OXY
Occidental Chemical Corporation OxyChem.
A subsidiary of Occidental Petroleum Corporation

P. O. Drawer CC, Ingleside, Texas 78362-0710
Hwy 361, Gregory, Texas 78359
Phone 361.776.6050 Fax 361.776.6240

Health Environmental Safety Department

August 1, 2012

Mr. Carl E. Edlund, P.E.
Director, Multimedia Planning and Permitting Division
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Completeness Determination for Occidental Chemical Corporation Ingleside Chemical Plant Application for a GHG PSD Permit for the Natural Gas Liquids Fractionation Facilities

Dear Mr. Edlund:

This letter is in response to your letter dated June 27, 2012 regarding additional information needed to complete the referenced GHG PSD permit application. Ms. Aimee Wilson is our contact for the current review of this application. Enclosed is her list of deficiencies with responses from Occidental Chemical Corporation (OxyChem).

OxyChem is very interested in proceeding with the timely processing of this application. If there are any questions, please feel free to call me at (361) 776-6169 or Stuart Keil, P.E., at (512) 306-9983.

Sincerely,

Mark R. Evans

Mark R. Evans
Environmental Manager

MRE:see/T1HH552W

Enclosures

cc: Mr. Tom Lawshae, Air Permits Division, TCEQ, Austin, w/enclosures
Mr. Stuart L. Keil, P.E., Keil Environmental, Inc., Austin, w/enclosures

File: Air 5.8 - Misc. Documents

Certified Letter: 7010 3090 0000 9863 0639

Occidental Chemical Corporation
July 2012

EPA Comments and Occidental Chemical Corporation (OxyChem) Responses Greenhouse Gas Prevention of Significant Deterioration Permit Application

General

1) On page 5, of the permit application, it states, "Most new pumps and compressors will have dual mechanical seals that route vapor losses to a control device or will be of equivalent non-leaker design. Due to this level of control, these pumps and compressors are not identified in the calculations found in Appendix C." Also on page 5, it states, "Similarly, relief valves that vent to control devices and relief valves that are equipped with rupture discs and pressure indicators are not identified in the calculations since their control is expected to be 100%." Please identify the control devices used by the pumps, compressors, and relief valves. Is the contribution from these sources included in the calculation of GHG emissions of the control device (i.e. thermal oxidizer or flare)?

> *OxyChem response: The control devices used by the pumps, compressors and relief valves will be the thermal oxidizers. The vent gas contributions from the pumps and compressors were considered as normal, continuous vents to the oxidizers and the relief valve venting was considered as additional peak venting in order to estimate GHG emissions from the thermal oxidizers.*

2) The permit application does not propose any compliance monitoring for the new thermal oxidizers or the existing cogeneration units. EPA requests that OxyChem propose its preferred monitoring, recordkeeping, and reporting strategy to ensure enforceability of the BACT requirements pursuant to 40 CFR Section 52.21(n). For the two thermal oxidizers and the cogeneration units, we are currently assuming that Continuous Emission Monitoring System (CEMS) is the preferred method followed by parametric fuel monitoring with emission factors, etc.

> *OxyChem response: Regarding the enforceability of the BACT requirements for the thermal oxidizer and the cogeneration units, OxyChem offers the following:*
>
> a) *Thermal oxidizers: In order to demonstrate that the maximum thermal efficiency is maintained for these units, OxyChem will continuously monitor and record the flue gas exhaust temperature hourly and limit the temperature to less than 550 °F on a 365-day rolling average basis.*
>
>   *As a reminder, most natural gas liquids (NGL) fractionation facilities utilize flares for VOC waste gas disposal, and so, the use of thermal oxidizers with waste heat recovery (and steam production) represents a high level of energy efficiency for the process.*
>
> b) *Cogeneration units: In order to demonstrate that maximum energy efficiency is maintained for these units, OxyChem will maintain a minimum overall thermal*

efficiency of 50% on a 12-month rolling average basis, calculated monthly, for the two cogeneration units, emission units CG-1 and CG-2. The cogeneration units' efficiency shall be calculated as the sum of the heat content of the steam produced and the heat content of the power produced divided by the heat content of the fuel supply times 100.

It should be noted that normal industry practice for fractionation is to use fuel-fired, hot oil systems. These systems have much lower energy efficiency than OxyChem's proposed use of the cogens and/or thermal oxidizers for process heat (steam).

c) *As an alternative to either or both of the above proposals, OxyChem may choose to install a CO_2 CEMS and volumetric stack gas flow monitoring system for measuring and recording CO_2 emissions discharged to the atmosphere and compare these values to demonstrate compliance with the BACT emission limits in the permit.*

OxyChem will ensure that all required CO_2 CEMS equipment is installed and all certification tests are completed on or before the earlier of 90 unit operating days or 180 calendar days after the unit commences operation. Existing CEMS equipment, flow monitoring systems and other ancillary equipment may be used in addition to the purchase of new equipment.

OxyChem shall comply with the specifications and test procedures for CO_2 monitoring systems in 40 CFR 75 or 40 CFR 60, Appendix B, Specification Nos. 1 through 9, as applicable. Also, the CEMS shall meet the appropriate quality assurance requirements specified in 40 CFR 60, Appendix F, for the CO_2 emissions monitoring system.

BACT Analysis

3) On page 4 "Proposed Greenhouse Gas (GHG) Emissions", the application indicates that several storage tanks and vessels will be utilized. Are these tanks and vessels existing or new units? The GHG application indicates that emissions from the tanks are routed to the thermal oxidizers and there is no indication what parameters are being used in the emission calculations. Please identify the size of each tank, type of tank, and what will be stored in each of the tanks. If there are multiple types of products or wastes stored, then please list each of them for the individual tanks. Since tank vapors are controlled by thermal oxidizers, the combustion will generate GHG emissions. Therefore, since GHG emissions are created from the combustion of VOC tank vapors, a BACT analysis should be developed for the tanks if they are new or modified units. Please be sure to incorporate into the tank BACT analysis the factors that were considered when comparing internal floating roof (IFR), external floating roof (EFR), and fixed roof. Are there any fixed roof tanks and do they have submerged fill? Please provide any other additional information for the tanks such as, did the applicant choose to have the tanks painted white or another color of high refractive index to reduce vapor production?

OxyChem response: Several new VOC tanks (and no existing tanks) will be included with the new NGL fractionation facilities. A summary of the tanks and the requested criteria is provided as follows:

Tank No.	*Tank Type*	*Tank Size (bbl)*	*Tank Contents*	*BACT and Other Comments*
C-3830A	*pressurized sphere*	*32,000*	*product propane*	*designed for no venting*
C-3830B	*pressurized sphere*	*32,000*	*product propane*	*designed for no venting*
C-3832	*pressurized bullet*	*1,200*	*off-spec propane*	*designed for no venting*
C-3840A	*pressurized sphere*	*32,000*	*product butane*	*designed for no venting*
C-3840B	*pressurized sphere*	*32,000*	*product butane*	*designed for no venting*
C-3842	*pressurized bullet*	*1,200*	*off-spec butane*	*designed for no venting*
D-3620A-D	*4 fixed roof tanks*	*na*	*diesel*	*vents to atmos.*
D-3850A	*low pressure fixed rook tank*	*37,800*	*natural gasoline*	*vents to thermal oxidizers*
D-3850B	*low pressure fixed rook tank*	*37,800*	*natural gasoline*	*vents to thermal oxidizers*
D-3852	*low pressure fixed rook tank*	*3,800*	*natural gasoline slops*	*vents to thermal oxidizers*
D-3520A	*low pressure fixed rook tank*	*24,200*	*contaminated water*	*vents to thermal oxidizers*
D-3520B	*low pressure fixed rook tank*	*24,200*	*contaminated water*	*vents to thermal oxidizers*
D-3710	*fixed rook tank*	*240*	*low v.p. amine*	*vents to atmos.*
D-3720	*fixed rook tank*	*240*	*low v.p. glycol*	*vents to atmos.*
D-3680	*fixed rook tank*	*na*	*diesel*	*vents to atmos.*
D-3220	*fixed rook tank*	*24*	*methanol*	*vents to atmos.*

Senior EPA staff in our September 2011 meeting in Dallas instructed OxyChem that VOC destruction in an area like San Patricio County is still a priority over CO_2 *minimization. Therefore, regarding BACT for these tanks, high pressure design with no VOC venting and low pressure design venting to high efficiency thermal oxidizers are considered the optimum methods for VOC control.*

The 99.9% VOC control by the thermal oxidizers is far greater than the control levels provided by internal or external floating roof tanks. Fixed roof tanks venting to the atmosphere are in use only for VOC materials with vapor pressures less than 0.5 psia and for small tanks equal to or less than 1,000 gallons capacity (24 bbl).

Tank vent gas contributions to the thermal oxidizers are provided in the response to Question No. 5 below. Some of the tanks designed for no normal venting to the thermal oxidizer still have intermittent flow to the oxidizers due to infrequent maintenance activities.

It should be noted that since the thermal oxidizers are disposing of dilute process streams and additional inert gas purge streams, the storage tanks' providing VOC vent gas for combustion means that less natural gas will need to be fired to achieve combustion temperature for the VOC in the dilute and inert streams. This approach represents a higher level of efficiency that is difficult to quantify, and yet, it represents an efficiency that is not easily achieved at NGL facilities that dispose of waste gases in flares.

All tanks handling materials with vapor pressures greater than 0.5 psia will be painted white to minimize vaporization. Also, fixed roof tanks handling low vapor pressure materials with be equipped with submerged fill lines.

4) What is the DRE of the flare? Is the flare air assisted, steam assisted, or unassisted? The BACT analysis for the emergency flare (EPN NGL-3), on pages 4 and 5 of appendix D, identifies the selection of a Thermal Oxidizer as BACT. This determination indicates that the flare will only be utilized as a last resort. Please provide comparative benchmark data you may have used as part of your BACT analysis comparing the destruction removal efficiency of this equipment/process to other similar or equivalent equipment/processes. Please clarify and propose a BACT limit for the flare.

OxyChem response: The expected DRE of the flare is 99% for VOC with up to three carbon atoms and 98% for all other VOC materials. At this time, the flare is expected to be unassisted, but a final decision has not been made at this time. The flare will be used only for emergency releases (emission events which we understand are not authorized by the EPA) and for the rare circumstance when both of the thermal oxidizers may be out of service.

As mentioned previously, since most NGL fractionation facilities utilize flares for VOC waste gas disposal, the use of thermal oxidizers with higher destruction efficiencies represents a significant step toward improved operations for these types of facilities. Also, since VOC destruction in San Patricio County is a priority over CO_2 minimization, the use of thermal oxidizers with 99.9% VOC DRE seems consistent with EPA guidance in this matter.

OxyChem's proposed BACT limit for the flare is to restrict its use to emergency releases and the rare circumstance when both of the thermal oxidizers are out of service. It should be noted that in order for the flare to be available for this service, a maximum of four flare pilots with natural gas flow (not to exceed 80 scfh) may be operated on a continuous basis.

5) EPA requests a detailed list of all the waste gases that are sent to the thermal oxidizers. Also, please indicate which waste gases are continuous and which are intermittent. Will these waste gases have a gas composition analyzer? Please provide the anticipated composition of each waste stream, if known. Also, please provide the destruction and removal efficiency (DRE) of the thermal oxidizers. The BACT analysis for the Thermal Oxidizers indicates that waste heat recovery on the thermal oxidizers will reduce GHG emissions from the cogeneration units by reducing steam demand. Please provide comparative benchmark data you may have used as part of your BACT analysis comparing the destruction removal efficiency of this equipment/process to other similar or equivalent equipment/processes. Also, please provide an output based BACT limit for the thermal oxidizers.

> *OxyChem response: A list of the normal (continuous) and intermittent waste gases that are sent to the thermal oxidizers is attached. This list of vent gas streams was summarized on the page entitled "NGL Thermal Oxidizers," which was provided as the second page of Appendix C, Emission Calculations, in the permit application.*
>
> *This list includes significant vent streams and may not be totally complete due to the design engineering that is still progressing. Therefore, approximate, representative VOC compositions are provided, which are preliminary in nature.*
>
> *Since the composition indicates that these VOC vent gas streams are dominated by simple alkanes, the nature of the vent gas does not justify the use of a gas composition analyzer. The performance of the thermal oxidizers will be adequately maintained through the monitoring of fire-box temperatures, exhaust oxygen and other operating parameters.*
>
> *The DRE of the thermal oxidizers is guaranteed to be at least 99.9%. In this industry, flares are typically used to achieve 98% efficiency for handling NGL waste gas.*
>
> *For purposes of minimizing GHG emissions, the use of thermal oxidizers with heat recovery allows for steam production from the facilities and reduced fuel firing at the site. Operation of a flare for waste gas disposal does not provide this recovered energy benefit.*
>
> *An output based BACT limit for demonstrating this improved level of performance for the thermal oxidizers is mentioned in OxyChem's response to Question No. 2 above, which states that to demonstrate thermal efficiency for the thermal oxidizers, the flue gas exhaust temperature will be continuously monitored and recorded, and the temperature will be limited to a value that reflects an energy efficient operation.*

6) For the NGL process fugitives BACT, on pages 8 and 9 of appendix D, it is stated that the applicant will implement 28MID for VOC. Will an enhanced 28MID program which would include monitoring for methane (CH4) be utilized? Also, it does not appear that OxyChem considered the TCEQ 28LAER program with other possibilities of reducing fugitive emissions and leaks as part of its BACT analysis. Did the BACT analysis consider 28LAER as the highest

available control option? If not, why? Please further refine the BACT analysis for fugitive emissions.

> *OxyChem response: OxyChem is willing to accept the 28LAER fugitive monitoring and maintenance program, except that the proposed 28MID program with quarterly monitoring of connectors is more stringent than 28LAER. 28LAER only requires annual monitoring of connectors. Most of the other criteria in 28LAER are similar and can be substituted for 28MID, if desired.*
>
> *Nevertheless, the emission calculations in the application are based on quarterly connector monitoring, which significantly reduces estimated fugitives. Therefore, this more aggressive monitoring effort will need to be added to 28LAER if that program is written in the permit.*
>
> *It should be noted that since OxyChem is proposing a fugitive monitoring and maintenance program that is more aggressive than 28LAER and since methane concentrations are so low in the monitored streams, no additional monitoring enhancements appear to be necessary for methane. Methane will be controlled at the same accelerated levels as the other VOC components.*

Emission Calculations

7) In Appendix C, the table titled "NGL Thermal Oxidizers," please provide an explanation of the calculations used to determine the annual GHG emissions. Why were equations W-39a, W-39b, and W-40 from 40 CFR Part 98 Subpart W not used? Are metered fuel flow measurements available for these units?

> *OxyChem response: The table entitled "NGL Thermal Oxidizers" provides calculations for seven different emission mechanisms for CO_2e from the thermal oxidizers. These mechanisms include the estimation of the following: CO_2 from fuel gas firing, CO_2 from waste gas firing, CO_2 from process contributions, CH_4 from fuel gas firing, CH_4 from waste gas firing, N_2O from fuel gas firing and N_2O from waste gas firing. Details are provided as follows:*
>
> *a) CO_2 from fuel (natural) gas firing: CO_2 emissions are calculated from the 7.03 MM Btu/hr core fuel firing (for sustaining minimum temperature in the oxidizers) for 8,760 hr/yr of operation and a CO_2 factor for natural gas taken from 40 CFR 98, Subpart C, Table C-1 (converted from 53.02 kg/MM Btu for use with Equation C-1b). Natural gas combustion is addressed more simply in Equation C-1b than Equation W-39a (which requires a fuel analysis), and so, Equation C-1b was used.*
>
> *b) CO_2 from waste gas firing: CO_2 emissions are estimated using a carbon count and a mass basis for process waste gas combustion (using a nominal gas composition), which is the same as the second part of Equation W-39a except that W-39a is designed for a volume basis rather than a mass basis. Therefore, these two*

calculation methods should result in the same estimated emissions. This calculation is significant since these CO_2 *emissions are the greatest contribution to the* CO_2e *emissions for this source, contributing about 75% of the total* CO_2 *emissions.*

c) CO_2 *from process contributions:* CO_2 *emissions are estimated from the* CO_2 *venting from the amine and glycol processes to the thermal oxidizer using a mass basis. The first part of Equation W-39a calculates* CO_2 *in a similar way, but by using a volume basis rather than a mass basis. The resulting estimated emissions should be the same.*

d) CH_4 *from fuel (natural) gas firing:* CH_4 *emissions are estimated using the* CH_4 *factor for natural gas from 40 CFR 98, Subpart C, Table C-2 (converted from 0.001 kg/MM Btu for use with Equation C-8b) and the maximum heat input rather than using the 0.5% non-combusted portion of* CH_4 *fuel estimated in Equation W-39b. It is expected that Equation C-8b is more accurate.*

e) CH_4 *from waste gas firing:* CH_4 *emissions are estimated using a* CH_4 *factor for the waste gas assuming that it is comparable to petroleum fuel, as taken from 40 CFR 98, Subpart C, Table C-2 (converted from 0.003 kg/MM Btu for use with Equation C-8b) and the maximum heat input. Equation W-39b for estimating* CH_4 *emissions only considers the 0.5% noncombusted portion, which appears to underestimate possible* CH_4 *emissions.*

f) N_2O *from fuel (natural) gas firing:* N_2O *emissions are estimated using the* N_2O *factor for natural gas from 40 CFR 98, Subpart C, Table C-2 (converted from 0.0001 kg/MM Btu for use with Equation C-8b) and the total heat input, which is the same emission factor used with the maximum heat input in Equation W-40. Therefore, the results of the two equations should be the same.*

g) N_2O *from waste gas firing:* N_2O *emissions are estimated using a* N_2O *factor for the waste gas assuming that it is comparable to petroleum fuel, as taken from 40 CFR 98, Subpart C, Table C-2 (converted from 0.0006 kg/MM Btu for use with Equation C-8b) and the maximum heat input. Equation W-40 for estimating* N_2O *emissions uses a lower emission factor of 0.0001 kg/MM Btu and the maximum heat input, which could underestimate possible* N_2O *emissions. Nevertheless, these* N_2O *emissions contribute to less than 0.1% of the total* CO_2e *emissions for the proposed project.*

8) In Appendix C, the table titled "NGL Emergency Flare," please provide an explanation of the calculations used to determine the annual GHG emissions. Will emissions be calculated using 40 CFR Part 98 Subpart W §98.233(n), using equations W-19, W-20, W-21, and W- 40?

OxyChem response: CO_2 *emissions are estimated for the flare using the* CO_2 *factor for natural gas from 40 CFR 98, Subpart C, Table C-1 (converted from 53.02 kg/MM Btu for use with Equation C-1) and the maximum heat input from the four flare pilots.*

Similarly, CH_4 and N_2O emissions are estimated for the flare using the CH_4 and N_2O factors for natural gas from 40 CFR 98, Subpart C, Table C-2 (converted from 0.001 kg/MM Btu and 0.0001 kg/MM Btu, respectively, for use with Equation C-8) and the estimated maximum fuel firing in the pilots.

Regarding future emission calculations for the flare, the following equations will be used: C-1, W-20 and W-21 for CO_2, and C-8b for CH_4 and N_2O. In this way, the calculation methods remain similar to those performed for the thermal oxidizers.

In addition to the previously documented 168.61 tons/yr of CO_2e emissions for flare pilots, another 831.57 tons/yr of CO_2e should be identified for the flare to reflect 2% of a single thermal oxidizer's emission representations for the rare occurrence of both thermal oxidizers being out of service. When both thermal oxidizers are down, the flare will handle all waste gas.

9) In Appendix C, the table titled "Cogeneration Units-Proposed GHG Increased Emissions," please provide an explanation of the calculations used to determine the annual GHG emissions. Are metered fuel flow measurements available for these units? Do these units have CEMS?

OxyChem response: CO_2 emissions are estimated for the increased firing of the cogens using the CO_2 factor for natural gas from 40 CFR 98, Subpart C, Table C-1 (converted from 53.02 kg/MM Btu for use with Equation C-1) and the maximum heat input estimated for the increased fuel firing.

Similarly, CH_4 and N_2O emissions are estimated for the cogens using the CH_4 and N_2O factors for natural gas from 40 CFR 98, Subpart C, Table C-2 (converted from 0.001 kg/MM Btu and 0.0001 kg/MM Btu, respectively, for use with Equation C-8) and the estimated maximum increase in fuel firing.

Metered fuel flow measurements are available for these units. Also, the units are equipped with CEMS for monitoring NO_x and CO emissions.

NORMAL AND INTERMITTENT VENT LOADS TO THE THERMAL OXIDIZERS

					Normal Vent Loads
Component	**MW**	**HHV Btu/SCF**	**HHV Btu/lb**	**Core Natural Gas Burner**	**DEA Regenerator Flash Tank Vent Rich PFD Continuous**
Component					**Average**
Methane	16.04	1010.0	23,865	272.95	0.41
Ethane	30.07	1769.7	22,305	18.41	43.00
Propane	44.10	2516.1	21,625	2.38	0.94
i-Butane	58.12	3251.9	21,205	0.52	
n-Butane	58.12	3262.9	21,276	0.52	
i-Pentane	72.15	4000.9	21,017	0.26	
n-Pentane	72.15	4008.9	21,059	0.13	
n-Hexane	86.18	4755.9	20,916	1.09	
n-Heptane	100.20	5502.5	20,812	0.00	
n- Octane	114.23	6248.9	20,733	0.00	
Benzene	78.11	17989.0	87,281	0.00	
Toluene	92.14	18250.0	75,067	0.00	
Para Xylene	106.17	18444.0	65,842	0.00	
CO2	44.01	0.0		11.10	0.02
H2S	34.08	0.0		0.00	
COS	60.07	0.0		0.00	
H2O	18.02	0.0		0.00	0.28
Methyl Mercaptan	48.10	0.0		0.00	
Ethyl Mercaptan	62.13	0.0		0.00	
Iso-Propyl Mercaptan	76.15	0.0		0.00	
Iso-Propyl-Methyl Mercaptan	90.18	0.0		0.00	
Di-Methyl Sulfide	62.13	0.0		0.00	
Di-Methyl Disulfide	94.19	0.0		0.00	
Di-Ethyl Disulfide	122.24	0.0		0.00	
DEA	105.14	0.0		0.00	
TEG	150.17	0.0		0.00	
Nitrogen	28.01	0.0		1.01	
Oxygen	32.00	0.0		0.00	
Total					
Mass Flow	**lb/hr**			**308.37**	**44.65**
Mole Flow	**lb-mole/hr**			**18.007**	**1.493**
Heat Load (HHV)	**MMBtu/hr**			**7.03**	**0.99**

NORMAL AND I

Component	Normal Vent Loads			
	DEA Regenerator Reflux Drum Vent Rich PFD Continuous	Glycol Flash Tank Vent Rich PFD Continuous	Glycol Regen Vent Rich PFD (N2) Continuous Water Condensed	Caustic Regen Absorber Vent Hysis + Merichem Continuous
Component	Average	Average	Average	Average
Methane	0.10	0.16		
Ethane	11.99	74.84	19.40	
Propane	0.21	41.51	19.60	
i-Butane		0.61	0.10	0.47
n-Butane		0.22		28.73
i-Pentane				142.20
n-Pentane				91.14
n-Hexane				30.12
n-Heptane				4.73
n- Octane				1.72
Benzene				6.11
Toluene				0.73
Para Xylene				0.11
CO_2	1481.66	1.57	1.40	
H_2S	0.59		0.01	
COS	0.30	0.01	0.03	
H_2O	38.32	0.62	30.50	
Methyl Mercaptan	0.02	0.01	0.23	
Ethyl Mercaptan			0.05	
Iso-Propyl Mercaptan				
Iso-Propyl-Methyl Mercaptan				
Di-Methyl Sulfide			0.03	0.11
Di-Methyl Disulfide				0.38
Di-Ethyl Disulfide				0.24
DEA				
TEG			0.04	
Nitrogen			678.00	495.74
Oxygen				44.00
Total				
Mass Flow	**1533.19**	**119.55**	**749.39**	**846.53**
Mole Flow	**36.220**	**3.525**	**27.019**	**23.307**
Heat Load (HHV)	**0.27**	**2.59**	**0.86**	**6.89**

NORMAL AND I

Normal Vent Loads

Component	**Gasoline Flash Tank Vent Hysis + Merichem Continuous**	**Gasoline Tanks Vent AP-42 Continuous**	**Contam Water Storage Tanks AP-42**	**Waste Water Stripper Vent Continuous**
Component	**Average**	**Average**	**Average**	**Average**
Methane				
Ethane				
Propane				
i-Butane	0.70	0.54	0.23	
n-Butane	28.00	23.08	9.71	
i-Pentane	175.00	142.66	60.03	
n-Pentane	118.00	95.30	40.10	
n-Hexane	39.00	31.13	13.10	
n-Heptane	5.60	4.72	1.99	
n- Octane	1.90	1.68	0.71	
Benzene	7.80	6.27	2.64	2.50
Toluene	1.00	0.74	0.31	1.00
Para Xylene	0.20	0.11	0.04	1.00
CO2				
H2S				
COS				
H2O				
Methyl Mercaptan				
Ethyl Mercaptan				
Iso-Propyl Mercaptan				
Iso-Propyl-Methyl Mercaptan				
Di-Methyl Sulfide	0.06	0.05	0.02	
Di-Methyl Disulfide	0.01	0.01	0.01	
Di-Ethyl Disulfide	0.01	0.01	0.00	
DEA		0.01	0.01	
TEG				
Nitrogen	26.00	19.63	8.26	10.00
Oxygen	2.60			
Total				
Mass Flow	**405.88**	**325.94**	**137.14**	**14.50**
Mole Flow	**6.202**	**4.918**	**2.069**	**0.409**
Heat Load (HHV)	**8.51**	**6.90**	**2.90**	**0.36**

NORMAL AND I

	Normal Vent Loads			
Component	**Pump Seals Barrier Chambers**	**Compressor Seals**	**Analyzer Vents**	**Total Normal Loads**
	Continuous	**Continuous**	**Continuous**	
Component	**Average**	**Average**	**Average**	
Methane				0.67
Ethane	0.69	4.00	5.10	159.02
Propane	2.07	1.00	2.52	67.85
i-Butane	1.04		0.57	4.25
n-Butane	1.07		0.57	91.39
i-Pentane	0.58		0.25	520.72
n-Pentane	0.51		0.15	345.19
n-Hexane	0.52			113.86
n-Heptane	0.24			17.27
n- Octane	0.25			6.25
Benzene	0.11			25.43
Toluene	0.04			3.83
Para Xylene	0.02			1.48
CO2				1484.65
H2S				0.60
COS				0.34
H2O				69.72
Methyl Mercaptan				0.26
Ethyl Mercaptan				0.05
Iso-Propyl Mercaptan				0.00
Iso-Propyl-Methyl Mercaptan				0.00
Di-Methyl Sulfide				0.27
Di-Methyl Disulfide				0.41
Di-Ethyl Disulfide				0.26
DEA				0.02
TEG				0.04
Nitrogen				1237.63
Oxygen				46.60
Total				
Mass Flow	**7.12**	**5.00**	**9.17**	**4198.06**
Mole Flow	**0.134**	**0.156**	**0.252**	**105.702**
Heat Load (HHV)	**0.16**	**0.11**	**0.20**	**30.75**

NORMAL AND I

	Intermittent Loads		
Component	**Gasoline Barge Loading Non-balanced Vapor Displacement Intermittent**	**Contaminated Water Storage Tanks Vapor Displacement Intermittent**	**Sampling**
Component	**Peak**	**Peak**	**Peak**
Methane			
Ethane			200.00
Propane			
i-Butane	0.86	0.00	
n-Butane	37.04	0.00	
i-Pentane	228.94	0.00	
n-Pentane	152.93	0.00	
n-Hexane	49.95	0.00	
n-Heptane	7.57	0.00	
n- Octane	2.69	0.00	
Benzene	10.06	222.86	
Toluene	1.19	0.00	
Para Xylene	0.17	0.00	
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide	0.01	0.00	
Di-Methyl Disulfide	0.00	0.00	
Di-Ethyl Disulfide	0.00	0.00	
DEA	0.00	0.00	
TEG			
Nitrogen	1011.59	10913.24	
Oxygen			
Total			
Mass Flow	**1503.00**	**11136.10**	**200.00**
Mole Flow	**42.878**	**392.425**	**6.651**
Heat Load (HHV)	**11.07**	**19.45**	**4.46**

NORMAL AND

		Intermittent Loads	
Component	**Sampling**	**Propane Storage Tank Venting**	
		Peak	**Annual Average**
Component	**Average**	**Peak**	**Average**
Methane			
Ethane	0.00		
Propane	0.00	1000.00	123.49
i-Butane	10.59		
n-Butane	10.59		
i-Pentane	0.00		
n-Pentane	0.00		
n-Hexane			
n-Heptane			
n- Octane			
Benzene			
Toluene			
Para Xylene			
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen			
Oxygen			
Total			
Mass Flow	**21.19**	**1000.00**	**123.49**
Mole Flow	**0.365**	**22.677**	**2.801**
Heat Load (HHV)	**0.45**	**21.63**	**2.67**

NORMAL AND I

Intermittent Loads

Component	**Butane Storage Tank Venting**		**LPG Barge Hose Clearing**
	Peak	**Annual Average**	**Peak**
Component	**Peak**	**Average**	**Peak**
Methane			
Ethane			
Propane			900.72
i-Butane	500.00	30.87	
n-Butane	500.00	30.87	
i-Pentane			
n-Pentane			
n-Hexane			
n-Heptane			
n- Octane			
Benzene			
Toluene			
Para Xylene			
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen			
Oxygen			
Total			
Mass Flow	**1000.00**	**61.75**	**900.72**
Mole Flow	**17.205**	**1.062**	**20.426**
Heat Load (HHV)	**21.24**	**1.31**	**19.48**

NORMAL AND I

	Intermittent Loads		
Component	**LPG Barge Hose Clearing Annual Average**	**LPG Rail Car Hose Clearing Peak**	**LPG Rail Car Hose Clearing Annual Average**
Component	**Average**	**Peak**	**Average**
Methane			
Ethane			
Propane	8.23	517.05	3.15
i-Butane	2.06		0.79
n-Butane	2.06		0.79
i-Pentane			
n-Pentane			
n-Hexane			
n-Heptane			
n- Octane			
Benzene			
Toluene			
Para Xylene			
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen			
Oxygen			
Total			
Mass Flow	**12.34**	**517.05**	**4.72**
Mole Flow	**0.257**	**11.725**	**0.098**
Heat Load (HHV)	**0.27**	**11.18**	**0.10**

NORMAL AND I

	Intermittent Loads		
Component	**LPG Truck Hose Clearing**		**Ethane Equipment Clearing MSS**
	Peak	**Annual Average**	
Component	**Peak**	**Average**	**Peak**
Methane			
Ethane			1000.00
Propane	517.05	3.15	
i-Butane		0.79	
n-Butane		0.79	
i-Pentane			
n-Pentane			
n-Hexane			
n-Heptane			
n- Octane			
Benzene			
Toluene			
Para Xylene			
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen			
Oxygen			
Total			
Mass Flow	**517.05**	**4.72**	**1000.00**
Mole Flow	**11.725**	**0.098**	**33.256**
Heat Load (HHV)	**11.18**	**0.10**	**22.31**

NORMAL AND I

Intermittent Loads

Component	**Ethane Equipment Clearing MSS**	**Propane Equipment Clearing MSS**	**Propane Equipment Clearing MSS**
Component	**Average**	**Peak**	**Average**
Methane			
Ethane	34.04		
Propane		1000.00	122.17
i-Butane			
n-Butane			
i-Pentane			
n-Pentane			
n-Hexane			
n-Heptane			
n- Octane			
Benzene			
Toluene			
Para Xylene			
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen			
Oxygen			
Total			
Mass Flow	**34.04**	**1000.00**	**122.17**
Mole Flow	**1.132**	**22.677**	**2.770**
Heat Load (HHV)	**0.76**	**21.63**	**2.64**

NORMAL AND I

	Intermittent Loads		
Component	**Butane Equipment Clearing MSS**	**Butane Equipment Clearing MSS**	**Gasoline Arm Clearing**
Component	**Peak**	**Average**	**Peak**
Methane			
Ethane			
Propane			
i-Butane	500.00	33.87	1.20
n-Butane	500.00	33.87	51.35
i-Pentane			212.00
n-Pentane			317.37
n-Hexane			67.64
n-Heptane			10.08
n- Octane			3.53
Benzene			13.96
Toluene			1.65
Para Xylene			0.24
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen			722.14
Oxygen			
Total			
Mass Flow	**1000.00**	**67.74**	**1401.15**
Mole Flow	**17.205**	**1.165**	**35.135**
Heat Load (HHV)	**21.24**	**1.44**	**15.31**

NORMAL AND I

		Intermittent Loads	
Component	**Gasoline Arm Clearing**	**LPG Rail Car Arms**	**LPG Rail Car Arms**
Component	**Average**	**Peak**	**Average**
Methane			
Ethane			
Propane		517.05	3.15
i-Butane	0.01		0.79
n-Butane	0.29		0.79
i-Pentane	1.21		
n-Pentane	1.81		
n-Hexane	0.39		
n-Heptane	0.06		
n- Octane	0.02		
Benzene	0.08		
Toluene	0.01		
Para Xylene	0.00		
CO2			
H2S			
COS			
H2O			
Methyl Mercaptan			
Ethyl Mercaptan			
Iso-Propyl Mercaptan			
Iso-Propyl-Methyl Mercaptan			
Di-Methyl Sulfide			
Di-Methyl Disulfide			
Di-Ethyl Disulfide			
DEA			
TEG			
Nitrogen	70.61		
Oxygen			
Total			
Mass Flow	**74.49**	**517.05**	**4.72**
Mole Flow	**2.574**	**11.725**	**0.098**
Heat Load (HHV)	**0.09**	**11.18**	**0.10**

NORMAL AND I

	Intermittent Loads	
Component	**LPG Truck Arms**	**LPG Truck Arms**
Component	**Peak**	**Average**
Methane		
Ethane		
Propane	517.05	3.15
i-Butane		0.79
n-Butane		0.79
i-Pentane		
n-Pentane		
n-Hexane		
n-Heptane		
n- Octane		
Benzene		
Toluene		
Para Xylene		
CO2		
H2S		
COS		
H2O		
Methyl Mercaptan		
Ethyl Mercaptan		
Iso-Propyl Mercaptan		
Iso-Propyl-Methyl Mercaptan		
Di-Methyl Sulfide		
Di-Methyl Disulfide		
Di-Ethyl Disulfide		
DEA		
TEG		
Nitrogen		
Oxygen		
Total		
Mass Flow	**517.05**	**4.72**
Mole Flow	**11.725**	**0.098**
Heat Load (HHV)	**11.18**	**0.10**