February 27, 2013

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 6 - PDR
1445 Ross Ave
Dallas, TX 75202

Re: Tribal Minor NSR Registration for Existing Sources
Williams Four Corners LLC – **Trunk E&H Receiver**

Dear Madam or Sir,

On behalf of Williams Four Corners LLC (Williams), Cirrus Consulting, LLC is pleased to submit this Registration for Existing Sources for the Williams Trunk E&H Receiver, located within the boundaries of the Jicarilla Apache Tribal Reservation boundaries in Rio Arriba County, New Mexico. This registration is submitted in accordance with the requirements of the Federal Minor New Source Review (NSR) program under 40 CFR 49.160(c)(1)(i) for facilities located in Indian Country.

A copy of this registration is also being provided to the Jicarilla Apache Tribe Environmental Programs Division at the address indicated below.

Please note that in March of 2010, Williams submitted a Part 71 Title V Operating Permit application for the Trunk E&H Receiver to EPA Region 6. However, at this time, no Operating Permit has been received. The regulation states, at §49.160(b)(ii), that a source is exempt from registration if it has a Part 71 permit, but does not state exemption if the source has applied for, but not yet received, a Part 71 permit.

Thank you for your help in this matter. If you have any questions with regard to this registration, please contact Danell Zawaski of Williams at (505) 634-4951.

Sincerely,

Lisa Killion

Lisa Killion
Sr. Environmental Scientist

Attachment (CD)

Cc: Jicarilla Apache Tribe, Environmental Programs Division, P.O. Box 507, Dulce, NM 87528
Danell Zawaski, Williams Four Corners LLC (via email to danell.zawaski@williams.com)
Bobby Myers, Cirrus Consulting, LLC, 951 Diestel Road, Salt Lake City, UT 84105

Cirrus Consulting, LLC
3 Herrada Terrace
Santa Fe, New Mexico 87508

Tel: (505) 466-1790
Fax: (505) 466-4599
lkillion@cirrusllc.com

OMB Control No. 2060-0003
Approval expires 04/30/2012

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY
40 CFR 49.151

Registration for Existing Sources
(FORM REG)

Please submit information to following:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 6 - PDR
1445 Ross Ave
Dallas, TX 75202
http://yosemite.epa.gov/r6/Apermit.nsf/AirP

The Tribal Environmental Contact for Region 6
http://www.epa.gov/region06/6dra/oejta/index.html

For more information, visit:
http://www.epa.gov/air/tribal/tribalnsr.html

A. GENERAL SOURCE INFORMATION

1. Company Name	**2. Source Name**
Williams Four Corners LLC	Trunk E&H Receiver
3. Type of Operation	**4. Portable Source?** ☐ **Yes** ☒ **No** **5. Temporary Source?** ☐ **Yes** ☒ **No**
Liquid receiving	
6. NAICS Code	**7. SIC Code**
213112	1389

8. Physical Address (home base for portable sources)
Jicarilla Apache Tribal Reservation
Township 26 North, Range 03 West, Section 07†
Rio Arriba County, New Mexico

9. Reservation*	**10. County***	**11a. Latitude***	**11b. Longitude***
Jicarilla Apache Indian Tribe Reservation	Rio Arriba County	36° 29’ 56.00”	-107° 11’ 26.12”
12a. Quarter-Quarter Section*	**12b. Section***	**12c. Township***	**12d. Range***
SW4/ NW4†	07†	26 North†	03 West†

* Provide all locations of operation for portable sources

† **Township/Range/Section (T/R/S) location extrapolated from Public Lands Survey System (PLSS) based on mapping of neighbor T/R/S.**

B. CONTACT INFORMATION

1. Owner Name Williams Four Corners LLC – Don Wicburg		Title Vice President & General Manager, Four Corners Area
Mailing Address 188 County Road 4900, Bloomfield, NM 87413		
Email Address Don.Wicburg@Williams.com		
Telephone Number 505-632-4628	Facsimile Number 505-632-4782	
2. Operator Name (if different from owner) Same as owner		Title
Mailing Address		
Email Address		
Telephone Number	Facsimile Number	
3. Source Contact Danell Zawaski		Title Environmental Specialist
Mailing Address 188 County Road 4900, Bloomfield, NM 87413		
Email Address Danell.Zawaski@Williams.com		
Telephone Number 505-634-4951	Facsimile Number 505-632-4782	
4. Compliance Contact Same as Source Contact	Title	
Mailing Address		
Email Address		
Telephone Number	Facsimile Number	

C. ATTACHMENTS

Include all of the following information as attachments to this form

☒ Narrative description of the operations

☒ Identification and description of all emission units and air pollution generating activities (with the exception of the exempt emissions units and activities listed in §49.153(c)

☒ Identification and description of any existing air pollution control equipment and compliance monitoring devices or activities

☒ Type and amount of each fuel used

☒ Type raw materials used

☒ Production Rates

☒ Operating Schedules

☒ Any existing limitations on source operations affecting emissions or any work practice standards, where applicable, for all regulated NSR pollutants at your source.

☒ Total allowable (potential to emit if there are no legally and practically enforceable restrictions) emissions from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

☒ Estimates of the total actual emissions from the air pollution source for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

☐ Other

D. TABLE OF ESTIMATED EMISSIONS

The following estimates of the total emissions in tons/year for all pollutants contained in your worksheet stated above should be provided.

Pollutant	Total Actual Emissions (tpy)	Total Allowable or Potential Emissions (TPY)	
PM	**0.03**	**0.03**	PM - Particulate Matter PM_{10} - Particulate Matter less than 10 microns in size $PM_{2.5}$ - Particulate Matter less than 2.5 microns in size SOx - Sulfur Oxides NOx - Nitrogen Oxides CO - Carbon Monoxide VOC - Volatile Organic Compound Pb - Lead and lead compounds Fluorides - Gaseous and particulates H_2SO_4 - Sulfuric Acid Mist H_2S - Hydrogen Sulfide TRS - Total Reduced Sulfur RSC - Reduced Sulfur Compounds
PM_{10}	**0.03**	**0.03**	
$PM_{2.5}$	**0.03**	**0.03**	
SO_X	**0.00**	**0.00**	
NO_X	**0.40**	**0.40**	
CO	**0.34**	**0.34**	
VOC	**224.53**	**224.53**	
Pb	**N/A**	**N/A**	
Fluorides	**N/A**	**N/A**	
H_2SO_4	**N/A**	**N/A**	
H_2S	**N/A**	**N/A**	
TRS	**N/A**	**N/A**	
RSC	**N/A**	**N/A**	

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

Narrative Description of Operations

The Trunk E&H Receiver is located in northern New Mexico, within the boundaries of the Jicarilla Apache Tribal Reservation, located in the jurisdiction of United States Environmental Protection Agency (USEPA) Region 6. The station is an existing true minor NSR source, as defined in 40 CFR 49, Subpart C. The potential to emit of regulated contaminants from all sources at the facility exceeds the minor NSR thresholds in Table 1 to §49.153.

Liquids from the pigging of a natural gas gathering line are intermittently received at WFC's Trunk E&H Receiver facility. The liquids are automatically transferred from the receiver to a pressurized bullet tank. With the manual opening of a valve on the pressurized bullet tank, the liquids (including condensate and produced water) are transferred by pressure into a condensate tank. The condensate tank is plumbed in series to two additional condensate tanks. Tank flash emissions occur as the liquids are transferred from the pressurized bullet tank to the atmospheric pressure of the storage tank, releasing volatile organic compounds (VOC) to the atmosphere. As needed, the contents of the condensate tanks are loaded onto truck(s) for sale or appropriate disposal. The produced water that separates from the condensate is drawn off the condensate tank by gravity feed into one of two produced water tanks. As needed, the contents of the produced water tanks are also loaded onto trucks for appropriate disposal.

Six catalytic heaters located at the site are used to prevent liquids from freezing in the system.

Emission Units and Air Pollution Generating Activities

The Trunk E&H Receiver facility includes the following equipment and emissions sources:

One pressurized bullet tank and three 300-barrel condensate storage tanks (Unit TK-CAP); one 80-barrel produced water tank (Unit TK-4); one 90-barrel produced water tank (Unit TK-5); three storage tank heaters; six 12,000 BTU per hour (Btu/hr) catalytic heaters (Units HTR-1–HTR-6); fugitive emissions from piping components (including equipment leaks from valves, flanges seals, etc.) (Unit F-1); fugitive emissions from pig receiver venting (Unit F-2); truck loading emissions (Unit L-1); and emissions from seven pneumatic devices; and one pneumatic pump.

Air Pollution Control Equipment and Monitoring Devices

The Trunk E&H Receiver utilizes no air pollution control equipment or compliance monitoring devices.

Fuel, Raw Materials, Production Rates, and Operating Schedules

Fuel use and heater heat capacities are provided on the attached emissions calculations worksheets. The facility operates up to 24 hours per day, seven days per week, 52 weeks per year.

Source Operations Limitations

There are no existing limitations on source operations affecting emissions or any work practice standards.

Potential and Actual Emissions Calculations

As the facility is designed to run continuously, actual emissions are estimated as equal to potential emissions. Please see the attached emissions calculations worksheets. Supporting documentation is included.

Other

In March 2010, WFC submitted a Part 71 Operating Permit application to USEPA Region 6. Currently, no operating permit has been received.

Storage Tank Emissions Data and Calculations

Unit Number: Storage Tanks
Description: Storage Tanks

Source	Working/Breathing Losses (lb/yr)	Working/Breathing Losses (ton/yr)	Working/Breathing Losses With Safety Factor (lb/yr)	Working/Breathing Losses With Safety Factor (ton/yr)	Flash Losses (ton/yr)	Flash Losses With Safety Factor (ton/yr)	Total Emissions (ton/yr)
TK-CAP (Bullet tank & 3x300 bbl condensate tanks)							
VOC*	9,050.07	4.53E+00	9,095.32	4.55	198.77	199.76	204.31
Benzene	56.07	2.80E-02	5.64E+01	2.82E-02	7.28E-01	7.32E-01	7.60E-01
Ethylbenzene	0.84	4.20E-04	8.44E-01	4.22E-04	1.80E-02	1.81E-02	1.85E-02
Toluene	47.86	2.39E-02	4.81E+01	2.40E-02	7.97E-01	8.01E-01	8.25E-01
Xylene	5.56	2.78E-03	5.59E+00	2.79E-03	1.42E-01	1.43E-01	1.46E-01
n-Hexane	966.73	4.83E-01	9.72E+02	4.86E-01	4.68E+00	4.71E+00	5.19E+00
2,2,4-Trimethylpentane	31.96	1.60E-02	3.21E+01	1.61E-02	3.78E-01	3.80E-01	3.96E-01
TK-4 (80 bbl Prod. Water tank)							
VOC*	2.96	1.48E-03	2.97	0.00	0.00	0.00	1.49E-03
Benzene	0.02	1.00E-05	2.01E-02	1.01E-05	0.00E+00	0.00E+00	1.01E-05
Ethylbenzene	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.02	1.00E-05	2.01E-02	1.01E-05	0.00E+00	0.00E+00	1.01E-05
Xylene	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.31	1.55E-04	3.12E-01	1.56E-04	0.00E+00	0.00E+00	1.56E-04
2,2,4-Trimethylpentane	0.01	5.00E-06	1.01E-02	5.03E-06	0.00E+00	0.00E+00	5.03E-06
TK-5 (90 bbl Prod. Water tank)							
VOC*	2.96	1.48E-03	2.97	0.00	0.00	0.00	1.49E-03
Benzene	0.02	1.00E-05	2.01E-02	1.01E-05	0.00E+00	0.00E+00	1.01E-05
Ethylbenzene	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.02	1.00E-05	2.01E-02	1.01E-05	0.00E+00	0.00E+00	1.01E-05
Xylene	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.31	1.55E-04	3.12E-01	1.56E-04	0.00E+00	0.00E+00	1.56E-04
2,2,4-Trimethylpentane	0.01	5.00E-06	1.01E-02	5.03E-06	0.00E+00	0.00E+00	5.03E-06

Working/breathing losses are calculated using TANKS 4.0.
Flash emissions are calculated using E&P TANK Version 2.0
* Produced Water storage tank emissions of VOC = Total annual emissions - water vapor emissions.

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* Project Setup Information *
****

Project File : C:\backup\aaWilliams Four Corners\NewMexico\permitting\E&H receiver\2009 Dec tank fl
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 0.0%
Known Separator Stream : High Pressure Oil
Entering Air Composition : No

Filed Name : E&H Receiver E&P Tank run for Part 71 application
Well Name : 11/17/09 hi-pressure condensate analysis
Well ID : actual throughput + safety factor
Date : 2010.01.15

****
* Data Input *
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Separator Pressure : 150.00[psig]
Separator Temperature : 70.00[F]
Ambient Pressure : 13.00[psia]
Ambient Temperature : 70.00[F]
C10+ SG : 0.7564
C10+ MW : 180.97

-- High Pressure Oil ----------

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0862
4	N2	0.0072
5	C1	3.8667
6	C2	3.6883
7	C3	6.2204
8	i-C4	2.7196
9	n-C4	6.5096
10	i-C5	5.7996
11	n-C5	6.0596
12	C6	7.8620
13	C7	26.7146
14	C8	7.7809
15	C9	2.9126
16	C10+	5.6227
17	Benzene	1.0679
18	Toluene	3.7880
19	E-Benzene	0.2467
20	Xylenes	2.2180
21	n-C6	5.7549
22	224Trimethylp	1.0745

-- Sales Oil ----------
Production Rate : 89[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 69.9
Reid Vapor Pressure : 14.769[psia]

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* Calculation Results *
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-- Emission Summary ----------

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]

Total HAPs	6.750	1.541	6.750	1.541
Total HC	274.790	62.737	274.790	62.737
VOCs, C2+	244.516	55.826	244.516	55.826
VOCs, C3+	198.177	45.246	198.177	45.246

Uncontrolled Recovery Info.

Vapor	14.5500	[MSCFD]
HC Vapor	14.4600	[MSCFD]
GOR	163.67	[SCF/bbl]

-- Emission Composition ----------

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
1	H2S	0.000	0.000	0.000	0.000
2	O2	0.000	0.000	0.000	0.000
3	CO2	1.785	0.408	1.785	0.408
4	N2	0.098	0.022	0.098	0.022
5	C1	30.274	6.912	30.274	6.912
6	C2	46.339	10.580	46.339	10.580
7	C3	73.437	16.766	73.437	16.766
8	i-C4	23.119	5.278	23.119	5.278
9	n-C4	41.322	9.434	41.322	9.434
10	i-C5	19.375	4.424	19.375	4.424
11	n-C5	14.893	3.400	14.893	3.400
12	C6	8.128	1.856	8.128	1.856
13	C7	10.033	2.291	10.033	2.291
14	C8	0.984	0.225	0.984	0.225
15	C9	0.132	0.030	0.132	0.030
16	C10+	0.009	0.002	0.009	0.002
17	Benzene	0.728	0.166	0.728	0.166
18	Toluene	0.797	0.182	0.797	0.182
19	E-Benzene	0.018	0.004	0.018	0.004
20	Xylenes	0.142	0.032	0.142	0.032
21	n-C6	4.682	1.069	4.682	1.069
22	224Trimethylp	0.378	0.086	0.378	0.086
	Total	276.673	63.167	276.673	63.167

-- Stream Data ----------

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0862	0.0094	0.0037	0.5680	0.8238	0.5786
4	N2	28.01	0.0072	0.0001	0.0000	0.0519	0.0110	0.0502
5	C1	16.04	3.8667	0.1508	0.0031	27.1640	21.4165	26.9257
6	C2	30.07	3.6883	0.7983	0.6221	21.8079	26.1536	21.9881
7	C3	44.10	6.2204	3.4279	3.2812	23.7284	24.5408	23.7621
8	i-C4	58.12	2.7196	2.2488	2.2244	5.6714	5.7634	5.6753
9	n-C4	58.12	6.5096	5.9309	5.9007	10.1379	10.2799	10.1438
10	i-C5	72.15	5.7996	6.1138	6.1294	3.8296	3.8749	3.8315
11	n-C5	72.15	6.0596	6.5566	6.5814	2.9438	2.9795	2.9453
12	C6	86.16	7.8620	8.8959	8.9480	1.3799	1.3980	1.3806
13	C7	100.20	26.7146	30.7403	30.9435	1.4750	1.4973	1.4759
14	C8	114.23	7.7809	9.0018	9.0634	0.1264	0.1286	0.1265
15	C9	128.28	2.9126	3.3747	3.3981	0.0152	0.0166	0.0153
16	C10+	180.97	5.6227	6.5194	6.5647	0.0007	0.0007	0.0007
17	Benzene	78.11	1.0679	1.2170	1.2245	0.1330	0.1349	0.1330
18	Toluene	92.13	3.7880	4.3725	4.4020	0.1234	0.1255	0.1235
19	E-Benzene	106.17	0.2467	0.2857	0.2876	0.0025	0.0025	0.0025
20	Xylenes	106.17	2.2180	2.5687	2.5864	0.0191	0.0195	0.0191
21	n-C6	86.18	5.7549	6.5492	6.5893	0.7747	0.7853	0.7752
22	224Trimethylp	114.24	1.0745	1.2384	1.2466	0.0471	0.0479	0.0472
	MW		86.47	93.98	94.35	39.43	40.52	39.48
	Stream Mole Ratio		1.0000	0.8624	0.8565	0.1376	0.0060	0.1435
	Heating Value	[BTU/SCF]				2245.58	2298.73	2247.78
	Gas Gravity	[Gas/Air]				1.36	1.40	1.36
	Bubble Pt. @ 100F	[psia]	154.75	23.35	17.82			

RVP @ 100F	[psia]	52.89	16.43	14.87
Spec. Gravity @ 100F		0.650	0.664	0.664

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	300 bbl Condensate Tank1
City:	Bloomfield
State:	New Mexico
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Trunk E&H Receiver

Tank Dimensions

Shell Height (ft):	15.00
Diameter (ft):	13.00
Liquid Height (ft) :	14.00
Avg. Liquid Height (ft):	7.00
Volume (gallons):	12,600.00
Turnovers:	108.00
Net Throughput(gal/yr):	1,360,800.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

300 bbl Condensate Tank1 - Vertical Fixed Roof Tank
Bloomfield, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Condensate	All	67.36	53.93	80.79	59.23	5.4792	4.1752	7.0814	65.2873			92.21	
2,2,4-Trimethylpentane						0.7338	0.4989	1.0546	114.2300	0.0187	0.0035	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.4274	0.9846	2.0237	78.1100	0.0168	0.0062	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Butane						29.9323	23.3587	37.8099	58.1300	0.0395	0.3047	58.13	Option 1: VP60 = 26.098 VP70 = 31.306
Decane (-n)						0.0395	0.0291	0.0536	142.2900	0.0722	0.0007	142.29	Option 1: VP60 = .033211 VP70 = .041762
Ethane						544.1363	461.6503	637.0970	30.0700	0.0002	0.0276	30.07	Option 1: VP60 = 497.04 VP70 = 561.01
Ethylbenzene						0.1396	0.0876	0.2162	106.1700	0.0026	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Heptane (-n)						0.7600	0.5088	1.1128	100.2000	0.3471	0.0680	100.20	Option 3: A=37358, B=8.2585
Hexane (-n)						2.3100	1.6303	3.2059	86.1700	0.1794	0.1068	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Iso-Butane						43.3101	34.4054	53.8156	58.1300	0.0128	0.1432	58.13	Option 1: VP60 = 38.144 VP70 = 45.161
Isopentane						11.8640	8.7212	15.5743	72.1500	0.0590	0.1804	72.15	Option 1: VP60 = 10.005 VP70 = 12.53
Nonane (-n)						0.0784	0.0568	0.1080	128.2600	0.0245	0.0005	128.26	Option 1: VP60 = .065278 VP70 = .08309
Octane (-n)						0.1769	0.1254	0.2493	114.2300	0.0854	0.0039	114.23	Option 1: VP60 = .145444 VP70 = .188224
Pentane (-n)						8.0308	5.9649	10.6537	72.1500	0.0645	0.1336	72.15	Option 3: A=27691, B=7.558
Propane						8.0096	5.9944	10.6440	72.1500	0.0072	0.0148	72.15	Option 1: VP60 = 6.828 VP70 = 8.433
Toluene						0.4136	0.2726	0.6120	92.1300	0.0496	0.0053	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Xylene (-m)						0.1165	0.0728	0.1813	106.1700	0.0204	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

300 bbl Condensate Tank1 - Vertical Fixed Roof Tank
Bloomfield, New Mexico

Annual Emission Calcaulations

Standing Losses (lb):	3,898.9098
Vapor Space Volume (cu ft):	1,061.8583
Vapor Density (lb/cu ft):	0.0633
Vapor Space Expansion Factor:	0.5285
Vented Vapor Saturation Factor:	0.3009
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,061.8583
Tank Diameter (ft):	13.0000
Vapor Space Outage (ft):	8.0000
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.0000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0000
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0000
Shell Radius (ft):	6.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0633
Vapor Molecular Weight (lb/lb-mole):	65.2873
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.4792
Daily Avg. Liquid Surface Temp. (deg. R):	527.0322
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.9042
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.5285
Daily Vapor Temperature Range (deg. R):	53.7176
Daily Vapor Pressure Range (psia):	2.9062
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.4792
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.1752
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	7.0814
Daily Avg. Liquid Surface Temp. (deg R):	527.0322
Daily Min. Liquid Surface Temp. (deg R):	513.6028
Daily Max. Liquid Surface Temp. (deg R):	540.4617
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.3009
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	5.4792

Vapor Space Outage (ft):	8.0000
Working Losses (lb):	5,151.1602
Vapor Molecular Weight (lb/lb-mole):	65.2873
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.4792
Annual Net Throughput (gal/yr.):	1,360,800.0000
Annual Turnovers:	108.0000
Turnover Factor:	0.4444
Maximum Liquid Volume (gal):	12,600.0000
Maximum Liquid Height (ft):	14.0000
Tank Diameter (ft):	13.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	9,050.0701

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

300 bbl Condensate Tank1 - Vertical Fixed Roof Tank
Bloomfield, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Condensate	5,151.16	3,898.91	9,050.07
	142.35	107.75	250.10
Ethane / Propane	76.39	57.82	134.21
	1,569.44	1,187.91	2,757.34
Butane / Iso-Butane	737.63	558.31	1,295.95
Pentane (-n)	688.26	520.94	1,209.20
	929.16	703.28	1,632.45
Isopentane / Hexane (-n)	550.25	416.48	966.73
Heptane (-n)	350.28	265.13	615.40
Octane (-n)	20.07	15.19	35.26
Nonane (-n)	2.55	1.93	4.48
Decane (-n)	3.79	2.87	6.66
	31.91	24.16	56.07
Benzene / Toluene	27.24	20.62	47.86
Ethylbenzene	0.48	0.36	0.84
Xylene (-m)	3.16	2.39	5.56
2,2,4-Trimethylpentane	18.19	13.77	31.96

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	3780 gal Produced Water Tank (90 bbl)
City:	Bloomfield
State:	New Mexico
Company:	Williams
Type of Tank:	Vertical Fixed Roof Tank
Description:	Trunk E&H Receiver

Tank Dimensions

Shell Height (ft):	8.00
Diameter (ft):	9.00
Liquid Height (ft) :	8.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	3,760.00
Turnovers:	26.00
Net Throughput(gal/yr):	97,760.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

3780 gal Produced Water Tank (90 bbl) - Vertical Fixed Roof Tank
Bloomfield, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Produced Water	All	67.36	53.93	80.79	59.23	0.3445	0.2162	0.5347	19.4760			18.15	
2,2,4-Trimethylpentane						0.7338	0.4989	1.0546	114.2300	0.0002	0.0004	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.4274	0.9846	2.0237	78.1100	0.0002	0.0006	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Butane						29.9323	23.3587	37.8099	58.1300	0.0004	0.0320	58.13	Option 1: VP60 = 26.098 VP70 = 31.306
Decane (-n)						0.0395	0.0291	0.0536	142.2900	0.0007	0.0001	142.29	Option 1: VP60 = .033211 VP70 = .041762
Ethane						544.1363	461.6503	637.0970	30.0700	0.0000	0.0029	30.07	Option 1: VP60 = 497.04 VP70 = 561.01
Ethylbenzene						0.1396	0.0876	0.2162	106.1700	0.0000	0.0000	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Heptane (-n)						0.7600	0.5088	1.1128	100.2000	0.0035	0.0071	100.20	Option 3: A=37358, B=8.2585
Hexane (-n)						2.3100	1.6303	3.2059	86.1700	0.0018	0.0110	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Iso-Butane						43.3101	34.4054	53.8156	58.1300	0.0001	0.0150	58.13	Option 1: VP60 = 38.144 VP70 = 45.161
Isopentane						11.8640	8.7212	15.5743	72.1500	0.0006	0.0189	72.15	Option 1: VP60 = 10.005 VP70 = 12.53
Nonane (-n)						0.0784	0.0568	0.1080	128.2600	0.0002	0.0001	128.26	Option 1: VP60 = .065278 VP70 = .08309
Octane (-n)						0.1769	0.1254	0.2493	114.2300	0.0009	0.0004	114.23	Option 1: VP60 = .145444 VP70 = .188224
Pentane (-n)						8.0308	5.9649	10.6537	72.1500	0.0006	0.0140	72.15	Option 3: A=27691, B=7.558
Propane						8.0096	5.9944	10.6440	72.1500	0.0001	0.0016	72.15	Option 1: VP60 = 6.828 VP70 = 8.433
Toluene						0.4136	0.2726	0.6120	92.1300	0.0005	0.0006	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Water						0.3344	0.2084	0.5218	18.0000	0.9900	0.8953	18.00	Option 1: VP60 = .255246 VP70 = .362758
Xylene (-m)						0.1165	0.0728	0.1813	106.1700	0.0002	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

3780 gal Produced Water Tank (90 bbl) - Vertical Fixed Roof Tank
Bloomfield, New Mexico

Annual Emission Calcaulations

Standing Losses (lb):	12.7147
Vapor Space Volume (cu ft):	254.4690
Vapor Density (lb/cu ft):	0.0012
Vapor Space Expansion Factor:	0.1238
Vented Vapor Saturation Factor:	0.9319
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	254.4690
Tank Diameter (ft):	9.0000
Vapor Space Outage (ft):	4.0000
Tank Shell Height (ft):	8.0000
Average Liquid Height (ft):	4.0000
Roof Outage (ft):	0.0000
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.0000
Roof Height (ft):	0.0000
Roof Slope (ft/ft):	0.0000
Shell Radius (ft):	4.5000
Vapor Density	
Vapor Density (lb/cu ft):	0.0012
Vapor Molecular Weight (lb/lb-mole):	19.4760
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.3445
Daily Avg. Liquid Surface Temp. (deg. R):	527.0322
Daily Average Ambient Temp. (deg. F):	56.1542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.9042
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,765.3167
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.1238
Daily Vapor Temperature Range (deg. R):	53.7176
Daily Vapor Pressure Range (psia):	0.3184
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.3445
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.2162
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.5347
Daily Avg. Liquid Surface Temp. (deg R):	527.0322
Daily Min. Liquid Surface Temp. (deg R):	513.6028
Daily Max. Liquid Surface Temp. (deg R):	540.4617
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9319
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.3445

Vapor Space Outage (ft):	4.0000
Working Losses (lb):	15.6174
Vapor Molecular Weight (lb/lb-mole):	19.4760
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.3445
Annual Net Throughput (gal/yr.):	97,760.0000
Annual Turnovers:	26.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	3,760.0000
Maximum Liquid Height (ft):	8.0000
Tank Diameter (ft):	9.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	28.3320

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

3780 gal Produced Water Tank (90 bbl) - Vertical Fixed Roof Tank
Bloomfield, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Produced Water	15.62	12.71	28.33
	13.98	11.38	25.37
Water Iso-Butane	0.23	0.19	0.43
	0.30	0.24	0.54
Isopentane Pentane (-n)	0.22	0.18	0.40
	0.01	0.01	0.02
Benzene Toluene	0.01	0.01	0.02
Ethylbenzene	0.00	0.00	0.00
Xylene (-m)	0.00	0.00	0.00
2,2,4-Trimethylpentane	0.01	0.00	0.01
	0.05	0.04	0.08
Ethane Propane	0.02	0.02	0.04
Hexane (-n)	0.17	0.14	0.31
Heptane (-n)	0.11	0.09	0.20
Octane (-n)	0.01	0.01	0.01
Nonane (-n)	0.00	0.00	0.00
Decane (-n)	0.00	0.00	0.00
	0.50	0.41	0.91

Butane

Heater Exhaust Emissions Data and Calculations

Unit Number: HTR-1, HTR-2, HTR-3, HTR-4 (& HTR-5, HTR-6)
Description: Heaters

Note: Where more than one emissions unit is identified above, this worksheet provides the emission rates and operating parameters for each individual emissions unit.

Fuel Consumption

0.012	MMBtu/hr	Capacity	Mfg. data
13	scf/hr	Hourly fuel consumption	MMBtu/hr x 1,000,000 / Btu/scf
105	MMBtu/yr	Annual fuel consumption	MMBtu/hr x 8,760 hr/yr
0.12	MMscf/yr	Annual fuel consumption	scf/hr x 8,760 hr/yr / 1,000,000
900	Btu/scf	Field gas heating value	Nominal heat content

Steady-State Emission Rates

Pollutant	Uncontrolled, lb/MMscf	pph	tpy
NOX	100	1.33E-03	5.84E-03
CO	84	1.12E-03	4.91E-03
VOC	5.5	7.33E-05	3.21E-04
SO2	0.6	8.00E-06	3.50E-05
TSP	7.60	1.01E-04	4.44E-04
PM10	7.60	1.01E-04	4.44E-04
PM2.5	7.60	1.01E-04	4.44E-04
Lead	5.00E-04	6.67E-09	2.92E-08

Emission factors (lb/MMBtu) taken from AP-42, Tables 1.4-1 & 1.4-2

Annual emissions based on 8,760 hr/yr operation

Heater Exhaust Emissions Data and Calculations

Unit Number: Three (3) storage tank heaters
Description: Storage tank heaters

Note: Where more than one emissions unit is identified above, this worksheet provides the emission rates and operating parameters for each individual emissions unit.

Fuel Consumption

0.25	MMBtu/hr	Capacity	Estimated based on similar units
278	scf/hr	Hourly fuel consumption	MMBtu/hr x 1,000,000 / Btu/scf
2,190	MMBtu/yr	Annual fuel consumption	MMBtu/hr x 8,760 hr/yr
2.43	MMscf/yr	Annual fuel consumption	scf/hr x 8,760 hr/yr / 1,000,000
900	Btu/scf	Field gas heating value	Nominal heat content

Steady-State Emission Rates

Pollutant	Uncontrolled, lb/MMscf	pph	tpy
NOX	100	2.78E-02	1.22E-01
CO	84	2.33E-02	1.02E-01
VOC	5.5	1.53E-03	6.69E-03
SO2	0.6	1.67E-04	7.30E-04
TSP	7.60	2.11E-03	9.25E-03
PM10	7.60	2.11E-03	9.25E-03
PM2.5	7.60	2.11E-03	9.25E-03
Lead	5.00E-04	1.39E-07	6.08E-07

Emission factors (lb/MMBtu) taken from AP-42, Tables 1.4-1 & 1.4-2

Annual emissions based on 8,760 hr/yr operation

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_x emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_x emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. 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 1b/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. $CO_2[lb/10^6 \text{ scf}] = (3.67)(CON)(C)(D)$, 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.

Loading Rack Emissions Data and Calculations

Unit Number: L-1
Description: Loading Rack

Emission Factor

$$L = 12.46 \frac{SPM}{T}$$

0.6		Saturation factor, S	AP-42, Table 5.2-1 (submerged loading & dedicated service)
9.46	psia	True vapor pressure of liquid, P	11/17/09 E&H RVP of 14.77 & Conway conversion table
91.4	lb/lb-mole	Molecular weight of vapors, M	MW of 11/17/09 E&H condensate analysis
70	°F	Temperature of liquid	Annual mean avg. temp (from 2010 appl.)
529.67	°R	Temperature of liquid, T	Carried forward from 2010 Title V application
12.20	lb/10^3 gal	Emission factor, L	AP-42, Section 5.2, Equation 1

Production Rate

5.00	10^3 gal/hr	Maximum hourly production rate	WFC
1,360.8	10^3 gal/yr	Maximum annual production rate	WFC

Steady-State Emission Rates

Pollutant	Uncontrolled, pph	Uncontrolled, tpy
VOC	61.02	8.30

Pollutant	Uncontrolled %	Uncontrolled pph	Uncontrolled tpy
n-Hexane	0.1794	1.09E-01	1.49E-02
2,2,4-Trimethylpentane	0.0187	1.14E-02	1.55E-03
Benzene	0.0168	1.03E-02	1.40E-03
Toluene	0.0496	3.03E-02	4.12E-03
Ethylbenzene	0.0026	1.59E-03	2.16E-04
Xylenes	0.0204	1.24E-02	1.69E-03

Pollutant percentages are estimated from the TANKS 4.0 results
Emissions are calculated as percentages of the VOC emissions

loading operation, resulting in high levels of vapor generation and loss. If the turbulence is great enough, liquid droplets will be entrained in the vented vapors.

A second method of loading is submerged loading. Two types 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 recent loading history of a cargo carrier is just as important a factor in loading losses as the method of loading. If the carrier has carried a nonvolatile liquid such as fuel oil, or has just been cleaned, it will contain vapor-free air. If it has just carried gasoline and has not been vented, the air in the carrier tank will contain volatile organic vapors, which will be expelled during the loading operation along with newly generated vapors.

Cargo carriers are sometimes designated to transport only one product, and in such cases are practicing "dedicated service". Dedicated gasoline cargo tanks return to a loading terminal containing air fully or partially saturated with vapor from the previous load. Cargo tanks may also be "switch loaded" with various products, so that a nonvolatile product being loaded may expel the vapors remaining from a previous load of a volatile product such as gasoline. These circumstances vary with the type of cargo tank and with the ownership of the carrier, the petroleum liquids being transported, geographic location, and season of the year.

One control measure for vapors displaced during liquid loading is called "vapor balance service", in which the cargo tank retrieves the vapors displaced during product unloading at bulk plants or service stations and transports the vapors back to the loading terminal. Figure 5.2-5 shows a tank truck in vapor balance service filling a service station underground tank and taking on displaced gasoline vapors for return to the terminal. A cargo tank returning to a bulk terminal in vapor balance service normally is saturated with organic vapors, and the presence of these vapors at the start of submerged loading of the tanker truck results in greater loading losses than encountered during nonvapor balance, or "normal", service. Vapor balance service is usually not practiced with marine vessels, although some vessels practice emission control by means of vapor transfer within their own cargo tanks during ballasting operations, discussed below.

Emissions from loading petroleum liquid can be estimated (with a probable error of ±30 percent)[4] using the following expression:

$$L_L = 12.46 \frac{SPM}{T} \quad (1)$$

where:

L_L = loading loss, pounds per 1000 gallons ($lb/10^3$ 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 Figure 7.1-5, Figure 7.1-6, and Table 7.1-2)
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Table 7.1-2)
T = temperature of bulk liquid loaded, °R (°F + 460)

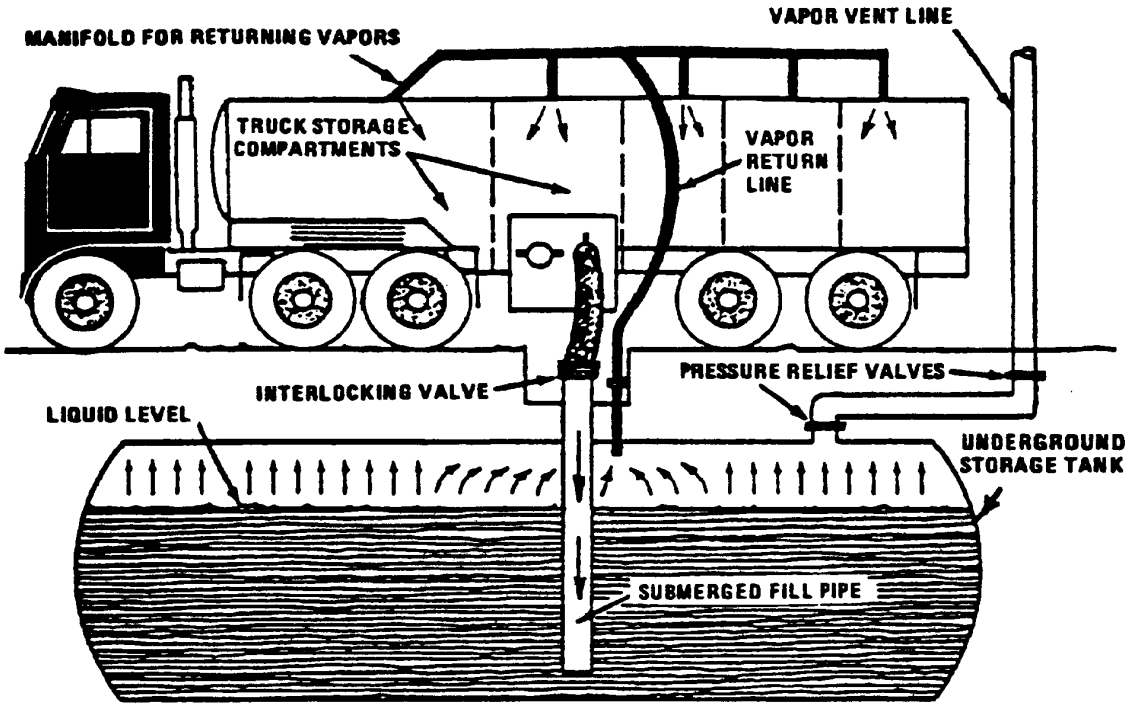

Figure 5.2-5. Tank truck unloading into a service station underground storage tank and practicing "vapor balance" form of emission control.

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

Cargo Carrier	Mode Of Operation	S Factor
Tank trucks and rail tank cars	Submerged loading of a clean cargo tank	0.50
	Submerged loading: dedicated normal service	0.60
	Submerged loading: dedicated vapor balance service	1.00
	Splash loading of a clean cargo tank	1.45
	Splash loading: dedicated normal service	1.45
	Splash loading: dedicated vapor balance service	1.00
Marine vessels[a]	Submerged loading: ships	0.2
	Submerged loading: barges	0.5

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

Equipment Leaks Emissions Data and Calculations

Unit Number: F-1
Description: Valves, Connectors, Seals & Open-Ended Lines

Equipment	Number of Components, #	Emission Factor, kg/hr/source	Emission Factor, lb/hr/source	TOC Emission Rate, pph	TOC Emission Rate, tpy
Valves	189	4.50E-03	0.0099	1.87	8.20
Connectors	111	2.00E-04	0.0004	0.05	0.21
Pump Seals	0	2.40E-03	0.0053	0.00	0.00
Compressor Seals (Others)	24	8.80E-03	0.0194	0.46	2.04
Pressure Relief Valves (Others)	7	8.80E-03	0.0194	0.14	0.59
Open-Ended Lines	58	2.00E-03	0.0044	0.26	1.12
TOTAL				**2.78**	**12.16**

Emission factors are from the EPA "1995 Protocol for Equipment Leak Emission Estimates" for natural gas.
Annual emissions are calculated assuming 8,760 hours per year of operation

Component	Mole Percent, %	Molecular Weight, lb/lb-mole	Component Weight, lb/lb-mole	Weight Percent TOC, %	VOC Emission Rate, pph	VOC Emission Rate, tpy
Carbon dioxide	0.5959	44.010	--	--	--	--
Hydrogen sulfide	0.0000	34.070	--	--	--	--
Nitrogen	0.4147	28.013	--	--	--	--
Methane	78.1863	16.043	1254.343	59.204	--	--
Ethane	10.8807	30.070	327.183	15.443	--	--
Propane	5.6746	44.097	250.233	11.811	3.28E-01	1.44E+00
Isobutane	0.9423	58.123	54.769	2.585	7.17E-02	3.14E-01
n-Butane	1.5578	58.123	90.544	4.274	1.19E-01	5.19E-01
Isopentane	0.5616	72.150	40.519	1.912	5.31E-02	2.32E-01
n-Pentane	0.4120	72.150	29.726	1.403	3.89E-02	1.71E-01
Cyclopentane	0.0000	70.134	0.000	0.000	0.00E+00	0.00E+00
n-Hexane	0.1287	86.177	11.091	0.523	1.45E-02	6.36E-02
Cyclohexane	0.0690	84.161	5.807	0.274	7.61E-03	3.33E-02
Other hexanes	0.2424	86.177	20.889	0.986	2.74E-02	1.20E-01
Heptanes	0.1425	100.204	14.279	0.674	1.87E-02	8.19E-02
Methylcyclohexane	0.0768	98.188	7.541	0.356	9.88E-03	4.33E-02
2,2,4-Trimethylpentane	0.0111	114.231	1.268	0.060	1.66E-03	7.27E-03
Benzene	0.0197	78.114	1.539	0.073	2.02E-03	8.83E-03
Toluene	0.0255	92.141	2.350	0.111	3.08E-03	1.35E-02
Ethylbenzene	0.0008	106.167	0.085	0.004	1.11E-04	4.87E-04
Xylenes	0.0070	106.167	0.743	0.035	9.73E-04	4.26E-03
C8+ Heavies	0.0506	114.231	5.780	0.273	7.57E-03	3.32E-02
TOTAL	100.0000		2118.689	100.000	**0.704**	**3.08**

Gas stream composition obtained from Trunk H (Five Points) extended gas analysis dated 04/11/2012
The VOC emissions are calculated as weight percentages of the TOC emissions

Equipment Leaks Emissions Data and Calculations

Unit Number: F1
Description: Valves, Connectors, Seals & Lines

Number of Compression Units at the Facility: 0
Number of Dehydrators at the Facility: 0

PROCESS EQUIPMENT DESCRIPTION	EQUIPMENT COUNT						INSTRUMENT COUNT		
	Valves	Connectors	Pump Seals	Compressor Seals	Pressure Relief Valves	Open-end	Flow	Level	Pressure
Station inlet, meter run to pulsation dampener	17	14	0	0	1	13	3	0	3
Pulsation dampener	12	8	0	0	0	2	0	4	1
Compressor suction header	7	4	0	0	0	3	0	0	1
Suction header feed to instrument gas header	3	1	0	0	0	1	0	0	0
Compressor discharge header and bypass to station discharge	6	5	0	0	0	3	0	1	1
Compressor discharge header and suction header bypass lines	4	2	0	0	0	2	0	0	1
Fuel gas header	2	2	0	0	1	2	0	0	1
Instrument gas header	2	2	0	0	1	2	0	0	0
Station discharge header	9	5	0	0	1	6	0	0	2
Fuel gas recovery header	2	2	0	0	1	2	0	0	0
Fuel gas feed and filter loop	15	9	0	0	0	1	0	4	1
Instrument gas feed and filter loop	9	11	0	0	0	3	0	0	0
Produced water storage tank	1	0	0	0	0	1	0	1	0
ESD panel	12	0	0	0	0	0	0	0	0
Starting gas header	6	2	0	0	1	3	0	0	0
Hot gas header	2	2	0	0	0	2	0	0	0
Volume bottle lop	12	4	0	24	1	2	0	0	1
Components from Compressors	0	0	0	0	0	0	0	0	0
Components from dehydrators	0	0	0	0	0	0	0	0	0
TOTAL	121	73	0	24	7	48	3	10	12
ADJUSTED TOTAL	189	111	0	24	7	58	--	--	--

The following additions are included in the Adjusted Total:

1 valve is added for each open end line
2 connectors are added for each flow meter
2 valves, 2 connectors and 1 open end line are added for each level gauge
1 connector is added for each pressure gauge

The component count is based on an evaluation of the Sim Mesa Compressor Station (two stage compression)

QUESTAR APPLIED TECHNOLOGY

1210 D. Street, Rock Springs, Wyoming 82901

(307) 352-7292

LIMS ID:	N/A		Description:	5 Points CDP Inlet
Analysis Date/Time:	4/17/2012	10:23 AM	Field:	Jicarilla Dist
Analyst Initials:	PRP		ML#:	Williams
Instrument ID:	Instrument 1		GC Method:	Quesbtex
Data File:	QPC57.D			
Date Sampled:	4/11/2012			

Component	Mol%	Wt%	LV%
Methane	78.1863	58.1592	68.4618
Ethane	10.8807	15.1701	15.0730
Propane	5.6746	11.6023	8.0824
Isobutane	0.9423	2.5393	1.5933
n-Butane	1.5578	4.1983	2.5387
Neopentane	0.0136	0.0456	0.0270
Isopentane	0.5480	1.8333	1.0369
n-Pentane	0.4120	1.3783	0.7713
2,2-Dimethylbutane	0.0115	0.0459	0.0248
2,3-Dimethylbutane	0.0445	0.1780	0.0943
2-Methylpentane	0.1196	0.4779	0.2565
3-Methylpentane	0.0668	0.2671	0.1410
n-Hexane	0.1287	0.5144	0.2736
Heptanes	0.3446	1.5198	0.7143
Octanes	0.0370	0.1955	0.0956
Nonanes	0.0182	0.0995	0.0455
Decanes plus	0.0032	0.0208	0.0100
Nitrogen	0.4147	0.5386	0.2350
Carbon Dioxide	0.5959	1.2161	0.5250
Oxygen	0.0000	0.0000	0.0000
Hydrogen Sulfide	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

Global Properties		Units
Gross BTU/Real CF	1292.3	BTU/SCF at 60°F and14.73 psia
Sat.Gross BTU/Real CF	1271.0	BTU/SCF at 60°F and14.73 psia
Gas Compressibility (Z)	0.9962	
Specific Gravity	0.7464	air=1
Avg Molecular Weight	21.568	gm/mole
Propane GPM	1.555196	gal/MCF
Butane GPM	0.797428	gal/MCF
Gasoline GPM	0.646450	gal/MCF
26# Gasoline GPM	1.137518	gal/MCF
Total GPM	6.074056	gal/MCF
Base Mol%	100.009	%v/v

Sample Temperature:	84	°F
Sample Pressure:	36	psig
H2SLength of Stain Tube	N/A	ppm

Component	Mol%	Wt%	LV%
Benzene	0.0197	0.0712	0.0284
Toluene	0.0255	0.1089	0.0441
Ethylbenzene	0.0008	0.0037	0.0015
M&P Xylene	0.0061	0.0299	0.0121
O-Xylene	0.0009	0.0042	0.0017
2,2,4-Trimethylpentane	0.0111	0.0586	0.0287
Cyclopentane	0.0000	0.0000	0.0000
Cyclohexane	0.0690	0.2694	0.1214
Methylcyclohexane	0.0768	0.3495	0.1595
Description:	5 Points CDP Inlet		

GRI GlyCalc Information

Component	Mol%	Wt%	LV%
Carbon Dioxide	0.5959	1.2161	0.5250
Hydrogen Sulfide	0.0000	0.0000	0.0000
Nitrogen	0.4147	0.5386	0.2350
Methane	78.1863	58.1592	68.4618
Ethane	10.8807	15.1701	15.0730
Propane	5.6746	11.6023	8.0824
Isobutane	0.9423	2.5393	1.5933
n-Butane	1.5578	4.1983	2.5387
Isopentane	0.5616	1.8789	1.0639
n-Pentane	0.4120	1.3783	0.7713
Cyclopentane	0.0000	0.0000	0.0000
n-Hexane	0.1287	0.5144	0.2736
Cyclohexane	0.0690	0.2694	0.1214
Other Hexanes	0.2424	0.9689	0.5166
Heptanes	0.1425	0.6622	0.3322
Methylcyclohexane	0.0768	0.3495	0.1595
2,2,4 Trimethylpentane	0.0111	0.0586	0.0287
Benzene	0.0197	0.0712	0.0284
Toluene	0.0255	0.1089	0.0441
Ethylbenzene	0.0008	0.0037	0.0015
Xylenes	0.0070	0.0341	0.0138
C8+ Heavies	0.0506	0.2780	0.1358
Subtotal	100.0000	100.0000	100.0000
Oxygen	0.0000	0.0000	0.0000
Total	100.0000	100.0000	100.0000

TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

Equipment Type	Service[a]	Emission Factor (kg/hr/source)[b]
Valves	Gas	4.5E-03
	Heavy Oil	8.4E-06
	Light Oil	2.5E-03
	Water/Oil	9.8E-05
Pump seals	Gas	2.4E-03
	Heavy Oil	NA
	Light Oil	1.3E-02
	Water/Oil	2.4E-05
Others[c]	Gas	8.8E-03
	Heavy Oil	3.2E-05
	Light Oil	7.5E-03
	Water/Oil	1.4E-02
Connectors	Gas	2.0E-04
	Heavy Oil	7.5E-06
	Light Oil	2.1E-04
	Water/Oil	1.1E-04
Flanges	Gas	3.9E-04
	Heavy Oil	3.9E-07
	Light Oil	1.1E-04
	Water/Oil	2.9E-06
Open-ended lines	Gas	2.0E-03
	Heavy Oil	1.4E-04
	Light Oil	1.4E-03
	Water/Oil	2.5E-04

[a]Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

[b]These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

[c]The "other" equipment type was derived from compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.

Pig Receiver Venting Emissions Data and Calculations

Unit Number: F-2
Description: Pig Receiver Venting

Note: Where more than one emissions unit is identified above, this worksheet provides the emission rates and operating parameters for each individual emissions unit.

Emission Rates

1	#/hr	Slug catch operations/day/week	WFC
104	#/yr	Slug catch operations per year	WFC

Pollutant	Uncontrolled Emission Rate (lb/hr)	(ton/yr)
VOC	1.56	0.08
benzene	4.47E-03	2.32E-04
ethylbenzene	2.47E-04	1.28E-05
n-hexane	3.22E-02	1.67E-03
toluene	6.82E-03	3.55E-04
xylene	2.16E-03	1.12E-04

Emission Rate (lb/hr) = Number of Blowdowns (#/hr) * Mass Per Blowdown (lb/blowdown)
Emission Rate (ton/hr) = Number of Blowdowns (#/yr) * Mass Per Blowdown (lb/blowdown) / 2000 (lb/ton)

Blowdown Gas

110 scf/slug catcher event Gas Loss Per Slug Catch Operation WFC est. (Carried over from Mar. 2010 Title V appl.)

Gas Stream Composition Per Pipeline Slug Catch Event				
Component	Mole% (%)	MW (lb/lb-mole)	Mole% * MW (lb/lb-mole)	Mass Per Blowdown (lb/blowdown)
water	0.0000	18.02	0.00	0.00
carbon dioxide	0.5959	44.01	0.26	0.08
hydrogen sulfide	0.0000	34.07	0.00	0.00
nitrogen	0.4147	28.01	0.12	3.37E-02
methane	78.1863	16.04	12.54	3.64
ethane	10.8807	30.07	3.27	0.95
propane	5.6746	44.09	2.50	0.73
isobutane	0.9423	58.12	0.55	0.16
n-butane	1.5578	58.12	0.91	0.26
isopentane	0.5616	72.15	0.41	1.18E-01
n-pentane	0.4120	72.15	0.30	8.63E-02
cyclopentane	0.0000	70.14	0.00	0.00
n-hexane	0.1287	86.17	0.11	3.22E-02
cyclohexane	0.0690	84.16	0.06	0.02
other hexanes	0.2424	86.18	0.21	0.06
heptanes	0.1425	100.20	0.14	4.14E-02
methylcyclohexane	0.0768	98.19	0.08	0.02
2,2,4-trimethylpentane	0.0111	100.21	0.01	0.00
benzene	0.0197	78.11	0.02	4.47E-03
toluene	0.0255	92.14	0.02	6.82E-03
ethylbenzene	0.0008	106.17	0.00	0.00
xylenes	0.0070	106.17	0.01	2.16E-03
C8+ heavies	0.0506	110.00	0.06	1.62E-02
Total	100.000			6.26
Total VOC, lb/event				1.56

Gas stream composition obtained from Trunk H (Five Points) extended gas analysis dated 04/11/2012
Mass (lb/slug catcher event) = Gas Volume (scf/event) / 379 (scf/mol) * Mol% * MW (lb/lb-mol)

Pneumatic Devices & Pumps Emissions Data and Calculations

Unit Number: N/A
Description: Pneumatic Devices and Pumps

Emission Rates

Description	Number of Devices, #	CH4 Emission Factor, tonne/device-yr	Baseline CH4 Content, mole %	CH4 Emission Rate, tonne/yr	VOC Emission Rate, tpy
Gas Driven Pneumatic Devices	7	2.415	78.8	16.8	7.91
Gas Driven Pumps	1	1.737	78.8	1.7	0.81

The number of devices are provided by Williams
The gas driven pneumatic devices CH4 emission factor and baseline CH4 content are taken from the API Compendium, Section 5.6.1, Table 5-15
The gas-driven chemical injection pumps CH4 emission factor and baseline CH4 content are taken from the API Compendium, Section 5.6.2, Table 5-16
CH4 Emission Rate (tonne/yr) = Number of Devices (#) * CH4 Emission Factor (tonne/device-yr) *[Facility CH4 Content (mole %) / Baseline CH4 Content (mole %)]
VOC Emission Rate (tpy) = (CH4 Emission Rate (tonne/yr) * 2,204.6 lb/tonne / 2,000 lb/ton) * (Weight Percent VOC (%) / Weight Percent CH4 (%))
The facility CH4 and VOC contents are taken from the facility extended gas analysis

Component	Mole Percent, %	Molecular Weight, lb/lb-mole	Component Weight, lb/lb-mole	Weight Percent, %
Carbon dioxide	0.5959	44.01	26.2256	1.2165
Hydrogen sulfide	0.0000	34.07	0.0000	0.0000
Nitrogen	0.4147	28.01	11.6157	0.5388
Methane	78.1863	16.04	1254.1083	58.1716
Ethane	10.8807	30.07	327.1826	15.1763
Propane	5.6746	44.09	250.1931	11.6052
Isobutane	0.9423	58.12	54.7665	2.5403
n-Butane	1.5578	58.12	90.5393	4.1997
Isopentane	0.5616	72.15	40.5194	1.8795
n-Pentane	0.4120	72.15	29.7258	1.3788
Cyclopentane	0.0000	70.14	0.0000	0.0000
n-Hexane	0.1287	86.17	11.0901	0.5144
Cyclohexane	0.0690	84.16	5.8070	0.2694
Other hexanes	0.2424	86.18	20.8900	0.9690
Heptanes	0.1425	100.20	14.2785	0.6623
Methylcyclohexane	0.0768	98.19	7.5410	0.3498
2,2,4-Trimethylpentane	0.0111	100.21	1.1123	0.0516
Benzene	0.0197	78.11	1.5388	0.0714
Toluene	0.0255	92.14	2.3496	0.1090
Ethylbenzene	0.0008	106.17	0.0849	0.0039
Xylenes	0.0070	106.17	0.7432	0.0345
C8+ Heavies	0.0506	110.00	5.5660	0.2582
Total	100.0000		2155.8778	100.0000
Total VOC				24.8968

Gas stream composition obtained from Trunk H (Five Points) extended gas analysis dated 04/11/2012