8 APPENDIX A - DETAILED SAMPLE RESULTS

Table 12: Summary of organic compound analytical and emission factor LDL values.

Component	MW	LDL	LDL Emission Factor
		µg/m^3	kg/ GJ (Fuel)
1,2,3-Trimethylbenzene	120	5.08	2.96E-06
1,2,4-Trimethylbenzene	120	100	5.82E-05
1,2,4-Trimethylcyclopentane	86	3.64	2.12E-06
1,2-Propadiene	40	1.69	9.85E-07
1,3,5-Trimethylbenzene	120	100	5.82E-05
1,3-Butadiyne	50	2.11	1.23E-06
1,3-Hexadiene, 3-ethyl-2-methyl-, (Z)-	124	5.24	3.05E-06
1,3-Pentadiene, (Z)-	68	2.88	1.67E-06
1,4-Pentadiene, 3,3-dimethyl-	96	4.06	2.36E-06
1-Buten-3-yne	52	2.20	1.28E-06
1-Butene	56	118	6.90E-05
1-Cyclohexyl-2-methyl-prop-2-en-1-one	152	6.43	3.74E-06
1-Heptene, 2-methyl-	112	0.14	8.28E-08
1-Heptene, 3-methyl-	112	0.14	8.28E-08
1-Hexene	84	3.55	2.07E-06
1H-Indene, octahydro-, trans-	124	0.16	9.16E-08
1-Methyl-2-n-hexylbenzene	86	3.64	2.12E-06
1-Pentene	70	0.09	5.17E-08
1-Pentene, 3-methyl-	84	0.11	6.21E-08
1-trans-2-cis-3-trans-trimethylcyclopent	84	3.55	2.07E-06
2,2,4-Trimethylpentane	114	0.14	8.42E-08
2,2-Dimethylbutane	86	0.11	6.35E-08
2,3,4-Trimethylpentane	114	0.14	8.42E-08
2,3-Dimethylbutane	86	0.11	6.35E-08
2,3-Dimethylpentane	100	0.13	7.39E-08
2,5-dimethyl Thiophene	112	4.74	2.76E-06
2-Ethyl-3-methylcyclopentene	110	4.65	2.71E-06
2-methyl Thiophene	98	4.14	2.41E-06
2-Methylheptane	114	0.14	8.42E-08
2-Methylhexane	100	0.13	7.39E-08
2-Methylpentane	86	0.11	6.35E-08
2-Pentanone, 4-methyl-4-phenyl-	86	3.64	2.12E-06
2-Propanone	58	2.45	1.43E-06
3-CYCLOHEXYL-PROPANOL	142	6.01	3.50E-06
3-methyl Thiophene	98	4.14	2.41E-06
3-Methylheptane	114	0.14	8.42E-08
3-Methylhexane	100	0.13	7.39E-08
3-Methylpentane	86	0.11	6.35E-08
4-Nonene, 3-methyl-, (Z)-	140	0.18	1.03E-07
Acetaldehyde	44	0.37	2.17E-07
Acetic Acid	60	2.54	1.48E-06

Table 12: Summary of organic compound analytical and emission factor LDL values.			
Component	**MW**	**LDL**	**LDL Emission Factor**
		µg/m^3	**kg/ GJ (Fuel)**
Acetone	58	0.49	2.86E-07
Acrolein	56	0.47	2.76E-07
Allyl sulphide	114	4.82	2.81E-06
Benzene	78	100	5.82E-05
Benzene, (1-methyl-1-propenyl)-, (Z)- (C	132	5.58	3.25E-06
Benzene, 1,2,3,4-tetramethyl-	134	5.67	3.30E-06
Benzene, 1,2,3,5-tetramethyl-	134	5.67	3.30E-06
Benzene, 1-ethyl-2,3-dimethyl-	134	5.67	3.30E-06
Benzene, 1-methyl-2-(1-methylethyl)- (CA	134	5.67	3.30E-06
Benzene, 1-methyl-2-(phenylmethyl)-	84	3.55	2.07E-06
Benzene, 1-methyl-2-propyl-	134	5.67	3.30E-06
Bicyclo[3.3.1]nonane	124	0.16	9.16E-08
Bicyclo[4.1.0]heptane, 3-methyl-	110	4.65	2.71E-06
Butane	58	10	5.82E-06
Butane, 2-methyl-	72	3.05	1.77E-06
Butyl mercaptan	98	4.14	2.41E-06
Carbon dioxide	44	1000000	5.80E-01
Carbon disulfide	76	3.21	1.87E-06
Carbon disulphide	76	3.21	1.87E-06
Carbonyl sulphide	60	2.54	1.48E-06
Chlorobenzene-d5	112	4.74	2.76E-06
cis-2-Butene	56	118	6.90E-05
CYCLOBUTANE, ISOPROPYL-	98	4.14	2.41E-06
Cyclobutanone, 3-ethyl-	98	0.12	7.24E-08
Cycloheptane	98	0.12	7.24E-08
Cyclohexane	84	0.11	6.21E-08
Cyclohexane, 1,1,3-trimethyl-	126	5.33	3.10E-06
Cyclohexane, 1,1-dimethyl-	84	4.74	2.76E-06
Cyclohexane, 1,2,4-trimethyl-, (1.alpha.	126	0.16	9.31E-08
Cyclohexane, 1,2-diethyl-3-methyl-	154	6.51	3.79E-06
Cyclohexane, 1,2-dimethyl-, cis-	112	4.74	2.76E-06
Cyclohexane, 1,2-dimethyl-, trans-	112	4.74	2.76E-06
Cyclohexane, 1,3,5-trimethyl-	126	0.16	9.31E-08
Cyclohexane, 1,3-dimethyl-, cis-	112	4.74	2.76E-06
Cyclohexane, 1,3-dimethyl-, trans-	112	4.74	2.76E-06
Cyclohexane, 1,4-dimethyl-	112	4.74	2.76E-06
Cyclohexane, ethyl-	112	4.74	2.76E-06
Cyclohexanone, 2-(2-methylpropylidene)-	152	6.43	3.74E-06
Cyclopentane	70	0.09	5.17E-08
Cyclopentane, 1,1-dimethyl-	98	4.14	2.41E-06
Cyclopentane, 1,2,3-trimethyl-, (1.alpha	112	0.14	8.28E-08
Cyclopentane, 1,2,4-trimethyl-	112	4.74	2.76E-06
Cyclopentane, 1,2-dimethyl-, cis-	98	0.12	7.24E-08

Table 12: Summary of organic compound analytical and emission factor LDL values.			
Component	**MW**	**LDL**	**LDL Emission Factor**
		µg/m^3	**kg/ GJ (Fuel)**
Cyclopentane, 1,3-dimethyl-	98	4.14	2.41E-06
Cyclopentane, 1-ethyl-3-methyl-	112	4.74	2.76E-06
Cyclopentane, 1-ethyl-3-methyl-, trans-	112	0.14	8.28E-08
Cyclopentane, ethyl-	98	4.14	2.41E-06
Cyclopentanol	86	3.64	2.12E-06
Cyclopentene-3-carboxylic acid, 1-(trime	214	9.05	5.27E-06
Cyclopropane, 1-methyl-1-isopropenyl-	96	4.06	2.36E-06
Cyclopropane, ethyl-	70	0.09	5.17E-08
Cyclotrisiloxane, hexamethyl-	100	4.23	2.46E-06
Decane	142	0.18	1.05E-07
Dimethyl disulphide	94	3.98	2.32E-06
Dimethyl sulphide	62	2.62	1.53E-06
Dimethyl trisulphide	126	5.33	3.10E-06
Dodecane	170	0.22	1.26E-07
Dodecane, 4,6-dimethyl-	98	4.14	2.41E-06
Dodecane, 4-methyl-	184	0.23	1.36E-07
Endo-tricyclo[5.2.1.0(2.6)]decane	136	5.75	3.35E-06
Ethane	30	10	5.82E-06
Ethyl benzene	106	100	5.82E-05
Ethyl mercaptan	62	2.62	1.53E-06
Ethyl sulphide	90	3.81	2.22E-06
Ethylene	28	10	5.82E-06
Ethyne, dichloro-	94	0.12	6.95E-08
Formaldehyde	30	2.54	1.48E-06
Formic acid	46	1.95	1.13E-06
Furan, 2,3-dihydro-	70	0.09	5.17E-08
Heptane	100	0.13	7.39E-08
Heptane, 2,3-dimethyl-	128	5.41	3.15E-06
Heptane, 2,6-dimethyl-	128	5.41	3.15E-06
Heptane, 3-ethyl-2-methyl-	114	4.82	2.81E-06
HEXA-4,5-DIENE CARBOXYLIC ACID	112	4.74	2.76E-06
Hexanal	100	4.23	2.46E-06
Hexane	86	0.11	6.35E-08
Hexane, 2,3-dimethyl-	92	3.89	2.27E-06
Hexane, 2,4-dimethyl-	114	4.82	2.81E-06
Hexane, 2,5-dimethyl-	114	4.82	2.81E-06
Hydrogen sulphide	34	1.44	8.37E-07
Isobutane	58	10	5.82E-06
Isobutyl mercaptan	90	3.81	2.22E-06
Isobutylene	56	118	6.90E-05
Isopentane	72	0.091	5.32E-08
Isopropyl mercaptan	76	3.21	1.87E-06
Isopropylbenzene	120	100	5.82E-05

Table 12: Summary of organic compound analytical and emission factor LDL values.			
Component	**MW**	**LDL**	**LDL Emission Factor**
		µg/m^3	**kg/ GJ (Fuel)**
m,p-Xylene	106	100	5.82E-05
m-Diethylbenzene	134	5.67	3.30E-06
Methane	16	10	5.82E-06
Methane, nitro-	61	0.07	4.51E-08
Methyl Alcohol	32	1.35	7.88E-07
Methyl ethyl disulfide	108	4.57	2.66E-06
Methyl mercaptan	48	2.03	1.18E-06
Methylcyclohexane	98	0.12	7.24E-08
Methylcyclopentane	84	0.11	6.21E-08
Methylene chloride	84	2000	1.16E-03
m-Ethyltoluene	120	5.08	2.96E-06
Naphthalene, 2,6-dimethyl-	112	4.74	2.76E-06
Naphthalene, 2-methyl-	142	6.01	3.50E-06
Naphthalene, decahydro-, trans-	138	5.84	3.40E-06
Nitrogen	28	6000000	3.49E+00
Nitrous acid, methyl ester	61	2.58	1.50E-06
Nonadecane	106	4.48	2.61E-06
Nonane	128	0.16	9.46E-08
Nonanol	144	6.09	3.55E-06
n-Propylbenzene	120	100	5.82E-05
Octane	114	0.14	8.42E-08
Octane, 2,6-dimethyl-	104	4.40	2.56E-06
Octane, 2-methyl-	106	4.48	2.61E-06
o-Ethyltoluene	120	5.08	2.96E-06
Oxygen	32	6000000	3.49E+00
o-Xylene	106	100	5.82E-05
Pentadecane	212	8.97	5.22E-06
Pentane	72	0.09	5.32E-08
p-Ethyltoluene	120	5.08	2.96E-06
Phthalic anhydride	148	0.19	1.09E-07
Propane	44	10	5.82E-06
Propane, 2,2-dimethyl-	72	3.05	1.77E-06
Propane, 2-methyl-	58	2.45	1.43E-06
Propene	42	0.05	3.10E-08
Propyl mercaptan	76	3.21	1.87E-06
Propylene	42	89	5.17E-05
Propylidencyclohexane	124	0.16	9.16E-08
Propyne	40	85	4.93E-05
Pyridine, 3,5-dimethyl-	107	0.14	7.91E-08
s-Dichloroethyl ether	142	6.01	3.50E-06
Silane, chlorotrimethyl-	108	4.57	2.66E-06
Styrene	104	100	5.82E-05
Sulfur dioxide	64	0.08	4.73E-08

Table 12: Summary of organic compound analytical and emission factor LDL values.			
Component	**MW**	**LDL**	**LDL Emission Factor**
		µg/m^3	**kg/ GJ (Fuel)**
tert-Butyl mercaptan	90	3.81	2.22E-06
tert-Pentyl mercaptan	104	0.13	7.68E-08
Tetradecane	198	8.37	4.88E-06
Tetrahydro thiophene	88	0.11	6.50E-08
Thiophene	84	3.55	2.07E-06
Toluene	92	100	5.82E-05
trans-2-Butene	56	118	6.90E-05
trans-4-Decene	140	0.18	1.03E-07
Tridecane	184	0.23	1.36E-07
Undecane	156	0.20	1.15E-07
Undecane, 2-methyl-	170	0.22	1.26E-07
Undecane, 3-methyl-	170	0.22	1.26E-07
Undecane, 4,6-dimethyl-	184	7.78	4.53E-06
Undecane, 5-methyl-	170	0.22	1.26E-07
The LDL Emission Factors were calculated using the following conditions: Estimated Dry Flue Gas Flow rate: 21.84 ± 13.84 m^3/h and High Heating Value: 37.51 ± 1.85 GJ/ (m^3 fuel)			

Table 13: Laboratory results and material balance determined emission factors and combustion efficiency for Location 1 – Sweet Gas Gathering System (Foothills Region) – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**(ppmv)**	**(µg/m^3)**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	6.23E+08	16	9.53E+01	9.53E+01	2.73E+03	1.85E+06	2.81E+07	7.78E+05	7.78E-01	9.53E-01	4.15E-02
Ethyl benzene	6.00E+00	106	1.30E-07	1.30E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-08	0.00E+00
Butane	6.82E+04	58	2.88E-03	2.88E-03	1.43E-01	3.50E+02	5.32E+03	1.47E+02	1.50E-04	1.15E-04	8.67E-06
1-Butene	0.00E+00	56	0.00E+00	0.00E+00	6.11E-02	1.45E+02	2.20E+03	6.10E+01	6.10E-05	0.00E+00	3.72E-06
Acrolein	0.00E+00	56	0.00E+00	0.00E+00	9.12E-02	2.16E+02	3.29E+03	9.10E+01	9.10E-05	0.00E+00	4.16E-06
Heptane, 2,6-dimethyl-	3.00E+01	128	5.70E-07	5.70E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E-08	0.00E+00
2-Methylpentane	6.72E+03	86	1.90E-04	1.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-05	0.00E+00
m,p-Xylene	1.40E+01	106	3.30E-07	3.30E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-08	0.00E+00
Methylcyclohexane	1.69E+03	98	4.20E-05	4.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-06	0.00E+00
Toluene	1.30E+01	92	3.50E-07	3.50E-07	3.21E-03	1.30E+01	1.90E+02	5.00E+00	5.30E-06	2.48E-08	3.42E-07
Pentane	1.67E+04	72	5.70E-04	5.70E-04	4.05E-02	1.23E+02	1.88E+03	5.20E+01	5.20E-05	2.84E-05	3.08E-06
1-Pentene	0.00E+00	70	0.00E+00	0.00E+00	9.13E-03	2.70E+01	4.11E+02	1.10E+01	1.10E-05	0.00E+00	6.94E-07
Hexane	2.71E+03	86	7.70E-05	7.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.62E-06	0.00E+00
Cyclohexane	4.92E+02	84	1.40E-05	1.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.60E-07	0.00E+00
Nonane	1.60E+01	128	3.00E-07	3.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-08	0.00E+00
Undecane	6.00E+00	156	8.90E-08	8.90E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.81E-09	0.00E+00
Dodecane	1.40E+01	170	2.00E-07	2.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-08	0.00E+00
Propene	1.00E+01	42	6.00E-07	6.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-08	0.00E+00
Cyclopropane, ethyl-	1.60E+01	70	5.50E-07	5.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-08	0.00E+00
Cyclopentane, 1,2-dimethyl-, cis-	2.78E+02	98	6.90E-06	6.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.86E-07	0.00E+00
Decane	6.00E+00	142	1.10E-07	1.10E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-08	0.00E+00
Heptane	4.99E+02	100	1.20E-05	1.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.54E-07	0.00E+00
Cyclopentane, ethyl-	9.80E+01	98	2.50E-06	2.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-07	0.00E+00
Cyclohexane, 1,3,5-trimethyl-	4.20E+01	126	8.10E-07	8.10E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.31E-08	0.00E+00
trans-4-Decene	4.30E+01	140	7.50E-07	7.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.52E-08	0.00E+00
Cyclohexane, 1,2-dimethyl-, cis-	2.32E+02	112	5.10E-06	5.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.06E-07	0.00E+00
Cyclohexane, 1,3-dimethyl-, trans-	6.70E+01	112	1.50E-06	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-07	0.00E+00
Cyclopentane, 1,3-dimethyl-	2.68E+02	98	6.70E-06	6.70E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.68E-07	0.00E+00
Cyclopentane, 1-ethyl-3-methyl-, trans-	2.60E+01	112	5.60E-07	5.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-08	0.00E+00

Table 13: Laboratory results and material balance determined emission factors and combustion efficiency for Location 1 – Sweet Gas Gathering System (Foothills Region) – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**(ppmv)**	**(µg/m^3)**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Bicyclo[3.3.1]nonane	6.60E+01	124	1.30E-06	1.30E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-07	0.00E+00
Cyclopentane, 1,2,4-trimethyl-	2.02E+02	112	4.40E-06	4.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E-07	0.00E+00
Cyclopentane	1.77E+03	70	6.20E-05	6.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-06	0.00E+00
Cycloheptane	6.76E+02	98	1.70E-05	1.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06	0.00E+00
Cyclohexane, 1,1,3-trimethyl-	3.82E+02	126	7.40E-06	7.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.68E-07	0.00E+00
Cyclopentane, 1-ethyl-3-methyl-	3.70E+01	112	8.10E-07	8.10E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.48E-08	0.00E+00
Carbonyl sulphide	0.00E+00	60	0.00E+00	0.00E+00	1.06E-02	2.70E+01	4.10E+02	1.10E+01	1.10E-05	0.00E+00	1.61E-07
Propane, 2,2-dimethyl-	2.99E+02	72	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-07	0.00E+00
Formaldehyde	0.00E+00	30	0.00E+00	0.00E+00	3.06E-02	3.90E+01	5.90E+02	1.60E+01	1.60E-05	0.00E+00	4.65E-07
2,3-Dimethylpentane	5.40E+02	100	1.30E-05	1.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.25E-07	0.00E+00
2,3,4-Trimethylpentane	5.90E+01	114	1.30E-06	1.30E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-07	0.00E+00
3-Methylhexane	5.24E+02	100	1.30E-05	1.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.97E-07	0.00E+00
3-Methylheptane	4.00E+01	114	8.50E-07	8.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.82E-08	0.00E+00
2-Methylhexane	3.26E+02	100	8.00E-06	8.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.59E-07	0.00E+00
2-Methylheptane	1.54E+02	114	3.30E-06	3.30E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-07	0.00E+00
1-Hexene	0.00E+00	84	0.00E+00	0.00E+00	4.95E-03	1.80E+01	2.68E+02	7.00E+00	7.40E-06	0.00E+00	4.52E-07
4-Nonene, 3-methyl-, (Z)-	1.08E+02	140	1.90E-06	1.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-07	0.00E+00
Cyclohexane, 1,2-dimethyl-, trans-	1.66E+02	112	3.60E-06	3.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-07	0.00E+00
Benzene	2.50E+01	78	7.80E-07	7.80E-07	1.70E-02	5.60E+01	8.53E+02	2.40E+01	2.40E-05	4.69E-08	1.55E-06
Ethane	3.27E+06	30	2.66E-01	2.66E-01	8.85E+00	1.12E+04	1.71E+05	4.72E+03	4.72E-03	5.33E-03	2.69E-04
Ethylene	0.00E+00	28	0.00E+00	0.00E+00	2.85E+00	3.38E+03	5.13E+04	1.42E+03	1.42E-03	0.00E+00	8.67E-05
Propane	4.63E+05	44	2.57E-02	2.57E-02	5.90E-01	1.10E+03	1.67E+04	4.62E+02	4.60E-04	7.72E-04	2.69E-05
Ethyl mercaptan	1.70E+01	62	6.60E-07	6.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-08	0.00E+00
Dimethyl sulphide	3.70E+01	62	1.50E-06	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-08	0.00E+00
Isobutane	2.09E+04	58	8.80E-04	8.80E-04	1.08E-01	2.65E+02	4.03E+03	1.12E+02	1.10E-04	3.53E-05	6.58E-06
Methane, nitro-	0.00E+00	61	0.00E+00	0.00E+00	9.34E-02	2.41E+02	3.66E+03	1.01E+02	1.00E-04	0.00E+00	1.42E-06
2,2-Dimethylbutane	1.91E+02	86	5.40E-06	5.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.26E-07	0.00E+00
Hydrogen sulphide	1.46E+02	34	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	3.29E+04	72	1.12E-03	1.12E-03	3.30E-02	1.01E+02	1.53E+03	4.20E+01	4.20E-05	5.59E-05	2.51E-06
2,3-Dimethylbutane	1.36E+03	86	3.90E-05	3.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-06	0.00E+00

Table 13: Laboratory results and material balance determined emission factors and combustion efficiency for Location 1 – Sweet Gas Gathering System (Foothills Region) – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**(ppmv)**	**(µg/m^3)**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
o-Xylene	7.00E+00	106	1.60E-07	1.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-08	0.00E+00
1,2,4-Trimethylbenzene	3.00E+00	120	6.60E-08	6.60E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.92E-09	0.00E+00
3-Methylpentane	1.77E+03	86	5.00E-05	5.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-06	0.00E+00
Methylcyclopentane	3.56E+03	84	1.00E-04	1.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-06	0.00E+00
Nitrogen	1.30E+08	28	1.13E+01	4.18E+00	8.76E+05	1.04E+09	1.58E+10	4.36E+08	4.36E+02	0.00E+00	0.00E+00
Carbon dioxide	4.15E+06	44	2.31E-01	2.31E-01	4.11E+04	7.65E+07	1.16E+09	3.22E+07	3.22E+01	0.00E+00	0.00E+00
										Comb Eff =	**95.63%**
										CH4 Comb Eff =	**95.64%**
										THC Comb Eff =	**95.65%**

Table 14: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 1 - Sweet Gas Gathering System (Foothills Region) – Reciprocating Engine.

Excess Air	84%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.92	1.83	1.53	13	17
2226	0	**percentage, %**	5.40	11	9.01	75	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.92		1.53	13	15
2745	0	**percentage, %**	6.05		10	84	100

Table 15: Laboratory results and material balance determined emission factors and combustion efficiency for Location 1 – wet Gas Gathering System (Foothills Region) – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	6.24E+08	16	9.54E+01	9.54E+01	1.28E+00	8.65E+02	9.79E+03	2.71E+02	2.70E-04	9.54E-01	1.45E-05
Undecane, 3-methyl-	8.20E+01	170	1.20E-06	1.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-07	0.00E+00
Ethyl benzene	6.00E+00	106	1.40E-07	1.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-08	0.00E+00
Butane	5.88E+04	58	2.48E-03	2.48E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.90E-05	0.00E+00
2-Methylpentane	6.44E+03	86	1.80E-04	1.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-05	0.00E+00
m,p-Xylene	1.40E+01	106	3.20E-07	3.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-08	0.00E+00
Methylcyclohexane	1.70E+03	98	4.20E-05	4.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00
Toluene	1.20E+01	92	3.10E-07	3.10E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-08	0.00E+00
Pentane	1.52E+04	72	5.20E-04	5.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-05	0.00E+00
Hexane	2.78E+03	86	7.90E-05	7.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E-06	0.00E+00
Cyclohexane	5.17E+02	84	1.50E-05	1.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-07	0.00E+00
Nonane	1.40E+01	128	2.70E-07	2.70E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-08	0.00E+00
Undecane	6.00E+00	156	9.90E-08	9.90E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-08	0.00E+00
Dodecane	2.42E+02	170	3.50E-06	3.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-07	0.00E+00
Propene	1.20E+01	42	6.90E-07	6.90E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-08	0.00E+00
Cyclopentane, 1,2-dimethyl-, cis-	2.72E+02	98	6.80E-06	6.80E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E-07	0.00E+00
Decane	6.00E+00	142	1.00E-07	1.00E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-08	0.00E+00
Heptane	5.28E+02	100	1.30E-05	1.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-07	0.00E+00
Undecane, 5-methyl-	6.10E+01	170	8.80E-07	8.80E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-07	0.00E+00
Cyclopentane, ethyl-	1.00E+02	98	2.50E-06	2.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-07	0.00E+00
Cyclohexane, ethyl-	6.30E+01	112	1.40E-06	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-07	0.00E+00
Propylidencyclohexane	5.50E+01	124	1.10E-06	1.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E-08	0.00E+00
Cyclohexane, 1,3-dimethyl-, trans-	6.90E+01	112	1.50E-06	1.50E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	0.00E+00
Cyclopentane, 1,3-dimethyl-	2.83E+02	98	7.10E-06	7.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.90E-07	0.00E+00
Cyclopentane, 1,2,4-trimethyl-	2.03E+02	112	4.40E-06	4.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-07	0.00E+00
Cyclopentane	1.82E+03	70	6.40E-05	6.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-06	0.00E+00
Cycloheptane	6.72E+02	98	1.70E-05	1.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-06	0.00E+00
Cyclohexane, 1,1,3-trimethyl-	3.73E+02	126	7.20E-06	7.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-07	0.00E+00
1H-Indene, octahydro-, trans-	8.10E+01	124	1.60E-06	1.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-07	0.00E+00
Propane, 2,2-dimethyl-	2.97E+02	72	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-07	0.00E+00
2,3-Dimethylpentane	5.40E+02	100	1.30E-05	1.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.30E-07	0.00E+00

Table 15: Laboratory results and material balance determined emission factors and combustion efficiency for Location 1 – wet Gas Gathering System (Foothills Region) – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
2,3,4-Trimethylpentane	5.10E+01	114	1.10E-06	1.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.70E-08	0.00E+00
Cyclohexane, 1,2-dimethyl- (cis/trans) $	1.65E+02	112	3.60E-06	3.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-07	0.00E+00
3-Methylhexane	4.86E+02	100	1.20E-05	1.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-07	0.00E+00
3-Methylheptane	3.40E+01	114	7.40E-07	7.40E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-08	0.00E+00
Cyclohexane, 1,4-dimethyl-	2.32E+02	112	5.10E-06	5.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-07	0.00E+00
cis-2-Butene	2.40E+01	56	1.00E-06	1.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-08	0.00E+00
2-Methylhexane	3.33E+02	100	8.10E-06	8.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.70E-07	0.00E+00
2-Methylheptane	1.51E+02	114	3.20E-06	3.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-07	0.00E+00
Dodecane, 4-methyl-	2.18E+02	184	2.90E-06	2.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-07	0.00E+00
Tridecane	6.00E+02	184	8.00E-06	8.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-06	0.00E+00
Tetradecane	1.60E+02	198	2.00E-06	2.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-07	0.00E+00
Acetone	0.00E+00	58	0.00E+00	0.00E+00	3.93E-03	9.64E+00	1.09E+02	3.02E+00	3.00E-06	0.00E+00	1.34E-07
Undecane, 2-methyl-	6.90E+01	170	9.90E-07	9.90E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	0.00E+00
Benzene	2.90E+01	78	9.00E-07	9.00E-07	9.80E-04	3.24E+00	3.67E+01	1.02E+00	1.00E-06	5.40E-08	6.68E-08
Ethane	3.32E+06	30	2.71E-01	2.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.41E-03	0.00E+00
Propane	4.70E+05	44	2.61E-02	2.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.80E-04	0.00E+00
Ethyl mercaptan	2.90E+01	62	1.10E-06	1.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-08	0.00E+00
Dimethyl sulphide	3.00E+01	62	1.20E-06	1.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-08	0.00E+00
Isobutane	1.74E+04	58	7.30E-04	7.30E-04	2.86E-03	7.02E+00	7.95E+01	2.20E+00	2.20E-06	2.90E-05	1.30E-07
2,2-Dimethylbutane	2.07E+02	86	5.90E-06	5.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-07	0.00E+00
1-Pentene, 3-methyl-	3.40E+01	84	9.90E-07	9.90E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-08	0.00E+00
Cyclohexane, 1,2,4-trimethyl-, (1.alpha.	4.40E+01	126	8.60E-07	8.60E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-08	0.00E+00
Hydrogen sulphide	1.43E+02	34	1.00E-05	1.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	2.85E+04	72	9.70E-04	9.70E-04	1.05E-03	3.20E+00	3.63E+01	1.00E+00	1.00E-06	4.80E-05	5.96E-08
2,3-Dimethylbutane	1.43E+03	86	4.10E-05	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-06	0.00E+00
o-Xylene	6.00E+00	106	1.50E-07	1.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-08	0.00E+00
1,2,4-Trimethylbenzene	3.00E+00	120	5.70E-08	5.70E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.10E-09	0.00E+00
3-Methylpentane	1.83E+03	86	5.20E-05	5.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-06	0.00E+00
Methylcyclopentane	3.60E+03	84	1.00E-04	1.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-06	0.00E+00

Table 15: Laboratory results and material balance determined emission factors and combustion efficiency for Location 1 – wet Gas Gathering System (Foothills Region) – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Nitrogen	1.29E+08	28	1.12E+01	4.07E+00	8.91E+05	1.10E+09	1.20E+10	3.30E+08	3.31E+02	0.00E+00	0.00E+00
Carbon dioxide	4.26E+06	44	2.37E-01	2.37E-01	8.55E+04	1.60E+08	1.80E+09	5.00E+07	4.98E+01	0.00E+00	0.00E+00
									Comb Eff =		**99.99%**
									CH4 Comb Eff =		**99.99%**
									THC Comb Eff =		**99.99%**

Table 16: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 1 - Sweet Gas Gathering System (Foothills Region) –Process Heater.

Excess Air	34%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.96	1.92	0.65	9.71	13
1.00	0	**percentage, %**	7.27	14	4.92	73	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.96		0.65	9.71	11
1.30	0	**percentage, %**	8.50		5.76	86	100

Table 17: Gas analysis for determine the metals emission factor in flue gas for Location 1 - Sweet Gas Gathering System (Foothills Region) – Process Heater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Aluminum	634.00	483.00	221.00	413.00	262.00	1.63E-04	1.34E-04
Antimony	0.35	0.11	0.08	0.26	0.03	1.03E-07	1.47E-08
Arsenic	28.70	53.50	20.30	8.40	33.20	3.32E-06	1.70E-05
Barium	183.00	276.00	143.00	40.00	133.00	1.58E-05	6.79E-05
Beryllium	0.01	0.02	0.01	0.00	0.01	1.07E-09	5.93E-09
Bismuth	0.03	0.02	0.00	0.02	0.02	8.18E-09	1.04E-08
Boron	548.00	673.00	286.00	262.00	387.00	1.04E-04	1.98E-04
Cadmium	0.25	11.60	0.07	0.17	11.53	6.85E-08	5.89E-06
Calcium	1,800.00	1,950.00	185.00	1,615.00	1,765.00	6.39E-04	9.02E-04
Chlorine	3,210.00	2,810.00	138.00	3,072.00	2,672.00	1.21E-03	1.36E-03
Chromium	2.88	3.35	0.53	2.35	2.82	9.29E-07	1.44E-06
Cobalt	0.26	0.33	0.00	0.25	0.33	9.94E-08	1.67E-07
Copper	36.10	105.00	4.08	32.02	100.92	1.27E-05	5.16E-05
Iron	85.50	117.00	12.00	73.50	105.00	2.91E-05	5.36E-05
Lead	2.73	12.30	0.65	2.08	11.65	8.22E-07	5.95E-06
Lithium	0.05	0.96	0.02	0.03	0.94	1.34E-08	4.79E-07
Magnesium	330.00	335.00	6.90	323.10	328.10	1.28E-04	1.68E-04
Manganese	4.43	10.90	0.36	4.07	10.54	1.61E-06	5.39E-06
Mercury	0.01	0.04	0.01	0.00	0.03	1.23E-09	1.55E-08
Molybdenum	12.90	0.28	0.03	12.87	0.26	5.09E-06	1.31E-07
Nickel	62.10	54.80	0.14	61.96	54.66	2.45E-05	2.79E-05
Phosphorus	0.80	0.80	0.80	0.00	0.00	0.00E+00	0.00E+00

Table 17: Gas analysis for determine the metals emission factor in flue gas for Location 1 - Sweet Gas Gathering System (Foothills Region) – Process Heater and Reciprocating Engine.

Component	Lab Analysis			Method Blank Corrected		Emission Factor,	
	Process Heater, Flue Gas	Reciprocating Engine, Flue Gas	Method Blank	Process Heater, Flue Gas	Reciprocating Engine, Flue Gas	Process Heater, Flue Gas	Reciprocating Engine, Flue Gas
	µg/L	µg/L	µg/L	µg/L	µg/L	kg/GJ (Fuel)	kg/GJ (Fuel)
Potassium	20,900.00	1,090.00	143.00	20,757.00	947.00	8.21E-03	4.84E-04
Selenium	0.10	0.10	0.10	0.00	0.00	0.00E+00	0.00E+00
Silicon	86.20	178.00	16.00	70.20	162.00	2.78E-05	8.28E-05
Silver	0.27	1.80	0.02	0.25	1.78	9.74E-08	9.10E-07
Sodium	2,010.00	3,990.00	1,360.00	650.00	2,630.00	2.57E-04	1.34E-03
Strontium	26.80	14.50	0.90	25.90	13.60	1.02E-05	6.95E-06
Sulphur	486.00	200.00	200.00	286.00	0.00	1.13E-04	0.00E+00
Thallium	0.01	0.01	0.00	0.00	0.01	7.91E-10	2.55E-09
Thorium	0.06	0.04	0.02	0.05	0.03	1.85E-08	1.38E-08
Tin	1.21	2.00	0.10	1.11	1.90	4.39E-07	9.71E-07
Titanium	1.32	2.02	0.68	0.64	1.34	2.52E-07	6.83E-07
Uranium	0.02	0.03	0.02	0.00	0.02	1.94E-09	8.94E-09
Vanadium	0.09	0.10	0.01	0.08	0.09	3.27E-08	4.62E-08
Zinc	47.40	102.00	1.26	46.14	100.74	1.82E-05	5.15E-05

Table 18: Laboratory results and material balance determined emission factors and combustion efficiency for Location 2 – Sweet Gas Processing Plant – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	µg/m^3	MW	Vol% C_i/m^3	Norm Vol% C_i/m^3	ppmv	µg/m^3	µg/ (m^3 fuel)	ug /(MJ fuel)	kg /(GJ fuel)	Non CO_2 C inlet	Non CO_2 C outlet
Methane	6.50E+08	16	9.94E+01	9.38E+01	2.23E+02	1.51E+05	1.35E+06	3.67E+04	3.67E-02	9.38E-01	1.99E-03
Ethyl benzene	0.00E+00	106	0.00E+00	0.00E+00	1.46E-03	7.00E+00	5.90E+01	2.00E+00	1.60E-06	0.00E+00	1.04E-07
Butane	2.21E+06	58	9.33E-02	8.80E-02	2.76E-02	6.80E+01	6.04E+02	1.60E+01	1.60E-05	3.52E-03	9.85E-07

Table 18: Laboratory results and material balance determined emission factors and combustion efficiency for Location 2 – Sweet Gas Processing Plant – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
1-Butene	0.00E+00	56	0.00E+00	0.00E+00	6.35E-02	1.50E+02	1.34E+03	3.70E+01	3.70E-05	0.00E+00	2.26E-06
2-Methylpentane	1.75E+05	86	4.98E-03	4.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00
m,p-Xylene	0.00E+00	106	0.00E+00	0.00E+00	1.23E-03	6.00E+00	4.90E+01	1.00E+00	1.30E-06	0.00E+00	8.76E-08
Methylcyclohexane	4.28E+04	98	1.07E-03	1.01E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-05	0.00E+00
Toluene	0.00E+00	92	0.00E+00	0.00E+00	4.12E-02	1.60E+02	1.43E+03	3.90E+01	3.90E-05	0.00E+00	2.57E-06
Pentane	4.04E+05	72	1.37E-02	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-04	0.00E+00
Hexane	1.78E+05	86	5.07E-03	4.79E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-04	0.00E+00
Cyclohexane	4.57E+04	84	1.33E-03	1.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-05	0.00E+00
Furan, 2,3-dihydro-	7.74E+03	70	2.70E-04	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-05	0.00E+00
Heptane	3.65E+04	100	8.90E-04	8.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-05	0.00E+00
Cyclopentane, 1,3-dimethyl-	7.37E+03	98	1.80E-04	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-05	0.00E+00
Cyclopentane	4.86E+04	70	1.70E-03	1.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-05	0.00E+00
2,3-Dimethylpentane	5.03E+04	100	1.23E-03	1.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.10E-05	0.00E+00
3-Methylhexane	3.50E+04	100	8.60E-04	8.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.70E-05	0.00E+00
Pyridine, 3,5-dimethyl-	0.00E+00	107	0.00E+00	0.00E+00	3.18E-03	1.40E+01	1.28E+02	4.00E+00	3.50E-06	0.00E+00	1.99E-07
2-Methylhexane	1.86E+04	100	4.60E-04	4.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-05	0.00E+00
Formic acid	0.00E+00	46	0.00E+00	0.00E+00	7.65E-03	1.50E+01	1.33E+02	4.00E+00	3.60E-06	0.00E+00	6.81E-08
Benzene	0.00E+00	78	0.00E+00	0.00E+00	3.64E-01	1.20E+03	1.07E+04	2.92E+02	2.90E-04	0.00E+00	1.95E-05
Ethane	1.01E+07	30	8.22E-01	7.76E-01	4.32E+00	5.49E+03	4.89E+04	1.33E+03	1.33E-03	1.55E-02	7.71E-05
Ethylene	0.00E+00	28	0.00E+00	0.00E+00	1.20E+01	1.42E+04	1.27E+05	3.45E+03	3.45E-03	0.00E+00	2.14E-04
Propane	5.19E+06	44	2.89E-01	2.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.18E-03	0.00E+00
Propyne	5.60E+05	40	3.43E-02	3.24E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E-04	0.00E+00
Isobutane	4.48E+06	58	1.89E-01	1.79E-01	3.44E-02	8.40E+01	7.52E+02	2.10E+01	2.10E-05	7.14E-03	1.23E-06
Methane, nitro-	0.00E+00	61	0.00E+00	0.00E+00	1.33E-03	3.00E+00	3.10E+01	1.00E+00	8.30E-07	0.00E+00	1.18E-08
Ethyne, dichloro-	0.00E+00	94	0.00E+00	0.00E+00	3.71E-03	1.50E+01	1.31E+02	4.00E+00	3.60E-06	0.00E+00	6.60E-08
2,2-Dimethylbutane	6.44E+04	86	1.83E-03	1.73E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-04	0.00E+00
Hydrogen sulphide	3.80E+01	34	2.70E-06	2.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	2.14E+06	72	7.26E-02	6.85E-02	7.39E-03	2.30E+01	2.01E+02	5.00E+00	5.50E-06	3.43E-03	3.29E-07
2,3-Dimethylbutane	1.69E+05	86	4.82E-03	4.55E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-04	0.00E+00
Phthalic anhydride	0.00E+00	148	0.00E+00	0.00E+00	1.24E-01	7.75E+02	6.91E+03	1.88E+02	1.90E-04	0.00E+00	8.83E-06
3-Methylpentane	2.97E+05	86	8.46E-03	7.99E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-04	0.00E+00

Table 18: Laboratory results and material balance determined emission factors and combustion efficiency for Location 2 – Sweet Gas Processing Plant – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methylcyclopentane	8.03E+04	84	2.34E-03	2.21E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-04	0.00E+00
Isopropylbenzene	0.00E+00	120	0.00E+00	0.00E+00	8.84E-03	4.50E+01	4.00E+02	1.10E+01	1.10E-05	0.00E+00	7.09E-07
Nitrogen	8.64E+07	28	4.05E+00	3.82E+00	8.58E+05	1.02E+09	9.06E+09	2.47E+08	2.47E+02	0.00E+00	0.00E+00
Carbon dioxide	1.79E+07	44	9.94E-01	9.38E-01	1.10E+05	2.05E+08	1.83E+09	4.98E+07	4.98E+01	0.00E+00	0.00E+00
									Combustion Efficiency =		**99.76%**
									CH4 Combustion Efficiency =		**99.79%**
									THC Combustion Efficiency =		**99.78%**

Table 19: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 2 - Sweet Gas Processing Plant –Reciprocating Engine.

Excess Air	6.34%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.99	1.93	0.12	7.80	11
195	0	**percentage, %**	9.10	18	1.14	72	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.99		0.12	7.80	8.91
240	0		11		1.38	88	100

Table 20: Laboratory results and material balance determined emission factors and combustion efficiency for Location 2 – Sweet Gas Processing Plant – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**

Table 20: Laboratory results and material balance determined emission factors and combustion efficiency for Location 2 – Sweet Gas Processing Plant – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	5.47E+08	16	8.37E+01	9.38E+01	2.77E+01	1.88E+04	4.37E+05	1.20E+04	1.20E-02	9.40E-01	6.50E-04
Butane	1.41E+06	58	5.90E-02	5.90E-02	2.10E-02	5.10E+01	1.19E+03	3.30E+01	3.27E-05	2.40E-03	1.94E-06
1-Butene	0.00E+00	56	0.00E+00	0.00E+00	4.30E-03	1.00E+01	2.36E+02	6.00E+00	6.48E-06	0.00E+00	3.99E-07
2-Methylpentane	1.35E+05	86	3.90E-03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-04	0.00E+00
Methylcyclohexane	3.85E+04	98	9.60E-04	9.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E-05	0.00E+00
Toluene	0.00E+00	92	0.00E+00	0.00E+00	1.92E-02	7.50E+01	1.74E+03	4.80E+01	4.77E-05	0.00E+00	3.13E-06
Pentane	2.61E+05	72	8.90E-03	8.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-04	0.00E+00
Hexane	1.35E+05	86	3.90E-03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-04	0.00E+00
Cyclohexane	3.98E+04	84	1.20E-03	1.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.96E-05	0.00E+00
Cyclopentane, 1,2-dimethyl-, cis-	9.90E+03	98	2.50E-04	2.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	0.00E+00
Heptane	2.90E+04	100	7.10E-04	7.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.97E-05	0.00E+00
1-Heptene, 2-methyl-	0.00E+00	112	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
Cyclopentane	3.58E+04	70	1.30E-03	1.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.25E-05	0.00E+00
Cyclopropane, 1-methyl-1-isopropenyl-	0.00E+00	96	0.00E+00	0.00E+00	3.30E-03	1.40E+01	3.17E+02	9.00E+00	8.71E-06	0.00E+00	5.47E-07
Propane, 2,2-dimethyl-	1.15E+04	72	3.90E-04	3.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-05	0.00E+00
2,3-Dimethylpentane	5.32E+04	100	1.30E-03	1.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.11E-05	0.00E+00
3-Methylhexane	3.34E+04	100	8.17E-04	8.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-05	0.00E+00
2-Methylhexane	1.80E+04	100	4.40E-04	4.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-05	0.00E+00
trans-2-Butene	3.73E+03	56	1.63E-04	1.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E-06	0.00E+00
Benzene	6.74E+03	78	2.10E-04	2.10E-04	4.40E-03	1.50E+01	3.40E+02	9.00E+00	9.32E-06	1.27E-05	6.17E-07
Ethane	9.07E+06	30	7.40E-01	7.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-02	0.00E+00
Propane	3.69E+06	44	2.10E-01	2.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.20E-03	0.00E+00
Propyne	3.97E+05	40	2.40E-02	2.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.30E-04	0.00E+00
Isobutane	3.26E+06	58	1.30E-01	1.40E-01	1.70E-02	4.30E+01	9.95E+02	2.70E+01	2.73E-05	5.50E-03	1.62E-06
2,2-Dimethylbutane	5.58E+04	86	1.70E-03	1.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.52E-05	0.00E+00
Hydrogen sulphide	2.60E+02	34	1.87E-05	1.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	1.37E+06	72	4.70E-02	4.70E-02	9.60E-03	2.90E+01	6.83E+02	1.90E+01	1.87E-05	2.30E-03	1.12E-06
2,3-Dimethylbutane	1.41E+05	86	4.00E-03	4.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-04	0.00E+00
3-Methylpentane	2.26E+05	86	6.40E-03	6.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-04	0.00E+00
Methylcyclopentane	6.84E+04	84	2.00E-03	1.90E-03	7.80E-04	3.00E+00	6.50E+01	2.00E+00	1.78E-06	1.20E-04	1.10E-07

Table 20: Laboratory results and material balance determined emission factors and combustion efficiency for Location 2 – Sweet Gas Processing Plant – Process Heater.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Nitrogen	1.84E+08	28	1.61E+01	3.79E+00	7.96E+05	9.43E+08	2.20E+10	6.04E+08	6.03E+02	0.00E+00	0.00E+00
Carbon dioxide	2.16E+07	44	1.20E+00	1.20E+00	4.49E+04	8.36E+07	1.95E+09	5.35E+07	5.30E+01	0.00E+00	0.00E+00
										Comb Eff =	**99.99%**
										CH4 Comb Eff =	**99.99%**
										THC Comb Eff =	**99.99%**

Table 21: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 2 - Sweet Gas Processing Plant –Reciprocating Engine.							
Excess Air	163.5%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.98	1.92	3.15	19	25
23	0	**percentage, %**	3.89	7.61	13	76	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.98		3.16	19	23
28	0	**percentage, %**	4.22		1.54	82	100

Table 22: Gas analysis for determine the metals emission factor in flue gas for Location 2 - Sweet Gas Processing Plant – Process Heater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**

Table 22: Gas analysis for determine the metals emission factor in flue gas for Location 2 - Sweet Gas Processing Plant – Process Heater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Aluminum	274.00	209.00	143.00	131.00	66.00	1.03E-04	2.09E-05
Antimony	0.05	0.05	0.01	0.04	0.04	2.81E-08	1.18E-08
Arsenic	9.34	8.66	5.93	3.41	2.73	2.68E-06	8.63E-07
Barium	69.00	57.40	41.80	27.20	15.60	2.14E-05	4.93E-06
Beryllium	0.02	0.01	0.01	0.01	0.00	6.06E-09	1.26E-09
Bismuth	0.00	0.00	0.02	0.00	0.00	0.00E+00	0.00E+00
Boron	154.00	141.00	97.50	56.50	43.50	4.45E-05	1.37E-05
Cadmium	6.14	167.00	0.51	5.63	166.49	4.43E-06	5.26E-05
Calcium	863.00	13000.00	104.00	759.00	12896.00	5.97E-04	4.07E-03
Chlorine	100.00	146.00	100.00	0.00	46.00	0.00E+00	1.45E-05
Chromium	0.85	0.87	0.23	0.62	0.64	4.84E-07	2.02E-07
Cobalt	0.50	9.34	0.03	0.47	9.31	3.71E-07	2.94E-06
Copper	76.80	254.00	2.55	74.25	251.45	5.84E-05	7.95E-05
Iron	308.00	304.00	10.90	297.10	293.10	2.34E-04	9.26E-05
Lead	30.20	155.00	1.39	28.81	153.61	2.27E-05	4.85E-05
Lithium	0.02	0.02	0.02	0.00	0.00	0.00E+00	0.00E+00
Magnesium	81.90	131.00	5.80	76.10	125.20	5.99E-05	3.96E-05
Manganese	9.41	103.00	0.44	8.97	102.56	7.06E-06	3.24E-05
Mercury	0.01	0.02	0.01	0.00	0.01	0.00E+00	2.46E-09
Molybdenum	0.30	2.99	0.02	0.28	2.97	2.20E-07	9.38E-07
Nickel	24.30	296.00	1.02	23.28	294.98	1.83E-05	9.32E-05
Phosphorus	6.82	11.80	0.80	6.02	11.00	4.74E-06	3.48E-06
Potassium	184.00	306.00	55.80	128.20	250.20	1.01E-04	7.91E-05
Selenium	0.10	0.10	0.10	0.00	0.00	0.00E+00	0.00E+00

Table 22: Gas analysis for determine the metals emission factor in flue gas for Location 2 - Sweet Gas Processing Plant – Process Heater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Silicon	123.00	414.00	10.00	113.00	404.00	8.89E-05	1.28E-04
Silver	0.34	0.56	0.06	0.28	0.49	2.18E-07	1.56E-07
Sodium	750.00	611.00	396.00	354.00	215.00	2.79E-04	6.79E-05
Strontium	1.69	9.83	0.29	1.40	9.54	1.10E-06	3.01E-06
Sulphur	200.00	10900.00	200.00	0.00	10700.00	0.00E+00	3.38E-03
Thallium	0.00	0.02	0.00	0.00	0.02	2.60E-09	6.29E-09
Thorium	0.00	0.00	0.00	0.00	0.00	0.00E+00	2.84E-10
Tin	0.31	0.26	0.05	0.26	0.21	2.04E-07	6.59E-08
Titanium	2.99	3.80	1.65	1.34	2.15	1.05E-06	6.79E-07
Uranium	0.01	0.02	0.00	0.01	0.01	7.48E-09	4.01E-09
Vanadium	0.16	0.18	0.02	0.14	0.16	1.09E-07	4.97E-08
Zinc	85.20	1300.00	4.74	80.46	1295.26	6.33E-05	4.09E-04

Table 23: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Process Heater.											
	Fuel Gas C_i (Lab Analyses)			**Norm Fuel Gas C_i**	**Flue Gas C_i (Lab Analyses)**		**C_i Emission factor**			**Combustion Efficiency Calculation**	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	6.45E+08	16	9.90E+01	9.40E+01	1.87E+00	1.26E+03	1.39E+04	3.88E+02	3.88E-04	9.37E-01	2.05E-05
Ethyl benzene	0.00E+00	106	0.00E+00	0.00E+00	1.67E-02	7.50E+01	8.22E+02	2.30E+01	2.30E-05	0.00E+00	1.47E-06
Butane	1.83E+05	58	7.73E-03	7.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-04	0.00E+00
2-Methylpentane	9.26E+03	86	2.63E-04	2.50E-04	3.28E-03	1.40E+01	1.53E+02	4.00E+00	4.27E-06	1.50E-05	2.52E-07

Table 23: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
m,p-Xylene	0.00E+00	106	0.00E+00	0.00E+00	4.61E-02	2.07E+02	2.27E+03	6.40E+01	6.35E-05	0.00E+00	4.05E-06
Methylcyclohexane	2.90E+03	98	7.24E-05	6.88E-05	8.54E-03	3.50E+01	3.89E+02	1.10E+01	1.09E-05	4.81E-06	6.56E-07
Toluene	0.00E+00	92	0.00E+00	0.00E+00	2.63E-02	1.02E+02	1.13E+03	3.20E+01	3.15E-05	0.00E+00	2.02E-06
Pentane	2.54E+04	72	8.62E-04	8.19E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-05	0.00E+00
Hexane	2.65E+03	86	7.55E-05	7.17E-05	2.31E-03	8.00E+00	9.20E+01	3.00E+00	2.58E-06	4.30E-06	1.52E-07
Cyclohexane	0.00E+00	84	0.00E+00	0.00E+00	2.83E-03	1.00E+01	1.10E+02	3.00E+00	3.09E-06	0.00E+00	1.86E-07
Nonane	0.00E+00	128	0.00E+00	0.00E+00	2.42E-03	1.30E+01	1.44E+02	4.00E+00	4.02E-06	0.00E+00	2.39E-07
Undecane	0.00E+00	156	0.00E+00	0.00E+00	2.61E-03	1.70E+01	1.89E+02	5.00E+00	5.30E-06	0.00E+00	3.16E-07
Dodecane	0.00E+00	170	0.00E+00	0.00E+00	1.46E-03	1.00E+01	1.15E+02	3.00E+00	3.21E-06	0.00E+00	1.92E-07
Decane	0.00E+00	142	0.00E+00	0.00E+00	3.97E-03	2.40E+01	2.62E+02	7.00E+00	7.33E-06	0.00E+00	4.36E-07
Heptane	0.00E+00	100	0.00E+00	0.00E+00	2.64E-03	1.10E+01	1.23E+02	3.00E+00	3.44E-06	0.00E+00	2.03E-07
Cyclohexane, ethyl-	0.00E+00	112	0.00E+00	0.00E+00	1.27E-03	6.00E+00	6.60E+01	2.00E+00	1.85E-06	0.00E+00	1.11E-07
Cyclohexane, 1,2-dimethyl-, cis-	0.00E+00	112	0.00E+00	0.00E+00	1.55E-03	7.00E+00	8.10E+01	2.00E+00	2.26E-06	0.00E+00	1.36E-07
Cyclohexane, 1,3-dimethyl-, trans-	0.00E+00	112	0.00E+00	0.00E+00	8.46E-04	4.00E+00	4.40E+01	1.00E+00	1.23E-06	0.00E+00	7.43E-08
Cyclopentane	2.19E+03	70	7.64E-05	7.25E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-06	0.00E+00
Carbonyl sulphide	0.00E+00	60	0.00E+00	0.00E+00	6.15E-02	1.56E+02	1.71E+03	4.80E+01	4.80E-05	0.00E+00	6.75E-07
Formaldehyde	0.00E+00	30	0.00E+00	0.00E+00	2.00E-02	2.50E+01	2.78E+02	8.00E+00	7.78E-06	0.00E+00	2.19E-07
2,3-Dimethylpentane	0.00E+00	100	0.00E+00	0.00E+00	4.80E-03	2.00E+01	2.23E+02	6.00E+00	6.23E-06	0.00E+00	3.69E-07
2,3,4-Trimethylpentane	0.00E+00	114	0.00E+00	0.00E+00	4.02E-03	1.90E+01	2.13E+02	6.00E+00	5.96E-06	0.00E+00	3.53E-07
3-Methylhexane	0.00E+00	100	0.00E+00	0.00E+00	4.25E-03	1.80E+01	1.97E+02	6.00E+00	5.52E-06	0.00E+00	3.26E-07
3-Methylheptane	0.00E+00	114	0.00E+00	0.00E+00	2.12E-03	1.00E+01	1.12E+02	3.00E+00	3.15E-06	0.00E+00	1.86E-07
cis-2-Butene	0.00E+00	56	0.00E+00	0.00E+00	4.61E-03	1.10E+01	1.20E+02	3.00E+00	3.36E-06	0.00E+00	2.02E-07
2-Methylhexane	0.00E+00	100	0.00E+00	0.00E+00	2.94E-03	1.20E+01	1.36E+02	4.00E+00	3.82E-06	0.00E+00	2.26E-07
2-Methylheptane	0.00E+00	114	0.00E+00	0.00E+00	1.21E-03	6.00E+00	6.40E+01	2.00E+00	1.79E-06	0.00E+00	1.06E-07
Benzene	0.00E+00	78	0.00E+00	0.00E+00	5.02E-03	1.70E+01	1.82E+02	5.00E+00	5.09E-06	0.00E+00	3.31E-07
Ethane	5.72E+06	30	4.67E-01	4.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.87E-03	0.00E+00
Propane	1.17E+06	44	6.50E-02	6.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-03	0.00E+00
Isobutane	3.28E+05	58	1.38E-02	1.31E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-04	0.00E+00
Hydrogen sulphide	3.90E+01	34	2.83E-06	2.69E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	6.79E+04	72	2.31E-03	2.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-04	0.00E+00

Table 23: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
2,3-Dimethylbutane	1.27E+03	86	3.61E-05	3.43E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-06	0.00E+00
o-Xylene	0.00E+00	106	0.00E+00	0.00E+00	5.93E-02	2.66E+02	2.92E+03	8.20E+01	8.17E-05	0.00E+00	5.20E-06
1,2,4-Trimethylbenzene	0.00E+00	120	0.00E+00	0.00E+00	1.19E-01	6.04E+02	6.63E+03	1.86E+02	1.86E-04	0.00E+00	1.17E-05
3-Methylpentane	4.04E+03	86	1.15E-04	1.09E-04	2.53E-03	9.00E+00	1.01E+02	3.00E+00	2.82E-06	6.55E-06	1.66E-07
Methylcyclopentane	7.68E+03	84	2.24E-04	2.13E-04	2.54E-03	9.00E+00	9.90E+01	3.00E+00	2.77E-06	1.28E-05	1.67E-07
trans-2-Butene	0.00E+00	56	0.00E+00	0.00E+00	1.63E-02	3.90E+01	4.24E+02	1.20E+01	1.19E-05	0.00E+00	7.16E-07
Acetaldehyde	2.38E+03	44	1.32E-04	1.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-06	0.00E+00
1,2,3-Trimethylbenzene	0.00E+00	120	0.00E+00	0.00E+00	4.06E-02	2.06E+02	2.26E+03	6.30E+01	6.33E-05	0.00E+00	4.01E-06
1,3,5-Trimethylbenzene	0.00E+00	120	0.00E+00	0.00E+00	4.44E-02	2.25E+02	2.48E+03	6.90E+01	6.93E-05	0.00E+00	4.39E-06
1,4-Pentadiene, 3,3-dimethyl-	0.00E+00	96	0.00E+00	0.00E+00	5.06E-03	2.10E+01	2.26E+02	6.00E+00	6.32E-06	0.00E+00	3.89E-07
2,2,4-Trimethylpentane	0.00E+00	114	0.00E+00	0.00E+00	6.41E-03	3.10E+01	3.39E+02	9.00E+00	9.50E-06	0.00E+00	5.63E-07
Acetic Acid	0.00E+00	60	0.00E+00	0.00E+00	1.76E-03	4.00E+00	4.90E+01	1.00E+00	1.37E-06	0.00E+00	3.86E-08
Benzene, (1-methyl-1-propenyl)-, (Z)- (C	0.00E+00	132	0.00E+00	0.00E+00	3.84E-02	2.15E+02	2.36E+03	6.60E+01	6.59E-05	0.00E+00	4.22E-06
Benzene, 1,2,3,4-tetramethyl-	0.00E+00	134	0.00E+00	0.00E+00	2.13E-02	1.21E+02	1.33E+03	3.70E+01	3.71E-05	0.00E+00	2.34E-06
Benzene, 1-ethyl-2,3-dimethyl-	0.00E+00	134	0.00E+00	0.00E+00	2.74E-02	1.55E+02	1.71E+03	4.80E+01	4.78E-05	0.00E+00	3.01E-06
Benzene, 1-methyl-2-(1-methylethyl)- (CA	0.00E+00	134	0.00E+00	0.00E+00	2.58E-02	1.46E+02	1.60E+03	4.50E+01	4.49E-05	0.00E+00	2.83E-06
Benzene, 1-methyl-2-propyl-	0.00E+00	134	0.00E+00	0.00E+00	1.15E-02	6.50E+01	7.15E+02	2.00E+01	2.00E-05	0.00E+00	1.26E-06
Carbon disulfide	0.00E+00	76	0.00E+00	0.00E+00	1.64E-02	5.30E+01	5.79E+02	1.60E+01	1.62E-05	0.00E+00	1.80E-07
Dimethyl disulphide	0.00E+00	94	0.00E+00	0.00E+00	3.57E-03	1.40E+01	1.56E+02	4.00E+00	4.36E-06	0.00E+00	7.83E-08
Endo-tricyclo[5.2.1.0(2.6)]decane	0.00E+00	136	0.00E+00	0.00E+00	2.52E-02	1.45E+02	1.59E+03	4.40E+01	4.45E-05	0.00E+00	2.76E-06
m-Diethylbenzene	0.00E+00	134	0.00E+00	0.00E+00	4.73E-03	2.70E+01	2.94E+02	8.00E+00	8.23E-06	0.00E+00	5.19E-07
Methyl ethyl disulfide	0.00E+00	108	0.00E+00	0.00E+00	1.66E-03	8.00E+00	8.30E+01	2.00E+00	2.33E-06	0.00E+00	5.47E-08
m-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	5.17E-02	2.62E+02	2.88E+03	8.10E+01	8.06E-05	0.00E+00	5.11E-06
Naphthalene, 2-methyl-	0.00E+00	142	0.00E+00	0.00E+00	1.71E-02	1.03E+02	1.13E+03	3.20E+01	3.16E-05	0.00E+00	2.06E-06
Naphthalene, decahydro-, trans-	0.00E+00	138	0.00E+00	0.00E+00	8.77E-03	5.10E+01	5.62E+02	1.60E+01	1.57E-05	0.00E+00	9.62E-07
n-Propylbenzene	0.00E+00	120	0.00E+00	0.00E+00	1.52E-02	7.70E+01	8.49E+02	2.40E+01	2.38E-05	0.00E+00	1.51E-06
Octane	0.00E+00	114	0.00E+00	0.00E+00	3.98E-03	1.90E+01	2.11E+02	6.00E+00	5.90E-06	0.00E+00	3.50E-07
o-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	2.97E-02	1.51E+02	1.65E+03	4.60E+01	4.63E-05	0.00E+00	2.93E-06
p-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	1.29E-02	6.50E+01	7.17E+02	2.00E+01	2.01E-05	0.00E+00	1.27E-06

Table 23: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Process Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Sulfur dioxide	0.00E+00	64	0.00E+00	0.00E+00	8.48E-04	2.00E+00	2.50E+01	1.00E+00	7.06E-07	0.00E+00	0.00E+00
Nitrogen	1.66E+08	28	6.00E+00	5.70E+00	8.35E+05	9.89E+08	1.09E+10	3.04E+08	3.04E+02	0.00E+00	0.00E+00
Carbon dioxide	1.23E+06	44	6.81E-02	6.47E-02	8.34E+04	1.55E+08	1.70E+09	4.77E+07	4.80E+01	0.00E+00	0.00E+00
										Comb Eff =	**99.99%**
										CH4 Comb Eff =	**99.99%**
										THC Comb Eff =	**99.99%**

Table 24: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 3 - Sweet Gas Gathering System (Plains Region)– Process Heater.

Excess Air	32%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m3/h**	0.95	1.89	0.60	9.43	13
2.2	0	**percentage, %**	7.38	4.64	4.64	73	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m3/h**	0.95		0.59	9.43	11
2.7	0	**percentage, %**	8.65		5.44	86	100

Table 25: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**

Table 25: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Reciprocating Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	6.03E+08	16	9.20E+01	9.24E+01	7.50E+02	5.07E+05	5.95E+06	1.69E+05	1.69E-01	9.24E-01	8.79E-03
Ethyl benzene	0.00E+00	106	0.00E+00	0.00E+00	1.55E-03	7.00E+00	8.20E+01	2.00E+00	2.32E-06	0.00E+00	1.46E-07
Butane	1.86E+05	58	7.90E-03	7.90E-03	2.46E-02	6.00E+01	7.07E+02	2.00E+01	2.01E-05	3.15E-04	1.15E-06
1-Butene	0.00E+00	56	0.00E+00	0.00E+00	2.00E-01	4.80E+02	5.62E+03	1.60E+02	1.60E-04	0.00E+00	9.50E-06
2-Methylpentane	9.90E+03	86	2.80E-04	3.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00
m,p-Xylene	0.00E+00	106	0.00E+00	0.00E+00	3.70E-03	1.70E+01	1.96E+02	6.00E+00	5.56E-06	0.00E+00	3.49E-07
Methylcyclohexane	2.91E+03	98	7.26E-05	7.28E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.10E-06	0.00E+00
Toluene	0.00E+00	92	0.00E+00	0.00E+00	6.20E-02	2.41E+02	2.83E+03	8.00E+01	8.02E-05	0.00E+00	5.08E-06
Pentane	2.66E+04	72	9.00E-04	9.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.53E-05	0.00E+00
1-Pentene	0.00E+00	70	0.00E+00	0.00E+00	3.70E-02	1.08E+02	1.27E+03	3.60E+01	3.60E-05	0.00E+00	2.14E-06
Hexane	1.91E+03	86	5.43E-05	5.44E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-06	0.00E+00
Cyclopentane	2.04E+03	70	7.13E-05	7.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-06	0.00E+00
cis-2-Butene	0.00E+00	56	0.00E+00	0.00E+00	9.40E-03	2.20E+01	2.62E+02	7.00E+00	7.43E-06	0.00E+00	4.42E-07
1-Hexene	0.00E+00	84	0.00E+00	0.00E+00	3.00E-02	1.21E+02	1.42E+03	4.00E+01	4.02E-05	0.00E+00	2.39E-06
Benzene	0.00E+00	78	0.00E+00	0.00E+00	2.90E-01	9.53E+02	1.12E+04	3.17E+02	3.17E-04	0.00E+00	2.03E-05
Ethane	5.41E+06	30	4.40E-01	4.40E-01	5.01E+00	6.36E+03	7.46E+04	2.12E+03	2.10E-03	8.90E-03	1.18E-04
Ethylene	0.00E+00	28	0.00E+00	0.00E+00	1.11E+01	1.32E+04	1.54E+05	4.38E+03	4.40E-03	0.00E+00	2.60E-04
Propane	1.12E+06	44	6.20E-02	6.20E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-03	0.00E+00
Isobutane	3.42E+05	58	1.40E-02	1.40E-02	5.20E-02	1.26E+02	1.48E+03	4.20E+01	4.21E-05	5.80E-04	2.42E-06
Hydrogen sulphide	1.10E+01	34	7.84E-07	7.86E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	7.15E+04	72	2.40E-03	2.40E-03	8.80E-03	2.70E+01	3.15E+02	9.00E+00	8.94E-06	1.20E-04	5.17E-07
2,3-Dimethylbutane	1.44E+03	86	4.11E-05	4.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-06	0.00E+00
o-Xylene	0.00E+00	106	0.00E+00	0.00E+00	1.60E-03	7.00E+00	8.20E+01	2.00E+00	2.32E-06	0.00E+00	1.46E-07
3-Methylpentane	4.15E+03	86	1.20E-04	1.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-06	0.00E+00
Methylcyclopentane	7.82E+03	84	2.30E-04	2.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-05	0.00E+00
Formic acid	0.00E+00	46	0.00E+00	0.00E+00	8.90E-02	1.73E+02	2.03E+03	5.80E+01	5.76E-05	0.00E+00	1.04E-06
trans-2-Butene	0.00E+00	56	0.00E+00	0.00E+00	2.20E-02	5.10E+01	6.01E+02	1.70E+01	1.71E-05	0.00E+00	1.01E-06
Acetaldehyde	2.78E+03	44	1.60E-04	1.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-06	0.00E+00
1,3-Pentadiene, (Z)-	0.00E+00	68	0.00E+00	0.00E+00	1.10E-03	3.00E+00	3.70E+01	1.00E+00	1.06E-06	0.00E+00	6.51E-08
Acetic Acid	0.00E+00	60	0.00E+00	0.00E+00	1.70E-03	4.00E+00	5.20E+01	1.00E+00	1.47E-06	0.00E+00	4.08E-08

Table 25: Laboratory results and material balance determined emission factors and combustion efficiency for Location 3 – Sweet Gas Gathering System (Plains Region) – Reciprocating Engine.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Cyclobutanone, 3-ethyl-	1.78E+03	98	4.45E-05	4.47E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E-06	0.00E+00
Cyclopentene-3-carboxylic acid, 1-(trime	0.00E+00	214	0.00E+00	0.00E+00	1.10E-02	1.02E+02	1.20E+03	3.40E+01	3.41E-05	0.00E+00	1.33E-06
m-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	1.60E-03	8.00E+00	9.50E+01	3.00E+00	2.71E-06	0.00E+00	1.69E-07
Nonanol	0.00E+00	144	0.00E+00	0.00E+00	1.10E-03	7.00E+00	7.70E+01	2.00E+00	2.17E-06	0.00E+00	1.13E-07
s-Dichloroethyl ether	0.00E+00	142	0.00E+00	0.00E+00	3.20E-03	1.90E+01	2.28E+02	6.00E+00	6.49E-06	0.00E+00	1.52E-07
Silane, chlorotrimethyl-	0.00E+00	108	0.00E+00	0.00E+00	5.00E-03	2.30E+01	2.70E+02	8.00E+00	7.65E-06	0.00E+00	1.77E-07
Nitrogen	1.20E+08	28	7.00E+00	7.00E+00	8.32E+05	9.85E+08	1.15E+10	3.28E+08	3.28E+02	0.00E+00	0.00E+00
Carbon dioxide	1.37E+06	44	7.60E-02	7.60E-02	8.63E+04	1.61E+08	1.88E+09	5.35E+07	5.35E+01	0.00E+00	0.00E+00
									Comb Eff =		**99.04%**
									CH4 Comb Eff =		**99.04%**
									THC Comb Eff =		**99.04%**

Table 26: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 3 - Sweet Gas Gathering System – Reciprocating Engine.							
Excess Air	43%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.93	1.85	0.79	9.99	14
622	0	**percentage, %**	6.83	14	5.82	74	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.93		0.79	9.99	12
767	0	**percentage, %**	7.91		6.74	85	100

Table 27: Gas analysis for determine the metals emission factor in flue gas for Location 3 - Sweet Gas Gathering System – Process Heater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Aluminum	155.00	68.30	3.48	151.52	64.82	6.36E-05	2.70E-05
Antimony	0.06	0.03	0.00	0.06	0.03	2.52E-08	1.05E-08
Arsenic	4.12	2.13	0.02	4.10	2.11	1.72E-06	8.80E-07
Barium	41.10	18.00	0.34	40.76	17.66	1.71E-05	7.37E-06
Beryllium	0.02	0.01	0.00	0.01	0.00	4.53E-09	1.79E-09
Bismuth	0.00	0.00	0.00	0.00	0.00	0.00E+00	0.00E+00
Boron	129.00	69.90	21.20	107.80	48.70	4.52E-05	2.03E-05
Cadmium	3.09	2.25	0.29	2.81	1.97	1.18E-06	8.20E-07
Calcium	671.00	662.00	16.50	654.50	645.50	2.75E-04	2.69E-04
Chlorine	679.00	719.00	100.00	579.00	619.00	2.43E-04	2.58E-04
Chromium	1.22	1.60	0.12	1.10	1.48	4.62E-07	6.17E-07
Cobalt	0.12	0.21	0.01	0.11	0.21	4.81E-08	8.62E-08
Copper	14.90	11.20	1.58	13.32	9.62	5.59E-06	4.01E-06
Iron	45.90	33.20	2.41	43.49	30.79	1.83E-05	1.28E-05
Lead	2.49	3.43	0.38	2.11	3.05	8.87E-07	1.27E-06
Lithium	0.02	0.02	0.02	0.00	0.00	0.00E+00	0.00E+00
Magnesium	63.50	71.20	2.70	60.80	68.50	2.55E-05	2.86E-05
Manganese	3.12	1.68	0.07	3.05	1.61	1.28E-06	6.73E-07
Mercury	0.01	0.03	0.01	0.00	0.02	0.00E+00	8.34E-09
Molybdenum	0.12	0.11	0.01	0.10	0.10	4.35E-08	4.20E-08
Nickel	11.00	7.66	0.63	10.38	7.04	4.35E-06	2.94E-06
Phosphorus	0.80	5.28	0.80	0.00	4.48	0.00E+00	1.87E-06

Table 27: Gas analysis for determine the metals emission factor in flue gas for Location 3 - Sweet Gas Gathering System – Process Heater and Reciprocating Engine.

Component	Lab Analysis			Method Blank Corrected		Emission Factor	
	Process Heater, Flue Gas	Reciprocating Engine, Flue Gas	Method blank	Process Heater, Flue Gas	Reciprocating Engine, Flue Gas	Process Heater, Flue Gas	Reciprocating Engine, Flue Gas
	µg/L	µg/L	µg/L	µg/L	µg/L	kg/GJ (Fuel)	kg/GJ (Fuel)
Potassium	257.00	213.00	15.50	241.50	197.50	1.01E-04	8.24E-05
Selenium	0.10	0.10	0.10	0.00	0.00	0.00E+00	0.00E+00
Silicon	10.00	10.00	10.00	0.00	0.00	0.00E+00	0.00E+00
Silver	0.69	1.40	0.14	0.55	1.26	2.31E-07	5.27E-07
Sodium	911.00	663.00	51.60	859.40	611.40	3.61E-04	2.55E-04
Strontium	2.32	2.58	0.12	2.20	2.46	9.25E-07	1.03E-06
Sulphur	200.00	200.00	200.00	0.00	0.00	0.00E+00	0.00E+00
Thallium	0.00	0.00	0.00	0.00	0.00	8.39E-11	0.00E+00
Thorium	0.00	0.00	0.00	0.00	0.00	1.72E-09	0.00E+00
Tin	0.41	0.69	0.11	0.30	0.58	1.24E-07	2.42E-07
Titanium	0.99	0.53	0.14	0.85	0.39	3.55E-07	1.62E-07
Uranium	0.01	0.00	0.00	0.01	0.00	3.02E-09	7.93E-10
Vanadium	0.04	0.03	0.01	0.04	0.03	1.62E-08	1.16E-08
Zinc	21.60	33.90	1.32	20.28	32.58	8.51E-06	1.36E-05

Table 28: Laboratory results and material balance determined emission factors and combustion efficiency for Location 4 – Thermal Heavy Oil Production – Steam Generator.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	µg/m^3	MW	Vol% C_i/m^3	Norm Vol% C_i/m^3	ppmv	µg/m^3	µg/ (m^3 fuel)	ug /(MJ fuel)	kg /(GJ fuel)	Non CO_2 C inlet	Non CO_2 C outlet
Methane	6.10E+08	16	9.33E+01	9.30E+01	5.90E+00	3.99E+03	3.96E+04	1.00E+03	1.01E-03	9.30E-01	5.85E-05
Ethane	3.93E+07	30	3.21E+00	3.20E+00	1.00E-01	1.27E+02	1.26E+03	3.19E+01	3.19E-05	6.39E-02	1.98E-06

Table 28: Laboratory results and material balance determined emission factors and combustion efficiency for Location 4 – Thermal Heavy Oil Production – Steam Generator.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Ethylene	3.55E+03	28	3.10E-04	3.09E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-06	0.00E+00
Propane	1.79E+07	44	9.95E-01	9.92E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-02	0.00E+00
Propylene	1.46E+04	42	8.48E-04	8.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-05	0.00E+00
Isobutane	4.15E+06	58	1.75E-01	1.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-03	0.00E+00
Butane	7.29E+06	58	3.07E-01	3.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-02	0.00E+00
trans-2-Butene	1.47E+04	56	6.42E-04	6.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-05	0.00E+00
1-Butene	3.32E+03	56	1.45E-04	1.44E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.78E-06	0.00E+00
Isobutylene	3.55E+03	56	1.55E-04	1.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.19E-06	0.00E+00
cis-2-Butene	7.82E+03	56	3.41E-04	3.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-05	0.00E+00
Hydrogen sulphide	2.07E+05	34	1.49E-02	1.49E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl sulphide	3.32E+02	60	1.36E-05	1.35E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-07	0.00E+00
Methyl mercaptan	3.76E+04	48	1.91E-03	1.91E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-05	0.00E+00
Ethyl mercaptan	7.55E+03	62	2.98E-04	2.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-06	0.00E+00
Dimethyl sulphide	5.51E+03	62	2.17E-04	2.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.33E-06	0.00E+00
Carbon disulphide	4.82E+01	76	1.55E-06	1.55E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-08	0.00E+00
Isopropyl mercaptan	4.63E+03	76	1.49E-04	1.49E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E-06	0.00E+00
tert-Butyl mercaptan	3.88E+02	90	1.06E-05	1.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-07	0.00E+00
Propyl mercaptan	1.01E+03	76	3.24E-05	3.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.68E-07	0.00E+00
Thiophene	1.28E+03	84	3.71E-05	3.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-06	0.00E+00
Isobutyl mercaptan	1.52E+03	90	4.12E-05	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-06	0.00E+00
Ethyl sulphide	2.31E+02	90	6.29E-06	6.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-07	0.00E+00
Butyl mercaptan	6.55E+02	98	1.63E-05	1.63E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.52E-07	0.00E+00
Dimethyl disulphide	7.95E+03	94	2.07E-04	2.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E-06	0.00E+00
2-methyl Thiophene	8.17E+03	98	2.04E-04	2.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00
3-methyl Thiophene	4.68E+03	98	1.17E-04	1.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-06	0.00E+00
Tetrahydro thiophene	1.85E+03	88	5.15E-05	5.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-06	0.00E+00
Allyl sulphide	5.98E+03	114	1.28E-04	1.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.67E-06	0.00E+00
2,5-dimethyl Thiophene	6.11E+03	112	1.33E-04	1.33E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-06	0.00E+00
Dimethyl trisulphide	2.65E+04	126	5.14E-04	5.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-05	0.00E+00
Isopentane	6.27E+06	72	2.13E-01	2.12E-01	2.60E-02	7.92E+01	7.84E+02	1.99E+01	1.99E-05	1.06E-02	1.29E-06
Pentane	3.84E+06	72	1.30E-01	1.30E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-03	0.00E+00

Table 28: Laboratory results and material balance determined emission factors and combustion efficiency for Location 4 – Thermal Heavy Oil Production – Steam Generator.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
2,2-Dimethylbutane	9.35E+04	86	2.66E-03	2.65E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	0.00E+00
Methylene chloride	3.55E-03	84	1.03E-10	1.03E-10	1.00E-06	3.55E-03	3.52E-02	8.94E-04	8.94E-10	1.03E-12	9.91E-12
2,3-Dimethylbutane	1.03E+05	86	2.94E-03	2.93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-04	0.00E+00
Cyclopentane	1.87E+05	70	6.54E-03	6.52E-03	7.83E-04	2.32E+00	2.30E+01	5.83E-01	5.83E-07	3.26E-04	3.88E-08
2-Methylpentane	7.57E+05	86	2.15E-02	2.15E-02	3.61E-03	1.31E+01	1.30E+02	3.30E+00	3.30E-06	1.29E-03	2.15E-07
3-Methylpentane	3.49E+05	86	9.93E-03	9.90E-03	1.78E-03	6.47E+00	6.41E+01	1.63E+00	1.63E-06	5.94E-04	1.06E-07
Hexane	6.77E+05	86	1.92E-02	1.92E-02	8.70E-04	3.16E+00	3.14E+01	7.96E-01	7.96E-07	1.15E-03	5.17E-08
Methylcyclopentane	1.62E+05	84	4.73E-03	4.71E-03	6.93E-04	2.46E+00	2.44E+01	6.20E-01	6.20E-07	2.83E-04	4.12E-08
Cyclohexane	1.41E+05	84	4.12E-03	4.11E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	0.00E+00
Benzene	1.48E+05	78	4.64E-03	4.62E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-04	0.00E+00
2-Methylhexane	6.18E+04	100	1.51E-03	1.51E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-04	0.00E+00
2,3-Dimethylpentane	2.06E+04	100	5.04E-04	5.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-05	0.00E+00
3-Methylhexane	7.19E+04	100	1.76E-03	1.75E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-04	0.00E+00
Heptane	0.00E+00	100	0.00E+00	0.00E+00	1.35E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-08
Toluene	0.00E+00	92	0.00E+00	0.00E+00	1.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-08
Chlorobenzene-d5	0.00E+00	112	0.00E+00	0.00E+00	1.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-11
Dodecane	0.00E+00	170	0.00E+00	0.00E+00	3.47E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E-07
Acetaldehyde	0.00E+00	44	0.00E+00	0.00E+00	4.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrogen	1.69E+06	28	1.48E-01	1.47E-01	8.63E+05	1.02E+09	1.01E+10	2.57E+08	2.57E+02	0.00E+00	0.00E+00
Carbon dioxide	3.09E+07	44	1.72E+00	1.71E+00	1.10E+05	2.05E+08	2.03E+09	5.15E+07	5.15E+01	0.00E+00	0.00E+00
Oxygen	0.00E+00	32	0.00E+00	0.00E+00	2.04E+04	2.76E+07	2.74E+08	6.95E+06	6.95E+00	0.00E+00	0.00E+00
										Comb Eff =	**99.99%**
										CH4 Comb Eff =	**99.99%**
										THC Comb Eff =	**99.99%**

Table 29: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 4 – Thermal Heavy Oil Production – Steam Generator.

Excess Air	9.75%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							

Table 29: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 4 – Thermal Heavy Oil Production – Steam Generator.							
Excess Air	9.75%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
THC (ppm)	**CO (ppm)**	**m^3/h**	1.08	2.04	0.20	8.62	12
4.9	0	**percentage, %**	9.05	17	1.70	72	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.08		0.20	8.62	9.91
6.0	0	**percentage, %**	11		2.05	87	100

Table 30: Laboratory results and material balance determined emission factors and combustion efficiency for Location 4 – Thermal Heavy Oil Production – Treater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	5.45E+08	16	8.34E+01	9.35E+01	7.40E+00	5.01E+03	9.62E+04	2.44E+03	2.44E-03	9.35E-01	1.42E-04
Ethane	4.07E+07	30	3.32E+00	3.72E+00	2.00E-01	2.54E+02	4.88E+03	1.24E+02	1.24E-04	7.44E-02	7.69E-06
Propane	1.82E+07	44	1.01E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-02	0.00E+00
Isobutane	3.63E+06	58	1.53E-01	1.72E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E-03	0.00E+00
Butane	4.49E+06	58	1.89E-01	2.12E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.49E-03	0.00E+00
Carbonyl sulphide	7.16E+01	60	2.92E-06	3.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-08	0.00E+00
Dimethyl sulphide	7.29E+01	62	2.88E-06	3.22E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.45E-08	0.00E+00
Carbon disulphide	2.60E+01	76	8.38E-07	9.39E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.39E-09	0.00E+00
Dimethyl disulphide	2.46E+02	94	6.40E-06	7.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-07	0.00E+00
Unknown Sulphur (MW=32)	0.00E+00	32	0.00E+00	0.00E+00	5.76E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	1.95E+06	72	6.62E-02	7.42E-02	2.77E-02	8.44E+01	1.62E+03	4.11E+01	4.11E-05	3.71E-03	2.66E-06
Pentane	1.13E+06	72	3.85E-02	4.31E-02	2.52E+00	7.67E+03	1.47E+05	3.74E+03	3.74E-03	2.16E-03	2.42E-04
2,2-Dimethylbutane	2.99E+04	86	8.49E-04	9.52E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.71E-05	0.00E+00
Methylene chloride	3.55E-03	84	1.03E-10	1.16E-10	1.00E-03	3.55E+00	6.83E+01	1.73E+00	1.73E-06	1.16E-12	1.92E-08
2,3-Dimethylbutane	3.24E+04	86	9.22E-04	1.03E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.20E-05	0.00E+00
Cyclopentane	3.38E+04	70	1.18E-03	1.32E-03	8.80E-01	2.61E+03	5.01E+04	1.27E+03	1.27E-03	6.61E-05	8.46E-05
2-Methylpentane	2.87E+05	86	8.15E-03	9.14E-03	3.38E+00	1.23E+04	2.36E+05	5.99E+03	5.99E-03	5.48E-04	3.90E-04
3-Methylpentane	1.21E+05	86	3.46E-03	3.87E-03	1.69E+00	6.15E+03	1.18E+05	2.99E+03	2.99E-03	2.32E-04	1.95E-04
Hexane	2.58E+05	86	7.33E-03	8.21E-03	1.04E+00	3.78E+03	7.27E+04	1.84E+03	1.84E-03	4.93E-04	1.20E-04

Table 30: Laboratory results and material balance determined emission factors and combustion efficiency for Location 4 – Thermal Heavy Oil Production – Treater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methylcyclopentane	4.65E+04	84	1.36E-03	1.52E-03	6.01E-01	2.14E+03	4.10E+04	1.04E+03	1.04E-03	9.11E-05	6.93E-05
Cyclohexane	4.23E+04	84	1.23E-03	1.38E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.28E-05	0.00E+00
Benzene	2.52E+04	78	7.91E-04	8.86E-04	2.29E+00	7.55E+03	1.45E+05	3.68E+03	3.68E-03	5.32E-05	2.64E-04
2-Methylhexane	2.98E+04	100	7.29E-04	8.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-05	0.00E+00
2,3-Dimethylpentane	8.88E+03	100	2.17E-04	2.44E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-05	0.00E+00
3-Methylhexane	3.27E+04	100	8.00E-04	8.96E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.27E-05	0.00E+00
Heptane	3.38E+04	100	8.27E-04	9.26E-04	1.30E+00	5.50E+03	1.06E+05	2.68E+03	2.68E-03	6.49E-05	6.49E-11
Methylcyclohexane	3.21E+04	98	8.01E-04	8.97E-04	2.19E-01	9.08E+02	1.74E+04	4.42E+02	4.42E-04	6.28E-05	6.28E-11
Toluene	6.15E+03	92	1.63E-04	1.83E-04	6.28E-01	2.44E+03	4.70E+04	1.19E+03	1.19E-03	0.00E+00	0.00E+00
Octane	4.45E+03	114	9.55E-05	1.07E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chlorobenzene-d5	4.74E-03	112	1.03E-10	1.16E-10	1.00E-03	4.74E+00	9.10E+01	2.31E+00	2.31E-06	0.00E+00	0.00E+00
Nitrogen	3.06E+06	28	2.68E-01	3.00E-01	8.30E+05	9.83E+08	1.89E+10	4.79E+08	4.79E+02	0.00E+00	0.00E+00
Carbon dioxide	1.36E+07	44	7.57E-01	8.49E-01	5.83E+04	1.08E+08	2.08E+09	5.28E+07	5.28E+01	0.00E+00	0.00E+00
									Comb Eff =		**99.86%**
									CH4 Comb Eff =		**99.98%**
									THC Comb Eff =		**99.96%**

Table 31: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 4 – Thermal Heavy Oil Production - Treater.

Excess Air	102%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.07	2.05	2.15	16	21
22	0	**percentage, %**	5.04	9.65	10	75	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.07		2.15	16	19
22	0	**percentage, %**	5.58		11	83	100

Table 32: Gas analysis for determine the metals emission factor in flue gas for Location 4 – Thermal Heavy Oil Production – Steam Generator and Treater.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Aluminum	796	366	219	577	147	1.78E-04	8.63E-05
Antimony	0.226	0.0378	0.0321	0.1939	0.0057	5.99E-08	3.35E-09
Arsenic	20	13.3	5.83	14.17	7.47	4.38E-06	4.38E-06
Barium	418	133	166	252	0	7.79E-05	0.00E+00
Beryllium	0.0272	0.0059	0.0154	0.0118	0	3.65E-09	0.00E+00
Bismuth	0.0563	0.0232	0.0094	0.0469	0.0138	1.45E-08	8.10E-09
Boron	938	304	300	638	4	1.97E-04	2.35E-06
Cadmium	2.35	0.0949	0.0293	2.3207	0.0656	7.17E-07	3.85E-08
Calcium	0.986	0.371	0.293	0.693	0.078	2.14E-07	4.58E-08
Chlorine	0.204	0.1	0.1	0.104	0	3.22E-08	0.00E+00
Chromium	278	0.583	0.17	277.83	0.413	8.59E-05	2.42E-07
Cobalt	2.45	0.0341	0.0033	2.4467	0.0308	7.56E-07	1.81E-08
Copper	29.7	4.34	2.74	26.96	1.6	8.34E-06	9.39E-07
Iron	5570	74.5	10.7	5559.3	63.8	1.72E-03	3.74E-05
Lead	19.5	0.733	0.203	19.297	0.53	5.97E-06	3.11E-07
Lithium	0.161	0.02	0.02	0.141	0	4.36E-08	0.00E+00
Magnesium	0.0808	0.0786	0.0452	0.0356	0.0334	1.10E-08	1.96E-08
Manganese	150	0.76	0.289	149.711	0.471	4.63E-05	2.76E-07
Mercury	0.0113	0.01	0.01	0.0013	0	4.02E-10	0.00E+00
Molybdenum	5.62	0.138	0.025	5.595	0.113	1.73E-06	6.63E-08
Nickel	139	0.714	0.121	138.879	0.593	4.29E-05	3.48E-07
Phosphorus	5.93	0.8	0.8	5.13	0	1.59E-06	0.00E+00
Potassium	284	109	86.2	197.8	22.8	6.12E-05	1.34E-05

Table 32: Gas analysis for determine the metals emission factor in flue gas for Location 4 – Thermal Heavy Oil Production – Steam Generator and Treater.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Selenium	0.1	0.1	0.1	0	0	0.00E+00	0.00E+00
Silicon	0.59	0.293	0.141	0.449	0.152	1.39E-07	8.92E-08
Silver	0.121	0.285	0.0346	0.0864	0.2504	2.67E-08	1.47E-07
Sodium	2510	697	801	1709	0	5.28E-04	0.00E+00
Strontium	7.92	3.24	3.31	4.61	0	1.43E-06	0.00E+00
Sulphur	13.7	0.2	0.2	13.5	0	4.17E-06	0.00E+00
Thallium	0.0125	0.0027	0.0014	0.0111	0.0013	3.43E-09	7.63E-10
Thorium	0.163	0.0458	0.0191	0.1439	0.0267	4.45E-08	1.57E-08
Tin	0.78	0.494	0.136	0.644	0.358	1.99E-07	2.10E-07
Titanium	12.6	3.43	0.479	12.121	2.951	3.75E-06	1.73E-06
Uranium	0.0277	0.017	0.0076	0.0201	0.0094	6.21E-09	5.52E-09
Vanadium	0.005	0.005	0.0138	0	0	0.00E+00	0.00E+00
Zinc	1110	2.65	1.79	1108.21	0.86	3.43E-04	5.05E-07

Table 33: Laboratory results and material balance determined emission factors and combustion efficiency for Location 5 – Cold Heavy Oil Production – Tank Heater.											
	Fuel Gas C_i (Lab Analyses)			**Norm Fuel Gas C_i**	**Flue Gas C_i (Lab Analyses)**		**C_i Emission factor**			**Combustion Efficiency Calculation**	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	4.42E+08	16	6.76E+01	9.42E+01	4.30E+00	2.91E+03	1.38E+05	3.79E+03	3.79E-03	9.42E-01	2.04E-04
Ethane	6.32E+06	30	5.17E-01	7.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-02	0.00E+00
Propane	0.00E+00	44	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
Isobutane	1.53E+06	58	6.47E-02	9.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-03	0.00E+00

Table 33: Laboratory results and material balance determined emission factors and combustion efficiency for Location 5 – Cold Heavy Oil Production – Tank Heater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Acetylene	0.00E+00	26	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
Butane	6.55E+05	58	2.77E-02	3.85E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-03	0.00E+00
Propyne	3.01E+05	40	1.87E-02	2.57E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-04	0.00E+00
Isopentane	7.03E+05	72	2.37E-02	3.33E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-03	0.00E+00
1-Pentene	0.00E+00	70	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
Pentane	4.05E+05	72	1.37E-02	1.92E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.59E-04	0.00E+00
2,2-Dimethylbutane	4.95E+04	86	1.47E-03	1.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-04	0.00E+00
2,3-Dimethylbutane	1.11E+05	86	3.20E-03	4.41E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.65E-04	0.00E+00
Cyclopentane	1.24E+05	70	4.31E-03	6.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-04	0.00E+00
2-Methylpentane	3.08E+05	86	8.80E-03	1.22E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.34E-04	0.00E+00
3-Methylpentane	2.16E+05	86	6.10E-03	8.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	0.00E+00
Acrolein	0.00E+00	56	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
Hexane	1.52E+05	86	4.30E-03	6.03E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-04	0.00E+00
Methylcyclopentane	2.59E+05	84	7.50E-03	1.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-04	0.00E+00
Cyclohexane	3.38E+05	84	9.80E-03	1.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.23E-04	0.00E+00
Benzene	1.84E+04	78	5.70E-04	8.03E-04	3.39E-03	1.12E+01	5.31E+02	1.46E+01	1.46E-05	4.82E-05	9.66E-07
2-Methylhexane	4.53E+04	100	1.10E-03	1.54E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-04	0.00E+00
2,3-Dimethylpentane	6.34E+04	100	1.60E-03	2.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-04	0.00E+00
3-Methylhexane	8.63E+04	100	2.10E-03	2.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-04	0.00E+00
2,2,4-Trimethylpentane	0.00E+00	114	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
Heptane	1.15E+04	100	2.80E-04	3.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-05	0.00E+00
Methylcyclohexane	3.94E+05	98	9.84E-03	1.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.60E-04	0.00E+00
2,3,4-Trimethylpentane	6.99E+03	114	1.50E-04	2.09E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-05	0.00E+00
2-Methylheptane	0.00E+00	114	0.00E+00	0.00E+00	4.98E-03	2.40E+01	1.14E+03	3.13E+01	3.13E-05	0.00E+00	1.89E-06
Toluene	7.12E+04	92	1.90E-03	2.64E-03	1.84E-03	7.16E+00	3.40E+02	9.34E+00	9.34E-06	1.85E-04	6.12E-07
3-Methylheptane	9.40E+03	114	2.00E-04	2.81E-04	3.30E-03	1.59E+01	7.55E+02	2.07E+01	2.07E-05	2.25E-05	1.25E-06
Octane	0.00E+00	114	0.00E+00	0.00E+00	1.01E-01	4.87E+02	2.31E+04	6.35E+02	6.35E-04	0.00E+00	3.84E-05
Chlorobenzene-d5	4.74E-03	112	1.03E-10	1.44E-10	1.00E-06	4.74E-03	2.25E-01	6.18E-03	6.18E-09	8.65E-12	2.85E-10
Ethyl benzene	1.53E+04	106	3.50E-04	4.93E-04	2.41E-02	1.08E+02	5.13E+03	1.41E+02	1.41E-04	3.95E-05	9.15E-06
m,p-Xylene	3.06E+04	106	7.10E-04	9.83E-04	2.07E-01	9.28E+02	4.41E+04	1.21E+03	1.21E-03	7.87E-05	7.86E-05
o-Xylene	9.73E+03	106	2.20E-04	3.13E-04	1.13E-01	5.07E+02	2.41E+04	6.61E+02	6.61E-04	2.50E-05	4.29E-05

Table 33: Laboratory results and material balance determined emission factors and combustion efficiency for Location 5 – Cold Heavy Oil Production – Tank Heater.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Nonane	1.07E+03	128	2.05E-05	2.86E-05	7.74E-01	4.19E+03	1.99E+05	5.46E+03	5.46E-03	2.57E-06	3.31E-04
n-Propylbenzene	2.03E+03	120	4.14E-05	5.77E-05	5.14E-02	2.61E+02	1.24E+04	3.40E+02	3.40E-04	5.19E-06	2.20E-05
m-Ethyltoluene	3.73E+03	120	7.61E-05	1.06E-04	1.82E-01	9.24E+02	4.39E+04	1.20E+03	1.20E-03	0.00E+00	0.00E+00
p-Ethyltoluene	1.83E+03	120	3.74E-05	5.21E-05	1.31E-01	6.65E+02	3.16E+04	8.67E+02	8.67E-04	4.68E-06	5.60E-05
1,3,5-Trimethylbenzene	1.48E+03	120	3.01E-05	4.20E-05	1.39E-01	7.05E+02	3.35E+04	9.20E+02	9.20E-04	3.78E-06	5.94E-05
o-Ethyltoluene	2.36E+03	120	4.81E-05	6.71E-05	1.13E-01	5.74E+02	2.72E+04	7.48E+02	7.48E-04	6.03E-06	4.83E-05
Decane	8.47E+02	142	1.46E-05	2.03E-05	2.92E-01	1.75E+03	8.33E+04	2.29E+03	2.29E-03	2.03E-06	1.39E-04
										Comb Eff =	**99.72%**
										CH4 Comb Eff =	**99.98%**
										THC Comb Eff =	**99.73%**

Table 34: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 5 – Cold Heavy Oil Production – Tank Heater.							
Excess Air	415%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.01	1.92	8.20	38	49
46	0	**percentage, %**	2.05	3.89	16	77	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	0.95		8.20	38	47
54	0	**percentage, %**	8.65		17	81	100

Table 35: Laboratory results and material balance determined emission factors and combustion efficiency for Location 5 – Cold Heavy Oil Production – Screw Pump Engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	4.42E+08	16	6.86E+01	9.52E+01	1.14E+01	7.71E+03	3.69E+05	9.97E+03	9.97E-03	9.58E-01	5.40E-04
Ethane	6.32E+06	30	5.10E-01	7.16E-01	1.00E-01	1.26E+02	6.08E+03	1.63E+02	1.64E-04	1.40E-02	9.57E-06
Propane	3.15E+06	44	1.70E-01	2.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.20E-03	0.00E+00
Isobutane	1.53E+06	58	6.40E-02	8.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-03	0.00E+00
Butane	6.55E+05	58	2.70E-02	3.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-03	0.00E+00
Propyne	3.01E+05	40	1.80E-02	2.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-04	0.00E+00
Hydrogen sulphide	1.03E+05	34	7.40E-03	1.00E-02	9.47E-03	1.30E+01	6.52E+02	1.70E+01	1.75E-05	0.00E+00	0.00E+00
Methyl mercaptan	5.00E+01	48	2.56E-06	3.55E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.55E-08	0.00E+00
Ethyl mercaptan	2.08E+02	62	8.23E-06	1.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-07	0.00E+00
Isopropyl mercaptan	3.63E+02	76	1.17E-05	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-07	0.00E+00
Thiophene	4.19E+02	84	1.22E-05	1.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E-07	0.00E+00
2-methyl Thiophene	6.30E+01	98	1.56E-06	2.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-07	0.00E+00
3-methyl Thiophene	3.32E+02	98	8.28E-06	1.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-07	0.00E+00
Allyl sulphide	1.21E+02	114	2.59E-06	3.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-07	0.00E+00
2,5-dimethyl Thiophene	4.40E+01	112	9.65E-07	1.34E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-08	0.00E+00
Dimethyl trisulphide	3.75E+02	126	7.28E-06	1.01E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-07	0.00E+00
Cyclohexane, 1,4-dimethyl-	5.64E+03	112	1.23E-04	1.71E-04	5.65E-04	2.68E+00	1.28E+02	3.46E+00	3.46E-06	1.37E-05	2.16E-07
HEXA-4,5-DIENE CARBOXYLIC ACID	0.00E+00	112	0.00E+00	0.00E+00	4.49E-04	2.13E+00	1.02E+02	2.75E+00	2.75E-06	0.00E+00	1.29E-07
Heptane, 2,6-dimethyl-	0.00E+00	128	0.00E+00	0.00E+00	1.28E-03	6.93E+00	3.32E+02	8.96E+00	8.96E-06	0.00E+00	5.52E-07
Cyclohexane, ethyl-	2.05E+04	112	4.47E-04	6.21E-04	7.54E-04	3.57E+00	1.71E+02	4.62E+00	4.62E-06	4.97E-05	2.89E-07
Cyclohexane, 1,1,3-trimethyl-	2.50E+04	126	4.86E-04	6.76E-04	9.47E-04	5.05E+00	2.42E+02	6.52E+00	6.52E-06	6.08E-05	4.08E-07
Heptane, 2,3-dimethyl-	0.00E+00	128	0.00E+00	0.00E+00	1.31E-03	7.09E+00	3.40E+02	9.17E+00	9.17E-06	0.00E+00	5.65E-07
Cyclohexane, 1,2-diethyl-3-methyl-	0.00E+00	154	0.00E+00	0.00E+00	3.47E-03	2.26E+01	1.08E+03	2.90E+01	2.92E-05	0.00E+00	1.83E-06
3-CYCLOHEXYL-PROPANOL	6.43E+03	142	1.11E-04	1.54E-04	1.95E-03	1.17E+01	5.61E+02	1.50E+01	1.51E-05	1.38E-05	8.40E-07
Cyclopentane, 1-ethyl-3-methyl-	4.88E+03	112	1.07E-04	1.48E-04	2.29E-03	1.08E+01	5.19E+02	1.40E+01	1.40E-05	1.18E-05	8.77E-07
2-Ethyl-3-methylcyclopentene	0.00E+00	110	0.00E+00	0.00E+00	2.61E-03	1.21E+01	5.81E+02	1.60E+01	1.57E-05	0.00E+00	1.00E-06
1,3-Hexadiene, 3-ethyl-2-methyl-, (Z)-	0.00E+00	124	0.00E+00	0.00E+00	3.17E-03	1.66E+01	7.96E+02	2.10E+01	2.15E-05	0.00E+00	1.37E-06
Bicyclo[4.1.0]heptane, 3-methyl-	0.00E+00	110	0.00E+00	0.00E+00	4.77E-03	2.22E+01	1.06E+03	2.90E+01	2.87E-05	0.00E+00	1.83E-06
1-Cyclohexyl-2-methyl-prop-2-en-	0.00E+00	152	0.00E+00	0.00E+00	7.72E-03	4.96E+01	2.38E+03	6.40E+01	6.41E-05	0.00E+00	3.70E-06

Table 35: Laboratory results and material balance determined emission factors and combustion efficiency for Location 5 – Cold Heavy Oil Production – Screw Pump Engine.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
1-one											
Cyclohexanone, 2-(2-methylpropylidene)-	0.00E+00	152	0.00E+00	0.00E+00	3.75E-03	2.41E+01	1.15E+03	3.10E+01	3.12E-05	0.00E+00	1.80E-06
Benzene, 1,2,3,5-tetramethyl-	0.00E+00	134	0.00E+00	0.00E+00	3.48E-03	1.97E+01	9.44E+02	2.50E+01	2.55E-05	0.00E+00	1.67E-06
Unresolved Hydrocarbons (C12+)	0.00E+00	150	0.00E+00	0.00E+00	8.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Isopentane	7.03E+05	72	2.39E-02	3.32E-02	1.52E-03	4.63E+00	2.22E+02	5.98E+00	5.98E-06	1.66E-03	3.64E-07
Pentane	4.05E+05	72	1.38E-02	1.91E-02	6.84E-04	2.08E+00	9.97E+01	2.69E+00	2.69E-06	9.56E-04	1.64E-07
2,2-Dimethylbutane	4.95E+04	86	1.41E-03	1.95E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,3-Dimethylbutane	1.11E+05	86	3.17E-03	4.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-04	0.00E+00
Cyclopentane	1.24E+05	70	4.34E-03	6.02E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-04	0.00E+00
2-Methylpentane	3.08E+05	86	8.77E-03	1.22E-02	4.60E-04	1.67E+00	8.01E+01	2.16E+00	2.16E-06	7.31E-04	1.32E-07
3-Methylpentane	2.16E+05	86	6.16E-03	8.55E-03	2.74E-04	9.97E-01	4.77E+01	1.29E+00	1.29E-06	5.13E-04	7.87E-08
										Comb Eff =	**99.60%**
										CH4 Comb Eff =	**99.94%**
										THC Comb Eff =	**99.89%**

Table 36: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 5 – Cold Heavy Oil Production – Screw Pump Engine.							
Excess Air	415%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.02	1.95	8.27	39	50
18	0	**percentage, %**	2.04	3.91	17	77	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.02		8.27	39	48
22	0	**percentage, %**	2.12		17	81	100

Table 37: Gas analysis for determine the metals emission factor in flue gas for Location 5 – Cold Heavy Oil Production – Tank Heater and Screw Pump Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Aluminum	337	804	241	96	563	1.34E-04	7.96E-04
Antimony	0.0864	0.123	0.062	0.0244	0.061	3.42E-08	8.62E-08
Arsenic	20.6	58.1	19.2	1.40	38.9	1.96E-06	5.50E-05
Barium	133	387	85	48	302	6.72E-05	4.27E-04
Beryllium	0.0277	0.0347	0.0192	0.0085	0.0155	1.19E-08	2.19E-08
Bismuth	0.0085	0.0323	0.001	0.0075	0.0313	1.05E-08	4.42E-08
Boron	532	997	533	0	464	0.00E+00	6.56E-04
Cadmium	0.436	4.58	0.0119	0.4241	4.5681	5.94E-07	6.46E-06
Calcium	0.33	0.722	0.185	0.145	0.537	2.03E-07	7.59E-07
Chlorine	0.1	0.491	0.1	0	0.391	0.00E+00	5.53E-07
Chromium	15.9	5.86	0.295	15.605	5.565	2.18E-05	7.86E-06
Cobalt	0.158	0.156	0.0054	0.1526	0.1506	2.14E-07	2.13E-07
Copper	4.78	34.4	1.86	2.92	32.54	4.09E-06	4.60E-05
Iron	398	155	18.8	379.2	136.2	5.31E-04	1.92E-04
Lead	3.58	4.81	0.287	3.293	4.523	4.61E-06	6.39E-06
Lithium	0.02	0.955	0.02	0	0.935	0.00E+00	1.32E-06
Magnesium	0.0262	0.0621	0.0056	0.0206	0.0565	2.88E-08	7.98E-08
Manganese	6.48	7.77	0.496	5.984	7.274	8.38E-06	1.03E-05
Mercury	0.01	0.0381	0.01	0	0.0281	0.00E+00	3.97E-08
Molybdenum	0.258	0.323	0.0266	0.2314	0.2964	3.24E-07	4.19E-07
Nickel	9.67	41.4	0.213	9.457	41.187	1.32E-05	5.82E-05
Phosphorus	0.8	3.04	0.8	0	2.24	0.00E+00	3.17E-06
Potassium	161	356	99.7	61.3	256.3	8.58E-05	3.62E-04

Table 37: Gas analysis for determine the metals emission factor in flue gas for Location 5 – Cold Heavy Oil Production – Tank Heater and Screw Pump Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Process Heater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Process Heater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Selenium	0.1	0.1	0.1	0	0	0.00E+00	0.00E+00
Silicon	0.361	0.553	0.285	0.076	0.268	1.06E-07	3.79E-07
Silver	0.291	0.787	0.0542	0.2368	0.7328	3.31E-07	1.04E-06
Sodium	994	3150	943	51	2207	7.14E-05	3.12E-03
Strontium	2.72	4.41	3.54	0	0.87	0.00E+00	1.23E-06
Sulphur	1.23	10.5	0.2	1.03	10.3	1.44E-06	1.46E-05
Thallium	0.0016	0.01	0.001	0.0006	0.009	8.40E-10	1.27E-08
Thorium	0.0325	0.0875	0.0095	0.023	0.078	3.22E-08	1.10E-07
Tin	0.439	1.38	0.39	0.049	0.99	6.86E-08	1.40E-06
Titanium	2.96	3.61	0.782	2.178	2.828	3.05E-06	4.00E-06
Uranium	0.0099	0.0454	0.0045	0.0054	0.0409	7.56E-09	5.78E-08
Vanadium	0.128	0.128	0.015	0.113	0.113	1.58E-07	1.60E-07
Zinc	46.3	52.3	2.31	43.99	49.99	6.16E-05	7.06E-05

Table 38: Laboratory results and material balance determined emission factors and combustion efficiency for Location 6 – Sour Processing Plant– Steam Boiler.											
	Fuel Gas C_i (Lab Analyses)			**Norm Fuel Gas C_i**	**Flue Gas C_i (Lab Analyses)**		**C_i Emission factor**			**Combustion Efficiency Calculation**	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	5.45E+08	16	8.33E+01	8.84E+01	1.26E+02	8.53E+04	1.20E+06	2.93E+04	2.93E-02	8.84E-01	1.77E-03
Ethane	6.79E+07	30	5.54E+00	5.88E+00	1.70E+00	2.16E+03	3.02E+04	7.41E+02	7.42E-04	1.18E-01	4.77E-05
Ethylene	0.00E+00	28	0.00E+00	0.00E+00	1.70E+00	2.01E+03	2.82E+04	6.92E+02	6.92E-04	0.00E+00	4.77E-05
Propane	3.65E+07	44	2.03E+00	2.15E+00	6.00E-01	1.12E+03	1.57E+04	3.83E+02	3.84E-04	6.46E-02	2.52E-05

Table 38: Laboratory results and material balance determined emission factors and combustion efficiency for Location 6 – Sour Processing Plant– Steam Boiler.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Isobutane	8.81E+06	58	3.70E-01	3.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-02	0.00E+00
Butane	1.18E+07	58	5.00E-01	5.30E-01	1.39E+01	3.41E+04	4.78E+05	1.17E+04	1.17E-02	2.12E-02	7.80E-04
cis-2-Butene	7.51E+04	56	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-04	0.00E+00
Propyne	1.98E+06	40	1.20E-01	1.30E-01	8.00E-01	1.35E+03	1.90E+04	4.65E+02	4.65E-04	3.86E-03	3.36E-05
Isopentane	2.52E+06	72	9.00E-02	9.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-03	0.00E+00
Pentane	1.68E+06	72	6.00E-02	6.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-03	0.00E+00
2,2-Dimethylbutane	2.30E+04	86	6.55E-04	6.95E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-05	0.00E+00
2,3-Dimethylbutane	2.18E+04	86	6.20E-04	6.58E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-05	0.00E+00
Cyclopentane	7.99E+04	70	2.79E-03	2.97E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-04	0.00E+00
2-Methylpentane	2.03E+05	86	1.00E-02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.67E-04	0.00E+00
3-Methylpentane	9.28E+04	86	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-04	0.00E+00
Hexane	1.62E+05	86	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-04	0.00E+00
Methylcyclopentane	2.85E+04	84	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.28E-05	0.00E+00
Cyclohexane	2.73E+04	84	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-05	0.00E+00
Benzene	1.61E+04	78	0.00E+00	0.00E+00	5.48E-02	1.81E+02	2.54E+03	6.20E+01	6.22E-05	5.37E-06	7.68E-07
2-Methylhexane	7.06E+03	100	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-05	0.00E+00
Heptane	7.83E+03	100	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-05	0.00E+00
Methylcyclohexane	6.63E+03	98	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-05	0.00E+00
Toluene	0.00E+00	92	0.00E+00	0.00E+00	6.01E-03	2.34E+01	3.28E+02	8.04E+00	8.04E-06	0.00E+00	5.90E-07
Chlorobenzene-d5	0.00E+00	112	1.03E-10	1.10E-10	1.00E-06	4.74E-03	6.64E-02	1.63E-03	1.63E-09	6.59E-12	8.41E-11
Ethyl benzene	0.00E+00	106	0.00E+00	0.00E+00	7.05E-04	3.16E+00	4.43E+01	1.09E+00	1.09E-06	0.00E+00	7.91E-08
m,p-Xylene	0.00E+00	106	0.00E+00	0.00E+00	2.18E-03	9.77E+00	1.37E+02	3.36E+00	3.36E-06	0.00E+00	2.45E-07
o-Xylene	0.00E+00	106	0.00E+00	0.00E+00	2.20E-03	9.86E+00	1.38E+02	3.39E+00	3.39E-06	0.00E+00	2.47E-07
m-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	8.79E-04	4.46E+00	6.25E+01	1.53E+00	1.53E-06	0.00E+00	1.11E-07
p-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	4.15E-04	2.11E+00	2.95E+01	7.24E-01	7.24E-07	0.00E+00	5.24E-08
o-Ethyltoluene	0.00E+00	120	0.00E+00	0.00E+00	3.10E-04	1.57E+00	2.21E+01	5.41E-01	5.41E-07	0.00E+00	3.91E-08
Decane	0.00E+00	142	0.00E+00	0.00E+00	4.03E-04	2.42E+00	3.39E+01	8.32E-01	8.32E-07	0.00E+00	5.65E-08
1,2,4-Trimethylbenzene	0.00E+00	120	0.00E+00	0.00E+00	2.02E-03	1.03E+01	1.44E+02	3.53E+00	3.53E-06	0.00E+00	2.55E-07
1,2,3-Trimethylbenzene	0.00E+00	120	0.00E+00	0.00E+00	7.21E-04	3.66E+00	5.13E+01	1.26E+00	1.26E-06	0.00E+00	9.10E-08
Undecane	0.00E+00	156	0.00E+00	0.00E+00	3.79E-04	2.50E+00	3.51E+01	8.60E-01	8.60E-07	0.00E+00	5.84E-08
Dodecane	0.00E+00	170	0.00E+00	0.00E+00	4.66E-04	3.35E+00	4.70E+01	1.15E+00	1.15E-06	0.00E+00	7.84E-08

Table 38: Laboratory results and material balance determined emission factors and combustion efficiency for Location 6 – Sour Processing Plant– Steam Boiler.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Hydrogen sulphide	1.50E+01	34	1.05E-06	1.11E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Carbonyl sulphide	9.08E+02	60	3.70E-05	3.93E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-07	0.00E+00
Methyl mercaptan	1.81E+03	48	9.21E-05	9.78E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethyl mercaptan	2.18E+03	62	8.62E-05	9.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-06	0.00E+00
Dimethyl sulphide	7.60E+01	62	2.99E-06	3.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.35E-08	0.00E+00
Isopropyl mercaptan	1.74E+03	76	5.60E-05	5.94E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-06	0.00E+00
tert-Butyl mercaptan	1.31E+02	90	3.58E-06	3.80E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-07	0.00E+00
Propyl mercaptan	8.30E+01	76	2.68E-06	2.84E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.53E-08	0.00E+00
Thiophene	3.60E+01	84	1.05E-06	1.12E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-08	0.00E+00
Dimethyl disulphide	9.42E+02	94	2.45E-05	2.60E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-07	0.00E+00
1,2-Propadiene	0.00E+00	40	0.00E+00	0.00E+00	2.22E-03	3.75E+00	5.27E+01	1.29E+00	1.29E-06	0.00E+00	9.33E-08
1,3-Butadiyne	0.00E+00	50	0.00E+00	0.00E+00	1.52E-03	3.21E+00	4.51E+01	1.10E+00	1.10E-06	0.00E+00	8.52E-08
1-Buten-3-yne	0.00E+00	52	0.00E+00	0.00E+00	7.19E-04	1.58E+00	2.22E+01	5.40E-01	5.43E-07	0.00E+00	4.03E-08
2-Propanone	0.00E+00	58	0.00E+00	0.00E+00	4.32E-03	1.06E+01	1.49E+02	3.64E+00	3.64E-06	0.00E+00	1.81E-07
Butane, 2-methyl-	0.00E+00	72	0.00E+00	0.00E+00	3.78E-03	1.15E+01	1.61E+02	3.95E+00	3.95E-06	0.00E+00	2.64E-07
Cyclopentanol	0.00E+00	86	0.00E+00	0.00E+00	3.80E-04	1.38E+00	1.94E+01	4.70E-01	4.75E-07	0.00E+00	2.66E-08
Hexanal	0.00E+00	100	0.00E+00	0.00E+00	1.51E-03	6.38E+00	8.95E+01	2.19E+00	2.19E-06	0.00E+00	1.27E-07
Methyl Alcohol	0.00E+00	32	0.00E+00	0.00E+00	6.11E-03	8.26E+00	1.16E+02	2.84E+00	2.84E-06	0.00E+00	8.57E-08
Nitrous acid, methyl ester	0.00E+00	61	0.00E+00	0.00E+00	5.44E-03	1.40E+01	1.96E+02	4.82E+00	4.82E-06	0.00E+00	7.63E-08
Pentadecane	0.00E+00	212	0.00E+00	0.00E+00	1.14E-02	1.02E+02	1.43E+03	3.51E+01	3.51E-05	0.00E+00	2.40E-06
Propane, 2-methyl-	0.00E+00	58	0.00E+00	0.00E+00	9.03E-03	2.22E+01	3.10E+02	7.61E+00	7.61E-06	0.00E+00	5.06E-07
Nitrogen	2.47E+07	28	2.16E+00	2.29E+00	7.42E+05	8.79E+08	1.23E+10	3.02E+08	3.02E+02	0.00E+00	0.00E+00
Carbon dioxide	0.00E+00	44	0.00E+00	0.00E+00	7.28E+04	1.35E+07	1.90E+08	4.66E+07	4.66E+01	0.00E+00	0.00E+00
Oxygen	0.00E+00	32	0.00E+00	0.00E+00	6.30E+04	8.53E+07	1.20E+09	2.93E+07	2.90E+01	0.00E+00	0.00E+00
										Comb Eff =	**99.76%**
										CH4 Comb Eff =	**99.80%**
										THC Comb Eff =	**99.82%**

Table 39: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 6 – Sour Processing Plant – Steam Boiler.							
Excess Air	47%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.11	2.09	1.00	11.90	16
118	0	**percentage, %**	6.91	13	6.25	74	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.11		1.01	12	14
145	0	**percentage, %**	7.94		7.18	85	100

Table 40: Gas analysis for determine the metals emission factor in flue gas for Location 6 – Sour Processing Plant – Steam Boiler.				
Component	**Lab Analysis**		**Method Blank Corrected**	**Emission Factor**
	Steam Boiler, Flue Gas	**Method Blank**	**Steam Boiler, Flue Gas**	**Steam Boiler, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**kg/GJ (Fuel)**
Aluminum	172	0.5	1.72E+02	3.69E-10
Antimony	0.0968	0.0028	9.40E-02	2.02E-13
Arsenic	5.39	0.002	5.39E+00	1.16E-11
Barium	56.4	0.191	5.62E+01	1.21E-10
Beryllium	0.013	0.0062	6.80E-03	1.46E-14
Bismuth	0.0044	0.001	3.40E-03	7.32E-15
Boron	132	0.11	1.32E+02	2.84E-10
Cadmium	5.07	0.0087	5.06E+00	1.09E-11
Calcium	2.53	0.0134	2.52E+00	5.42E-12
Chlorine	0.243	0.1	1.43E-01	3.08E-13
Chromium	1.7	0.0493	1.65E+00	3.55E-12
Cobalt	0.152	0.001	1.51E-01	3.25E-13
Copper	22.7	0.05	2.27E+01	4.87E-11
Iron	102	2	1.00E+02	2.15E-10
Lead	3.43	0.0033	3.43E+00	7.38E-12

Table 40: Gas analysis for determine the metals emission factor in flue gas for Location 6 – Sour Processing Plant – Steam Boiler.				
Component	**Lab Analysis**		**Method Blank Corrected**	**Emission Factor**
	Steam Boiler, Flue Gas	**Method Blank**	**Steam Boiler, Flue Gas**	**Steam Boiler, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**kg/GJ (Fuel)**
Lithium	0.02	0.02	171.5	7.25E-05
Magnesium	0.0939	0.0021	0.094	3.98E-08
Manganese	13.1	0.0832	5.388	2.28E-06
Mercury	0.0484	0.01	56.209	2.38E-05
Molybdenum	3.55	0.0141	0.0068	2.88E-09
Nickel	6.84	0.0426	0.0034	1.44E-09
Phosphorus	1.83	0.8	131.89	5.58E-05
Potassium	169	3.77	5.0613	2.14E-06
Selenium	0.1	0.1	2.5166	1.06E-06
Silicon	0.147	0.01	0.143	6.05E-08
Silver	0.117	0.0221	1.6507	6.98E-07
Sodium	701	3.2	0.151	6.39E-08
Strontium	3.51	0.004	22.65	9.58E-06
Sulphur	0.689	0.2	100	4.23E-05
Thallium	0.0025	0.0003	3.4267	1.45E-06
Thorium	0.0096	0.0003	0	0.00E+00
Tin	2.02	0.03	0.0918	3.88E-08
Titanium	2.85	0.04	13.0168	5.51E-06
Uranium	0.0119	0.0009	0.0384	1.62E-08
Vanadium	0.0717	0.005	3.5359	1.50E-06
Zinc	259	0.245	6.7974	2.88E-06

Table 41: Laboratory results and material balance determined emission factors and combustion efficiency for Location 7 – Conventional Oil Production – Treater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	4.07E+08	16	6.20E+01	6.90E+01	7.00E+00	4.53E+03	1.41E+05	3.71E+03	3.71E-03	6.87E-01	2.08E-04
Ethane	1.02E+08	30	8.00E+00	9.00E+00	0.00E+00	3.81E+02	1.18E+04	3.12E+02	3.12E-04	1.83E-01	1.86E-05
Propane	8.28E+07	44	2.48E-03	2.74E-03	1.00E-01	1.86E+02	5.78E+03	1.52E+02	1.52E-04	8.21E-05	9.32E-06
Isobutane	1.73E+07	58	7.31E-01	8.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E-02	0.00E+00
Butane	3.68E+07	58	1.55E+00	1.71E+00	1.00E-01	2.45E+02	7.62E+03	2.01E+02	2.01E-04	6.85E-02	1.24E-05
Propyne	1.14E+07	40	6.97E-01	7.69E-01	2.00E-01	3.38E+02	1.05E+04	2.77E+02	2.77E-04	2.31E-02	1.86E-05
Isopentane	1.30E+07	72	4.41E-01	4.86E-01	4.44E-03	1.35E+01	4.20E+02	1.11E+01	1.11E-05	2.43E-02	6.89E-07
Pentane	1.02E+07	72	3.47E-01	3.82E-01	3.79E-03	1.15E+01	3.58E+02	9.45E+00	9.45E-06	1.91E-02	5.89E-07
2,2-Dimethylbutane	1.59E+05	86	4.51E-03	4.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-04	0.00E+00
2,3-Dimethylbutane	4.29E+05	86	1.22E-02	1.35E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.08E-04	0.00E+00
Cyclopentane	6.13E+05	70	2.14E-02	2.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-03	0.00E+00
2-Methylpentane	2.71E+06	86	7.70E-02	8.49E-02	7.23E-04	2.63E+00	8.17E+01	2.15E+00	2.15E-06	5.09E-03	1.35E-07
3-Methylpentane	1.69E+06	86	4.80E-02	5.30E-02	3.49E-04	1.27E+00	3.94E+01	1.04E+00	1.04E-06	3.18E-03	6.50E-08
Hexane	3.26E+06	86	9.27E-02	1.02E-01	6.77E-04	2.46E+00	7.65E+01	2.02E+00	2.02E-06	6.14E-03	1.26E-07
Methylcyclopentane	6.08E+05	84	1.77E-02	1.95E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-03	0.00E+00
Cyclohexane	5.97E+05	84	1.74E-02	1.92E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-03	0.00E+00
Benzene	1.83E+05	78	5.74E-03	6.33E-03	5.50E-04	1.81E+00	5.63E+01	1.49E+00	1.49E-06	3.80E-04	1.02E-07
2-Methylhexane	4.27E+05	100	1.05E-02	1.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-04	0.00E+00
2,3-Dimethylpentane	1.68E+05	100	4.11E-03	4.53E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-04	0.00E+00
3-Methylhexane	4.82E+05	100	1.18E-02	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.11E-04	0.00E+00
Heptane	7.99E+05	100	1.96E-02	2.16E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-03	0.00E+00
Methylcyclohexane	4.52E+05	98	1.13E-02	1.24E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.71E-04	0.00E+00
2-Methylheptane	9.79E+04	114	2.10E-03	2.32E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-04	0.00E+00
Toluene	2.24E+05	92	5.96E-03	6.57E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.60E-04	0.00E+00
3-Methylheptane	5.30E+04	114	1.14E-03	1.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-04	0.00E+00
Octane	1.89E+05	114	4.07E-03	4.49E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E-04	0.00E+00
Chlorobenzene-d5	0.00E+00	112	1.03E-10	1.14E-10	1.00E-06	4.74E-03	1.47E-01	3.88E-03	3.88E-09	6.85E-12	1.86E-10
Ethyl benzene	1.82E+04	106	4.20E-04	4.63E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-05	0.00E+00
m,p-Xylene	3.37E+04	106	7.77E-04	8.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-05	0.00E+00
Styrene	0.00E+00	104	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
o-Xylene	1.17E+04	106	2.70E-04	2.98E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-05	0.00E+00

Table 41: Laboratory results and material balance determined emission factors and combustion efficiency for Location 7 – Conventional Oil Production – Treater.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Nonane	2.30E+04	128	4.40E-04	4.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E-05	0.00E+00
Decane	0.00E+00	142	0.00E+00	0.00E+00	7.03E-04	4.22E+00	1.31E+02	3.46E+00	3.46E-06	0.00E+00	2.18E-07
Undecane	0.00E+00	156	0.00E+00	0.00E+00	1.32E-02	8.71E+01	2.70E+03	7.13E+01	7.13E-05	0.00E+00	4.51E-06
Dodecane	0.00E+00	170	0.00E+00	0.00E+00	2.53E-02	1.82E+02	5.65E+03	1.49E+02	1.49E-04	0.00E+00	9.43E-06
2-Propanone	0.00E+00	58	0.00E+00	0.00E+00	2.01E-04	4.93E-01	1.53E+01	4.04E-01	4.04E-07	0.00E+00	1.87E-08
Formaldehyde	0.00E+00	30	0.00E+00	0.00E+00	5.03E-03	6.38E+00	1.98E+02	5.23E+00	5.23E-06	0.00E+00	1.56E-07
Uknown Sulfur	2.71E+04	64	1.03E-03	1.14E-03	3.96E-01	1.07E+03	3.33E+04	8.78E+02	8.78E-04	0.00E+00	0.00E+00
Undecane, 4,6-dimethyl-	0.00E+00	184	0.00E+00	0.00E+00	2.31E-03	1.80E+01	5.58E+02	1.47E+01	1.47E-05	0.00E+00	9.33E-07
Hydrogen sulphide	6.72E+06	34	4.83E-01	5.33E-01	6.46E-02	9.29E+01	2.88E+03	7.61E+01	7.61E-05	0.00E+00	0.00E+00
Methyl mercaptan	2.88E+04	48	1.47E-03	1.62E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00
Ethyl mercaptan	6.06E+03	62	2.39E-04	2.64E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00
Dimethyl sulphide	2.78E+03	62	1.10E-04	1.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-06	0.00E+00
Isopropyl mercaptan	3.47E+03	76	1.12E-04	1.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-06	0.00E+00
tert-Butyl mercaptan	5.06E+03	90	1.38E-04	1.52E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E-06	0.00E+00
Propyl mercaptan	1.05E+03	76	3.37E-05	3.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E-06	0.00E+00
Thiophene	4.41E+02	84	1.28E-05	1.42E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.66E-07	0.00E+00
Isobutyl mercaptan	1.10E+03	90	2.99E-05	3.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-06	0.00E+00
Ethyl sulphide	1.28E+02	90	3.48E-06	3.83E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-07	0.00E+00
tert-Pentyl mercaptan	1.28E+03	104	3.01E-05	3.32E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-06	0.00E+00
Dimethyl disulphide	5.50E+01	94	1.43E-06	1.58E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.15E-08	0.00E+00
2-methyl Thiophene	1.35E+02	98	3.36E-06	3.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.85E-07	0.00E+00
3-methyl Thiophene	2.11E+02	98	5.28E-06	5.82E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-07	0.00E+00
Allyl sulphide	2.34E+02	114	5.03E-06	5.55E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-07	0.00E+00
2,5-dimethyl Thiophene	6.30E+01	112	1.38E-06	1.52E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.11E-08	0.00E+00
Dimethyl trisulphide	2.07E+02	126	4.03E-06	4.44E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.88E-08	0.00E+00
1-Heptene, 3-methyl-	1.32E+04	112	2.88E-04	3.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-05	0.00E+00
CYCLOBUTANE, ISOPROPYL-	6.47E+04	98	1.61E-03	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-04	0.00E+00
Cyclohexane, 1,1,3-trimethyl-	1.36E+04	126	2.65E-04	2.92E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-05	0.00E+00
Cyclohexane, 1,3-dimethyl-, cis-	2.42E+04	112	5.28E-04	5.82E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-05	0.00E+00
Cyclohexane, ethyl-	1.65E+04	112	3.60E-04	3.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.18E-05	0.00E+00

Table 41: Laboratory results and material balance determined emission factors and combustion efficiency for Location 7 – Conventional Oil Production – Treater.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Cyclopentane, 1,1-dimethyl-	1.50E+04	98	3.74E-04	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-05	0.00E+00
Cyclopentane, 1,2,3-trimethyl-, (1.alpha	1.54E+04	112	3.37E-04	3.72E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-05	0.00E+00
Cyclopentane, 1,3-dimethyl-	4.31E+04	98	1.08E-03	1.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.31E-05	0.00E+00
Cyclopentane, ethyl-	1.69E+04	98	4.21E-04	4.65E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-05	0.00E+00
Hexane, 2,4-dimethyl-	1.05E+04	114	2.25E-04	2.48E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-05	0.00E+00
Unknown Sulfur	1.40E+04	32	1.07E-03	1.18E-03	3.96E-01	5.36E+02	1.66E+04	4.39E+02	4.39E-04	0.00E+00	0.00E+00
Nitrogen	8.42E+06	28	7.36E-01	8.11E-01	7.86E+05	9.31E+08	2.89E+10	7.62E+08	7.62E+02	0.00E+00	0.00E+00
Carbon dioxide	2.64E+08	44	1.50E+01	1.60E+01	5.67E+03	1.06E+07	3.28E+08	8.64E+06	9.00E+00	0.00E+00	0.00E+00
										Comb Eff =	**99.97%**
										CH4 Comb Eff =	**99.97%**
										THC Comb Eff =	**99.98%**

Table 42: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 7 – Conventional Oil Production - Treater.							
Excess Air	234%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.23	1.88	4.68	25	33
6.5	0	**percentage, %**	3.72	5.7	14	76	100
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.23		4.68	25	31
7.9	0	**percentage, %**	3.94		15	81	100

Table 43: Laboratory results and material balance determined emission factors and combustion efficiency for Location 7 – Conventional Oil Production – Reciprocating engine.

	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Methane	4.07E+08	16	6.23E+01	6.63E+01	2.74E+01	1.85E+04	6.11E+05	1.52E+04	1.52E-02	6.63E-01	9.02E-04
Ethane	1.02E+08	30	8.31E+00	8.84E+00	3.00E+00	3.81E+03	1.25E+05	3.11E+03	3.11E-03	1.77E-01	1.98E-04
Propane	5.27E+07	28	4.60E+00	4.90E+00	1.60E+00	1.90E+03	6.24E+04	1.55E+03	1.55E-03	1.47E-01	1.58E-04
Isobutane	1.31E+07	44	0.00E+00	0.00E+00	2.00E-01	3.72E+02	1.23E+04	3.05E+02	3.05E-04	1.06E-04	2.63E-05
Butane	2.66E+07	42	1.55E+00	1.65E+00	6.00E-01	1.07E+03	3.51E+04	8.72E+02	8.72E-04	6.61E-02	7.90E-05
Propyne	1.60E+07	56	7.00E-01	7.40E-01	4.00E-01	9.47E+02	3.12E+04	7.75E+02	7.75E-04	2.23E-02	3.95E-05
Isopentane	8.65E+06	48	4.40E-01	4.70E-01	1.75E-01	3.55E+02	1.17E+04	2.91E+02	2.91E-04	2.35E-02	2.88E-05
Pentane	8.78E+06	62	3.50E-01	3.70E-01	1.88E-01	4.93E+02	1.62E+04	4.03E+02	4.03E-04	1.84E-02	3.10E-05
2,2-Dimethylbutane	1.40E+05	76	0.00E+00	0.00E+00	2.54E-03	8.00E+00	2.69E+02	7.00E+00	6.68E-06	2.88E-04	5.02E-07
2,3-Dimethylbutane	3.79E+05	76	1.00E-02	1.00E-02	6.16E-03	2.00E+01	6.52E+02	1.60E+01	1.62E-05	7.80E-04	1.22E-06
Cyclopentane	7.88E+05	90	2.00E-02	2.00E-02	1.35E-02	5.10E+01	1.69E+03	4.20E+01	4.20E-05	1.14E-03	2.22E-06
2-Methylpentane	2.39E+06	76	8.00E-02	8.00E-02	5.20E-02	1.67E+02	5.50E+03	1.37E+02	1.37E-04	4.91E-03	1.03E-05
3-Methylpentane	1.49E+06	76	5.00E-02	5.00E-02	3.28E-02	1.05E+02	3.47E+03	8.60E+01	8.63E-05	3.07E-03	6.48E-06
Hexane	3.18E+06	84	9.00E-02	1.00E-01	6.64E-02	2.36E+02	7.77E+03	1.93E+02	1.93E-04	5.92E-03	1.31E-05
Methylcyclopentane	6.51E+05	90	2.00E-02	2.00E-02	1.27E-02	4.80E+01	1.59E+03	4.00E+01	3.96E-05	1.13E-03	2.51E-06
Cyclohexane	6.39E+05	90	2.00E-02	2.00E-02	1.23E-02	4.70E+01	1.54E+03	3.80E+01	3.83E-05	1.11E-03	2.43E-06
Benzene	2.11E+05	90	1.00E-02	1.00E-02	4.65E-03	1.80E+01	5.83E+02	1.40E+01	1.45E-05	3.67E-04	9.19E-07
2-Methylhexane	4.19E+05	98	1.00E-02	1.00E-02	8.51E-03	3.50E+01	1.16E+03	2.90E+01	2.89E-05	7.78E-04	1.96E-06
2,3-Dimethylpentane	1.75E+05	104	0.00E+00	0.00E+00	3.21E-03	1.40E+01	4.65E+02	1.20E+01	1.16E-05	3.06E-04	7.40E-07
3-Methylhexane	4.53E+05	94	1.00E-02	1.00E-02	1.02E-02	4.10E+01	1.34E+03	3.30E+01	3.32E-05	8.79E-04	2.35E-06
Heptane	7.83E+05	98	2.00E-02	2.00E-02	2.12E-02	8.80E+01	2.89E+03	7.20E+01	7.19E-05	1.46E-03	4.89E-06
Methylcyclohexane	4.52E+05	98	1.00E-02	1.00E-02	1.29E-02	5.30E+01	1.76E+03	4.40E+01	4.37E-05	8.40E-04	2.97E-06
2-Methylheptane	7.56E+04	88	0.00E+00	0.00E+00	4.52E-03	1.70E+01	5.54E+02	1.40E+01	1.38E-05	1.79E-04	1.19E-06
Toluene	2.53E+05	104	1.00E-02	1.00E-02	8.46E-03	3.70E+01	1.23E+03	3.00E+01	3.04E-05	4.44E-04	1.95E-06
3-Methylheptane	5.21E+04	112	0.00E+00	0.00E+00	2.56E-03	1.20E+01	3.99E+02	1.00E+01	9.92E-06	9.69E-05	6.74E-07
Octane	1.89E+05	114	0.00E+00	0.00E+00	1.24E-02	6.00E+01	1.97E+03	4.90E+01	4.89E-05	3.46E-04	3.27E-06
Chlorobenzene-d5	0.00E+00	126	0.00E+00	0.00E+00	1.00E-06	0.00E+00	0.00E+00	0.00E+00	4.36E-09	6.61E-12	1.98E-10
Ethyl benzene	1.92E+04	112	0.00E+00	0.00E+00	1.96E-03	9.00E+00	3.06E+02	8.00E+00	7.60E-06	3.58E-05	5.16E-07
m,p-Xylene	3.75E+04	118	0.00E+00	0.00E+00	4.53E-03	2.30E+01	7.44E+02	1.80E+01	1.85E-05	6.61E-05	1.19E-06
o-Xylene	1.39E+04	126	0.00E+00	0.00E+00	1.80E-03	1.00E+01	3.16E+02	8.00E+00	7.85E-06	2.30E-05	4.74E-07
Nonane	1.76E+04	98	0.00E+00	0.00E+00	9.97E-03	4.10E+01	1.36E+03	3.40E+01	3.38E-05	4.21E-05	2.95E-06

Table 43: Laboratory results and material balance determined emission factors and combustion efficiency for Location 7 – Conventional Oil Production – Reciprocating engine.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	µg/m^3	MW	Vol% C_i/m^3	Norm Vol% C_i/m^3	ppmv	µg/m^3	µg/ (m^3 fuel)	ug /(MJ fuel)	kg /(GJ fuel)	Non CO_2 C inlet	Non CO_2 C outlet
n-Propylbenzene	0.00E+00	98	0.00E+00	0.00E+00	9.80E-04	4.00E+00	1.34E+02	3.00E+00	3.32E-06	0.00E+00	2.90E-07
m-Ethyltoluene	0.00E+00	112	0.00E+00	0.00E+00	2.99E-03	1.40E+01	4.66E+02	1.20E+01	1.16E-05	0.00E+00	8.86E-07
p-Ethyltoluene	0.00E+00	72	0.00E+00	0.00E+00	1.54E-03	5.00E+00	1.54E+02	4.00E+00	3.84E-06	0.00E+00	4.56E-07
1,3,5-Trimethylbenzene	0.00E+00	70	0.00E+00	0.00E+00	1.34E-03	4.00E+00	1.31E+02	3.00E+00	3.25E-06	0.00E+00	3.97E-07
o-Ethyltoluene	0.00E+00	72	0.00E+00	0.00E+00	2.01E-03	6.00E+00	2.02E+02	5.00E+00	5.01E-06	0.00E+00	5.96E-07
Decane	0.00E+00	68	0.00E+00	0.00E+00	1.45E-02	4.20E+01	1.37E+03	3.40E+01	3.41E-05	0.00E+00	4.77E-06
1,2,4-Trimethylbenzene	0.00E+00	70	0.00E+00	0.00E+00	5.57E-03	1.60E+01	5.43E+02	1.30E+01	1.35E-05	0.00E+00	1.65E-06
1,2,3-Trimethylbenzene	0.00E+00	70	0.00E+00	0.00E+00	2.74E-03	8.00E+00	2.67E+02	7.00E+00	6.64E-06	0.00E+00	8.12E-07
m-Diethylbenzene	0.00E+00	86	0.00E+00	0.00E+00	9.01E-04	3.00E+00	1.08E+02	3.00E+00	2.68E-06	0.00E+00	2.97E-07
Undecane	0.00E+00	86	0.00E+00	0.00E+00	1.35E-02	4.90E+01	1.62E+03	4.00E+01	4.02E-05	0.00E+00	4.89E-06
Dodecane	0.00E+00	70	0.00E+00	0.00E+00	4.51E-02	1.34E+02	4.40E+03	1.09E+02	1.09E-04	0.00E+00	1.78E-05
1,2,4-Trimethylcyclopentane	0.00E+00	86	0.00E+00	0.00E+00	4.78E-04	2.00E+00	5.70E+01	1.00E+00	1.42E-06	0.00E+00	1.26E-07
1-Methyl-2-n-hexylbenzene	0.00E+00	86	0.00E+00	0.00E+00	2.56E-02	9.30E+01	3.07E+03	7.60E+01	7.62E-05	0.00E+00	1.10E-05
1-trans-2-cis-3-trans-trimethylcyclopent	0.00E+00	84	0.00E+00	0.00E+00	3.64E-04	1.00E+00	4.30E+01	1.00E+00	1.06E-06	0.00E+00	9.59E-08
2-Pentanone, 4-methyl-4-phenyl-	0.00E+00	86	0.00E+00	0.00E+00	3.03E-02	1.10E+02	3.63E+03	9.00E+01	9.02E-05	0.00E+00	1.20E-05
Benzene, 1-methyl-2-(phenylmethyl)-	0.00E+00	84	0.00E+00	0.00E+00	2.05E-02	7.30E+01	2.40E+03	6.00E+01	5.96E-05	0.00E+00	9.45E-06
CYCLOBUTANE, ISOPROPYL-	6.60E+04	100	0.00E+00	0.00E+00	1.28E-03	5.00E+00	1.78E+02	4.00E+00	4.43E-06	1.20E-04	2.95E-07
Cyclohexane, 1,1-dimethyl-	0.00E+00	84	0.00E+00	0.00E+00	1.64E-04	1.00E+00	1.90E+01	0.00E+00	4.77E-07	0.00E+00	4.32E-08
Cyclohexane, 1,4-dimethyl-	0.00E+00	78	0.00E+00	0.00E+00	1.04E-03	3.00E+00	1.13E+02	3.00E+00	2.81E-06	0.00E+00	2.74E-07
Cyclohexane, ethyl-	1.47E+04	100	0.00E+00	0.00E+00	1.28E-03	5.00E+00	1.78E+02	4.00E+00	4.43E-06	3.07E-05	3.37E-07
Cyclopentane, 1,1-dimethyl-	1.53E+04	100	0.00E+00	0.00E+00	2.67E-04	1.00E+00	3.70E+01	1.00E+00	9.24E-07	2.78E-05	6.15E-08
Cyclopentane, 1,3-dimethyl-	4.40E+04	100	0.00E+00	0.00E+00	9.74E-04	4.00E+00	1.36E+02	3.00E+00	3.37E-06	8.02E-05	2.24E-07
Cyclopentane, ethyl-	1.96E+04	114	0.00E+00	0.00E+00	5.74E-04	3.00E+00	9.10E+01	2.00E+00	2.26E-06	3.14E-05	1.32E-07
Cyclotrisiloxane, hexamethyl-	0.00E+00	100	0.00E+00	0.00E+00	2.04E-03	9.00E+00	2.84E+02	7.00E+00	7.06E-06	0.00E+00	4.03E-07
Dodecane, 4,6-dimethyl-	0.00E+00	98	0.00E+00	0.00E+00	1.82E-02	7.50E+01	2.48E+03	6.20E+01	6.17E-05	0.00E+00	8.39E-06
Heptane, 2,3-dimethyl-	0.00E+00	114	0.00E+00	0.00E+00	3.28E-04	2.00E+00	5.20E+01	1.00E+00	1.29E-06	0.00E+00	9.72E-08
Heptane, 3-ethyl-2-methyl-	0.00E+00	114	0.00E+00	0.00E+00	6.29E-04	3.00E+00	1.00E+02	2.00E+00	2.48E-06	0.00E+00	2.07E-07
Hexane, 2,3-dimethyl-	0.00E+00	92	0.00E+00	0.00E+00	1.83E-04	1.00E+00	2.30E+01	1.00E+00	5.83E-07	0.00E+00	4.82E-08
Hexane, 2,4-dimethyl-	1.05E+04	114	0.00E+00	0.00E+00	3.43E-04	2.00E+00	5.40E+01	1.00E+00	1.35E-06	1.91E-05	9.04E-08

Table 43: Laboratory results and material balance determined emission factors and combustion efficiency for Location 7 – Conventional Oil Production – Reciprocating engine.											
	Fuel Gas C_i (Lab Analyses)			Norm Fuel Gas C_i	Flue Gas C_i (Lab Analyses)		C_i Emission factor			Combustion Efficiency Calculation	
Based on 1 m^3 of fuel gas	**µg/m^3**	**MW**	**Vol% C_i/m^3**	**Norm Vol% C_i/m^3**	**ppmv**	**µg/m^3**	**µg/ (m^3 fuel)**	**ug /(MJ fuel)**	**kg /(GJ fuel)**	**Non CO_2 C inlet**	**Non CO_2 C outlet**
Hexane, 2,5-dimethyl-	0.00E+00	114	0.00E+00	0.00E+00	2.16E-04	1.00E+00	3.40E+01	1.00E+00	8.52E-07	0.00E+00	5.69E-08
Naphthalene, 2,6-dimethyl-	0.00E+00	112	0.00E+00	0.00E+00	1.56E-02	7.40E+01	2.43E+03	6.00E+01	6.05E-05	0.00E+00	6.16E-06
Naphthalene, 2-methyl-	0.00E+00	106	0.00E+00	0.00E+00	2.98E-02	1.34E+02	4.40E+03	1.09E+02	1.09E-04	0.00E+00	1.08E-05
Nonadecane	0.00E+00	106	0.00E+00	0.00E+00	4.89E-02	2.19E+02	7.22E+03	1.79E+02	1.79E-04	0.00E+00	3.06E-05
Octane, 2,6-dimethyl-	0.00E+00	104	0.00E+00	0.00E+00	2.75E-03	1.20E+01	3.98E+02	1.00E+01	9.90E-06	0.00E+00	9.05E-07
Octane, 2-methyl-	0.00E+00	106	0.00E+00	0.00E+00	7.97E-04	4.00E+00	1.18E+02	3.00E+00	2.92E-06	0.00E+00	2.36E-07
Tetradecane	0.00E+00	128	0.00E+00	0.00E+00	2.28E-02	1.23E+02	4.06E+03	1.01E+02	1.01E-04	0.00E+00	1.05E-05
Unresolved Hydrocarbons (C12+)	0.00E+00	120	0.00E+00	0.00E+00	3.70E+00	1.88E+04	6.18E+05	1.54E+04	1.54E-02	0.00E+00	0.00E+00
Hydrogen sulphide	2.37E+07	120	4.80E-01	5.10E-01	2.44E-02	1.24E+02	4.08E+03	1.01E+02	1.01E-04	0.00E+00	0.00E+00
Methyl mercaptan	7.21E+04	120	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-05	0.00E+00
Ethyl mercaptan	1.17E+04	120	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.09E-06	0.00E+00
Dimethyl sulphide	5.38E+03	120	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-06	0.00E+00
Isopropyl mercaptan	5.48E+03	120	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-06	0.00E+00
Isopropyl mercaptan	5.48E+03	120	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-06	0.00E+00
Nitrogen	8.42E+06	113	1.80E-01	1.90E-01	7.79E+05	9.23E+08	3.04E+10	7.55E+08	7.55E+02	0.00E+00	0.00E+00
Carbon dioxide	2.64E+08	44	1.47E+01	1.56E+01	1.49E+03	2.77E+06	9.13E+07	2.27E+06	2.27E+00	0.00E+00	0.00E+00
Oxygen	0.00E+00	32	0.00E+00	0.00E+00	2.19E+05	2.96E+08	9.76E+09	2.43E+08	2.43E+02	0.00E+00	0.00E+00
										Comb Eff =	**99.85%**
										CH4 Comb Eff =	**99.86%**
										THC Comb Eff =	**99.89%**

Table 44: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 7 – Conventional Oil Production – Reciprocating Engine.							
Excess Air	234%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Wet Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.30	1.96	4.97	27	35
31	0	**percentage, %**	3.72	5.63	14	76	100

Table 44: Wet and dry flue gas analyses and flow rates based on 1 m^3/h of fuel gas at excess air rate determined by material balance and flue gas oxygen content for the Location 7 – Conventional Oil Production – Reciprocating Engine.							
Excess Air	234%	**Item**	**CO_2**	**H_2O**	**O_2**	**N_2**	**Total**
Dry Basis							
THC (ppm)	**CO (ppm)**	**m^3/h**	1.30		4.97	27	33
38	0	**percentage, %**	3.94		15	81	100

Table 45: Gas analysis for determine the metals emission factor in flue gas for Location 7 – Conventional Oil Production – Treater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Treater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Treater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Treater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Aluminum	869	812	0.5	868.5	811.5	7.42E-04	6.90E-04
Antimony	0.278	0.156	0.005	0.273	0.151	2.33E-07	1.28E-07
Arsenic	45.7	55.3	0.0209	45.6791	55.2791	3.90E-05	4.70E-05
Barium	461	437	0.0192	460.9808	436.9808	3.94E-04	3.71E-04
Beryllium	0.0305	0.0278	0.0109	0.0196	0.0169	1.67E-08	1.44E-08
Bismuth	0.0211	0.0093	0.001	0.0201	0.0083	1.72E-08	7.05E-09
Boron	922	871	0.822	921.178	870.178	7.87E-04	7.39E-04
Cadmium	47.6	1.07	0.0067	47.5933	1.0633	4.06E-05	9.04E-07
Calcium	1.56	3.37	0.0095	1.5505	3.3605	1.32E-06	2.86E-06
Chlorine	0.725	0.418	0.1	0.625	0.318	5.34E-07	2.70E-07
Chromium	2.91	2.27	0.03	2.88	2.24	2.46E-06	1.90E-06
Cobalt	0.0992	0.0788	0.001	0.0982	0.0778	8.39E-08	6.61E-08
Copper	32.5	19.4	0.05	32.45	19.35	2.77E-05	1.64E-05
Iron	71.3	62.9	2	69.3	60.9	5.92E-05	5.18E-05
Lead	5.74	2.56	0.0045	5.7355	2.5555	4.90E-06	2.17E-06
Lithium	0.847	0.149	0.02	0.827	0.129	7.06E-07	1.10E-07

Table 45: Gas analysis for determine the metals emission factor in flue gas for Location 7 – Conventional Oil Production – Treater and Reciprocating Engine.							
Component	**Lab Analysis**			**Method Blank Corrected**		**Emission Factor,**	
	Treater, Flue Gas	**Reciprocating Engine, Flue Gas**	**Method Blank**	**Treater, Flue Gas**	**Reciprocating Engine, Flue Gas**	**Treater, Flue Gas**	**Reciprocating Engine, Flue Gas**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**kg/GJ (Fuel)**	**kg/GJ (Fuel)**
Magnesium	0.0731	0.132	0.0014	0.0717	0.1306	6.12E-08	1.11E-07
Manganese	3.77	5.43	0.03	3.74	5.4	3.19E-06	4.59E-06
Mercury	0.0455	0.01	0.01	0.0355	0	3.03E-08	0.00E+00
Molybdenum	0.825	1.43	0.116	0.709	1.314	6.05E-07	1.12E-06
Nickel	13.6	7.46	0.0915	13.5085	7.3685	1.15E-05	6.26E-06
Phosphorus	23	2.3	0.8	22.2	1.5	1.90E-05	1.27E-06
Potassium	506	403	2.73	503.27	400.27	4.30E-04	3.40E-04
Selenium	0.111	0.1	0.1	0.011	0	9.39E-09	0.00E+00
Silicon	0.604	0.575	0.01	0.594	0.565	5.07E-07	4.80E-07
Silver	0.172	0.0488	0.0142	0.1578	0.0346	1.35E-07	2.94E-08
Sodium	3270	3080	2	3268	3078	2.79E-03	2.62E-03
Strontium	6.88	9.46	0.0263	6.8537	9.4337	5.85E-06	8.02E-06
Sulphur	0.351	0.2	0.2	0.151	0	1.29E-07	0.00E+00
Thallium	0.0085	0.0059	0.0005	0.008	0.0054	6.83E-09	4.59E-09
Thorium	0.099	0.0573	0.0003	0.0987	0.057	8.43E-08	4.84E-08
Tin	0.681	0.568	0.03	0.651	0.538	5.56E-07	4.57E-07
Titanium	4.31	2.98	0.0584	4.2516	2.9216	3.63E-06	2.48E-06
Uranium	0.039	0.0317	0.0005	0.0385	0.0312	3.29E-08	2.65E-08
Vanadium	0.148	0.107	0.0062	0.1418	0.1008	1.21E-07	8.57E-08
Zinc	79.9	90.8	0.299	79.601	90.501	6.80E-05	7.69E-05

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 1	Compressor	Methane	7.78E-01	5.82E-06	133,580
Location 1	Compressor	Methane, nitro-	1.01E-04	4.51E-08	2,248
Location 1	Compressor	Pentane	5.19E-05	5.32E-08	975
Location 1	Compressor	Ethane	4.72E-03	5.82E-06	811
Location 1	Compressor	Isopentane	4.23E-05	5.32E-08	795
Location 1	Compressor	Acrolein	9.09E-05	2.76E-07	329
Location 1	Compressor	Ethylene	1.42E-03	5.82E-06	244
Location 1	Compressor	1-Pentene	1.14E-05	5.17E-08	220
Location 1	Compressor	Nitrogen	4.36E+02	3.49E+00	125
Location 1	Compressor	Propane	4.62E-04	5.82E-06	79
Location 1	Compressor	Carbon dioxide	3.22E+01	5.82E-01	55
Location 1	Compressor	Butane	1.47E-04	5.82E-06	25
Location 1	Compressor	Isobutane	1.12E-04	5.82E-06	19
Location 1	Compressor	Formaldehyde	1.63E-05	1.48E-06	11
Location 1	Compressor	Carbonyl sulphide	1.13E-05	1.48E-06	7.67
Location 1	Compressor	1-Hexene	7.40E-06	2.07E-06	3.58
Location 1	Compressor	1-Butene	6.09E-05	6.90E-05	0.88
Location 1	Compressor	Benzene	2.36E-05	5.82E-05	0.41
Location 1	Compressor	Toluene	5.26E-06	5.82E-05	0.090
Location 1	Reboiler	Nitrogen	3.31E+02	3.49E+00	95
Location 1	Reboiler	Carbon dioxide	4.98E+01	5.82E-01	86
Location 1	Reboiler	Methane	2.71E-04	5.82E-06	46
Location 1	Reboiler	Isopentane	1.00E-06	5.32E-08	19
Location 1	Reboiler	Acetone	3.02E-06	2.86E-07	11
Location 2	Compressor	Methane	3.67E-02	5.82E-06	6,301
Location 2	Compressor	Phthalic anhydride	1.88E-04	1.09E-07	1,723
Location 2	Compressor	Ethylene	3.45E-03	5.82E-06	593
Location 2	Compressor	Ethane	1.33E-03	5.82E-06	229
Location 2	Compressor	Isopentane	5.47E-06	5.32E-08	103

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 2	Compressor	Carbon dioxide	4.98E+01	5.82E-01	85
Location 2	Compressor	Nitrogen	2.47E+02	3.49E+00	71
Location 2	Compressor	Ethyne, dichloro-	3.58E-06	6.95E-08	52
Location 2	Compressor	Pyridine, 3,5-dimethyl-	3.50E-06	7.91E-08	44
Location 2	Compressor	Methane, nitro-	8.32E-07	4.51E-08	18
Location 2	Compressor	Benzene	2.92E-04	5.82E-05	5.02
Location 2	Compressor	Isobutane	2.05E-05	5.82E-06	3.52
Location 2	Compressor	Formic acid	3.62E-06	1.13E-06	3.19
Location 2	Compressor	Butane	1.65E-05	5.82E-06	2.83
Location 2	Compressor	Toluene	3.89E-05	5.82E-05	0.67
Location 2	Compressor	1-Butene	3.66E-05	6.90E-05	0.53
Location 2	Compressor	Isopropylbenzene	1.09E-05	5.82E-05	0.19
Location 2	Compressor	Ethyl benzene	1.60E-06	5.82E-05	0.027
Location 2	Compressor	m,p-Xylene	1.34E-06	5.82E-05	0.023
Location 2	Reboiler	Methane	1.20E-02	5.82E-06	2,062
Location 2	Reboiler	Isopentane	1.88E-05	5.32E-08	353
Location 2	Reboiler	Nitrogen	6.04E+02	3.49E+00	173
Location 2	Reboiler	Carbon dioxide	5.35E+01	5.82E-01	92
Location 2	Reboiler	Methylcyclopentane	1.78E-06	6.21E-08	29
Location 2	Reboiler	Butane	3.27E-05	5.82E-06	6
Location 2	Reboiler	Isobutane	2.73E-05	5.82E-06	4.69
Location 2	Reboiler	Cyclopropane, 1-methyl-1-isopropenyl-	8.71E-06	2.36E-06	3.68
Location 2	Reboiler	Toluene	4.77E-05	5.82E-05	0.82
Location 2	Reboiler	Benzene	9.32E-06	5.82E-05	0.16
Location 2	Reboiler	1-Butene	6.48E-06	6.90E-05	0.09
Location 3	Reboiler	Methylcyclohexane	1.09E-05	7.24E-08	150
Location 3	Reboiler	2,2,4-Trimethylpentane	9.50E-06	8.42E-08	113
Location 3	Reboiler	Nitrogen	3.04E+02	3.49E+00	87
Location 3	Reboiler	2,3-Dimethylpentane	6.23E-06	7.39E-08	84

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 3	Reboiler	Carbon dioxide	4.77E+01	5.82E-01	82
Location 3	Reboiler	3-Methylhexane	5.52E-06	7.39E-08	75
Location 3	Reboiler	2,3,4-Trimethylpentane	5.96E-06	8.42E-08	71
Location 3	Reboiler	Octane	5.90E-06	8.42E-08	70
Location 3	Reboiler	Decane	7.33E-06	1.05E-07	70
Location 3	Reboiler	2-Methylpentane	4.27E-06	6.35E-08	67
Location 3	Reboiler	Methane	3.88E-04	5.82E-06	67
Location 3	Reboiler	2-Methylhexane	3.82E-06	7.39E-08	52
Location 3	Reboiler	Cyclohexane	3.09E-06	6.21E-08	50
Location 3	Reboiler	Heptane	3.44E-06	7.39E-08	47
Location 3	Reboiler	Undecane	5.30E-06	1.15E-07	46
Location 3	Reboiler	Methylcyclopentane	2.77E-06	6.21E-08	45
Location 3	Reboiler	3-Methylpentane	2.82E-06	6.35E-08	44
Location 3	Reboiler	Nonane	4.02E-06	9.46E-08	43
Location 3	Reboiler	Hexane	2.58E-06	6.35E-08	41
Location 3	Reboiler	3-Methylheptane	3.15E-06	8.42E-08	37
Location 3	Reboiler	Carbonyl sulphide	4.80E-05	1.48E-06	32
Location 3	Reboiler	m-Ethyltoluene	8.06E-05	2.96E-06	27
Location 3	Reboiler	Dodecane	3.21E-06	1.26E-07	26
Location 3	Reboiler	1,2,3-Trimethylbenzene	6.33E-05	2.96E-06	21
Location 3	Reboiler	2-Methylheptane	1.79E-06	8.42E-08	21
Location 3	Reboiler	Benzene, (1-methyl-1-propenyl)-, (Z)- (C	6.59E-05	3.25E-06	20
Location 3	Reboiler	o-Ethyltoluene	4.63E-05	2.96E-06	16
Location 3	Reboiler	Sulfur dioxide	7.06E-07	4.73E-08	15
Location 3	Reboiler	Benzene, 1-ethyl-2,3-dimethyl-	4.78E-05	3.30E-06	14
Location 3	Reboiler	Benzene, 1-methyl-2-(1-methylethyl)- (CA	4.49E-05	3.30E-06	14
Location 3	Reboiler	Endo-tricyclo[5.2.1.0(2.6)]decane	4.45E-05	3.35E-06	13
Location 3	Reboiler	Benzene, 1,2,3,4-tetramethyl-	3.71E-05	3.30E-06	11
Location 3	Reboiler	Naphthalene, 2-methyl-	3.16E-05	3.50E-06	9.03

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 3	Reboiler	Carbon disulfide	1.62E-05	1.87E-06	8.66
Location 3	Reboiler	p-Ethyltoluene	2.01E-05	2.96E-06	6.79
Location 3	Reboiler	Benzene, 1-methyl-2-propyl-	2.00E-05	3.30E-06	6.07
Location 3	Reboiler	Formaldehyde	7.78E-06	1.48E-06	5.26
Location 3	Reboiler	Naphthalene, decahydro-, trans-	1.57E-05	3.40E-06	4.63
Location 3	Reboiler	1,2,4-Trimethylbenzene	1.86E-04	5.82E-05	3.19
Location 3	Reboiler	1,4-Pentadiene, 3,3-dimethyl-	6.32E-06	2.36E-06	2.67
Location 3	Reboiler	m-Diethylbenzene	8.23E-06	3.30E-06	2.49
Location 3	Reboiler	Dimethyl disulphide	4.36E-06	2.32E-06	1.88
Location 3	Reboiler	o-Xylene	8.17E-05	5.82E-05	1.40
Location 3	Reboiler	1,3,5-Trimethylbenzene	6.93E-05	5.82E-05	1.19
Location 3	Reboiler	m,p-Xylene	6.35E-05	5.82E-05	1.09
Location 3	Reboiler	Acetic Acid	1.37E-06	1.48E-06	0.93
Location 3	Reboiler	Methyl ethyl disulfide	2.33E-06	2.66E-06	0.88
Location 3	Reboiler	Cyclohexane, 1,2-dimethyl-, cis-	2.26E-06	2.76E-06	0.82
Location 3	Reboiler	Cyclohexane, ethyl-	1.85E-06	2.76E-06	0.67
Location 3	Reboiler	Toluene	3.15E-05	5.82E-05	0.54
Location 3	Reboiler	Cyclohexane, 1,3-dimethyl-, trans-	1.23E-06	2.76E-06	0.45
Location 3	Reboiler	n-Propylbenzene	2.38E-05	5.82E-05	0.41
Location 3	Reboiler	Ethyl benzene	2.30E-05	5.82E-05	0.40
Location 3	Reboiler	trans-2-Butene	1.19E-05	6.90E-05	0.17
Location 3	Reboiler	Benzene	5.09E-06	5.82E-05	0.087
Location 3	Compressor	Methane	1.69E-01	5.82E-06	29,015
Location 3	Compressor	Ethylene	4.38E-03	5.82E-06	752
Location 3	Compressor	1-Pentene	3.60E-05	5.17E-08	697
Location 3	Compressor	Ethane	2.12E-03	5.82E-06	364
Location 3	Compressor	Isopentane	8.94E-06	5.32E-08	168
Location 3	Compressor	Nitrogen	3.28E+02	3.49E+00	94
Location 3	Compressor	Carbon dioxide	5.35E+01	5.82E-01	92

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 3	Compressor	Formic acid	5.76E-05	1.13E-06	51
Location 3	Compressor	1-Hexene	4.02E-05	2.07E-06	19
Location 3	Compressor	Isobutane	4.21E-05	5.82E-06	7.22
Location 3	Compressor	Cyclopentene-3-carboxylic acid, 1-(trime	3.41E-05	5.27E-06	6.46
Location 3	Compressor	Benzene	3.17E-04	5.82E-05	5.45
Location 3	Compressor	Butane	2.01E-05	5.82E-06	3.45
Location 3	Compressor	Silane, chlorotrimethyl-	7.65E-06	2.66E-06	2.88
Location 3	Compressor	1-Butene	1.60E-04	6.90E-05	2.32
Location 3	Compressor	s-Dichloroethyl ether	6.49E-06	3.50E-06	1.85
Location 3	Compressor	Toluene	8.02E-05	5.82E-05	1.38
Location 3	Compressor	Acetic Acid	1.47E-06	1.48E-06	0.99
Location 3	Compressor	m-Ethyltoluene	2.71E-06	2.96E-06	0.92
Location 3	Compressor	1,3-Pentadiene, (Z)-	1.06E-06	1.67E-06	0.63
Location 3	Compressor	Nonanol	2.17E-06	3.55E-06	0.61
Location 3	Compressor	trans-2-Butene	1.71E-05	6.90E-05	0.25
Location 3	Compressor	cis-2-Butene	7.43E-06	6.90E-05	0.11
Location 3	Compressor	m,p-Xylene	5.56E-06	5.82E-05	0.095
Location 3	Compressor	Ethyl benzene	2.32E-06	5.82E-05	0.040
Location 3	Compressor	o-Xylene	2.32E-06	5.82E-05	0.040
Location 4	Steam Gen	Isopentane	1.99E-05	5.32E-08	375
Location 4	Steam Gen	Methane	1.00E-03	5.82E-06	173
Location 4	Steam Gen	Carbon dioxide	5.15E+01	5.82E-01	88
Location 4	Steam Gen	Nitrogen	2.57E+02	3.49E+00	74
Location 4	Steam Gen	2-Methylpentane	3.30E-06	6.35E-08	52
Location 4	Steam Gen	3-Methylpentane	1.63E-06	6.35E-08	26
Location 4	Steam Gen	Hexane	7.96E-07	6.35E-08	13
Location 4	Steam Gen	Cyclopentane	5.83E-07	5.17E-08	11
Location 4	Steam Gen	Methylcyclopentane	6.20E-07	6.21E-08	9.98
Location 4	Steam Gen	Ethane	3.19E-05	5.82E-06	5.48

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 4	Steam Gen	Methylene chloride	8.94E-10	1.16E-03	7.68E-07
Location 4	Steam Gen	2-Methylpentane	5.99E-03	6.35E-08	94,197
Location 4	Treater	Pentane	3.74E-03	5.32E-08	70,230
Location 4	Treater	3-Methylpentane	2.99E-03	6.35E-08	47,099
Location 4	Treater	Heptane	2.68E-03	7.39E-08	36,230
Location 4	Treater	Hexane	1.84E-03	6.35E-08	28,984
Location 4	Treater	Cyclopentane	1.27E-03	5.17E-08	24,525
Location 4	Treater	Methylcyclopentane	1.04E-03	6.21E-08	16,749
Location 4	Treater	Methylcyclohexane	4.42E-04	7.24E-08	6,103
Location 4	Treater	Isopentane	4.11E-05	5.32E-08	772
Location 4	Treater	Methane	2.44E-03	5.82E-06	419
Location 4	Treater	Nitrogen	4.79E+02	3.49E+00	137
Location 4	Treater	Carbon dioxide	5.28E+01	5.82E-01	91
Location 4	Treater	Benzene	3.68E-03	5.82E-05	63
Location 4	Treater	Ethane	1.24E-04	5.82E-06	21
Location 4	Treater	Toluene	1.19E-03	5.82E-05	20
Location 4	Treater	Chlorobenzene-d5	2.31E-06	2.76E-06	0.84
Location 5	Tank Heater	Nonane	5.46E-03	9.46E-08	57,772
Location 5	Tank Heater	Decane	2.29E-03	1.05E-07	21,795
Location 5	Tank Heater	Undecane	1.26E-03	1.15E-07	10,898
Location 5	Tank Heater	Octane	6.35E-04	8.42E-08	7,539
Location 5	Tank Heater	Dodecane	2.01E-04	1.26E-07	1,597
Location 5	Tank Heater	Camphor	4.43E-03	3.74E-06	1,182
Location 5	Tank Heater	Benzene, 1,3,5-trimethyl-	3.46E-03	2.96E-06	1,171
Location 5	Tank Heater	Dimethyl trisulphide	2.35E-03	3.10E-06	757
Location 5	Tank Heater	Cyclopentane, 1-methyl-2-propyl-	2.31E-03	3.10E-06	743
Location 5	Tank Heater	.delta.-Fenchane	2.45E-03	3.40E-06	721
Location 5	Tank Heater	Naphthalene, decahydro-2-methyl-	2.69E-03	3.74E-06	719
Location 5	Tank Heater	1,2,3-Trimethylbenzene	2.05E-03	2.96E-06	694

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 5	Tank Heater	Methane	3.79E-03	5.82E-06	652
Location 5	Tank Heater	Camphane	1.99E-03	3.40E-06	584
Location 5	Tank Heater	Neopentylidenecyclohexane	1.86E-03	3.74E-06	497
Location 5	Tank Heater	m-Ethyltoluene	1.20E-03	2.96E-06	408
Location 5	Tank Heater	2-Methylheptane	3.13E-05	8.42E-08	372
Location 5	Tank Heater	Nitrogen	1.25E+03	3.49E+00	357
Location 5	Tank Heater	p-Ethyltoluene	8.67E-04	2.96E-06	293
Location 5	Tank Heater	o-Ethyltoluene	7.48E-04	2.96E-06	253
Location 5	Tank Heater	3-Methylheptane	2.07E-05	8.42E-08	246
Location 5	Tank Heater	Hexane, 3-ethyl-	3.93E-04	2.81E-06	140
Location 5	Tank Heater	Carbon dioxide	6.48E+01	5.82E-01	111
Location 5	Tank Heater	2-Pentene, 3-ethyl-4,4-dimethyl-	3.30E-04	3.10E-06	106
Location 5	Tank Heater	Heptane, 2,6-dimethyl-	3.06E-04	3.15E-06	97
Location 5	Tank Heater	Cyclohexane, 1,1,3-trimethyl-	2.92E-04	3.10E-06	94
Location 5	Tank Heater	m-Diethylbenzene	2.45E-04	3.30E-06	74
Location 5	Tank Heater	Cyclohexane, ethyl-	1.62E-04	2.76E-06	59
Location 5	Tank Heater	1,2,4-Trimethylbenzene	2.40E-03	5.82E-05	41
Location 5	Tank Heater	Cyclopentane, propyl-	5.91E-05	2.76E-06	21
Location 5	Tank Heater	m,p-Xylene	1.21E-03	5.82E-05	21
Location 5	Tank Heater	Heptane, 2,4-dimethyl-	5.94E-05	3.15E-06	19
Location 5	Tank Heater	1,3,5-Trimethylbenzene	9.20E-04	5.82E-05	16
Location 5	Tank Heater	o-Xylene	6.61E-04	5.82E-05	11
Location 5	Tank Heater	Allyl sulphide	2.66E-05	2.81E-06	9.47
Location 5	Tank Heater	Methyl Alcohol	7.11E-06	7.88E-07	9.02
Location 5	Tank Heater	n-Propylbenzene	3.40E-04	5.82E-05	5.84
Location 5	Tank Heater	Cyclohexane, 1,4-dimethyl-	1.24E-05	2.76E-06	4.48
Location 5	Tank Heater	Cyclopentane, 1,1,3,4-tetramethyl-, tran	1.36E-05	3.10E-06	4.39
Location 5	Tank Heater	Dimethyl disulphide	9.80E-06	2.32E-06	4.23
Location 5	Tank Heater	Ethyl benzene	1.41E-04	5.82E-05	2.42

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 5	Tank Heater	Benzene	1.46E-05	5.82E-05	0.25
Location 5	Tank Heater	Toluene	9.34E-06	5.82E-05	0.16
Location 5	Tank Heater	Chlorobenzene-d5	6.18E-09	2.76E-06	0.0022
Location 5	Pump Engine	CYCLOBUTANE, ISOPROPYL-	1.06E-02	2.41E-06	4372
Location 5	Pump Engine	Cyclopentane, 1,3-dimethyl-	7.55E-03	2.41E-06	3129
Location 5	Pump Engine	Cyclohexane, 1,3-dimethyl-, cis-	7.29E-03	2.76E-06	2641
Location 5	Pump Engine	Cyclopentane, ethyl-	4.27E-03	2.41E-06	1769
Location 5	Pump Engine	Methane	9.97E-03	5.82E-06	1712
Location 5	Pump Engine	Cyclopentane, 1,2,4-trimethyl-	4.55E-03	2.76E-06	1651
Location 5	Pump Engine	Cyclopentane, 1,1-dimethyl-	3.33E-03	2.41E-06	1380
Location 5	Pump Engine	Cyclohexane, 1,2-dimethyl-, trans-	3.04E-03	2.76E-06	1103
Location 5	Pump Engine	Propane, 2,2-dimethyl-	1.73E-03	1.77E-06	976
Location 5	Pump Engine	Hexane, 2,4-dimethyl-	2.10E-03	2.81E-06	748
Location 5	Pump Engine	Ethanone, 1-cyclohexyl-	2.16E-03	3.10E-06	695
Location 5	Pump Engine	Cyclohexanepropanol-	2.20E-03	3.50E-06	628
Location 5	Pump Engine	Cyclohexane, 1,1-dimethyl-	1.52E-03	2.76E-06	553
Location 5	Pump Engine	Pentane, 2,4-dimethyl-	1.08E-03	2.46E-06	437
Location 5	Pump Engine	Octane	3.53E-05	8.42E-08	419
Location 5	Pump Engine	Cyclohexane, 1,3-dimethyl-, trans-	1.08E-03	2.76E-06	393
Location 5	Pump Engine	Cyclopropane, 1-ethyl-1-methyl-	7.58E-04	2.07E-06	366
Location 5	Pump Engine	Nitrogen	1.19E+03	3.49E+00	341
Location 5	Pump Engine	Hexane, 2,5-dimethyl-	9.22E-04	2.81E-06	328
Location 5	Pump Engine	Nonane	2.48E-05	9.46E-08	262
Location 5	Pump Engine	Undecane	2.28E-05	1.15E-07	198
Location 5	Pump Engine	Decane	1.38E-05	1.05E-07	132
Location 5	Pump Engine	Isopentane	5.98E-06	5.32E-08	112
Location 5	Pump Engine	Methylcyclohexane	7.55E-06	7.24E-08	104
Location 5	Pump Engine	2-Methylheptane	6.61E-06	8.42E-08	78
Location 5	Pump Engine	Pentane	2.69E-06	5.32E-08	51

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 5	Pump Engine	Heptane	3.63E-06	7.39E-08	49
Location 5	Pump Engine	Cyclohexane	2.75E-06	6.21E-08	44
Location 5	Pump Engine	Dodecane	5.48E-06	1.26E-07	44
Location 5	Pump Engine	3-Methylheptane	3.57E-06	8.42E-08	42
Location 5	Pump Engine	3-Methylhexane	3.09E-06	7.39E-08	42
Location 5	Pump Engine	2-Methylpentane	2.16E-06	6.35E-08	34
Location 5	Pump Engine	Methylcyclopentane	1.89E-06	6.21E-08	30
Location 5	Pump Engine	Ethane	1.64E-04	5.82E-06	28
Location 5	Pump Engine	Hydrogen sulphide	1.76E-05	8.37E-07	21
Location 5	Pump Engine	3-Methylpentane	1.29E-06	6.35E-08	20
Location 5	Pump Engine	1-Cyclohexyl-2-methyl-prop-2-en-1-one	6.41E-05	3.74E-06	17
Location 5	Pump Engine	Bicyclo[4.1.0]heptane, 3-methyl-	2.87E-05	2.71E-06	11
Location 5	Pump Engine	Cyclohexanone, 2-(2-methylpropylidene)-	3.12E-05	3.74E-06	8.32
Location 5	Pump Engine	Benzene, 1,2,3,5-tetramethyl-	2.55E-05	3.30E-06	7.72
Location 5	Pump Engine	Cyclohexane, 1,2-diethyl-3-methyl-	2.92E-05	3.79E-06	7.70
Location 5	Pump Engine	Carbon dioxide	4.33E+00	5.82E-01	7.43
Location 5	Pump Engine	1,3-Hexadiene, 3-ethyl-2-methyl-, (Z)-	2.15E-05	3.05E-06	7.03
Location 5	Pump Engine	2-Ethyl-3-methylcyclopentene	1.57E-05	2.71E-06	5.79
Location 5	Pump Engine	Cyclopentane, 1-ethyl-3-methyl-	1.40E-05	2.76E-06	5.08
Location 5	Pump Engine	3-CYCLOHEXYL-PROPANOL	1.51E-05	3.50E-06	4.33
Location 5	Pump Engine	Heptane, 2,3-dimethyl-	9.17E-06	3.15E-06	2.91
Location 5	Pump Engine	Heptane, 2,6-dimethyl-	8.96E-06	3.15E-06	2.84
Location 5	Pump Engine	Cyclohexane, 1,1,3-trimethyl-	6.52E-06	3.10E-06	2.10
Location 5	Pump Engine	1,2,3-Trimethylbenzene	5.82E-06	2.96E-06	1.97
Location 5	Pump Engine	Cyclohexane, ethyl-	4.62E-06	2.76E-06	1.67
Location 5	Pump Engine	m-Ethyltoluene	4.14E-06	2.96E-06	1.40
Location 5	Pump Engine	Cyclohexane, 1,4-dimethyl-	3.46E-06	2.76E-06	1.25
Location 5	Pump Engine	p-Ethyltoluene	2.95E-06	2.96E-06	1.00
Location 5	Pump Engine	HEXA-4,5-DIENE CARBOXYLIC ACID	2.75E-06	2.76E-06	1.00

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 5	Pump Engine	o-Ethyltoluene	2.34E-06	2.96E-06	0.79
Location 5	Pump Engine	m,p-Xylene	3.09E-05	5.82E-05	0.53
Location 5	Pump Engine	Toluene	1.55E-05	5.82E-05	0.27
Location 5	Pump Engine	o-Xylene	1.01E-05	5.82E-05	0.17
Location 5	Pump Engine	Ethyl benzene	6.55E-06	5.82E-05	0.11
Location 5	Pump Engine	1,2,4-Trimethylbenzene	6.39E-06	5.82E-05	0.11
Location 5	Pump Engine	Benzene	3.31E-06	5.82E-05	0.057
Location 5	Pump Engine	n-Propylbenzene	2.25E-06	5.82E-05	0.039
Location 5	Pump Engine	1,3,5-Trimethylbenzene	1.78E-06	5.82E-05	0.031
Location 5	Pump Engine	Chlorobenzene-d5	6.12E-09	2.76E-06	0.0022
Location 6	Steam Boiler	Methane	2.93E-02	5.82E-06	5,035
Location 6	Steam Boiler	Butane	1.17E-02	5.82E-06	2,013
Location 6	Steam Boiler	Ethane	7.42E-04	5.82E-06	127
Location 6	Steam Boiler	Ethylene	6.92E-04	5.82E-06	119
Location 6	Steam Boiler	Nitrogen	3.02E+02	3.49E+00	86
Location 6	Steam Boiler	Carbon dioxide	4.66E+01	5.82E-01	80
Location 6	Steam Boiler	Propane	3.84E-04	5.82E-06	66
Location 6	Steam Boiler	Propyne	4.65E-04	4.93E-05	9.45
Location 6	Steam Boiler	Dodecane	1.15E-06	1.26E-07	9.17
Location 6	Steam Boiler	Decane	8.32E-07	1.05E-07	7.93
Location 6	Steam Boiler	Undecane	8.60E-07	1.15E-07	7.46
Location 6	Steam Boiler	Pentadecane	3.51E-05	5.22E-06	6.73
Location 6	Steam Boiler	Propane, 2-methyl-	7.62E-06	1.43E-06	5.33
Location 6	Steam Boiler	Methyl Alcohol	2.84E-06	7.88E-07	3.61
Location 6	Steam Boiler	Nitrous acid, methyl ester	4.83E-06	1.50E-06	3.21
Location 6	Steam Boiler	2-Propanone	3.64E-06	1.43E-06	2.55
Location 6	Steam Boiler	Butane, 2-methyl-	3.96E-06	1.77E-06	2.23
Location 6	Steam Boiler	1,2-Propadiene	1.29E-06	9.85E-07	1.31
Location 6	Steam Boiler	Benzene	6.22E-05	5.82E-05	1.07

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 6	Steam Boiler	1,3-Butadiyne	1.11E-06	1.23E-06	0.90
Location 6	Steam Boiler	Hexanal	2.20E-06	2.46E-06	0.89
Location 6	Steam Boiler	m-Ethyltoluene	1.53E-06	2.96E-06	0.52
Location 6	Steam Boiler	1,2,3-Trimethylbenzene	1.26E-06	2.96E-06	0.43
Location 6	Steam Boiler	1-Buten-3-yne	5.44E-07	1.28E-06	0.42
Location 6	Steam Boiler	p-Ethyltoluene	7.24E-07	2.96E-06	0.25
Location 6	Steam Boiler	Cyclopentanol	4.75E-07	2.12E-06	0.22
Location 6	Steam Boiler	o-Ethyltoluene	5.41E-07	2.96E-06	0.18
Location 6	Steam Boiler	Toluene	8.04E-06	5.82E-05	0.14
Location 6	Steam Boiler	1,2,4-Trimethylbenzene	3.53E-06	5.82E-05	0.061
Location 6	Steam Boiler	o-Xylene	3.39E-06	5.82E-05	0.058
Location 6	Steam Boiler	m,p-Xylene	3.36E-06	5.82E-05	0.058
Location 6	Steam Boiler	Ethyl benzene	1.09E-06	5.82E-05	0.019
Location 6	Steam Boiler	Chlorobenzene-d5	1.63E-09	2.76E-06	0.00059
Location 7	Tank Heater	Methane	3.71E-03	5.82E-06	638
Location 7	Tank Heater	Dodecane	1.49E-04	1.26E-07	1,186
Location 7	Tank Heater	Undecane	7.13E-05	1.15E-07	619
Location 7	Tank Heater	Nitrogen	7.62E+02	3.49E+00	218
Location 7	Tank Heater	Isopentane	1.11E-05	5.32E-08	208
Location 7	Tank Heater	Pentane	9.45E-06	5.32E-08	178
Location 7	Tank Heater	Hydrogen sulphide	7.61E-05	8.37E-07	91
Location 7	Tank Heater	Ethane	3.12E-04	5.82E-06	54
Location 7	Tank Heater	Butane	2.01E-04	5.82E-06	34
Location 7	Tank Heater	2-Methylpentane	2.15E-06	6.35E-08	34
Location 7	Tank Heater	Decane	3.46E-06	1.05E-07	33
Location 7	Tank Heater	Hexane	2.02E-06	6.35E-08	32
Location 7	Tank Heater	Propane	1.52E-04	5.82E-06	26
Location 7	Tank Heater	3-Methylpentane	1.04E-06	6.35E-08	16
Location 7	Tank Heater	Carbon dioxide	8.64E+00	5.82E-01	15

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 7	Tank Heater	Propyne	2.77E-04	4.93E-05	5.62
Location 7	Tank Heater	Formaldehyde	5.23E-06	1.48E-06	3.54
Location 7	Tank Heater	Undecane, 4,6-dimethyl-	1.47E-05	4.53E-06	3.25
Location 7	Tank Heater	2-Propanone	4.04E-07	1.43E-06	0.28
Location 7	Tank Heater	Benzene	1.49E-06	5.82E-05	0.026
Location 7	Tank Heater	Chlorobenzene-d5	3.88E-09	2.76E-06	0.0014
Location 7	Reciprocating	Pentane	4.03E-04	5.32E-08	7,581
Location 7	Reciprocating	Isopentane	2.91E-04	5.32E-08	5,464
Location 7	Reciprocating	Hexane	1.93E-04	6.35E-08	3,037
Location 7	Reciprocating	Methane	1.52E-02	5.82E-06	2,605
Location 7	Reciprocating	2-Methylpentane	1.37E-04	6.35E-08	2,152
Location 7	Reciprocating	3-Methylpentane	8.63E-05	6.35E-08	1,357
Location 7	Reciprocating	Heptane	7.19E-05	7.39E-08	973
Location 7	Reciprocating	Dodecane	1.09E-04	1.26E-07	870
Location 7	Reciprocating	Cyclopentane	4.20E-05	5.17E-08	813
Location 7	Reciprocating	Methylcyclopentane	3.96E-05	6.21E-08	637
Location 7	Reciprocating	Cyclohexane	3.83E-05	6.21E-08	617
Location 7	Reciprocating	Methylcyclohexane	4.37E-05	7.24E-08	604
Location 7	Reciprocating	Octane	4.89E-05	8.42E-08	581
Location 7	Reciprocating	Ethane	3.11E-03	5.82E-06	535
Location 7	Reciprocating	3-Methylhexane	3.32E-05	7.39E-08	449
Location 7	Reciprocating	2-Methylhexane	2.89E-05	7.39E-08	391
Location 7	Reciprocating	Nonane	3.38E-05	9.46E-08	357
Location 7	Reciprocating	Undecane	4.02E-05	1.15E-07	349
Location 7	Reciprocating	Decane	3.41E-05	1.05E-07	325
Location 7	Reciprocating	Propane	1.55E-03	5.82E-06	266
Location 7	Reciprocating	2,3-Dimethylbutane	1.62E-05	6.35E-08	255
Location 7	Reciprocating	Nitrogen	7.55E+02	3.49E+00	216
Location 7	Reciprocating	2-Methylheptane	1.38E-05	8.42E-08	163

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 7	Reciprocating	2,3-Dimethylpentane	1.16E-05	7.39E-08	156
Location 7	Reciprocating	Butane	8.72E-04	5.82E-06	150
Location 7	Reciprocating	Hydrogen sulphide	1.01E-04	8.37E-07	121
Location 7	Reciprocating	3-Methylheptane	9.92E-06	8.42E-08	118
Location 7	Reciprocating	2,2-Dimethylbutane	6.68E-06	6.35E-08	105
Location 7	Reciprocating	Oxygen	2.43E+02	3.49E+00	69
Location 7	Reciprocating	Nonadecane	1.79E-04	2.61E-06	69
Location 7	Reciprocating	Isobutane	3.05E-04	5.82E-06	52
Location 7	Reciprocating	2-Pentanone, 4-methyl-4-phenyl-	9.02E-05	2.12E-06	43
Location 7	Reciprocating	1-Methyl-2-n-hexylbenzene	7.62E-05	2.12E-06	36
Location 7	Reciprocating	Naphthalene, 2-methyl-	1.09E-04	3.50E-06	31
Location 7	Reciprocating	Benzene, 1-methyl-2-(phenylmethyl)-	5.96E-05	2.07E-06	29
Location 7	Reciprocating	Dodecane, 4,6-dimethyl-	6.17E-05	2.41E-06	26
Location 7	Reciprocating	Naphthalene, 2,6-dimethyl-	6.05E-05	2.76E-06	22
Location 7	Reciprocating	Tetradecane	1.01E-04	4.88E-06	21
Location 7	Reciprocating	Propyne	7.75E-04	4.93E-05	16
Location 7	Reciprocating	m-Ethyltoluene	1.16E-05	2.96E-06	3.92
Location 7	Reciprocating	Carbon dioxide	2.27E+00	5.82E-01	3.90
Location 7	Reciprocating	Octane, 2,6-dimethyl-	9.90E-06	2.56E-06	3.86
Location 7	Reciprocating	Cyclotrisiloxane, hexamethyl-	7.06E-06	2.46E-06	2.87
Location 7	Reciprocating	1,2,3-Trimethylbenzene	6.64E-06	2.96E-06	2.25
Location 7	Reciprocating	CYCLOBUTANE, ISOPROPYL-	4.43E-06	2.41E-06	1.83
Location 7	Reciprocating	o-Ethyltoluene	5.01E-06	2.96E-06	1.69
Location 7	Reciprocating	Cyclohexane, ethyl-	4.43E-06	2.76E-06	1.61
Location 7	Reciprocating	Cyclopentane, 1,3-dimethyl-	3.37E-06	2.41E-06	1.40
Location 7	Reciprocating	p-Ethyltoluene	3.84E-06	2.96E-06	1.30
Location 7	Reciprocating	Octane, 2-methyl-	2.92E-06	2.61E-06	1.12
Location 7	Reciprocating	Cyclohexane, 1,4-dimethyl-	2.81E-06	2.76E-06	1.02
Location 7	Reciprocating	Cyclopentane, ethyl-	2.26E-06	2.41E-06	0.94

Table 46: Comparison of determined and LDL emission factors and ratio of measured to LDL for all organic and fixed gas compounds in the 13 sources sampled.

	Sources	Component	Emission Factor		Ratio of Measured/LDL
			Measured	LDL	
			kg /(GJ fuel)		
Location 7	Reciprocating	Heptane, 3-ethyl-2-methyl-	2.48E-06	2.81E-06	0.88
Location 7	Reciprocating	m-Diethylbenzene	2.68E-06	3.30E-06	0.81
Location 7	Reciprocating	1,2,4-Trimethylcyclopentane	1.42E-06	2.12E-06	0.67
Location 7	Reciprocating	Toluene	3.04E-05	5.82E-05	0.52
Location 7	Reciprocating	1-trans-2-cis-3-trans-trimethylcyclopent	1.06E-06	2.07E-06	0.51
Location 7	Reciprocating	Hexane, 2,4-dimethyl-	1.35E-06	2.81E-06	0.48
Location 7	Reciprocating	Heptane, 2,3-dimethyl-	1.29E-06	3.15E-06	0.41
Location 7	Reciprocating	Cyclopentane, 1,1-dimethyl-	9.24E-07	2.41E-06	0.38
Location 7	Reciprocating	m,p-Xylene	1.85E-05	5.82E-05	0.32
Location 7	Reciprocating	Hexane, 2,5-dimethyl-	8.52E-07	2.81E-06	0.30
Location 7	Reciprocating	Hexane, 2,3-dimethyl-	5.83E-07	2.27E-06	0.26
Location 7	Reciprocating	Benzene	1.45E-05	5.82E-05	0.25
Location 7	Reciprocating	1,2,4-Trimethylbenzene	1.35E-05	5.82E-05	0.23
Location 7	Reciprocating	Cyclohexane, 1,1-dimethyl-	4.77E-07	2.76E-06	0.17
Location 7	Reciprocating	o-Xylene	7.85E-06	5.82E-05	0.13
Location 7	Reciprocating	Ethyl benzene	7.60E-06	5.82E-05	0.13
Location 7	Reciprocating	n-Propylbenzene	3.32E-06	5.82E-05	0.057
Location 7	Reciprocating	1,3,5-Trimethylbenzene	3.25E-06	5.82E-05	0.056
Location 7	Reciprocating	Chlorobenzene-d5	4.36E-09	2.76E-06	0.0016

9 APPENDIX B - FIELD DATA COLLECTION HISTORIES

Table 47: Field sample location details and site specific data collection histories.

Location	Sources	Sampling time	Comments
Location 1 - Sweet Gas Gathering System - (Plains Region)	Reciprocating Engine	Summer, 2012	The temperature was above zero and the sampling went smoothly.
	Process Heater	Summer, 2012	
Location 2 - Sweet Gas Gathering System - (Foothills Region)	Reciprocating Engine	Summer, 2012	
	Process Heater	Summer, 2012	
Location 3 - Sweet Gas Processing Plant	Reciprocating Engine	Summer, 2012	
	Process Heater	Summer, 2012	
Location 4 - Thermal Heavy Oil Production	Treater - sweet gas	Fall, 2012	Although the treater and steam generator were exposed to cold weather, the atmospheric temperature was above zero and did not affect the sampling.
	Steam Generators, mixed fuel gas, slightly sour.	Fall, 2012	
Location 5 - Cold Heavy Oil Production	Tank Heaters	Fall, 2012	The treater and screw pump engine were exposed to cold weather. Hydrate most likely formed in metals sampling train during sampling and affected results. The fuel/flue gases for organic components may not have been affected by the weather since the sampling time was short. The metal impinger sampling train might be affect by the cool weather due to long sampling time.
	Screw Pump Engine	Fall, 2012	
Location 6 - Sour Processing Plant	Tail Gas Incinerator	Fall, 2012	The source was not easily accessible and a high angle rescue team was required by operator (cost not in budget). For these reasons this source was not sampled.
	Turbine Engine	Fall, 2012	Sample was not collected due to weather issue.

Table 47: Field sample location details and site specific data collection histories.			
Location	**Sources**	**Sampling time**	**Comments**
	Process Heater/Steam Boiler	Fall, 2012	The steam boiler is located in a building and the fuel/flue gases were sampled without the effect of cool weather.
Location 7 - Conventional Oil Production	Enclosed Flare	Fall, 2012	The enclosed flare system could not be accessed and it was not sampled.
	Reciprocating Engine	Fall, 2012	The reciprocating engine is located in a building and the fuel/flue gases were sampled without the effect of cold weather.
	Treater	Fall, 2012	The treater was exposed to cold weather. Hydrate might form during sampling. The fuel/flue gases for organic components might not affect by the weather since the sampling time was short. The metal impinge sampling train might affect by the cool weather due to long sampling time.

Table 48: Fuel gas normalization procedure and site specific comments.			
	Sources	**Sampling time**	**Comments**
Location 1 - Sweet Gas Gathering System - (Plains Region)	Reciprocating Engine	Summer, 2012	The fuel gas for the reciprocating engine and heater are the same. The analytical results for both sources agreed well with each other. The calculated total mole fraction equaled more than 100%.The normalized composition was calculated by dividing the individual component concentration by the total composition. After normalizing, the composition agreed well with the typical gas analysis information
	Process Heater	Summer, 2012	

Table 48: Fuel gas normalization procedure and site specific comments.			
	Sources	**Sampling time**	**Comments**
			provided by client.
Location 2 - Sweet Gas Gathering System - (Foothills Region)	Reciprocating Engine	Summer, 2012	The fuel gas for the reciprocating engine and heater are the same. The analytical results for both sources agreed well with each other. The total vol% of composition before normalization was 107.167%. To normalize the fuel gas composition, the extra 7.167% was subtracted from the nitrogen content. After normalizing, the composition agreed well with the typical gas analysis information provided by client.
	Process Heater	Summer, 2012	The fuel gas for the reciprocating engine and heater are the same. The analytical results for both sources agreed well with each other. The total vol% of composition before normalization was 107.178%. To normalize the fuel gas composition, the extra 7.178% was subtracted from the nitrogen content. After normalizing, the composition agreed well with the typical gas analysis information provided by client.
Location 3 - Sweet Gas Processing Plant	Reciprocating Engine	Summer, 2012	The fuel gas for the reciprocating engine and heater are the same. The analytical results for both sources agreed well with each other. The normalized composition was calculated by dividing the individual component with the total composition before normalization. After normalizing, the organic composition agreed well with the typical gas analysis information provided by client.
	Process Heater	Summer, 2012	
Location 4 - Thermal Heavy Oil Production	Treater, sweet gas	Fall, 2012	The normalized composition was calculated by dividing the individual component with the total composition before normalization. The C1 and N2 agreed with the typical analysis provided by client. The C2 and C3 do not agree and the differences were accepted.

Table 48: Fuel gas normalization procedure and site specific comments.			
	Sources	**Sampling time**	**Comments**
	Steam Generators, mixed fuel gas, slightly sour.	Fall, 2012	The normalized composition was calculated by dividing the individual component with the total composition before normalization. The C1 and N2 agreed with the typical analysis provided by client. The C2 and C3 do not agree and the differences were accepted.
Location 5 - Cold Heavy Oil Production	Tank Heaters	Fall, 2012	The normalized composition was calculated by dividing the individual component with the total composition before normalization. The C1, C2 and N2 agree well with the typical analysis provided by operator.
	Screw Pump Engine	Fall, 2012	
Location 6 - Sour Processing Plant	Tail Gas Incinerator	Fall, 2012	Not applicable. No sample was collected for this source.
	Turbine Engine	Fall, 2012	Not applicable. No sample was collected for this source.
	Process Heater/Steam Boiler	Fall, 2012	The normalized composition was calculated by dividing the individual component with the total composition before normalization. After normalizing, the organic composition agreed well with the typical gas analysis information provided by the operator.
Location 7 - Conventional Oil Production	Enclosed Flare	Fall, 2012	Not applicable. No sample was collected for this source.
	Reciprocating Engine	Fall, 2012	The fuel gas for the reciprocating engine and treater are the same. The normalized composition was calculated by dividing the individual component with the total composition before normalization. After normalizing, C1 and C2 agreed with the typical analysis provided by the operator but the C3 was different and accepted.
	Treater	Fall, 2012	

10 APPENDIX C - SAMPLING PROTOCOLS

10.1 PURPOSE

This protocol outlines the test conditions, test procedures, data recording and emission test methods to be followed when testing heaters, boilers and compressors for the purpose of establishing actual acrolein and arsenic (and other pollutant) emission factors.

10.2 TEST CONDITIONS

1. Preferable all units should be operating at 80% – 100% of full load conditions during the test period unless otherwise specified by the manufacturer or operating approval agency. Each unit should be operating at steady conditions for at least one hour prior to the test and for the duration of the test. For fuel modulated equipment this should not be a problem. For heaters, boiler and other combustion units with on/off burner controls, emission testing needs to be coordinated with the firing cycle.

2. For units that normally operate at less than 80%, it is acceptable to test the unit while it is operating within plus or minus 10% of its normal operating range. Again, steady operation before and during the test is required.

3. Air-to-fuel ratios or excess air should be checked prior to the test period and adjustments should be made to the unit if it is found to be operating at outside of normal conditions. Proper conditions may be specified in the operating manual, company procedure or the approving authority's approval. It is expected that the unit will be operated at the specified air-to-fuel ratio and therefore, the test to establish the actual emission factor, should be at the specified condition.

4. Where a process unit combustion chamber or process fluid operating temperature is specified, as is the case for an incinerator or a heat medium heater, the specified temperature must be maintained for one hour prior to and during the test period.

10.3 TEST PROCEDURE

1. The plant operator will schedule the test period and be responsible for maintaining the correct operating conditions prior to and during the test period. The plant operator will provide the approval to start the test and, should conditions change, abort the test.

2. The plant operator will ensure that the required process data is recorded by the plant distributed control system (DCS), plant technicians or the emission testing team.

10.3.1 TEST PROCEDURE FOR ACROLEIN

1. The fuel/flue gases are collected using canister (Figure 1). Initially, the canister has a negative pressure and it will be connected to the sampling port on the source. A pressure regulator may added between the sampling port and canister to regulate inlet pressure in the event of a high pressure source (i.e. The pressure regulator is needed for sampling from high pressure fuel line but is not needed for sampling exhaust stacks).

2. Metal sampling line is used for hot sources. The sampling line is purged of air with a hand pump connected (t-valve) immediately before the sample canister where the exhaust has cooled.

3. After connecting and purging the sampling line, the canister inlet valve is opened slowly. The flue gases will flow through a water knockout vessel and then flow into the canister until the canister pressure is equilibrium with the surrounding.

4. When acrolein testing is complete, a combustion analyzer (TESTO 350) is inserted into the exhaust stack and used to record other flue gas information (i.e. O_2, CO, CO_2, and C_xH_y). Manufacturer testing procedures are followed for these measurements.

10.3.2 TEST PROCEDURE FOR ARSENIC

1. The test for the arsenic and metals will be done using a modified version of NCASI Method IM/CAN/WP-99.02. This is an impinge method for collecting arsenic - metals and is illustrated in Figure 2.

2. The modification of Method IM/CAN/WP-99.02 will involve employing an acid solution (i.e. 1.0% nitric acid in water) instead of a water solution in the impinge train to also scrub any metals from the gas stream. Thus, the liquid from the impinger train will also be subject to a full ICP-MS scan for metals.

3. The sampling rate for this method is measured on dry basis (i.e. the flow meter is installed after the impinger train).

4. The dry flow meter has a temperature sensor used to correct the flow rate to the standard reference condition of 15^o C. A differential pressure sensor is used to measure the vacuum at the meter outlet (i.e. put a tee connection at the flow meter outlet with one branch connected to the differential pressure sensor and the other branch connected to the sampling pump). Measure the local barometric pressure,

record the pressure differential and correct the flow rate to the standard reference condition of 101.325 kPa.

5. The acid solution (1% nitric acid in water) is used to clean the impinger train.

6. After cleaning, 20 ml of solution (1% nitric acid in water) is measured and put into the first impinge train.

7. The sampling rate is 500 ml/min. Record the reading on the dry flow meter and collect at least 20 L of sample. When the pump starts, make sure there is gas bubbling through the impinge train.

8. When the dry flow meter gives a reading of 20 L gas flow, stop the pump. The solution in the impinger trains are collected and labeled. These samples will be subjected to full ICP- MS scan for metals.

11 APPENDIX D – GAS SAMPLE ANALYTICAL METHODS

All gas sample chemical analyses were performed by Alberta Innovates Technology Futures (AITF) at their laboratory in Vegreville. A brief summary of the different analytical procedures that were applied is provided in the subsections below.

INERTS

The analysis for inerts determined concentrations of N_2, O_2, CO_2 and CO in the gas samples. The analyses were performed by gas chromatography with thermal conductivity detection (GC/TCD). The minimum detection limit for this method was 50 ppm for CO_2 and 100 ppm for the other inerts.

REDUCED SULPHUR COMPOUNDS (RSCS)

Analyses for sulphur gases were performed by gas chromatography with sulphur chemiluminescence detection (GC/SCD). The minimum detection limit of this method was 1-ppb. The specific sulphur compounds targeted by the analysis are summarized in **Table 49**.

C_1 THROUGH C_4 GASES

The analyses for lighter VOCs were done by gas chromatography with flame ionization detection (GC/FID). The minimum detection limit for individual compounds was 50 ppb. The target compounds are summarized in **Table 50**.

C_5 THROUGH C_{12+} GASES

Analyses for the heavier VOCs in gas samples were done by mass spectroscopy (GC/MS) with cryogenic focusing to provide a minimum detection limit of 10 µg/m^3. For liquid samples, a purge and trap GC/MS analysis was performed for compounds in the C_5 to C_{12} range and a solvent extraction GC/MS analysis was done for compounds heavier than C_{12}. The GC/MS was operated in full scan (or total ion) mode. In this operating mode the substance type denoted by each chromatographic peak is determined based on the best match quality achieved with the available entries in the instrument's mass spectral library. Additionally, the instrument was calibrated using a calibration standard of selected target compounds (see **Table 51**), and therefore provided exact matches where these substances occurred in the collected samples.

Table 49: Listing of the target reduced sulphur compounds (RSCs).	
CAS Number	**Substance Name**
638-02-8	2,5-Dimethyl Thiophene
872-55-9	2-Ethyl Thiophene
554-14-3	2-Methyl Thiophene
616-44-4	3-Methyl Thiophene
592-88-1	Allyl Sulphide
109-79-5	Butyl Mercaptan
544-40-1	Butyl Sulphide
75-15-0	Carbon Disulphide
463-58-1	Carbonyl Sulphide
624-92-0	Dimethyl Disulphide
75-18-3	Dimethyl Sulphide
3658-80-8	Dimethyl Trisulphide
75-08-1	Ethyl Mercaptan
352-93-2	Ethyl Sulphide
111-31-9	Hexyl Mercaptan
7783-06-4	Hydrogen Sulphide
75-33-2	Isopropyl Mercaptan
74-93-1	Methyl Mercaptan
107-03-9	Propyl Mercaptan
7446-09-5	Sulphur Dioxide
110-02-1/513-44-0 and 513-53-1	Thiophene/*iso* and *sec* Butyl Mercaptan
110-66-7	*n* Amyl Mercaptan
1679—09-0	*tert* Amyl Mercaptan
75-66-1	*tert* Butyl Mercaptan

Table 50: Listing of the target substances in the C_1 to C_4 range.	
CAS Number	**Substance Name**
106-99-0	1,3-Butadiene
106-98-9	1-Butene
74-86-2	Acetylene
106-97-8	Butane
74-84-0	Ethane
107-00-6	Ethylacetylene
74-85-1	Ethylene
75-28-5	Isobutane
115-11-7	Isobutylene
74-82-8	Methane
74-98-6	Propane
115-07-1	Propylene
74-99-7	Propyne
590-18-1	Cis-2-Butene
624-64-6	Trans-2-Butene

Table 51: Listing of the target substances in the C_5 to C_{12+} range.	
CAS Number	**Substance Name**
630-20-6	1,1,1,2-Tetrachloroethane
71-55-6	1,1,1-Trichloroethane
79-34-5	1,1,2,2-Tetrachloroethane
79-00-5	1,1,2-Trichloroethane
75-34-3	1,1-Dichloroethane
75-35-4	1,1-Dichloroethylene
563-58-6	1,1-Dichloropropylene
87-61-6	1,2,3-Trichlorobenzene
96-18-4	1,2,3-Trichloropropane
120-82-1	1,2,4-Trichlorobenzene
95-63-6	1,2,4-Trimethylbenzene
96-12-8	1,2-Dibromo-3-chloropropane
106-93-4	1,2-Dibromoethane
95-50-1	1,2-Dichlorobenzene
107-06-2	1,2-Dichloroethane
78-87-5	1,2-Dichloropropane
108-67-8	1,3,5-Trimethylbenzene
541-73-1	1,3-Dichlorobenzene
142-28-9	1,3-Dichloropropane
106-46-7	1,4-Dichlorobenzene
594-20-7	2,2-Dichloropropane
110-75-8	2-Chloroethoxyethylene
95-49-8	2-Chlorotoluene
106-43-4	4-Chlorotoluene
71-43-2	Benzene
108-86-1	Bromobenzene
75-27-4	Bromodichloromethane
75-25-2	Bromoform
74-83-9	Bromomethane
56-23-5	Carbon tetrachloride
108-90-7	Chlorobenzene
75-00-3	Chloroethane
67-66-3	Chloroform
124-48-1	Dibromochloromethane
74-95-3	Dibromomethane
100-41-4	Ethyl benzene
87-68-3	Hexachlorobutadiene

Table 51: Listing of the target substances in the C_5 to C_{12+} range.	
CAS Number	**Substance Name**
98-82-8	Isopropylbenzene (Cumene)
1634-04-4	MTBE
75-09-2	Methylene chloride
91-20-3	Naphthalene
100-42-5	Styrene
127-18-4	Tetrachloroethylene
108-88-3	Toluene
79-01-6	Trichloroethylene
75-69-4	Trichlorofluoromethane
75-01-4	Vinyl chloride
156-59-2	cis-1,2-Dichloroethylene
10061-01-5	cis-1,3-Dichloropropylene
108-38-3 / 106-42-3	m,p-Xylene
104-51-8	n-Butylbenzene
103-65-1	n-Propylbenzene
95-47-6	o-Xylene
99-87-6	p-Isopropyltoluene
135-98-8	sec-Butylbenzene
98-06-6	tert-Butylbenzene
156-60-5	trans-1,2-Dichloroethylene
10061-02-6	trans-1,3-Dichloropropylene