2S content; (B) flow rate; (C) heat content; or (D) other characteristic including, but not limited to: (i) American Petroleum Institute gravity and Reid vapor pressure (RVP);(ii) sales oil throughput; or (iii) condensate throughput. Laboratory extended VOC GC analysis at a minimum to C10+ and H_2S analysis for gas and liquids for the following shall be performed and used for emission compliance demonstrations:(A) Separator at the inlet; (B) Dehydration Unit / Glycol Contactor prior to dehydrator;(C) Amine Unit prior to sweetening unit; (D) Separator dumping to gunbarrel or storage tank; (E) Tanks for liquids and vapors; or (F) P
Engines & Turbines	Initial Sampling of (i)Any engine greater than 500 horsepower; (ii) Any turbine	Perform stack sampling and other testing as required to establish the actual quantities of air contaminants being emitted into the atmosphere (including but not limited to nitrogen oxide (NO_X), carbon monoxide (CO), and oxygen (O2). Each combustion facility shall be tested at a minimum of 50% of the design maximum firing rate of the facility. Each tested firing rate shall be identified in the sampling report. Sampling shall occur within 180 days after initial start-up of each unit. Additional sampling shall occur as requested by the TCEQ Regional Director. If there are multiple engines at an oil and gas sites (OGS) of identical model, year, and control system, sampling may be performed on 50% of the units and used for compliance demonstration of all identical units at the OGS. The remaining 50% of the units not initially tested must be tested during the next biennial testing period. This sampling is not required upon initial installation at any location if the engine or turbine was previously installed and tested at any location in the United States and the test conformed with EPA Reference Methods. Regardless of engine location, records of performance testing, or relied upon sampling reports, must remain with each specific engine for a minimum of five years unless records are unavailable and the permit holder performs the initial sampling on-site. No one may claim records are unavailable for the time period in which an engine is at the site which is authorized by this standard permit. This testing is not required for emergency engines unless requested by the TCEQ Regional Director. Idle engines do not need to be re-started only for the purpose of completing required testing. If biennial testing is required for an engine that is re-started for production purposes, the biennial testing is required within 30 days after re-starting the engine.

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Table 7 Sampling and Demonstrations of Compliance (continued)

Category	Description	Specifications and Expectations
Engines	Periodic Evaluation	The following is applicable to sites with federal operating permits only: (A) For any engine with a NOx standard under Table 6, conduct evaluations of each engine performance quarterly after initial compliance testing by measuring the NO_x and CO content of the exhaust. Tests shall occur more than 30 days apart. Individual engines shall be subject to the quarterly performance evaluation if they were in operation for 1000 hours or more during the quarter period. If an engine is not operating, the permit holder may delay the test until such time as the engine is expected to run for more than fourteen days. Idled engines do not need to be re-started only for the purpose of completing required testing. (B) The use of portable analyzers specifically designed for measuring the concentration of each contaminant in parts per million by volume is acceptable for these evaluations. The portable analyzer shall be operated at minimum in accordance with the manufacturer's instructions. The operator may modify the procedure if it does not negatively alter the accuracy of the analyzer. Also, colorimetric testing (stain tubes) maybe used in these periodic evaluations. The NO_x and CO emissions then shall be converted into units of grams per horsepower-hour and pounds per hour. (C) Emissions shall be measured and recorded in the as-found operating condition, except no compliance determination shall be established during start-up, shutdown, or under breakdown conditions. (D) In lieu of the above mentioned periodic monitoring for engines and biennial testing, the holder of this permit may install, calibrate, maintain, and operate a continuous emission monitoring system (CEMS) to measure and record the concentrations of NO_x and CO from any engine, turbine, or other external combustion facility. Diluents to be measured include O_2 or CO_2. Except for system breakdowns, repairs, calibration checks, zero and span adjustments, and other quality assurance tests, the Continuous Emission Monitoring Systems (CEMS) shall be in continuous operation and shall record a minimum of four, and normally 60, approximately equally spaced data points for each full hour. The NO_x and diluents CEMS shall be operated according to the methods and procedures as set out in 40 CFR Part 60, Appendix B, Performance Specifications 2 and 3. The CO CEMS shall be operated according to the methods and procedures as set out in 40 CFR Part 60, Appendix B, Performance Specifications 4, 4A, or 4B. CEMS shall follow the quality assurance requirements of Appendix F except that Cylinder Gas Audits may be conducted in all four calendar quarters in lieu of the annual Relative Accuracy Test Audit. A CEMS with downtime due to breakdown or repair of more than 10% of the facility operating time for any calendar shall be considered as a defective CEMS and the CEMS shall be replaced within 2 weeks.
Engines & Turbines	Biennial Testing Any engine greater than 500 horsepower or any turbine	Every two years starting from the completion date of the Initial Compliance Testing, any engine greater than 500 horsepower or any turbine shall be retested according to the procedures of the Initial Compliance Testing. Retesting shall occur within 90 days of the two year anniversary date. If a facility has been operated for less than 2000 hours during the two year period, it may skip the retesting requirement for that period. After biennial testing, any engine retested under the above requirements shall resume periodic evaluations within the next 6 calendar months (January to June or July to December). If biennial testing is required for an engine that is re-started for production purposes, the biennial testing shall be performed within 45 days after re-starting the engine.

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Table 7 Sampling and Demonstrations of Compliance (continued)

Category	Description	Specifications and Expectations
Oxidation or Combustion Control Device	Initial Sampling and Monitoring for performance for VOC, Benzene, and H_2S	Stack testing, when a company wants to establish efficiencies of 99% or greater, must be coordinated and approved. Sampling is required for VOC, benzene and H_2S at Region's discretion. The thermal oxidizer (TO) must have proper monitoring and sampling ports installed in the vent stream and the exit to the combustion chamber, to monitor and test the unit simultaneously. The temperature and oxygen measurement devices shall reduce the temperature and oxygen concentration readings to an averaging period of 6 minutes or less and record it at that frequency. The temperature measurement device shall be installed, calibrated, and maintained according to accepted practice and the manufacturer's specifications. The device shall have an accuracy of the greater of ±0.75% of the temperature being measured expressed in degrees Celsius or ±2.5°C. The oxygen or carbon monoxide analyzer shall be zeroed and spanned daily and corrective action taken when the 24-hour span drift exceeds two times the amounts specified Performance Specification No. 3 or 4A, 40 CFR Part 60, Appendix B. Zero and span is not required on weekends and plant holidays if instrument technicians are not normally scheduled on those days. The oxygen or carbon monoxide analyzer shall be quality-assured at least semiannually using cylinder gas audits (CGAs) in accordance with 40 CFR Part 60, Appendix F, Procedure 1, §5.1.2, with the following exception: a relative accuracy test audit is not required once every four quarters (i.e., two successive semiannual CGAs may be conducted). An equivalent quality-assurance method approved by the TCEQ may also be used. Successive semiannual audits shall occur no closer than four months. Necessary corrective action shall be taken for all CGA exceedances of ±15 percent accuracy and any continuous emissions monitoring system downtime in excess of 5% of the incinerator operating time. These occurrences and corrective actions shall be reported to the appropriate TCEQ Regional Director on a quarterly basis. Supplemental stack concentration measurements may be required at the discretion of the appropriate TCEQ Regional Director. Quality assured or valid data of oxygen or carbon monoxide analyzer must be generated when the TO is operating except during the performance of a daily zero and span check. Loss of valid data due to periods of monitor break down, inaccurate data, repair, maintenance, or calibration may be exempted provided it does not exceed 5% of the time (in minutes) that the oxidizer operated over the previous rolling 12 month period. The measurements missed shall be estimated using engineering judgment and the methods used recorded.

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Table 8 Monitoring and Records Demonstrations

Category	Description	Record Information
Site Production or Collection	natural gas, oil, condensate, and water production records	Site inlet and outlet gas volume and sulfur concentration, daily gas/liquid production and load-out from tanks
Equipment and facility summary	Current process description	Accurate and detailed plot plan with property line, off-site receptors, and all equipment on-site or drawings with sufficient detail to confirm all authorized facilities to confirm emission estimates, impact review, and registration scope
Equipment specifications	Process units, tanks, vapor recovery systems; flares; thermal oxidizers; and reboiler control devices	A copy of the registration and emission calculations including the fixed equipment sizes or capacities and manufacturer's specifications and programs to maintain performance, with the plan and records for routine inspection, cleaning, repair and replacement.
	Leaks in piping, fugitive components and process vessels	If a leak has been found and determined that there would be less emissions from the repair by delaying repair until the next shutdown, then a record of the calculation showing that the emissions would be less shall be kept.
Physical Inspection	Fugitive Component Check	A record of the component count shall be maintained. A record of the date each quarterly inspection was made and the date components found leaking were repaired or the date of the planned shutdown.

Table 8 Monitoring and Records Demonstrations (continued)

Category	Description	Record Information
Voluntary LDAR Program	Details of fugitive component monitoring plan, and LDAR results, including QA, QC	The following records are required where a company uses an LDAR program to reduce the potential fugitive emissions from the site to meet emission limitations or certify fugitive emissions. (A) A monitoring program plan must be maintained that contains, at a minimum, the following information: (i) an accounting of all the fugitive components by type and service at the site with the total uncontrolled fugitive potential to emit estimate; (ii) identification of the components at the site that are required to be monitored with an instrument or are exempt with the justification, note the following can be used for this purpose: (a) piping and instrumentation diagram (PID); or (b) a written or electronic database.; (iii) the monitoring schedule for each component at the site with difficult-to-monitor and unsafe-to-monitor valves, as defined by Title 30 Texas Administrative Code Chapter 115 (30 TAC Chapter 115), identified and justified, note if an unsafe-to-monitor component is not considered safe to monitor within a calendar year, then it shall be monitored as soon as possible during safe-to-monitor times and a record of the plan to monitor shall be maintained; and (iv) the monitoring method that will be used (audio, visual, or olfactory (AVO) means; Method 21; the Alternative Work Practice in 40 CFR §60.18(g) - (i)); (v) for components where instrument monitoring is used, information clarifying the adequacy of the instrument response; (vi) the plan for hydraulic or pressure testing or instrument monitoring new and reworked components. (B) Records must be maintained of all monitoring instrument calibrations. (C) Records must be maintained for all monitoring and inspection data collected for each component required to be monitored with a Method 21 portable analyzer that include the type of component and the monitoring results in ppmv regardless if the screening value is above or below the leak definition.. (D) Leaking components must be tagged and a leaking-components monitoring log must be maintained for all leaks greater than the applicable leak definition (i.e.10,000 ppmv, 2000 ppmv, or 500 ppmv) of VOC detected using Method 21, all leaks detected by AVO inspection, and all leaks found using Alternative Work Practice specified in 40 CFR §60.18(g)-(i). The log must contain, at a minimum, the following: (i) the method used to monitor the leaking component (audio, visual, or olfactory inspection; Method 21; or the Alternative Work Practice in 40 CFR §60.18(g) - (i)); (ii) the name of the process unit or other appropriate identifier where the component is located; (iii) the type (e.g., valve or seal) and tag identification of component; (iv) the results of the monitoring (in ppmv if a Method 21 portable analyzer was used); (v) the date the leaking component was discovered;(vi) the date that a first attempt at repair was made to a leaking component; (vii) the date that a leaking component is repaired; (viii) the date and instrument reading of the recheck procedure after a leaking component is repaired; and (ix) the leaks that cannot be repaired until turnaround and the date that the leaking component is placed on the shutdown list. (E) If the owner or operator is using the Alternative Work Practice specified in 40 CFR §60.18(g) - (i), the records required by 40 CFR §60.18(i)(4). (F) A record of the monitored value any open-ended line or valve for which is a repair or replacement is not completed within 72 hours and monitoring in lieu of covering is chosen. (G) Any open-ended line or valve caused by a repair or replacement not completed within 72 hours shall be monitored as specified in table 10 and the checks and any corrective actions taken shall be recorded. (H) Weekly audio, visual and olfactory inspections shall be noted in a log (I) A check of the reading for any pressure-sensing device to verify rupture disc integrity shall be performed weekly and noted in a log.
Minor Changes	Additions, changes or replacement	Records showing all replacements and additions, including summary of emission type and quantities, for a rolling 6-month period of time.
Equipment Replacement	Like-Kind replacement	Records on equipment specifications and operations, including summary of emissions type and quantity.

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Table 8 Monitoring and Records Demonstrations (continued)

Category	Description	Record Information
Process Units	Glycol Dehydration Units	For emission estimates, the worst-case combination of parameters resulting in the greatest emission rates must be used. If worst-case parameters are not used, then glycol dehydrator unit monitoring records include dry gas flow rate, absorber pressure and temperature, glycol type, and circulation rate recorded weekly. If worst-case parameters are not used, then in addition to weekly unit monitoring, where control of flash tank or reboiler emissions are required to meet the emission limitations of the section and emissions are certified, the following control monitoring requirements apply weekly: flash tank temperature and pressure, any reboiler stripping gas flow rate, and condenser outlet temperature. VRU, flare, or thermal oxidizer control or reboiler fire box used for control must comply with the monitoring and recordkeeping for those devices. Where all emissions from the flash tank and the reboiler or reboiler condenser vent are directed to a VRU, flare, or thermal oxidizer designed to be on-line at all times the glycol dehydrator is in operation, the control system monitoring for the glycol dehydrator is not required.
	Amine Units	Amine units may simply retain site production or inlet gas records if all sulfur compounds in the inlet are assumed to be emitted. Where only partial removal of the inlet sulfur is assumed, for emission estimates, the worst-case combination of parameters resulting in the greatest emission rates must be used. If worst-case parameters are not used, then records of the amine solution, contactor pressure, temperature and pump rate shall be maintained. Where the waste gas is vented to combustion control, the requirements of the control device utilized should be noted.
Boilers, Reboilers, Heater-Treaters, and and Process Heaters	Combustion	Records of Operational Monitoring and Testing Records Records of the hours of operation of every combustion device of any size by the use of a process monitor such as a run time meter, fuel flow meter, or other process variable that indicates a unit is running unless, in the registration for the facility, the emissions from the facility were calculated using full year operation at maximum design capacity in which case no hours of operation records must be kept.
Internal Combustion Engines	Combustion	Records of Appropriate Operational Monitoring and Testing Records Records of the hours of operation of every combustion device and engine of any size by the use of a process monitor such as a run time meter, fuel flow meter, or other process variable that indicates a unit is running. The owner or operator may test and retest at the most frequent intervals identified in Table 7 in lieu of installing a process monitor and recording the hours of operation. If an engine has no testing requirements in Table 7, no records of the hours of operation must be kept. See fuel records below
Gas Fired Turbines	Combustion	Records of Appropriate Operational Monitoring and Testing Records Records of the hours of operation of every turbine greater than 500 hp by the use of a process monitor such as a run time meter, fuel flow meter, or other process variable that indicates a unit is running unless the permit holder determined emissions from the facility assuming full year operation at maximum design capacity in which case no hours of operation records must be kept.
Fuel Records	VOC and Sulfur Content	A fuel flow meter is not required if emissions are based on maximum fuel usage for 8,760 hr/yr. There are no specific requirements for allowable VOC content of fuel. If field gas contains more than 1.5 grains (24 ppmv) of H2S or 30 grains total sulfur compounds per 100 dry standard cubic feet, the operator shall maintain records, including at least quarterly measurements of fuel H2S and total sulfur content, which demonstrate that the annual SO2 emissions do not exceed limitations
Tanks/Vessels	Color/Exterior	Records demonstrating design, inspection, and maintenance of paint color and vessel integrity.
Tanks/Vessels	Emission and emission potential	Maintain a record of the material stored in each tank/vessel that vents to the atmosphere and the maximum vapor pressure used to establish the maximum potential short-term emission rate. Where pressurized liquids can flash in the tank/vessel monitor and record weekly the maximum fluid pressure that can enter the tank / vessel. Records that tank / vessel hatches and relief valves are properly sealed when tank /vessel is directed to control and after loading events (as needed).

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Table 8 Monitoring and Records Demonstrations (continued)

Category	Description	Record Information
Truck Loading	All Types	Records indicating type of material loaded, amount transferred, method of transfer, condition of tank truck before loading.
	Vacuum Trucks	Note loading with an air mover or vacuum. No additional record is needed where a vacuum truck uses only an on-board or portable pump to push material into the truck.
	Controlled Loading	Where control is required note the control that is utilized.
Control Devices	Vapor Capture and Recovery	Records of hours of use are required for all units and on-line time must be considered when emission estimates and actual emissions inventories are calculated. mVRU Basic Design Function Record: Record demonstrating the unit captures vapor and includes a sensing device set to capture this vapor at peak intervals. Additional Design Parameter Record: Record demonstrating additional design parameters are utilized such as additional sensing equipment, a properly designed bypass system, an appropriate gas blanket, an adequate compressor selection, and the ability to vary the drive speed for units utilizing electric driven compressors mVRUs that are used at oil and gas sites to control emissions may claim up to 100% control efficiency provided records of basic and additional design functions and parameters of a VRU along with appropriate records listed in Table 8 are satisfied. mVRUs may claim up to 99% control efficiency for units where records of basic and additional design functions are satisfied and parameters listed in Table 8 are not satisfied. mVRUs may claim up to 95% control efficiency for units where records listed in Table 8 are not satisfied. IVRU The record of proper design must be kept to demonstrate how the unit was designed and for what capacity. The record of liquid replacement must be kept, along with the calculations for demonstrating that the VOC to liquid ratio has been maintained. Additionally, the system must be tested to demonstrate the efficiency. This testing needs to be performed and results recorded to receive 95% control efficiency no longer than: vacuum truck emissions: after 20 loads have been pulled through the IVRU, for tanks: Produced Water – Monthly, Crude – Bi-Monthly, Condensate – Weekly. This testing needs to be performed and results recorded to receive 98% control efficiency no longer than: vacuum truck emissions: after 15 loads have been pulled through the IVRU, for tanks: Produced Water – 3 weeks, Crude – 10 days, Condensate – 5 days. All valves must be designed and maintained to prevent leaks. All hatches and openings must be properly gasketed and sealed with the unit properly connected. Downtime is limited to a rolling 12 month average of 5% or 432 hr/per rolling 12 months and waste vents shall be redirected to an appropriate control device if possible during down time unless otherwise registered for alternate operating hours.

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Table 8 Monitoring and Records Demonstrations (continued)

Category	Description	Record Information
Cooling Tower	Design data	Records shall be kept of maximum cooling water circulation rate and basis, maximum total dissolved solids allowed as maintained through blowdown, and towers design drift rate. These records are only required if the cooling system is used to cool process VOC streams or control from drift eliminators or minimizing solids content is needed to meet particulate matter emission limits.
	VOC Leak Monitoring, Maintenance and Repair	Cooling tower heat exchanger systems cooling process VOC streams are assumed to have potential uncontrolled leaks repaired when obviated by process problems. If controlled emissions (systems monitored for leaks) are required to meet emission rate limits then the cooling tower water shall be monitored monthly for VOC leakage from heat exchangers in accordance with the requirements of the TCEQ Sampling Procedures Manual, Appendix P (dated January 2003 or a later edition) or another air stripping method approved by the TCEQ Executive Director. Cooling water VOC concentrations above 0.08 parts per million by volume (ppmv) indicate faulty equipment. Equipment shall be maintained so as to minimize VOC emissions into the cooling water. Faulty equipment shall be repaired at the earliest opportunity but no later than the next scheduled shutdown of the process unit in which the leak occurs. Records must be maintained of all monitoring data and equipment repairs.
	Particulate Monitoring, Maintenance and Repair.	Inspect and record integrity of drift eliminators annually, repairing as necessary. If a maximum solids content must be maintained through blowdowns to meet particulate emission rate limits, cooling water shall be sampled for total dissolved solids (TDS) once a month at prior to any periodic blow downs and maintain records of the monitoring results and all corrective actions.
Planned Maintenance, Start-up, and Shutdown (MSS)	Alternate Operational Scenarios and Redirection of Vent Streams	Records of redirection of vent streams during primary operational unit or control downtime, including associated alternate controls, releases and compliance with emission limitations.
Planned MSS	Pigging, Purging and Blowdowns	Pigging records, including catcher design, date, emission estimate to atmosphere and to control, and when controlled, the control device. Note where a control device is necessary to meet emission limitations the device is subject to the requirements of standard permit (c) and record requirements of this table. Purging and blowdown records, including the volume and pressure and a description of the piping and equipment involved, the date, emission estimate to atmosphere and to control, and when controlled, the control device. Where purging to control to meet a lower concentration before purging to atmosphere is conducted the concentrations of VOC, BTEX or H2S as appropriate must be measured and recorded prior to purging to atmosphere. Note where a control device is necessary to meet emission limitations the device is subject to the requirements of standard permit (c) and record requirements of this table.
Planned MSS	Temporary Facilities for Bypass, and Degassing and Purging	Temporary facility records, including a description and estimate of potential fugitive emissions from temporary piping, size and design of facilities (eg. tanks or pan volume, fill method, and throughput; engine horse power, fuel and usage time, flare tip area, ignition method, and heating value assurance method; etc.) and the date and emission estimate to atmosphere and to control for their use
Planned MSS	Management of Sludge from Pits, Ponds, Sumps and Water Conveyances	Records including the source identification, removal plan, emission estimate direct to atmosphere and through control. Note where a control device is necessary to meet emission limitations the device is subject to the requirements of standard permit (c) and record requirements of this table.
Planned MSS	Degassing or Purging of Tanks, Vessels, or Other Facilities	Records including: a) the EPN and description of vessels and equipment degassed or purged; b) the material, volume and pressure (if applicable); c) the volume of purge gas used; d) a description of the piping and equipment involved; e) clarifying estimates for a coated surface or heel; f) the date; g) emission estimate to atmosphere and to control; h) when controlled, the control device; and i) where purging to a control device to reduce concentrations before purging to atmosphere, the concentrations of VOC, BTEX or H_2S as appropriate must be measured and recorded prior to purging to atmosphere.

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Table 8 Monitoring and Records Demonstrations (continued)

Category	Description	Record Information
Planned MSS	Records	Records or copies of work orders, contracts, or billing by contractors for the following activities shall be kept at the site, or nearest manned site, and made available upon request: • Routine engine component maintenance including filter changes, oxygen sensor replacements, compression checks, overhauls, lubricant changes, spark plug changes, and emission control system maintenance; • Boiler refractory replacements and cleanings; • Heater and heat exchanger cleanings; • Turbine hot standard permit swaps; • Pressure relief valve testing, calibration of analytical equipment; instrumentation/analyzer maintenance; replacement of analyzer filters and screens.
Control Devices	Flare Monitoring	Basic monitoring requires the flare and pilot flame to be continuously monitored by a thermocouple or an infrared monitor. Where an automatic ignition system is employed, the system shall ensure ignition when waste gas is present. The time, date, and duration of any loss of flare, pilot flame, or auto-ignition shall be recorded. Each monitoring device shall be accurate to, and shall be calibrated at a frequency in accordance with, the manufacturer's specifications. A temporary, portable or backup flare used less than 480 hours per year is not required to be monitored. Records of hours of use are required for all units and on-line time must be considered when emission estimates and actual emissions inventories are calculated.
Control Devices	Thermal Oxidation and Vapor Combustion Performance Monitoring Basic	Control device monitoring and records are required only where the device is necessary for the site to meet emission rate limits. Basic monitoring is a thermocouple or infrared monitor that indicates the device is working. Records of hours of use are required for all units and on-line time must be considered when emission estimates and actual emissions inventories are calculated.
	Intermediate	Intermediate monitoring and records include continuously monitoring and recording temperature to insure the control device is working when waste gas can be directed to the device and showing compliance with the 1400 degrees Fahrenheit if applicable.
	Enhanced	Enhanced monitoring requires continuous temperature and oxygen or carbon monoxide monitoring on the exhaust with six minute averages recorded to show compliance with the temperature requirement and the design oxygen range or a CO limit of 100 ppmv. Some indication of waste gas flow to the control device, like a differential pressure, flow monitoring or valve position indicator, must also be continuously recorded, if the flow to the control device can be intermittent.
	Alternate Monitoring	Records of stack testing and the monitored parameters during the testing shall be maintained to allow alternate monitoring parameters and limits.

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Table 8 Monitoring and Records Demonstrations (continued)

Category	Description	Record Information
Control Devices	Control with process combustion or heating devices (e.g. reboilers, heaters & furnaces)	Basic monitoring is any continuous monitor that indicates when the flame in the device is on or off (other than partial operational use). The following are effective basic options: a fire box temperature monitor, rising or steady process temperature monitor, CO monitor, primary fuel flow monitor, fire box pressure monitor or equivalent. Enhanced monitoring for 91 to 99% control, where waste gas is not introduced as the primary fuel, must include the following monitors: continuous fire box or fire box exhaust temperature, and CO and O_2 monitoring, with at least 6 minute averages recorded. Additionally, enhanced monitoring where the waste gas may be flowing when the control device is not firing must show continuous disposition of the waste gas streams, including continuous monitoring of flow or valve position through any potential by-pass to the control where more than 50% run time of control is claimed.. Basic monitoring is any continuous monitor that indicates when the flame in the device is on or off (other than partial operational use). The following are effective basic options: a fire box temperature monitor, rising or steady process temperature monitor, CO monitor, primary fuel flow monitor, fire box pressure monitor or equivalent. Enhanced monitoring for 91 to 99% control, where waste gas is not the primary fuel, must include the following monitors: continuous fire box or fire box exhaust temperature monitoring; and CO and O_2 monitoring, with at least 6 minute averages recorded. Additionally, enhanced monitoring where the waste gas may be flowing when the control device is not firing must show continuous disposition of the waste gas streams. This includes continuous monitoring of flow or valve position through any potential by-pass to the control where more than 50% run time of the control is claimed.

Table 9 Fugitive Component LDAR BACT Table

FUGITIVE COMPONENT LEAK DETECTION AND REPAIR (LDAR) BEST AVAILABLE CONTROL TECHNOLOGY REQUIREMENTS TABLE	
Exceptions *All fugitive components must meet the minimum design, monitoring, control and other emissions techniques listed in this Table unless the component's service meets one of the following exceptions:*	**Additional Details** *Compliance with these requirements does not assure compliance with requirements of NSPS, NESHAPS or MACT, and does not constitute approval of alternate standards for these regulations.*
Total uncontrolled potential to emit from all components ≤ 10 tpy	
Nitrogen lines	No expectation to estimate emissions. Note this exemption does not include lines with nitrogen that has been used as a sweep gas.
Steam lines (non contact)	No expectation to estimate emissions.
Flexible plastic tubing ≤ 0.5 inches in diameter, unless it is subject to monitoring by other state or federal regulations.	No expectation to estimate emissions, unless it is subject to monitoring by other state or federal regulations.
The operating pressure is at least 5 kilopascals (0.725 psi) below ambient pressure	No expectation to estimate emissions.
Mixtures in streams where the VOC has an aggregate partial pressure of less than 0.002 psia at 68°F.	No expectation to estimate emissions.
Components containing only noble gases, inserts such as CO_2 and water or air contaminants not typically listed on a MAERT such as methane, ethane, and Freon.	No expectation to estimate emissions.
Instrument monitoring is not required for pipeline quality sweet natural gas	Uncontrolled Emissions should be estimated. Must meet pipeline quality specifications
Instrument monitoring is not required when the aggregate partial pressure or vapor pressure is less than 0.044 psia at 68 °F or at maximum process operating temperature.	Uncontrolled Emissions should be estimated. This applies at all times, unless a control efficiency is being claimed for instrument monitoring, in which case there must be a record supporting that the instrument could detect a leak.
Instrument monitoring is not required for waste water lines containing less than 1% VOC by weight and operated at ≤ 1 psig	Uncontrolled Emissions should be estimated.
Instrument monitoring is not required for cooling water line components	Emissions are estimated and associated with the cooling tower
Instrument monitoring is not required for CO_2 lines after VOC is removed. This is referred to as Dry Gas lines in 40 CFR Part 60 Subpart KKK, and defined as a stream having a VOC weight percentage less than 4 %; a weighted average Effects Screening Level (ESL) of the combined VOC stream is > 3,500 $\mu g/m^3$; and total uncontrolled emissions for all such sources is < 1 ton per year at any OGS.	Uncontrolled Emissions should be estimated. The weighted average ESL_x for process stream, X, with multiple VOC species will be determined by: $ESL_x = fa/ESL_a + f_b/ESL_b + f_c/ESL_c + ... + fn/ESL_n$ Where: n =total number of VOC species in process stream; ESL_n = the effects screening level in $\mu g/m^3$ for the contaminant being evaluated (published in the most recent edition of the TCEQ ESL list); f_n=the weight fraction of the appropriate VOC species in relation to all other VOC in process stream.
At OGS sites where the total uncontrolled potential to emit from all components < 25 tpy, instrument monitoring is not required on components where the aggregate partial pressure or vapor pressure is less than 0.5 psia at 100 F or at maximum process operating temperature, unless the components are subject to monitoring by other state or federal regulations.	Uncontrolled Emissions should be estimated.
Minimum Design, Monitoring, Technique or Control for all fugitive components with uncontrolled potential to emit of ≥ 10 tpy VOC or ≥ 1 tpy H2S	

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Table 9 Fugitive Component LDAR BACT Table (continued)

FUGITIVE COMPONENT LEAK DETECTION AND REPAIR (LDAR) BEST AVAILABLE CONTROL TECHNOLOGY REQUIREMENTS TABLE	
Requirements	**Additional Details**
Construction of new and reworked piping, valves, pump systems, and compressor systems shall conform to applicable American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), or equivalent codes.	To the extent that good engineering practice will permit, new and reworked valves and piping connections shall be so located to be reasonably accessible for leak-checking during plant operation.
New and reworked underground process pipelines shall contain no buried valves such that fugitive emission monitoring is rendered impractical. New and reworked piping connections shall be welded or flanged. Screwed connections are permissible only on piping smaller than two-inch diameter. Gas or hydraulic testing of the new and reworked piping connections at no less than operating pressure shall be performed prior to returning the components to service or they shall be monitored for leaks using an approved gas analyzer within 15 days of the components being returned to service. Where technically feasible new and reworked components may be screened for leaks with a soap bubble test within 8 hours of being returned to service in lieu of instrument testing. Adjustments shall be made as necessary to obtain leak-free performance.	
Each open-ended valve or line shall be equipped with an appropriately sized cap, blind flange, plug, or a second valve to seal the line so that no leakage occurs. Except during sampling, both valves shall be closed.	If the removal of a component for repair or replacement results in an open ended line or valve, it is exempt from the requirement to install a cap, blind flange, plug, or second valve for 72 hours. If the repair or replacement is not completed within 72 hours, the permit holder must complete either of the following actions within that time period: the line or valve must have a cap, blind flange, plug, or second valve installed; or the open-ended valve or line shall be monitored once for leaks above background for a plant or unit turnaround lasting up to 45 days with an approved gas analyzer and the results recorded. For all other situations, the open-ended valve or line shall be monitored once at the end of the 72 hour period following the creation of the open ended line and monthly thereafter with an approved gas analyzer and the results recorded. For turnarounds and all other situations, leaks are indicated by readings 20 ppmv above background and must be repaired within 24 hours or a cap, blind flange, plug, or second valve must be installed on the line or valve.
Components shall be inspected by visual, audible, and/or olfactory means at least weekly by operating personnel walk-through.	
Accessible valves shall be monitored by leak-checking for fugitive emissions quarterly using an approved gas analyzer. Sealless/leakless valves (including, but not limited to, welded bonnet bellows and diaphragm valves) and relief valves equipped with a rupture disc upstream or venting to a control device are not required to be monitored. If an unsafe-to-monitor valve is not considered safe to monitor within a calendar year, then it shall be monitored as soon as possible during safe-to-monitor times. A difficult-to-monitor component for which quarterly monitoring is specified may instead be monitored annually.	Sealless/leakless valves and relief valves equipped with rupture disc or venting to a control device and exempted from instrument monitoring are not counted in the fugitive emissions estimates. See Table 7 Sampling and Demonstrations of Compliance for Fugitive and LDAR Analyzer requirements. See Table 8, Monitoring and Records Demonstrations to identify Difficult-to-monitor and unsafe-to-monitor valves.
For valves equipped with rupture discs, a pressure-sensing device shall be installed between the relief valve and rupture disc to monitor disc integrity.	All leaking discs shall be replaced at the earliest opportunity but no later than the next process shutdown.

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Table 9 Fugitive Component LDAR BACT Table (continued)

FUGITIVE COMPONENT LEAK DETECTION AND REPAIR (LDAR) BEST AVAILABLE CONTROL TECHNOLOGY REQUIREMENTS TABLE	
Requirements	**Additional Details**
All pump, compressor and agitator seals shall be monitored quarterly with an approved gas analyzer or be equipped with a shaft sealing system that prevents or detects emissions of VOC from the seal. Seal systems designed and operated to prevent emissions or seals equipped with an automatic seal failure detection and alarm system need not be instrument monitored. Seal systems that prevent emissions may include (but are not limited to) dual pump seals with barrier fluid at higher pressure than process pressure or seals degassing to vent control systems kept in good working order. Submerged pumps or sealless pumps (including, but not limited to, diaphragm, canned, or magnetic-driven pumps) may be used to satisfy the requirements of this condition and need not be monitored.	Pumps compressor and agitator seals that prevent leaks or direct emissions from the seals to control and are exempt from instrument monitoring are not counted in the fugitive emissions estimates. Equipment equipped with alarms would still be counted. See Table 7 Sampling and Demonstrations of Compliance for Fugitive and LDAR Analyzer requirements.
For a site where the total uncontrolled potential to emit from all components is < **25 tpy**; Components found to be emitting VOC in excess of 10,000 parts per million by volume (ppmv) using EPA Method 21, found by visual inspection to be leaking (e.g. whistling, dripping or blowing process fluids or emitting hydrocarbon or H_2S odors) or found leaking using the Alternative Work Practice in 40 CFR §60.18(g) - (i) shall be considered to be leaking and shall be repaired, replaced, or tagged as specified. A first attempt to repair the leak must be made within 5 days. A leaking component shall be repaired as soon as practicable, but no later than 15 days after the leak is found. If the repair of a component would require a unit shutdown, the repair may be delayed until the next scheduled shutdown. All leaking components which cannot be repaired until a scheduled shutdown shall be identified for such repair by tagging.	Components subject to routine instrument monitoring with an approved gas analyzer under this leak definition my claim a 75% emission reduction credit when evaluating controlled fugitive emission estimates. This reduction credit does not apply when evaluating uncontrolled emission or to any component not measured with an instrument quarterly, but is allowed for all components monitored by the Alternative Work Practice. See Table 7 Sampling and Demonstrations of Compliance for Fugitive and LDAR Analyzer requirements
Components **not** subject to a instrument monitoring program but found to be emitting VOC in excess of 10,000 ppmv using EPA Method 21, found by audio, visual or olfactory inspection to be leaking (e.g. whistling, dripping or blowing process fluids or emitting hydrocarbon or H_2S odors) shall be considered to be leaking and shall be repaired, replaced, or tagged as specified. All components are subject to monitoring when using the Alternative Work Practice in 40 CFR §60.18(g) - (i).	At the discretion of the TCEQ Executive Director or designated representative, early unit shutdown or other appropriate action may be required based on the number and severity of tagged leaks awaiting shutdown.
Minimum Design, Monitoring, Technique or Control for all fugitive components with uncontrolled potential to emit of ≥ 25 tpy or ≥ 5 tpy H2S	
For a site where the total uncontrolled potential to emit from all components is ≥ **25 tpy**; All the requirements for < 25tpy VOC above apply, except valves found to be emitting VOC in excess of 500 ppmv using EPA Method 21, found by audio, visual or olfactory inspection to be leaking (e.g. whistling, dripping or blowing process fluids or emitting hydrocarbon or H_2S odors) or found leaking using the Alternative Work Practice in 40 CFR §60.18(g) - (i) shall be considered to be leaking and shall be repaired, replaced, or tagged as specified and Pump, compressor, and agitator seals found to be emitting VOC in excess of 2,000 ppmv using EPA Method 21, found by audio, visual or olfactory inspection to be leaking (e.g. whistling, dripping or blowing process fluids or emitting hydrocarbon or H_2S odors) or found leaking using the Alternative Work Practice in 40 CFR §60.18(g) - (i) shall be considered to be leaking and shall be repaired, replaced, or tagged as specified.	Components subject to routine instrument monitoring under this leak definition my claim a 97% emission reduction credit for valves and an 85% emission reduction credit for pump, compressor and agitator seals when evaluating controlled fugitive emission estimates. This reduction credit does not apply when evaluating uncontrolled emission or to any component not measured with an instrument quarterly. See Table 7 Sampling and Demonstrations of Compliance for Fugitive and LDAR Analyzer requirements.

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Table 9 Fugitive Component LDAR BACT Table (continued)

FUGITIVE COMPONENT LEAK DETECTION AND REPAIR (LDAR) BEST AVAILABLE CONTROL TECHNOLOGY REQUIREMENTS TABLE	
Requirements	**Additional Details**
LDAR **Monitoring Options**	
Any site may reduce the controlled fugitive emission estimates by including components not required to be monitored in the quarterly instrument monitoring program or applying the lower leak definition of the more stringent program as appropriate.	Quarterly monitoring at a leak definition of 10,000 ppmv would equate to a 75% emission reduction credit when evaluating controlled fugitive emission estimates for the component. Quarterly monitoring at a leak definition of 500 ppmv would equate to a 97% emission reduction credit for valves, flanges and connectors, a 93% emission reduction credit for pumps, and a 95% emission reduction credit for compressor, agitator seals and other component groups when evaluating controlled fugitive emission estimates. This reduction credit does not apply when evaluating uncontrolled emission or to any component not measured with an instrument quarterly. See Table 7 Sampling and Demonstrations of Compliance for Fugitive and LDAR Analyzer requirements.
After completion of the required quarterly inspections for a period of at least two years, the operator of the OGS facility may change the monitoring schedule as follows:(i)After two consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0%, an owner or operator may begin to skip one of the quarterly leak detection periods for the valves in gas/vapor and light liquid service.(ii)After five consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0%, an owner or operator may begin to skip three of the quarterly leak detection periods for the valves in gas/vapor and light liquid service. If the owner or operator is using the Alternative Work Practice in 40 CFR §60.18(g) - (i), the alternative frequencies specified in this standard permit are not allowed.	
Shutdown prior to Maintenance of Fugitive Components	**Start-up after Maintenance of components**
All components shall be kept in good repair. During repair or replacement, emission releases from the emptying of associated piping, equipment, and vessels must meet the emission limits and control requirements listed under pipeline or compressor blowdowns.	When returning associated equipment and piping to service after repair or replacement of fugitive components, appropriate leak detection shall occur and correction, maintenance or repair shall be immediately performed if fugitive components are not in good working order.

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Table 10 Best Available Control Technology Requirements

Source or Facility	Air Contaminant	Minimum Acceptable Design, Control or Technique, Control Efficiencies, and Other Details during Production Operations
Combined Control Requirements	< 25 tpy VOC	No add on control is required if the continuous and periodic vents from all units, vessels and equipment (including normal operation process blow downs) is less than 25 tons of VOC per year.
	≥ 25 tpy VOC	All continuous and periodic vents on process vessels and equipment with potential emissions containing ≥ 1% VOC at any time must be captured and directed to a control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 95%, if the sum of the uncontrolled PTE of the vents at the site will equal or exceed 25 tons of VOC per year. A site total potential to emit of 1 tpy of VOC from vent gas streams may be exempted from this control requirement.
Glycol Dehydration Unit	Uncontrolled PTE < 10 tpy VOC VOC, BTEX, H_2S	No control is required. Condensers included in the equipment constructed must be maintained and operated as specified by the manufacturer or design engineering.
	Uncontrolled PTE ≥ 10 tpy and < 50 tpy VOC VOC, BTEX, H_2S	All non-combustion VOC emissions shall be routed to a vapor recovery unit (VRU), the unit reboiler, or to an appropriate control device listed in the Control Device BACT Table. This includes the emissions from the condenser vent. Liquid waste or product material captured by a condenser must be enclosed and transferred to a unit compliant with the requirements of this table and the condenser must meet the requirements listed in the Control Device BACT Table with a minimum design control efficiency of 80%. For condensers, greater efficiencies may be claimed where enhanced monitoring and testing are applied following Table 7. If the unit reboiler is used to control the VOC emissions from the dehydrator (e.g. to control the condenser vent and the flash tank if one is present) the unit must be designed to efficiently combust those vented VOCs at least 50% of the time the unit is operated.
	Uncontrolled PTE ≥ 50 tpy VOC VOC, BTEX, H_2S	All non-combustion VOC emissions shall be captured and directed to an appropriate control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 95%.
Atmospheric Oil/Water separators	VOC with partial pressure < 0.5 psia at maximum liquid temperature or 95 F whichever is greater. VOC, BTEX, H_2S	May vent to atmosphere through vent no larger than 3 inch diameter. If H_2S can exceed 24 ppmv in the vapor space the separator vent shall be captured and directed to a control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 95%.
	VOC with partial pressure ≥ 0.5 psia at maximum liquid surface temperature or 95 F whichever is greater, VOC, BTEX, H_2S	The oil layer must have a floating cover over the entire liquid surface with a conservation vent to atmosphere or the vents must be captured and directed to a control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 95%. If H_2S can exceed 24 ppmv in the vapor space the separator vent shall be captured and directed to a control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 95%. If the separator operates with more than 25,000 gallons (595 barrels) of liquid contained or is used as an oil storage tank, it shall be treated as a storage tank and meet those requirements.
	Oil water separators where the material entering the separator may flash. VOC, BTEX, H_2S	These separators must be treated as process separators with a gas stream and follow those requirements.
Fuel Combustion Units including auxiliary fuel for combustion control devices	H_2S	Fuel for all combustion units at the site shall be sweet natural gas or liquid petroleum gas, fuel gas containing no more than ten grains of total sulfur per 100 dry standard cubic feet (dscf), or field gas.

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Table 10 Best Available Control Technology Requirements (continued)

Source or Facility	Air Contaminant	Minimum Acceptable Design, Control or Technique, Control Efficiencies, and Other Details during Production Operations
Boilers, Reboilers, Heater-Treaters, and Process Heaters	NOx, CO, $PM_{10/2.5}$, VOC, HCHO, SO_2	If any unit has a designed maximum firing rate of < 40 MMBTU/hr and greater than 10 MMBtu/hr, it must be designed and operated for good combustion and meet 0.10 lb/MMBtu for NO_X. For boilers and reboilers greater than or equal to 40 MMBtu/hr, emission shall not exceed 0.036 lb/MMBtu for NOx. For heaters and heater treaters greater than or equal to 40 MMBtu/hr but less than 100 MBtu/hr, emissions shall not exceed 0.06 lb/MMBtu for NOx. Heaters and heater treaters greater than or equal to 100 MMBtu/hr shall not exceed 0.036 lb/MMBtu for NOx. For boilers, reboilers, process heaters, and heater treaters with heat inputs equal to or greater than 10 MMBtu/hr, the emission limit for CO is 0.074 lb CO/MMBtu
GasFired Turbines	NOx, CO, $PM_{10/2.5}$, VOC, HCHO, SO_2	Units shall be designed and operate with low NOx combustors and meet 25 ppmvd @ 15% O_2 for NO_X and 50 ppmvd @ 15% O_2 for CO.
All Tanks	Uncontrolled PTE of < 1.0 tpy VOC or < 0.1 tpy H2S	Open-topped tanks or ponds containing VOCs or H_2S are allowed
All Tanks	Uncontrolled PTE of ≥ 1.0 tpy VOC or ≥ 0.1 tpy H2S	Open-topped tanks or ponds containing VOCs or H_2S are not allowed. Tank hatches and valves, which emit to the atmosphere, shall remain closed except for sampling or planned maintenance activities. All pressure relief devices (PRD) shall be designed and operated to ensure that proper pressure in the vessel is maintained and shall stay closed except in upset or malfunction conditions. If the PRD does not automatically reset, it must be reset within 24 hours at a manned site and within one week if located at an unmanned site.
Process Separators, Crude oil, Condensate, Treatment chemicals, Produced water, Fuel, Slop/Sump Oil and any other storage tanks or vessels that contain a VOC or a film of VOC on the surface of water.	VOC with partial pressure < 0.5 psia at maximum liquid surface temperature or 95 F whichever is greater, or with uncontrolled PTE of < 5 tpy VOC from working and breathing losses, including flash emissions VOC, BTEX, H_2S	All storage tanks with a storage capacity greater than 500 gallons must be submerged fill. Existing tanks and vessels (including temporary liquid storage tanks) which are not increasing emissions at an OGS shall also meet this requirement no later than 180 days after a registration renewal as of January 1, 2016
	VOC with partial pressure ≥ 0.5 psia at maximum liquid surface temperature or 95 F (whichever is greater), and with uncontrolled PTE of < 5 tpy from working and breathing losses, including flash emissions VOC. BTEX. H_2S	All storage tanks with a storage capacity greater than 500 gallons must be submerged fill. Un-insulated tank exterior surfaces exposed to the sun shall be of a color that minimizes the effects of solar heating (including, but not limited to, white or aluminum). To meet this requirement the solar absorptance should be 0.43 or less, as referenced in Table 7.1-6 in AP-42. Paint shall be maintained in good condition. If a new or modified tank cannot be painted white or other reflective color, then another control device may be used to control emissions. Exceptions to the color requirement include the following: (A) Up to 10% of the external surface area of the roof or walls of the tank or vessel may be painted with other colors to allow for identifying information or aesthetic purposes; and (B) If a local, state or federal law or ordinance or private contract which predates this standard permit's effective date establishes in writing tank and vessel colors other than white. If applicable, a copy of this documentation must be provided to the commission upon registration. (C) Tanks and vessels purposefully darkened to create the process reaction and help condense liquids from being entrained in the vapor. Existing tanks and vessels (including temporary liquid storage tanks) which are not increasing emissions at an OGS using shall also meet this requirement no later than 180 days after a registration renewal as of January 1, 2016.

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Table 10 Best Available Control Technology Requirements (continued)

Source or Facility	Air Contaminant	Minimum Acceptable Design, Control or Technique, Control Efficiencies, and Other Details during Production Operations
Process Separators, Crude oil, Condensate, Treatment chemicals, Produced water, Fuel, Slop/Sump Oil and any other storage tanks or vessels that contain a VOC or a film of VOC on the surface of water.	VOC with uncontrolled PTE of ≥ 5 tpy	Vents shall be captured and directed to an appropriate control device as listed in standard permit (c) BMP and BACT. Un-insulated tank exterior surfaces exposed to the sun shall be of a color that minimizes the effects of solar heating (including, but not limited to, white or aluminum). To meet this requirement the solar absorptance should be 0.43 or less, as referenced in Table 7.1-6 in AP-42. Paint shall be maintained in good condition. Exceptions to the color requirement include the following: (A) Up to 10% of the external surface area of the roof or walls of the tank or vessel may be painted with other colors to allow for identifying information or aesthetic purposes; and (B) If a local, state or federal law or ordinance or private contract which predates this standard permit's effective date establishes in writing tank and vessel colors other than white. If applicable, a copy of this documentation must be provided to the commission upon registration. (C) Tanks and vessels purposefully darkened to create the process reaction and help condense liquids from being entrained in the vapor. Existing tanks and vessels (including temporary liquid storage tanks) which are not increasing emissions at an OGS using shall also meet this requirement no later than 180 days after a registration renewal as of January 1, 2016.
Truck Loading	VOC with partial pressure < 0.5 psia at maximum liquid surface temperature or 95 F whichever is greater, or with uncontrolled PTE of < 5 tpy VOC VOC, BTEX, H_2S	Loading is recommended to be performed with submerged filling, or vapor balancing back to the tank and any subsequent recovery or control device.
	VOC with partial pressure ≥ 0.5 psia at maximum liquid surface temperature or 95 F whichever is greater VOC, BTEX, H_2S	Splash loading and uncontrolled vacuum truck loading is not allowed. Loading shall be performed with a control effectiveness of at least 42% as compared to splash loading. Loading may occur by submerged filling or equivalent prevention or recovery technique as listed in Table 10.
	VOC with uncontrolled PTE of ≥ 5 tpy VOC VOC, BTEX, H_2S	Loading vapors shall be captured and directed to an appropriate control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 98%, routed to a vapor recovery unit (VRU) with a control effectiveness of at least 95%, or vapor balanced back to the delivering storage tank equipped with a VRU, or connected to a control device listed in the Control Device BACT Table with a minimum design control efficiency of at least 95%.
	Controlled Loading	Where loading control is required, the collection or capture system must be connected to the tank truck so all displaced vapors are directed to the control device and the control device is operational before loading is commenced. When properly connected the capture efficiency will be assumed to be 70% efficient at capturing the displaced truck vapors. The capture efficiency may be assumed to be 98.7 percent efficient when the tanker truck has certification that the tank has passed vapor-tightness testing within the last 12 months using the methods described in 40 CFR 60, Subpart XX. The capture efficiency may be assumed to be 99.2 percent efficient when the tanker truck has certification that the tank has passed vapor-tightness testing within the last 12 months using the methods described in 40 CFR 63, Subpart R. Loading shall be discontinued when liquid or gas leaks from the loading or collection system are observed.

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Table 10 Best Available Control Technology Requirements (continued)

Source or Facility	Air Contaminant	Minimum Acceptable Design, Control or Technique, Control Efficiencies, and Other Details during Production Operations
Cooling Tower Heat Exchange System	VOC, BTEX, $PM_{10/2.5}$	Heat exchange systems must be non-contact design (i.e. designed and operated to avoid direct contact with gaseous or liquid process streams containing VOC, H2S, halogens or halogen compounds, cyanide compounds, inorganic acids, or acid gases). Systems with heat exchangers that cool a fluid with VOC shall meet the following: The cooling water must be at a higher pressure than the process fluid in the heat exchangers or the cooling tower water must be monitored monthly for VOC emissions using TCEQ Sampling Procedures Manual, Appendix P dated January 2003 or a later edition. Equipment shall be maintained so as to minimize VOC emissions into the cooling water. Cooling water VOC concentrations greater than 0.08 ppmw indicate faulty equipment. If the repair of a heat exchanger would require a unit shutdown that would create more emissions than the repair would eliminate, the repair may be delayed until the next planned shutdown or 180 days if no shutdowns are scheduled. Cooling towers shall be designed and operated with properly functioning drift eliminators. New cooling towers shall be designed with drift eliminators designed to meet ≤ 0.001% drift.

List of Acronyms

°C	Degrees Celsius
°F	Degrees Fahrenheit
$\mu g/m^3$	Micrograms per cubic meter
acfm	Actual cubic feet per minute
ADMT	Air Dispersion Modeling Team
AMINECalc	Amine Unit Air Emissions Model Ver 1.0
AP-42	Air Pollutant Emission Factors, 5th ed
APD	Air Permits Division
API	American Petroleum Institute
APWL	Air Pollutant Watch List
AREACIRC	Co-located circular area source from the EPA
	AERMOD Modeling System
AWP	Alternative Work Practices
BACT	Best Available Control Technology
bbl	Barrel
bbl/day	Barrels per day
BMP	Best Management Practices (includes equipment manufacturer's guidelines and specifications)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
Btu/scf	British thermal units per standard cubic feet
CEMS	Continuous Emissions Monitoring System
cf/day	Cubic feet per day
cfm	Cubic feet per minute
CFR	Code of Federal Regulations
CO_2	Carbon dioxide
COS	Carbonyl sulfide
CPR	Considerable personnel and resources
CS_2	Carbon disulfide
CT	Cooling towers
DEA	Diethanolamine
DGA	Diglycolamine
DIPA	Di-isopropylamine
DOT	Department of Transportation
DRE	Destruction rate efficiency
dscf	Dry standard cubic feet
DV	Designated value
E	Maximum acceptable emission rate (lb/hr)
EF	Emission factor
EFR	External floating roof tank
E_{max}	Maximum acceptable emission rate (lb/hr)
EPA	Environmental Protection Agency
EPN	Emission point number
ESL	Effects screening level
FR	Federal Register
ft	Feet
ft/sec	Feet per second
gal/wk	Gallons per week
gal/yr	Gallons per year
GLC_{max}	Max predicted ground-level concentration
GOP	General Operating Permit

List of Acronyms (continued)

H_2S	Hydrogen sulfide
HAP	Hazardous air pollutant
HB	House Bill
HCl	Hydrogen chloride
hp	Horsepower
hr	Hour
HRVOC	Highly reactive volatile organic compounds
HYSIM®	Hydrologic Simulation Model computer program
HYSIS®	Process simulator computer program
ICE	Internal combustion engine
IFR	Internal floating roof tank
IR	Infrared
ISCST3	Industrial Source Complex Short-term Model V02035
LACT	Lease automatic custody transfer unit
lb	Pound
lb/hr	Pounds per hour
lb/MMBtu	Pounds per million British thermal units
lbs/day	Pounds per day
LDAR	Leak detection and repair
L_L	Loading losses
LPG	Liquid petroleum gas
LT/D	Long ton per day
m/sec	Meters per second
MACT	Maximum Available Control Technology
MDEA	Methyl-diethanolamine
MEA	Monoethanol amine
MERA	Modeling and Effects Review Applicability
MMBtu	Million British thermal units
MMBtu/hr	Million British thermal units per hour
MMCFD	Million cubic feet per day
MSS	Maintenance, start-up, and shutdown
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGL	Natural gas liquids
NNSR	Nonattainment New Source Review
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NSPS	New Source Performance Standards
NSR	New Source Review
O_2	Oxygen (molecular form)
OGS	Oil and gas site
PBR	Permit by Rule
PM_{10}	Particulate matter less than or equal to 10 microns
POC	Products of combustion
ppm	Parts per million
Ppmvd	Parts per million by volume, dry
PROSIM®	DOS based process simulator computer program

List of Acronyms (continued)

PSD	Prevention of Significant Deterioration
psi	Pounds per square inch
psia	Pounds per square inch, absolute
psig	Pounds per square inch, gage
RICE	Reciprocating internal combustion engine
RVP	Reid vapor pressure
scfh	Standard cubic feet per hour
scfm	Standard cubic feet per minute
scmd	Standard cubic feet per day
SCREEN3	Air dispersion modeling computer program for windows, Version 5.0. BEE-line Software c1998-2002
SE	Standard Exemption
SIC	Standard Industrial Classification System
SO_2	Sulfur dioxide
SOP	Site Operating Permit
Standard permit	Standard Permit
SRU	Sulfur recovery unit
T&S	Transfer and storage
TAC	Texas Administrative Code
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality
TEA	Triethanolamine
THSC	Texas Health and Safety Code
tpy	Tons per year
V-B	Vasquez-Beggs correlation equation
VOC	Volatile organic compounds
VRU	Vapor recovery unit or system
WINSIM®	Windows process simulator computer program

standard permit in accordance with the requirements of §116.611 of this title (relating to Registration to Use a Standard Permit).

(f) If the commission revokes a standard permit, it will provide written notice to affected registrants prior to the revocation of the standard permit. The notice will advise registrants that they must apply for a permit under this chapter or qualify for an authorization under Chapter 106 of this title (relating to Exemptions from Permitting).

(g) The issuance, amendment, or revocation of a standard permit or the issuance, renewal, or revocation of a registration to use a standard permit is not subject to Texas Government Code, Chapter 2001.

Adopted December 16, 1999 Effective January 11, 2000

§116.606. Delegation.

The commission may delegate to the executive director any authority in this subchapter.

Adopted December 16, 1999 Effective January 11, 2000

§116.610. Applicability.

(a) Under the Texas Clean Air Act, §382.051, a project that meets the requirements for a standard permit listed in this subchapter or issued by the commission is hereby entitled to the standard permit, provided the following conditions listed in this section are met. For the purposes of this subchapter, project means the construction or modification of a facility or a group of facilities submitted under the same registration.

(1) Any project that results in a net increase in emissions of air contaminants from the project other than carbon dioxide, water, nitrogen, methane, ethane, hydrogen, oxygen, or those for which a national ambient air quality standard has been established must meet the emission limitations of §106.261 of this title (relating to Facilities (Emission Limitations), unless otherwise specified by a particular standard permit.

(2) Construction or operation of the project must be commenced prior to the effective date of a revision to this subchapter under which the project would no longer meet the requirements for a standard permit.

(3) The proposed project must comply with the applicable provisions of the Federal Clean Air Act (FCAA), §111 (concerning New Source Performance Standards) as listed under 40 Code of Federal Regulations (CFR) Part 60, promulgated by the United States Environmental Protection Agency (EPA).

(4) The proposed project must comply with the applicable provisions of FCAA, §112 (concerning Hazardous Air Pollutants) as listed under 40 CFR Part 61, promulgated by the EPA.

(5) The proposed project must comply with the applicable maximum achievable control technology standards as listed under 40 CFR Part 63, promulgated by the EPA under FCAA, §112 or as listed under Chapter 113, Subchapter C of this title (relating to National Emissions Standards for Hazardous Air Pollutants for Source Categories (FCAA, §112, 40 CFR Part 63)).

(6) If subject to Chapter 101, Subchapter H, Division 3 of this title (relating to Mass Emissions Cap and Trade Program) the proposed facility, group of facilities, or account must obtain allocations to operate.

(b) Any project that constitutes a new major stationary source or major modification as defined in §116.12 of this title (relating to Nonattainment and Prevention of Significant Deterioration Review Definitions) is subject to the requirements of §116.110 of this title (relating to Applicability) rather than this subchapter.

(c) Persons may not circumvent by artificial limitations the requirements of §116.110 of this title.

(d) Any project involving a proposed affected source (as defined in §116.15(1) of this title (relating to Section 112(g) Definitions)) shall comply with all applicable requirements under Subchapter E of this chapter (relating to Hazardous Air Pollutants: Regulations Governing Constructed or Reconstructed Major Sources (FCAA, §112(g), 40 CFR Part 63)). Affected sources subject to Subchapter E of this chapter may use a standard permit under this subchapter only if the terms and conditions of the specific standard permit meet the requirements of Subchapter E of this chapter.

Adopted January 11, 2006 Effective February 1, 2006

§116.611. Registration to Use a Standard Permit.

(a) If required, registration to use a standard permit shall be sent by certified mail, return receipt requested, or hand delivered to the executive director, the appropriate commission regional office, and any local air pollution program with jurisdiction, before a standard permit can be used. The registration must be submitted on the required form and must document compliance with the requirements of this section, including, but not limited to:

(1) the basis of emission estimates;

(2) quantification of all emission increases and decreases associated with the project being registered;

(3) sufficient information as may be necessary to demonstrate that the project will comply with §116.610(b) of this title (relating to Applicability);

(4) information that describes efforts to be taken to minimize any collateral emissions increases that will result from the project;

(5) a description of the project and related process; and

(6) a description of any equipment being installed.

(b) Construction may begin any time after receipt of written notification from the executive director that there are no objections or 45 days after receipt by the executive director of the registration, whichever occurs first, except where a different time period is specified for a particular standard permit.

(c) In order to avoid applicability of Chapter 122 of this title (relating to Federal Operating Permits), a certified registration shall be submitted. The certified registration must state the maximum allowable emission rates and must include documentation of the basis of emission estimates and a written statement by the registrant certifying that the maximum emission rates listed on the registration reflect the reasonably anticipated maximums for operation of the facility. The certified registration shall be amended if the basis of the emission estimates changes or the maximum emission rates listed on the registration no longer reflect the reasonably anticipated maximums for operation of the facility. The certified registration shall be submitted to the executive director; to the appropriate commission regional office; and to all local air pollution control agencies having jurisdiction over the site. Certified registrations must also be maintained in accordance with the requirements of §116.115 of this title (relating to General and Special Conditions).

(1) Certified registrations established prior to the effective date of this rule shall be submitted on or before February 3, 2003.

(2) Certified registrations established on or after the effective date of this rule shall be submitted no later than the date of operation.

Adopted November 20, 2002 Effective December 11, 2002

§116.614. Standard Permit Fees.

Any person who registers to use a standard permit or an amended standard permit, or to renew a registration to use a standard permit shall remit, at the time of registration, a flat fee of $900 for each standard permit being registered, unless otherwise specified in a particular standard permit. No fee is required if a registration is automatically renewed by the commission. All standard permit fees will be remitted in the form of a check, certified check, electronic funds transfer, or money order made payable to the Texas Commission on Environmental Quality (TCEQ) and delivered with the permit registration to the TCEQ, P.O. Box 13088, MC 214, Austin, Texas 78711-3087. No fees will be refunded.

Adopted September 25, 2002 Effective October 20, 2002

§116.615. General Conditions.

The following general conditions are applicable to holders of standard permits, but will not necessarily be specifically stated within the standard permit document.

(1) Protection of public health and welfare. The emissions from the facility, including dockside vessel emissions, must comply with all applicable rules and regulations of the commission adopted under Texas Health and Safety Code, Chapter 382, and with the intent of the Texas Clean Air Act (TCAA), including protection of health and property of the public.

(2) Standard permit representations. All representations with regard to construction plans, operating procedures, and maximum emission rates in any registration for a standard permit become conditions upon which the facility or changes thereto, must be constructed and operated. It is unlawful for any person to vary from such representations if the change will affect that person's right to claim a standard permit under this section. Any change in condition such that a person is no longer eligible to claim a standard permit under this section requires proper authorization under §116.110 of this title (relating to Applicability). If the facility remains eligible for a standard permit, the owner or operator of the facility shall notify the executive director of any change in conditions which will result in a change in the method of control of emissions, a change in the character of the emissions, or an increase in the discharge of the various emissions as compared to the representations in the original registration or any previous notification of a change in representations. Notice of changes in representations must be received by the executive director no later than 30 days after the change.

(3) Standard permit in lieu of permit amendment. All changes authorized by standard permit to a facility previously permitted under §116.110 of this title shall be administratively incorporated into that facility's permit at such time as the permit is amended or renewed.

(4) Construction progress. Start of construction, construction interruptions exceeding 45 days, and completion of construction shall be reported to the appropriate regional office not later than 15 working days after occurrence of the event, except where a different time period is specified for a particular standard permit.

(5) Start-up notification.

(A) The appropriate air program regional office of the commission and any other air pollution control agency having jurisdiction shall be notified prior to the commencement of operations of the facilities authorized by a standard permit in such a manner that a representative of the executive director may be present.

(B) For phased construction, which may involve a series of units commencing operations at different times, the owner or operator of the facility shall provide separate notification for the commencement of operations for each unit.

(C) Prior to beginning operations of the facilities authorized by the permit, the permit holder shall identify to the Office of Permitting, Remediation, and Registration, the source or sources of allowances to be utilized for compliance with Chapter 101, Subchapter H, Division 3 of this title (relating to Mass Emissions Cap and Trade Program).

(D) A particular standard permit may modify start-up notification requirements.

(6) Sampling requirements. If sampling of stacks or process vents is required, the standard permit holder shall contact the commission's appropriate regional office and any other air pollution control agency having jurisdiction prior to sampling to obtain the proper data forms and procedures. All sampling and testing procedures must be approved by the executive director and coordinated with the regional representatives of the commission. The standard permit holder is also responsible for providing sampling facilities and conducting the sampling operations or contracting with an independent sampling consultant.

(7) Equivalency of methods. The standard permit holder shall demonstrate or otherwise justify the equivalency of emission control methods, sampling or other emission testing methods, and monitoring methods proposed as alternatives to methods indicated in the conditions of the standard permit. Alternative methods must be applied for in writing and must be reviewed and approved by the executive director prior to their use in fulfilling any requirements of the standard permit.

(8) Recordkeeping. A copy of the standard permit along with information and data sufficient to demonstrate applicability of and compliance with the standard permit shall be maintained in a file at the plant site and made available at the request of representatives of the executive director, the United States Environmental Protection Agency, or any air pollution control agency having jurisdiction. For facilities that normally operate unattended, this information shall be maintained at the nearest staffed location within Texas specified by the standard permit holder in the standard permit registration. This information must include, but is not limited to, production records and operating hours. Additional recordkeeping requirements may be specified in the conditions of the standard permit. Information and data sufficient to demonstrate applicability of and compliance with the standard permit must be retained for at least two years following the date that the information or data is obtained. The copy of the standard permit must be maintained as a permanent record.

(9) Maintenance of emission control. The facilities covered by the standard permit may not be operated unless all air pollution emission capture and abatement equipment is maintained in good

working order and operating properly during normal facility operations. Notification for emissions events and scheduled maintenance shall be made in accordance with §101.201 and §101.211 of this title (relating to Emissions Event Reporting and Recordkeeping Requirements; and Scheduled Maintenance, Startup, and Shutdown Reporting and Recordkeeping Requirements).

(10) Compliance with rules. Registration of a standard permit by a standard permit applicant constitutes an acknowledgment and agreement that the holder will comply with all rules, regulations, and orders of the commission issued in conformity with the TCAA and the conditions precedent to the claiming of the standard permit. If more than one state or federal rule or regulation or permit condition are applicable, the most stringent limit or condition shall govern. Acceptance includes consent to the entrance of commission employees and designated representatives of any air pollution control agency having jurisdiction into the permitted premises at reasonable times to investigate conditions relating to the emission or concentration of air contaminants, including compliance with the standard permit.

(11) Distance limitations, setbacks, and buffer zones. Notwithstanding any requirement in any standard permit, if a standard permit for a facility requires a distance, setback, or buffer from other property or structures as a condition of the permit, the determination of whether the distance, setback, or buffer is satisfied shall be made on the basis of conditions existing at the earlier of:

(A) the date new construction, expansion, or modification of a facility begins; or

(B) the date any application or notice of intent is first filed with the commission to obtain approval for the construction or operation of the facility.

Adopted February 21, 2007 Effective March 15, 2007

§116.617. State Pollution Control Project Standard Permit.

(a) Scope and applicability.

(1) This standard permit applies to pollution control projects undertaken voluntarily or as required by any governmental standard, that reduce or maintain currently authorized emission rates for facilities authorized by a permit, standard permit, or permit by rule.

(2) The project may include:

(A) the installation or replacement of emissions control equipment;

(B) the implementation or change to control techniques; or

(C) the substitution of compounds used in manufacturing processes.

(3) This standard permit must not be used to authorize the installation of emission control equipment or the implementation of a control technique that:

Facility/Compound Specific Fugitive Emission Factors

Equipment/ Service	Ethylene Oxide [1]	Phosgene [2]	Butadiene [3]	Petroleum Marketing Terminal [4]	Oil and Gas Production Operations [5]				Refinery [6]
					Gas	Heavy Oil <20° API	Light Oil >20°	Water/Light Oil	
Valves					0.00992	0.0000185	0.0055	0.000216	
Gas/Vapor	0.000444	0.00000216	0.001105	0.0000287					0.059
Light Liquid	0.00055	0.00000199	0.00314	0.0000948					0.024
Heavy Liquid				0.0000948					0.00051
Pumps	0.042651	0.0000201	0.05634		0.00529	0.00113 [10]	0.02866	0.000052	
Light Liquid				0.00119					0.251
Heavy Liquid				0.00119					0.046
Flanges/Connectors	0.000555	0.00000011	0.000307		0.00086	0.00000086	0.000243	0.000006	0.00055
Gas/Vapor				0.000092604					
Light Liquid				0.00001762					
Heavy Liquid				0.0000176					
Compressors	0.000767		0.000004		0.0194	0.0000683	0.0165	0.0309	1.399
Relief Valve	0.000165	0.0000162	0.02996		0.0194	0.0000683	0.0165	0.0309	0.35
Open-ended Lines [7]	0.001078	0.00000007	0.00012		0.00441	0.000309	0.00309	0.00055	0.0051
Sampling	0.000088		0.00012						0.033
Connectors					0.00044	0.0000165	0.000463	0.000243	
Other [9]					0.0194	0.0000683	0.0165	0.0309	
Gas/Vapor				0.000265					
Light/Heavy Liquid				0.000287					
Process Drains					0.0194	0.0000683	0.0165	0.0309	0.07

Table Notes: All factors are in units of (lb/hr)/component.

1. Monitoring must occur at a leak definition of 500 ppmv. No additional control credit can be applied to these factors. Emission factors are from EOIC Fugitive Emission Study, Summer 1988.

2. Monitoring must occur at a leak definition of 50 ppmv. No additional control credit can be applied to these factors. Emission factors are from Phosgene Panel Study, Summer 1988.

3. Monitoring must occur at a leak definition of 100 ppmv. No additional control credit can be applied to these factors. Emission factors are from Randall, J. L., et al., Radian Corporation. Fugitive Emissions from the 1,3-butadiene Production Industry: A Field Study. Final Report. Prepared for the 1,3-Butadiene Panel of the Chemical Manufacturers Association. April 1989.

4. Control credit is included in the factor; no additional control credit can be applied to these factors. Monthly AVO inspection required.

5. Factors give the total organic compound emission rate. Multiply by the weight percent of non-methane, non-ethane organics to get the VOC emission rate.

6. Factors are taken from EPA Document EPA-453/R-95-017, November 1995, Page 2-13.

7. The 28 Series quarterly LDAR programs require open-ended lines to equipped with a cap, blind flange, plug, or a second valve. If so equipped, open-ended lines may be given a 100% control credit.

8. Emission factor for Sampling Connections is in terms of pounds per hour per sample taken.

9. For Petroleum Marketing Terminals"Other" includes any component excluding fittings, pumps, and valves. For Oil and Gas Production Operations, "Other" includes diaphragms, dump arms, hatches, instruments, meters, polished rods, and vents.

10. No Heavy Oil - Pump factor was derived during the API study. The factor is the SOCMI without C_2 Heavy Liquid - Pump factor with a 93% reduction credit for the physical inspection.

Tank Truck Loading of Crude Oil or Condensate

Scope: Tank Truck Loading activities at loading terminals

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. Crude oil or condensate is transported from oil and gas sites to a refinery or other refining operations by tankers, barges, rail tank cars, tank trucks, and pipelines.

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations (for marine loading please review Marine Loading of Crude Oil and Condensate Guidance Document). Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is, therefore, a function of the following parameters:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

Tank truck loading operations can be divided into three general categories: A) atmospheric trucks, B) pressure trucks used in atmospheric service, and C) pressure trucks. The type of connection that is used in the loading procedure will be considered to determine the collection efficiency. "Quick connects" are clamp type connections that are not bolted or flanged. "Quick connects" can be used with atmospheric trucks. Hard-piped connections are bolted or flanged to the receiving vessel. Hard-piped connections should be used with pressure trucks to achieve its maximum collection efficiency. Atmospheric trucks must be leak checked according to NSPS Subpart XX to achieve its maximum collection efficiency.

Tank Truck Loading Authorizations

All stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water that satisfy the general conditions of Title 30, Texas Administrative Code (30 TAC), Section 106.4, and the specific conditions of 30 TAC Section 106.352 are permitted by rule. The commission also has available rule language in an easy-to-read format for the permit by rule.

For all new projects and dependent facilities not located in the Barnett Shale counties, the current 106.352 subsection (l) is applicable, which contains the previous requirements of 106.352.

For projects located in one of the Barnett Shale counties which are constructed or modified on or after April 1, 2011 subsections (a)-(k) apply.

Other permit by rules which may be used for tank truck loading but are not commonly seen are 106.261, 106.262, 106.472, and 106.473.

If a site does not qualify for a PBR, it may be authorized by a standard permit. Sites constructed prior to April 1, 2011 may be authorized using the Oil and Gas Standard Permit (30 TAC 116.620, effective January 11, 2000). For sites in one of the Barnett Shale counties constructed or modified on or after April 1, 2011, the site is subject to the requirements of the Air Quality Standard Permit for Oil and Gas Handling and Production Facilities.

Emission Calculations

Loading calculations are listed in AP-42, Chapter 5, Section 5.2: Transportation and Marketing of Petroleum Liquids.

Submerged tank truck loading is the minimum level of control required. The two types of submerge loading are the submerged fill pipe method and the bottom loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. During most of submerged loading by both methods, the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly during submerged loading, resulting in much lower vapor generation than encountered during splash loading.

The saturation factor, S, represents the expelled vapor's fractional approach to saturation, and it accounts for the variations observed in emission rates from the different unloading and loading methods. The loading calculation requires the use of a Saturation Factor (S factor) listed in Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses.

<u>Submerged loading: dedicated normal service, S factor = 0.6</u>

The S factor of 0.6 should be used if the tank truck is in "dedicated normal service". Dedicated normal service means the tank truck is used to transport only one product or products with similar characteristics (petroleum products with similar API gravity, molecular weight, vapor pressure).

<u>Submerged Loading: dedicated vapor balance, S factor = 1.0</u>

The S factor of 1.0 should be used if the loading vapors are returned back to the tank truck when it is unloaded to a storage tank or other vessel.

Emissions from loading petroleum liquid can be estimated using the following expression:

Where:

$$L_L = 12.46 \frac{SPM}{T}$$

- LL= loading loss, pounds per 1000 gallons (lb/103 gal) of liquid loaded
- S = a saturation factor (see Table 5.2-1)

- P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
- M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
- T = temperature of bulk liquid loaded, °R (°F + 460)

Emissions are broken down into short-term emissions (lb/hr) and annual emissions (tons/year). Short-term emissions should be estimated by using the maximum expected vapor pressure and temperature of the compound being loaded and the maximum expected pumping rate being used to fill the container (loading tank truck). Annual emissions should be estimated by using the average annual temperature and corresponding vapor pressure of the compound and the expected annual throughput of the compound.

Capture/Collection techniques and efficiency

The overall reduction efficiency should account for the capture efficiency of the collection system as well as both the control efficiency and any downtime of the control device. Measures to reduce loading emissions include selection of alternate loading methods and application of vapor recovery equipment.

Please note,not all of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 98.7 percent for tanker trucks passing an annual leak test per EPA standards. A collection efficiency of 70 percent should be assumed for trucks which are not leak tested.

- 70% capture/collection efficiency if not leak tested
- 98.7% capture/collection efficiency if leak tested based on EPA standards (NSPS Subpart XX)
- 100% capture/collection efficiency if a blower system is installed which will produce a vacuum in the tank truck during all loading operations. A pressure/vacuum gauge shall be installed on the suction side of the loading rack blower system adjacent to the truck being loaded to verify a vacuum in that vessel. Loading shall not occur unless there is a vacuum of at least 1.5 inch water column being maintained by the vacuum-assist vapor collection system when loading trucks. The vacuum shall be recorded every 15 minutes during loading.

Uncollected Loading Emissions

Uncollected loading emissions are referred to as loading fugitives and are listed as a separate emission point or source. Uncollected loading emissions (LLF) can be estimated using the following expression:

$$L_{LF} = (L_L)\,\frac{(1 - \text{Collection Efficiency})}{100}$$

Control techniques and control efficiencies

Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate calculated in the loading loss equation (LL) by an overall reduction efficiency term:

$$\text{Emissions} = (L_L)\left(\frac{\text{Collection Efficiency}}{100}\right)\left(1 - \frac{\text{Control Efficiency}}{100}\right)$$

- Flares – Flares must meet 40 CFR 60.18 requirements of minimum heating value of waste gas and a maximum flare tip velocity. Flares can have a control efficiency of 98% or 99% for the following compounds: methanol, ethanol, propanol, ethylene oxide, and propylene oxide. The agency highly encourages the consideration of variable speed blowers when a control efficiency of > 98% is claimed for a steam – assisted flare to reduce over steaming of the flare which could affect the control efficiency.
- Thermal oxidizers – must be designed for the variability of the waste gas stream and basic monitoring which consists of thermocouple or infrared monitor that indicates the device is working. Control efficiencies range from 95% - <99%.
- Carbon Systems – Can claim up to a 98% control efficiency. The carbon system must have an alarm system that will prevent break through.
- Vapor Recovery Units (VRU) – Can claim up to 100% control. Designed systems claiming 100% control must submit the requirements found in the Vapor Recovery Unit Capture/Control Guidance.

Note: Loading cannot occur while the control system is off-line.

Vapor balancing is NOT a form of control; it is only a capture technique.

Flare Emission Factors

The usual flare destruction efficiencies and emission factors are provided in Table 4. The high-Btu waste streams referred to in the table have a heating value greater than 1,000 Btu/scf.

Flare Destruction Efficiencies

Claims for destruction efficiencies greater than those listed in Table 4 will be considered on a case-by-case basis. The applicant may make one of the three following demonstrations to justify the higher destruction efficiency: (1) general method, (2) 99.5 percent justification, or (3) flare stack sampling.

Table 4. Flare Factors

Waste Stream	Destruction/Removal Efficiency (DRE)		
VOC	98 percent (generic)		
	99 percent for compounds containing no more than 3 carbons that contain no elements other than carbon and hydrogen in addition to the following compounds: methanol, ethanol, propanol, ethylene oxide and propylene oxide		
H_2S	98 percent		
NH_3	case by case		
CO	case by case		
Air Contaminants	**Emission Factors**		
thermal NO_x	steam-assist:	high Btu	0.0485 lb/MMBtu
		low Btu	0.068 lb/MMBtu
	other:	high Btu	0.138 lb/MMBtu
		low Btu	0.0641 lb/MMBtu
fuel NO_x	NO_x is 0.5 wt percent of inlet NH_3, other fuels case by case		
CO	steam-assist:	high Btu	0.3503 lb/MMBtu
		low Btu	0.3465 lb/MMBtu
	other:	high Btu	0.2755 lb/MMBtu
		low Btu	0.5496 lb/MMBtu
PM	none, required to be smokeless		
SO_2	100 percent S in fuel to SO_2		

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 scf] = (3.67)(CON)(C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, 4.2×10^4 $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

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

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

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

CAS No.	Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
74-98-6	Propane	1.6E+00	E
129-00-0	Pyrene[b, c]	5.0E-06	E
108-88-3	Toluene[b]	3.4E-03	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

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

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

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

SITE DATA

OIL & GAS STANDARD PERMIT REGISTRATION

BORGFELD UNIT A1 AND CULPEPPER UNIT A1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Representative Analyses:
Yanta North #1
and Laird B1

Stream Compositions:

	Stream 1		Stream 2		Stream 3		Stream 4	
	Inlet Gas		Flare Assist Gas		LP Condensate		Produced Water	
Component	mole %	wgt. %	mole %	wgt. %	mole %	wgt. %	mole %	wgt %
Nitrogen	0.040%	0.038%	0.164%	0.202%	0.083%	0.021%	0.001%	0.001%
Carbon Dioxide	1.380%	2.064%	2.163%	4.183%	0.054%	0.021%	0.001%	0.002%
Water	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	99.000%	94.081%
Hydrogen Sulfide	0.0200%	0.023%	0.020%	0.030%	0.000%	0.000%	0.000%	0.000%
Methane	51.655%	28.160%	75.685%	53.360%	1.451%	0.207%	0.015%	0.013%
Ethane	20.842%	21.297%	11.765%	15.547%	2.300%	0.616%	0.023%	0.037%
Propane	13.702%	20.532%	4.689%	9.087%	4.295%	1.688%	0.043%	0.100%
I-Butane	2.466%	4.871%	0.899%	2.296%	1.537%	0.796%	0.015%	0.046%
N-Butane	5.021%	9.917%	1.663%	4.248%	4.592%	2.379%	0.046%	0.141%
I-Pentane	1.515%	3.714%	0.652%	2.067%	3.054%	1.964%	0.031%	0.118%
N-Pentane	1.467%	3.597%	0.623%	1.975%	3.942%	2.535%	0.039%	0.148%
Cyclopentane	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
n-Hexane	0.478%	1.400%	0.279%	1.057%	2.644%	2.031%	0.026%	0.118%
Cyclohexane	0.157%	0.460%	0.137%	0.519%	0.773%	0.594%	0.008%	0.036%
Other Hexanes	0.828%	2.425%	0.517%	1.958%	3.433%	2.637%	0.034%	0.155%
Heptanes	0.291%	0.991%	0.347%	1.528%	7.087%	6.329%	0.071%	0.375%
Octanes	0.029%	0.113%	0.109%	0.547%	6.303%	6.417%	0.063%	0.380%
Nonanes	0.011%	0.048%	0.058%	0.327%	5.216%	5.963%	0.052%	0.352%
Decanes Plus	0.000%	0.000%	0.014%	0.088%	48.611%	61.653%	0.486%	3.648%
Benzene	0.046%	0.122%	0.034%	0.117%	0.252%	0.175%	0.003%	0.012%
Toluene	0.061%	0.191%	0.132%	0.534%	1.346%	1.105%	0.013%	0.063%
Ethylbenzene	0.002%	0.007%	0.006%	0.028%	0.453%	0.429%	0.005%	0.028%
Xylene	0.009%	0.032%	0.065%	0.303%	2.577%	2.439%	0.026%	0.146%
Totals	100.02%	100.00%	100.02%	100.00%	100.003%	100.00%	100.001%	100.00%
Totals (C3+)		48.42%		26.68%		99.13%		5.87%
VOC max (%)		50.00%		30.00%		100.00%		10.00%
Benzene Max (%)		0.18%		0.18%		0.26%		0.02%
Higher Heating Value (Btu/scf)	1703		1315					
Lower Heating Value (Btu/scf)	1674		1292					
Specific Gravity	1.0224				0.7785			

SGS LABORATORY REFERENCE NUMBER : **6882-250891**

Conoco Phillips

ID:	**Yanta North 1**	LINE PRESSURE:	**52 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**128 F**
METER:	**LP Upstream of Compressor**	CYLINDER NUMBER:	**SN0074**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/14/2011**	ANALYZED DATE:	**12/22/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

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Physical Properties per GPA 2145-09 — Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.040	0.038	
CARBON DIOXIDE	1.380	2.065	
METHANE	51.655	28.175	
ETHANE	20.842	21.307	5.600
PROPANE	13.702	20.542	3.792
ISOBUTANE	2.466	4.873	0.811
N-BUTANE	5.021	9.922	1.590
ISOPENTANE	1.515	3.716	0.557
N-PENTANE	1.467	3.599	0.534
HEXANES	1.213	3.553	0.501
HEPTANES PLUS	0.699	2.210	0.273
	100.000	100.000	13.658

BTU	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1690.9	1703.0
BTU @ 14.696 PSIA (SAT.)	1661.4	1674.1
Specific Gravity	1.0155	1.0224
Compressibility (Z)	0.9929	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	13.385
Propane & Heavier	7.785
Butane & Heavier	3.993
Pentane & Heavier	1.592
Total 26 psi Reid V.P. Gasoline GPM	2.868

Secondary BTU Psia Base	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1728.7	1741.4
BTU @ 15.025 PSIA (SAT.)	1698.6	1711.9
Compressibility (Z) at 15.025 =	0.9927	

Remarks:
Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6882-250891**

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: ########

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.040	0.038	0.004
CARBON DIOXIDE	1.380	2.065	0.237
METHANE	51.655	28.175	8.797
ETHANE	20.842	21.307	5.600
PROPANE	13.702	20.542	3.792
ISOBUTANE	2.466	4.873	0.811
N-BUTANE	5.021	9.922	1.590
ISOPENTANE	1.515	3.716	0.557
N-PENTANE	1.467	3.599	0.534
2,2-Dimethylbutane	0.042	0.122	0.017
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.478	1.401	0.199
3-Methylpentane	0.215	0.630	0.088
n-Hexane	0.478	1.400	0.197
2,2-Dimethylpentane	0.011	0.037	0.005
Methylcyclopentane	0.093	0.266	0.033
2,4-Dimethylpentane	0.001	0.003	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.046	0.122	0.013
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.157	0.449	0.054
2-Methylhexane	0.013	0.044	0.006
2,3-Dimethylpentane	0.068	0.232	0.031
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.010	0.034	0.005
1,t-3-Dimethylcyclopentane	0.006	0.020	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.008	0.027	0.003
1,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.105	0.358	0.049
Methylcyclohexane	0.068	0.227	0.027
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.001	0.004	0.000
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.002	0.008	0.001
Ethylcyclopentane	0.001	0.003	0.000
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3.Dimethylhexane	0.000	0.000	0.000
Toluene	0.061	0.191	0.021
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.010	0.039	0.005
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.002	0.008	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/95 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6882-250891**

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: ########

	MOL%	WEIGHT%	GPM @ 14.696
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
l,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.007	0.027	0.003
n-Octane	0.012	0.047	0.006
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.001	0.004	0.000
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.001	0.004	0.000
Isopropylcyclopentane	0.000	0.000	0.000
Dimethylheptanes & Trimethylhexanes	0.001	0.004	0.001
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.001	0.004	0.001
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.002	0.007	0.001
Dimethylheptanes & Trimethylhexanes	0.000	0.000	0.000
m-Xylene & p-Xylene	0.002	0.007	0.001
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.007	0.025	0.003
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.002	0.009	0.001
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.000	0.000	0.000
Isopropylbenzene & Trimethylcyclohexanes	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
Isopropylcyclohexane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.000	0.000	0.000
N-Propylcyclohexane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.000	0.000	0.000
n-Propylbenzene	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyloctane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.000	0.000	0.000
	100.000	100.000	22.696

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6882-250891**

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: ########

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	29.413	93.021
Relative Density	0.4126	0.7547
Liquid Density (lbs/gal Absolute Density)	3.440	6.292
Liquid Density (lbs/gal Weight in Air)	3.437	6.286
Cu.Ft./Vapor / Gal. @ 14.696	44.383	25.669
Vapor Pressure @ 100° F	2780.360	0.890
API Gravity at 60° F	211.4	56.0
BTU / LB	21816	7725
BTU / GAL.	75026	44758
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1690.9	4938.0
Specific Gravity as a Vapor @ 14.696	1.0155	1.1744

Heavy End Grouping Breakdown

HEXANES	C6	1.213
HEPTANES	C7	0.518
OCTANES	C8	0.164
NONANES	C9	0.017
DECANES+	C10	0.000
	Total	1.912 Mol%

BTEX BREAKDOWN

	Mol%	WT.%
BENZENE	0.046	0.122
TOLUENE	0.061	0.191
ETHYLBENZENE	0.002	0.007
XYLENES	0.009	0.032
Total BTEX	**0.118**	**0.352**

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6882-250891**

Conoco Phillips

ID:	**Yanta North 1**	LINE PRESSURE:	**52 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**128 F**
METER:	**LP Upstream of Compressor**	CYLINDER NUMBER:	**SN0074**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/14/2011**	ANALYZED DATE:	**12/22/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

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Physical Properties per GPA 2145-09 — Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.040	0.038	
CARBON DIOXIDE	1.380	2.065	
METHANE	51.655	28.175	
ETHANE	20.842	21.307	5.600
PROPANE	13.702	20.542	3.792
ISOBUTANE	2.466	4.873	0.811
N-BUTANE	5.021	9.922	1.590
ISOPENTANE	1.515	3.716	0.557
N-PENTANE	1.467	3.599	0.534
HEXANE	1.213	3.553	0.501
HEPTANE	0.518	1.592	0.201
OCTANE	0.164	0.554	0.064
NONANE	0.017	0.064	0.008
DECANE+	0.000	0.000	0.000
	100.000	100.000	13.658

BTU	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1690.9	1703.0
BTU @ 14.696 PSIA (SAT.)	1661.4	1674.1
Specific Gravity	1.0155	1.0224
Compressibility (Z)	0.9929	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	13.385
Propane & Heavier	7.785
Butane & Heavier	3.993
Pentane & Heavier	1.592
Total 26 psi Reid V.P. Gasoline GPM	2.868

Secondary BTU Psia Base	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1728.7	1741.4
BTU @ 15.025 PSIA (SAT.)	1698.6	1711.9
Compressibility (Z) at 15.025 =	0.9927	

Remarks:

Precision parameters apply to the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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COMPANY: Conoco Phillips
AREA / FIELD: Eagleford

Sample Container	Sample Description	Sample Point	Sample Time	Matrix	RVP by D 5191	Sample Pressue, psi	Sample Temp, F
Cylinder Type/No.or Bottle	Field/Locations.Well		Date, hours				
Station No. 74144 (1)	Yanta North #1	LP Separator before Dump Valve	12-14-2011 @ 10:15 AM	Condensate	6.67psi	50 psi	130F

Chromatographic Extended Analysis - Summation Report

Component	Mol%	Liq Vol%	Wt%
Nitrogen	0.083	0.014	0.015
Carbon Dioxide	0.054	0.014	0.015
Methane	1.451	0.377	0.145
Ethane	2.300	0.943	0.432
Propane	4.295	1.814	1.182
Isobutane	1.537	0.771	0.557
N-Butane	4.592	2.219	1.665
2,2 Dimethylpropane	0.037	0.022	0.017
IsoPentane	3.054	1.712	1.375
n-Pentane	3.905	2.170	1.758
2,2 Dimethylbutane	0.086	0.055	0.046
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.304	0.191	0.164
2 Methylpentane	1.540	0.980	0.828
3 Methylpentane	0.982	0.614	0.528
n-Hexane	2.644	1.667	1.422
Heptanes Plus	73.135	86.436	89.851
Total	100.000	100.000	100.000

Chsracteristics of Heptanes Plus

Specific Gravity	0.8092	(Water = 1)
API Gravity	43.36	@60 F
Molecular Weight	196.9	
Vapor Volume	13.05	CF/Gal
Weight	6.74	Lbs/Gal

Characteristics of Total Sample

Specific Gravity	0.7785	(Water = 1)
API Gravity	50.27	@60 F
Molecular Weight	160.3	
Vapor Volume	15.42	CF/Gal
Weight	6.49	Lbs/Gal

Total Extended Report

Component	Mol%	Liq Vol%	Wt%
Nitrogen	0.083	0.014	0.015
Carbon Dioxide	0.054	0.014	0.015
Methane	1.451	0.377	0.145
Ethane	2.300	0.943	0.432
Propane	4.295	1.814	1.182
Isobutane	1.537	0.771	0.557
N-Butane	4.592	2.219	1.665
2,2 Dimethylpropane	0.037	0.022	0.017
IsoPentane	3.054	1.712	1.375
n-Pentane	3.905	2.170	1.758
2,2 Dimethylbutane	0.086	0.055	0.046
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.304	0.191	0.164
2 Methylpentane	1.540	0.980	0.828
3 Methylpentane	0.982	0.614	0.528
n-Hexane	2.644	1.667	1.422
Methylcyclopentane	0.521	0.282	0.273
Benzene	0.252	0.108	0.123
Cyclohexane	0.773	0.403	0.406
2-Methylhexane	1.004	0.716	0.628
3-Methylhexane	0.999	0.703	0.625
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	1.003	0.692	0.621
n-Heptane	2.472	1.748	1.546
Methylcyclohexane	1.609	0.991	0.986
Toluene	1.346	0.691	0.774
Other C-8's	4.064	3.017	2.795
n-Octane	2.239	1.758	1.596
E-Benzene	0.453	0.268	0.300
M & P Xylenes	1.967	1.170	1.303
O-Xylene	0.610	0.356	0.404
Other C-9's	3.354	2.781	2.642
n-Nonane	1.862	1.606	1.490
Other C-10's	4.866	4.435	4.290
n-Decane	1.627	1.531	1.444
Undecanes (11)	5.222	4.883	4.791
Dodecanes (12)	4.236	4.279	4.255
Tridecanes (13)	4.012	4.345	4.381
Tetradecanes (14)	3.431	3.979	4.067
Pentadecanes (15)	3.083	3.831	3.964
Hexadecanes (16)	2.510	3.332	3.476
Heptadecanes (17)	2.279	3.200	3.370
Octadecanes (18)	2.096	3.098	3.282
Nonadecanes (19)	1.918	2.953	3.147
Eicosanes (20)	1.593	2.550	2.733
Heneicosanes (21)	1.367	2.302	2.482
Docosanes (22)	1.275	2.237	2.426
Tricosanes (23)	1.124	2.046	2.231
Tetracosanes (24)	0.997	1.880	2.060
Pentacosanes (25)	0.876	1.715	1.887
Hexacosanes (26)	0.804	1.629	1.801
Heptacosanes (27)	0.706	1.485	1.649
Octacosanes (28)	0.617	1.340	1.493
Nonacosanes (29)	0.560	1.302	1.455
Triacontanes (30)	0.439	1.016	1.139
Hentriacontanes Plus (31+)	2.953	9.777	11.517
Total	100.000	100.000	100.000

SGS LABORATORY REFERENCE NUMBER : **6894-250891**

Conoco Phillips

ID:	**Laird B1**	LINE PRESSURE:	**1060 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**112 F**
METER:	**High Pressure Separator**	CYLINDER NUMBER:	**0110**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/20/2011**	ANALYZED DATE:	**12/24/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

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Physical Properties per GPA 2145-09 — Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	
CARBON DIOXIDE	2.163	4.187	
METHANE	75.685	53.403	
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
HEXANES	0.733	2.778	0.302
HEPTANES PLUS	0.964	4.182	0.396
	100.000	100.000	6.428

BTU	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1310.2	1315.3
BTU @ 14.696 PSIA (SAT.)	1287.3	1292.9
Specific Gravity	0.7850	0.7878
Compressibility (Z)	0.9961	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	6.032
Propane & Heavier	2.881
Butane & Heavier	1.587
Pentane & Heavier	0.767
Total 26 psi Reid V.P. Gasoline GPM	1.791

Secondary BTU Psia Base	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1339.5	1344.8
BTU @ 15.025 PSIA (SAT.)	1316.1	1321.9
Compressibility (Z) at 15.025 =	0.9960	

Remarks:
Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6894-250891**

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: ########

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	0.018
CARBON DIOXIDE	2.163	4.187	0.370
METHANE	75.685	53.403	12.848
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
2,2-Dimethylbutane	0.025	0.093	0.010
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.248	0.940	0.103
3-Methylpentane	0.182	0.688	0.074
n-Hexane	0.279	1.057	0.115
2,2-Dimethylpentane	0.009	0.040	0.004
Methylcyclopentane	0.062	0.229	0.022
2,4-Dimethylpentane	0.001	0.004	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.034	0.117	0.010
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.137	0.507	0.047
2-Methylhexane	0.012	0.053	0.006
2,3-Dimethylpentane	0.071	0.313	0.032
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.010	0.044	0.005
l,t-3-Dimethylcyclopentane	0.006	0.026	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.009	0.039	0.004
l,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.135	0.595	0.062
Methylcyclohexane	0.092	0.397	0.037
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.003	0.015	0.001
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.005	0.025	0.003
Ethylcyclopentane	0.002	0.009	0.001
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3.Dimethylhexane	0.000	0.000	0.000
Toluene	0.132	0.535	0.044
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.033	0.166	0.017
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.002	0.010	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6894-250891**

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: #######

	MOL%	WEIGHT%	GPM @ 14.696
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
l,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.017	0.084	0.008
n-Octane	0.057	0.286	0.029
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.004	0.020	0.002
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.002	0.010	0.001
Isopropylcyclopentane	0.003	0.015	0.001
Dimethylheptanes & Trimethylhexanes	0.006	0.033	0.003
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.007	0.039	0.004
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.006	0.028	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.019	0.089	0.007
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.002	0.011	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.046	0.215	0.018
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.020	0.113	0.011
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.001	0.006	0.001
Isopropylcyclohexane	0.002	0.011	0.001
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.002	0.010	0.001
N-Propylcyclohexane	0.001	0.006	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.003	0.019	0.002
n-Propylbenzene	0.003	0.016	0.001
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyloctane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.004	0.025	0.002
	100.000	100.000	19.664

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6894-250891**

COMPANY: Conoco Phillips
AREA / FIELD: Eagleford
LEASE:

SAMPLE DATE: ########

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	22.736	98.624
Relative Density	0.3670	0.7618
Liquid Density (lbs/gal Absolute Density)	3.060	6.351
Liquid Density (lbs/gal Weight in Air)	3.057	6.345
Cu.Ft./Vapor / Gal. @ 14.696	51.074	24.437
Vapor Pressure @ 100° F	3889.010	1.010
API Gravity at 60° F	254.1	54.2
BTU / LB	21868	12034
BTU / GAL.	66890	72131
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1310.2	5205.2
Specific Gravity as a Vapor @ 14.696	0.7850	1.9341

Heavy End Grouping Breakdown

HEXANES	C6	0.733
HEPTANES	C7	0.486
OCTANES	C8	0.343
NONANES	C9	0.117
DECANES+	C10	0.018
	Total	1.697 Mol%

BTEX BREAKDOWN

	Mol%	WT.%
BENZENE	0.034	0.117
TOLUENE	0.132	0.535
ETHYLBENZENE	0.006	0.028
XYLENES	0.065	0.304
Total BTEX	**0.237**	**0.984**

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER : **6894-250891**

Conoco Phillips

ID:	**Laird B1**	LINE PRESSURE:	**1060 PSI**
AREA:	**Eagleford**	LINE TEMPERATURE:	**112 F**
METER:	**High Pressure Separator**	CYLINDER NUMBER:	**0110**
LEASE:		EFFECTIVE DATE:	
OPERATOR:		SAMPLED BY:	**Robert Hester**
STATION:		ANALYZED BY:	**Kerry Quave**
SAMPLE DATE:	**12/20/2011**	ANALYZED DATE:	**12/24/2011**
SAMPLE OF:	**Gas**	SAMPLE TYPE:	**Spot**

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Physical Properties per GPA 2145-09 — Calculations per GPA 2286-03

Note: Zero = Less than detection limit

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	
CARBON DIOXIDE	2.163	4.187	
METHANE	75.685	53.403	
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
'SOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
HEXANE	0.733	2.778	0.302
HEPTANE	0.486	1.967	0.194
OCTANE	0.343	1.527	0.141
NONANE	0.117	0.584	0.051
DECANE+	0.018	0.104	0.010
	100.000	100.000	6.428

BTU	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 14.696 PSIA (DRY)	1310.2	1315.3
BTU @ 14.696 PSIA (SAT.)	1287.3	1292.9
Specific Gravity	0.7850	0.7878
Compressibility (Z)	0.9961	

Gasoline Content (Gallons Per Thousand - GPM)

Ethane & Heavier	6.032
Propane & Heavier	2.881
Butane & Heavier	1.587
Pentane & Heavier	0.767
Total 26 psi Reid V.P. Gasoline GPM	1.791

Secondary BTU Psia Base	Vol. IDEAL Gas Fuel	Vol. Real Gas Fuel
BTU @ 15.025 PSIA (DRY)	1339.5	1344.8
BTU @ 15.025 PSIA (SAT.)	1316.1	1321.9
Compressibility (Z) at 15.025 =	0.9960	

Remarks:

Precision parameters apply to the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

Remarks:

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A Division of Apex Companies, LLC

FIGURE 6-1
H2S REPRESENTATIVE READING
Burlington Resources Oil & Gas Company LP
Standard Permit Registration
Borgfeld Unit A1 and Culpepper Unit A1
TITAN Project No. 84800507-72.004
August 2012
from USGS Quadrangle New Davey, Texas
Ground Condition Depicted October 2011
Digital Data Courtesy of ESRI Online Datasets