APR 11 2019
APR 08 2019

Par Hawaii Refining
91-325 Komohana Street
Kapolei, HI 96707

CERTIFIED MAIL No. 91 7199 9991 7037 9194 2824

April 4, 2019

Ms. Marianne Rossio, P.E.
State of Hawaii
Clean Air Branch
2827 Waimano Home Road #130
Pearl City, Hawaii 96782

Subject: **Par West Refinery**
GHG Emission Reduction Plan

Dear Ms. Rossio:

Par Hawaii Refining, LLC (Par) is hereby submitting a revised Greenhouse Gas Emission Reduction Plan (GHGERP) for it's Par West Refinery located in Kapolei, Hawaii to meet the requirements of HAR §11-60.1-204(a).

The Par West Refinery is comprised of the Crude and Vacuum Units and associated supporting utility infrastructure (Steam and Power generators) from the former Chevron/IES Hawaii Refinery located at 91-480 Malakole Street in Campbell Industrial Park, Kapolei, HI. This equipment and associated covered source permits, CSP Nos. 0088-01-C, 0088-02-C and 0088-03-C, were transferred to Par from IES Downstream, LLC on December 19, 2018. IES retained ownership of the remaining facility equipment including the tank fields, fluid catalytic cracker, dimersol and alkylation plants. The baseline year of 2009, upon which this GHGERP is based, is unchanged from the original GHG Plan submitted by Chevron on June 30, 2015. Moreover, this plan also splits the 2009 baseline GHG emissions according to the the revised estimates that were previously submitted to the Department to the Health on October 28, 2016 by Chevron.

If you have any questions or require further information, please contact Anna Chung, Environmental Engineer, at (808)440-4456.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief.

Sincerely,

Richard Creamer

Richard Creamer
Vice President

asc
Attachment

Par Hawaii Refining

Greenhouse Gas Emission Reduction Plan

Par West Refinery
91-480 Malakole Street, Bldg. CCB
Kapolei, HI 96707

Covered Source Permit Nos. 0088-01-C
0088-02-C
0088-03-C

April 2019

Table of Contents

1.0 Introduction

The state's Greenhouse Gas ("GHG") rule[1] sets forth the regulatory program for meeting the statutory statewide GHG limit that is equal to or below the 1990 statewide GHG emission levels. The GHG rule generally requires each regulated source to propose a GHG Plan that would cap the source's direct GHG emissions to 16% of that source's 2010 direct GHG emissions. In meeting the GHG limit, the regulation provides flexibility to the Director of the Department of Health, Clean Air Branch ("Director" or "CAB") to set the facility-wide GHG emissions cap for an individual source by varying from the established regulatory structure in two ways: 1) by granting a request to use an alternate emission baseline; and 2) establishing an alternate GHG emission cap based on a finding that the presumptively required 16% reduction is not attainable.

An initial Greenhouse Gas Emission Reduction Plan ("GHG Plan" or "Plan") was submitted by Chevron on June 30, 2015 for the Hawaii Refinery to comply with requirements of the Hawaii Greenhouse Gas Emissions law[2] (the Act) and implement regulations of the Hawaii Department of Health ("DOH").[3] The original plan called for a reduction of 2.2% from the baseline year of 2009 and represented that additional reductions were not attainable. On November 1, 2016, IES Downstream, LLC ("IES") acquired the Hawaii Refinery from Chevron and assumed responsibility for implementing the previously submitted GHG Plan. On December 19, 2018, Par Hawaii Refining, LLC ("Par") acquired a portion of the refinery assets, which include the Crude and Vacuum Units and associated supporting utility infrastructure (Steam and Power generators), from IES, and must submit a revised GHG Plan to reflect this new configuration and ownership.

The Hawaii Refinery, previously operated by Chevron and then IES, as IES Downstream, LLC - Kapolei Refinery, is located within the Campbell Industrial Park at 91-480 Malakole Street, Kapolei, Hawaii and operated under CSP Nos. 0088-01-C, 0088-02-C, 0088-03-C, and 0863-01-C issued by the DOH. The facility began operation in 1960 with the capacity of processing up to 58,000 barrels of crude oil per day. The facility consisted of numerous operational units, including crude vacuum and distillation units, fluid catalytic cracker, dimersol, hydrogen manufacturing, alkylation, and isomerization units. It also operated utilities including boilers, cogeneration units, effluent treatment plant, and tank fields for storage, blending, and shipping capability in support of its operations. On December 19, 2018, IES transferred the refinery topping plant assets and CSPs 0088-01-C, 0088-02-C and 0088-03-C to Par and retained ownership of the tank fields, fluid catalytic cracker, dimersol and alkylation plants.

This updated GHG Plan is submitted by Par to meet the requirements of §11-60.1-204(a) for the Par West Refinery which now functions principally as a topping plant. This update sets the baseline year, as proposed by Chevron, and splits the baseline GHG emissions between Par and

---

[1] HAR §11-60.1-201, Purpose.
[2] HRS §§ 342B *et seq.*, enacted by Act 234, 2007 Hawaii Session Laws.
[3] HAR § 11-60.1-204, "Greenhouse gas emission reduction plan." Hereinafter, the "GHG rule."

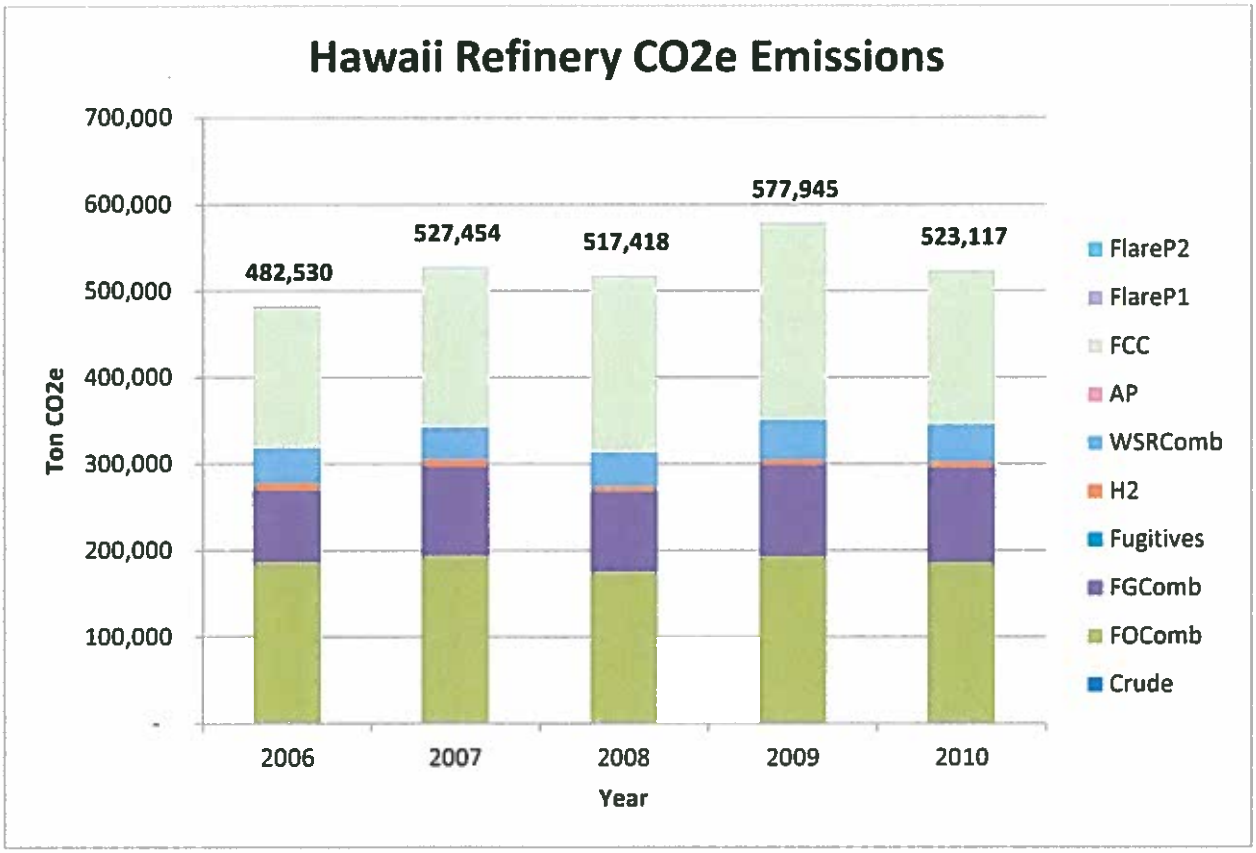
IES in alignment with the topping plant purchase agreement which excluded the tank fields, fluid catalytic cracker, dimersol and alkylation plants in the sale to Par, and associated permits. IES submitted a permit modification for CSP 0088-01-C to remove IES retained process units prior to the close of the sale to Par in December. Par's baseline will not include the emissions for those units. This update also provides the baseline year analysis requested by DOH CAB that was not included in the previously submitted GHG Plan by Chevron and is consistent with the analysis provided to DOH in subsequent information requests.

This plan consists of 5 sections. Section 2 presents the proposed baseline emission year for the entire facility and split of the baseline between the Par and IES. References to "Refinery" are for the entire facility prior to the split of assets by IES and sale to Par. Section 3, discusses the proposed 2020 facility-wide direct GHG Emissions cap. Section 4 discusses the GHG Control Assessment and Section 5 discusses the Proposed Control Strategy. Appendices of this plan contain supporting data for the selected baseline.

2.0 Request for Alternate Baseline Annual Emission Year

Section 11-60.1-204(d)(1) generally requires regulated sources to use 2010 to compute the GHG baseline emissions. This paragraph, however, also allows an owner or operator to propose an alternate GHG emission baseline and includes several potential methodologies to support computation of an acceptable alternative. These alternatives allow an owner or operator to use emissions from the years 2006-2010 in various formulations, if the owner or operator documents that 2010 is "not representative of normal source operations." A chart of the estimated refinery GHG emissions from these years is provided below.

Figure 1. 2006 – 2010 GHG Emissions and Unit Breakdown



LEGEND:

- Combustion Emissions from Fuel Oil, Fuel Gas and Whole Straight Run Fuels: FOComb, FGComb, and WSRComb
- Coke Combustion Emissions from Fluid Catalytic Cracking (FCC) Unit: FCC
- Hydrogen Manufacturing Vent Emissions: H2
- Crude Storage Emissions: Crude
- Fugitive Emissions from Process Piping: Fugitives
- Flaring Emissions: Flare P1 and Flare P2
- Acid Gas Processing Emissions: AP

These estimated emissions were recalculated in 2016 by Chevron utilizing the calculation methodologies prescribed in 40 CFR 98 Subparts A, C, P and Y along with 2015 emission and global warming potential (GWP) factors. The calculation summary is presented in Appendix A.

2.1 PROPOSED ALTERNATE BASELINE YEAR

Per §11-60.1-204(d)(1)(A)(i), the GHG Plan submitted on June 30, 2015 requested that the Director approve an alternative baseline year of 2009 based on the criteria that it is the most representative year during the five-year period ending in 2010. Direct GHG emission estimates for the proposed 2009 baseline year are 577,945 metric tons (tonnes) per year of carbon dioxide equivalent (CO_2e). Table 1. GHG Annual Emission Summary indicates the direct GHG emissions estimated for the 1990 calendar year as well as the calculated 2009 and 2010 calendar years. The 1990, 2009, and 2010 calendar years were calculated using the methodologies as required by the GHG Reporting Rule in 40 CFR Part 98; however, estimates were used for some operational data that was unavailable for the 1990 calendar year.

Table 1. GHG Annual Emission Summary

Calendar Year	Direct emissions reported in tonnes per year of CO_2e
1990	613,900 (estimated)
2009 (baseline year)	577,945
2010	523,117

2.2 JUSTIFICATION

Follow-up documentation to support the selection of 2009 as the baseline year was requested by DOH CAB on February 10, 2016 resulting in two letters submitted by Chevron on October 28, 2016, one with non-confidential business information ("CBI") and the other with CBI information. The non-CBI letter contained the calculations for the estimated GHG emissions presented in Figure 1. and Appendix A. The CBI letter, which included confidential throughput information, explained the criteria used for determining normal source operations. Process unit shutdown periods and utilization-related data were analyzed to determine the most representative year during the five-year period ending in 2010. Three alternatives for the baseline were presented for consideration with 2009 emissions selected as the most recent representative year and are discussed below.

2.2.1 Unit Downtime

Refinery GHG emissions occur from the processing of crude oil to produce high value products that are distributed in commerce for fuels. GHG emissions from normal operations are generated from the following sources:

1. Combustion of fuels supplying heat to the Refinery processes (account for approximately 60% of total GHG emissions from the Refinery)
2. Coke combustion in the Fluid Catalytic Cracking ("FCC") Unit (account for approximately 35% of total GHG emissions from the Refinery)
3. Hydrogen Plant
4. Crude Storage
5. Fugitives (piping)
6. (Emissions from) Flaring Events
7. Acid Gas Production (<5% of total GHG emissions from the Refinery).

Normal source operations are characterized by crude and process unit throughputs (utilization) and continuous operation that allow the Refinery to meet the fuel market demands.

Factors that can impact normal operations include:

1. Unit downtime, whether planned or unplanned, including crude supply interruptions and turnaround years;
2. External factors that reduce utilization, including widespread economic downturns impacting fuel market demands;
3. Periods of malfunction resulting in excess emissions, including force majeure events.

In the Refinery, planned maintenance is required for each unit. Short-term shutdowns to service equipment in each process unit occur regularly during the year and typically only last hours. Approximately every five years the units have scheduled long-term shutdowns that can last weeks or months, which all occur in a "turnaround ("TA") year". A TA year differs on average 12% of CO2e GHG emissions from the year before it and can vary up to 19%. TA years are not considered representative of normal operation due to this impact.

2.2.2 Refinery Utilization

A second quantitative marker of "normal source operations" is Refinery utilization. Utilization can be described in several ways including crude throughput, process unit feed rates, product output, and Complexity Weighted Barrels ("CWB") throughput.

Throughput is typically measured in barrels or barrels per day. For benchmarking comparison of multiple facilities in the refining industry, California Air Resources Board has standardized on

Complexity Weighted Barrels, CWB, as a Refinery's throughput measurement in their Regulation for the Mandatory Reporting of Greenhouse Emissions.[4]

In determining the CWB throughput, the actual crude and individual process unit throughputs, in barrels, are weighted by factors that equalize the number and complexity differences in process units found at different facilities. For the same crude throughput, a Refinery with more processing will have a higher CWB.

CWB is correlated with GHG emissions, because more processing generally leads to higher GHG emissions. Thus, CWB is a throughput measurement normalized for the complexity of the Refinery that is a reasonable metric for discussing GHG emissions.

2.2.3 Procedures for Determining Alternative Baseline Year

2.2.3.1 HAR §11-60.1-204 (d)(1)(A)(i)

HAR §11-60.1-204 (d)(1)(A)(i) allows a facility to determine alternative facility-wide GHG emissions (less biogenic CO2) based on the most recent representative year during the five-year period ending 2010. The Refinery considers representative operation to be periods with (1) no significant process unit shutdowns and (2) a CWB throughput that reflects normal fuel markets and falls within the normal operating window.

No significant process unit shutdowns are a measure of normal operation because during extended periods of shutdown or shutdowns of the large process units such as the Crude Unit or the Fluid Catalytic Cracker, the emissions are low to zero, and do not represent emissions when the units are operating. Refinery CWB throughput is determined by the fuel markets that the Refinery supplies and relates to Actual GHG emissions because firing rates of Refinery heaters and boilers are determined by the feed to the Refinery and process units.

CWB throughput for years 2002 through 2015 were evaluated by Chevron to determine a typical operating window that is representative of normal operation for GHG emissions evaluation. The operating window was established based on the 14-yr mean with a standard deviation of +/- 6%.

2010
The 2010 calendar year does not meet the criteria of normal operation because there was extended unplanned shutdown of the FCC Unit due to equipment malfunction and reduced CWB throughput due to lower fuel market demands driven by poor economic conditions.

2009
The 2009 calendar year meets the criteria of normal operation, as no significant shutdowns occurred and Refinery CWB throughput was within the normal range.

2008

[4] Title 17, California Code of Regulations, Section 95100 et seq, (MRR)

2008 was a turnaround year, in which the Refinery executed a planned Refinery-wide shutdown that lasted 31 days (8% of the year) at the Crude Unit and 41 days (11% of the year) for the FCCU. The CWB throughput for the year was significantly impacted by this downtime. The combined influence of these two criteria makes the 2008 calendar year non-representative of normal operation.

2007

The 2007 calendar year meets the criteria of normal operation, as no significant shutdowns occurred and Refinery CWB throughput was within the normal range.

2006

In calendar year 2006, two external events occurred that resulted in significant unit downtime and had some impact on the Refinery CWB throughput. On February 21, 2006, a Refinery-wide shutdown unexpectedly occurred as a result of an island-wide power outage. The FCC downtime was extended in order to internally inspect equipment. On October 15, 2006, a second Refinery-wide shutdown occurred as a result of an island-wide power outage following an earthquake off the island of Hawaii. These two events resulted in 30 days of FCC downtime, or 8% of the year. It also resulted in a 1% overall downtime for the Crude Unit. This significant downtime also lowered the Refinery CWB. The combined influence of these two events makes the 2006 calendar year non-representative of normal operation.

Table 2. summarizes the evaluation of the 2006-2010 calendar years.

Table 2. Normal Operation Analyses Summary

Year	Direct Estimated GHG Emissions (tonnes)	Refinery Operation Impacted by Shutdowns	Refinery Throughput	CWB Throughput % of Mean (+/-6%)	Representative Year?
2010	523,117	Refinery Actual GHG emissions reduced due to an unplanned FCC shutdown	Refinery Actual GHG emissions reduced due to lower Refinery throughput	-8%	No
2009	577,945	No impact	No impact	-1%	Yes
2008	517,418	Planned Refinery turnaround (TA)	Not estimated due to impact from TA	-10%	No
2007	527,454	No impact	No impact	4%	Yes
2006	482,530	Refinery Actual GHG emissions reduced due to an unplanned Refinery-wide shutdown	No impact	-2%	No

2.2.3.2 HAR §11-60.1-204 (d)(1)(A)(ii)

The next method allowed by HAR §11-60.1-204 (d)(1)(A)(ii) is to average facility-wide Actual GHG emissions (less biogenic CO2) over any consecutive two-year period during the five-year period ending in 2010. As described in the previous section, there are no representative consecutive two-year periods; therefore, this method is not feasible.

However, averaging the two years with Actual GHG emissions representative of normal operation, 2009 and 2007, does reflect emissions that could be considered representative. The average Actual GHG emissions for 2007 and 2009 are 552,700 tonnes CO2e.

2.2.3.3 HAR §11-60.1-204 (d)(1)(A)(iii)

The third method allowed by HAR §11-60.1-204 (d)(1)(A)(iii) is to average facility-wide GHG emissions (less biogenic CO2) for the five-year period ending in 2010. As described in the previous section, the five-year period ending in 2010 includes three years that are not representative of normal operation for GHG emissions; therefore, this method is not feasible.

2.2.3.4 HAR §11-60.1-204 (d)(1)(A)(iv)

The fourth method allowed by HAR §11-60.1-204 (d)(1)(A)(iv) is to utilize comparable methods as approved by the director. As noted in the regulation, the director will not consider the use of periods greater than five years from 2010, except for extreme cases such as where an affected source may not have been fully operational for an extended period of time.

A comparable method for determining an alternative baseline year, is to adjust the actual emissions of a non-representative year to reflect expected emissions from restored operation. Chevron adjusted the 2010 calendar year emissions to include the GHG emissions for the FCC shutdown days and unrealized Refinery throughput (adjusted to mean CWB value). Data showed that 2010 GHG CO2e emissions would have been at most 2.5% greater than years 2007 and 2009 emissions and 2010 CWB varied between 2% and 4% of years 2007 and 2009 throughput which had throughput within normal the range.

2.2.4 Baseline Year Determination Alternatives

Following HAR §11-60.1-204 (d)(1)(A)(i-iv), the procedures set forth to evaluate alternative baseline year emissions, the Refinery has determined the following:

1. Calendar year 2009 Actual GHG emissions are the most recent representative of normal operations. These emissions are 577,945 tonnes CO2e per year.

2. The average of Actual GHG emissions for calendar years 2009 and 2007 is the second most representative baseline emissions. These emissions are 552,700 tonnes CO2e per year.

3. The adjusted 2010 calendar year Actual GHG emissions estimated to remove the impacts of downtime and lost CWB throughput could be considered feasible and is the third most representative baseline emissions. These emissions are ~0.3% greater than 2009 emissions.

2.2.5 Conclusion

Based on detailed reviews of historical operation, 2006-2010 GHG input data and emissions recalculations, and computational comparisons between eGGRT and SLEIS data done in cooperation with the DOH CAB, 2009 is the most recent representative year for the facility-wide baseline annual emission rate. Although GHG emissions were somewhat higher in 2009, most of that increase was associated with the FCC. The remaining refinery emissions were quite similar to their related emissions in 2007 and 2010. Appendix A contains the computational worksheets supporting the 2009 baseline emission rate previously provided to the DOH by Chevron in 2016.

2.3 BASELINE EMISSION SPLIT

Par proposes to split the 2009 baseline emissions between the Par West Refinery topping plant and IES' facility as shown in Table 3. The split is based on the topping plant purchase agreement which did not include the tank fields, fluid catalytic cracker, dimersol and alkylation plants in the sale to Par, and associated permits.

Table 3. Baseline Emission Split

		Total Emissions (tonnes)	Par Topping Plant (tonnes)	IES Facility (tonnes)
		2009	2009	2009
Subpart C	CatOx Combustion	-	-	
	Fuel Gas Combustion	103,990	100,767	3,223
	WSR Combustion	44,986	44,986	-
	Diesel Combustion	-	-	-
	Fuel Oil Combustion	193,346	193,346	-
	Total Subpart C	**342,322**	**339,099**	**3,223**
Subpart P	**Hydrogen Mfg**	**7,247**	**7,247**	**-**
Subpart Y	FCC Coke Combustion	226,349	-	226,349
	Flare P1	1,017	1,017	-
	Flare P2 (Crude/Sweet)	117	117	-
	Acid Plant	485	485	-
	Fugitive Venting (Columns)	363	308	55
	Loading Vent (Crude Receipts)	45	-	45
	Total Subpart Y	**228,376**	**1,927**	**226,449**
	Total Direct CO2e (tonnes)	**577,945**	**348,273**	**229,672**

Table 4. compares the equipment and associated 2009 baseline emissions to 2017 emissions, the last report submitted to the EPA via eGGRT. The table also lists permit numbers, current owners and changes in equipment operational status. In addition, it shows where GHG emissions from Boilers F-5201, F-5202 and F-5203 transferred to Boilers F-5205 and F-5206 and supports why the baseline emissions from those shutdown boilers should remain with Par.

Table 4. 2009 Baseline Emissions/Equipment Split and Current Equipment Status Comparison

			Baseline Analysis			Current Equipment Comparison		
			Total	Split		Total Emissions	Equipment Status as of March 2019	
				Par	IES			
		Permit Number	2009	2009	2009	2017	Owner	Status
Subpart C	**CatOx Combustion**							
	Catalytic Oxidizer	0088-01-C	-	-	-	106	Par	Operating
		SubTotal	-	-	-	**106**		
	Fuel Gas Combustion							
	F-5103 - Crude Atm Furnace (pilot light)	0088-01-C	-	-	-	-	Par	Operating
	F-5153 - Crude Vac Furnace (pilot light)	0088-01-C						
	F-5201 - Boiler[5]	0088-01-C	24,168	24,168	-	-	Chevron/IES	Permanently Shut down
	F-5202 - Boiler[5]	0088-01-C						
	F-5203 - Boiler[5]	0088-01-C						
	F-5205 - Boiler	0088-02-C	-	-	-	23,320	Par	Operating
	F-5206 - Boiler	0088-02-C						
	F-5300 - FCC Furnace	TBD	3,223	-	3,223	6,832	IES	Idle
	F-5310 - FCC Startup Air Heater	TBD						
	F-5700 - Hydrogen Furnace	0088-01-C	43,967	43,967	-	32,374	Par	Idle
	F-5930 - Isomerization Furnace	0088-01-C						
	F-5950 - Isomerization Furnace	0088-01-C						
	F-5600 - Hydrogenation Furnace	0088-01-C						
	F-6200 - Acid Plant Combustion Chamber	0088-01-C						
	F-6260 - Acid Plant Pre-heater	0088-01-C						
	K-6701 – Cogen & HSRG	0088-01-C	32,632	32,632	-	57,730	Par	Operating
	K-6702 – Cogen & HSRG	0088-01-C						
	K-6703 – Cogen & HSRG	0088-01-C						

[5] Boilers operating during the 2009 baseline were shutdown June 1, 2016 and replaced with new boilers (under the same project/permit modification). The new boilers were acquired by Par, and baseline emissions should transfer with them.

			Baseline Analysis			Current Equipment Comparison		
			Total	Split		Total Emissions	Equipment Status as of March 2019	
				Par	IES			
		Permit Number	2009	2009	2009	2017	Owner	Status
	K-6704 – Cogen & HSRG	0088-02-C	-	-	-		Par	Operating
		SubTotal	**103,990**	**100,767**	**3,223**	**120,256**		
	WSR Combustion							
	K-6701 - Cogen	0088-01-C	44,986	44,986	-	54,225	Par	Operating
	K-6702 - Cogen	0088-01-C						
	K-6703 - Cogen	0088-01-C						
	K-6704 - Cogen	0088-02-C	-	-	-		Par	Operating
		SubTotal	**44,986**	**44,986**	**-**	**54,225**		
	Diesel Combustion							
	F-5205 - Boiler	0088-02-C	-	-	-	37,203	Par	Operating
	F-5206 - Boiler	0088-02-C						
	Black Start Generator	0088-03-C	-	-	-	424	Par	Operating
	RICE-110	0088-03-C						
	RICE-1233	0088-03-C						
	RICE-1522	0088-03-C						
		SubTotal	**-**	**-**	**-**	**37,627**		
	Fuel Oil Combustion							
	F-5103 - Crude Atm Furnace	0088-01-C	103,699	103,699	-	96,052	Par	Operating
	F-5153 - Crude Vac Furnace	0088-01-C						
	F-5201 - Boiler[5]	0088-01-C	89,647	89,647	-	-	Chevron/IES	Permanently Shutdown
	F-5202 - Boiler[5]	0088-01-C						
	F-5203 - Boiler[5]	0088-01-C						
	F-5205 - Boiler	0088-02-C	-	-	-	-	Par	Operating
	F-5206 - Boiler	0088-02-C						
		SubTotal	**193,346**	**193,346**	**-**	**96,052**		
	Total Subpart C		**342,322**	**339,099**	**3,223**	**308,266**		
Subpart P	**Hydrogen Mfg**	0088-01-C	7,247	7,247	-	4,881	Par	Idle
		SubTotal	**7,247**	**7,247**	**-**	**4,881**		

			Baseline Analysis			Current Equipment Comparison		
			Total	Split		Total Emissions	Equipment Status as of March 2019	
				Par	IES			
		Permit Number	2009	2009	2009	2017	Owner	Status
	Total Subpart P		**7,247**	**7,247**	**-**	**4,881**		
Subpart Y	**FCC Coke Combustion**	0088-01-C	226,349	-	226,349	162,253	IES	Idle
	Flare P1 (FCC/Sour)	0088-01-C	1,017	1,017	-	140	Par	Operating
	Flare P2 (Crude/Sweet)	0088-01-C	117	117	-	-	Par	Operating
	Acid Plant	0088-01-C	485	485	-	581	Par	Idle
	Fugitive Venting (Columns)		363	308	55			
	C-5100 - Crude Unit	0088-01-C					Par	Operating
	C-5150 - Crude Unit	0088-01-C					Par	Operating
	C-5170 - Crude Unit	0088-01-C					Par	Operating
	C-5830 - Alkylation Unit	0088-01-C				308	Par	Idle
	C-5840 - Alkylation Unit	0088-01-C					Par	Idle
	C-5940 - Isomerization Unit	0088-01-C					Par	Idle
	C-6101 - Amine/Acid Unit	0088-01-C					Par	Idle
	C-6660 - Dimersol Unit	TBD					IES	Idle
	C-5850 - Alkylation Unit	TBD					IES	Idle
	C-5860 - Alkylation Unit	TBD					IES	Idle
	C-5330 - FCC Unit	TBD					IES	Idle
	C-5340 - FCC Unit	TBD					IES	Idle
	C-5350 - FCC Unit	TBD				55	IES	Idle
	C-5405 - FCC Unit	TBD					IES	Idle
	C-5400 - FCC Unit	TBD					IES	Idle
	C-5410 - FCC Unit	TBD					IES	Idle
	C-5420 - FCC Unit	TBD					IES	Idle
	C-5450 - FCC Unit	TBD					IES	Idle
	Loading Vent (Crude Receipts)	0863-01-C	45	-	45	39	IES	Operating
		SubTotal	**228,376**	**1,927**	**226,449**	**163,376**		
	Total Subpart Y		**228,376**	**1,927**	**226,449**	**163,376**		

		Baseline Analysis			Current Equipment Comparison		
		Total	Split		Total Emissions	Equipment Status as of March 2019	
			Par	IES			
	Permit Number	2009	2009	2009	2017	Owner	Status
Total Direct metric tons CO2e		**577,945**	**348,273**	**229,672**	476,523	**Total 2017 Emissions**	
					307,344	**2017 Par Equipment**	
					169,179	**2017 IES Equipment**	

As indicated in the table above, the GHG baseline allocation associated with boilers F-5201, F-5202 and F-5203 ("Boilers 1/2/3") should be held and retained by Par Hawaii Refining. Based on the GHG calculations which Chevron submitted on October 28, 2016, these boilers accounted for approximately 113,815 tonnes or roughly 20% of the 577,945 tonnes of GHG's emitted by the refinery in 2009, the baseline year set forth in Chevron's GHG plan. Boilers 1/2/3, used to establish the 2009 baseline, were shut down by Chevron in 2016 and replaced by 2 new boilers, F-5205 and F-5206, which Par subsequently purchased from IES.

The new boilers were permitted under CSP 0088-02-C with a condition in Attachment IIB, Section C.1, that required Boilers 1/2/3 to be shutdown within one year after the startup of the new boilers. A notification of permanent shutdown of the existing boilers on June 1, 2016 was sent to DOH by Chevon. The equipment was subsequently removed from CSP 0088-01-C when the permit was reissued on November 16, 2018. A copy of the letter is included in Appendix B.

3.0 2020 Direct GHG Emissions Cap – Par West Refinery

Per §11-60.1-204(d)(2), the regulation requires a 16% reduction from the proposed 2009 baseline year emission split of 348,273 tonnes per year CO2e for Par West. This equates to a reduction of 55,724 tonnes per year of CO2e and an emissions cap of 292,549 tonnes per year CO2e.

Par proposes a cap of **292,549** tonnes per year CO2e for its Par West Refinery operations which meets the State's 16% emission reduction requirement.

4.0 GHG Control Assessment

Per §11-60.1-204(d)(2), the GHG rule requires each affected source to conduct a GHG control assessment. The initial GHG plan submitted by Chevron includes an assessment of the control measures identified in §11-60.1-204(d)(3) as well as an evaluation of the technical feasibility, control effectiveness, and cost evaluation of each measure as required by §11-60.1-204(d)(4-5).

Par West has not included a revised control assessment in this updated GHG plan because it does not seek an alternate cap.

5.0 Proposed Control Strategy

Per §11-60.1-204(d)(6), the regulation requires each affected source to propose a control strategy to include a listing of identified control measures that can be implemented in order to meet the required or proposed alternate 2020 facility-wide GHG emissions cap.

Par West proposes to attain a 16% reduction in emissions from operational changes as a result of only operating the refinery as a topping plant. Many of the GHG producing units that Par purchased from IES will be idled and suspending their operation will account for the bulk of the reduction. While the operations of many of the process heaters will be suspended, projects will continue to be evaluated to optimize business needs that may cause some of these units to be restarted in the future. In addition, since the temporary cessation is projected to yield reductions in excess of 16%, Par plans to partner the Par West and Par East facilities.

Table 5. summarizes the reductions attributed to idling process heaters that had been used to establish the baseline year and the amount of credits that would be available to the Par East Refinery through partnering. Par's baseline emissions and proposed emission cap are presented

along with projected GHG emissions in RY2019, which have been estimated by reducing emissions from the idled Hydrogen Manufacturing, Isomerization, Hydrogenation and Acid Plants and replacing the old Boiler emissions with the 2017 emissions from the new Boilers. There is approximately 35,558 tonnes of CO2e available for partnering with the Par East Refinery.

Table 5. Projected Available Partnering Emissions

Par 2009 Baseline Emissions	**348,273**	tonnes
16% Reduction	55,724	tonnes
GHG Emissions Cap with 16% reduction	**292,549**	tonnes
Par 2009 Baseline Emissions	**348,273**	tonnes
- Idled Equipment Subpart C	32,374	tonnes
- Idled Equipment Subpart P	4,881	tonnes
- Idled Equipment Subpart Y	735	tonnes
- Old Boiler Fuel Gas Emissions	24,168	tonnes
- Old Boiler Fuel Oil Emissions	89,647	tonnes
+ 2017 New Boiler Fuel Gas Emissions	23,320	tonnes
+ 2017 New Boiler Diesel Emissions	37,203	tonnes
Projected 2019 Emissions w/ new Boilers less idled and shut down equipment	**256,991**	tonnes
Proposed GHG Emissions Cap	**292,549**	tonnes
Available GHG Emissions for Partnering	**35,558**	tonnes

Par Hawaii Refining

Appendix A

2009 Baseline Emission Calculations

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Gas Volume) [FuelCalculated]	Units	Carbon Content [CC]	Units	Molecular Weight [MW]	Units	Higher Heating Value	Units	Convert Fuel Volume to STP	Fuel Use (Gas Volume) At STP [FuelConverted]	Units	Convert CC to Annual Weighted Average	Annual Weighted Average CC	Units	Convert MW to Annual Weighted Average	Annual Weighted Average MW	Units	Species Emission Rate Expression	Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	141295.1409	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	143470.2885	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	17466918.32	lb/month	7922.870299	MT/month	7922.870299	
Jan	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	141295.1409	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	143470.2885	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	975.4613894	lb/month	0.44246237	MT/month	11.06155924	
Jan	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	141295.1409	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	143470.2885	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	195.0922779	lb/month	0.088492474	MT/month	26.37075723	
Feb	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	133358.9603	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	135411.9355	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	16485846.95	lb/month	7477.863282	MT/month	7477.863282	
Feb	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	133358.9603	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	135411.9355	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	920.6722603	lb/month	0.417610409	MT/month	10.44026023	
Feb	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	133358.9603	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	135411.9355	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	184.1344521	lb/month	0.083522082	MT/month	24.88958039	
Mar	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	136662.0965	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	138765.9214	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	16894180.95	lb/month	7663.080691	MT/month	7663.080691	
Mar	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	136662.0965	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	138765.9214	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	943.4761715	lb/month	0.427954102	MT/month	10.69885254	
Mar	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	136662.0965	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	138765.9214	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	188.6952343	lb/month	0.08559082	MT/month	25.50606446	
Apr	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	137719.2741	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	139839.3735	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	17024869.34	lb/month	7722.360016	MT/month	7722.360016	
Apr	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	137719.2741	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	139839.3735	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	950.7746241	lb/month	0.431264628	MT/month	10.7816157	
Apr	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	137719.2741	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	139839.3735	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	190.1549248	lb/month	0.086252926	MT/month	25.70337183	
May	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	153196.9327	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	155555.3007	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	18938218.92	lb/month	8590.241821	MT/month	8590.241821	
May	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	153196.9327	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	155555.3007	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	1057.627969	lb/month	0.479732548	MT/month	11.99331369	
May	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	153196.9327	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	155555.3007	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	211.5255938	lb/month	0.09594651	MT/month	28.59205983	
Jun	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	126838.4462	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	128791.0423	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	15679780.4	lb/month	7112.237209	MT/month	7112.237209	
Jun	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	126838.4462	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	128791.0423	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	875.656489	lb/month	0.397191575	MT/month	9.929789363	
Jun	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	126838.4462	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	128791.0423	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	175.1312978	lb/month	0.079438315	MT/month	23.67261784	
Jul	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	144104.6647	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	146323.0631	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	17814231.91	lb/month	8080.409281	MT/month	8080.409281	
Jul	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	144104.6647	mscf	0.706671	kg C/kg gas	18.10487	kg/kmol	0.00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	146323.0631	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0.7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18.104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	994.8575411	lb/month	0.451260327	MT/month	11.28150816	

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Gas Volume) [FuelCalculated]	Units	Carbon Content [CC]	Units	Molecular Weight [MW]	Units	Higher Heating Value	Units	Convert Fuel Volume to STP	Fuel Use (Gas Volume) At STP [FuelConverted]	Units	Convert CC to Annual Weighted Average	Annual Weighted Average CC	Units	Convert MW to Annual Weighted Average	Annual Weighted Average MW	Units	Species Emission Rate Expression	Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jul	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	144104 6647	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	146323 0631	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	198 9715082	lb/month	0 090252065	MT/month	26 89511546	
Aug	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	155720 3423	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	158117 5566	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	19250163 05	lb/month	8731 737464	MT/month	8731 737464	
Aug	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	155720 3423	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	158117 5566	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	1075 04887	lb/month	0 487634545	MT/month	12 19086361	
Aug	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	155720 3423	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	158117 5566	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	215 0097739	lb/month	0 097526909	MT/month	29 06301885	
Sep	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	152070 6513	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	154411 6809	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	18798987 91	lb/month	8527 08762	MT/month	8527 08762	
Sep	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	152070 6513	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	154411 6809	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	1049 852443	lb/month	0 476205624	MT/month	11 9051406	
Sep	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	152070 6513	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	154411 6809	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	209 9704886	lb/month	0 095241125	MT/month	28 38185519	
Oct	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	164171 6392	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	166698 9557	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	20294913 14	lb/month	9205 628699	MT/month	9205 628699	
Oct	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	164171 6392	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	166698 9557	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	1133 394215	lb/month	0 514099579	MT/month	12 85248948	
Oct	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	164171 6392	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	166698 9557	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	226 6788429	lb/month	0 102819916	MT/month	30 64033493	
Nov	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	220390 0985	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	223782 862	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	27244644 26	lb/month	12357 97746	MT/month	12357 97746	
Nov	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	220390 0985	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	223782 862	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	1521 510438	lb/month	0 690146346	MT/month	17 25365865	
Nov	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	220390 0985	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	223782 862	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	304 3020876	lb/month	0 138029269	MT/month	41 13272224	
Dec	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Carbon Dioxide	180296 6365	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	183072 187	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	(44/12) * FuelCalculated * CarbonContent * MW / StdMolVolEPA * ConvScfMscf * ConvLbG	22288286 8	lb/month	10109 80886	MT/month	10109 80886	
Dec	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Methane	180296 6365	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	183072 187	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	1244 716601	lb/month	0 564594625	MT/month	14 11486562	
Dec	2009	Mix Drum Fuel Gas To Refinery	Stationary Comb	Nitrogen Oxide	180296 6365	mscf	0 706671	kg C/kg gas	18 10487	kg/kmol	0 00103	mmbtu/scf	FuelUsage * (68 + STPConv) / (60 + STPConv)	183072 187	mscf	∑ (FuelCalculated(i) * CC(i)) / ∑ (FuelCalculated(i))	0 7066707	kg C/kg gas	∑ (FuelCalculated(i) * MW(i)) / ∑ (FuelCalculated(i))	18 104871	kg/kmol	FuelConverted*HHV*EF * ConvScfMscf * ConvLbKg	248 9433203	lb/month	0 112918925	MT/month	33 64983963	

Appendix A
GHG Calculations 2009
WSR Combustion

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Liquid Volume) [FuelUsage]	Units	Heat Content (Liquid) - HHV [HHV]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	16661	bbl	4974	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	12427312.4	lb/month	5636.940788	MT/month	5636.940788	
Jan	2009	WSR Combustion Sources	Stationary Comb	Methane	16661	bbl	4974	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	548.1025757	lb/month	0.248615442	MT/month	6.21538605	
Jan	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	16661	bbl	4974	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	109.6205151	lb/month	0.049723088	MT/month	14.81748034	
Feb	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	12224	bbl	4912	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	9004136.495	lb/month	4084.21247	MT/month	4084.21247	
Feb	2009	WSR Combustion Sources	Stationary Comb	Methane	12224	bbl	4912	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	397.1245146	lb/month	0.180132864	MT/month	4.5033216	
Feb	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	12224	bbl	4912	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	79.42490293	lb/month	0.036026573	MT/month	10.73591869	
Mar	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	11897	bbl	5008	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	8934539.071	lb/month	4052.643572	MT/month	4052.643572	
Mar	2009	WSR Combustion Sources	Stationary Comb	Methane	11897	bbl	5008	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	394.0549428	lb/month	0.178740528	MT/month	4.4685132	
Mar	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	11897	bbl	5008	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	78.81098857	lb/month	0.035748106	MT/month	10.65293547	
Apr	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	11312	bbl	5006	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	8491816.722	lb/month	3851.827853	MT/month	3851.827853	
Apr	2009	WSR Combustion Sources	Stationary Comb	Methane	11312	bbl	5006	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	374.5288175	lb/month	0.169883616	MT/month	4.2470904	
Apr	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	11312	bbl	5006	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	74.9057635	lb/month	0.033976723	MT/month	10.12506351	
May	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	8712	bbl	5045	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	6590971.108	lb/month	2989.617761	MT/month	2989.617761	
May	2009	WSR Combustion Sources	Stationary Comb	Methane	8712	bbl	5045	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	290.6926393	lb/month	0.13185612	MT/month	3.296403	
May	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	8712	bbl	5045	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	58.13852785	lb/month	0.026371224	MT/month	7.858624752	

Appendix A
GHG Calculations 2009
WSR Combustion

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Liquid Volume) [FuelUsage]	Units	Heat Content (Liquid) - HHV [HHV]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jun	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	9204	bbl	5046	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	6964568.7	lb/month	3159.07898	MT/month	3159.07898	
Jun	2009	WSR Combustion Sources	Stationary Comb	Methane	9204	bbl	5046	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	307.1700397	lb/month	0.139330152	MT/month	3.4832538	
Jun	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	9204	bbl	5046	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	61.43400794	lb/month	0.02786603	MT/month	8.304077059	
Jul	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	6502	bbl	5018	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	4892693.3	lb/month	2219.290989	MT/month	2219.290989	
Jul	2009	WSR Combustion Sources	Stationary Comb	Methane	6502	bbl	5018	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	215.7906483	lb/month	0.097881108	MT/month	2.4470277	
Jul	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	6502	bbl	5018	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	43.15812966	lb/month	0.019576222	MT/month	5.833714037	
Aug	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	6333	bbl	5063	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	4808258.256	lb/month	2180.991852	MT/month	2180.991852	
Aug	2009	WSR Combustion Sources	Stationary Comb	Methane	6333	bbl	5063	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	212.0666681	lb/month	0.096191937	MT/month	2.404798425	
Aug	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	6333	bbl	5063	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	42.41333363	lb/month	0.019238387	MT/month	5.733039445	
Sep	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	10866	bbl	5009	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	8161896.87	lb/month	3702.178548	MT/month	3702.178548	
Sep	2009	WSR Combustion Sources	Stationary Comb	Methane	10866	bbl	5009	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	359.9778096	lb/month	0.163283382	MT/month	4.08208455	
Sep	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	10866	bbl	5009	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	71.99556192	lb/month	0.032656676	MT/month	9.731689567	
Oct	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	10849	bbl	4992	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	8121470.225	lb/month	3683.841308	MT/month	3683.841308	
Oct	2009	WSR Combustion Sources	Stationary Comb	Methane	10849	bbl	4992	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	358.1948056	lb/month	0.162474624	MT/month	4.0618656	
Oct	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	10849	bbl	4992	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	71.63896111	lb/month	0.032494925	MT/month	9.68348759	

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Liquid Volume) [FuelUsage]	Units	Heat Content (Liquid) - HHV [HHV]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Nov	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	11055	bbl	5034	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	8345307.21	lb/month	3785.372177	MT/month	3785.372177	
Nov	2009	WSR Combustion Sources	Stationary Comb	Methane	11055	bbl	5034	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	368.0670631	lb/month	0.16695261	MT/month	4.17381525	
Nov	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	11055	bbl	5034	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	73.61341261	lb/month	0.033390522	MT/month	9.950375556	
Dec	2009	WSR Combustion Sources	Stationary Comb	Carbon Dioxide	16053	bbl	5012	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	12065286.49	lb/month	5472.728401	MT/month	5472.728401	
Dec	2009	WSR Combustion Sources	Stationary Comb	Methane	16053	bbl	5012	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	532.1355404	lb/month	0.241372908	MT/month	6.0343227	
Dec	2009	WSR Combustion Sources	Stationary Comb	Nitrogen Oxide	16053	bbl	5012	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	106.4271081	lb/month	0.048274582	MT/month	14.38582532	

Appendix A
GHG Calculations 2009
Fuel Oil Combustion

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Liquid	Units	Heat Content	Units	Species Emission Rate Calculation	Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	36719	bbl	6314	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	38385668	lb/month	17411.47	MT/month	17411.47	
Jan	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	36719	bbl	6314	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1533.3822	lb/month	0.695531	MT/month	17.38828	
Jan	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	36719	bbl	6314	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	306.67644	lb/month	0.139106	MT/month	41.45367	
Feb	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	33395	bbl	6287	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	34761506	lb/month	15767.57	MT/month	15767.57	
Feb	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	33395	bbl	6287	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1388.6088	lb/month	0.629863	MT/month	15.74658	
Feb	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	33395	bbl	6287	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	277.72176	lb/month	0.125973	MT/month	37.53984	
Mar	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	37900	bbl	6328	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	39708123	lb/month	18011.32	MT/month	18011.32	
Mar	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	37900	bbl	6328	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1586.21	lb/month	0.719494	MT/month	17.98734	
Mar	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	37900	bbl	6328	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	317.242	lb/month	0.143899	MT/month	42.88182	
Apr	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	33723	bbl	6292	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	35130845	lb/month	15935.1	MT/month	15935.1	
Apr	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	33723	bbl	6292	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1403.3627	lb/month	0.636555	MT/month	15.91388	
Apr	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	33723	bbl	6292	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	280.67253	lb/month	0.127311	MT/month	37.9387	
May	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	35290	bbl	6324	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	36950235	lb/month	16760.36	MT/month	16760.36	
May	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	35290	bbl	6324	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1476.0413	lb/month	0.669522	MT/month	16.73805	
May	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	35290	bbl	6324	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	295.20827	lb/month	0.133904	MT/month	39.9035	
Jun	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	31427	bbl	6303	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	32796229	lb/month	14876.14	MT/month	14876.14	
Jun	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	31427	bbl	6303	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1310.1024	lb/month	0.594253	MT/month	14.85633	
Jun	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	31427	bbl	6303	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	262.02047	lb/month	0.118851	MT/month	35.41749	
Jul	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	35350	bbl	6308	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	36919413	lb/month	16746.38	MT/month	16746.38	
Jul	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	35350	bbl	6308	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1474.8101	lb/month	0.668963	MT/month	16.72409	
Jul	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	35350	bbl	6308	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	294.96202	lb/month	0.133793	MT/month	39.87022	
Aug	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	33960	bbl	6345	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	35675740	lb/month	16182.26	MT/month	16182.26	
Aug	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	33960	bbl	6345	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1425.1294	lb/month	0.646429	MT/month	16.16072	

Appendix A
GHG Calculations 2009
Fuel Oil Combustion

Month	Year	Process Unit	Emission Scenario	GHG Species	Fuel Use (Liquid	Units	Heat Content	Units	Species Emission Rate Calculation	Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Aug	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	33960	bbl	6345	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	285.02588	lb/month	0.129286	MT/month	38.52714	
Sep	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	34521	bbl	6313	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	36082186	lb/month	16366.62	MT/month	16366.62	
Sep	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	34521	bbl	6313	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1441.3656	lb/month	0.653793	MT/month	16.34483	
Sep	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	34521	bbl	6313	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	288.27312	lb/month	0.130759	MT/month	38.96608	
Oct	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	38044	bbl	6299	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	39676327	lb/month	17996.9	MT/month	17996.9	
Oct	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	38044	bbl	6299	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1584.9398	lb/month	0.718917	MT/month	17.97294	
Oct	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	38044	bbl	6299	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	316.98797	lb/month	0.143783	MT/month	42.84748	
Nov	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	27119	bbl	6342	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	28475646	lb/month	12916.35	MT/month	12916.35	
Nov	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	27119	bbl	6342	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1137.5092	lb/month	0.515966	MT/month	12.89915	
Nov	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	27119	bbl	6342	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	227.50183	lb/month	0.103193	MT/month	30.75158	
Dec	2009	Fuel Oil Combustion Sources	Stationary Comb	Carbon Dioxide	28856	bbl	6333	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	30256542	lb/month	13724.15	MT/month	13724.15	
Dec	2009	Fuel Oil Combustion Sources	Stationary Comb	Methane	28856	bbl	6333	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	1208.6502	lb/month	0.548235	MT/month	13.70588	
Dec	2009	Fuel Oil Combustion Sources	Stationary Comb	Nitrogen Oxide	28856	bbl	6333	mbtu/bbl	FuelUsage*HHV*EF * ConvLbKg * ConvMmbtuMbtu	241.73003	lb/month	0.109647	MT/month	32.67481	

Month	Year	Process Unit	Emission Scenario	GHG Species	Feedstock Volume [Feedstock]	Units	Carbon Content [CarbonContent]	Units	Molecular Weight [MW_Fuel]	Units	Feedstock Volume at Standard Conditions (STP) Expression	Feedstock Volume at STP [FeedstockCalc]	Units	Emission Rate Expression	EmissionRate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	5958.694211	mscf	0.80186822	lb/lb	32.72872373	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	6050.424466	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1510983.443	lb/month	685.371376	MT/month	685.3713761	
Feb	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	6563.694567	mscf	0.793936583	lb/lb	27.98133516	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	6664.738413	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1408896.68	lb/month	639.065544	MT/month	639.065544	
Mar	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	4679.473646	mscf	0.802065	lb/lb	33.14838185	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	4751.511126	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1202113.402	lb/month	545.270115	MT/month	545.2701153	
Apr	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	7503.379572	mscf	0.793204849	lb/lb	27.69753453	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	7618.889263	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1592795.148	lb/month	722.480586	MT/month	722.4805855	
May	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	4888.019012	mscf	0.796654277	lb/lb	28.88938995	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	4963.266913	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1086970.318	lb/month	493.042029	MT/month	493.0420288	
Jun	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	4996.716173	mscf	0.796189667	lb/lb	28.75547443	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	5073.637397	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1105346.117	lb/month	501.377161	MT/month	501.3771613	
Jul	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	4263.185184	mscf	0.79718298	lb/lb	29.16538709	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	4328.814171	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	957715.4544	lb/month	434.412939	MT/month	434.4129394	
Aug	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	3600.251792	mscf	0.799475067	lb/lb	30.42184951	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	3655.675347	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	846057.6325	lb/month	383.765743	MT/month	383.7657431	
Sep	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	6851.956891	mscf	0.798691977	lb/lb	30.03796296	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	6957.43835	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1588330.796	lb/month	720.455587	MT/month	720.4555868	
Oct	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	7975.415561	mscf	0.796787294	lb/lb	28.97770236	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	8098.191941	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1779246.842	lb/month	807.053752	MT/month	807.0537518	
Nov	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	6007.980916	mscf	0.796520097	lb/lb	28.73186991	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	6100.469909	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1328512.694	lb/month	602.603938	MT/month	602.6039382	
Dec	2009	Unit 57 - Hydrogen Manufacturing	Hydrogen Plant	Carbon Dioxide	6680.580599	mscf	0.798963373	lb/lb	30.44804614	lb/lb-mol	Feedstock * ((68 + STPConv) / (60 + STPConv))	6783.423831	mscf	44 / 12 * FeedstockCalc * CarbonContent * (MW_Fuel / StdMolVolEPA) * ConvLbG * ConvScfMscf	1570279.794	lb/month	712.26778	MT/month	712.2677803	

Month	Year	Process Unit	Emission Scenario	GHG Species	Heat Content (Gas) - HHV [HHV]	Units	Flare Volume (Gas) [FlareGasVolNorm]	Units	SSM Flare Volume (Gas) [FlareGasVolSSM]	Units	SSM Molecular Weight [MW_SSM]	Units	SSM Carbon Content [CarbContentSSM]	Units	Heat Content at Standard Conditions (STP) Expression	Heat Content (Gas) - HHV [HHVStd]	Units	Flare Gas Volume at STP Expression	Flare Volume (Gas) [FlrGsVolNormStd]	Units	SSM Flare Volume at STP Expression	SSM Flare Volume [FlrGsVolSSMStd]	Units	CO2 Emission Rate Factor Expression For Calculating CH4 and N2O	CO2 Emission Rate Factor [EmissionsCO2]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1098 020658	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1114 923979	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	181338 913	lb/month	82 25404515	Mt/month	82 25404515	
Jan	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1098 020658	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1114 923979	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	181338 913	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	547 3642756	lb/month	0 248280554	Mt/month	5 207913857	
Jan	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1098 020658	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1114 923979	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	181338 913	lb/month	EmissionsCO2 * EF_N2O / EF_CO2	1 81338813	lb/month	0 00082254	Mt/month	0 245117655	
Feb	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1005 425763	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1020 903644	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	166046 7984	lb/month	75 31765039	Mt/month	75 31765039	
Feb	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1005 425763	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1020 903644	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	166046 7984	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	501 2056376	lb/month	0 227343323	Mt/month	5 683583085	
Feb	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1005 425763	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1020 903644	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	166046 7984	lb/month	EmissionsCO2 * EF_N2O / EF_CO2	1 660467984	lb/month	0 000753177	Mt/month	0 224448598	
Mar	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1122 830885	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1140 116143	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	185436 3401	lb/month	84 11260901	Mt/month	84 11260901	
Mar	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1122 830885	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1140 116143	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	185436 3401	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	359 7321957	lb/month	0 253890555	Mt/month	6 347263879	
Mar	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1122 830885	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1140 116143	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	185436 3401	lb/month	EmissionsCO2 * EF_N2O / EF_CO2	1 854363401	lb/month	0 000841126	Mt/month	0 250655575	
Apr	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1060 783841	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1077 113924	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	175189 2254	lb/month	79 46459046	Mt/month	79 46459046	
Apr	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1060 783841	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1077 113924	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	175189 2254	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	526 8016889	lb/month	0 239660697	Mt/month	5 998517414	
Apr	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1060 783841	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1077 113924	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	175189 2254	lb/month	EmissionsCO2 * EF_N2O / EF_CO2	1 751892254	lb/month	0 000794646	Mt/month	0 23680448	
May	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1143 210079	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1160 809061	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	188801 9787	lb/month	85 63923885	Mt/month	85 63923885	
May	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1143 210079	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1160 809061	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	188801 9787	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	569 8812416	lb/month	0 258498626	Mt/month	6 46246566	
May	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1143 210079	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1160 809061	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	188801 9787	lb/month	EmissionsCO2 * EF_N2O / EF_CO2	1 888019787	lb/month	0 000856392	Mt/month	0 25520493	
Jun	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	937 4495578	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	951 8809893	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	154820 4786	lb/month	70 22547131	Mt/month	70 22547131	
Jun	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	937 4495578	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 884934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	951 8809893	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	154820 4786	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	467 319439	lb/month	0 211972784	Mt/month	5 299319599	

Month	Year	Process Unit	Emission Scenario	GHG Species	Heat Content (Gas) - HHV [HHV]	Units	Flare Volume (Gas) [FlareGasVolNorm]	Units	SSM Flare Volume (Gas) [FlareGasVolSSM]	Units	SSM Molecular Weight [MW_SSM]	Units	SSM Carbon Content [CarbContentSSM]	Units	Heat Content at Standard Conditions (STP) Expression	Heat Content (Gas) - HHV [HHVStd]	Units	Flare Gas Volume at STP Expression	Flare Volume (Gas) [FlrGasVolNormStd]	Units	SSM Flare Volume at STP Expression	SSM Flare Volume [FlrGasVolSSMStd]	Units	CO2 Emission Rate Factor Expression For Calculating CH4 and N2O	CO2 Emission Rate Factor [EmissionsCO2]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jun	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	937 4495578	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	951 6809893	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	1548204786	lb/month	EmissionsCO2 * EF_N2O / EF_CO7	1 548204786	lb/month	0 000702255	Mt/month	0 209271905	
Jul	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1077 060865	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1093 641523	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	177877 3878	lb/month	80 68392187	Mt/month	80 68392187	
Jul	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1077 060865	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1093 641523	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	177877 3878	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	536 9157999	lb/month	0 2435412	Mt/month	6 086529995	
Jul	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1077 060865	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1093 641523	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	177877 3878	lb/month	EmissionsCO2 * EF_N2O / EF_CO8	1 778773878	lb/month	0 000806839	Mt/month	0 240438087	
Aug	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1060 966927	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1077 299828	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	175219 4622	lb/month	79 47830583	Mt/month	79 47830583	
Aug	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1060 966927	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1077 299828	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	175219 4622	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	526 8929573	lb/month	0 239902095	Mt/month	5 997552382	
Aug	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1060 966927	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1077 299828	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	175219 4622	lb/month	EmissionsCO2 * EF_N2O / EF_CO9	1 752194622	lb/month	0 000794783	Mt/month	0 236845351	
Sep	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1011 803483	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1027 379545	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	167100 0836	lb/month	75 79541308	Mt/month	75 79541308	
Sep	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1011 803483	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1027 379545	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	167100 0836	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	504 3849369	lb/month	0 228785431	Mt/month	5 719635775	
Sep	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1011 803483	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1027 379545	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	167100 0836	lb/month	EmissionsCO2 * EF_N2O / EF_CO10	1 671000836	lb/month	0 000751954	Mt/month	0 225878331	
Oct	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1049 425485	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1065 580714	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	173313 3848	lb/month	78 61372238	Mt/month	78 61372238	
Oct	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1049 425485	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1065 580714	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	173313 3848	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	523 1395383	lb/month	0 237292385	Mt/month	5 93230963	
Oct	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1049 425485	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1065 580714	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	173313 3848	lb/month	EmissionsCO2 * EF_N2O / EF_CO11	1 733133848	lb/month	0 000786137	Mt/month	0 234268893	
Nov	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	990 4951226	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1005 743156	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	163580 9923	lb/month	74 19917823	Mt/month	74 19917823	
Nov	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	990 4951226	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1005 743156	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	163580 9923	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	493 7827003	lb/month	0 22398726	Mt/month	5 599181495	
Nov	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	990 4951226	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1005 743156	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	163580 9923	lb/month	EmissionsCO2 * EF_N2O / EF_CO12	1 635809923	lb/month	0 000741992	Mt/month	0 221113551	
Dec	2009	P1 Sweet Flare	Flaring	Carbon Dioxide	1274	btu/scf	1037 034476	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1052 998953	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	171267 0005	lb/month	77 68549704	Mt/month	77 68549704	

Month	Year	Process Unit	Emission Scenario	GHG Species	Heat Content (Gas) - HHV [HHV]	Units	Flare Volume (Gas) [FlareGasVolNorm]	Units	SSM Flare Volume (Gas) [FlareGasVolSSM]	Units	SSM Molecular Weight [MW_SSM]	Units	SSM Carbon Content [CarbContentSSM]	Units	Heat Content at Standard Conditions (STP) Expression	Heat Content (Gas) - HHV [HHVStd]	Units	Flare Gas Volume at STP Expression	Flare Volume (Gas) [FlrGsVolNormStd]	Units	SSM Flare Volume at STP Expression	SSM Flare Volume [FlrGsVolSSMStd]	Units	CO2 Emission Rate Factor Expression For Calculating CH4 and N2O	CO2 Emission Rate Factor [EmissionsCO2]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Dec	2009	P1 Sweet Flare	Flaring	Methane	1274	btu/scf	1037 034476	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1052 998953	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	171267 0005	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	516 9626094	lb/month	0 234490574	Mt/month	5 862264351	
Dec	2009	P1 Sweet Flare	Flaring	Nitrogen Oxide	1274	btu/scf	1037 034476	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	1052 998953	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	171267 0005	lb/month	EmissionsCO2 * EF_N2O / EF_CO13	1 712670005	lb/month	0 000776655	Mt/month	0 231502781	

Month	Year	Process Unit	Emission Scenario	GHG Species	Heat Content (Gas) - HHV [HHV]	Units	Flare Volume (Gas) [FlareGasVolNorm]	Units	SSM Flare Volume (Gas) [FlareGasVolSSM]	Units	SSM Molecular Weight [MW_SSM]	Units	SSM Carbon Content [CarbContentSSM]	Units	Heat Content at Standard Conditions (STP) Expression	Heat Content (Gas) - HHV [HHVStd]	Units	Flare Gas Volume at STP Expression	Flare Volume (Gas) [FlrGsVolNormStd]	Units	SSM Flare Volume at STP Expression	Flare Volume SSM [FlrGsVolSSMStd]	Units	CO2 Emission Rate Factor Expression For Calculating CH4 and N2O	CO2 Emission Rate Factor [EmissionsCO2]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	55 44	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	56 29346306	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	9155 95646	lb/month	4 1530789	MT/month	4 15307693	
Jan	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	55 44	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	56 29346306	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	9155 956457	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	27 6388893	lb/month	0 0125359	MT/month	0 31339743	
Jan	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	55 44	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	56 29346306	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	9155 956457	lb/month	EmissionsCO2 * EF_N2O / EF_CO2	0 09155956	lb/month	4 153E-05	MT/month	0 01237617	
Feb	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	42 24	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	42 89025757	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	6975 96682	lb/month	3 1642491	MT/month	3 16424909	
Feb	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	42 24	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	42 89025757	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	6975 966824	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	21 0566776	lb/month	0 0095512	MT/month	0 23877899	
Feb	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	42 24	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	42 89025757	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	6975 966824	lb/month	EmissionsCO2 * EF_N2O / EF_CO3	0 06975967	lb/month	3 164E-05	MT/month	0 00942948	
Mar	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	46 32	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	47 03306654	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	7649 7818	lb/month	3 4698868	MT/month	3 46988678	
Mar	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	46 32	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	47 03306654	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	7649 781802	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	23 0905812	lb/month	0 0104737	MT/month	0 26184287	
Mar	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	46 32	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	47 03306654	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	7649 781802	lb/month	EmissionsCO2 * EF_N2O / EF_CO4	0 07649782	lb/month	3 47E-05	MT/month	0 01034026	
Apr	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	362 88	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	368 4663036	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	59929 6968	lb/month	27 183776	MT/month	27 1837763	
Apr	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	362 88	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	368 4663036	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	59929 89681	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	180 896003	lb/month	0 0820531	MT/month	2 05132881	
Apr	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	362 88	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	368 4663036	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	59929 89681	lb/month	EmissionsCO2 * EF_N2O / EF_CO5	0 59929897	lb/month	0 0002718	MT/month	0 08100765	
May	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	106 56	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	108 2004225	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	17598 4618	lb/month	7 9825375	MT/month	7 98253747	
May	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	106 56	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	108 2004225	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	17598 46176	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	53 1202548	lb/month	0 024095	MT/month	0 80237427	
May	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	106 56	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	108 2004225	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	17598 46176	lb/month	EmissionsCO2 * EF_N2O / EF_CO6	0 17598462	lb/month	7 983E-05	MT/month	0 02378796	
Jun	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	318 72	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	323 6264889	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	52636 8406	lb/month	23 875698	MT/month	23 8756977	
Jun	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	318 72	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	323 6264889	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	52636 84058	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	158 882204	lb/month	0 0720678	MT/month	1 80169603	
Jun	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	318 72	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	323 6264889	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	52636 84058	lb/month	EmissionsCO2 * EF_N2O / EF_CO7	0 52636841	lb/month	0 0002388	MT/month	0 07114958	

Month	Year	Process Unit	Emission Scenario	GHG Species	Heat Content (Gas) - HHV [HHV]	Units	Flare Volume (Gas) [FlareGasVolNorm]	Units	SSM Flare Volume (Gas) [FlareGasVolSSM]	Units	SSM Molecular Weight [MW_SSM]	Units	SSM Carbon Content [CarbContentSSM]	Units	Heat Content at Standard Conditions (STP) Expression	Heat Content (Gas) - HHV [HHVStd]	Units	Flare Gas Volume at STP Expression	Flare Volume (Gas) [FlrGsVolNormStd]	Units	SSM Flare Volume at STP Expression	Flare Volume SSM [FlrGsVolSSMStd]	Units	CO2 Emission Rate Factor Expression For Calculating CH4 and N2O	CO2 Emission Rate Factor [EmissionsCO2]	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jul	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	181 44	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	184 2331518	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	29964 9484	lb/month	13 591888	MT/month	13 5918881	
Jul	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	181 44	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	184 2331518	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	29964 9484	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	90 4480015	lb/month	0 0410266	MT/month	1 0256643	
Jul	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	181 44	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	184 2331518	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	29964 9484	lb/month	EmissionsCO2 * EF_N2O / EF_CO8	0 29964948	lb/month	0 0001359	MT/month	0 04050383	
Aug	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	50 4	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	51 17587551	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	8323 596779	lb/month	25 1244449	lb/month	0 0113963	MT/month	0 28490675	
Aug	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	50 4	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	51 17587551	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	8323 596779	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	25 1244449	lb/month	0 0113963	MT/month	0 28490675	
Aug	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	50 4	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	51 17587551	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	8323 596779	lb/month	EmissionsCO2 * EF_N2O / EF_CO9	0 08323597	lb/month	3 77E-05	MT/month	0 01125106	
Sep	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	43 2	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	43 86503615	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	7134 511525	lb/month	3 2361638	MT/month	3 23616384	
Sep	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	43 2	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	43 86503615	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	7134 511525	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	21 5352385	lb/month	0 0097682	MT/month	0 24420579	
Sep	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	43 2	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	43 86503615	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	7134 511525	lb/month	EmissionsCO2 * EF_N2O / EF_CO10	0 07134512	lb/month	3 23E-05	MT/month	0 00964377	
Oct	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	51 36	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	52 15065409	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	8482 14148	lb/month	3 8474392	MT/month	3 84743923	
Oct	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	51 36	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	52 15065409	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	8482 14148	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	25 6030057	lb/month	0 0116133	MT/month	0 29033355	
Oct	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	51 36	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	52 15065409	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	8482 14148	lb/month	EmissionsCO2 * EF_N2O / EF_CO11	0 08482141	lb/month	3 847E-05	MT/month	0 01146537	
Nov	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	76 8	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	77 98228649	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	12683 576	lb/month	5 7531802	MT/month	5 75318018	
Nov	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	76 8	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	77 98228649	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	12683 57604	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	38 2846584	lb/month	0 0173657	MT/month	0 43414362	
Nov	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	76 8	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	77 98228649	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	12683 57604	lb/month	EmissionsCO2 * EF_N2O / EF_CO12	0 12683576	lb/month	5 753E-05	MT/month	0 01714448	
Dec	2009	P2 Sour Flare	Flaring	Carbon Dioxide	1274	btu/scf	112 8	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	114 5364833	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf				0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	18629 9023	lb/month	8 4499834	MT/month	8 44998336	
Dec	2009	P2 Sour Flare	Flaring	Methane	1274	btu/scf	112 8	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	114 5364833	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	18629 00232	lb/month	((EmissionsCO2 * EF_CH4 / EF_CO2) + (EmissionsCO2 * 0 02 / 0 98 * (16 / 44) * f_CH4))	56 2309004	lb/month	0 0255059	MT/month	0 63764844	
Dec	2009	P2 Sour Flare	Flaring	Nitrogen Oxide	1274	btu/scf	112 8	mscf	0	mscf	0	kg/kmol	0	kg/kg	HHV / ((68 + STPConv) / (60 + STPConv))	1254 684934	btu/scf	FlareGasVolNorm * (68 + STPConv) / (60 + STPConv)	114 5364833	mscf	FlareGasVolSSM * (68 + STPConv) / (60 + STPConv)	0	mscf	0 98 * [[FlrGsVolNormStd * HHVStd * EF_CO2 * ConvLbKg * ConvScfMscf * ConvMmbtuBtu] + [(44 / 12) * FlrGsVolSSMStd * MW_SSM / StdMolVolEPA * CarbContentSSM * ConvLbG * ConvScfMscf]]	18629 00232	lb/month	EmissionsCO2 * EF_N2O / EF_CO13	0 18629002	lb/month	8 45E-05	MT/month	0 02518095	

Month	Year	Process Unit	Emission Scenario	GHG Species	AGR Flow Inlet [FlowInlet]	Units	AGR Mole Pct Sour Gas - Carbon [MolPctCSour]	Units	Correction Factor: Tail Gas Recycle [CorrectionFactr]	Units	AGR Flow Inlet Feed rate to Standard Contiditions (STP) Expression	AGR Flow Inlet [FlowInletConv]	Units	Emission Rate Expression	Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	4506.513377	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	4575.888245	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	104502.924	lb/month	47.40179	MT/month	47.40178523	
Feb	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	3877.768821	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	3937.464572	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	89922.773	lb/month	40.78833	MT/month	40.78833223	
Mar	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	4141.117532	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	4204.867366	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	96029.6472	lb/month	43.55837	MT/month	43.55836707	
Apr	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	2846.238613	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	2890.054622	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	66002.302	lb/month	29.93818	MT/month	29.93817619	
May	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	3857.294541	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	3916.675104	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	89447.9886	lb/month	40.57297	MT/month	40.57297341	
Jun	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	3276.227062	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	3326.662465	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	75973.4363	lb/month	34.46101	MT/month	34.461012	
Jul	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	3784.005839	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	3842.258169	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	87748.4744	lb/month	39.80209	MT/month	39.8020858	
Aug	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	3995.726853	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	4057.238492	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	92658.1381	lb/month	42.02907	MT/month	42.02907443	
Sep	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	4338.024752	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	4404.805846	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	100595.789	lb/month	45.62954	MT/month	45.62953673	
Oct	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	4358.444723	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	4425.54017	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	101069.314	lb/month	45.84432	MT/month	45.8443243	
Nov	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	2929.351355	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	2974.44683	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	67929.6289	lb/month	30.8124	MT/month	30.81239801	
Dec	2009	Unit 62 - Acid Plant	Sulfur Recovery	Carbon Dioxide	4185.40386	mscf	20	%	100	%	FlowInlet * (68 + STPConv) / (60 + STPConv)	4249.835454	mscf	FlowInletConv * (44 / StdMolVolEPA) * (MolPctCSour / 100) * (CorrectionFactr / 100) * ConvLbG * ConvScfMscf	97056.6165	lb/month	44.02419	MT/month	44.02419305	

Month	Year	Process Unit	Emission Scenario	GHG Species	# Crude Oil Distillation Columns [CrudeDistill]	Units	# Cat Cracking / Coking Units [CatAndCoke]	Units	# Hydrotreaters [HydroTreater]	Units	# Hydrogen Plants [H2Plants]	Units	# Fuel Gas Systems [FuelGasSystems]	Units	Fugitive Emissions Estimation Expression	Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Feb	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Mar	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Apr	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
May	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Jun	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Jul	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Aug	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Sep	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Oct	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Nov	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	
Dec	2009	Fugitive - Refining Equipment - EPA	Fugitive	Methane	1	dimensionless	18	dimensionless	2	dimensionless	1	dimensionless	1	dimensionless	(0.4 * CrudeDistill + 0.2 * CatAndCoke + 0.1 * HydroTreater + 4.3 * H2Plants + 6 * FuelGasSystems) * ConvLbTonne / 12	2663.915833	lb/month	1.20833333	MT/month	30.20833333	

Appendix A
GHG Calculations 2009
Crude

Month	Year	Process Unit	Emission Scenario	GHG Species	Crude Received	Units	Species Emission Rate Expression	Species Emission Rate	Units	Converted Rate	Units	MT/Month CO2e	Comments
Jan	2009	Crude Receiving Tanks	Venting	Methane	1559299	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	343.7661761	lb/month	0.1559299	MT/month	3.8982475	
Feb	2009	Crude Receiving Tanks	Venting	Methane	1427805	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	314.7767459	lb/month	0.1427805	MT/month	3.5695125	
Mar	2009	Crude Receiving Tanks	Venting	Methane	1594532	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	351.5337138	lb/month	0.1594532	MT/month	3.98633	
Apr	2009	Crude Receiving Tanks	Venting	Methane	1506419	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	332.1081456	lb/month	0.1506419	MT/month	3.7660475	
May	2009	Crude Receiving Tanks	Venting	Methane	1623472.49	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	357.9139921	lb/month	0.162347249	MT/month	4.058681225	
Jun	2009	Crude Receiving Tanks	Venting	Methane	1331272	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	293.4948877	lb/month	0.1331272	MT/month	3.32818	
Jul	2009	Crude Receiving Tanks	Venting	Methane	1529534	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	337.2041247	lb/month	0.1529534	MT/month	3.823835	
Aug	2009	Crude Receiving Tanks	Venting	Methane	1506679	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	332.1654657	lb/month	0.1506679	MT/month	3.7666975	
Sep	2009	Crude Receiving Tanks	Venting	Methane	1436862	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	316.7734702	lb/month	0.1436862	MT/month	3.592155	
Oct	2009	Crude Receiving Tanks	Venting	Methane	1490289	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	328.5520935	lb/month	0.1490289	MT/month	3.7257225	
Nov	2009	Crude Receiving Tanks	Venting	Methane	1406602	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	310.1022901	lb/month	0.1406602	MT/month	3.516505	
Dec	2009	Crude Receiving Tanks	Venting	Methane	1472692.53	bbl	CrudeReceived * EF / ConvBblMmbbl * ConvLbTonne	324.6727405	lb/month	0.147269253	MT/month	3.681731325	

Par Hawaii Refining

Appendix B

Chevron Notification of Permanent Shutdown of Existing Boilers Letter Dated June 24, 2016

Chevron

Jon Mauer
Refinery Manager

Hawaii Refinery
Chevron Products Company
91-480 Malakole St
Kapolei HI 96707
Tel 808 682 5711
Fax 808 682 2324
JonMauer@chevron.com

June 24, 2016

CERTIFIED MAIL RECEIPT NO. 7015 0640 0003 9266 1424
RETURN RECEIPT REQUESTED

Mr. Nolan Hirai
Manager, Clean Air Branch
Hawaii Department of Health
919 Ala Moana Boulevard, Room 203
Honolulu, Hawaii 96814

Refinery Covered Source Permit (CSP) Nos. 0088-01-C and 0088-02-C
Notification of Permanent Shutdown of Existing Boilers

Dear Mr. Hirai:

As required by CSP No. 0088-01-C, Attachment II(H), Special Condition E.2.c and CSP No. 0088-02-C, Attachment IIB, Special Condition E.7, this letter provides the required notification of permanent shutdown of three existing boilers, identified as Unit Nos F-5201, F-5202 and F-5203. Permanent shutdown of these units occurred June 1, 2016.

If you should have questions or require further information, please contact Alice Armstrong of our Environmental Staff at (808) 682-2205.

I certify, as the company official having supervisory responsibility for the persons who, acting under my direct instructions made the verification, that this knowledge is true, accurate, and complete to the best of their knowledge, information, and belief.

Sincerely,

aea

Par Hawaii Refining

Appendix C

GHGERP Change Log

Date	Description of Review/ Amendment
04/2019	Start of Change Log.