From: efilingmail@tylerhost.net
To: Hamre, John G.
Subject: Filing Accepted for Case: 08-2018-CV-02937; Environmental Law and Policy Center, et al. vs. North Dakota Public Service Commission, et al.; Envelope Number: 3293135
Date: Friday, February 01, 2019 8:32:55 AM

Filing Accepted

Envelope Number: 3293135
Case Number: 08-2018-CV-02937
Case Style: Environmental Law and Policy Center, et al. vs. North Dakota Public Service Commission, et al.

The filing below was reviewed and has been accepted by the clerk's office. You may access the file stamped copy of the document filed by clicking on the below link.

Filing Details	
Court	Burleigh County - South Central District
Case Number	08-2018-CV-02937
Case Style	Environmental Law and Policy Center, et al. vs. North Dakota Public Service Commission, et al.
Date/Time Submitted	1/31/2019 5:02 PM CST
Date/Time Accepted	2/1/2019 8:32 AM CST
Accepted Comments	
Filing Type	Exhibit
Filing Description	CR Exhibit 1 Supporting Exhibit C, part 4 of 6
Activity Requested	EFileAndServe
Filed By	John Hamre
Filing Attorney	Illona Jeffcoat-Sacco

Document Details	
Lead Document	CR Exhibit 1 Supporting Exhibit C, part 4 of 6.pdf
Lead Document Page Count	150
File Stamped Copy	View Stamped Document

This link is active for 30 days. If the link above is not accessible, copy this URL into your browser's address bar to view the document:
https://northdakota.tylerhost.net/ViewDocuments.aspx?FID=9b51bc6a-5d7f-4bbd-8a36-f9acd4084d5f

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to:	☐40 CFR 60, Subpart K	☐40 CFR 60, Subpart Ka	☒40 CFR 60, Subpart Kb
Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb being adhered to, where applicable? ☒Yes ☐ No – Explain:			

Signature of Applicant	Date
	09/26/2016

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR VOLATILE ORGANIC COMPOUNDS STORAGE TANK

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8535 (10-13)

SECTION A – FACILITY INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant´s Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – TANK DATA

Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***				
County ***Billings***		Source ID Number ***203-T-0024***		
Capacity	Barrels ***64,996***		Gallons ***2,729,832***	
Dimensions	Diameter ***88'***	Height ***60'***	Length	Width
Shape	☒Cylindrical	☐Spherical	☐Other – Specify:	
Materials of Construction	***Carbon Steel***			
Construction	☐Riveted	☒Welded	☐Other – Specify:	
Color	***Beige***			
Condition	☒Good	☐Fair	☐Poor	
Status	☒New Construction	☐Alteration	☐Existing (Give Date Constructed): _____	
Type of Tank	☒Fixed Roof ☐Variable Vapor Space ☐Pressure (low or high)		☐External Floating ☐ Internal Floating ☐Other – Specify:	
Type of Roof	☐Pan	☐Double Deck	☐Pontoon	☒Other – Specify: ***Cone Roof***
Type of Seal	Metallic Shoe Seal	Liquid Mounted Resilient Seal	Vapor Mounted Resilient Seal	
	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Shoe Mounted Secondary Seal	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	

SECTION C – TANK CONTENTS

Fuel Oil, (TVP 0.000028 psia)

SECTION D – VAPOR DISPOSAL

☒Atmosphere	☐Vapor Recovery Unit	☐Flare	☐Other – Specify:

SECTION E – VAPOR PRESSURE DATA

psia	
Maximum True Vapor Pressure ***0.000028***	Maximum Reid Vapor Pressure ***-***

SECTION F – OPERATIONAL DATA

Maximum Filling Rate (barrels per hour or gallons per hour) ***TBD***	Vapor Space Outage (See AP-42, 7.1-92, Equation 1-15) ***14***
Average Throughput (gallons per day) ***131,880***	Tank Turnovers per Year ***21.16***

SECTION G – SOLUTION STORAGE

If material stored is a solution, supply the following information:	
Name of Solvent ***N/A***	Name of Material Dissolved ***N/A***
Concentration of Material Dissolved (% by weight or % by volume or lbs/gal) ***N/A***	

SECTION H – AIR CONTAMINANTS EMITTED

Pollutant*	Maximum Pounds Per Hour	Tons Per Year	Basis and Calculations for Quantities (Attach separate sheet if needed)
2-Methyl naphthalene	***2.3E-05***	***9.9E-05***	***VOC from TANKS 4.0.9d software modeled runs.*** ***HAPs from Table 3-3 of the Emissions Estimation Protocol for Petroleum Refineries*** ***See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
Anthracene	***1.5E-06***	***6.8E-06***	
Benzene	***3.5E-04***	***1.5E-03***	
Biphenyl	***0.0E+00***	***0.0E+00***	
Chrysene	***1.4E-06***	***5.9E-06***	
Cresol	***1.2E-06***	***5.4E-06***	
Cumene	***6.4E-05***	***2.8E-04***	
Ethylbenzene	***1.2E-04***	***5.1E-04***	
Fluorene	***2.3E-06***	***1.0E-05***	
Hexane	***3.1E-03***	***1.4E-02***	
Methanol	***2.4E-05***	***1.1E-04***	
Methyl isobutyl ketone	***2.1E-03***	***9.0E-03***	
Methyl tertiary-butyl ether	***0.0E+00***	***0.0E+00***	
Naphthalene	***2.6E-05***	***1.1E-04***	
Phenanthrene	***9.7E-06***	***4.2E-05***	
Phenol	***4.3E-06***	***1.9E-05***	
Pyrene	***2.5E-06***	***1.1E-05***	
Styrene	***0.0E+00***	***0.0E+00***	
Toluene	***6.4E-04***	***2.8E-03***	
Xylene	***4.5E-04***	***2.0E-03***	
VOC	***9.42E-04***	***4.13E-03***	

* Include an estimate of greenhouse gas emissions (CO_2e)

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to:	☐40 CFR 60, Subpart K	☐40 CFR 60, Subpart Ka	☒40 CFR 60, Subpart Kb

Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb being adhered to, where applicable? ☒Yes ☐ No – Explain:

Signature of Applicant	Date
	09/26/2016

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR VOLATILE ORGANIC COMPOUNDS STORAGE TANK

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8535 (10-13)

SECTION A – FACILITY INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant´s Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – TANK DATA

Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***				
County ***Billings***		Source ID Number ***203-T-0031***		
Capacity	Barrels ***33,312***		Gallons ***1,399,104***	
Dimensions	Diameter ***63'***	Height ***60'***	Length	Width
Shape	☒Cylindrical	☐Spherical	☐Other – Specify:	
Materials of Construction	***Carbon Steel***			
Construction	☐Riveted	☒Welded	☐Other – Specify:	
Color	***Beige***			
Condition	☒Good	☐Fair	☐Poor	
Status	☒New Construction	☐Alteration	☐Existing (Give Date Constructed): _____	
Type of Tank	☐Fixed Roof ☐Variable Vapor Space ☐Pressure (low or high)		☐External Floating ☒ Internal Floating ☐Other – Specify:	
Type of Roof	☐Pan	☒Double Deck	☐Pontoon	☐Other – Specify:
Type of Seal	Metallic Shoe Seal	Liquid Mounted Resilient Seal	Vapor Mounted Resilient Seal	
	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Shoe Mounted Secondary Seal	☐Primary Seal Only ☒With Rim Mounted Seal ☐With Weather Shield	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	

SECTION C – TANK CONTENTS

Light Naphtha, (RVP 15 psia)

SECTION D – VAPOR DISPOSAL

☒Atmosphere	☐Vapor Recovery Unit	☐Flare	☐Other – Specify:

SECTION E – VAPOR PRESSURE DATA

psia	
Maximum True Vapor Pressure ***-***	Maximum Reid Vapor Pressure ***15***

SECTION F – OPERATIONAL DATA

Maximum Filling Rate (barrels per hour or gallons per hour) ***TBD***	Vapor Space Outage (See AP-42, 7.1-92, Equation 1-15) ***N/A***
Average Throughput (gallons per day) ***136,500***	Tank Turnovers per Year ***35.61***

SECTION G – SOLUTION STORAGE

If material stored is a solution, supply the following information:	
Name of Solvent ***N/A***	Name of Material Dissolved ***N/A***
Concentration of Material Dissolved (% by weight or % by volume or lbs/gal) ***N/A***	

SECTION H – AIR CONTAMINANTS EMITTED

Pollutant*	Maximum Pounds Per Hour	Tons Per Year	Basis and Calculations for Quantities (Attach separate sheet if needed)
2-Methyl naphthalene	***1.2E-04***	***5.3E-04***	***VOC from TANKS 4.0.9d software modeled runs.*** ***HAPs from Table 3-3 of the Emissions Estimation Protocol for Petroleum Refineries*** ***See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
Anthracene	***8.3E-06***	***3.6E-05***	
Benzene	***2.4E-03***	***1.1E-02***	
Biphenyl	***5.9E-06***	***2.6E-05***	
Chrysene	***7.3E-06***	***3.2E-05***	
Cresol	***4.5E-04***	***2.0E-03***	
Cumene	***5.2E-04***	***2.3E-03***	
Ethylbenzene	***1.1E-03***	***4.7E-03***	
Fluorene	***1.2E-05***	***5.5E-05***	
Hexane	***1.5E-02***	***6.4E-02***	
Methanol	***1.3E-04***	***5.8E-04***	
Methyl isobutyl ketone	***1.1E-02***	***4.9E-02***	
Methyl tertiary-butyl ether	***1.1E-02***	***4.7E-02***	
Naphthalene	***2.6E-04***	***1.2E-03***	
Phenanthrene	***5.2E-05***	***2.3E-04***	
Phenol	***3.1E-05***	***1.4E-04***	
Pyrene	***1.4E-05***	***5.9E-05***	
Styrene	***2.3E-03***	***1.0E-02***	
Toluene	***6.2E-03***	***2.7E-02***	
Xylene	***4.8E-03***	***2.1E-02***	
VOC	***8.55E-02***	***3.75E-01***	

* Include an estimate of greenhouse gas emissions (CO_2e)

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to:	☐40 CFR 60, Subpart K	☐40 CFR 60, Subpart Ka	☒40 CFR 60, Subpart Kb
Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb being adhered to, where applicable? ☒Yes ☐ No – Explain:			

Signature of Applicant	Date
	09/26/2016

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR VOLATILE ORGANIC COMPOUNDS STORAGE TANK

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8535 (10-13)

SECTION A – FACILITY INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant´s Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – TANK DATA

Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***				
County ***Billings***		Source ID Number ***203-T-0032***		
Capacity	Barrels ***33,312***		Gallons ***1,399,104***	
Dimensions	Diameter ***63'***	Height ***60'***	Length	Width
Shape	☒Cylindrical	☐Spherical	☐Other – Specify:	
Materials of Construction	***Carbon Steel***			
Construction	☐Riveted	☒Welded	☐Other – Specify:	
Color	***Beige***			
Condition	☒Good	☐Fair	☐Poor	
Status	☒New Construction	☐Alteration	☐Existing (Give Date Constructed): _____	
Type of Tank	☐Fixed Roof ☐Variable Vapor Space ☐Pressure (low or high)		☐External Floating ☒ Internal Floating ☐Other – Specify:	
Type of Roof	☐Pan	☒Double Deck	☐Pontoon	☐Other – Specify:
Type of Seal	Metallic Shoe Seal	Liquid Mounted Resilient Seal	Vapor Mounted Resilient Seal	
	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Shoe Mounted Secondary Seal	☐Primary Seal Only ☒With Rim Mounted Seal ☐With Weather Shield	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	

SECTION C – TANK CONTENTS

Light Naphtha, (RVP 15 psia)

SECTION D – VAPOR DISPOSAL

☒Atmosphere	☐Vapor Recovery Unit	☐Flare	☐Other – Specify:

SECTION E – VAPOR PRESSURE DATA

psia	
Maximum True Vapor Pressure ***-***	Maximum Reid Vapor Pressure ***15***

SECTION F – OPERATIONAL DATA

Maximum Filling Rate (barrels per hour or gallons per hour) ***TBD***	Vapor Space Outage (See AP-42, 7.1-92, Equation 1-15) ***N/A***
Average Throughput (gallons per day) ***136,500***	Tank Turnovers per Year ***35.61***

SECTION G – SOLUTION STORAGE

If material stored is a solution, supply the following information:	
Name of Solvent ***N/A***	Name of Material Dissolved ***N/A***
Concentration of Material Dissolved (% by weight or % by volume or lbs/gal) ***N/A***	

SECTION H – AIR CONTAMINANTS EMITTED

Pollutant*	Maximum Pounds Per Hour	Tons Per Year	Basis and Calculations for Quantities (Attach separate sheet if needed)
2-Methyl naphthalene	***1.2E-04***	***5.3E-04***	***VOC from TANKS 4.0.9d software modeled runs.*** ***HAPs from Table 3-3 of the Emissions Estimation Protocol for Petroleum Refineries*** ***See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
Anthracene	***8.3E-06***	***3.6E-05***	
Benzene	***2.4E-03***	***1.1E-02***	
Biphenyl	***5.9E-06***	***2.6E-05***	
Chrysene	***7.3E-06***	***3.2E-05***	
Cresol	***4.5E-04***	***2.0E-03***	
Cumene	***5.2E-04***	***2.3E-03***	
Ethylbenzene	***1.1E-03***	***4.7E-03***	
Fluorene	***1.2E-05***	***5.5E-05***	
Hexane	***1.5E-02***	***6.4E-02***	
Methanol	***1.3E-04***	***5.8E-04***	
Methyl isobutyl ketone	***1.1E-02***	***4.9E-02***	
Methyl tertiary-butyl ether	***1.1E-02***	***4.7E-02***	
Naphthalene	***2.6E-04***	***1.2E-03***	
Phenanthrene	***5.2E-05***	***2.3E-04***	
Phenol	***3.1E-05***	***1.4E-04***	
Pyrene	***1.4E-05***	***5.9E-05***	
Styrene	***2.3E-03***	***1.0E-02***	
Toluene	***6.2E-03***	***2.7E-02***	
Xylene	***4.8E-03***	***2.1E-02***	
VOC	***8.55E-02***	***3.75E-01***	

* Include an estimate of greenhouse gas emissions (CO_2e)

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to:	☐40 CFR 60, Subpart K	☐40 CFR 60, Subpart Ka	☒40 CFR 60, Subpart Kb
Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb being adhered to, where applicable? ☒Yes ☐ No – Explain:			

Signature of Applicant	Date
	09/26/2016

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR VOLATILE ORGANIC COMPOUNDS STORAGE TANK

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8535 (10-13)

SECTION A – FACILITY INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant´s Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – TANK DATA

Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***				
County ***Billings***		Source ID Number ***203-T-0033***		
Capacity	Barrels ***2,620***		Gallons ***110,040***	
Dimensions	Diameter ***25'***	Height ***30'***	Length	Width
Shape	☒Cylindrical	☐Spherical	☐Other – Specify:	
Materials of Construction	***Carbon Steel***			
Construction	☐Riveted	☒Welded	☐Other – Specify:	
Color	***Beige***			
Condition	☒Good	☐Fair	☐Poor	
Status	☒New Construction	☐Alteration	☐Existing (Give Date Constructed): _____	
Type of Tank	☐Fixed Roof ☐Variable Vapor Space ☐Pressure (low or high)		☐External Floating ☒ Internal Floating ☐Other – Specify:	
Type of Roof	☐Pan	☒Double Deck	☐Pontoon	☐Other – Specify:
Type of Seal	Metallic Shoe Seal	Liquid Mounted Resilient Seal	Vapor Mounted Resilient Seal	
	☐Primary Seal Only ☐With Rim Mounted Seal ☒With Shoe Mounted Secondary Seal	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	

SECTION C – TANK CONTENTS

Light Slops, (RVP 10 psia)

SECTION D – VAPOR DISPOSAL

☐Atmosphere	☒Vapor Recovery Unit	☐Flare	☐Other – Specify:

SECTION E – VAPOR PRESSURE DATA

psia	
Maximum True Vapor Pressure -	Maximum Reid Vapor Pressure ***10 psia***

SECTION F – OPERATIONAL DATA

Maximum Filling Rate (barrels per hour or gallons per hour) ***TBD***	Vapor Space Outage (See AP-42, 7.1-92, Equation 1-15) ***N/A***
Average Throughput (gallons per day) ***5,775***	Tank Turnovers per Year ***22.96***

SECTION G – SOLUTION STORAGE

If material stored is a solution, supply the following information:	
Name of Solvent ***N/A***	Name of Material Dissolved ***N/A***
Concentration of Material Dissolved (% by weight or % by volume or lbs/gal) ***N/A***	

SECTION H – AIR CONTAMINANTS EMITTED

Pollutant*	Maximum Pounds Per Hour	Tons Per Year	Basis and Calculations for Quantities (Attach separate sheet if needed)
2-Methyl naphthalene	***9.53E-06***	***4.2E-05***	***VOC from TANKS 4.0.9d software modeled runs.*** ***HAPs from Table 3-3 of the Emissions Estimation Protocol for Petroleum Refineries*** ***See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
Anthracene	***6.54E-07***	***2.9E-06***	
Benzene	***1.91E-04***	***8.4E-04***	
Biphenyl	***4.63E-07***	***2.0E-06***	
Chrysene	***5.72E-07***	***2.5E-06***	
Cresol	***3.54E-05***	***1.6E-04***	
Cumene	***4.09E-05***	***1.8E-04***	
Ethylbenzene	***8.44E-05***	***3.7E-04***	
Fluorene	***9.80E-07***	***4.3E-06***	
Hexane	***1.14E-03***	***5.0E-03***	
Methanol	***1.03E-05***	***4.5E-05***	
Methyl isobutyl ketone	***8.72E-04***	***3.8E-03***	
Methyl tertiary-butyl ether	***8.44E-04***	***3.7E-03***	
Naphthalene	***2.07E-05***	***9.1E-05***	
Phenanthrene	***4.09E-06***	***1.8E-05***	
Phenol	***2.45E-06***	***1.1E-05***	
Pyrene	***1.06E-06***	***4.7E-06***	
Styrene	***1.80E-04***	***7.9E-04***	
Toluene	***4.90E-04***	***2.1E-03***	
Xylene	***3.81E-04***	***1.7E-03***	
VOC	***1.27E-01***	***5.57E-01***	

* Include an estimate of greenhouse gas emissions (CO_2e)

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to:	☐40 CFR 60, Subpart K	☐40 CFR 60, Subpart Ka	☒40 CFR 60, Subpart Kb
Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb being adhered to, where applicable? ☒Yes ☐ No – Explain:			

Signature of Applicant	Date
	09/26/2016

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR VOLATILE ORGANIC COMPOUNDS STORAGE TANK

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8535 (10-13)

SECTION A – FACILITY INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant´s Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – TANK DATA

Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***				
County ***Billings***		Source ID Number ***203-T-0034***		
Capacity	Barrels ***2,620***		Gallons ***110,040***	
Dimensions	Diameter ***25'***	Height ***30'***	Length	Width
Shape	☒Cylindrical	☐Spherical	☐Other – Specify:	
Materials of Construction	***Carbon Steel***			
Construction	☐Riveted	☒Welded	☐Other – Specify:	
Color	***Beige***			
Condition	☒Good	☐Fair	☐Poor	
Status	☒New Construction	☐Alteration	☐Existing (Give Date Constructed): _____	
Type of Tank	☒Fixed Roof ☐Variable Vapor Space ☐Pressure (low or high)		☐External Floating ☐ Internal Floating ☐Other – Specify:	
Type of Roof	☐Pan	☐Double Deck	☐Pontoon	☒Other – Specify: ***Cone Roof***
Type of Seal	Metallic Shoe Seal	Liquid Mounted Resilient Seal	Vapor Mounted Resilient Seal	
	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Shoe Mounted Secondary Seal	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	☐Primary Seal Only ☐With Rim Mounted Seal ☐With Weather Shield	

SECTION C – TANK CONTENTS

Heavy Slops, (TVP 0.000028 – 0.004 psia)

SECTION D – VAPOR DISPOSAL

☒Atmosphere	☐Vapor Recovery Unit	☐Flare	☐Other – Specify:

SECTION E – VAPOR PRESSURE DATA

psia	
Maximum True Vapor Pressure ***0.000028 – 0.004 psia***	Maximum Reid Vapor Pressure *-*

SECTION F – OPERATIONAL DATA

Maximum Filling Rate (barrels per hour or gallons per hour) ***TBD***	Vapor Space Outage (See AP-42, 7.1-92, Equation 1-15) ***21.67 ft***
Average Throughput (gallons per day) ***5,775***	Tank Turnovers per Year ***22.96***

SECTION G – SOLUTION STORAGE

If material stored is a solution, supply the following information:	
Name of Solvent ***N/A***	Name of Material Dissolved ***N/A***
Concentration of Material Dissolved (% by weight or % by volume or lbs/gal) ***N/A***	

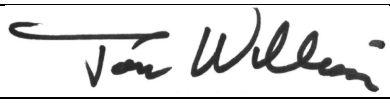
SECTION H – AIR CONTAMINANTS EMITTED

Pollutant*	Maximum Pounds Per Hour	Tons Per Year	Basis and Calculations for Quantities (Attach separate sheet if needed)
2-Methyl naphthalene	***9.09E-07***	***4.0E-06***	***VOC from TANKS 4.0.9d software modeled runs.*** ***HAPs from Table 3-3 of the Emissions Estimation Protocol for Petroleum Refineries*** ***See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
Anthracene	***6.23E-08***	***2.7E-07***	
Benzene	***1.40E-05***	***6.1E-05***	
Biphenyl	***0.00E+00***	***0.0E+00***	
Chrysene	***5.45E-08***	***2.4E-07***	
Cresol	***4.93E-08***	***2.2E-07***	
Cumene	***2.60E-06***	***1.1E-05***	
Ethylbenzene	***4.67E-06***	***2.0E-05***	
Fluorene	***9.35E-08***	***4.1E-07***	
Hexane	***1.25E-04***	***5.5E-04***	
Methanol	***9.87E-07***	***4.3E-06***	
Methyl isobutyl ketone	***8.31E-05***	***3.6E-04***	
Methyl tertiary-butyl ether	***0.00E+00***	***0.0E+00***	
Naphthalene	***1.04E-06***	***4.5E-06***	
Phenanthrene	***3.89E-07***	***1.7E-06***	
Phenol	***1.74E-07***	***7.6E-07***	
Pyrene	***1.01E-07***	***4.4E-07***	
Styrene	***0.00E+00***	***0.0E+00***	
Toluene	***2.60E-05***	***1.1E-04***	
Xylene	***1.82E-05***	***8.0E-05***	
VOC	***0.00E+00***	***0.00E+00***	

* Include an estimate of greenhouse gas emissions (CO_2e)

SECTION I – STANDARDS OF PERFORMANCE

Tank subject to:	☐40 CFR 60, Subpart K	☐40 CFR 60, Subpart Ka	☒40 CFR 60, Subpart Kb
Are the standards of performance for new stationary sources; petroleum liquid storage vessels, 40 CFR Part 60, Subparts K, Ka, and Kb being adhered to, where applicable? ☒Yes ☐ No – Explain:			

Signature of Applicant	Date
	09/26/2016

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***101-H-0101***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.160 lb/h)***	***TBD (0.454 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	9/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***102-H-0201***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.160 lb/h)***	***TBD (0.454 lb/h)***

Pressure Drop Through Gas Cleaning Device (in. H_2O)
TBD

Signature of Applicant	Date
	9/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***103-H-0301***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

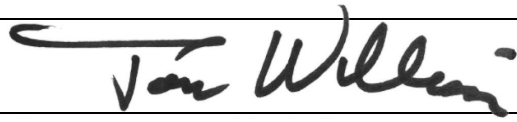
Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.294 lb/h)***	***TBD (0.482 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	9/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***103-H-0302***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

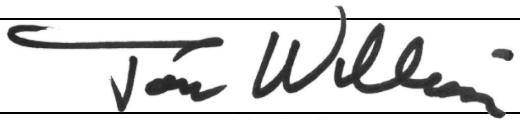
Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (1.730 lb/h)***	***TBD (0.363 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	9/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***106-H-0601***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer	Model Number	Date to Be Installed
TBD	***TBD***	***TBD***

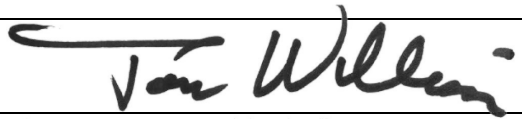
Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (1.252 lb/h)***	***TBD (0.263 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***107-H-0701***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.775lb/h)***	***TBD (0.583 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***118-H-1801***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process heater***

Pollutants Removed	***NOx***			
Design Efficiency (%)	***TBD***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.526 lb/h)***	***TBD (0.530 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***202-PK-0201A***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

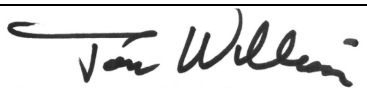
Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Utility boiler***

Pollutants Removed	***NOx***	***Organic HAP***		
Design Efficiency (%)	***75***	***75***		
Operating Efficiency (%)	***TBD***	***TBD***		

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.941 lb/h)***	***TBD (0.735 lb/h)***
	Organic HAPs	***ppmv***	***TBD (1.17E-01 lb/h)***	***TBD (2.93E-02 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***202-PK-0201B***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Utility boiler***

Pollutants Removed	***NOx***	***Organic HAP***		
Design Efficiency (%)	***75***	***75***		
Operating Efficiency (%)	***TBD***	***TBD***		

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.941 lb/h)***	***TBD (0.735 lb/h)***
	Organic HAPs	***ppmv***	***TBD (1.17E-01 lb/h)***	***TBD (2.93E-02 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Process Heaters and Boilers***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***202-PK-0201C***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Selective Catalytic Reduction (SCR)***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Utility boiler***

Pollutants Removed	***NOx***	***Organic HAP***		
Design Efficiency (%)	***75***	***75***		
Operating Efficiency (%)	***TBD***	***TBD***		

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	NOx	***ppmv***	***TBD (2.941 lb/h)***	***TBD (0.735 lb/h)***
	Organic HAPs	***ppmv***	***TBD (1.17E-01 lb/h)***	***TBD (2.93E-02 lb/h)***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / FCCU***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***112-VS-1201***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator

☒ ***Wet Scrubber*** ☐ Spray Dryer ☒ Other – Specify:

COP-NP - Non-Platinum CO combustion promoter

Name of Manufacturer	Model Number	Date to Be Installed
TBD	***TBD***	***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process Vent***

Pollutants Removed	***PM***	***SO_2***	***NOx***		
Design Efficiency (%)	***98***	***99***	***98***		
Operating Efficiency	***TBD***	***TBD***	***TBD***		

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	PM	***ppmv***	***TBD***	***TBD***
	SO_2	***ppmv***	***TBD***	***TBD***
	NOx	***ppmv***	***TBD***	***TBD***
	VOC	***ppmv***	***TBD***	***TBD***
	HAPs	***ppmv***	***TBD***	***TBD***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / SRU Thermal Oxidizer***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***122-H-2201***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator

☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Thermal Oxidizer***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

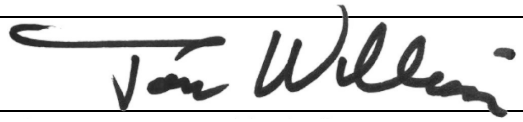
Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Process Vent***

Pollutants Removed	***VOC***	***H_2S***		
Design Efficiency (%)	***99.9***	***99.9***		
Operating Efficiency (%)	***TBD***	***TBD***		

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***3,779.2***	***3,917.2***
Gas Temperature (°F)			***125***	***414.5***
Gas Pressure (in. H_2O)			***TBD***	***406.8***
Gas Velocity (ft/sec)			***TBD***	***50***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	VOC	***ppmv***	***1.54% (molar)***	***16.0***
	SO_2	***ppmv***	***1.13 (H_2S)***	***1.15***
	CO	***ppmv***	***0***	***28.7***
	NO_x	***ppmv***	***0***	***3.84***
Pressure Drop Through Gas Cleaning Device (in. H_2O) ***TBD***				

Signature of Applicant	Date
	9/26/2016

PERMIT APPLICATION FOR AIR POLLUTION CONTROL EQUIPMENT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8532 (09-12)

NOTE: READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group - Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning &Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Vapor Recovery Unit (VRU)***		
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***
Facility Location ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***		Source ID No. ***Applied to sources: 203-T-0013, 203-T-0014, 203-T-0015, 203-T-0016, 203-T-0033***

SECTION C – EQUIPMENT

Type: ☐ Cyclone ☐ Multicyclone ☐ Baghouse ☐ Electrostatic Precipitator ☐ Wet Scrubber ☐ Spray Dryer ☒ Other – Specify: ***Vapor Recovery Unit***

Name of Manufacturer ***TBD***	Model Number ***TBD***	Date to Be Installed ***TBD***

Application: ☐ Boiler ☐ Kiln ☐ Engine ☒ Other – Specify: ***Diesel and Slop Tanks***

Pollutants Removed	***VOC***			
Design Efficiency (%)	***95***			
Operating Efficiency (%)	***TBD***			

Describe method used to determine operating efficiency:
TBD

SECTION D – GAS CONDITIONS

Gas Conditions			Inlet	Outlet
Gas Volume (SCFM; 68°F; 14.7 psia)			***TBD***	***TBD***
Gas Temperature (°F)			***TBD***	***TBD***
Gas Pressure (in. H_2O)			***TBD***	***TBD***
Gas Velocity (ft/sec)			***TBD***	***TBD***
Pollutant Concentration (Specify Pollutant and Unit of Concentration)	Pollutant	Unit of Concentration		
	VOC	***ppmv***	***TBD***	***TBD***

Pressure Drop Through Gas Cleaning Device (in. H_2O)
TBD

Signature of Applicant	Date
	09/26/2016

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 59652 (09-12)

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Enclosed HC Operating Flare***			
ND Air Pollution Control Permit No. (If Applicable) ***N/A***			
Contact Person for Air Pollution Matters ***Tom Johnson***			
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***	
Facility Address (Street & No.) ***37th Street***			
City ***Belfield***	State ***ND***	ZIP Code ***58622***	
Country ***USA***	Latitude (Nearest Second) ***46°52'45"N***	Longitude (Nearest Second) ***103°14'55" W***	
Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***	MSL Elevation at Facility ***2,685 feet***	Source ID ***207-FL-1701***	

SECTION C – FLARE INFORMATION

Use: ☐Emergency ☒Process ☐Both	Subject to NSPS (40 CFR 60.18) ☒Yes ☐No		
Emission Point ID ***207-FL-1701***	Height Above Ground Level (ft.) ***50***	Diameter at Top (ft.) ***30***	
Flame Monitor:	☒Thermocouple ☐Infrared ☐Ultraviolet ☐Acoustic ☐Other:		
Ignition:	☐Automatic ☐Other:	☒Continuous Burning Pilot	
Average Btu/1000 scf ***0.52***	Percent H_2S ***0***	Maximum Hourly Flow Rate to Flare ***24.4 MMSCFD***	

SECTION D – AIR CONTAMINANTS EMITTED

Pollutant	Quantity		Basis Of Estimate
	Pounds/Hr	Tons/Yr	
SO_2	***7.20E-04***	***3.15E-03***	***Criteria Pollutants from Gas pilots: TABLE 1.4-2. AP 42, Chapter 1: External Combustion Sources.*** ***HAPs: Emissions Estimation Protocol for Petroleum Refineries, Table 6-4 "Flare General Emission Factors"*** ***See Document P-5715043-00-001-18042-I001 "EMISSIONS INVENTORY"***
VOC	***6.60E-03***	***2.89E-02***	
NOx	***6.00E-02***	***2.63E-01***	
CO	***1.01E-01***	***4.42E-01***	
PM 10 Total	***9.12E-03***	***3.99E-02***	
PM 10 Filterable	***2.28E-03***	***9.99E-03***	
PM 2.5 Total	***9.12E-03***	***3.99E-02***	
PM 2.5 Filterable	***2.28E-03***	***9.99E-03***	
PM 2.5 Condensable	***6.84E-03***	***3.00E-02***	
Lead (Pb)	***6.00E-07***	***2.63E-06***	
GHG (as CO2e)	***N/A***		
Total HAPS	***5.42E-01***	***2.38***	

Will flaring of gas comply with applicable Ambient Air Quality Standards? ☒Yes ☐No

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?

☒YES ☐NO

If “NO” a Compliance Schedule must be completed and attached.

Signature of Applicant	Date
	09/26/2016

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 59652 (09-12)

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / Acid Flare***			
ND Air Pollution Control Permit No. (If Applicable) ***N/A***			
Contact Person for Air Pollution Matters ***Tom Johnson***			
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***	
Facility Address (Street & No.) ***37th Street***			
City ***Belfield***	State ***ND***	ZIP Code ***58622***	
Country ***USA***	Latitude (Nearest Second) ***46°52'45"N***	Longitude (Nearest Second) ***103°14'55" W***	
Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***	MSL Elevation at Facility ***2,685 feet***	Source ID ***207-FL-1702***	

SECTION C – FLARE INFORMATION

Use: ☐Emergency ☒Process ☐Both	Subject to NSPS (40 CFR 60.18) ☒Yes ☐No		
Emission Point ID ***207-FL-1702***	Height Above Ground Level (ft.) ***150***	Diameter at Top (ft.) ***0.8333***	
Flame Monitor:	☒Thermocouple ☐Infrared ☐Ultraviolet ☐Acoustic ☐Other:		
Ignition:	☐Automatic ☒Continuous Burning Pilot ☐Other:		
Average Btu/1000 scf ***0.52***	Percent H_2S ***0***	Maximum Hourly Flow Rate to Flare ***15.8 MMSCFD***	

SECTION D – AIR CONTAMINANTS EMITTED

Pollutant	Quantity		Basis Of Estimate
	Pounds/Hr	Tons/Yr	
SO2	***1.20E-04***	***5.26E-04***	***Criteria Pollutants from Gas pilots: TABLE 1.4-2. AP 42, Chapter 1: External Combustion Sources.*** ***See Document P-5715043-00-001-18042-I001 "EMISSIONS INVENTORY"***
VOC	***1.10E-03***	***4.82E-03***	
NOx	***1.00E-02***	***4.38E-02***	
CO	***1.68E-02***	***7.36E-02***	
PM 10 Total	***1.52E-03***	***6.66E-03***	
PM 10 Filterable	***3.80E-04***	***1.66E-03***	
PM 2.5 Total	***1.52E-03***	***6.66E-03***	
PM 2.5 Filterable	***3.80E-04***	***1.66E-03***	
PM 2.5 Condensable	***1.14E-03***	***4.99E-03***	
Lead (Pb)	***1.00E-07***	***4.38E-07***	
GHG (as CO2e)	***N/A***		
Total HAPS	***-***	***-***	

Will flaring of gas comply with applicable Ambient Air Quality Standards? ☒Yes ☐No

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?

☒YES ☐NO

If "NO" a Compliance Schedule must be completed and attached.

Signature of Applicant  Date 09/26/2016

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 59652 (09-12)

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / HC Emergency Flare (Phase 1)***			
ND Air Pollution Control Permit No. (If Applicable) ***N/A***			
Contact Person for Air Pollution Matters ***Tom Johnson***			
Title ***Vice President of Operations***	Telephone Number ***(409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***	
Facility Address (Street & No.) ***37th Street***			
City ***Belfield***	State ***ND***	ZIP Code ***58622***	
Country ***USA***	Latitude (Nearest Second) ***46°52'45"N***	Longitude (Nearest Second) ***103°14'55" W***	
Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***	MSL Elevation at Facility ***2,685 feet***	Source ID ***207-FL-1703***	

SECTION C – FLARE INFORMATION

Use: ☒Emergency ☐Process ☐Both	Subject to NSPS (40 CFR 60.18) ☒Yes ☐No		
Emission Point ID ***207-FL-1703***	Height Above Ground Level (ft.) ***150***	Diameter at Top (ft.) ***3***	
Flame Monitor:	☒Thermocouple ☐Infrared ☐Ultraviolet ☐Acoustic ☐Other:		
Ignition:	☐Automatic ☐Other:	☒Continuous Burning Pilot	
Average Btu/1000 scf ***0.52***	Percent H_2S ***0***	Maximum Hourly Flow Rate to Flare ***74.6 MMSCFD***	

SECTION D – AIR CONTAMINANTS EMITTED

Pollutant	Quantity		Basis Of Estimate
	Pounds/Hr	Tons/Yr	
SO2	***1.80E-04***	***7.88E-04***	***Criteria Pollutants from Gas pilots: TABLE 1.4-2. AP 42, Chapter 1: External Combustion Sources.*** ***See Document P-5715043-00-001-18042-I001 "EMISSIONS INVENTORY"***
VOC	***1.65E-03***	***7.23E-03***	
NOx	***1.50E-02***	***6.57E-02***	
CO	***2.52E-02***	***1.10E-01***	
PM 10 Total	***2.28E-03***	***9.99E-03***	
PM 10 Filterable	***5.70E-04***	***2.50E-03***	
PM 2.5 Total	***2.28E-03***	***9.99E-03***	
PM 2.5 Filterable	***5.70E-04***	***2.50E-03***	
PM 2.5 Condensable	***1.71E-03***	***7.49E-03***	
Lead (Pb)	***1.50E-07***	***6.57E-07***	
GHG (as CO2e)	***N/A***		
Total HAPS	***-***	***-***	

Will flaring of gas comply with applicable Ambient Air Quality Standards? ☒Yes ☐No

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?

☒YES ☐NO

If "NO" a Compliance Schedule must be completed and attached.

Signature of Applicant	Date
Jon Wilson	09/26/2016

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR FLARES

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 59652 (09-12)

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***

SECTION B – FACILITY INFORMATION

Facility Name ***Davis Refinery / HC Emergency Flare (Phase 2)***			
ND Air Pollution Control Permit No. (If Applicable) ***N/A***			
Contact Person for Air Pollution Matters ***Tom Johnson***			
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***	
Facility Address (Street & No.) ***37th Street***			
City ***Belfield***	State ***ND***	ZIP Code ***58622***	
Country ***USA***	Latitude (Nearest Second) ***46°52'45"N***	Longitude (Nearest Second) ***103°14'55" W***	
Legal Description of Facility Site ***Property ID 07 0000 00165 000 in the SE 1/4 of Section 2, Twp 139N, Range 100W and Property ID: 07 0000 00162 000 in the NW1/4 and SW 1/4 of Section 1, Twp 139N, Range 100W***	MSL Elevation at Facility ***2,685 feet***	Source ID ***207-FL-1704***	

SECTION C – FLARE INFORMATION

Use: ☒Emergency ☐Process ☐Both	Subject to NSPS (40 CFR 60.18) ☒Yes ☐No		
Emission Point ID ***207-FL-1704***	Height Above Ground Level (ft.) ***150***	Diameter at Top (ft.) ***3***	
Flame Monitor:	☒Thermocouple ☐Infrared ☐Ultraviolet ☐Acoustic ☐Other:		
Ignition:	☐Automatic ☐Other:	☒Continuous Burning Pilot	
Average Btu/1000 scf ***0.52***	Percent H_2S ***0***	Maximum Hourly Flow Rate to Flare ***88.8 MMSCFD***	

SECTION D – AIR CONTAMINANTS EMITTED

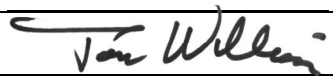
Pollutant	Quantity		Basis Of Estimate
	Pounds/Hr	Tons/Yr	
SO2	***1.80E-04***	***7.88E-04***	***Criteria Pollutants from Gas pilots: TABLE 1.4-2. AP 42, Chapter 1: External Combustion Sources.*** ***See Document P-5715043-00-001-18042-I001 "EMISSIONS INVENTORY"***
VOC	***1.65E-03***	***7.23E-03***	
NOx	***1.50E-02***	***6.57E-02***	
CO	***2.52E-02***	***1.10E-01***	
PM 10 Total	***2.28E-03***	***9.99E-03***	
PM 10 Filterable	***5.70E-04***	***2.50E-03***	
PM 2.5 Total	***2.28E-03***	***9.99E-03***	
PM 2.5 Filterable	***5.70E-04***	***2.50E-03***	
PM 2.5 Condensable	***1.71E-03***	***7.49E-03***	
Lead (Pb)	***1.50E-07***	***6.57E-07***	
GHG (as CO2e)	***N/A***		
Total HAPS	***-***	***-***	

Will flaring of gas comply with applicable Ambient Air Quality Standards? ☒Yes ☐No

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS?

☒YES ☐NO

If "NO" a Compliance Schedule must be completed and attached.

Signature of Applicant	Date
	09/26/2016

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR INTERNAL COMBUSTION ENGINES AND TURBINES

NORTH DAKOTA DEPARTMENT OF
HEALTH DIVISION OF AIR QUALITY
SFN 8891 (09-12)

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – FACILITY AND UNIT INFORMATION

Facility Location ***37th Street, Belfield, ND. ZIP: 58622***		
County ***Billings***	Source ID Number (From SFN 8516) ***212-P-1201 A/B/C***	
Type of Unit (check all that apply)	☐Stationary Natural Gas-Fired Engine ☒Stationary Diesel and Dual Fuel ☐Engine Stationary Gasoline Engine ☐Stationary Natural Gas-Fired Turbine	☒Emergency Use ☐Only Non- Emergency ☐Use Peaking ☐Demand Response
	Other – Specify: ***Firewater Diesel Pump***	

SECTION C – MANUFACTURER DATA

Make ***TBD***	Model ***TBD***		Date of Manufacture ***TBD***
Reciprocating Internal Combustion Engine			
☒ Spark Ignition ☐Compression Ignition			
☐ 4 Stroke ☐ 2 Stroke		☐Rich Burn ☐ Lean Burn	
Maximum Rating (BHP @ rpm) ***TBD***		Operating Capacity (BHP @ rpm) ***600 HP each***	
Engine Subject to: ☒ 40 CFR 60, Subpart IIII ☒ 40 CFR 60, Subpart JJJJ ☒ 40 CFR 63, Subpart ZZZZ			
Turbine		Dry Low Emissions? ☐ Yes ☐ No	
Heat Input (MMBtu/hr)	Maximum Rating (HP)	75% Rating (HP)	Efficiency
Turbine Subject to: ☐ 40 CFR 60, Subpart GG ☐ 40 CFR 60, Subpart KKKK			

SECTION D – FUELS USED

Natural Gas (10^6 cu ft/year)	Percent Sulfur	Percent H_2S
Oil (gal/year)	Percent Sulfur	Grade No.
LP Gas (gal/year)	Other – Specify: ***Diesel <0.05% sulfur. 3,334 gal/year***	

SECTION E – NORMAL OPERATING SCHEDULE

Hours Per Day	Days Per Week	Weeks Per Year	Hours Per Year	Peak Production Season (if any)
N/A	***N/A***	***N/A***	***100 (emergency)***	***N/A***

SECTION F – STACK PARAMETERS

Emission Point		Stack Height Above Ground Level (feet)	
212-P-1201 A/B/C		***TBD***	
Stack Diameter (feet at top)	Gas Discharged (SCFM)	Exit Temp (°F)	Gas Velocity (FPS)
TBD	***TBD***	***TBD***	***TBD***

SECTION G – EMISSION CONTROL EQUIPMENT

Is any emission control equipment installed on this unit?

☒ No ☐Yes – Complete and attach form SFN 8532

SECTION H – MAXIMUM AIR CONTAMINANTS EMITTED

Emission Point	Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
	NO_X	***23.40***	***1.17***	***Emission factors From AP-42 Chapter 3 Section 3.4. Large Stationary Diesel And All Stationary Dual-fuel Engines. See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
	CO	***9.90***	***0.50***	
	PM	***1.26***	***0.06***	
	PM 10 (Total)	***7.85E-01***	***3.93E-02***	
	PM 10 (Filterable)	***6.80E-01***	***3.40E-02***	
	PM 2.5 (Total)	***6.56E-01***	***3.28E-02***	
	PM 2.5(Filterable)	***6.56E-01***	***3.28E-02***	
	PM (Condensable)	***1.06E-01***	***5.28E-03***	
	SO_2	***7.28E-03***	***3.64E-04***	
	VOC	***1.27***	***6.35E-02***	
	GHG (as CO_2e)	***N/A***	***N/A***	
	Formaldehyde	***1.08E-03***	***5.41E-05***	
	Total HAPS**	***5.98E-02***	***2.99E-03***	

* If performance test results are available for the unit, submit a copy of test with this application

** Total HAPS includes formaldehyde

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS? ☒YES ☐NO	If "NO" a Compliance Schedule must be completed and attached.

Signature of Applicant 	Date 09/26/2016

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

PERMIT APPLICATION FOR INTERNAL COMBUSTION ENGINES AND TURBINES

NORTH DAKOTA DEPARTMENT OF
HEALTH DIVISION OF AIR QUALITY
SFN 8891 (09-12)

SECTION A – GENERAL INFORMATION

Name of Firm or Organization ***Meridian Energy Group – Davis Refinery***		
Applicant's Name ***Tom Williams***		
Title ***VP of Planning & Permitting***	Telephone Number ***(707) 299-0182***	E-mail Address ***twilliams@meridianenergygroup.inc***
Mailing Address (Street & No.) ***2062 Business Center Drive, Suite 115***		
City ***Irvine***	State ***CA***	ZIP Code ***92612***
Contact Person for Air Pollution Matters ***Tom Johnson***		
Title ***Vice President of Operations***	Telephone Number (***409)795-0792***	E-mail Address ***tjohnson@meridianenergygroup.inc***

SECTION B – FACILITY AND UNIT INFORMATION

Facility Location ***37th Street, Belfield, ND. ZIP: 58622***		
County ***Billings***	Source ID Number (From SFN 8516) ***216-EG-1601 A/B/C***	
Type of Unit (check all that apply)	☒Stationary Natural Gas-Fired Engine ☒Stationary Diesel and Dual Fuel ☐Engine Stationary Gasoline Engine ☐Stationary Natural Gas-Fired Turbine	☒Emergency Use ☐Only Non- Emergency ☐Use Peaking ☐Demand Response
	Other – Specify: ***Diesel/Natural gas-fired emergency generator set***	

SECTION C – MANUFACTURER DATA

Make ***TBD***	Model ***TBD***		Date of Manufacture ***TBD***
Reciprocating Internal Combustion Engine			
☒ Spark Ignition ☐Compression Ignition			
☐ 4 Stroke ☐ 2 Stroke		☐Rich Burn ☐ Lean Burn	
Maximum Rating (BHP @ rpm) ***TBD***		Operating Capacity (BHP @ rpm) ***3.5 MW each (4,700 HP each)***	
Engine Subject to: ☒ 40 CFR 60, Subpart IIII ☒ 40 CFR 60, Subpart JJJJ ☒ 40 CFR 63, Subpart ZZZZ			
Turbine		Dry Low Emissions? ☐ Yes ☐ No	
Heat Input (MMBtu/hr)	Maximum Rating (HP)	75% Rating (HP)	Efficiency
Turbine Subject to: ☐ 40 CFR 60, Subpart GG ☐ 40 CFR 60, Subpart KKKK			

SECTION D – FUELS USED

Natural Gas (10^6 cu ft/year) ***TBD***	Percent Sulfur	Percent H_2S
Oil (gal/year)	Percent Sulfur	Grade No.
LP Gas (gal/year)	Other – Specify: ***Diesel <0.05% sulfur. 4,230 gal/year***	

SECTION E – NORMAL OPERATING SCHEDULE

Hours Per Day	Days Per Week	Weeks Per Year	Hours Per Year	Peak Production Season (if any)
N/A	***N/A***	***N/A***	***100 (emergency)***	***N/A***

SECTION F – STACK PARAMETERS

Emission Point		Stack Height Above Ground Level (feet)	
216-EG-1601 A/B/C		***TBD***	
Stack Diameter (feet at top)	Gas Discharged (SCFM)	Exit Temp (°F)	Gas Velocity (FPS)
TBD	***TBD***	***TBD***	***TBD***

SECTION G – EMISSION CONTROL EQUIPMENT

Is any emission control equipment installed on this unit?

☒ No ☐Yes – Complete and attach form SFN 8532

SECTION H – MAXIMUM AIR CONTAMINANTS EMITTED

Emission Point	Pollutant	Maximum Pounds Per Hour	Amount (Tons Per Year)	Basis of Estimate*
	NO_X	***183.05***	***9.15***	***Emission factors From AP-42 Chapter 3 Section 3.4. Large Stationary Diesel And All Stationary Dual-fuel Engines. See Document P-5715043-01-001-18042-I001 "EMISSIONS INVENTORY" and P-5715043-01-001-18035-I001 "BACT Analysis"***
	CO	***77.44***	***3.87***	
	PM	***9.86***	***0.49***	
	PM 10 (Total)	***9.96***	***4.98E-01***	
	PM 10 (Filterable)	***8.62***	***4.31E-01***	
	PM 2.5 (Total)	***8.33***	***4.16E-01***	
	PM 2.5(Filterable)	***8.33***	***4.16E-01***	
	PM (Condensable)	***1.34***	***6.69E-02***	
	SO_2	***5.70E-02***	***2.85E-03***	
	VOC	***9.93***	***4.96E-01***	
	GHG (as CO_2e)	***N/A***	***N/A***	
	Formaldehyde	***1.37E-02***	***6.86E-04***	
	Total HAPS**	***7.59E-01***	***3.79E-02***	

* If performance test results are available for the unit, submit a copy of test with this application

** Total HAPS includes formaldehyde

IS THIS UNIT IN COMPLIANCE WITH ALL APPLICABLE AIR POLLUTION RULES AND REGULATIONS? ☒YES ☐NO	If "NO" a Compliance Schedule must be completed and attached.

Signature of Applicant 	Date 09/26/2016

Attach and label separate sheet(s) if you need more space to explain any system or answers or to provide complete listings of Emissions, Contaminants, or other items.

SEND COMPLETED APPLICATION AND ALL ATTACHMENTS TO:

North Dakota Department of Health
Division of Air Quality
918 E Divide Ave., 2nd Floor
Bismarck, ND 58501-1947
(701) 328-5188

Exhibit B: Emissions Inventory

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: A **DATE:** 09/23/16	
		SHEET: 1 **OF** 64	

VEPICA CODE : P-5715043-01-001-18042-I001 **SHEET** 1 **OF** 224

COMPANY CODE: TBD

TITLE: EMISSIONS INVENTORY

PROJECT Nº : P-5715043

NAME : PERMITTING SUPPORT – DAVIS REFINERY

CLIENT : MERIDIAN ENERGY GROUP INC.

LOCATION : BILLINGS COUNTY, NORTH DAKOTA

0	09/23/16	ISSUED FOR PTC	J. GOMEZ J. SOLANO	A. PEÑA	C. GARCÍA	T. JOHNSON
ISSUE	**DATE**	**DESCRIPTION**	**PREPARED**	**REVIEWED**	**APPROVED VEPICA**	**APPROVED CLIENT**

Meridian Energy Group Inc.	EMISSIONS INVENTORY	VEPICA CODE: P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 DATE: 09/23/16	
		SHEET: 2 OF 64	

INDEX

DESCRIPTION **SHEET**

Meridian Energy Group Inc.	EMISSIONS INVENTORY	VEPICA CODE: P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 DATE: 09/23/16	
		SHEET: 3 OF 64	

1. INTRODUCTION

Meridian Energy Group (MEG) has engaged VEPICA to develop an air permit application for construction of the 55,000 BPD (barrels per day) oil Davis Refinery in Billings County, North Dakota.

The present document comprises the Emissions Inventory from Davis Refinery, based on the available engineering data and guidelines stablished in EPA *Emissions Estimation Protocol for Petroleum Refineries, Version 3* (RTI International, April 2015).

2. DOCUMENT SCOPE

This emission inventory includes the estimation of annual atmospheric discharges of criteria pollutants and hazardous air pollutants (HAPs) from primary sources within the refinery, categorized as follows:

- Equipment Leaks
- Storage Tanks
- Stationary Combustion
- Process Vents
- Flares
- Wastewater Treatment Systems
- Cooling Towers
- Product Loading
- Fugitive Dust

It is important to highlight that the estimations for New Source Review (NSR) regulated pollutants presented in this document comprise normal operation scenario for these main units using the engineering, licensor and vendor data available to date. Other Emission categories indicated in the protocol, such as, Startup/Shutdown and Malfunctions, are not considered in this scope.

Additionally, Greenhouse Gas (GHG) emissions are not included as part of this inventory since GHG are not “Regulated NSR pollutant”, in accordance NDAC 33-15-15 and 33-15-16. Regulated NSR pollutants for petroleum refineries include particulate matter (PM), particulate matter with a diameter of 10 microns or less (PM_{10}), particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), ozone (as VOCs), lead (Pb), hydrogen sulphide (H_2S) and reduced sulfur compounds.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 4 **OF** 64	

3. LOCATION

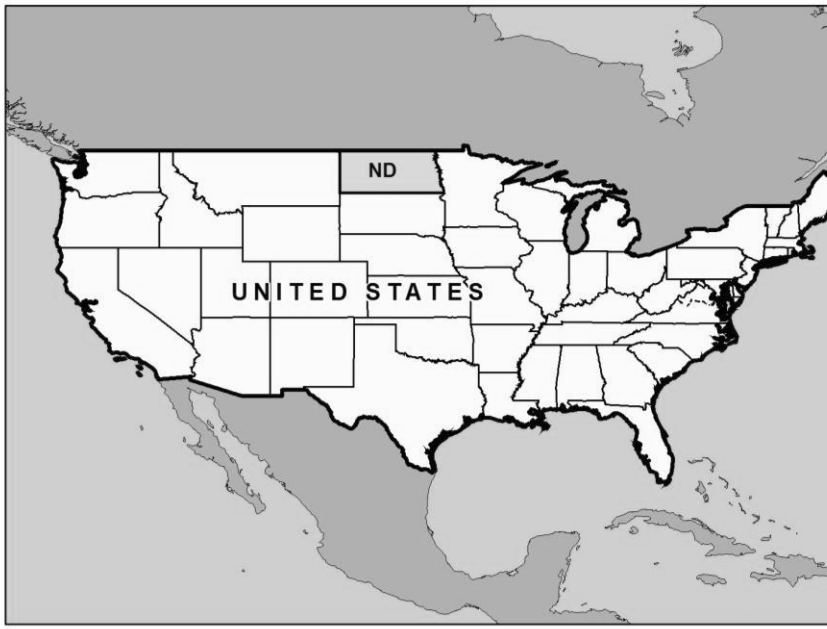
The oil Davis Refinery will be located in Billings County, North Dakota. Figure 1 shows the site layout and its geographical location.

		SHEET: 5 **OF** 64	

FIGURE 1.: SITE LOCATION MAP
PROCESS STUDY FOR THE 55,000 BPSD DAVIS REFINERY IN BILLINGS COUNTY, ND

RELATIVE REGIONAL LOCATION

RELATIVE NATIONAL LOCATION



4. EMISSION INVENTORY METHODOLOGY

This section describes the methodology and main activities performed to prepare the detailed emissions inventory of the Emission Units associated with the refinery operations

4.1. Sources Identification

Identification of primary sources was made based on the review of engineering data of process units, specifically: block and process flow diagrams (BFD & PFDs), process descriptions and data sheets.

“Potential to emit" has the meaning given to it in NDAC 33-15-14-06: *“the maximum capacity of a stationary source to emit any air contaminant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air contaminant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation is enforceable by the administrator of the United States environmental protection agency and the department.”* For a petroleum refinery, quantifiable fugitive emissions must also be included with point source emissions in the facility-wide PTE calculation.

“Emissions Unit” in accordance with NDAC 33-15-14-06 *“means any part or activity of a stationary source that emits or has the potential to emit any regulated air contaminant or any contaminant listed under section 112(b) of the Federal Clean Air Act.”*

The emission units of the proposed Davis Refinery include:

Process Units

1. Atmospheric Distillation Unit #1 & #2: heaters.
2. Vacuum Distillation Unit: heaters.
3. Light Naphtha Hydrotreater: heater.
4. Heavy Naphtha Hydrotreater Unit: heaters.
5. Diesel Hydrotreater Unit: heater.
6. Catalytic Reforming Units #1 & #2: heaters and regenerator vents.
7. Fluid Catalytic Cracking (FCC) Unit (including gas concentrator): heater and regenerator vent.

8. FCC Naphtha Hydrotreater: heater.
9. Kerosene Hydrotreater: heater.
10. Isomerization Unit: heaters.
11. Alkylation Unit: heater.
12. SRU - Thermal Oxidizer: thermal oxidizer vent stack.
13. Tank Farm (through relief valves in each tank), including crude oil (feed), intermediate products and final products.
14. Flare System.

Main Utilities

15. Boiler #1, #2 & #3 (in stand-by).
16. Waste Water Treatment System: equalization tank, API, IGF, MBR (fugitive).
17. Cooling Water System: drift loss in cooling tower.
18. Loading Stations: product loading operations.
19. Emergency Generator (Diesel): internal combustion engine exhaust stack.
20. Firewater Diesel Pump: exhaust stack
21. Emergency Power Generator: exhaust stack

The emission sources identified for each primary units of the refinery are listed as follows in Table 1. Figure 2 shows the identification of emission units in a block flow diagram.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 8 **OF** 64	

Table 1: Identified emission sources

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
101	Atmospheric Distillation Unit #1	ADU #1 heater rated 72.00 MMBTU/h and fired on refinery fuel gas	101-H-0101	101H0101	1	Best combustion practices. Ultra Low NOx Burner
102	Atmospheric Distillation Unit #2	ADU #2 heater rated 72.00 MMBTU/h and fired on refinery fuel gas	102-H-0201	102H0201	2	Best combustion practices. Ultra Low NOx Burner
103	Vacuum Distillation Unit	VDU heater #1 rated 76.47 MMBTU/h and fired on refinery fuel gas	103-H-0301	103H0301	3	Best combustion practices. Ultra Low NOx Burner
		VDU heater #2 rated 57.65 MMBTU/h and fired on refinery fuel gas	103-H-0302	103H0302	4	Best combustion practices. Ultra Low NOx Burner
105	Heavy Naphtha Hydrotreater	HNHT heater #1 rated 13.75 MMBTU/h and fired on refinery fuel gas	105-H-0501	105H0501	5	Best combustion practices. Ultra Low NOx Burner
		HNHT heater #2 rated 16.25 MMBTU/h and fired on refinery fuel gas	105-H-0502	105H0502	6	Best combustion practices. Ultra Low NOx Burner
106	Catalytic Reformer Unit #2	CRU #2 heater with a combined rating of 41.73 MMBTU/h and fired on refinery fuel gas	106-H-0601	106H0601	7	Best combustion practices. Ultra Low NOx Burner

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 9 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
107	Catalytic Reformer Unit #1	CRU #1 heater with a combined rating of 92.50 MMBTU/h and fired on refinery fuel gas	107-H-0701	107H0701	8	Best combustion practices. Ultra Low NOx Burner
110	Diesel Hydrotreater	Diesel HDT heater rated 16.25 MMBTU/h and fired on refinery fuel gas	110-H-1001	110H1001	9	Best combustion practices. Ultra Low NOx Burner
111	Light Naphtha Hydrotreater	LNHT heater rated 13.90MMBTU/h and fired on refinery fuel gas	111-H-1101	111H1101	10	Best combustion practices. Ultra Low NOx Burner
112	Fluid Catalytic Cracking (FCC) Unit	Regenerator vent stack	112-VS-1201	112VS1201	11	Best combustion practices (complete Carbon burn regenerator design)*
		FCCU heater rated 28.35 MMBTU/h and fired on refinery fuel gas	112-H-1201	112H1201	12	Best combustion practices. Ultra Low NOx Burner
114	FCC Naphtha Hydrotreater	FCC Naphtha HDT heater rated 17.48 MMBTU/h and fired on refinery fuel gas	114-H-1401	114H1401	13	Best combustion practices. Ultra Low NOx Burner
117	Isomerization Unit	Isomerization heater #1 rated 1.65 MMBTU/h and fired on refinery fuel gas	117-H-1701	117H1701	14	Best combustion practices. Ultra Low NOx Burner
		Isomerization heater #2 rated 3.75 MMBTU/h and fired on refinery fuel gas	117-H-1702	117H1702	15	Best combustion practices. Ultra Low NOx Burner

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 10 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
118	Alkylation Unit	Alkylation heater rated 84.19 MMBTU/h and fired on refinery fuel gas	118-H-1801	118H1801	16	Best combustion practices. Ultra Low NOx Burner
122	SRU Thermal Oxidizer	Thermal Oxidizer with a rated capacity of 1.58 MMBTU/h	122-H-2201	122H2201	17	Emissions from SRU vents will be routed via a common header to aThermal Oxidizer.
125	Kerosene Hydrotreater	Kerosene HDT heater rated 12.50 MMBTU/h and fired on refinery fuel gas	125-H-2501	125H2501	18	Best combustion practices. Ultra Low NOx Burner
202	Utility Boiler 1	Boiler with a rated capacity of 60 MMBTU	202-B-0201A	202B0201A	19	Under normal operations 2 Boilers in service 1 in hot standby
202	Utility Boiler 2	Boiler with a rated capacity of 60 MMBTU	202-B-0201B	202B0201B	20	
202	Utility Boiler 3	Boiler with a rated capacity of 60 MMBTU	202-B-0201C	202B0201C	21	
203	Crude oil tank #1	Bakken crude oil storage tank #1 with a nominal 110,999 bbl capacity	203-T-0001	203T0001	22	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Crude oil tank #2	Bakken crude oil storage tank #2 with a nominal 110,999 bbl capacity	203-T-0002	203T0002	23	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Crude oil tank #3	Bakken crude oil storage tank #3 with a nominal 110,999 bbl capacity	203-T-0003	203T0003	24	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 11 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
203	Desulfurized Heavy Naphtha tank #1	Heavy Naphtha storage tank #1 with a nominal 64,996 bbl capacity	203-T-0005	203T0005	25	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Reformate tank #1	Reformate storage tank #1 with a nominal 33,312 bbl capacity	203-T-0006	203T0006	26	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Reformate tank #2	Reformate storage tank #2 with a nominal 33,312 bbl capacity	203-T-0007	203T0007	27	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Gasoline tank #1	Regular Gasoline tank #1 with a nominal 64,996 bbl capacity	203-T-0008	203T0008	28	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Gasoline tank #2	Regular Gasoline tank #2 with a nominal 64,996 bbl capacity	203-T-0009	203T0009	29	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Mid Gasoline tank #1	Mid Gasoline tank #1 with a nominal 64,996 bbl capacity	203-T-0010	203T0010	30	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Jet Fuel tank #1	Jet Fuel tank #1 with a nominal 33,312 bbl capacity	203-T-0011	203T0011	31	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Jet Fuel tank #2	Jet Fuel tank #2 with a nominal 33,312 bbl capacity	203-T-0012	203T0012	32	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 12 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
203	Undesulphurized Diesel tank #1	Undesulphurized Diesel storage tank #1 with a nominal 33,312 bbl capacity	203-T-0013	203T0013	33	Cone Roof, Submerged Fill Pipe
203	Undesulphurized Diesel tank #2	Undesulphurized Diesel storage tank #2 with a nominal 33,312 bbl capacity	203-T-0014	203T0014	34	Cone Roof, Submerged Fill Pipe
203	Desulphurized Diesel tank #1	Desulphurized Diesel storage tank #1 with a nominal 64,996 bbl capacity	203-T-0015	203T0015	35	Cone Roof, Submerged Fill Pipe
203	Desulphurized Diesel tank #2	Desulphurized Diesel storage tank #2 with a nominal 64,996 bbl capacity	203-T-0016	203T0016	36	Cone Roof, Submerged Fill Pipe
203	UVGO tank	UVGO storage tank with a nominal 33,312 bbl capacity	203-T-0017	203T0017	37	Cone Roof, Submerged Fill Pipe
203	FCC Naphtha tank #1	FCC naphtha storage tank #1 with a nominal 33,312 bbl capacity	203-T-0018	203T0018	38	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	FCC Naphtha tank #2	FCC naphtha storage tank #2 with a nominal 33,312 bbl capacity	203-T-0019	203T0019	39	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 13 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
203	Alkylate tank #1	Alkylate storage tank #1 with a nominal 33,312 bbl capacity	203-T-0020	203T0020	40	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Alkylate tank #2	Alkylate storage tank #2 with a nominal 33,312 bbl capacity	203-T-0021	203T0021	41	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Diluent tank	Diluent tank with a nominal 33,312 bbl capacity	203-T-0022	203T0022	42	Cone Roof, Submerged Fill Pipe
203	Fuel Oil tank #1	Fuel Oil tank #1 with a nominal 64,996 bbl capacity	203-T-0023	203T0023	43	Cone Roof, Submerged Fill Pipe
203	Fuel Oil tank #2	Fuel Oil tank #2 with a nominal 64,996 bbl capacity	203-T-0024	203T0024	44	Cone Roof, Submerged Fill Pipe
203	Light Naphtha tank #1	Light Naphtha tank #1 with a nominal 33,312 bbl capacity	203-T-0031	203T0031	45	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Light Naphtha tank #2	Light Naphtha tank #2 with a nominal 33,312 bbl capacity	203-T-0032	203T0032	46	Dome with IFR (Internal Floating Roof) and Submerged Fill Pipe
203	Light Slops tank	Light slops tank with a nominal 2,620 bbl capacity	203-T-0033	203T0033	47	Cone Roof, Submerged Fill Pipe

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 14 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
203	Heavy Slops tank	Heavy slops tank with a nominal 2,620 bbl capacity	203-T-0034	203T0034	48	Cone Roof, Submerged Fill Pipe
206	Wastewater Treatment Plant	Oil/Separator Inlet from Benzene Waste Operations NESHAP (BWON) Compliant plant with a design capacity of 155,000 gal/d**	-	206WWT	49	Wastewater treatment plant must comply with the design requirements of 40 CFR 60 Subpart QQQ
207	Enclosed HC Operating Flare	Enclosed flare with pilot at 100 SCFH average of fuel gas, for handling up to 24.4 MMSCFD (including purges and fuel gas blowdown)	207-FL-1701	207FL1701	50	High temperature, optimal balance between air flow, gas/pollutant loading and low heating value
207	Acid Flare	Acid gas flare with pilot at 100 SCFH average of fuel gas, for handling up to 15.8 MMSCFD of gas.	207-FL-1702	207FL1702	51	High temperature, optimal balance between air flow, gas/pollutant loading and low heating value
207	HC Emergency Flare #1	HC Emergency Flare at 100 SCFH average of fuel gas, for handling up to 74.6 MMSCFD (including purges and fuel gas blowdown)	207-FL-1703	207FL1703	52	High temperature, optimal balance between air flow, gas/pollutant loading and low heating value

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 15 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
207	HC Emergency Flare #2	HC Emergency Flare at 100 SCFH average of fuel gas, for handling up to 88.8 MMSCFD (including purges and fuel gas blowdown)	207-FL-1704	207FL1704	53	High temperature, optimal balance between air flow, gas/pollutant loading and low heating value
208	Truck Loading-Unloading System	Dedicated normal service of loading/unloading refinery products (Gasoline, Jet Kerosene, Diesel and Fuel Oil).	-	208TL	54	Submerged Loading and dedicated service.
209	Rail Loading-Unloading System	Dedicated normal service of loading/unloading refinery products (Gasoline, Jet Kerosene, Diesel and Fuel Oil).	-	209RL	55	Submerged Loading and dedicated service
212	Firewater Diesel Pumps	Combustion gases (flue gas) from 600 HP x3 diesel firewater pump.	212-P-1201 A/B/C	212P1201A/B/C	56	Normal operation of less than 100 hours per year. The engines shall be certified to emissions standards as outlined under 40 CFR 60, Subparts IIII and JJJ. The engines shall be manufactured with the appropriate control equipment to meet these emissions standards

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 16 **OF** 64	

Unit Number	Unit Description	Emission Unit Description	TAG	Point ID	Point Number	Air Pollution Control Equipment (inherent to design)
215	Cooling Towers	Induced draft - counter flow Cooling Tower. Design Cooling Water Circulation Rate: 1,500 gpm	215-CT-1501A/B/C	215CT1501A/B/C	57 58 59	Drift Eliminators Inherent to Design. Under normal operations 2 in service 1 in standby
216	Diesel/Natural gas-fired emergency generator set	Combustion gases (flue gas) from 3.5 MWx3 emergency generator stack.	216-EG-1601 A/B/C	216EG1601 A/B/C	60	Normal operation of less than 100 hours per year. The engines shall be certified to emissions standards as outlined under 40 CFR 60, Subparts IIII and JJJ. The engines shall be manufactured with the appropriate control equipment to meet these emissions standards
FUGITIVE	Process equipment leaks in VOC and Natural Gas service	Fugitive (leaks) emissions from process equipment elements throughout the refinery	-	FUG-1	61	Leak Detection and Repair (LDAR) Program Screen level at 500 ppm

*: An add-on pollution control device such as ESP, filtering media or wet/dry scrubber are being considered for this unit. Further discussion is in the Controls Technology Review Report.
**: Calculated based on waste water treatment plant design.
.

4.2. Emission Estimation – Basis and Assumptions

Emissions for criteria pollutants and HAPs were estimated using the Emission Factors presented in the EPA *Emissions Estimation Protocol for Petroleum Refineries* and engineering data, unless noted otherwise. When needed, EPA AP-42 *Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources*, Fifth Edition, was consulted for specific criteria pollutant emission factors.

When using the mentioned emission factors, the following basis and assumptions were considered:

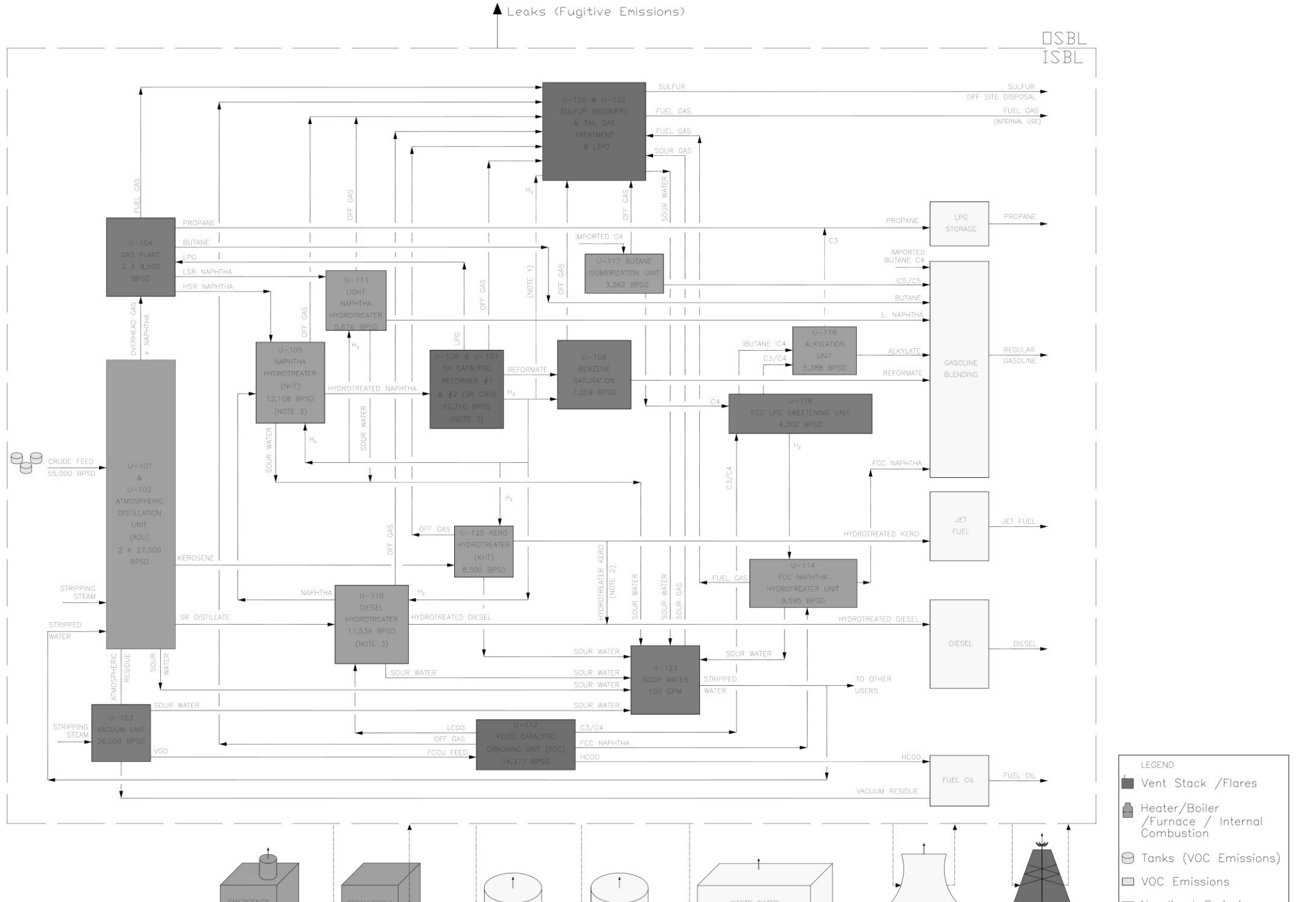
- Since this is a new refinery, and site-specific measurement or test data are not available, default emission factors (Methodology Ranks 5, or 4, as applicable) were used to estimate criteria pollutant and HAPs emissions, unless noted otherwise. For new industrial sources with no actual monitoring or direct measurements, the methodology ranks above mentioned were used since they are based on typical refinery average stream concentrations and statistical default process compositions. Also, when available, actual engineering/licensor data or vendor guarantees were used.

- When normalized emission factors for feed or throughput were used to determine PTE, maximum design capacity for applicable units/equipment was considered.

- For continuous operation process units, 8,760 hr/yr operating hours per year was considered to obtain annual mass emissions (tons per year or tpy). Depending on specific equipment, such as venting from regeneration units, these operating hours would in practice be less, in accordance with the process operation philosophy.

- For fugitive dust emissions from vehicular traffic, the base case is paving high traffic areas including employee parking areas and truck loading facilities. Actual emissions may be lower, since crude and/or products may be imported/dispatched via pipeline in the future.

Figure 1: Identification of emission sources per main process units



5. CALCULATION BASIS

This section describes de basis of the calculations made to estimate the emissions of pollutants from each main unit and equipment identified in section 4.1 of this document.

5.1. Equipment Leaks

Equipment leaks are small fugitive emissions that occur throughout the refinery from a broad variety of equipment components and connections that may develop leaks through normal wear and tear which allow volatile fluids to escape into the atmosphere.

To estimate VOCs and HAPs leak emissions, Methodology Rank 2 and 4 were used, based in default model process component counts. Equipment counts for large model processes (more than 50,000 BPSD) were selected from Table 2-5 *Median Equipment Leak Component Counts for Large Model Processes*,

For the base case emissions inventory a 10,000 ppmv leak definition, which is the highest detection threshold allowed by New Source Performance Standards (NSPS), was utilized to determine emission factors. Emission Factors were obtained from AP-42 *Table 2-6. Refinery and SOCMI Average Component Emission Factors (Rank 4)*. Emissions reductions from implementing a Leak Detection and Repair (LDAR) program with a monthly monitoring interval at a 10,000 ppmv leak definition rate were taken from Table 4.1 – *Control effectiveness for an LDAR program at a chemical process unit and a refinery* – in EPA's Publication EPA-305-D-07-001, "*Leak Detection and Repair, A Best Practices Guide".*

However, in order to demonstrate compliance with 40 CFR 60 Subpart GGGa, applicable portions of Subpart VVa, and compliance with 40 CFR 61 Subparts J and V, Meridian has chosen to adopt a 500 ppmv leak definition which is the current EPA recommended value for implementation of monitoring rather than the previous regulatory level of 10,000 for NSPS. In addition, to minimize leaks, the design of the refinery will include pumps in VOC service with double mechanical seals, enhanced valve packing, no open ended lines and connection of pressure relief devices, sampling connecting systems, surge control vessels and bottoms receivers to closed-vent systems routed to fuel gas or flare. Meridian's facility integrity management system for the Davis Refinery will also include the use of advanced monitoring methods such as differential light absorption and ranging (DIAL) or optical gas imaging (OGI) technology that can visualize gas leaks using ultra-sensitive passive infrared sensing technology, as part of, and complementing, its proposed LDAR program to improve operational and safety practices so that leaks can be identified more efficiently and fixed soon as practicable.

Meridian's proposed LDAR program assumes monitoring and directed maintenance with a leak definition of 500 ppmv for all components other than compressors which are to be screened at 10,000 ppmv. To estimate potential fugitive emissions from refinery equipment leaks, Emission Factors were obtained from AP-42 *Table 2-2. Equipment Leak Rate for Petroleum and SOCMI Equipment Components (Rank 2)*. Emissions reductions from implementing an LDAR program equivalent to Texas Commission on Environmental Quality (TCEQ) approved 28LAER program have been considered in the controlled emissions inventory. Results of this estimation is summarized in Appendix 2.

5.2. Storage Tanks Emissions

For Storage Tank VOC Emission Estimates a Methodology Rank 2 *Tank-specific modeling* with EPA Tanks 4.09d software was used for all petroleum liquid storage tanks in the refinery, based on available engineering information such as tank type, tank dimensions, stored liquid properties, tank condition/fitting information, annual throughput. Results of this modeling for VOCs are shown in Appendix 2.

For Storage Tank HAPs Emission Estimates, a Methodology Rank 3b *Default Tank Modeling* was used, which is applicable to common petroleum liquid storage tanks, and requires Crude throughput and production capacities. These default emissions factors consider assumptions regarding the typical fitting controls and the average composition of crude oil, gasoline, and other products at the refinery. Emission factors for VOCs were used from Table 3-3 *Default Emissions Factors for Petroleum Refinery Storage Tanks* of the protocol, based on crude oil processing capacity and production of various distillates, as noted in Appendix 2.

These factors consider an estimation of distillates production as a fraction of crude oil processing capacity, subtracting the production of heavy distillates and aromatics. In the emissions inventory for the proposed Davis Refinery, such production was assumed zero since the heaviest product will be fuel oil which is considered part of the middle distillates pool. The HAP emissions were assumed then from:

- Gasoline and Other Light Distillates (such as desulfurized naphtha, alkylates, reformates, butane) at 60% of the crude oil processing rate, and,

- Diesel Fuel and Other Middle Distillates (diesel, kerosenes, jet fuel, fuel oil), at 40% of crude oil processing rate.

5.3. Stationary Combustion Sources

Combustion sources such as heaters and boilers of the proposed Davis Refinery will For the base case emissions inventory for criteria pollutants, AP-42 emission factors based on heat input in MMBTU/hr were taken from Chapter 1 of the *Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources* (*External*

Combustion Sources, *Tables 1.4-1 and 1.4-2*). Manufacturer guaranteed emission rates for particulate matter (PM), nitrogen oxides (NOx), and carbon monoxide (CO) were utilized to obtain the emissions inventory process for process heaters and utility boilers. For emission estimates of SO_2 and VOC default AP-42 emission values were utilized. For the controlled emissions inventory a reduction on emissions were applied based on the add-on controls selected.

HAPs emissions for process heaters and boilers were calculated based on fuel usage using Methodology Rank 4 and default emission factors in Table 4-3 *Summary of Emission Factors for Boilers and Process Heaters Firing Various Fuels*.

In the case of criteria pollutants and HAPs from internal combustion engines, such as the emergency generator and firewater pump engines, emission factors based on power output (HP) and fuel input (MMBTUh) were taken from AP-42 Chapter 3 Section 3.4. *Large Stationary Diesel And All Stationary Dual-fuel Engines, Table 3.4-1 to 3.4-3*). It should be noted that these emissions were not added to the total refinery emissions as it is expected that these emergency engines will not operate under normal conditions for more than 100 hours per year.

Emission factors and emission estimations for stationary combustion equipment (heaters and boilers) are presented in Appendix 3.

5.4. Process Vents

Emissions from process vents are those that can be released directly to the atmosphere through a vent stack. .At the proposed Davis Refinery most of the process gases will be routed to the refinery's fuel gas system. Those not routed to the refinery's fuel system will be controlled using a flare, thermal incinerator, or other air pollution control technique. Process vent emissions from the proposed Davis Refinery that are not recovered into the refinery's fuel gas system are described in this section.

5.4.1. Fluid Catalytic Cracking Unit (FCCU)

Emissions from the FCCU catalyst regenerator vent are often the single largest emissions vent at the refinery. These emissions include a variety of pollutants, such as PM (primary, filterable and condensable), SO_2, NOx, CO, VOC, metal HAPs, organic HAPs, and ammonia.

Criteria pollutant emissions for the base case were based on FCCU fresh feed rate using AP-42 Emission Factors, *Volume 1: Stationary Point and Area Sources* (*Petroleum Industry Table 5.1-1*). For the controlled emissions inventory the FCCU technology licensor provided CO and SO_2 emission rates to replace default values based on its licensed technology design for Bakken crude coke and hot burn regenerator. Tables and Results of these calculations are presented in Appendix 4.

For PM emissions including PM size distribution estimates, default values based on the FCCU coke-burn off rate were used, following the procedure for PM Emissions Inventory Calculations indicated in the protocol. Likewise, emission estimates for metal HAPs were based on Nickel E-Cat typical value for FCC units (Methodology Rank 5A).

For HAPs (volatile, semi-volatile, non-volatile organics), dioxins, furans, inorganics and other pollutants of interest, the emission factors from Table 5-4. *Organic HAP Emissions Factors for CCU Catalyst Regenerator Vent,* based on FCCU feed (Methodology Rank 5B for Catalytic Cracking Units).

5.4.2. Catalytic Reforming Units

Emissions from the Catalytic Reforming Units # 1 & 2 process vents are discharged while purging in the regeneration cycle. For CRU semi-regenerative design as is porposed for the Davis Refinery, these emissions are generated for a maximum 672 hr/yr for each reactor at each unit.

To estimate emissions from catalyst regeneration, based on catalytic reforming unit process capacity, Methodology Rank 5 and AP-42 Default Emission Factors for VOCs, organic HAPs, dioxins, PCBs, inorganics and other pollutants of interest were taken from Table 5-6 *Emissions Factors for CRU Catalyst Regeneration Vent*. Results are summarized in Appendix 4.

5.4.3. Sulfur Recovery Unit (SRU)

The sulfur recovery plant of the Davis Refinery will be based on Merichem's LO-CAT® licensed technology. This patented liquid-redox system uses a proprietary chelated iron solution catalyst to convert H_2S to innocuous, elemental sulfur slurry inside an oxidizer vessel. The slurry passes through a sulfur filter to produce an elemental sulfur cake which is loaded onto trucks for offsite reuse or disposal. No hazardous waste byproducts are produced. The environmentally safe catalyst is continuously regenerated in the process. The LO-CAT process allows 100% turndown in gas flow and H_2S concentrations and has an H_2S Removal efficiency of 99.9 %. The process vents of the LO-CAT unit; an oxidizer vent and a flash drum vent, will be routed to a thermal oxidizer for the 99.9% destruction (oxidation) of any unconverted sulphur and residual organic volatiles.

Calculations for the emissions associated with SRU - Thermal Oxidizer were performed on the basis of engineering data provided by the licensor of the LO-CAT unit. These calculations are summarized in Appendix 4.

5.4.4. Blowdown System

Blowdown systems are used during depressurization processes to recover liquids entrained in a process gas stream. The remaining uncondensed gases may be compressed and recovered for use as fuel gas or they may be vented to a thermal destruction device (thermal oxidizer or flare). Either of these scenarios is considered a "controlled" blowdown system. The design of the proposed Davis Refinery includes a vapor recovery system to capture vapors released by pressure control valves during normal operations and return to product/processes instead of releasing through stacks or via flaring.

To estimate yearly emissions from blowdown scenarios for the proposed Davis Refinery, the total refinery Fuel Gas production was considered as being routed to the Flare system for no more than 168 hours a year. Emissions estimations were performed based on the total refinery capacity using the AP-42 emission factors presented in *Table 5-12. Default Emissions Factors for Blowdown Systems*. These results are presented in Appendix 4.

5.4.5. Vacuum Producing Systems

VOC emissions from the Vacuum Distillation Unit, are generated from the ejectors and condensers system. The design of the Vacuum Distilation Unit at the Davis Refinery considers recovery of uncondensed gases into the refinery's fuel gas system. Therefore, there are no emissions associated to process vents from the vacuum distillation unit at the proposed Davis Refinery.

5.5. Flares

Emissions from flares consist of a fraction of the hydrocarbons in the flare gas (e.g., CH_4, CO, VOC, and specific organic HAP) that are not combusted in the flare; SO_2 resulting from the oxidation of sulfur compound impurities, such as H_2S, in the gas stream; and CO_2 from the combustion process. Flares are also expected to produce NO_x emissions and may produce PM (soot) if combustion conditions are not adequate.

To safely combust hydrocarbon relief flows during process upsets, and other times as needed during startups, shutdowns, or malfunctions the refinery will have a flare system comprised of a combination of an enclosed flare and elevated flares. A separate system with an elevated flare to handle acid gases in cases of SRU unavailability will be provided.

The proposed Davis Refinery will include four (4) flares; one main enclosed flare for normal operation, one acid gas flare and two elevated emergency flares. The enclosed flare is being designed to receive the streams of excess gas expected to be produced during purge and blowdown beyond the capacity of the refinery's vapor recovery system. The elevated flares will only operate during emergency cases in

which the capacity of the enclosed flare is exceeded. Blowdown cases emission estimates are captured under Blowdown System in Section 5.4.4 and Appendix 4.

Flaring at the proposed Davis Refinery will be on an intermittent and as-needed basis, since the refinery will operate a vapor recovery system to capture vapors and return to product/processes instead of releasing through stacks or via flaring during normal operations. Therefore, emissions estimates were calculated using Methodologies Ranks 5 and 6 based flare pilots capacity and the Lower Heating Value (LHV) of the gas stream routed to the pilots. AP-42 *Table 6-4. Flare General Emission Factors* were used to estimate HAP emissions associated to the normal operation of the flares. The AP-42 emission factors of *Table 6-2. Flare Energy Consumption-Based Emission Factors* and *Table 6-3. Emission Factors for Soot from Flares* were used to calculate emissions of VOCs, CO, NO_x and Soot (PM) based on the LHV of the gas stream being flared through the pilots under normal operations. Tables and Results of these calculations are presented in Appendix 5.

5.6. Wastewater Treatment Systems

Methodology Rank 3 was utilized to estimate the VOC emissions associated to the WWTS. The mass flow through the WWTS was estimated based on the average throughput of Davis Refinery main units, using the emissions factors from *Table 7-8. Model Process Unit Characteristics for Petroleum Refinery Wastewater* and *Table 7-9. Refinery Wastewater Contaminant Concentrations as a Ratio to Benzene* since the WWTS for the proposed Davis Refinery will be a Benzene Waste Operations NESHAP (BWON) Compliant plant. The estimation of the uncontrolled amount of the compounds emitted was calculated using AP-42 emission factors in *Table 7-10. Default Mass Emission Factors for Refinery Wastewater Collection and Treatment Systems,* the controlled estimate included a percentage of control as expected for a BWON compliant plant. The results of these calculations are presented in Appendix 6.

5.7. Cooling Towers

The main emissions from cooling towers are VOC and particulate matter, which are picked up by cooling water when leaks occur in heat exchangers or condensers (product on the high-pressure side, leaks through cracks in the exchanger and contaminants the water).

The base case emission inventory calculations for the Cooling Towers were based on Cooling Water Circulation Rate, a default drift factor and AP-42 emission factors of *Table 8-5. Methodology Rank 5 Default Emission Factors.* Controlled emissions were estimated based on the proposed Davis Refinery cooling towers which are induced mechanical draft type with counter flow arrangement and drift eliminators (0.005% drift rate) built into the media. Results of these estimations are presented in Appendix 7.

5.8. Product Loading

During loading and unloading operations of feedstock and products from tank trucks and rail tank cars, vapors from the material previously transported and vapors from the material being loaded, are displaced and consequently emitted if left uncontrolled. HAPs and VOCs are the main gases to be emitted from loading operations.

Based on the type of product and loading/unloading rates of the Davis Refinery (Crude Oil, Gasoline, Jet Kerosene, Diesel and Fuel Oil), the potential uncontrolled emissions were calculated using the AP-42 emission factors of *Table 5.2-5 Total Uncontrolled Organic Emission Factors for Petroleum Liquid Rail Tank Cars and Tank Trucks*, from Chapter 5 of the AP-42 *Compilation of Air Pollutant Emission Factors. Volume 1, Chapter 5: Transportation And Marketing Of Petroleum Liquids.*

Controlled emissions were estimated considering that the loading/unloading facilities will be designed with vapor recovery to product recycle with upsets routed to emergency flares, since the proposed Davis Refinery must comply with the provisions of 40 CFR 63 Subpart BBBBBB. These results are presented in Appendix 8.

5.9. Fugitive Dust

Fugitive dust from the proposed Davis Refinery comprises silt suspension from vehicular traffic, and particulate matter from catalyst handling at the FCC unit. Results for these estimations are shown in Appendix 9.

Emissions from vehicular traffic at the proposed Davis Refinery were estimated using expected truck traffic at loading facilities and employee vehicular traffic following AP-42 guidelines, and utilizing the silt loading factor for limited access roads in Chapter 13 of the AP-42 *Compilation of Air Pollutant Emission Factors. Volume 1, Chapter 13: Miscellaneous Sources. Section 13.2.1: Paved Roads*. Primary control is paving of areas of routine vehicle traffic, and speed controls to limit vehicle speeds to less than 15 mph.

Regarding emissions from FCCU catalyst handling were estimated based on experience and best practices for these operations and considering catalyst to flow from the control device hopper and deliver it to enclosed bins for storage pending off-site disposal. The particulate matter generated by the displacement of air within the bin as it fills is controlled by a filter bag (sock).

6. BASE CASE EMISSIONS INVENTORY

In the base case emissions inventory, emission factors that consider air pollution control systems were used, as applicable, only when these controls were inherent part of the equipment design (i.e. Ultra Low NOx Burners, IFR tank design, etc.). A summary of the base case emissions inventory for the proposed Davis Refinery is presented in Table 2.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 26 **OF** 64	

Table 2: Base Case Emissions Inventory Summary for Davis Refinery

	Criteria Pollutants										HAPs
Emissions Unit	CO	Pb	PM<10	Filerable PM <10	PM <2.5	Filterable PM <2.5	Condensable PM	NO_X (as NO_2)	SO_2	VOC	Total HAPs
Leaks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	243.72	40.35
Tanks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.79	14.95
Stationary Combustion Sources	91.42	1.60E-03	13.06	3.26	13.06	3.26	9.79	97.95	1.92	17.61	6.41
Fluid Catalytic Cracking Unit	0.00	2.03E-03	50.14	33.16	45.65	28.67	16.98	186.28	664.88	577.20	5.39
Catalytic Reforming Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.79
Sulfur Recovery Plant	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.20	1.50	0.00
Vacuum Systems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blowdown System	0.83	0.00	0.01	0.01	0.01	0.01	0.00	3.66	5.20	0.15	0.00
Flares	0.25	4.38E-06	0.04	0.01	0.04	0.01	0.03	0.27	0.005	0.05	0.00
Wastewater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	210.41	23.28
Cooling Towers	0.00	0.00	24.83	0.00	0.00	0.00	0.00	0.00	0.00	4.73	0.00
Rail Product Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,713.49	0.00
Truck Product Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	366.76	0.00
Fugitive Dust	0.00	0.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (STPY)	**94.65**	**0.004**	**89.40**	**36.44**	**58.75**	**31.95**	**26.80**	**288.62**	**672.20**	**3,157.45**	**91.17**

Meridian Energy Group Inc.	EMISSIONS INVENTORY	VEPICA CODE: P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 DATE: 09/23/16	
		SHEET: 27 OF 64	

7. PROPOSED DAVIS REFINERY POTENTIAL TO EMIT

A Controls Technology Review was conducted as part of determining the proposed Davis Refinery "Potential to Emit", as defined in North Dakota's Air Pollution Control Rules (NDAC 33-15-14-06).

This review generally followed Best Available Control Technology (BACT) methods for identification of proposed controls and included a pollutant-by-pollutant analysis of technically feasible available control technologies that can be implemented for each emission unit. Based on the estimated controlled emissions for the facility, the source qualifies as a synthetic minor source under North Dakota Air Quality regulations, and therefore, a formal BACT analysis was not completed. The results of the Controls Technology Review is detailed in Exhibit C of the Permit Application, and a summary of the selected controls is listed in Table 3 below.

The proposed Davis Refinery "Potential to Emit", under its physical and operational design and including the effect of add-on pollution control equipment, was calculated utilizing the same methodologies as in the "Base Case" or "uncontrolled" Emissions Inventory, this time applying the reduction efficiencies of the selected add-on control technologies. Table 4 summarizes the "Potential to Emit" of the proposed Davis Refinery.

Table 3: Summary of Proposed Control Technology for the Davis Refinery

Source/Unit	Target Pollutant	Pollution Control Technologies Used	Assumed % Control
Leaks (Fugitive Emissions)	VOC	LDAR (Leak, Detection and Repair) program with 500 ppmv leak definition, and including differential light absorption and ranging (DIAL) or optical gas imaging (OGI) technology	97% valves, 93% pumps, 97% flanges, 97% sample points, (30% heavies). Program baseline/ screen value of 500 ppm
Tanks	VOC	Double Seal and Wipers on IFR Tanks (NESHAP std). Vapor Recovery to product recycle on select fixed roof tanks	95%
Stationary Combustion Sources (Heater and Boilers)	CO NOx VOC/HAPs PM SO2	CO – Best Comb. Practices w/ Ultra Low NOx Burners NOx – SCR's w/ Ultra Low NOx Burners VOC / HAPs – Best Comb. Practices with Ultra Low NOx Burners PM – Venturi Scrubbers on larger heaters	CO – 96% NOx – 75% VOCs / HAPs – 75%
FCC Regeneration Vent	CO NOx SO2	CO– Best Comb. Practices / complete carbon burn regenerator design NOx – COP-NP Combustion Promotor OR Tri-Mer SO2 – Wet Scrubber OR Dri-Sorb Catalyst	CO – 100% NOx – 98% SO_2 – 99%
Catalytic Reforming Unit	HAPs	NA – minor emissions levels	NA
Sulfur Recovery Plants	SO_2	Lo-CAT with tail gas treatment (thermal oxidizer) Other pollutants are considered minor	SO_2 - 99.9%
Blowdown System	CO NOx SO_2	Vapor recovery to product capture and emergency flaring only for upsets	99.8%
Flares	CO NOx VOC HAPs	Lower heating value of feed gases, requirements specified by EPA and NDDoH regulations. Flares will only be used during upset conditions.	98% +
Wastewater Treatment System	VOC/HAPs	Covered API/CPI oil/water separators and induced/dissolved air flotation units. Equalization tanks instead of open ponds. Vapor Recovery System	VOC – 95% HAPs – 55%
Cooling Towers	PM VOC	PM10 – drift eliminators VOC – periodic monitoring of flows for VOC's hydrocarbons	Controls are inherent in design for cooling tower for PM10 and are part water level monitoring for VOCs
Product Loading	VOC	Vapor recovery to product recycle with upsets to emergency flares	98%
Fugitive (on-site vehicular) emissions	PM	Paving of areas of routine vehicle traffic. Maintain vehicle speeds to < 15 mph	$PM_{2.5}$ - 0.00054 lb/vmt PM_{10} - 0.0022 lb/vmt Silt load = 2.15E-02
Spent Catalyst	PM	De-minimus	NA – de-minimus

Taken from report N° P-5715043-01-001-18035-I001. EMISSIONS INVENTORY – CONTROLS TECHNOLOGY REVIEW FOR DAVIS REFINERY. VEPICA, 2016.

Meridian Energy Group Inc.	EMISSIONS INVENTORY	VEPICA CODE: P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 DATE: 09/23/16	
		SHEET: 29 OF 64	

Table 4: Summary of proposed Davis Refinery "Potential to Emit"

	Criteria Pollutants										HAPs
Emissions Unit	CO	Pb	PM<10	Filerable PM <10	PM <2.5	Filterable PM <2.5	Condensable PM	NO_X (as NO_2)	SO_2	VOC	Total HAPs
Leaks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.06	2.39
Tanks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.17	4.48
Stationary Combustion Sources	91.42	1.60E-03	8.00	2.00	8.00	2.00	6.00	46.40	1.92	17.61	1.62
Fluid Catalytic Cracking Unit	0.00	2.03E-05	1.00	0.66	0.91	0.57	0.34	3.73	6.65	5.77	0.87
Catalytic Reforming Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.79
Sulfur Recovery Plant	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.20	1.50	0.00
Vacuum Systems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blowdown System	0.83	0.00	0.01	0.01	0.01	0.01	0.00	3.66	5.20	0.15	0.00
Flares	0.25	4.38E-06	0.04	0.01	0.04	0.01	0.03	0.27	0.005	0.05	0.00
Wastewater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	0.52
Cooling Towers	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00
Rail Product Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.81	0.00
Truck Product Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00
Fugitive Dust	0.00	0.00	1.33	0.00	5.65E-04	0.00	0.00	0.00	0.00	0.00	0.00
Total (STPY)	**94.65**	**1.62E-03**	**12.24**	**2.68**	**8.96**	**2.59**	**6.37**	**54.53**	**13.97**	**69.78**	**10.67**

8. REFERENCES

- Vendor information, Engineering Documentation and Process calculations from VEPICA.
- Letcher, T.; Vallero, D. 2011. Waste: A Handbook for Management. Academic Press.
- RTI International, 2015. Emissions Estimation Protocol for Petroleum Refineries, Version 3. April 2015. Submitted to U.S. EPA Office of Air Quality Planning and Standards
- U.S. EPA (Environmental Protection Agency). 1995a. Compilation of Air Pollutant Emission Factors. Volume 1: Stationary Point and Area Sources. AP-42, Fifth Edition. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

9. APPENDIXES

APPENDIX 1: Results for Equipment Leaks

APPENDIX 2: Results for Storage Tanks

APPENDIX 3: Results for Stationary Combustion

APPENDIX 4: Results for Process Vents

APPENDIX 5: Results for Flares

APPENDIX 6: Results for Wastewater Treatment Systems

APPENDIX 7: Results for Cooling Towers

APPENDIX 8: Results for Product Loading

APPENDIX 9: Results for Fugitive Dust

APPENDIX 1: Results for Equipment Leaks

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 32 **OF** 64	

Table A1-1 - Number of Equipment per Unit (Average for a large refinery) [(a)]

		Number of Equipments (Average for a large refinery)								
	Median Equipments Leak Components Count*	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillation	Isomerization
Valves	Gas	204	192	310	224	277	75	100	229	164
	Light Liquid	440	597	383	253	282	419	125	108	300
	Heavy Liquid	498	0	84	200	445	186	110	447	78
Pumps	Light Liquid	15	21	12	7	12	10	8	2	9
	Heavy Liquid	14	0	2	6	12	10	3	12	5
	Compressors	2	2	3	2	2	2	1	1	2
Pressure Relief Valves	Gas	7	13	8	9	11	9	4	5	15
Flanges	Gas	549	491	653	439	593	227	280	473	300
	Light Liquid	982	1,328	842	581	747	664	460	136	540
	Heavy Liquid	1,046	600	132	481	890	473	179	1,072	265
	Open-Ended Lines	75	35	48	49	59	24	22	0	36
	Sampling Connections	9	6	9	8	15	8	7	7	7

[(a)] Adapted from Table 2-5 *Median Equipment Leak Component Counts for Large Model Processes* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015).

		SHEET: 33 **OF** 64	

Table A1-2 – Controlled Emissions from Leaking Equipment

ipment onents *	LDAR Program*	Emission Factor Definition**			Controlled Leak Emissions (VOC) in lb/h						
	Yes	Screening Value (ppmv)	Emission Factor (Kg/h)***	Emission Factor (lb/h)***	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant
	97%	500	2.36E-04	5.21E-04	3.19E-03	3.00E-03	4.85E-03	3.50E-03	4.33E-03	1.17E-03	1.56E-03
uid	97%	500	2.36E-04	5.21E-04	6.88E-03	9.33E-03	5.99E-03	3.95E-03	4.41E-03	6.55E-03	1.95E-03
quid	0%	500	2.36E-04	5.21E-04	2.59E-01	0.00E+00	4.38E-02	1.04E-01	2.32E-01	9.69E-02	5.73E-02
uid	85%	500	2.23E-03	4.92E-03	1.11E-02	1.55E-02	8.85E-03	5.16E-03	8.85E-03	7.37E-03	5.90E-03
quid	85%	500	2.23E-03	4.92E-03	1.03E-02	0.00E+00	1.47E-03	4.42E-03	8.85E-03	7.37E-03	2.21E-03
sors	85%	10,000	7.30E-02	1.61E-01	4.83E-02	4.83E-02	7.25E-02	4.83E-02	4.83E-02	4.83E-02	2.42E-02
	97%	500	2.36E-04	5.21E-04	1.09E-04	2.03E-04	1.25E-04	1.41E-04	1.72E-04	1.41E-04	6.25E-05
	97%	500	3.64E-04	8.03E-04	1.32E-02	1.18E-02	1.57E-02	1.06E-02	1.43E-02	5.47E-03	6.74E-03
uid	97%	500	3.64E-04	8.03E-04	2.37E-02	3.20E-02	2.03E-02	1.40E-02	1.80E-02	1.60E-02	1.11E-02
quid	30%	500	3.64E-04	8.03E-04	5.88E-01	3.37E-01	7.42E-02	2.70E-01	5.00E-01	2.66E-01	1.01E-01
d Lines	97%	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
nections	97%	500	5.29E-04	1.17E-03	3.15E-04	2.10E-04	3.15E-04	2.80E-04	5.25E-04	2.80E-04	2.45E-04
			Total (lb/h)		0.96	0.46	0.25	0.46	0.84	0.46	0.21
			Total Controlled (STPY)		4.22	2.00	1.09	2.04	3.68	1.99	0.93
			Total Controlled (STPY)		**21.06**	Total VOC Controlled TPY					
			Total Controlled (lb/h)		**4.81**	Total VOC Controlled (lb/h)					

cing fugitive emissions equivalent to those achievable under the TCEQ 28LAER. LDAR assumes automated monitoring/directed maintenance
73%
for Petroleum and SOCMI Equipment Components. of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015)
ion), based in a threshold of 500 ppmv for leak detection, with automated corrective action, and pegged emission factor for 10,000 ppm SV....

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 34 **OF** 64	

Table A1-2 – Controlled Speciated VOC HAPs Emissions from Leaking Equipment

	Average Weight Percent of Compound in Process Unit Streams[1]								
HAPs	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillation	Isomerization
1,3-Butadiene	0.01	0.22	0.009		0.012				
n-Hexane	4.3	1.6	2.8	1.9	1.0			0.01	3.2
2,2,4-Trimethyl pentane	0.05	25	0.25		0.3			0.003	0.01
Benzene	0.9	0.03	6.3	0.37	1.0			0.003	0.5
Toluene	1.7	2.0	17.4	1.7	3.3			0.04	0.6
Xylenes (total)	2.0	0.08	17.6	1.9	4.9			0.04	0.15
Ethylbenzene	0.63		3.9	0.37	1.1			0.02	
Cumene	0.12		0.42	0.07	0.10				
1,2,4-trimethyl benzene	0.63		5.9	0.4	1.9			0.02	
Naphthalene	0.25		0.87	0.25	0.72			0.12	
Biphenyl	0.06			0.22	0.43			0.09	

1 - Table 2-7. Concentration of HAP in Refinery Process Unit Streams, Emissions Estimation Protocol for Petroleum Refineries, Version 3, RTI International.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 35 **OF** 64	

Table A1-2 – Controlled Speciated VOC HAPs Emissions from Leaking Equipment (Cont.)

	Controlled Leak Emissions (HAP) in STPY									
HAPs	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreat/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillation	Isomerization	Total HAPs Controlled (STPY)
1,3-Butadiene	4.22E-04	4.41E-03	9.78E-05	0.00E+00	4.41E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.37E-03
n-Hexane	1.82E-01	3.21E-02	3.04E-02	3.87E-02	3.68E-02	0.00E+00	0.00E+00	3.90E-04	3.87E-02	3.59E-01
2,2,4-Trimethyl pentane	2.11E-03	5.01E-01	2.72E-03	0.00E+00	1.10E-02	0.00E+00	0.00E+00	1.17E-04	1.21E-04	5.17E-01
Benzene	3.80E-02	6.01E-04	6.84E-02	7.53E-03	3.68E-02	0.00E+00	0.00E+00	1.17E-04	6.05E-03	1.58E-01
Toluene	7.18E-02	4.01E-02	1.89E-01	3.46E-02	1.21E-01	0.00E+00	0.00E+00	1.56E-03	7.26E-03	4.66E-01
Xylenes (total)	8.45E-02	1.60E-03	1.91E-01	3.87E-02	1.80E-01	0.00E+00	0.00E+00	1.56E-03	1.81E-03	5.00E-01
Ethylbenzene	2.66E-02	0.00E+00	4.24E-02	7.53E-03	4.05E-02	0.00E+00	0.00E+00	7.80E-04	0.00E+00	1.18E-01
Cumene	5.07E-03	0.00E+00	4.56E-03	1.43E-03	3.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-02
1,2,4-trimethyl benzene	2.66E-02	0.00E+00	6.41E-02	8.15E-03	6.99E-02	0.00E+00	0.00E+00	7.80E-04	0.00E+00	1.70E-01
Naphthalene	1.06E-02	0.00E+00	9.45E-03	5.09E-03	2.65E-02	0.00E+00	0.00E+00	4.68E-03	0.00E+00	5.63E-02
Biphenyl	2.53E-03	0.00E+00	0.00E+00	4.48E-03	1.58E-02	0.00E+00	0.00E+00	3.51E-03	0.00E+00	2.63E-02
	0.45	0.58	0.60	0.15	0.54	0.00	0.00	0.01	0.05	**2.39**

APPENDIX 2: Results for Storage Tanks

Table A2-1 – Controlled VOC Emissions from Petroleum Refinery Storage Tanks

	Qty.	Roof Type ->	Emissions per Tank (pounds/year)				Emissions per Tank (STPY)			Total VOC Tank Em	
			IFR / External Self Supporting Roof[1]	Fixed Cone Uncontrolled Emissions	Fixed Cone Not Connected to VRU	Fixed Cone connected to VRU[2]	Self-Supported & Gasketed Penetrations	Fixed Cone not connected to VRU	Fixed Cone connected to VRU	Self-Supported & Gasketed Penetrations	Fixed Co connect VRU
	3.00	115 ID X 60	2,449.39				1.22			3.67	
	1.00	88 ID X 60	345.61				0.17			0.17	
	3.00	88 ID X 60	1,047.99				0.52			1.57	
	2.00	63 ID X 60	518.55				0.26			0.52	
	2.00	63 ID X 60	840.74				0.42			0.84	
	2.00	63 ID X 60	749.26				0.37			0.75	
	2.00	63 ID X 60	548.95				0.27			0.55	
	2.00	63 ID X 60	225.38				0.11			0.23	
	2.00	88 ID X 60		1,392.64		69.63			0.03		
L	2.00	63 ID X 60		751.10		37.56			0.02		
	2.00	63 ID X 60		8.64	8.64			0.00			8.64E
JCT	1.00	63 ID X 60		326.64	326.64			0.16			1.63E
	2.00	88 ID X 60		8.25	8.25			0.004			8.25E
	1.00	25 ID X 30		22,281.90		1,114.10			0.56		
	1.00	25 ID X 30		54.65	54.65			0.03			2.73E
										8.30	**0.2**

d penetrations - External Self-Supporting Roof, double seals and wipers, all gasketed tank fittings and fixed floating roof legs.

PA Tanks 4.09d modeled runs.

Table A2-2 – Controlled HAPs Emissions from Petroleum Refinery Storage Tanks

Emissions Factors for Petroleum Liquid Storage Tanks (lb/MMbbl)*			Emissions (lb/h)			STPY (Uncontrolled)			Control Efficiencies***			STPY (Con		
Crude Oil	Gasoline and Other Light Distillates	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates**	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates	Diese and Mi Disti
0	3.5	3.5	0.00E+00	4.81E-03	3.21E-03	0.00	2.11E-02	1.41E-02	60%	60%	95%	0.00E+00	0.008	0.0
0	0.24	0.24	0.00E+00	3.30E-04	2.20E-04	0.00	1.45E-03	9.64E-04	60%	60%	95%	0.00E+00	0.001	0.0
10	70	54	2.29E-02	9.63E-02	4.95E-02	0.10	4.22E-01	2.17E-01	60%	60%	95%	4.02E-02	0.169	0.0
0.2	0.17	0	4.58E-04	2.34E-04	0.00E+00	0.00	1.02E-03	0.00E+00	60%	60%	95%	8.03E-04	0.000	0.0
0	0.21	0.21	0.00E+00	2.89E-04	1.93E-04	0.00	1.26E-03	8.43E-04	60%	60%	95%	0.00E+00	0.001	0.0
0.6	13	0.19	1.38E-03	1.79E-02	1.74E-04	0.01	7.83E-02	7.63E-04	60%	60%	95%	2.41E-03	0.031	0.0
0.5	15	10	1.15E-03	2.06E-02	9.17E-03	0.01	9.03E-02	4.02E-02	60%	60%	95%	2.01E-03	0.036	0.0
1.6	31	18	3.67E-03	4.26E-02	1.65E-02	0.02	1.87E-01	7.23E-02	60%	60%	95%	6.42E-03	0.075	0.0
0	0.36	0.36	0.00E+00	4.95E-04	3.30E-04	0.00	2.17E-03	1.45E-03	60%	60%	95%	0.00E+00	0.001	0.0
84	420	480	1.93E-01	5.78E-01	4.40E-01	0.84	2.53E+00	1.93E+00	60%	60%	95%	3.37E-01	1.012	0.0
0	3.8	3.8	0.00E+00	5.23E-03	3.48E-03	0.00	2.29E-02	1.53E-02	60%	60%	95%	0.00E+00	0.009	0.0
0	320	320	0.00E+00	4.40E-01	2.93E-01	0.00	1.93E+00	1.28E+00	60%	60%	95%	0.00E+00	0.771	0.0
0	310	0	0.00E+00	4.26E-01	0.00E+00	0.00	1.87E+00	0.00E+00	60%	60%	95%	0.00E+00	0.747	0.0
0.6	7.6	4	1.38E-03	1.05E-02	3.67E-03	0.01	4.58E-02	1.61E-02	60%	60%	95%	2.41E-03	0.018	0.0
0	1.5	1.5	0.00E+00	2.06E-03	1.38E-03	0.00	9.03E-03	6.02E-03	60%	60%	95%	0.00E+00	0.004	0.0
0.9	0.9	0.67	2.06E-03	1.24E-03	6.14E-04	0.01	5.42E-03	2.69E-03	60%	60%	95%	3.61E-03	0.002	0.0
0	0.39	0.39	0.00E+00	5.36E-04	3.58E-04	0.00	2.35E-03	1.57E-03	60%	60%	95%	0.00E+00	0.001	0.0
0	66	0	0.00E+00	9.08E-02	0.00E+00	0.00	3.97E-01	0.00E+00	60%	60%	95%	0.00E+00	0.159	0.0
7.5	180	100	1.72E-02	2.48E-01	9.17E-02	0.08	1.08E+00	4.02E-01	60%	60%	95%	3.01E-02	0.434	0.0
6.2	140	70	1.42E-02	1.93E-01	6.42E-02	0.06	8.43E-01	2.81E-01	60%	60%	95%	2.49E-02	0.337	0.0
			Total Hazardous Air Pollutants (HAP), Uncontrolled			**1.13**	**9.54**	**4.28**	**Total Hazardous Air Pollutants (HAP), Controlled**			**0.45**	**3.82**	**0.**

ons Factors for Petroleum Refinery Storage Tanks of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015).

distillates production as a fraction of crude oil processing capacity, subtracting the production of heavy distillates and aromatics. In the case of Davis Refinery, such production is zero, then: Gasoline a
s, butane) is considered to be up to 60% of crude oil processing rate, and, Diesel Fuel and Other Middle Distillates (diesel, kerosenes, jet fuel, fuel oil), is considered to be up to 40% of crude oil proce

Vapor Recovery Systems 95% VRU + thermal destruction / thermal destruction achieved via flaring, use as fuel gas or thermal oxidizer.

APPENDIX 3: Results for Stationary Combustion

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 40 **OF** 64	

Table A3-1 – Summary of Controlled Emissions from Stationary Combustion Sources (Heaters/Boilers) – See detailed calculations in next Appendix

Emissions Summary	CO	Pb	PM Total 2.5	Filterable PM2.5	Condensable PM	NOx	SO_2	VOC	Metal HAP	Total Organic HAP
Heaters	87.918	1.54E-03	7.50	1.88	5.63	42.65	1.847	16.93	0.020	1.33
Boilers	3.500	6.13E-05	0.50	0.13	0.38	3.75	0.074	0.67	0.004	0.27
Total STPY	**91.42**	**1.60E-03**	**8.00**	**2.00**	**6.00**	**46.40**	**1.92**	**17.61**	**0.024**	**1.60**
Total lb/h	**20.87**	**3.65E-04**	**1.83**	**0.46**	**1.37**	**10.59**	**0.44**	**4.02**	**0.005**	**0.36**

Table A3-2 Emissions from Stationary Combustion Sources (Internal Combustion Engines)

			EMERGENCY GENERATOR SET						
			216-EG-1601A		216-EG-1601B		216-EG-1601C		
Criteria Pollutants	Emission Factor		Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Total Emissions Gen Set (STPY)
	lb/HP-hr	lb/MMBTU							
Carbon Monoxide	0.0055		25.8	1.29	25.8	1.3	25.8	1.3	3.87
PM	0.0007		3.29	0.16	3.29	0.16	3.29	0.16	0.49
PM 10 (Total)		0.0573	3.32	0.17	3.3	0.2	3.3	0.2	4.98E-01
PM 10 (Filterable)		0.0496	2.87	0.14	2.9	0.1	2.9	0.1	4.31E-01
PM 2.5 (Total)		0.0479	2.78	0.14	2.8	0.1	2.8	0.1	4.16E-01
PM 2.5(Filterable)		0.0479	2.78	0.14	2.8	0.1	2.8	0.1	4.16E-01
PM (Condensable)		0.0077	0.45	0.02	0.4	0.0	0.4	0.0	6.69E-02
NOx*	0.013		61.0	3.05	61.0	3.1	61.0	3.1	9.15
SOx	4.05E-06		1.90E-02	9.49E-04	1.90E-02	9.49E-04	1.90E-02	9.49E-04	2.85E-03
TOC (as VOC)	7.05E-04		3.31	0.17	3.31	0.17	3.31	0.17	4.96E-01
Org HAP (Total)			2.53E-01	1.26E-02	2.53E-01	1.26E-02	2.53E-01	1.26E-02	3.79E-02

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 41 **OF** 64	

Table A3-2 Emissions from Stationary Combustion Sources (Internal Combustion Engines) Cont.

			FIREWATER PUMPS						
			212-P-1201 A		212-P-1201 B		212-P-1201 C		
Criteria Pollutants	Emission Factor		Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Total Emissions FWP (STPY)
	lb/HP-hr	lb/MMBTU							
Carbon Monoxide	0.0055		3.3	0.17	3.3	0.2	3.3	0.2	0.50
PM	0.0007		0.42	0.02	0.42	0.02	0.42	0.02	0.06
PM 10 (Total)		0.0573	0.26	0.01	0.26	0.01	0.26	0.01	3.93E-02
PM 10 (Filterable)		0.0496	0.23	0.01	0.23	0.01	0.23	0.01	3.40E-02
PM 2.5 (Total)		0.0479	0.22	0.01	0.22	0.01	0.22	0.01	3.28E-02
PM 2.5(Filterable)		0.0479	0.22	0.01	0.22	0.01	0.22	0.01	3.28E-02
PM (Condensable)		0.0077	0.04	0.00	0.04	0.00	0.04	0.00	5.28E-03
NOx*	0.013		7.8	0.39	7.80	0.39	7.80	0.39	1.17
SOx	4.05E-06		2.43E-03	1.21E-04	2.43E-03	1.21E-04	2.43E-03	1.21E-04	3.64E-04
TOC (as VOC)	7.05E-04		0.42	0.02	0.42	0.02	0.42	0.02	6.35E-02
Org HAP (Total)			1.99E-02	9.97E-04	1.99E-02	9.97E-04	1.99E-02	9.97E-04	2.99E-03

*Controlled by ignition timing retard.
"From AP-42 Chapter 3 Section 3.4. Large Stationary Diesel And All Stationary Dual-fuel Engines. Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES and Table 3.4-2. PARTICULATE AND PARTICLE-SIZING EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES"

Table A3-3 HAPs Emissions from Stationary Combustion Sources (Internal Combustion Engines)

		EMERGENCY GENERATOR SETx3		FIREWATER PUMPSx3	
Volatile HAPS	lb/MMBTU	lb/hr	Emission (STPY)	lb/hr	Emission (STPY)
Benzene	7.76E-04	1.35E-01	6.75E-03	1.06E-02	5.32E-04
Toluene	2.81E-04	4.89E-02	2.44E-03	3.85E-03	1.93E-04
Xylene	1.93E-04	3.36E-02	1.68E-03	2.64E-03	1.32E-04
Propylene	2.79E-03	4.85E-01	2.43E-02	3.82E-02	1.91E-03
Formaldehyde	7.89E-05	1.37E-02	6.86E-04	1.08E-03	5.41E-05
Acetaldehyde	2.52E-05	4.38E-03	2.19E-04	3.45E-04	1.73E-05
Acrolein	7.88E-06	1.37E-03	6.85E-05	1.08E-04	5.40E-06
TOTAL VOLATILE HAPS		**7.22E-01**	**3.61E-02**	**5.69E-02**	**2.84E-03**
PAHs					
Naphthalene	1.30E-04	2.26E-02	1.13E-03	1.78E-03	8.91E-05
Acenaphthylene	9.23E-06	1.61E-03	8.03E-05	1.26E-04	6.32E-06
Acenaphthene	4.68E-06	8.14E-04	4.07E-05	6.41E-05	3.21E-06
Fluorene	1.28E-05	2.23E-03	1.11E-04	1.75E-04	8.77E-06
Phenanthrene	4.08E-05	7.09E-03	3.55E-04	5.59E-04	2.80E-05
Anthracene	1.23E-06	2.14E-04	1.07E-05	1.69E-05	8.43E-07
Fluoranthene	4.03E-06	7.01E-04	3.50E-05	5.52E-05	2.76E-06
Pyrene	3.71E-06	6.45E-04	3.23E-05	5.08E-05	2.54E-06
Benz(a)anthracene	6.22E-07	1.08E-04	5.41E-06	8.52E-06	4.26E-07
Chrysene	1.53E-06	2.66E-04	1.33E-05	2.10E-05	1.05E-06
Benzo(b)fluoranthene	1.11E-06	1.93E-04	9.65E-06	1.52E-05	7.61E-07
Benzo(k)fluoranthene	2.18E-07	3.79E-05	1.90E-06	2.99E-06	1.49E-07
Benzo(a)pyrene	2.57E-07	4.47E-05	2.23E-06	3.52E-06	1.76E-07
Indeno(1,2,3-cd)pyrene	4.14E-07	7.20E-05	3.60E-06	5.67E-06	2.84E-07
Dibenz(a,h)anthracene	3.46E-07	6.02E-05	3.01E-06	4.74E-06	2.37E-07
Benzo(g,h,I)perylene	5.56E-07	9.67E-05	4.83E-06	7.62E-06	3.81E-07
TOTAL PAH	**2.12E-04**	**3.69E-02**	**1.84E-03**	**2.91E-03**	**1.45E-04**

"From AP-42 Chapter 3 Section 3.4. Large Stationary Diesel And All Stationary Dual-fuel Engines. Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE, UNCONTROLLED STATIONARY DIESEL ENGINES and Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES"

APPENDIX 4: Results for Process Vents

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 44 **OF** 64	

Table A4-1 – Summary of Controlled Emissions from the Fluid Catalytic Cracking Unit[(a)]

	Uncontrolled			Controlled			
Criteria Pollutants	Emission Factors (lb/Mbbl Fresh Feed)	Emissions (lb/h) Uncontrolled	Emission (STPY) Uncontrolled	Contol Device	Control %	Emissions (lb/h) Controlled	Emission (STPY) Controlled
CO*	0	0	0	BCP	100%	0	0
Lead (Ratio to Nickel Conc.)	0.08	4.63E-04	2.03E-03	BCP	99%	4.63E-06	2.03E-05
PM10 Primary	-	11.448	50.1	Wet Scrubber or Tri-Mer	98.0%	0.229	1.003
PM condensable	-	3.876	17.0	Wet Scrubber or Tri-Mer	98.0%	0.078	0.340
PM2.5 filterable	-	6.55	28.7	Wet Scrubber or Tri-Mer	98.0%	0.131	0.573
PM2.5 Primary	-	10.42	45.7	Wet Scrubber or Tri-Mer	98.0%	0.208	0.913
PM10 filterable	-	7.572	33.2	Wet Scrubber or Tri-Mer	98.0%	0.151	0.663
NOx	71	42.53	186.3	COP-NP or Tri-Mer	98%	0.851	3.73
SO_2	***	151.80	664.9	Wet Scrubber or Dry Sorbent	99%	1.52	6.65
VOC**	220	131.78	577.2	Flue Gas Recirculation	99%	1.32	5.77
Total HAP [(b)]	-	4.85	5.39	BCP		2.70E-01	0.87

* Based on FCCU regenerator design for complete carbon burn operation

** Based on FCCU flue gas capture and recirculation design for complete combustion

*** Based on FCCU Licensor Data

BCP - Best Combustion Practices

COP-NP - Non-Platinum CO combustion promoter

[(a)] All calculations are based on Table 5-4 *Organic HAP Emissions Factors for CCU Catalyst Regenerator Vent* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015), unless noted otherwise.

[(b)] Metal HAPs were calculated using the Equation 5-1 and Table 5-3 of the RTI Emissions Estimation Protocol. HCN emissions considered to be emitted only in startup and shutdown operations, which means a factor of 200 hours/year.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 45 **OF** 64	

Table A4-2 – Emissions from the Catalytic Reforming Units (Reformers) [(a)]

		Reformer #2		Reformer #1	
	Emissions Factor (lb/Mbbl fresh feed)	Emission (lb/h)	Emission (US TPY)	Emission (lb/h)	Emission (US TPY)
Dioxins/PCBs					
Dioxin toxic equivalents (TEQ)	5.70E-09	9.41E-10	**3.16E-10**	2.08E-09	**7.00E-10**
Total polychlorinated biphenyls	2.60E-06	4.29E-07	**1.44E-07**	9.49E-07	**3.19E-07**
SV-NV Organic HAPs					
Naphthalene	3.50E-05	5.78E-06	1.94E-06	1.28E-05	4.30E-06
2-Methylnaphthalene	1.30E-06	2.15E-07	7.21E-08	4.75E-07	1.60E-07
Acenaphthylene	3.00E-08	4.95E-09	1.66E-09	1.10E-08	3.68E-09
Acenaphthene	4.30E-08	7.10E-09	2.39E-09	1.57E-08	5.28E-09
Fluorene	2.00E-07	3.30E-08	1.11E-08	7.30E-08	2.46E-08
Phenanthrene	6.10E-07	1.01E-07	3.38E-08	2.23E-07	7.49E-08
Anthracene	9.10E-08	1.50E-08	5.05E-09	3.32E-08	1.12E-08
Fluoranthene	1.00E-07	1.65E-08	5.55E-09	3.65E-08	1.23E-08
Pyrene	1.50E-08	2.48E-09	8.32E-10	5.48E-09	1.84E-09
Benzo(a)anthracene	9.00E-10	1.49E-10	4.99E-11	3.29E-10	1.10E-10
Benzo(b)fluoranthene	1.50E-09	2.48E-10	8.32E-11	5.48E-10	1.84E-10
Benzo(k)fluoranthene	7.50E-10	1.24E-10	4.16E-11	2.74E-10	9.21E-11
Benzo(e)pyrene	2.90E-09	4.79E-10	1.61E-10	1.06E-09	3.56E-10
Benzo(g,h,i)perylene	4.00E-09	6.60E-10	2.22E-10	1.46E-09	4.91E-10
Chrysene	2.90E-09	4.79E-10	1.61E-10	1.06E-09	3.56E-10
Dibenzo(a,h)anthracene	7.80E-10	1.29E-10	4.33E-11	2.85E-10	9.57E-11
Indeno(1,2,3-c,d)pyrene	1.70E-09	2.81E-10	9.43E-11	6.21E-10	2.09E-10
Total SV-NV Organic HAPs			**2.07E-06**		**4.59E-06**

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 46 **OF** 64	

		Reformer #2		Reformer #1	
	Emissions Factor (lb/Mbbl fresh feed)	Emission (lb/h)	Emission (US TPY)	Emission (lb/h)	Emission (US TPY)
Volatile Organics					
Benzene	0.004	6.60E-04	2.22E-04	1.46E-03	4.91E-04
Toluene	0.0096	1.58E-03	5.33E-04	3.50E-03	1.18E-03
Xylene	0.007	1.16E-03	3.88E-04	2.56E-03	8.59E-04
THC (Total Hydrocarbons)*	0.24	3.96E-02	**1.33E-02**	8.76E-02	**2.94E-02**
Other Inorganic HAPs					
Hydrogen chloride**	4.2	0.69	2.33E-01	1.53	5.16E-01
Chlorine**	0.23	0.04	1.28E-02	8.40E-02	2.82E-02
Total Inorganic HAPs		0.73	**2.47E-01**	1.62	**5.46E-01**

[(a)] All calculations are based on Table 5-6 *Emissions Factors for CRU Catalyst Regeneration Vent* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015), unless noted otherwise.

*Total hydrocarbons may be used as a surrogate for VOC. Total hydrocarbons are presented on an as propane basis.

**Emissions factor for uncontrolled coke burn vent.

Meridian Energy Group Inc.	EMISSIONS INVENTORY	VEPICA CODE: P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 DATE: 09/23/16	
		SHEET: 47 OF 64	

Table A4-3 –Controlled Emissions from Sulfur Recovery Unit (SRU) + Thermal Oxidizer [a]

SRU UNIT: LO-CAT ® (licensed by MERICHEM)			LTPD	10.14
Capacity (MMSCFD)	9.4			
Operating hours/year	8,760			
Number of Vents:	2			
to be directed to a Thermal Oxidizer				
Molar Flow combined	597.6	lbmol/h		
STD Vapor Volumetric Flow Combined	5.442	MMSCFD		
Component	Combined Mole%	Molar Flow (lbmol/h)		
H2	0.1722	1.0292		
C1	0.4742	2.8335		
Ethylene	0.3566	2.1310		
C2	0.4245	2.5370		
C3	0.1750	1.0456		
iC4	0.0295	0.1765		
nC4	0.0843	0.5040		
H2S	1.17E-06	0.0007	1.13	ppmv
CO2	0.0000	0.0000		
H2O	14.3990	86.0485		
O2	15.9311	95.2045		
N2	67.1550	401.3185		
Ar	0.7985	4.7717		
	100.0000	597.6007		
Specifications Thermal Oxidizer				
Duty (MMBTU/h)	1.583			
VOC Destruction (%)	99.9			
Flue Gas Component	Molar Flow (lbmol/h)	MW	lb/hr	STPY
C1	0.001	16.04	0.02	0.07
Ethylene	0.003	28.05	0.08	0.35
C2	0.002	30.07	0.06	0.28
C3	0.003	44.1	0.11	0.49
iC4	0.001	58.12	0.06	0.27
nC4	0.000	58.12	0.01	0.04
Sum VOC				**1.50**
SO2	0.0007	64.1	0.04	**0.20**

	Emission Factor *** (lb/MMBtu, LHV basis)	Emission (lb/h)	Emission (US tpy)
Carbon monoxide	0.31	4.91E-01	**2.15E+00**
Nitrogen oxides	0.068	1.08E-01	**4.71E-01**

Emissions Estimation Protocol for Petroleum Refineries, Table 6-2 "Flare Energy Consumption-Based Emission Factors"

[a] Calculations are based on available engineering data from licensor.

Table A4-4 –Emissions from Blowdown System (with vapor recovery and flaring) [(a)]

Compound Name	Emissions Factor (lb/MBbl of refinery feed)*	Emission (lb/h)	Emission (US TPY)
Carbon monoxide	4.3	9.85	0.83
Nitrogen oxides	19	43.54	3.66
Sulfur dioxide	27	61.88	5.20
Total hydrocarbons	0.8	1.83	0.15
SOOT ($PM_{2.5}$-FIL) from Lightly smoking flares (2)	0.027	0.1	0.005

[(a)] Calculations are based on Table 5-12. *Default Emissions Factors for Blowdown Systems* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015).
* This calculation shows how much from the total flare emission, corresponds to the blowdown.

APPENDIX 5: Results for Flares

Table A5-1 –Flare Natural Gas (Fuel Gas)-Based Pilot Emissions

				Emissions (lb/h)							
				EF (lb/MMBTU)*	CO	Pb	PM total	PM COND	PM FILT	NOX	S
	# Pilots	NG Flow/Pilot	NG SCF/h	MMBTU/h	0.0280000	0.0000005	0.0040000	0.0030000	0.0010000	0.0300000	0.000
1	3	100	300	0.306	8.57E-03	1.50E-07	1.22E-03	9.18E-04	3.06E-04	9.18E-03	1.80
2	3	100	300	0.306	8.57E-03	1.50E-07	1.22E-03	9.18E-04	3.06E-04	9.18E-03	1.80
	2	100	200	0.204	5.71E-03	1.00E-07	8.16E-04	6.12E-04	2.04E-04	6.12E-03	1.20
Flare	12	100	1200	1.224	3.43E-02	6.00E-07	4.90E-03	3.67E-03	1.22E-03	3.67E-02	7.20
				Total (lb/h)	**5.71E-02**	**1.00E-06**	**8.16E-03**	**6.12E-03**	**2.04E-03**	**6.12E-02**	**1.20**
				Total (STPY)	**0.25**	**4.38E-06**	**0.04**	**0.03**	**0.01**	**0.27**	**0.0**

d on the TABLE 1.4-2. AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources.

Table A5-2 – Total Flare HAP Emissions [(a)]

Compound	Emission Factor (tons/yr/bbl/cd)	Emission US TPY	Emission (lb/h)
Benzene	9.00E-06	0.495	1.13E-01
Toluene	7.00E-06	0.385	8.79E-02
Xylene	6.00E-06	0.330	7.53E-02
Methyl tertiary-butyl ether	3.00E-06	0.165	3.77E-02
Hexane	1.00E-05	0.550	1.26E-01
Formaldehyde	1.00E-06	0.055	1.26E-02
Ethylbenzene	2.00E-07	0.011	2.51E-03
1,3-Butadiene	7.00E-06	0.385	8.79E-02
Total VOC HAPs TPY		**2.376**	**5.42E-01**

[(a)] Calculations are based on Table 6-4. *Flare General Emission Factors* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015)

APPENDIX 6: Results for Wastewater Treatment Systems

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 52 **OF** 64	

Table A6-1 – Waste Water Flow and Benzene Mass calculation for Petroleum Refinery Wastewater [(a)]

Process Unit	Average Waste Water Flow Factor (gal/bbl)	Average Benzene Concentration (ppmw)	Average Organic HAP Concentration (ppmw)	Average Throughput of the Unit (bbl/cd)	Waste Water Flow (gal/cd)	Uncontrolled Benzene Mass Flow (lb/cd)	Benzene Mass Flow (lb/d) Controlled ***
Crude distillation*	0.05*	21	140	55,000	115,644	20.25	1.013
Alkylation unit	6	3	6.9	5,388	0	0.00	-
Catalytic reforming	1.5	106	238	12,720	0	0.00	-
Hydrotreating/ hydrorefining	2.6	6.3	32	47,418	0	0.00	-
Catalytic cracking	2.4	13	165	14,376	0	0.00	-
Product blending	2.9	24	1,810	32,221	0	0.00	-
Sulfur plant**	9.7	0.8	3.4	11.37	110.28	0.0007	0.000
Isomerization	1.5	33	117	3,362	0	0.00	-
Tank drawdown	0.02	188	840	110,586	2,211.72	3.47	0.173
					Total Benzene Mass (lb/cd)	23.72	1.186

[(a)]Calculations are based on Table 7-8. *Model Process Unit Characteristics for Petroleum Refinery Wastewater* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015)

* Estimated as 5% of the unit throughput (desalter purge)

**This flow factor is given in gal/ton of sulfur

*** Assumes VSEP pretreatment or similar pretreatment of inflow into API (or in lieu of API) 95% Assumed Efficiency

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 53 **OF** 64	

Table A6-2 – Controlled Waste Water Emissions Calculations for Petroleum Refinery Wastewater [a]

	Benzene Mass Ratio [b]	Mass Flow (lb/d)	Mass Fraction Table 7-10 BWON [C]	Emissions (STPY)	Emissions (STPY) Controlled*
Total VOC	81	96.08	0.6	10.52	**10.52**
2,2,4- Trimethylpentane	1.97	2.34	0.55	0.23	**1.06E-01**
Benzene	1	1.19	0.25	0.05	**2.44E-02**
Biphenyl	0.034	0.04	0.031	2.28E-04	**1.03E-04**
Cresols	0.25	0.30	0	0.00E+00	**0.00E+00**
Cumene	0.37	0.44	0.24	0.02	**8.65E-03**
Ethylbenzene	0.88	1.04	0.22	0.04	**1.89E-02**
Hexane	3.5	4.15	0.55	0.42	**1.88E-01**
Methyl tertiary-butyl ether	0.58	0.69	0.091	0.01	**5.14E-03**
Naphthalene	0.29	0.34	0.098	0.01	**2.77E-03**
Phenol	0.18	0.21	0	0.00	**0.00E+00**
Styrene	0.58	0.69	0.64	0.08	**3.62E-02**
Toluene	3.3	3.91	0.19	0.14	**6.11E-02**
Xylene	3.6	4.27	0.21	0.16	**7.36E-02**
1,3-Butadiene	0.0006	0.00	0.75	0.00	**4.38E-05**
			Total HAP (Uncontrolled)	1.16	
*55% Efficiency by use of activated carbon filters in API Separator			Total HAP (Controlled)	0.52	

[a] Calculations are based on Table 7-8. *Model Process Unit Characteristics for Petroleum Refinery Wastewater* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015)

[b] Calculations are based on Table 7-9. *Refinery Wastewater Contaminant Concentrations as a Ratio to Benzene* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015)

[c] Calculations are based on Table 7-10. *Default Mass Emission Factors for Refinery Wastewater Collection and Treatment Systems* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015). **Emission Factors for: BWON-Compliant Wastewater Collection and Treatment System

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 54 **OF** 64	

APPENDIX 7: Results for Cooling Towers

Meridian Energy Group Inc.	EMISSIONS INVENTORY	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 55 **OF** 64	

Table A7-1 – Controlled Emissions from the Cooling Tower Systems [(a)]

Compound	Emission Factor (lbs/MMgal)*	Emission (lb/h)	Emission (US TPY)
VOC	6	8.10E-02	3.55E-01
PM_{10}	31.5	4.25E-01	1.86E+00

[(a)] Calculations are based on Table 8-5. *Methodology Rank 5 Default Emission Factors* of Emissions Estimation Protocol for Petroleum Refineries, Version 3 (RTI, 2015).

* Emission Factors showed correspond only to induced draft, counter flow cooling towers, for a drift factor Water Drift Factor of 625.5 lb/Mgal (0.005% of drift factor for a water loss of 0.075 GPM) . Engineering calculations can yield drift factors considerably lower, to minimize water loss.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 56 **OF** 64	

APPENDIX 8: Results for Product Loading

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 57 **OF** 64	

Table A8-1 – Controlled Emissions from the Rail Product Loading/Unloading Operations [(a)]

Description	EF (lb/Mgal)1	Uncontrolled Emissions (lb/h)	Uncontrolled Emissions (TPY)	Control Device	% Efficiency	Actual Emissions (TPY)	Actual Emissions (lb/h)
Crude oil	2	193	562	NG Assisted Flare or VRU	99.85%	0.83	0.19
Gasoline+butane	5	198	579	NG Assisted Flare or VRU	99.85%	0.86	0.20
Jet Kerosene	0.016	0.2	0.5		0.00%	0.52	0.12
Diesel No. 2	0.014	0.2	0.6		0.00%	0.60	0.14
Fuel Oil No. 6	0.0001	0.001	0.002	None	0%	0.00	0.00
	Totals	391	1,142			**2.81**	**0.64**

[(a)] Calculations are based on Table 5.2-5 AP-42, Fifth Edition, Volume I, Chapter 5: Transportation And Marketing Of Petroleum Liquids.

Table A8-2 – Controlled Emissions from the Truck Product Loading/Unloading Operations [(a)]

Description	EF (lb/Mgal)1	Uncontrolled Emissions (lb/h)	Uncontrolled Emissions (TPY)	Control Device	% Efficiency	Actual Emissions (TPY)	Actual Emissions (lb/h)
Gasoline+butane	5	84	244	NG Assisted Flare or VRU	99.85%	0.4	0.1
Jet Kerosene	0.016	0.1	0.2	None	0%	0.17	0.0
Diesel No. 2	0.014	0.1	0.2	None	0%	0.20	0.0
	Totals	84	245			**0.73**	**0.17**

[(a)] Calculations are based on Table 5.2-5 AP-42, Fifth Edition, Volume I, Chapter 5: Transportation And Marketing Of Petroleum Liquids.

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 58 **OF** 64	

APPENDIX 9: Results for Fugitive Dust

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 59 **OF** 64	

A.9.1. PAVED ROADS DUST

BASIS

It is assumed that crude oil inlet is via rails, not trucking. Also, it is assumed that 25% of liquid products (excep fuel oil) are loaded and transported via trucking; actual emissions might be lower, since in the future more volume may be transported via

Refinery production	bbl/d	gal/d	Notes	Truck Capacity (gallon)	trips/day
Gasoline+butane	9,555	401,321	Including offspec gasoline/naphtha and light slop	10000	40
Jet Kerosene	2,116	88,883		8000	11
Diesel	2,776	116,582	Including offspec diesel/fuel oil	6000	19
LPG	1,500	63,000	Including heavy slop	6000	11
				Total	81

Truck Round Trip Distance/t	0.0379	mile
	5280	feet
		mile
	200	feet traveled

TRUCK LOADING VMT

	81 Trip	0.04 mile	365 day	=	1,120	VMT
	day	Round Trip	year			year
				=	3.07	VMT
						d

Maximum Gross Weight for USDOT tractor trailer

	80000	lb
	40	ton

Average Speed		
	5	mile
		hr
Wet days (Mean)	90	day
P (Value)	2160	hour
N (Value)	8760	hour

TRUCK VMT IN LIMITED ACCESS ROAD

Pollutant	k (lb/VMT)	Silt L (grain/sq ft) [2]	W (ST)	N (hour)	P (hour)	Emission Factor (lb/VMT)
PM 2.5	0.00054	2.15E-02	40	8760	2160	0.001
PM 10	0.0022	2.15E-02	40	8760	2160	0.003

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 60 **OF** 64	

PM 2.5 Emissions									
				0.001 lb	3.07 VMT	d	=	8.47E-05	lb PM 2.5
				VMT	d	24 h			h
			0.001 lb	3.07 VMT	365 day	ton	=	3.71E-04	Ton PM 2.5
			VMT	d	year	2000 lb			Year
	0.001 lb	3.07 VMT	d	h	kg	1000 g	=	1.07E-05	g PM 2.5
	VMT	d	24 h	3600 s	2.206 lb	s			s
PM 10 Emissions									
				0.003 lb	3.07 VMT	d	=	3.45E-04	lb PM TOT
				VMT	d	24 h			h
			0 lb	3.07 VMT	365 day	ton	=	1.51E-03	Ton PM TOT
			VMT	d	year	2000 lb			Year
	0.003lb	3.07 VMT	d	h	kg	1000 g	=	5.37E-04	g PM TOT
	VMT	d	24 h	3600 s	2.206 lb	s			s

Assumption: Silt loading at the lower range of values since the vehicles will not exceed 5 MPH, and will not be involved in heavy braking

EMPLOYEE PARKING VMT

Employees/shift	Shifts	Trips
100	2	200

Employee Round Trip Distance/trip

0.1894	mile	
5280	feet	
	mile	
1000	feet traveled	

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 61 **OF** 64	

Vehicle Miles Traveled

	200 Trip	0.19 mile	365 day	=	13,826	VMT			
	day	Round Trip	year			year			
				=	37.88	VMT			
						d			

Average Gross Weight Vehicle [1]

	3600	lb
	1.8	ton

Average Speed

	5	mile
		hr
Wet days (Mean)	90	day
P (Value)	2160	hour
N (Value)	8760	hour

EMPLOYEE VMT IN LIMITED ACCESS PARKING LOT

Pollutant	k (lb/VMT)	Silt L (grain/sq ft) [2]	W (ST)	N (hour)	P (hour)	Emission Factor (lb/VMT)
PM 2.5	0.00054	2.15E-02	1.8	8760	2160	2.80E-05
PM 10	0.0022	2.15E-02	1.8	8760	2160	1.14E-04

PM 2.5 Emissions

				0.000028 lb	37.88 VMT	d	=	4.42E-05	lb PM 2.5
				VMT	d	24 h			h
			0.00003 lb	37.88 VMT	365 day	ton	=	1.94E-04	Ton PM 2.5
			VMT	d	year	2000 lb			Year
	0.00003 lb	37.88 VMT	d	h	kg	1000 g	=	5.57E-06	g PM 2.5
	VMT	d	24 h	3600 s	2.206 lb	s			s

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: 62 **OF** 64	

PM 10 Emissions									
				0.0001142 lb	37.88 VMT	d	=	1.80E-04	lb PM TOT
				VMT	d	24 h			h
			0.00011 lb	37.88 VMT	365 day	ton	=	7.89E-04	Ton PM TOT
			VMT	d	year	2000 lb			Year
	0.00011 lb	37.88 VMT	d	h	kg	1000 g	=	2.27E-05	g PM TOT
	VMT	d	24 h	3600 s	2.206 lb	s			s
Assumption	Silt loading at the lower range of values since the vehicles will not exceed 5 MPH, and will not be involved in heavy braking								
[1]	Passenger Car and Light Truck Fleets Characteristics, Corporate Average Fuel Economy (CAFE) standards								
	http://www.nhtsa.gov/cars/rules/CAFE/NewPassengerCarFleet.htm								
[2]	AP 42 Emission Factors, Fifth Edition, Volume I, Section 13.2.1. Paved Roads, Silt loading factor for limited access roads, page 13.2.1-9								

Meridian Energy Group Inc.	EMISSIONS INVENTORY	VEPICA CODE: P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 DATE: 09/23/16	
		SHEET: 63 OF 64	

A.9.2. CATALYST HANDLING

Data

8.614 ton catalyst/14 day
14 day maintenance schedule
70000 bbl/day

Calculations

Spent Catalyst Production

$$\frac{8.614\ \text{ton}}{} \times \frac{2000\ \text{lb}}{\text{ton}} \times \frac{}{14\ \text{day}} = 1231\ \frac{\text{lb PM}}{\text{day}}$$

Percentage of catalyst suspended in the air during transfer into the bin: 15%

$$\frac{1230.6\ \text{lb}}{\text{day}} \times \frac{15\%}{} = 184.59\ \frac{\text{lb PM}}{\text{day}}$$

Controlled Emissions 95% efficiency

$$\frac{184.6\ \text{lb}}{\text{day}} \times \frac{\text{day}}{70000\ \text{bbl}} \times \frac{(1-0.95)}{} = 1.32\text{E-}04\ \frac{\text{lb PM}}{\text{bbl}}$$

Emissions for 365 day operation, 55 000 barrel/day

$$\frac{0.0001\ \text{lb}}{\text{bbl}} \times \frac{55000\ \text{bbl}}{\text{day}} \times \frac{365\ \text{day}}{\text{year}} = 2646.83\ \frac{\text{lb PM}}{\text{year}}$$

$$\frac{2646.8\text{lb}}{\text{year}} \times \frac{\text{yr}}{2000\ \text{lb}} = 1.32\ \frac{\text{ton PM}}{\text{year}}$$

Meridian Energy Group Inc.	**EMISSIONS INVENTORY**	**VEPICA CODE:** P-5715043-01-001-18042-I001	vepica USA
		COMPANY CODE: TBD	
		ISSUE: 0 **DATE:** 09/23/16	
		SHEET: **OF**	

EMISSION INVENTORY CALCULATION NOTES

	Criteria Pollutants										HAPs
Unit	CO	Pb	PM<10	Filerable PM <10	PM <2.5	Filterable PM <2.5	Condensable PM	NOx	SO_2	VOC	Total HAP
Leaks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.06	2.39
Tanks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.17	4.48
Stationary Combustion Sources	91.42	1.60E-03	13.06	3.26	13.06	3.26	9.79	46.40	1.92	17.61	1.62
Fluid Catalytic Cracking Unit	0.00	2.03E-05	1.00	0.66	0.91	0.57	0.34	3.73	6.65	5.77	0.87
Catalytic Reforming Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.79
Sulfur Recovery Plant	2.15	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.20	1.50	0.00
Vacuum Systems	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blowdown System	0.83	0.00	0.01	0.01	0.01	0.01	0.00	3.66	5.20	0.15	0.00
Flares	0.74	4.38E-06	0.07	0.02	0.07	0.02	0.05	0.44	0.005	0.05	2.38
Wastewater	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	0.52
Cooling Towers	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00
Rail Product Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.81	0.00
Truck Product Loading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00
Fugitive Dust	0.00	0.00	1.33	0.00	5.65E-04	0.00	0.00	0.00	0.00	0.00	0.00
Total Short Ton per Year	95.13	1.62E-03	17.32	3.95	14.05	3.86	10.18	54.70	13.97	69.78	13.05

pments Leak Count*	Yes	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillati
Gas	97%	204	192	310	224	277	75	100	229
nt Liquid	97%	440	597	383	253	282	419	125	108
vy Liquid	0%	498	0	84	200	445	186	110	447
nt Liquid	85%	15	21	12	7	12	10	8	2
vy Liquid	85%	14	0	2	6	12	10	3	12
pressors	85%	2	2	3	2	2	2	1	1
Gas	97%	7	13	8	9	11	9	4	5
Gas	97%	549	491	653	439	593	227	280	473
nt Liquid	97%	982	1,328	842	581	747	664	460	136
vy Liquid	30%	1,046	600	132	481	890	473	179	1,072
Ended Lines	97%	75	35	48	49	59	24	22	0
g Connections	97%	9	6	9	8	15	8	7	7

fugitive emissions equivalent to those achievable under the TCEQ 28LAER. LDAR assumes automated monitoring/directed maintenance

73%

	Average Weight Percent of Compound in Process Unit Streams[1]							
HAPs	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillati
1,3-Butadiene	0.01	0.22	0.009		0.012			
n-Hexane	4.3	1.6	2.8	1.9	1.0			0.01
2,2,4-Trimethyl pentane	0.05	25	0.25		0.3			0.003
Benzene	0.9	0.03	6.3	0.37	1.0			0.003
Toluene	1.7	2.0	17.4	1.7	3.3			0.04
Xylenes (total)	2.0	0.08	17.6	1.9	4.9			0.04
Ethylbenzene	0.63		3.9	0.37	1.1			0.02
Cumene	0.12		0.42	0.07	0.10			
1,2,4-trimethyl benzene	0.63		5.9	0.4	1.9			0.02
Naphthalene	0.25		0.87	0.25	0.72			0.12
Biphenyl	0.06			0.22	0.43			0.09

REFERENCES 1 - Table 2-7. Concentration of HAP in Refinery Process Unit Streams, Emissions Estimation Protocol for Petroleum Refineries, Version 3, RTI International.

U.S. Environmental Protection Agency. Oil and Natural Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transr

*Process component counts as presented in EPA's document, Locating and Estimating Air Emissions from Sources of Benzene (U.S. EPA, 1998a

pments Leak Count*	Yes	Screening Value (ppmv)	Emission Factor (Kg/h)***	Emission Factor (lb/h)***	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	S p
Gas	97%	500	2.36E-04	5.21E-04	0.11	0.10	0.16	0.12	0.14	0.04	
nt Liquid	97%	500	2.36E-04	5.21E-04	0.23	0.31	0.20	0.13	0.15	0.22	
vy Liquid	0%	500	2.36E-04	5.21E-04	0.26	0.00	0.04	0.10	0.23	0.10	
nt Liquid	85%	500	2.23E-03	4.92E-03	0.07	0.10	0.06	0.03	0.06	0.05	
vy Liquid	85%	500	2.23E-03	4.92E-03	0.07	0.00	0.01	0.03	0.06	0.05	
pressors	85%	10,000	7.30E-02	1.61E-01	0.32	0.32	0.48	0.32	0.32	0.32	
Gas	97%	500	2.36E-04	5.21E-04	0.00	0.01	0.00	0.00	0.01	0.00	
Gas	97%	500	3.64E-04	8.03E-04	0.44	0.39	0.52	0.35	0.48	0.18	
nt Liquid	97%	500	3.64E-04	8.03E-04	0.79	1.07	0.68	0.47	0.60	0.53	
vy Liquid	30%	500	3.64E-04	8.03E-04	0.84	0.48	0.11	0.39	0.71	0.38	
Ended Lines	97%	0	0.00E+00	0.00E+00	0.00	0.00	0.00	0.00	0.00	0.00	
g Connections	97%	500	5.29E-04	1.17E-03	0.01	0.01	0.01	0.01	0.02	0.01	
			Total (lb/h)		3.14	2.79	2.28	1.96	2.78	1.88	
			Total Uncontrolled (STPY)		13.77	12.23	9.98	8.58	12.16	8.25	
			Total Controlled (STPY)		4.22	2.00	1.09	2.04	3.68	1.99	
			Total Controlled (lb/h)		0.96	0.46	0.25	0.46	0.84	0.46	

fugitive emissions equivalent to th

73%

**Table 2-2. Equipment Leak Rate for Petroleum and SOCMI Equipment Components.

*** Emission factors used (correlation), based in a threshold of 500 ppmv for leak detection, with automated corrective action, and pegged emission factor fo

HAPs	Total HAPs Uncontrolled (STPY)	Uncontrolled Leak Emissions (HAP) in STPY						
		Crude Distillation	Alkylation	Catalytic reforming	Hydrotreat/ hydrorefining	Catalytic cracking	Product blending	S p
1,3-Butadiene	3.06E-02	1.38E-03	2.69E-02	8.98E-04	0.00E+00	1.46E-03	0.00E+00	0.0
n-Hexane	1.57E+00	5.92E-01	1.96E-01	2.79E-01	1.63E-01	1.22E-01	0.00E+00	0.0
2,2,4-Trimethyl pentane	3.13E+00	6.88E-03	3.06E+00	2.49E-02	0.00E+00	3.65E-02	0.00E+00	0.0
Benzene	9.44E-01	1.24E-01	3.67E-03	6.29E-01	3.17E-02	1.22E-01	0.00E+00	0.0
Toluene	2.81E+00	2.34E-01	2.45E-01	1.74E+00	1.46E-01	4.01E-01	0.00E+00	0.0
Xylenes (total)	2.81E+00	2.75E-01	9.78E-03	1.76E+00	1.63E-01	5.96E-01	0.00E+00	0.0
Ethylbenzene	6.43E-01	8.67E-02	0.00E+00	3.89E-01	3.17E-02	1.34E-01	0.00E+00	0.0
Cumene	7.66E-02	1.65E-02	0.00E+00	4.19E-02	6.00E-03	1.22E-02	0.00E+00	0.0
1,2,4-trimethyl benzene	9.43E-01	8.67E-02	0.00E+00	5.89E-01	3.43E-02	2.31E-01	0.00E+00	0.0
Naphthalene	2.41E-01	3.44E-02	0.00E+00	8.68E-02	2.14E-02	8.76E-02	0.00E+00	0.0
Biphenyl	8.73E-02	8.26E-03	0.00E+00	0.00E+00	1.89E-02	5.23E-02	0.00E+00	0.0
REFERENCES	**13.29**	1.47	3.54	5.53	0.62	1.80	0.00	

pments Leak Count*	Yes	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillation	Isomerization
Gas	97%	3.19E-03	3.00E-03	4.85E-03	3.50E-03	4.33E-03	1.17E-03	1.56E-03	3.58E-03	2.56E-03
nt Liquid	97%	6.88E-03	9.33E-03	5.99E-03	3.95E-03	4.41E-03	6.55E-03	1.95E-03	1.69E-03	4.69E-03
vy Liquid	0%	2.59E-01	0.00E+00	4.38E-02	1.04E-01	2.32E-01	9.69E-02	5.73E-02	2.33E-01	4.06E-02
nt Liquid	85%	1.11E-02	1.55E-02	8.85E-03	5.16E-03	8.85E-03	7.37E-03	5.90E-03	1.47E-03	6.64E-03
vy Liquid	85%	1.03E-02	0.00E+00	1.47E-03	4.42E-03	8.85E-03	7.37E-03	2.21E-03	8.85E-03	3.69E-03
pressors	85%	4.83E-02	4.83E-02	7.25E-02	4.83E-02	4.83E-02	4.83E-02	2.42E-02	2.42E-02	4.83E-02
Gas	97%	1.09E-04	2.03E-04	1.25E-04	1.41E-04	1.72E-04	1.41E-04	6.25E-05	7.82E-05	2.34E-04
Gas	97%	1.32E-02	1.18E-02	1.57E-02	1.06E-02	1.43E-02	5.47E-03	6.74E-03	1.14E-02	7.23E-03
nt Liquid	97%	2.37E-02	3.20E-02	2.03E-02	1.40E-02	1.80E-02	1.60E-02	1.11E-02	3.28E-03	1.30E-02
vy Liquid	30%	5.88E-01	3.37E-01	7.42E-02	2.70E-01	5.00E-01	2.66E-01	1.01E-01	6.03E-01	1.49E-01
Ended Lines	97%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
g Connections	97%	3.15E-04	2.10E-04	3.15E-04	2.80E-04	5.25E-04	2.80E-04	2.45E-04	2.45E-04	2.45E-04
		0.96	0.46	0.25	0.46	0.84	0.46	0.21	0.89	0.28
		4.22	2.00	1.09	2.04	3.68	1.99	0.93	3.90	1.21

21.06 Total VOC Controlled (STPY)

4.81 Total VOC Controlled (lb/h)

fugitive emissions equivalent to th

73%

	Controlled Leak Emissions (HAP) in STPY								
HAPs	Crude Distillation	Alkylation	Catalytic reforming	Hydrotreating/ hydrorefining	Catalytic cracking	Product blending	Sulfur plant	Vacuum distillation	Isomerization
1,3-Butadiene	4.22E-04	4.41E-03	9.78E-05	0.00E+00	4.41E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.82E-01	3.21E-02	3.04E-02	3.87E-02	3.68E-02	0.00E+00	0.00E+00	3.90E-04	3.87E-02
2,2,4-Trimethyl pentane	2.11E-03	5.01E-01	2.72E-03	0.00E+00	1.10E-02	0.00E+00	0.00E+00	1.17E-04	1.21E-04
Benzene	3.80E-02	6.01E-04	6.84E-02	7.53E-03	3.68E-02	0.00E+00	0.00E+00	1.17E-04	6.05E-03
Toluene	7.18E-02	4.01E-02	1.89E-01	3.46E-02	1.21E-01	0.00E+00	0.00E+00	1.56E-03	7.26E-03
Xylenes (total)	8.45E-02	1.60E-03	1.91E-01	3.87E-02	1.80E-01	0.00E+00	0.00E+00	1.56E-03	1.81E-03
Ethylbenzene	2.66E-02	0.00E+00	4.24E-02	7.53E-03	4.05E-02	0.00E+00	0.00E+00	7.80E-04	0.00E+00
Cumene	5.07E-03	0.00E+00	4.56E-03	1.43E-03	3.68E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,2,4-trimethyl benzene	2.66E-02	0.00E+00	6.41E-02	8.15E-03	6.99E-02	0.00E+00	0.00E+00	7.80E-04	0.00E+00
Naphthalene	1.06E-02	0.00E+00	9.45E-03	5.09E-03	2.65E-02	0.00E+00	0.00E+00	4.68E-03	0.00E+00
Biphenyl	2.53E-03	0.00E+00	0.00E+00	4.48E-03	1.58E-02	0.00E+00	0.00E+00	3.51E-03	0.00E+00
REFERENCES	0.45	0.58	0.60	0.15	0.54	0.00	0.00	0.01	0.05

	Roof Type →	Self-Supporting Roof[1]	Uncontrolled Emissions	Connected to VRU	connected to VRU[2]	Gasketed Penetrations	connected to VRU	connected to VRU	& Gasketed Penetrations	connected to VRU	connected to VRU		per Unit (lb/h
00	115 ID X 60	2,449.39				1.22			3.67			CRUDE OIL	2.80E-0
00	88 ID X 60	345.61				0.17			0.17			HEAVY NAPHTHA	3.95E-0
00	88 ID X 60	1,047.99				0.52			1.57			GASOLINE	1.20E-0
00	63 ID X 60	518.55				0.26			0.52			REFORMATE	5.92E-0
00	63 ID X 60	840.74				0.42			0.84			FCC NAPHTHA	9.60E-0
00	63 ID X 60	749.26				0.37			0.75			LIGHT NAPHTHA	8.55E-0
00	63 ID X 60	548.95				0.27			0.55			ALKYLATE	6.27E-0
00	63 ID X 60	225.38				0.11			0.23			JET FUEL	2.57E-0
00	88 ID X 60		1,392.64		69.63			0.03			0.07	DESULPHURIZED DIESEL	7.95E-0
00	63 ID X 60		751.10		37.56			0.02			0.04	UNDESULPHURIZED DIESEL	4.29E-0
00	63 ID X 60		8.64	8.64			0.00			8.64E-03		VACUUM GASOIL	1.97E-0
00	63 ID X 60		326.64	326.64			0.16			1.63E-01		DILUENT - HEAVY FCC PRODUCT	3.73E-0
00	88 ID X 60		8.25	8.25			0.004			8.25E-03		FUEL OIL	9.42E-0
00	25 ID X 30		22,281.90		1,114.10			0.56			0.56	LIGHT SLOPS	1.27E-0
00	25 ID X 30		54.65	54.65			0.03			2.73E-02		HEAVY SLOPS	6.24E-0
									8.30	**0.21**	**0.66**	**Total Tank Farm**	**2.0**

elf-Supporting Roof, double seals and wipers, all gasketed tank fittings and fixed floating roof legs.
5%
runs

s Factors for Petroleum Liquid Storage Tanks (lb/MMbbl)*			Emissions (lb/h)			STPY (Uncontrolled)			Control Efficiencies			STPY (Con	
	Gasoline and Other Light Distillates	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates**	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates	Diesel Fuel and Other Middle Distillates	Crude Oil	Gasoline and Other Light Distillates
	3.5	3.5	0.00E+00	4.81E-03	3.21E-03	0.00	2.11E-02	1.41E-02	60%	60%	95%	0.00E+00	0.008
	0.24	0.24	0.00E+00	3.30E-04	2.20E-04	0.00	1.45E-03	9.64E-04	60%	60%	95%	0.00E+00	0.001
	70	54	2.29E-02	9.63E-02	4.95E-02	0.10	4.22E-01	2.17E-01	60%	60%	95%	4.02E-02	0.169
	0.17	0	4.58E-04	2.34E-04	0.00E+00	0.00	1.02E-03	0.00E+00	60%	60%	95%	8.03E-04	0.000
	0.21	0.21	0.00E+00	2.89E-04	1.93E-04	0.00	1.26E-03	8.43E-04	60%	60%	95%	0.00E+00	0.001
	13	0.19	1.38E-03	1.79E-02	1.74E-04	0.01	7.83E-02	7.63E-04	60%	60%	95%	2.41E-03	0.031
	15	10	1.15E-03	2.06E-02	9.17E-03	0.01	9.03E-02	4.02E-02	60%	60%	95%	2.01E-03	0.036
	31	18	3.67E-03	4.26E-02	1.65E-02	0.02	1.87E-01	7.23E-02	60%	60%	95%	6.42E-03	0.075
	0.36	0.36	0.00E+00	4.95E-04	3.30E-04	0.00	2.17E-03	1.45E-03	60%	60%	95%	0.00E+00	0.001
	420	480	1.93E-01	5.78E-01	4.40E-01	0.84	2.53E+00	1.93E+00	60%	60%	95%	3.37E-01	1.012
	3.8	3.8	0.00E+00	5.23E-03	3.48E-03	0.00	2.29E-02	1.53E-02	60%	60%	95%	0.00E+00	0.009
	320	320	0.00E+00	4.40E-01	2.93E-01	0.00	1.93E+00	1.28E+00	60%	60%	95%	0.00E+00	0.771
	310	0	0.00E+00	4.26E-01	0.00E+00	0.00	1.87E+00	0.00E+00	60%	60%	95%	0.00E+00	0.747
	7.6	4	1.38E-03	1.05E-02	3.67E-03	0.01	4.58E-02	1.61E-02	60%	60%	95%	2.41E-03	0.018
	1.5	1.5	0.00E+00	2.06E-03	1.38E-03	0.00	9.03E-03	6.02E-03	60%	60%	95%	0.00E+00	0.004
	0.9	0.67	2.06E-03	1.24E-03	6.14E-04	0.01	5.42E-03	2.69E-03	60%	60%	95%	3.61E-03	0.002
	0.39	0.39	0.00E+00	5.36E-04	3.58E-04	0.00	2.35E-03	1.57E-03	60%	60%	95%	0.00E+00	0.001
	66	0	0.00E+00	9.08E-02	0.00E+00	0.00	3.97E-01	0.00E+00	60%	60%	95%	0.00E+00	0.159
	180	100	1.72E-02	2.48E-01	9.17E-02	0.08	1.08E+00	4.02E-01	60%	60%	95%	3.01E-02	0.434
	140	70	1.42E-02	1.93E-01	6.42E-02	0.06	8.43E-01	2.81E-01	60%	60%	95%	2.49E-02	0.337
			Total Hazardous Air Pollutants (HAP), Uncontrolled			**1.13**	**9.54**	**4.28**	**Total Hazardous Air Pollutants (HAP), Controlled**			**0.45**	**3.82**

0
0%
5% VRU + thermal destruction thermal destruction achieved via flaring, use as fuel gas or thermal oxidizer
eum Refineries, Table 3-3. *Default Emissions Factors for Petroleum Refinery Storage Tank*
finery Storage Tanks (Normalized by production capacity of the refinery)
oduction as a fraction of feed processing capacity, subtracting the production of heavy distillates and aromatics. In the case of Soljet, such production is zero, then:

	ADU #1 HEATER		ADU #2 HEATER		Vacuum Heater 1		Vacuum Heater 2		Raw Charge Heater		Reactor Charge Heater		Dr
	101-H-0101		102-H-0201		103-H-0301		103-H-0302		112-H-1201		117-H-1701		
	72		72		76.47		57.65		28.35		1.65		
	YES		YES		YES		YES		NO		NO		
	YES		YES		YES		YES		NO		NO		
	YES		YES		YES		YES		YES		YES		
Emission (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	E
2.02E+00	8.83E+00	2.02E+00	8.83E+00	2.14E+00	9.38E+00	1.61E+00	7.07E+00	7.94E-01	3.48E+00	4.62E-02	2.02E-01	1.
3.53E-05	1.55E-04	3.53E-05	1.55E-04	3.75E-05	1.64E-04	2.82E-05	1.24E-04	1.39E-05	6.08E-05	8.09E-07	3.54E-06	1.
8.64E-02	3.78E-01	8.64E-02	3.78E-01	9.18E-02	4.02E-01	6.92E-02	3.03E-01	1.13E-01	4.97E-01	6.60E-03	2.89E-02	1.
6.48E-02	2.84E-01	6.48E-02	2.84E-01	6.88E-02	3.01E-01	5.19E-02	2.27E-01	8.51E-02	3.73E-01	4.95E-03	2.17E-02	1.
2.16E-02	9.46E-02	2.16E-02	9.46E-02	2.29E-02	1.00E-01	1.73E-02	7.58E-02	2.84E-02	1.24E-01	1.65E-03	7.23E-03	3.
4.54E-01	1.99E+00	4.54E-01	1.99E+00	4.82E-01	2.11E+00	3.63E-01	1.59E+00	8.51E-01	3.73E+00	4.95E-02	2.17E-01	1.
4.24E-02	1.86E-01	4.24E-02	1.86E-01	4.50E-02	1.97E-01	3.39E-02	1.49E-01	1.67E-02	7.30E-02	9.71E-04	4.25E-03	2.
3.88E-01	1.70E+00	3.88E-01	1.70E+00	4.12E-01	1.81E+00	3.11E-01	1.36E+00	1.53E-01	6.70E-01	8.90E-03	3.90E-02	2.
5.26E-04	2.31E-03	5.26E-04	2.31E-03	5.59E-04	2.45E-03	4.22E-04	1.85E-03	2.07E-04	9.08E-04	1.21E-05	5.28E-05	2.
1.41E-01	6.17E-01	1.41E-01	6.17E-01	1.50E-01	6.55E-01	1.13E-01	4.94E-01	5.54E-02	2.43E-01	3.23E-03	1.41E-02	7.
3.52E-02	1.54E-01	3.52E-02	1.54E-01	3.74E-02	1.64E-01	2.82E-02	1.23E-01	1.39E-02	6.07E-02	8.07E-04	3.53E-03	1.
2.160	9.461	2.160	9.461	2.294	10.048	1.730	7.575	0.851	3.725	0.050	0.217	
0.454	1.987	0.454	1.987	0.482	2.110	0.363	1.591	0.000	0.000	0.000	0.000	

Emissions Summary	CO	Pb	PM Total	Filterable PM	Condensable PM	NOx	SO_2	VOC	Total Metal HAP	Controlled Organic HAP
Heaters	87.918	1.54E-03	7.50	1.88	5.63	42.65	1.847	16.93	0.020	1.33
Boilers	3.500	6.13E-05	0.50	0.13	0.38	3.75	0.074	0.67	0.004	0.27
Total STPY	**91.42**	**1.60E-03**	**8.00**	**2.00**	**6.00**	**46.40**	**1.92**	**17.61**	**0.024**	**1.60**
Total lb/h	**20.87**	**3.65E-04**	**1.83**	**0.46**	**1.37**	**10.59**	**0.44**	**4.02**	**0.005**	**0.36**

Hours of Operation

Annual Operation Hours
(opsh) 8760 hour/year

Carbon Monoxide	2.80E-02		Vendor Guarantee
CO Controlled	2.80E-02		Vendor Guarantee
Lead*	4.90E-07		
NOx (Ultra Low NOx Burner)	3.00E-02		Vendor Guarantee
NOx (Ultra Low NOx + SCR)	6.30E-03		Vendor Guarantee
PM (Total)	0.0040		Vendor Guarantee
PM (Total) Controlled	0.0012	70%	Venturi scrubber
PM (Condensable)	0.0030		
PM (Filterable)	0.0010		
SOx	0.0006		
VOC	0.0054		

Metal HAPs	Emission Factor (lb/M
Antimony	5.20E-07
Arsenic	2.00E-07
Beryllium	1.30E-07
Cadmium	1.10E-06
Chromium (hexavalent)	2.80E-07
Chromium	1.40E-06
Cobalt	8.20E-08
Manganese	3.70E-07
Mercury	2.50E-07
Nickel	2.10E-06
Selenium	8.80E-07
Total Metal HAP (lb/MMBTU)	7.31E-06

Org HAP Total	1.96E-03		
Org HAP Controlled	4.89E-04	75%	Good combustion practices

PM (Total)	7.45E-03
PM (Condensable) * **	5.59E-03
PM (Filterable) * **	1.86E-03
Total	7.45E-03

REFERENCES

*Calculated based on the TABLE 1.4-2. AP 42, Fifth Edition, Volume I Chapter 1: External Combustion Sources, unless noted otherwise

** All PM (total, Condensable, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate emissions.

Charge Heater		Stripper Reboiler Heater		CRU #2 Heater		CRU #1 Heater		Diesel HDT Heater		Alky Unit Heater		Feed H
105-H-0501		105-H-0502		106-H-0601		107-H-0701		110-H-1001		118-H-1801		111-H
13.75		16.25		41.73		92.5		16.25		84.19		13.9
NO		NO		YES		YES		NO		YES		NO
NO		NO		YES		YES		NO		NO		NO
YES		YES		YES		YES		YES		YES		YES
Emissions (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	Emissions (lb/h)	Emission (STPY)	Emissions (lb/h)
3.85E-01	1.69E+00	4.55E-01	1.99E+00	1.17E+00	5.12E+00	2.59E+00	1.13E+01	4.55E-01	1.99E+00	2.36E+00	1.03E+01	3.89E-01
6.74E-06	2.95E-05	7.96E-06	3.49E-05	2.04E-05	8.96E-05	4.53E-05	1.99E-04	7.96E-06	3.49E-05	4.13E-05	1.81E-04	6.81E-06
5.50E-02	2.41E-01	6.50E-02	2.85E-01	5.01E-02	2.19E-01	1.11E-01	4.86E-01	6.50E-02	2.85E-01	3.37E-01	1.48E+00	5.56E-02
4.13E-02	1.81E-01	4.88E-02	2.14E-01	3.76E-02	1.64E-01	8.33E-02	3.65E-01	4.88E-02	2.14E-01	2.53E-01	1.11E+00	4.17E-02
1.38E-02	6.02E-02	1.63E-02	7.12E-02	1.25E-02	5.48E-02	2.78E-02	1.22E-01	1.63E-02	7.12E-02	8.42E-02	3.69E-01	1.39E-02
4.13E-01	1.81E+00	4.88E-01	2.14E+00	2.63E-01	1.15E+00	5.83E-01	2.55E+00	4.88E-01	2.14E+00	5.30E-01	2.32E+00	4.17E-01
8.09E-03	3.54E-02	9.56E-03	4.19E-02	2.45E-02	1.08E-01	5.44E-02	2.38E-01	9.56E-03	4.19E-02	4.95E-02	2.17E-01	8.18E-03
7.41E-02	3.25E-01	8.76E-02	3.84E-01	2.25E-01	9.86E-01	4.99E-01	2.18E+00	8.76E-02	3.84E-01	4.54E-01	1.99E+00	7.50E-02
1.01E-04	4.40E-04	1.19E-04	5.20E-04	3.05E-04	1.34E-03	6.76E-04	2.96E-03	1.19E-04	5.20E-04	6.16E-04	2.70E-03	1.02E-04
2.69E-02	1.18E-01	3.18E-02	1.39E-01	8.16E-02	3.57E-01	1.81E-01	7.92E-01	3.18E-02	1.39E-01	1.65E-01	7.21E-01	2.72E-02
6.72E-03	2.94E-02	7.94E-03	3.48E-02	2.04E-02	8.94E-02	4.52E-02	1.98E-01	7.94E-03	3.48E-02	4.12E-02	1.80E-01	6.80E-03
0.413	1.807	0.488	2.135	1.252	5.483	2.775	12.155	0.488	2.135	2.526	11.063	0.417
0.000	0.000	0.000	0.000	0.263	1.151	0.583	2.552	0.000	0.000	0.530	2.323	0.000

Carbon Monoxide	2.80E-02		Vendor Guarantee
CO Controlled	2.80E-02		Vendor Guarantee
Lead*	4.90E-07		
NOx (Ultra Low NOx Burner)	3.00E-02		Vendor Guarantee
NOx (Ultra Low NOx + SCR)	6.30E-03		Vendor Guarantee
PM (Total)	0.0040		Vendor Guarantee
PM (Total) Controlled	0.0012	70%	Venturi scrubber
PM (Condensable)	0.0030		
PM (Filterable)	0.0010		
SOx	0.0006		
VOC	0.0054		

Metal HAPs	Emission Factor (lb/M
Antimony	5.20E-07
Arsenic	2.00E-07
Beryllium	1.30E-07
Cadmium	1.10E-06
Chromium (hexavalent)	2.80E-07
Chromium	1.40E-06
Cobalt	8.20E-08
Manganese	3.70E-07
Mercury	2.50E-07
Nickel	2.10E-06
Selenium	8.80E-07
Total Metal HAP (lb/MMBTU)	7.31E-06

Org HAP Total	1.96E-03		
Org HAP Controlled	4.89E-04	75%	Good combustion practices

PM (Total)	7.45E-03
PM (Condensable) * **	5.59E-03
PM (Filterable) * **	1.86E-03
Total	7.45E-03

REFERENCES

*Calculated based on the TABLE 1.4-2. AP 42, Fifth Edition, Volume I Chapter 1: External Combustion Sources, unless noted otherwise

** All PM (total, Condensable, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be us
estimate PM10, PM2.5 or PM1 emissions.

DT Heater	FCC NHDT Heater		Boiler 1		Boiler 2		Boiler 3		
2501	114-H-1401		202-PK-0201A		202-PK-0201B		202-PK-0201C		
	17.48		60		60		5	Stand-by Duty	
	NO		NO		NO		NO		
	NO		NO		NO		NO		
	YES		YES		YES		YES		
Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Emission (lb/h)	Emission (STPY)	Total Emissions (STPY)
1.53E+00	4.89E-01	2.14E+00	1.68E+00	7.36E+00	1.68E+00	7.36E+00	1.40E-01	6.13E-01	91.42
2.68E-05	8.57E-06	3.75E-05	2.94E-05	1.29E-04	2.94E-05	1.29E-04	2.45E-06	1.07E-05	1.60E-03
2.19E-01	6.99E-02	3.06E-01	2.40E-01	1.05E+00	2.40E-01	1.05E+00	2.00E-02	8.76E-02	8.00
1.64E-01	5.24E-02	2.30E-01	1.80E-01	7.88E-01	1.80E-01	7.88E-01	1.50E-02	6.57E-02	6.00
5.48E-02	1.75E-02	7.66E-02	6.00E-02	2.63E-01	6.00E-02	2.63E-01	5.00E-03	2.19E-02	2.00
1.64E+00	5.24E-01	2.30E+00	1.80E+00	7.88E+00	1.80E+00	7.88E+00	1.50E-01	6.57E-01	46.40
3.22E-02	1.03E-02	4.50E-02	3.53E-02	1.55E-01	3.53E-02	1.55E-01	2.94E-03	1.29E-02	1.92
2.95E-01	9.43E-02	4.13E-01	3.24E-01	1.42E+00	3.24E-01	1.42E+00	2.70E-02	1.18E-01	17.61
4.00E-04	1.28E-04	5.60E-04	4.39E-04	1.92E-03	4.39E-04	1.92E-03	3.66E-05	1.60E-04	0.024
1.07E-01	3.42E-02	1.50E-01	1.17E-01	5.14E-01	1.17E-01	5.14E-01	9.78E-03	4.28E-02	6.38
2.68E-02	8.55E-03	3.74E-02	2.93E-02	1.28E-01	2.93E-02	1.28E-01	2.44E-03	1.07E-02	1.60
1.643	0.524	2.297	1.800	7.884	1.800	7.884	0.150	0.657	97.95
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.70

Page intentionally left in blank

		Atmospheric Distillation Unit #1		Tag	101-H-0101		Atmospheric Distillation Unit #2	
r Petroleum Refineries, Version 3, RTI International.		Crude Oil Heater		flue gas (lb/h)	66470.6		Crude Oil Heater 1	
tors for Boilers and Process Heaters Firing Various Fuels		Heat input (MMBtu/h)	72	density (lb/ft3)	0.0296		Heat input (MMBtu/h)	72
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	2,245,628.38	37,427.14	Emission (lb/h)	Emission (us tpy)
				T (°F)	787.7			
				T(K)	692.98			
				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	5.20E-07	3.74E-05	1.64E-04	1.67E-11	2.67E-04	1.25E-04	3.74E-05	1.64E-04
	2.00E-07	1.44E-05	6.31E-05	6.41E-12	1.03E-04	7.80E-05	1.44E-05	6.31E-05
	1.30E-07	9.36E-06	4.10E-05	4.17E-12	6.68E-05	4.22E-04	9.36E-06	4.10E-05
	1.10E-06	7.92E-05	3.47E-04	3.53E-11	5.65E-04	2.86E-04	7.92E-05	3.47E-04
	2.80E-07	2.02E-05	8.83E-05	8.98E-12	1.44E-04	1.57E-04	2.02E-05	8.83E-05
	1.40E-06	1.01E-04	4.42E-04	4.49E-11	7.20E-04	7.87E-04	1.01E-04	4.42E-04
	8.20E-08	5.90E-06	2.59E-05	2.63E-12	4.22E-05	4.07E-05	5.90E-06	2.59E-05
	3.70E-07	2.66E-05	1.17E-04	1.19E-11	1.90E-04	1.97E-04	2.66E-05	1.17E-04
	2.50E-07	1.80E-05	7.88E-05	8.02E-12	1.29E-04	3.64E-05	1.80E-05	7.88E-05
	2.10E-06	1.51E-04	6.62E-04	6.73E-11	1.08E-03	1.05E-03	1.51E-04	6.62E-04
	8.80E-07	6.34E-05	2.78E-04	2.82E-11	4.52E-04	3.26E-04	6.34E-05	2.78E-04
	-	**5.26E-04**	**2.31E-03**	**2.34E-10**	**3.76E-03**		**5.26E-04**	**2.31E-03**
APs				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	1.20E-05	2.16E-04	9.46E-04	9.62E-11	1.54E-03	1.99E-03	2.16E-04	9.46E-04
	1.70E-05	3.06E-04	1.34E-03	1.36E-10	2.18E-03	2.22E-03	3.06E-04	1.34E-03
	2.10E-06	3.78E-05	1.66E-04	1.68E-11	2.70E-04	1.96E-04	3.78E-05	1.66E-04
	2.20E-08	3.96E-07	1.73E-06	1.76E-13	2.83E-06	7.04E-07	3.96E-07	1.73E-06
	1.20E-06	2.16E-05	9.46E-05	9.62E-12	1.54E-04	5.97E-05	2.16E-05	9.46E-05
	1.60E-05	2.88E-04	1.26E-03	1.28E-10	2.06E-03	1.10E-03	2.88E-04	1.26E-03
	7.40E-05	1.33E-03	5.83E-03	5.93E-10	9.51E-03	1.80E-02	1.33E-03	5.83E-03
	1.80E-03	3.24E-02	1.42E-01	1.44E-08	2.31E-01	1.53E-01	3.24E-02	1.42E-01
	3.30E-06	5.94E-05	2.60E-04	2.65E-11	4.24E-04	2.62E-04	5.94E-05	2.60E-04
	2.50E-05	4.50E-04	1.97E-03	2.00E-10	3.21E-03	1.72E-03	4.50E-04	1.97E-03
		3.51E-02	1.54E-01	1.56E-08	2.51E-01		3.51E-02	1.54E-01
cs (excluding dioxin/furans)				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	2.40E-09	4.32E-08	1.89E-07	1.92E-14	3.08E-07	1.14E-07	4.32E-08	1.89E-07
	6.50E-09	1.17E-07	5.12E-07	5.21E-14	8.35E-07	3.12E-07	1.17E-07	5.12E-07
	4.70E-09	8.46E-08	3.71E-07	3.77E-14	6.04E-07	1.93E-07	8.46E-08	3.71E-07

		Atmospheric Distillation Unit #1		Tag	101-H-0101		Atmospheric Distillation Unit #2	
r Petroleum Refineries, Version 3, RTI International.		Crude Oil Heater		flue gas (lb/h)	66470.6		Crude Oil Heater 1	
tors for Boilers and Process Heaters Firing Various Fuels		Heat input (MMBtu/h)	72	density (lb/ft3)	0.0296		Heat input (MMBtu/h)	72
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	2,245,628.38	37,427.14	Emission (lb/h)	Emission (us tpy)
				T (°F)	787.7			
				T(K)	692.98			
				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	1.30E-09	2.34E-08	1.02E-07	1.04E-14	1.67E-07	3.44E-08	2.34E-08	1.02E-07
	1.70E-08	3.06E-07	1.34E-06	1.36E-13	2.18E-06	4.92E-07	3.06E-07	1.34E-06
	1.60E-09	2.88E-08	1.26E-07	1.28E-14	2.06E-07	5.12E-08	2.88E-08	1.26E-07
	1.20E-09	2.16E-08	9.46E-08	9.62E-15	1.54E-07	3.15E-08	2.16E-08	9.46E-08
	1.60E-08	2.88E-07	1.26E-06	1.28E-13	2.06E-06	4.56E-07	2.88E-07	1.26E-06
	2.90E-09	5.22E-08	2.29E-07	2.32E-14	3.73E-07	1.05E-07	5.22E-08	2.29E-07
	2.70E-09	4.86E-08	2.13E-07	2.16E-14	3.47E-07	1.19E-07	4.86E-08	2.13E-07
	7.10E-08	1.28E-06	5.60E-06	5.69E-13	9.12E-06	1.88E-06	1.28E-06	5.60E-06
	1.80E-09	3.24E-08	1.42E-07	1.44E-14	2.31E-07	4.90E-08	3.24E-08	1.42E-07
	2.40E-08	4.32E-07	1.89E-06	1.92E-13	3.08E-06	1.23E-06	4.32E-07	1.89E-06
	6.00E-07	1.08E-05	4.73E-05	4.81E-12	7.71E-05	3.42E-05	1.08E-05	4.73E-05
	1.70E-08	3.06E-07	1.34E-06	1.36E-13	2.18E-06	6.97E-07	3.06E-07	1.34E-06
	4.00E-06	7.20E-05	3.15E-04	3.21E-11	5.14E-04	3.11E-04	7.20E-05	3.15E-04
	4.90E-09	8.82E-08	3.86E-07	3.93E-14	6.30E-07	1.77E-07	8.82E-08	3.86E-07
	4.26E-06	**7.67E-05**	**3.36E-04**	**3.41E-11**	**5.47E-04**	**3.19E-04**	**7.67E-05**	**3.36E-04**
		8.75E-05	3.83E-04	3.89E-11	6.24E-04		8.75E-05	3.83E-04
		3.52E-02	**1.54E-01**				**3.52E-02**	**1.54E-01**
nterest				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	4.30E-06	3.10E-04	1.36E-03	1.38E-10	2.21E-03	9.15E-04	3.10E-04	1.36E-03
	2.10E-03	1.51E-01	6.62E-01	6.73E-08	1.08E+00	1.06E+00	1.51E-01	6.62E-01
	8.30E-07	5.98E-05	2.62E-04	2.66E-11	4.27E-04	3.82E-04	5.98E-05	2.62E-04
	3.00E-03	2.16E-01	9.46E-01	9.62E-08	1.54E+00	2.92E+00	2.16E-01	9.46E-01
	8.50E-05	6.12E-03	2.68E-02	2.73E-09	4.37E-02	7.29E-02	6.12E-03	2.68E-02
	1.10E-06	7.92E-05	3.47E-04	3.53E-11	5.65E-04	3.35E-04	7.92E-05	3.47E-04
	6.40E-07	4.61E-05	2.02E-04	2.05E-11	3.29E-04	6.04E-04	4.61E-05	2.02E-04
	2.30E-06	1.66E-04	7.25E-04	7.37E-11	1.18E-03	1.32E-03	1.66E-04	7.25E-04
	2.80E-05	2.02E-03	8.83E-03	8.98E-10	1.44E-02	1.25E-02	2.02E-03	8.83E-03

2. AP 42, Fifth Edition, Volume IChapter 1: External Combustion Sources.

			Vacuum Distillation Unit		Tag	103-H-0301		Vacuum Distilla
r Petroleum Refineries, Version 3, RTI International.			Vacuum Heater 1		flue gas (lb/h)	70,380.60		Vacuum Hea
tors for Boilers and Process Heaters Firing Various Fuels			Heat input (MMBtu/h)	76.47	density (lb/ft3)	0.0349		Heat input (MMBtu/h)
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		37,427.14	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	2,016,636.10	33,610.60	Emission (lb/h)
					T (°F)	600.4		
					T(K)	588.93		
		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	5.20E-07	1.25E-04	3.98E-05	1.74E-04	1.97E-11	3.16E-04	1.25E-04	3.00E-05
	2.00E-07	7.80E-05	1.53E-05	6.70E-05	7.58E-12	1.22E-04	7.84E-05	1.15E-05
	1.30E-07	4.22E-04	9.94E-06	4.35E-05	4.93E-12	7.90E-05	4.24E-04	7.49E-06
	1.10E-06	2.86E-04	8.41E-05	3.68E-04	4.17E-11	6.69E-04	2.87E-04	6.34E-05
	2.80E-07	1.57E-04	2.14E-05	9.38E-05	1.06E-11	1.70E-04	1.58E-04	1.61E-05
	1.40E-06	7.87E-04	1.07E-04	4.69E-04	5.31E-11	8.51E-04	7.91E-04	8.07E-05
	8.20E-08	4.07E-05	6.27E-06	2.75E-05	3.11E-12	4.99E-05	4.09E-05	4.73E-06
	3.70E-07	1.97E-04	2.83E-05	1.24E-04	1.40E-11	2.25E-04	1.98E-04	2.13E-05
	2.50E-07	3.64E-05	1.91E-05	8.37E-05	9.48E-12	1.52E-04	3.66E-05	1.44E-05
	2.10E-06	1.05E-03	1.61E-04	7.03E-04	7.96E-11	1.28E-03	1.05E-03	1.21E-04
	8.80E-07	3.26E-04	6.73E-05	2.95E-04	3.34E-11	5.35E-04	3.27E-04	5.07E-05
	-		**5.59E-04**	**2.45E-03**	**2.49E-10**	**4.45E-03**		**4.22E-04**
APs		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	1.20E-05	1.99E-03	2.29E-04	1.00E-03	1.14E-10	1.82E-03	2.00E-03	1.73E-04
	1.70E-05	2.22E-03	3.25E-04	1.42E-03	1.61E-10	2.58E-03	2.23E-03	2.45E-04
	2.10E-06	1.96E-04	4.01E-05	1.76E-04	1.99E-11	3.19E-04	1.97E-04	3.03E-05
	2.20E-08	7.04E-07	4.21E-07	1.84E-06	2.09E-13	3.34E-06	7.08E-07	3.17E-07
	1.20E-06	5.97E-05	2.29E-05	1.00E-04	1.14E-11	1.82E-04	6.00E-05	1.73E-05
	1.60E-05	1.10E-03	3.06E-04	1.34E-03	1.52E-10	2.43E-03	1.11E-03	2.31E-04
	7.40E-05	1.80E-02	1.41E-03	6.20E-03	7.02E-10	1.12E-02	1.81E-02	1.07E-03
	1.80E-03	1.53E-01	3.44E-02	1.51E-01	1.71E-08	2.74E-01	1.53E-01	2.59E-02
	3.30E-06	2.62E-04	6.31E-05	2.76E-04	3.13E-11	5.02E-04	2.63E-04	4.76E-05
	2.50E-05	1.72E-03	4.78E-04	2.09E-03	2.37E-10	3.80E-03	1.73E-03	3.60E-04
			3.73E-02	1.63E-01	1.85E-08	2.96E-01		2.81E-02
cs (excluding dioxin/furans)		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	2.40E-09	1.14E-07	4.59E-08	2.01E-07	2.28E-14	3.65E-07	1.14E-07	3.46E-08
	6.50E-09	3.12E-07	1.24E-07	5.44E-07	6.16E-14	9.88E-07	3.14E-07	9.37E-08
	4.70E-09	1.93E-07	8.99E-08	3.94E-07	4.46E-14	7.14E-07	1.94E-07	6.77E-08

			Vacuum Distillation Unit		Tag	103-H-0301		Vacuum Distilla
r Petroleum Refineries, Version 3, RTI International.			Vacuum Heater 1		flue gas (lb/h)	70,380.60		Vacuum Hea
tors for Boilers and Process Heaters Firing Various Fuels			Heat input (MMBtu/h)	76.47	density (lb/ft3)	0.0349		Heat input (MMBtu/h)
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		37,427.14	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	2,016,636.10	33,610.60	Emission (lb/h)
					T (°F)	600.4		
					T(K)	588.93		
		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	1.30E-09	3.44E-08	2.49E-08	1.09E-07	1.23E-14	1.98E-07	3.46E-08	1.87E-08
	1.70E-08	4.92E-07	3.25E-07	1.42E-06	1.61E-13	2.58E-06	4.95E-07	2.45E-07
	1.60E-09	5.12E-08	3.06E-08	1.34E-07	1.52E-14	2.43E-07	5.15E-08	2.31E-08
	1.20E-09	3.15E-08	2.29E-08	1.00E-07	1.14E-14	1.82E-07	3.17E-08	1.73E-08
	1.60E-08	4.56E-07	3.06E-07	1.34E-06	1.52E-13	2.43E-06	4.58E-07	2.31E-07
	2.90E-09	1.05E-07	5.54E-08	2.43E-07	2.75E-14	4.41E-07	1.05E-07	4.18E-08
	2.70E-09	1.19E-07	5.16E-08	2.26E-07	2.56E-14	4.10E-07	1.19E-07	3.89E-08
	7.10E-08	1.88E-06	1.36E-06	5.95E-06	6.73E-13	1.08E-05	1.89E-06	1.02E-06
	1.80E-09	4.90E-08	3.44E-08	1.51E-07	1.71E-14	2.74E-07	4.93E-08	2.59E-08
	2.40E-08	1.23E-06	4.59E-07	2.01E-06	2.28E-13	3.65E-06	1.24E-06	3.46E-07
	6.00E-07	3.42E-05	1.15E-05	5.02E-05	5.69E-12	9.12E-05	3.44E-05	8.65E-06
	1.70E-08	6.97E-07	3.25E-07	1.42E-06	1.61E-13	2.58E-06	7.01E-07	2.45E-07
	4.00E-06	3.11E-04	7.65E-05	3.35E-04	3.79E-11	6.08E-04	3.12E-04	5.77E-05
	4.90E-09	1.77E-07	9.37E-08	4.10E-07	4.65E-14	7.45E-07	1.78E-07	7.06E-08
	4.26E-06	**3.19E-04**	**8.14E-05**	**3.57E-04**	**4.04E-11**	**6.47E-04**	**3.21E-04**	**6.14E-05**
			9.29E-05	4.07E-04	4.61E-11	7.39E-04		7.00E-05
			3.74E-02	**1.64E-01**				**2.82E-02**
terest		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	4.30E-06	9.15E-04	3.29E-04	1.44E-03	1.63E-10	2.61E-03	9.20E-04	2.48E-04
	2.10E-03	1.06E+00	1.61E-01	7.03E-01	7.96E-08	1.28E+00	1.06E+00	1.21E-01
	8.30E-07	3.82E-04	6.35E-05	2.78E-04	3.15E-11	5.05E-04	3.84E-04	4.78E-05
	3.00E-03	2.92E+00	2.29E-01	1.00E+00	1.14E-07	1.82E+00	2.93E+00	1.73E-01
	8.50E-05	7.29E-02	6.50E-03	2.85E-02	3.22E-09	5.17E-02	7.33E-02	4.90E-03
	1.10E-06	3.35E-04	8.41E-05	3.68E-04	4.17E-11	6.69E-04	3.37E-04	6.34E-05
	6.40E-07	6.04E-04	4.89E-05	2.14E-04	2.43E-11	3.89E-04	6.07E-04	3.69E-05
	2.30E-06	1.32E-03	1.76E-04	7.70E-04	8.72E-11	1.40E-03	1.33E-03	1.33E-04
	2.80E-05	1.25E-02	2.14E-03	9.38E-03	1.06E-09	1.70E-02	1.26E-02	1.61E-03

2. AP 42, Fifth Edition, Volume IChapter 1: External Comb

		103-H-0302		Fluid Catalytic Cracking (FCC) Unit		Tag	112-H-1201		
r Petroleum Refineries, Version 3, RTI International.		53,050.00		Raw Charge Heater		flue gas (lb/h)	25,145.00		
tors for Boilers and Process Heaters Firing Various Fuels		0.0349		Heat input (MMBtu/h)	28.35	density (lb/ft3)	0.0297		H (M
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		1,520,057.31	25334.2884	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	846,633.00	14110.5499	Em
		600.1				T (°F)	785		
		588.76				T(K)	691.48		
		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	5.20E-07	3.16E-04	1.25E-04	1.47E-05	6.46E-05	1.74E-11	2.79E-04	1.30E-04	
	2.00E-07	1.22E-04	7.84E-05	5.67E-06	2.48E-05	6.70E-12	1.07E-04	8.13E-05	
	1.30E-07	7.90E-05	4.24E-04	3.69E-06	1.61E-05	4.35E-12	6.98E-05	4.39E-04	
	1.10E-06	6.69E-04	2.87E-04	3.12E-05	1.37E-04	3.68E-11	5.91E-04	2.98E-04	
	2.80E-07	1.70E-04	1.58E-04	7.94E-06	3.48E-05	9.38E-12	1.50E-04	1.64E-04	
	1.40E-06	8.51E-04	7.91E-04	3.97E-05	1.74E-04	4.69E-11	7.52E-04	8.20E-04	
	8.20E-08	4.99E-05	4.09E-05	2.32E-06	1.02E-05	2.75E-12	4.40E-05	4.24E-05	
	3.70E-07	2.25E-04	1.98E-04	1.05E-05	4.59E-05	1.24E-11	1.99E-04	2.05E-04	
	2.50E-07	1.52E-04	3.66E-05	7.09E-06	3.10E-05	8.37E-12	1.34E-04	3.80E-05	
	2.10E-06	1.28E-03	1.05E-03	5.95E-05	2.61E-04	7.03E-11	1.13E-03	1.09E-03	
	8.80E-07	5.35E-04	3.27E-04	2.49E-05	1.09E-04	2.95E-11	4.72E-04	3.39E-04	
	-	**4.45E-03**		**2.07E-04**	**9.08E-04**	**9.23E-11**	**3.93E-03**		
APs		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	1.20E-05	1.82E-03	2.00E-03	8.51E-05	3.73E-04	1.00E-10	1.61E-03	2.07E-03	
	1.70E-05	2.58E-03	2.23E-03	1.20E-04	5.28E-04	1.42E-10	2.28E-03	2.31E-03	
	2.10E-06	3.19E-04	1.97E-04	1.49E-05	6.52E-05	1.76E-11	2.82E-04	2.05E-04	
	2.20E-08	3.34E-06	7.08E-07	1.56E-07	6.83E-07	1.84E-13	2.95E-06	7.34E-07	
	1.20E-06	1.82E-04	5.99E-05	8.51E-06	3.73E-05	1.00E-11	1.61E-04	6.22E-05	
	1.60E-05	2.43E-03	1.11E-03	1.13E-04	4.97E-04	1.34E-10	2.15E-03	1.15E-03	
	7.40E-05	1.12E-02	1.81E-02	5.24E-04	2.30E-03	6.19E-10	9.93E-03	1.88E-02	
	1.80E-03	2.74E-01	1.53E-01	1.28E-02	5.59E-02	1.51E-08	2.42E-01	1.59E-01	
	3.30E-06	5.02E-04	2.63E-04	2.34E-05	1.02E-04	2.76E-11	4.43E-04	2.73E-04	
	2.50E-05	3.80E-03	1.73E-03	1.77E-04	7.76E-04	2.09E-10	3.36E-03	1.79E-03	
		2.97E-01		1.38E-02	6.06E-02	1.63E-08	2.62E-01		
cs (excluding dioxin/furans)		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	2.40E-09	3.65E-07	1.14E-07	1.70E-08	7.45E-08	2.01E-14	3.22E-07	1.19E-07	
	6.50E-09	9.88E-07	3.14E-07	4.61E-08	2.02E-07	5.44E-14	8.72E-07	3.25E-07	
	4.70E-09	7.14E-07	1.94E-07	3.33E-08	1.46E-07	3.93E-14	6.31E-07	2.01E-07	

		103-H-0302		Fluid Catalytic Cracking (FCC) Unit		Tag	112-H-1201		
r Petroleum Refineries, Version 3, RTI International.		53,050.00		Raw Charge Heater		flue gas (lb/h)	25,145.00		
tors for Boilers and Process Heaters Firing Various Fuels		0.0349		Heat input (MMBtu/h)	28.35	density (lb/ft3)	0.0297		H (M
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		1,520,057.31	25334.2884	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	846,633.00	14110.5499	Em
		600.1				T (°F)	785		
		588.76				T(K)	691.48		
		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	1.30E-09	1.98E-07	3.46E-08	9.21E-09	4.04E-08	1.09E-14	1.74E-07	3.58E-08	
	1.70E-08	2.58E-06	4.95E-07	1.20E-07	5.28E-07	1.42E-13	2.28E-06	5.13E-07	
	1.60E-09	2.43E-07	5.15E-08	1.13E-08	4.97E-08	1.34E-14	2.15E-07	5.34E-08	
	1.20E-09	1.82E-07	3.17E-08	8.51E-09	3.73E-08	1.00E-14	1.61E-07	3.28E-08	
	1.60E-08	2.43E-06	4.58E-07	1.13E-07	4.97E-07	1.34E-13	2.15E-06	4.75E-07	
	2.90E-09	4.41E-07	1.05E-07	2.06E-08	9.00E-08	2.43E-14	3.89E-07	1.09E-07	
	2.70E-09	4.10E-07	1.19E-07	1.91E-08	8.38E-08	2.26E-14	3.62E-07	1.24E-07	
	7.10E-08	1.08E-05	1.89E-06	5.03E-07	2.20E-06	5.94E-13	9.53E-06	1.96E-06	
	1.80E-09	2.74E-07	4.93E-08	1.28E-08	5.59E-08	1.51E-14	2.42E-07	5.11E-08	
	2.40E-08	3.65E-06	1.24E-06	1.70E-07	7.45E-07	2.01E-13	3.22E-06	1.29E-06	
	6.00E-07	9.12E-05	3.44E-05	4.25E-06	1.86E-05	5.02E-12	8.05E-05	3.56E-05	
	1.70E-08	2.58E-06	7.00E-07	1.20E-07	5.28E-07	1.42E-13	2.28E-06	7.26E-07	
	4.00E-06	6.08E-04	3.12E-04	2.84E-05	1.24E-04	3.35E-11	5.37E-04	3.24E-04	
	4.90E-09	7.45E-07	1.78E-07	3.47E-08	1.52E-07	4.10E-14	6.58E-07	1.84E-07	
	4.26E-06	**6.47E-04**	**3.21E-04**	**3.02E-05**	**1.32E-04**	**3.57E-11**	**5.72E-04**	**3.32E-04**	
		7.39E-04	3.55E-04	3.44E-05	1.51E-04	4.07E-11	6.52E-04		
				1.39E-02	**6.07E-02**				
nterest		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	4.30E-06	2.61E-03	9.20E-04	1.22E-04	5.34E-04	1.44E-10	2.31E-03	9.54E-04	
	2.10E-03	1.28E+00	1.06E+00	5.95E-02	2.61E-01	7.03E-08	1.13E+00	1.10E+00	
	8.30E-07	5.05E-04	3.84E-04	2.35E-05	1.03E-04	2.78E-11	4.46E-04	3.98E-04	
	3.00E-03	1.82E+00	2.93E+00	8.51E-02	3.73E-01	1.00E-07	1.61E+00	3.04E+00	
	8.50E-05	5.17E-02	7.33E-02	2.41E-03	1.06E-02	2.85E-09	4.56E-02	7.60E-02	
	1.10E-06	6.69E-04	3.37E-04	3.12E-05	1.37E-04	3.68E-11	5.91E-04	3.49E-04	
	6.40E-07	3.89E-04	6.07E-04	1.81E-05	7.95E-05	2.14E-11	3.44E-04	6.29E-04	
	2.30E-06	1.40E-03	1.33E-03	6.52E-05	2.86E-04	7.70E-11	1.23E-03	1.38E-03	
	2.80E-05	1.70E-02	1.26E-02	7.94E-04	3.48E-03	9.38E-10	1.50E-02	1.30E-02	

2, AP 42, Fifth Edition, Volume IChapter 1: External Comb

		Isomerization Unit							
r Petroleum Refineries, Version 3, RTI International.		flue gas (lb/h)	1463	Tag	Dryer Regeneration Heater		flue gas (lb/h)	3326	Ta
tors for Boilers and Process Heaters Firing Various Fuels		density (lb/ft3)	0.0286	117-H-1701	Heat input (MMBtu/h)	3.75	density (lb/ft3)	0.0296	117-H
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		flue gas (ft3/h)	51,153.85	852.56	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	112,364.86	1,87
		T (°F)	823.8				T (°F)	787.7	
		T(K)	713.04				T(K)	692.98	
		Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (
	5.20E-07	1.68E-11	2.69E-04	1.29E-04	1.95E-06	8.54E-06	1.74E-11	2.78E-04	1.30
	2.00E-07	6.45E-12	1.03E-04	8.08E-05	7.50E-07	3.29E-06	6.67E-12	1.07E-04	8.12
	1.30E-07	4.19E-12	6.72E-05	4.37E-04	4.88E-07	2.14E-06	4.34E-12	6.96E-05	4.39
	1.10E-06	3.55E-11	5.69E-04	2.96E-04	4.13E-06	1.81E-05	3.67E-11	5.89E-04	2.98
	2.80E-07	9.03E-12	1.45E-04	1.63E-04	1.05E-06	4.60E-06	9.34E-12	1.50E-04	1.64
	1.40E-06	4.52E-11	7.24E-04	8.15E-04	5.25E-06	2.30E-05	4.67E-11	7.49E-04	8.19
	8.20E-08	2.64E-12	4.24E-05	4.21E-05	3.08E-07	1.35E-06	2.74E-12	4.39E-05	4.23
	3.70E-07	1.19E-11	1.91E-04	2.04E-04	1.39E-06	6.08E-06	1.23E-11	1.98E-04	2.05
	2.50E-07	8.06E-12	1.29E-04	3.77E-05	9.38E-07	4.11E-06	8.34E-12	1.34E-04	3.79
	2.10E-06	6.77E-11	1.09E-03	1.08E-03	7.88E-06	3.45E-05	7.01E-11	1.12E-03	1.09
	8.80E-07	2.84E-11	4.55E-04	3.37E-04	3.30E-06	1.45E-05	2.94E-11	4.71E-04	3.39
	-	**5.37E-12**	**3.78E-03**		**2.74E-05**	**1.20E-04**	**1.22E-11**	**3.91E-03**	
APs		Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (
	1.20E-05	9.68E-11	1.55E-03	2.06E-03	1.13E-05	4.93E-05	1.00E-10	1.61E-03	2.07
	1.70E-05	1.37E-10	2.20E-03	2.29E-03	1.59E-05	6.98E-05	1.42E-10	2.27E-03	2.31
	2.10E-06	1.69E-11	2.72E-04	2.03E-04	1.97E-06	8.62E-06	1.75E-11	2.81E-04	2.04
	2.20E-08	1.77E-13	2.84E-06	7.29E-07	2.06E-08	9.03E-08	1.84E-13	2.94E-06	7.33
	1.20E-06	9.68E-12	1.55E-04	6.17E-05	1.13E-06	4.93E-06	1.00E-11	1.61E-04	6.21
	1.60E-05	1.29E-10	2.07E-03	1.14E-03	1.50E-05	6.57E-05	1.33E-10	2.14E-03	1.15
	7.40E-05	5.97E-10	9.57E-03	1.86E-02	6.94E-05	3.04E-04	6.17E-10	9.90E-03	1.87
	1.80E-03	1.45E-08	2.33E-01	1.58E-01	1.69E-03	7.39E-03	1.50E-08	2.41E-01	1.59
	3.30E-06	2.66E-11	4.27E-04	2.71E-04	3.09E-06	1.36E-05	2.75E-11	4.41E-04	2.72
	2.50E-05	2.02E-10	3.23E-03	1.78E-03	2.34E-05	1.03E-04	2.09E-10	3.34E-03	1.79
		1.57E-08	2.52E-01		1.83E-03	8.01E-03	1.63E-08	2.61E-01	
cs (excluding dioxin/furans)		Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (
	2.40E-09	1.94E-14	3.10E-07	1.18E-07	2.25E-09	9.86E-09	2.00E-14	3.21E-07	1.18
	6.50E-09	5.24E-14	8.40E-07	3.23E-07	6.09E-09	2.67E-08	5.42E-14	8.69E-07	3.25
	4.70E-09	3.79E-14	6.08E-07	1.99E-07	4.41E-09	1.93E-08	3.92E-14	6.29E-07	2.01

		Isomerization Unit							
r Petroleum Refineries, Version 3, RTI International.		flue gas (lb/h)	1463	Tag	Dryer Regeneration Heater		flue gas (lb/h)	3326	Ta
tors for Boilers and Process Heaters Firing Various Fuels		density (lb/ft3)	0.0286	117-H-1701	Heat input (MMBtu/h)	3.75	density (lb/ft3)	0.0296	117-H
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		flue gas (ft3/h)	51,153.85	852.56	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	112,364.86	1,87
		T (°F)	823.8				T (°F)	787.7	
		T(K)	713.04				T(K)	692.98	
		Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (
	1.30E-09	1.05E-14	1.68E-07	3.56E-08	1.22E-09	5.34E-09	1.08E-14	1.74E-07	3.58
	1.70E-08	1.37E-13	2.20E-06	5.10E-07	1.59E-08	6.98E-08	1.42E-13	2.27E-06	5.12
	1.60E-09	1.29E-14	2.07E-07	5.30E-08	1.50E-09	6.57E-09	1.33E-14	2.14E-07	5.33
	1.20E-09	9.68E-15	1.55E-07	3.26E-08	1.13E-09	4.93E-09	1.00E-14	1.61E-07	3.28
	1.60E-08	1.29E-13	2.07E-06	4.72E-07	1.50E-08	6.57E-08	1.33E-13	2.14E-06	4.75
	2.90E-09	2.34E-14	3.75E-07	1.08E-07	2.72E-09	1.19E-08	2.42E-14	3.88E-07	1.09
	2.70E-09	2.18E-14	3.49E-07	1.23E-07	2.53E-09	1.11E-08	2.25E-14	3.61E-07	1.24
	7.10E-08	5.73E-13	9.18E-06	1.94E-06	6.66E-08	2.92E-07	5.92E-13	9.50E-06	1.95
	1.80E-09	1.45E-14	2.33E-07	5.07E-08	1.69E-09	7.39E-09	1.50E-14	2.41E-07	5.10
	2.40E-08	1.94E-13	3.10E-06	1.28E-06	2.25E-08	9.86E-08	2.00E-13	3.21E-06	1.28
	6.00E-07	4.84E-12	7.76E-05	3.54E-05	5.63E-07	2.46E-06	5.01E-12	8.03E-05	3.56
	1.70E-08	1.37E-13	2.20E-06	7.21E-07	1.59E-08	6.98E-08	1.42E-13	2.27E-06	7.25
	4.00E-06	3.23E-11	5.17E-04	3.21E-04	3.75E-06	1.64E-05	3.34E-11	5.35E-04	3.23
	4.90E-09	3.95E-14	6.34E-07	1.83E-07	4.59E-09	2.01E-08	4.09E-14	6.55E-07	1.84
	4.26E-06	**3.43E-11**	**5.51E-04**	**3.30E-04**	**3.99E-06**	**1.75E-05**	**3.55E-11**	**5.70E-04**	**3.32**
		3.92E-11	6.28E-04		4.56E-06	2.00E-05	4.05E-11	6.50E-04	
					1.83E-03	**8.03E-03**			
terest		Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (
	4.30E-06	1.39E-10	2.22E-03	9.47E-04	1.61E-05	7.06E-05	1.44E-10	2.30E-03	9.53
	2.10E-03	6.77E-08	1.09E+00	1.09E+00	7.88E-03	3.45E-02	7.01E-08	1.12E+00	1.10
	8.30E-07	2.68E-11	4.29E-04	3.95E-04	3.11E-06	1.36E-05	2.77E-11	4.44E-04	3.97
	3.00E-03	9.68E-08	1.55E+00	3.02E+00	1.13E-02	4.93E-02	1.00E-07	1.61E+00	3.04
	8.50E-05	2.74E-09	4.40E-02	7.55E-02	3.19E-04	1.40E-03	2.84E-09	4.55E-02	7.59
	1.10E-06	3.55E-11	5.69E-04	3.47E-04	4.13E-06	1.81E-05	3.67E-11	5.89E-04	3.49
	6.40E-07	2.06E-11	3.31E-04	6.25E-04	2.40E-06	1.05E-05	2.14E-11	3.42E-04	6.29
	2.30E-06	7.42E-11	1.19E-03	1.37E-03	8.63E-06	3.78E-05	7.68E-11	1.23E-03	1.37
	2.80E-05	9.03E-10	1.45E-02	1.30E-02	1.05E-04	4.60E-04	9.34E-10	1.50E-02	1.30

2. AP 42, Fifth Edition, Volume IChapter 1: External Comb

		Light Naphtha Hydrotreater				Catalytic Reformer Unit #2			
r Petroleum Refineries, Version 3, RTI International.		eater	flue gas (lb/h)	12,328.00	Tag	Reformer Heater 1		flue gas (lb/h)	37,0
tors for Boilers and Process Heaters Firing Various Fuels		13.9	density (lb/ft3)	0.03	111-H-1101	Heat input (MMBtu/h)	41.73	density (lb/ft3)	0.
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (us tpy)	flue gas (ft3/h)	417,898.31	6,964.97	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	1,246,
			T (°F)	793.1				T (°F)	78
			T(K)	695.98				T(K)	69
			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (
	5.20E-07	3.17E-05	1.73E-11	2.77E-04	1.30E-04	2.17E-05	9.50E-05	1.74E-11	2.79
	2.00E-07	1.22E-05	6.65E-12	1.07E-04	8.13E-05	8.35E-06	3.66E-05	6.70E-12	1.07
	1.30E-07	7.91E-06	4.32E-12	6.93E-05	4.39E-04	5.42E-06	2.38E-05	4.35E-12	6.98
	1.10E-06	6.70E-05	3.66E-11	5.87E-04	2.98E-04	4.59E-05	2.01E-04	3.68E-11	5.91
	2.80E-07	1.70E-05	9.31E-12	1.49E-04	1.64E-04	1.17E-05	5.12E-05	9.38E-12	1.50
	1.40E-06	8.52E-05	4.66E-11	7.47E-04	8.20E-04	5.84E-05	2.56E-04	4.69E-11	7.52
	8.20E-08	4.99E-06	2.73E-12	4.37E-05	4.24E-05	3.42E-06	1.50E-05	2.75E-12	4.40
	3.70E-07	2.25E-05	1.23E-11	1.97E-04	2.05E-04	1.54E-05	6.76E-05	1.24E-11	1.99
	2.50E-07	1.52E-05	8.32E-12	1.33E-04	3.80E-05	1.04E-05	4.57E-05	8.37E-12	1.34
	2.10E-06	1.28E-04	6.98E-11	1.12E-03	1.09E-03	8.76E-05	3.84E-04	7.03E-11	1.13
	8.80E-07	5.36E-05	2.93E-11	4.69E-04	3.39E-04	3.67E-05	1.61E-04	2.95E-11	4.72
	-	**4.45E-04**	**4.53E-11**	**3.90E-03**		**3.05E-04**	**1.34E-03**	**1.36E-10**	**3.93**
APs			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (
	1.20E-05	1.83E-04	9.98E-11	1.60E-03	2.07E-03	1.25E-04	5.48E-04	1.00E-10	1.61
	1.70E-05	2.59E-04	1.41E-10	2.27E-03	2.31E-03	1.77E-04	7.77E-04	1.42E-10	2.28
	2.10E-06	3.20E-05	1.75E-11	2.80E-04	2.05E-04	2.19E-05	9.60E-05	1.76E-11	2.82
	2.20E-08	3.35E-07	1.83E-13	2.93E-06	7.34E-07	2.30E-07	1.01E-06	1.84E-13	2.95
	1.20E-06	1.83E-05	9.98E-12	1.60E-04	6.21E-05	1.25E-05	5.48E-05	1.00E-11	1.61
	1.60E-05	2.44E-04	1.33E-10	2.13E-03	1.15E-03	1.67E-04	7.31E-04	1.34E-10	2.15
	7.40E-05	1.13E-03	6.15E-10	9.87E-03	1.88E-02	7.72E-04	3.38E-03	6.19E-10	9.93
	1.80E-03	2.74E-02	1.50E-08	2.40E-01	1.59E-01	1.88E-02	8.22E-02	1.51E-08	2.42
	3.30E-06	5.02E-05	2.74E-11	4.40E-04	2.73E-04	3.44E-05	1.51E-04	2.76E-11	4.43
	2.50E-05	3.81E-04	2.08E-10	3.33E-03	1.79E-03	2.61E-04	1.14E-03	2.09E-10	3.36
		2.97E-02	1.62E-08	2.60E-01		2.03E-02	8.91E-02	1.63E-08	2.62
cs (excluding dioxin/furans)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (
	2.40E-09	3.65E-08	2.00E-14	3.20E-07	1.18E-07	2.50E-08	1.10E-07	2.01E-14	3.22
	6.50E-09	9.89E-08	5.41E-14	8.67E-07	3.25E-07	6.78E-08	2.97E-07	5.44E-14	8.72
	4.70E-09	7.15E-08	3.91E-14	6.27E-07	2.01E-07	4.90E-08	2.15E-07	3.93E-14	6.31

		Light Naphtha Hydrotreater				Catalytic Reformer Unit #2			
r Petroleum Refineries, Version 3, RTI International.		eater	flue gas (lb/h)	12,328.00	Tag	Reformer Heater 1		flue gas (lb/h)	37,0
tors for Boilers and Process Heaters Firing Various Fuels		13.9	density (lb/ft3)	0.03	111-H-1101	Heat input (MMBtu/h)	41.73	density (lb/ft3)	0.
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (us tpy)	flue gas (ft3/h)	417,898.31	6,964.97	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	1,246,
			T (°F)	793.1				T (°F)	78
			T(K)	695.98				T(K)	69
			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (
	1.30E-09	1.98E-08	1.08E-14	1.73E-07	3.58E-08	1.36E-08	5.94E-08	1.09E-14	1.74
	1.70E-08	2.59E-07	1.41E-13	2.27E-06	5.13E-07	1.77E-07	7.77E-07	1.42E-13	2.28
	1.60E-09	2.44E-08	1.33E-14	2.13E-07	5.34E-08	1.67E-08	7.31E-08	1.34E-14	2.15
	1.20E-09	1.83E-08	9.98E-15	1.60E-07	3.28E-08	1.25E-08	5.48E-08	1.00E-14	1.61
	1.60E-08	2.44E-07	1.33E-13	2.13E-06	4.75E-07	1.67E-07	7.31E-07	1.34E-13	2.15
	2.90E-09	4.41E-08	2.41E-14	3.87E-07	1.09E-07	3.03E-08	1.33E-07	2.43E-14	3.89
	2.70E-09	4.11E-08	2.25E-14	3.60E-07	1.24E-07	2.82E-08	1.23E-07	2.26E-14	3.62
	7.10E-08	1.08E-06	5.90E-13	9.47E-06	1.96E-06	7.41E-07	3.24E-06	5.94E-13	9.53
	1.80E-09	2.74E-08	1.50E-14	2.40E-07	5.11E-08	1.88E-08	8.22E-08	1.51E-14	2.42
	2.40E-08	3.65E-07	2.00E-13	3.20E-06	1.29E-06	2.50E-07	1.10E-06	2.01E-13	3.22
	6.00E-07	9.13E-06	4.99E-12	8.00E-05	3.56E-05	6.26E-06	2.74E-05	5.02E-12	8.05
	1.70E-08	2.59E-07	1.41E-13	2.27E-06	7.26E-07	1.77E-07	7.77E-07	1.42E-13	2.28
	4.00E-06	6.09E-05	3.33E-11	5.33E-04	3.24E-04	4.17E-05	1.83E-04	3.35E-11	5.37
	4.90E-09	7.46E-08	4.07E-14	6.53E-07	1.84E-07	5.11E-08	2.24E-07	4.10E-14	6.58
	4.26E-06	**6.48E-05**	**3.54E-11**	**5.68E-04**	**3.32E-04**	**4.44E-05**	**1.95E-04**	**3.57E-11**	**5.72**
		7.40E-05	4.04E-11	6.48E-04		5.07E-05	2.22E-04	4.07E-11	6.52
		2.98E-02				**2.04E-02**	**8.94E-02**		
terest			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (
	4.30E-06	2.62E-04	1.43E-10	2.29E-03	9.54E-04	1.79E-04	7.86E-04	1.44E-10	2.31
	2.10E-03	1.28E-01	6.98E-08	1.12E+00	1.10E+00	8.76E-02	3.84E-01	7.03E-08	1.13
	8.30E-07	5.05E-05	2.76E-11	4.43E-04	3.98E-04	3.46E-05	1.52E-04	2.78E-11	4.46
	3.00E-03	1.83E-01	9.98E-08	1.60E+00	3.04E+00	1.25E-01	5.48E-01	1.00E-07	1.61
	8.50E-05	5.17E-03	2.83E-09	4.53E-02	7.60E-02	3.55E-03	1.55E-02	2.85E-09	4.56
	1.10E-06	6.70E-05	3.66E-11	5.87E-04	3.49E-04	4.59E-05	2.01E-04	3.68E-11	5.91
	6.40E-07	3.90E-05	2.13E-11	3.41E-04	6.29E-04	2.67E-05	1.17E-04	2.14E-11	3.44
	2.30E-06	1.40E-04	7.65E-11	1.23E-03	1.37E-03	9.60E-05	4.20E-04	7.70E-11	1.23
	2.80E-05	1.70E-03	9.31E-10	1.49E-02	1.30E-02	1.17E-03	5.12E-03	9.38E-10	1.50

2. AP 42, Fifth Edition, Volume IChapter 1: External Comb

		Catalytic Reformer Unit #1							D
r Petroleum Refineries, Version 3, RTI International.		Reformer Heater 1		flue gas (lb/h)	82,042.00	Tag	Reactor Charge Heater		flu
tors for Boilers and Process Heaters Firing Various Fuels		Heat input (MMBtu/h)	92.5	density (lb/ft3)	0.03	107-H-0701	Heat input (MMBtu/h)	16.25	den
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	2,771,689.19	46,194.82	Emission (lb/h)	Emission (us tpy)	flue
				T (°F)	787.7				
				T(K)	692.98				
				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Co
	5.20E-07	4.81E-05	2.11E-04	1.74E-11	2.78E-04	1.30E-04	8.45E-06	3.70E-05	
	2.00E-07	1.85E-05	8.10E-05	6.67E-12	1.07E-04	8.12E-05	3.25E-06	1.42E-05	
	1.30E-07	1.20E-05	5.27E-05	4.34E-12	6.96E-05	4.39E-04	2.11E-06	9.25E-06	
	1.10E-06	1.02E-04	4.46E-04	3.67E-11	5.89E-04	2.98E-04	1.79E-05	7.83E-05	
	2.80E-07	2.59E-05	1.13E-04	9.34E-12	1.50E-04	1.64E-04	4.55E-06	1.99E-05	
	1.40E-06	1.30E-04	5.67E-04	4.67E-11	7.49E-04	8.19E-04	2.28E-05	9.96E-05	
	8.20E-08	7.59E-06	3.32E-05	2.74E-12	4.39E-05	4.23E-05	1.33E-06	5.84E-06	
	3.70E-07	3.42E-05	1.50E-04	1.23E-11	1.98E-04	2.05E-04	6.01E-06	2.63E-05	
	2.50E-07	2.31E-05	1.01E-04	8.34E-12	1.34E-04	3.79E-05	4.06E-06	1.78E-05	
	2.10E-06	1.94E-04	8.51E-04	7.01E-11	1.12E-03	1.09E-03	3.41E-05	1.49E-04	
	8.80E-07	8.14E-05	3.57E-04	2.94E-11	4.71E-04	3.39E-04	1.43E-05	6.26E-05	
	-	**6.76E-04**	**2.96E-03**	**3.01E-10**	**3.91E-03**		**1.19E-04**	**5.20E-04**	
APs				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Co
	1.20E-05	2.78E-04	1.22E-03	1.00E-10	1.61E-03	2.07E-03	4.88E-05	2.14E-04	
	1.70E-05	3.93E-04	1.72E-03	1.42E-10	2.27E-03	2.31E-03	6.91E-05	3.02E-04	
	2.10E-06	4.86E-05	2.13E-04	1.75E-11	2.81E-04	2.04E-04	8.53E-06	3.74E-05	
	2.20E-08	5.09E-07	2.23E-06	1.84E-13	2.94E-06	7.33E-07	8.94E-08	3.91E-07	
	1.20E-06	2.78E-05	1.22E-04	1.00E-11	1.61E-04	6.21E-05	4.88E-06	2.14E-05	
	1.60E-05	3.70E-04	1.62E-03	1.33E-10	2.14E-03	1.15E-03	6.50E-05	2.85E-04	
	7.40E-05	1.71E-03	7.50E-03	6.17E-10	9.90E-03	1.87E-02	3.01E-04	1.32E-03	
	1.80E-03	4.16E-02	1.82E-01	1.50E-08	2.41E-01	1.59E-01	7.31E-03	3.20E-02	
	3.30E-06	7.63E-05	3.34E-04	2.75E-11	4.41E-04	2.72E-04	1.34E-05	5.87E-05	
	2.50E-05	5.78E-04	2.53E-03	2.09E-10	3.34E-03	1.79E-03	1.02E-04	4.45E-04	
		4.51E-02	1.98E-01	1.63E-08	2.61E-01		7.92E-03	3.47E-02	
cs (excluding dioxin/furans)				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Co
	2.40E-09	5.55E-08	2.43E-07	2.00E-14	3.21E-07	1.18E-07	9.75E-09	4.27E-08	
	6.50E-09	1.50E-07	6.58E-07	5.42E-14	8.69E-07	3.25E-07	2.64E-08	1.16E-07	
	4.70E-09	1.09E-07	4.76E-07	3.92E-14	6.29E-07	2.01E-07	1.91E-08	8.36E-08	

		Catalytic Reformer Unit #1							D
r Petroleum Refineries, Version 3, RTI International.		Reformer Heater 1		flue gas (lb/h)	82,042.00	Tag	Reactor Charge Heater		flu
tors for Boilers and Process Heaters Firing Various Fuels		Heat input (MMBtu/h)	92.5	density (lb/ft3)	0.03	107-H-0701	Heat input (MMBtu/h)	16.25	den
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	2,771,689.19	46,194.82	Emission (lb/h)	Emission (us tpy)	flue
				T (°F)	787.7				
				T(K)	692.98				
				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Co
	1.30E-09	3.01E-08	1.32E-07	1.08E-14	1.74E-07	3.58E-08	5.28E-09	2.31E-08	
	1.70E-08	3.93E-07	1.72E-06	1.42E-13	2.27E-06	5.12E-07	6.91E-08	3.02E-07	
	1.60E-09	3.70E-08	1.62E-07	1.33E-14	2.14E-07	5.33E-08	6.50E-09	2.85E-08	
	1.20E-09	2.78E-08	1.22E-07	1.00E-14	1.61E-07	3.28E-08	4.88E-09	2.14E-08	
	1.60E-08	3.70E-07	1.62E-06	1.33E-13	2.14E-06	4.75E-07	6.50E-08	2.85E-07	
	2.90E-09	6.71E-08	2.94E-07	2.42E-14	3.88E-07	1.09E-07	1.18E-08	5.16E-08	
	2.70E-09	6.24E-08	2.73E-07	2.25E-14	3.61E-07	1.24E-07	1.10E-08	4.80E-08	
	7.10E-08	1.64E-06	7.19E-06	5.92E-13	9.50E-06	1.95E-06	2.88E-07	1.26E-06	
	1.80E-09	4.16E-08	1.82E-07	1.50E-14	2.41E-07	5.10E-08	7.31E-09	3.20E-08	
	2.40E-08	5.55E-07	2.43E-06	2.00E-13	3.21E-06	1.28E-06	9.75E-08	4.27E-07	
	6.00E-07	1.39E-05	6.08E-05	5.01E-12	8.03E-05	3.56E-05	2.44E-06	1.07E-05	
	1.70E-08	3.93E-07	1.72E-06	1.42E-13	2.27E-06	7.25E-07	6.91E-08	3.02E-07	
	4.00E-06	9.25E-05	4.05E-04	3.34E-11	5.35E-04	3.23E-04	1.63E-05	7.12E-05	
	4.90E-09	1.13E-07	4.96E-07	4.09E-14	6.55E-07	1.84E-07	1.99E-08	8.72E-08	
	4.26E-06	**9.85E-05**	**4.31E-04**	**3.55E-11**	**5.70E-04**	**3.32E-04**	**1.73E-05**	**7.58E-05**	
		1.12E-04	4.92E-04	4.05E-11	6.50E-04		1.97E-05	8.65E-05	
		4.52E-02	**1.98E-01**				**7.94E-03**	**3.48E-02**	
terest				Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)			Co
	4.30E-06	3.98E-04	1.74E-03	1.44E-10	2.30E-03	9.53E-04	6.99E-05	3.06E-04	
	2.10E-03	1.94E-01	8.51E-01	7.01E-08	1.12E+00	1.10E+00	3.41E-02	1.49E-01	
	8.30E-07	7.68E-05	3.36E-04	2.77E-11	4.44E-04	3.97E-04	1.35E-05	5.91E-05	
	3.00E-03	2.78E-01	1.22E+00	1.00E-07	1.61E+00	3.04E+00	4.88E-02	2.14E-01	
	8.50E-05	7.86E-03	3.44E-02	2.84E-09	4.55E-02	7.59E-02	1.38E-03	6.05E-03	
	1.10E-06	1.02E-04	4.46E-04	3.67E-11	5.89E-04	3.49E-04	1.79E-05	7.83E-05	
	6.40E-07	5.92E-05	2.59E-04	2.14E-11	3.42E-04	6.29E-04	1.04E-05	4.56E-05	
	2.30E-06	2.13E-04	9.32E-04	7.68E-11	1.23E-03	1.37E-03	3.74E-05	1.64E-04	
	2.80E-05	2.59E-03	1.13E-02	9.34E-10	1.50E-02	1.30E-02	4.55E-04	1.99E-03	

2. AP 42, Fifth Edition, Volume IChapter 1: External Comb

			Alkylation Unit					
r Petroleum Refineries, Version 3, RTI International.		Tag	Iso-Stripper Reboiler		flue gas (lb/h)	30,004.10	Tag	Feed H
tors for Boilers and Process Heaters Firing Various Fuels		110-H-1001	Heat input (MMBtu/h)	84.19	density (lb/ft3)	0.03	118-H-1801	Heat input (MMBtu/h)
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		8,091.77	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	1,013,652.03	16,894.20	Emission (lb/h)
					T (°F)	785.5		
					T(K)	691.76		
		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	5.20E-07	1.28E-04	4.38E-05	1.92E-04	4.32E-11	6.92E-04	3.23E-04	7.15E-06
	2.00E-07	7.99E-05	1.68E-05	7.38E-05	1.66E-11	2.66E-04	2.02E-04	2.75E-06
	1.30E-07	4.32E-04	1.09E-05	4.79E-05	1.08E-11	1.73E-04	1.09E-03	1.79E-06
	1.10E-06	2.93E-04	9.26E-05	4.06E-04	9.14E-11	1.46E-03	7.40E-04	1.51E-05
	2.80E-07	1.61E-04	2.36E-05	1.03E-04	2.33E-11	3.73E-04	4.07E-04	3.85E-06
	1.40E-06	8.06E-04	1.18E-04	5.16E-04	1.16E-10	1.86E-03	2.04E-03	1.93E-05
	8.20E-08	4.17E-05	6.90E-06	3.02E-05	6.81E-12	1.09E-04	1.05E-04	1.13E-06
	3.70E-07	2.02E-04	3.12E-05	1.36E-04	3.07E-11	4.93E-04	5.09E-04	5.09E-06
	2.50E-07	3.73E-05	2.10E-05	9.22E-05	2.08E-11	3.33E-04	9.42E-05	3.44E-06
	2.10E-06	1.07E-03	1.77E-04	7.74E-04	1.74E-10	2.80E-03	2.70E-03	2.89E-05
	8.80E-07	3.34E-04	7.41E-05	3.25E-04	7.31E-11	1.17E-03	8.42E-04	1.21E-05
	-		**6.16E-04**	**2.70E-03**	**2.74E-10**	**9.74E-03**	**9.05E-03**	**1.01E-04**
APs		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	1.20E-05	2.04E-03	2.53E-04	1.11E-03	2.49E-10	3.99E-03	5.15E-03	4.13E-05
	1.70E-05	2.27E-03	3.58E-04	1.57E-03	3.53E-10	5.66E-03	5.73E-03	5.84E-05
	2.10E-06	2.01E-04	4.42E-05	1.94E-04	4.36E-11	6.99E-04	5.08E-04	7.22E-06
	2.20E-08	7.21E-07	4.63E-07	2.03E-06	4.57E-13	7.32E-06	1.82E-06	7.56E-08
	1.20E-06	6.11E-05	2.53E-05	1.11E-04	2.49E-11	3.99E-04	1.54E-04	4.13E-06
	1.60E-05	1.13E-03	3.37E-04	1.48E-03	3.32E-10	5.33E-03	2.85E-03	5.50E-05
	7.40E-05	1.84E-02	1.56E-03	6.82E-03	1.54E-09	2.46E-02	4.66E-02	2.54E-04
	1.80E-03	1.56E-01	3.79E-02	1.66E-01	3.74E-08	5.99E-01	3.95E-01	6.19E-03
	3.30E-06	2.68E-04	6.95E-05	3.04E-04	6.85E-11	1.10E-03	6.77E-04	1.13E-05
	2.50E-05	1.76E-03	5.26E-04	2.30E-03	5.19E-10	8.32E-03	4.45E-03	8.59E-05
			4.11E-02	1.80E-01	4.05E-08	6.49E-01	4.61E-01	6.71E-03
cs (excluding dioxin/furans)		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	2.40E-09	1.16E-07	5.05E-08	2.21E-07	4.98E-14	7.99E-07	2.94E-07	8.25E-09
	6.50E-09	3.20E-07	1.37E-07	5.99E-07	1.35E-13	2.16E-06	8.07E-07	2.23E-08
	4.70E-09	1.97E-07	9.89E-08	4.33E-07	9.76E-14	1.56E-06	4.98E-07	1.62E-08

			Alkylation Unit					
r Petroleum Refineries, Version 3, RTI International.		Tag	Iso-Stripper Reboiler		flue gas (lb/h)	30,004.10	Tag	Feed H
tors for Boilers and Process Heaters Firing Various Fuels		110-H-1001	Heat input (MMBtu/h)	84.19	density (lb/ft3)	0.03	118-H-1801	Heat input (MMBtu/h)
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		8,091.77	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	1,013,652.03	16,894.20	Emission (lb/h)
					T (°F)	785.5		
					T(K)	691.76		
		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	1.30E-09	3.52E-08	2.74E-08	1.20E-07	2.70E-14	4.33E-07	8.89E-08	4.47E-09
	1.70E-08	5.04E-07	3.58E-07	1.57E-06	3.53E-13	5.66E-06	1.27E-06	5.84E-08
	1.60E-09	5.25E-08	3.37E-08	1.48E-07	3.32E-14	5.33E-07	1.32E-07	5.50E-09
	1.20E-09	3.23E-08	2.53E-08	1.11E-07	2.49E-14	3.99E-07	8.15E-08	4.13E-09
	1.60E-08	4.67E-07	3.37E-07	1.48E-06	3.32E-13	5.33E-06	1.18E-06	5.50E-08
	2.90E-09	1.07E-07	6.10E-08	2.67E-07	6.02E-14	9.65E-07	2.71E-07	9.97E-09
	2.70E-09	1.22E-07	5.68E-08	2.49E-07	5.61E-14	8.99E-07	3.07E-07	9.28E-09
	7.10E-08	1.92E-06	1.49E-06	6.55E-06	1.47E-12	2.36E-05	4.85E-06	2.44E-07
	1.80E-09	5.02E-08	3.79E-08	1.66E-07	3.74E-14	5.99E-07	1.27E-07	6.19E-09
	2.40E-08	1.26E-06	5.05E-07	2.21E-06	4.98E-13	7.99E-06	3.19E-06	8.25E-08
	6.00E-07	3.50E-05	1.26E-05	5.53E-05	1.25E-11	2.00E-04	8.85E-05	2.06E-06
	1.70E-08	7.14E-07	3.58E-07	1.57E-06	3.53E-13	5.66E-06	1.80E-06	5.84E-08
	4.00E-06	3.18E-04	8.42E-05	3.69E-04	8.31E-11	1.33E-03	8.03E-04	1.38E-05
	4.90E-09	1.81E-07	1.03E-07	4.52E-07	1.02E-13	1.63E-06	4.58E-07	1.68E-08
	4.26E-06	**3.27E-04**	**8.96E-05**	**3.93E-04**	**8.84E-11**	**1.42E-03**	**8.25E-04**	**1.46E-05**
			1.02E-04	4.48E-04	1.01E-10	1.62E-03	9.13E-04	1.67E-05
			4.12E-02	**1.80E-01**				**6.72E-03**
terest		Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)	
	4.30E-06	9.37E-04	3.62E-04	1.59E-03	3.57E-10	5.73E-03	2.37E-03	5.91E-05
	2.10E-03	1.08E+00	1.77E-01	7.74E-01	1.74E-07	2.80E+00	2.73E+00	2.89E-02
	8.30E-07	3.91E-04	6.99E-05	3.06E-04	6.89E-11	1.11E-03	9.87E-04	1.14E-05
	3.00E-03	2.99E+00	2.53E-01	1.11E+00	2.49E-07	3.99E+00	7.54E+00	4.13E-02
	8.50E-05	7.47E-02	7.16E-03	3.13E-02	7.06E-09	1.13E-01	1.89E-01	1.17E-03
	1.10E-06	3.43E-04	9.26E-05	4.06E-04	9.14E-11	1.46E-03	8.67E-04	1.51E-05
	6.40E-07	6.19E-04	5.39E-05	2.36E-04	5.32E-11	8.52E-04	1.56E-03	8.80E-06
	2.30E-06	1.35E-03	1.94E-04	8.48E-04	1.91E-10	3.06E-03	3.41E-03	3.16E-05
	2.80E-05	1.28E-02	2.36E-03	1.03E-02	2.33E-09	3.73E-02	3.24E-02	3.85E-04

2, AP 42, Fifth Edition, Volume IChapter 1: External Comb

		Heavy Naphtha Hydrotreater						
r Petroleum Refineries, Version 3, RTI International.		12,195.00	Tag	Heater 2		flue gas (lb/h)	14,412.80	Tag
tors for Boilers and Process Heaters Firing Various Fuels		0.03	105-H-0501	Heat input (MMBtu/h)	16.25	density (lb/ft3)	0.03	105-H-050
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		411,993.24	6,866.55	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	486,918.92	8,115.32
		787.7				T (°F)	787.7	
		692.98				T(K)	692.98	
		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppm
	5.20E-07	2.78E-04	1.30E-04	8.45E-06	3.70E-05	1.74E-11	2.78E-04	1.30E-04
	2.00E-07	1.07E-04	8.12E-05	3.25E-06	1.42E-05	6.67E-12	1.07E-04	8.12E-05
	1.30E-07	6.96E-05	4.39E-04	2.11E-06	9.25E-06	4.34E-12	6.96E-05	4.39E-04
	1.10E-06	5.89E-04	2.98E-04	1.79E-05	7.83E-05	3.67E-11	5.89E-04	2.98E-04
	2.80E-07	1.50E-04	1.64E-04	4.55E-06	1.99E-05	9.34E-12	1.50E-04	1.64E-04
	1.40E-06	7.49E-04	8.19E-04	2.28E-05	9.96E-05	4.67E-11	7.49E-04	8.19E-04
	8.20E-08	4.39E-05	4.23E-05	1.33E-06	5.84E-06	2.74E-12	4.39E-05	4.23E-05
	3.70E-07	1.98E-04	2.05E-04	6.01E-06	2.63E-05	1.23E-11	1.98E-04	2.05E-04
	2.50E-07	1.34E-04	3.79E-05	4.06E-06	1.78E-05	8.34E-12	1.34E-04	3.79E-05
	2.10E-06	1.12E-03	1.09E-03	3.41E-05	1.49E-04	7.01E-11	1.12E-03	1.09E-03
	8.80E-07	4.71E-04	3.39E-04	1.43E-05	6.26E-05	2.94E-11	4.71E-04	3.39E-04
	-	**3.91E-03**		**1.19E-04**	**5.20E-04**	**5.29E-11**	**3.91E-03**	**3.64E-03**
APs		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppm
	1.20E-05	1.61E-03	2.07E-03	4.88E-05	2.14E-04	1.00E-10	1.61E-03	2.07E-03
	1.70E-05	2.27E-03	2.31E-03	6.91E-05	3.02E-04	1.42E-10	2.27E-03	2.31E-03
	2.10E-06	2.81E-04	2.04E-04	8.53E-06	3.74E-05	1.75E-11	2.81E-04	2.04E-04
	2.20E-08	2.94E-06	7.33E-07	8.94E-08	3.91E-07	1.84E-13	2.94E-06	7.33E-07
	1.20E-06	1.61E-04	6.21E-05	4.88E-06	2.14E-05	1.00E-11	1.61E-04	6.21E-05
	1.60E-05	2.14E-03	1.15E-03	6.50E-05	2.85E-04	1.33E-10	2.14E-03	1.15E-03
	7.40E-05	9.90E-03	1.87E-02	3.01E-04	1.32E-03	6.17E-10	9.90E-03	1.87E-02
	1.80E-03	2.41E-01	1.59E-01	7.31E-03	3.20E-02	1.50E-08	2.41E-01	1.59E-01
	3.30E-06	4.41E-04	2.72E-04	1.34E-05	5.87E-05	2.75E-11	4.41E-04	2.72E-04
	2.50E-05	3.34E-03	1.79E-03	1.02E-04	4.45E-04	2.09E-10	3.34E-03	1.79E-03
		2.61E-01	1.85E-01	7.92E-03	3.47E-02	1.63E-08	2.61E-01	1.85E-01
cs (excluding dioxin/furans)		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppm
	2.40E-09	3.21E-07	1.18E-07	9.75E-09	4.27E-08	2.00E-14	3.21E-07	1.18E-07
	6.50E-09	8.70E-07	3.25E-07	2.64E-08	1.16E-07	5.42E-14	8.69E-07	3.25E-07
	4.70E-09	6.29E-07	2.01E-07	1.91E-08	8.36E-08	3.92E-14	6.29E-07	2.01E-07

		Heavy Naphtha Hydrotreater						
r Petroleum Refineries, Version 3, RTI International.		12,195.00	Tag	Heater 2		flue gas (lb/h)	14,412.80	Tag
tors for Boilers and Process Heaters Firing Various Fuels		0.03	105-H-0501	Heat input (MMBtu/h)	16.25	density (lb/ft3)	0.03	105-H-050
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		411,993.24	6,866.55	Emission (lb/h)	Emission (us tpy)	flue gas (ft3/h)	486,918.92	8,115.32
		787.7				T (°F)	787.7	
		692.98				T(K)	692.98	
		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppm
	1.30E-09	1.74E-07	3.58E-08	5.28E-09	2.31E-08	1.08E-14	1.74E-07	3.58E-08
	1.70E-08	2.27E-06	5.13E-07	6.91E-08	3.02E-07	1.42E-13	2.27E-06	5.12E-07
	1.60E-09	2.14E-07	5.33E-08	6.50E-09	2.85E-08	1.33E-14	2.14E-07	5.33E-08
	1.20E-09	1.61E-07	3.28E-08	4.88E-09	2.14E-08	1.00E-14	1.61E-07	3.28E-08
	1.60E-08	2.14E-06	4.75E-07	6.50E-08	2.85E-07	1.33E-13	2.14E-06	4.75E-07
	2.90E-09	3.88E-07	1.09E-07	1.18E-08	5.16E-08	2.42E-14	3.88E-07	1.09E-07
	2.70E-09	3.61E-07	1.24E-07	1.10E-08	4.80E-08	2.25E-14	3.61E-07	1.24E-07
	7.10E-08	9.50E-06	1.95E-06	2.88E-07	1.26E-06	5.92E-13	9.50E-06	1.95E-06
	1.80E-09	2.41E-07	5.10E-08	7.31E-09	3.20E-08	1.50E-14	2.41E-07	5.10E-08
	2.40E-08	3.21E-06	1.28E-06	9.75E-08	4.27E-07	2.00E-13	3.21E-06	1.28E-06
	6.00E-07	8.03E-05	3.56E-05	2.44E-06	1.07E-05	5.01E-12	8.03E-05	3.56E-05
	1.70E-08	2.27E-06	7.25E-07	6.91E-08	3.02E-07	1.42E-13	2.27E-06	7.25E-07
	4.00E-06	5.35E-04	3.23E-04	1.63E-05	7.12E-05	3.34E-11	5.35E-04	3.23E-04
	4.90E-09	6.55E-07	1.84E-07	1.99E-08	8.72E-08	4.09E-14	6.55E-07	1.84E-07
	4.26E-06	**5.70E-04**	**3.32E-04**	**1.73E-05**	**7.58E-05**	**3.55E-11**	**5.70E-04**	**3.32E-04**
		6.50E-04	3.68E-04	1.97E-05	8.65E-05	4.05E-11	6.50E-04	3.68E-04
				7.94E-03	**3.48E-02**			
terest		Conc. (mg/m3)	Conc. (ppmv)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppm
	4.30E-06	2.30E-03	9.53E-04	6.99E-05	3.06E-04	1.44E-10	2.30E-03	9.53E-04
	2.10E-03	1.12E+00	1.10E+00	3.41E-02	1.49E-01	7.01E-08	1.12E+00	1.10E+00
	8.30E-07	4.44E-04	3.97E-04	1.35E-05	5.91E-05	2.77E-11	4.44E-04	3.97E-04
	3.00E-03	1.61E+00	3.04E+00	4.88E-02	2.14E-01	1.00E-07	1.61E+00	3.04E+00
	8.50E-05	4.55E-02	7.59E-02	1.38E-03	6.05E-03	2.84E-09	4.55E-02	7.59E-02
	1.10E-06	5.89E-04	3.49E-04	1.79E-05	7.83E-05	3.67E-11	5.89E-04	3.49E-04
	6.40E-07	3.42E-04	6.29E-04	1.04E-05	4.56E-05	2.14E-11	3.42E-04	6.29E-04
	2.30E-06	1.23E-03	1.37E-03	3.74E-05	1.64E-04	7.68E-11	1.23E-03	1.37E-03
	2.80E-05	1.50E-02	1.30E-02	4.55E-04	1.99E-03	9.34E-10	1.50E-02	1.30E-02

2. AP 42, Fifth Edition, Volume IChapter 1: External Comb

		Kero HT					
r Petroleum Refineries, Version 3, RTI International.			flue gas (lb/h)	11,802.00	Tag	Boiler 1	
tors for Boilers and Process Heaters Firing Various Fuels		12.5	density (lb/ft3)	0.03	125-H-2501	Heat input (MMBtu/h)	60
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (us tpy)	flue gas (ft3/h)	373,481.01	6,224.68	Emission (lb/h)	Emission (us tpy)
			T (°F)	764.3			
			T(K)	679.98			
			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	5.20E-07	2.85E-05	1.74E-11	2.79E-04	1.28E-04	3.12E-05	1.37E-04
	2.00E-07	1.10E-05	6.69E-12	1.07E-04	7.99E-05	1.20E-05	5.26E-05
	1.30E-07	7.12E-06	4.35E-12	6.98E-05	4.32E-04	7.80E-06	3.42E-05
	1.10E-06	6.02E-05	3.68E-11	5.90E-04	2.93E-04	6.60E-05	2.89E-04
	2.80E-07	1.53E-05	9.37E-12	1.50E-04	1.61E-04	1.68E-05	7.36E-05
	1.40E-06	7.67E-05	4.69E-11	7.51E-04	8.06E-04	8.40E-05	3.68E-04
	8.20E-08	4.49E-06	2.74E-12	4.40E-05	4.17E-05	4.92E-06	2.15E-05
	3.70E-07	2.03E-05	1.24E-11	1.99E-04	2.02E-04	2.22E-05	9.72E-05
	2.50E-07	1.37E-05	8.37E-12	1.34E-04	3.73E-05	1.50E-05	6.57E-05
	2.10E-06	1.15E-04	7.03E-11	1.13E-03	1.07E-03	1.26E-04	5.52E-04
	8.80E-07	4.82E-05	2.95E-11	4.72E-04	3.34E-04	5.28E-05	2.31E-04
	-	**4.00E-04**	**4.07E-11**	**3.92E-03**	**3.59E-03**	**4.39E-04**	**1.92E-03**
APs			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	1.20E-05	1.64E-04	1.00E-10	1.61E-03	2.04E-03	1.80E-04	7.88E-04
	1.70E-05	2.33E-04	1.42E-10	2.28E-03	2.27E-03	2.55E-04	1.12E-03
	2.10E-06	2.87E-05	1.76E-11	2.82E-04	2.01E-04	3.15E-05	1.38E-04
	2.20E-08	3.01E-07	1.84E-13	2.95E-06	7.21E-07	3.30E-07	1.45E-06
	1.20E-06	1.64E-05	1.00E-11	1.61E-04	6.11E-05	1.80E-05	7.88E-05
	1.60E-05	2.19E-04	1.34E-10	2.15E-03	1.13E-03	2.40E-04	1.05E-03
	7.40E-05	1.01E-03	6.19E-10	9.93E-03	1.84E-02	1.11E-03	4.86E-03
	1.80E-03	2.46E-02	1.51E-08	2.41E-01	1.56E-01	2.70E-02	1.18E-01
	3.30E-06	4.52E-05	2.76E-11	4.43E-04	2.68E-04	4.95E-05	2.17E-04
	2.50E-05	3.42E-04	2.09E-10	3.35E-03	1.76E-03	3.75E-04	1.64E-03
		2.67E-02	1.63E-08	2.62E-01	1.83E-01	2.93E-02	1.28E-01
cs (excluding dioxin/furans)			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	2.40E-09	3.29E-08	2.01E-14	3.22E-07	1.16E-07	3.60E-08	1.58E-07
	6.50E-09	8.90E-08	5.44E-14	8.72E-07	3.20E-07	9.75E-08	4.27E-07
	4.70E-09	6.43E-08	3.93E-14	6.31E-07	1.97E-07	7.05E-08	3.09E-07

		Kero HT					
r Petroleum Refineries, Version 3, RTI International.			flue gas (lb/h)	11,802.00	Tag	Boiler 1	
tors for Boilers and Process Heaters Firing Various Fuels		12.5	density (lb/ft3)	0.03	125-H-2501	Heat input (MMBtu/h)	60
Process Heaters Firing. External Combustion, Natural Refinery Gas (lb/MMBtu)		Emission (us tpy)	flue gas (ft3/h)	373,481.01	6,224.68	Emission (lb/h)	Emission (us tpy)
			T (°F)	764.3			
			T(K)	679.98			
			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	1.30E-09	1.78E-08	1.09E-14	1.74E-07	3.52E-08	1.95E-08	8.54E-08
	1.70E-08	2.33E-07	1.42E-13	2.28E-06	5.04E-07	2.55E-07	1.12E-06
	1.60E-09	2.19E-08	1.34E-14	2.15E-07	5.25E-08	2.40E-08	1.05E-07
	1.20E-09	1.64E-08	1.00E-14	1.61E-07	3.23E-08	1.80E-08	7.88E-08
	1.60E-08	2.19E-07	1.34E-13	2.15E-06	4.67E-07	2.40E-07	1.05E-06
	2.90E-09	3.97E-08	2.43E-14	3.89E-07	1.07E-07	4.35E-08	1.91E-07
	2.70E-09	3.70E-08	2.26E-14	3.62E-07	1.22E-07	4.05E-08	1.77E-07
	7.10E-08	9.72E-07	5.94E-13	9.52E-06	1.92E-06	1.07E-06	4.66E-06
	1.80E-09	2.46E-08	1.51E-14	2.41E-07	5.02E-08	2.70E-08	1.18E-07
	2.40E-08	3.29E-07	2.01E-13	3.22E-06	1.26E-06	3.60E-07	1.58E-06
	6.00E-07	8.21E-06	5.02E-12	8.05E-05	3.50E-05	9.00E-06	3.94E-05
	1.70E-08	2.33E-07	1.42E-13	2.28E-06	7.14E-07	2.55E-07	1.12E-06
	4.00E-06	5.48E-05	3.35E-11	5.37E-04	3.18E-04	6.00E-05	2.63E-04
	4.90E-09	6.71E-08	4.10E-14	6.57E-07	1.81E-07	7.35E-08	3.22E-07
	4.26E-06	**5.83E-05**	**3.56E-11**	**5.71E-04**	**3.27E-04**	**6.39E-05**	**2.80E-04**
		6.65E-05	4.07E-11	6.52E-04	3.62E-04	7.29E-05	3.19E-04
		2.68E-02				**2.93E-02**	**1.28E-01**
terest			Conc. (lb/ft3)	Conc. (mg/m3)	Conc. (ppmv)		
	4.30E-06	2.35E-04	1.44E-10	2.31E-03	9.37E-04	2.58E-04	1.13E-03
	2.10E-03	1.15E-01	7.03E-08	1.13E+00	1.08E+00	1.26E-01	5.52E-01
	8.30E-07	4.54E-05	2.78E-11	4.45E-04	3.91E-04	4.98E-05	2.18E-04
	3.00E-03	1.64E-01	1.00E-07	1.61E+00	2.99E+00	1.80E-01	7.88E-01
	8.50E-05	4.65E-03	2.84E-09	4.56E-02	7.47E-02	5.10E-03	2.23E-02
	1.10E-06	6.02E-05	3.68E-11	5.90E-04	3.43E-04	6.60E-05	2.89E-04
	6.40E-07	3.50E-05	2.14E-11	3.43E-04	6.19E-04	3.84E-05	1.68E-04
	2.30E-06	1.26E-04	7.70E-11	1.23E-03	1.35E-03	1.38E-04	6.04E-04
	2.80E-05	1.53E-03	9.37E-10	1.50E-02	1.28E-02	1.68E-03	7.36E-03

2. AP 42, Fifth Edition, Volume IChapter 1: External Comb