CONSTRUCTION PERMIT APPLICATION

ROUSH COMPRESSOR STATION

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1.0 INTRODUCTION

Rowdy Pipeline, LLC (Rowdy) is submitting this construction permit application with NO_2 and formaldehyde ambient impact analyses for the Roush Compressor Station (Facility). The Facility is located in Section 11, Township 43 North, Range 74 West in Campbell County, Wyoming. A facility location map is presented in Figure 1 (Attachment A). The most recent permit issued for this facility is MD-10437A.

1.1 Equipment

This application is seeking authorization to install/operate the following equipment at the Roush Compressor Station:

Existing:

- (1) Caterpillar G3408TA engine with one engine driven screw compressor

Proposed:

- (3) Three engines rich or lean burn less than 637 hp with three engine driven screw compressors
- (1) One up to 400 bbl atmospheric storage tank for produced water
- (1) One flare with low pressure feed line
- (1) One pig receiver and (1) one pig launcher

One engine has been placed at the facility under permit MD-10437A. The total number of engines at the station will be four. A simplified plot plan is presented in Figure 2.

Engine models for units E2-E4 have yet to be specified. A lean burn engine will be equipped with an oxidation catalyst, and a rich burn engine will be equipped with a NSCR catalyst. Ambient dispersion modeling parameters utilized for the model are based on the worst case scenario of installing lean burn engines. Proposed engine emission limits are summarized in Table 1.

Table 1: Proposed Engine Emission Limits

Unit	Engine Model	Rating (hp)	Engine Emission Factors (g/hp-hr)			
			NO_X	CO	VOC	CH_2O
E1	Caterpillar G3408TA	400 hp	0.70	2.00	0.70	0.05
E2, E3, E4	Lean Burn	<637	1.00	0.50	0.70	0.07
E2, E3, E4	Rich Burn	<637	0.70	1.00	0.70	0.05

1.2 Process Description

The Roush Compressor Station will gather gas produced from oil wells and compress it to sales line pressures. Gas will feed from the field to an inlet scrubber to separate any condensed water from the gas stream. The overhead gas will be compressed and then discharged to the sales line.

All compressor scrubber liquids and hydrocarbon liquids from separation units will be routed to a three phase separator, to gravimetrically separate condensate and water. The overhead gas and condensate will be routed to the station's discharge gas line and eventually processed at another Rowdy facility that is equipped to handle liquids. All produced water that may form within the facility will be collected in an atmospheric storage tank. Vapors from the atmospheric storage tank will be vented to the atmosphere. Lubricating oil and possibly small amounts of methanol will be stored in atmospheric storage tanks on site. Storage tank emissions are considered an insignificant source of VOC and are not inventoried. A process flow diagram is presented as Figure 3.

2.0 EMISSION INVENTORY

An emission inventory for the Roush facility as proposed has been developed. Emission estimates for the engines requested are based on manufacturer and AP-42 emissions factors for criteria pollutants and HAP, respectively. Additional emission sources incorporated in the inventory include compressor blowdown, compressor cylinder rod packing vents, compressor starter gas, fugitive equipment leaks, pigging, and flare emissions.

2.1 Facility Potential to Emit (PTE)

Emissions in the PTE table (Table 2) below for the unspecified requested engines, units E2 – E4 reflect the maximum emission for each species from either a lean burn or rich burn engine. Worst-case NO_x and HCOH emissions are associated with lean burn engine selection; worst-case CO emissions result from rich burn engine selection. Potential VOC and CO_{2e} emissions are independent of rich/lean burn choice. Flare emissions include all CO_2, CO, and NO_X emissions from the combustion of the controlled emission units. The Flare is not considered a source of VOC or HAP emissions. VOC and HAP emissions are associated with the sources being controlled. VOC and HAP emissions associated with regular operation of the flare are included in flare pilot/purge gas emissions. HAP emissions are presented in Table 3.

Table 2: Roush Compressor Station Potential to Emit

ID	Source	**Rating** / *Throughput*	NOX		CO		VOC		HCOH		CO_{2e}	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
E1	Caterpillar 3408TA	**400 hp**	0.62	2.70	1.76	7.73	0.62	2.70	0.04	0.19	350	1534
E2	Lean/Rich burn <637hp	**Max. 637 hp**	1.40	6.15	1.40	6.15	0.98	4.31	0.10	0.43	716	3134
E3	Lean/Rich burn <637hp	**Max. 637 hp**	1.40	6.15	1.40	6.15	0.98	4.31	0.10	0.43	716	3134
E4	Lean/Rich burn <637hp	**Max. 637 hp**	1.40	6.15	1.40	6.15	0.98	4.31	0.10	0.43	716	3134
LP Pilot	LP Pilot and Purge Gas	*80 scf/hr*					0.24	1.05				
LP Flare	Low Pressure Flare	*0.8 MMBtu hr*	0.14	0.61	0.04	0.15			0.00	0.00	21	92
BD	Blowdowns		--	--	--	--	--	0.09	--	--	0	1
Pig	Pigging Emissions	*1 per week*	--	--	--	--	--	0.00	--	--	--	0
Fugitives	Fugitives		--	--	--	--	1.00	4.38	--	--	23	103
		Total:	5.0	**21.8**	6.0	**26.3**	4.8	**21.15**	0.3	**1.5**	2542	**11,133**

E2 - E4 Engine emissions represented are, for each species, the highest potential values for either a rich burn or lean burn engine

Table 3: Roush HAP PTE

ID	Source	Rating / Throughput	n-Hexane		2,2,4-Trimethylpentane		Benzene		Toluene		Ethylbenzene		Xylenes		HCOH		Acrolein		Acetaldehyde		HAPs	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
E1	Caterpillar 3408TA	**400 hp**	0.00	0.01	--	--	0.00	0.02	0.00	0.01	--	--	--	--	0.04	0.19	0.01	0.03	0.01	0.04	0.07	0.31
E2	Lean/Rich burn <637hp	**Max. 637 hp**	0.01	0.03	--	--	0.01	0.04	0.00	0.01	--	--	--	--	0.10	0.43	0.03	0.14	0.05	0.22	0.20	0.88
E3	Lean/Rich burn <637hp	**Max. 637 hp**	0.01	0.03	--	--	0.01	0.04	0.00	0.01	--	--	--	--	0.10	0.43	0.03	0.14	0.05	0.22	0.20	0.88
E4	Lean/Rich burn <637hp	**Max. 637 hp**	0.01	0.03	--	--	0.01	0.04	0.00	0.01	--	--	--	--	0.10	0.43	0.03	0.14	0.05	0.22	0.20	0.88
LP Pilot	LP Pilot and Purge Gas	*80 scf/hr*	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	--	--	--	--	--	--	0.00	0.01
LP Flare	Low Pressure Flare	*0.8 MMBtu/hr*																				
BD	Blowdowns		--	0.00	--	0.00	--	0.00	--	0.00	--	0.00	--	0.00	--	--	--	--	--	--	0.00	0.01
Pig	Pigging Emissions	*1 per week*	--	0.00	--	0.00	--	0.00	--	0.00	--	0.00	--	0.00	--	--	--	--	--	--	0.00	0.00
Fugitives	Fugitives		0.03	0.12	0.01	0.04	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.03	--	--	--	--	--	--	0.05	0.21
		Total:	0.05	**0.23**	0.01	**0.04**	0.04	**0.15**	0.01	**0.06**	0.00	**0.01**	0.01	**0.03**	0.34	**1.48**	0.10	**0.45**	0.16	**0.71**	0.72	**3.17**

E2 - E4 Engine emissions represented are, for each species, the highest potential values for either a rich burn or lean burn engine

2.2 Engine Emissions

Emissions for the existing Caterpillar G3408TA are based on current permit limits. Emissions for the requested rich/lean burn engine <637 hp were calculated assuming emission factors from similar engines in which the permit was issued within the last six months. The fuel usage (Btu/hp-hr) for the proposed lean/rich burn engine was conservatively estimated to be 9,600 Btu/hp-hr. Emission factors and calculated emissions for the engines are presented in Table 4 (Caterpillar G3408TA), Table 5 (rich burn), and Table 6 (lean burn).

Table 4: E1 – Caterpillar G3408TA

Basis

Source ID	E1	Engine rating	400 BHP
Source Description	4-Stroke Rich Burn	Fuel HHV	1488 Btu/scf
Engine Make	Caterpillar	Heat Rate	3.0 MMBtu/hr
Engine Model	G3408TA	Engine Heat Rate	7485 Btu/hp-hr
Serial Number	6NB01811	Hours of Operation	8760 hr/year
Manufacture Date	8/10/1998	Potential Fuel Usage	2012 scf/hr
Emission Controls	AFRC/NSCR Catalyst		17.6 MMscf/yr

PTE Emissions

Species	Emission Factor		Estimated Emissions		Source of emission Factor
	lb/MMBtu	g/hp-hr	lb/hr	ton/yr	
NOx	0.206	0.700	0.62	2.70	WDEQ BACT
CO	0.589	2.000	1.76	7.73	WDEQ BACT
VOC	0.206	0.700	0.62	2.70	WDEQ BACT
SOx	0.001	0.002	0.00	0.01	AP 42 Table 3.2-3
PM_{10}[1]	0.019	0.066	0.06	0.25	AP 42 Table 3.2-3
$PM_{2.5}$[1]	0.019	0.066	0.06	0.25	AP 42 Table 3.2-3
HCOH	0.015	0.050	0.04	0.19	WDEQ BACT
n-Hexane	0.001	0.004	0.00	0.01	AP 42 Table 3.2-2
Benzene	0.002	0.005	0.00	0.02	AP 42 Table 3.2-3
Toluene	0.001	0.002	0.00	0.01	AP 42 Table 3.2-3
Acrolein	0.003	0.009	0.01	0.03	AP 42 Table 3.2-3
Acetaldehyde	0.003	0.009	0.01	0.04	AP 42 Table 3.2-3

Green House Gas Emissions

Species	Emission Factor		Estimated Emissions		Source of emission Factor
	Kg/MMBtu	g/hp-hr	lb/hr	ton/yr	
CO_2	53.02	396.9	349.97	1532.85	40 CFR Part 98, Subpart C Tables C-1 & C-2
CH_4	0.001	0.007	0.01	0.03	
N_2O	0.0001	0.0007	0.001	0.003	
CO_2e	--	--	350.33	1534.43	

[1] PM_{10} and $PM_{2.5}$ emission factors include PM condensible emission factor (PM_{10} EF + PM_{cond} EF = presented EF)

Table 5: E2-E4 – Rich Burn Emissions

Basis

Source ID	E2 - E4	Engine rating	637 BHP
Source Description	4-Stroke Rich Burn	Fuel HHV	1488 Btu/scf
Engine Make	TBD flex	Heat Rate	6.1 MMBtu/hr
Engine Model	flex	Engine Heat Rate	9600 Btu/hp-hr
Serial Number	TBD	Hours of Operation	8760 hr/year
Manufacture Date	TBD	Potential Fuel Usage	4110 scf/hr
Emission Controls	AFRC/NSCR Catalyst		36.0 MMscf/yr

PTE Emissions

Species	Emission Factor		Estimated Emissions		Source of emission Factor
	lb/MMBtu	g/hp-hr	lb/hr	ton/yr	
NOx	0.161	0.700	0.98	4.31	WDEQ BACT
CO	0.230	1.000	1.40	6.15	WDEQ BACT
VOC	0.161	0.700	0.98	4.31	WDEQ BACT
SOx	0.001	0.003	0.00	0.02	AP 42 Table 3.2-3
PM_{10}[1]	0.019	0.085	0.12	0.52	AP 42 Table 3.2-3
$PM_{2.5}$[1]	0.019	0.085	0.12	0.52	AP 42 Table 3.2-3
HCOH	0.011	0.050	0.07	0.31	WDEQ BACT
n-Hexane	0.001	0.005	0.01	0.03	AP 42 Table 3.2-2
Benzene	0.002	0.007	0.01	0.04	AP 42 Table 3.2-3
Toluene	0.001	0.002	0.00	0.01	AP 42 Table 3.2-3
Acrolein	0.003	0.011	0.02	0.07	AP 42 Table 3.2-3
Acetaldehyde	0.003	0.012	0.02	0.07	AP 42 Table 3.2-3

Green House Gas Emissions

Species	Emission Factor		Estimated Emissions		Source of emission Factor
	Kg/MMBtu	g/hp-hr	lb/hr	ton/yr	
CO_2	53.02	509.0	714.80	3130.82	40 CFR Part 98, Subpart C Tables C-1 & C-2
CH_4	0.001	0.010	0.01	0.06	
N_2O	0.0001	0.0010	0.001	0.006	
CO_2e	--	--	715.54	3134.06	

[1] PM_{10} and $PM_{2.5}$ emission factors include PM condensible emission factor (PM_{10} EF + PM_{cond} EF = presented EF)

Table 6: E2-E4 – Lean Burn Emissions

Basis			
Source ID	E2 - E4	Engine rating	637 BHP
Source Description	4-Stroke Lean Burn	Fuel HHV	1488 Btu/scf
Engine Make	TBD flex	Heat Rate	6.1 MMBtu/hr
Engine Model	flex	Engine Heat Rate	9600 Btu/hp-hr
Serial Number	TBD	Hours of Operation	8760 hr/year
Manufacture Date	TBD	Potential Fuel Usage	4110 scf/hr
Emission Controls	Oxidation Catalyst		36.0 MMscf/yr

PTE Emissions

Species	Emission Factor		Estimated Emissions		Source of emission Factor
	lb/MMBtu	g/hp-hr	lb/hr	ton/yr	
NOx	0.230	1.000	1.40	6.15	WDEQ BACT
CO	0.115	0.500	0.70	3.08	WDEQ BACT
VOC	0.161	0.700	0.98	4.31	WDEQ BACT
SOx	0.001	0.003	0.00	0.02	AP 42 Table 3.2-2
PM_{10}[1]	0.010	0.043	0.06	0.27	AP 42 Table 3.2-2
$PM_{2.5}$[1]	0.010	0.043	0.06	0.27	AP 42 Table 3.2-2
HCOH	0.016	0.070	0.10	0.43	WDEQ BACT
n-Hexane	0.001	0.005	0.01	0.03	AP 42 Table 3.2-2
Benzene	0.000	0.002	0.00	0.01	AP 42 Table 3.2-2
Toluene	0.000	0.002	0.00	0.01	AP 42 Table 3.2-2
Acrolein	0.005	0.022	0.03	0.14	AP 42 Table 3.2-2
Acetaldehyde	0.008	0.036	0.05	0.22	AP 42 Table 3.2-2

Green House Gas Emissions

Species	Emission Factor		Estimated Emissions		Source of emission Factor
	Kg/MMBtu	g/hp-hr	lb/hr	ton/yr	
CO_2	53.02	509.0	714.80	3130.82	40 CFR Part 98, Subpart C Tables C-1 & C-2
CH_4	0.001	0.010	0.01	0.06	
N_2O	0.0001	0.0010	0.001	0.006	
CO_2e	--	--	715.54	3134.06	

[1] PM_{10} and $PM_{2.5}$ emission factors include PM condensible emission factor (PM_{10} EF + PM_{cond} EF = presented EF)

2.3 Flare

One flare with low pressure feed line will be used for control blowdown emissions and other miscellaneous facility emission sources. A destruction efficiency of 98 percent has been assumed for the flare. Pilot fuel and purge gas is assumed to be supplied at a total energy rate of 1 MMBtu/hr. Flare input stream composition calculations used to calculate greenhouse gas emissions are in Table 7 below. Greenhouse gas emissions are presented in Table 8. Flare modeling parameters were calculated using 1 MMBtu/hr energy rate to calculate NO_X, CO, and

Formaldehyde emissions, and emission estimates are presented in Table 9. All VOC emissions from the flare are inventoried with the equipment from which they are emitted. All GHG emissions from controlled sources are attributed to the flare.

Table 7: Flare Stream Composition

Component	MW	Reactive carbons (Per Mole)	Btu/scf LHV	Blowdown Gas flared	Pigging Gas Flared	Pilot Fuel	Purge	Average composition
Carbon Dioxide	44.0	0	0.0	1.569	1.569	1.569	1.569	1.569
Nitrogen	28.0	0	0.0	1.697	1.697	1.697	1.697	1.697
Methane	16.0	1	911.0	67.051	67.051	67.051	67.051	67.051
Ethane	30.1	2	1631.0	9.758	9.758	9.758	9.758	9.758
Propane	44.1	3	2353.0	10.161	10.161	10.161	10.161	10.161
i-Butane	58.1	4	3094.0	1.304	1.304	1.304	1.304	1.304
n-Butane	58.1	4	3101.0	3.975	3.975	3.975	3.975	3.975
i-Pentane	72.2	5	3698.0	1.021	1.021	1.021	1.021	1.021
n-Pentane	72.2	5	3709.0	1.085	1.085	1.085	1.085	1.085
Cyclopentane	70.1	5	3512.1	0.056	0.056	0.056	0.056	0.056
n-Hexane	86.2	6	4403.8	0.363	0.363	0.363	0.363	0.363
Cyclohexane	84.2	6	4179.7	0.175	0.175	0.175	0.175	0.175
Other Hexanes	86.2	6	5096.0	0.504	0.504	0.504	0.504	0.504
Heptane	100.2	7	5100.0	0.742	0.742	0.742	0.742	0.742
Methylcyclohexane	98.2	7	4863.6	0.171	0.171	0.171	0.171	0.171
2,2,4-Trimethylpentane	114.2	8	6231.6	0.085	0.085	0.085	0.085	0.085
Benzene	78.1	6	3590.9	0.019	0.019	0.019	0.019	0.019
Toluene	92.1	7	4273.6	0.031	0.031	0.031	0.031	0.031
Ethylbenzene	106.2	8	4970.5	0.014	0.014	0.014	0.014	0.014
Xylenes	106.2	8	4958.2	0.067	0.067	0.067	0.067	0.067
Octane	114.2	8	5796.1	0.152	0.152	0.152	0.152	0.152
Water	18.0	0	0.0	0.000	0.000	0.000	0.000	0.000
		Total:		100.0	100.000	100.0	100.0	100.0
Flare Efficiency	Feed Rate		scf/hr	23.01	1.089	40.00	40.00	104.10
98%	Average MW		lb/lbmole	26.17	26.170	26.17	26.17	26.17
Average Carbons/mole	Heat Content		Btu/scf	1367.93	1367.927	1367.93	1367.93	1367.93
1.64	Energy Rate		MMBtu/hr	0.03	0.031	0.05	0.05	**0.14**

Table 8: Flare GHG Emissions

Non-Combusted Emissions

Component	lb/hr	tpy
CO_2	0.188	0.822
CH_4	0.058	0.256

Combusted Emissions

Component	lb/hr	tpy
CO_2	19.279	84.442
N_2O	0.00003	0.0001

*N_2O EF based on GHG Reporting Rule equation W-40

Total Emissions

Component	lb/hr	tpy
CO_2	19.467	85.264
N_2O	0.000	0.000
CH_4	0.058	0.256
CO_2e	20.938	91.707

Table 9: Flare Modeling Emission Factors

WY State EF	EF	Units	g/s	lb/hr	tpy
NOx	0.14	lb/MMBtu	0.0176	0.1400	0.6132
CO	0.035	lb/MMBtu	0.0044	0.0350	0.1533
Form	0.075	lb/10^6 scf	0.00000635	0.0001	0.0002

2.4 Compressors

Compressors have multiple sources of VOC emissions. These sources include compressor blowdown and starter gas. Compressors at the facility are used for primary compression of natural gas. All are screw compressors that are not anticipated to have rod vent packing leaks.

2.4.1 Blowdowns

Blowdowns for each of the compressors is anticipated to occur once a month. The blowdown volume for each of the engine driven compressors was calculated based on P&ID diagrams for an Ariel JGE4-2 Attachment D includes the information used to calculate the volume 4.2 Mscf/event) used. The Roush Compressor Station will send all blowdowns to the flare for thermal destruction. Blowdown emissions from each of the engine driven compressors assume 98% control by the flare. Table 10 summarizes the estimated emissions resulting from the anticipated compressor blowdowns.

Table 10: Compressor Blowdown Emissions Estimates

Basis		
Ariel JGE4-2 P&IDs were used for Volume Estimate		
Blowdown Volume	4.2	Mscf/event/comp
Number Compressors	4	
Blowdowns for base loaded	12	per year
Total Vent Volume	201.60	Mscf/year

Emissions Estimate

Component	Mole %	MW	Uncontrolled	Controlled
			tpy	tpy
VOC	30.250	56.782	4.568	0.091
CO_2	1.294	44.000	0.151	0.151
CH_4	54.941	16.000	2.338	0.047
2,2,4-Trimethylpentane	0.213	114.230	0.065	0.001
Benzene	0.026	78.110	0.005	0.000
Toluene	0.050	92.140	0.012	0.000
Ethylbenzene	0.026	106.170	0.007	0.000
Xylenes	0.125	106.170	0.035	0.001
n-Hexane	0.721	86.170	0.165	0.003
CO_2e			58.60	1.32
Controll Efficiency	98%			

2.5 Pigging Activities

The Roush Compressor Station will have one pig receiver and one pig launcher that are each estimated to receive/launch one pig per week. Liquids from the pigging units will be routed to the facility's discharge line while vapors will be controlled by the flare. The pig receiver and launcher will be up to 10 inches in diameter with a 20 foot length. The inlet temperature and pressure were assumed to be 50 degrees Fahrenheit and 5 psig, respectively. The outlet temperature and pressure were assumed to be 70 degrees Fahrenheit and 100 psig, respectively. These pressures, which are at the maximum of pressure range anticipated, were used to estimate a conservatively high amount of emissions from these sources. Emissions associated with pigging are summarized in Table 11.

Table 11: Pigging Emissions

Pigging Activities Launchers

Number of pig launchers	1.0
Frequency of Pigging	52.0 a year

Dimensions of Launchers

Diameter	10.0 inches
Length	20.0 ft
Gas Constant	10.7 ft^3 psi/R-lbmole
Station Exit pressure (Max)	112.2 psia
Station Exit Temperature	70.0 F
Standard pressure	14.7 psi
Standard Temperature	60.0 F
Initial Volume	10.9 cf
Standard Volume	81.7 scf
Total Vented Volume	0.004 MMscf

Uncontrolled Emissions Estimate

Component	MW	Mole%	tpy
VOC	56.8	56.782	0.181
CO_2	44.0	1.294	0.003
Methane	16.0	54.941	0.049
2,2,4-Trimethylpentane	114.2	0.213	0.001
Benzene	78.1	0.026	0.000
Toluene	92.1	0.050	0.000
Ethylbenzene	106.2	0.026	0.000
Xylenes	106.2	0.125	0.001
n-Hexane	86.2	0.721	0.003

Pigging Activities Receivers

Number of pig receivers	1.0
Frequency of Pigging	52.0 a year

Dimensions of Receivers

Diameter	10.0 inches
Length	20.0 ft
Gas Constant	10.7 ft^3 psi/R-lbmole
Station Inlet pressure (Max)	17.2 psia
Station Inlet Temperature	50.0 F
Standard pressure	14.7 psi
Standard Temperature	60.0 F
Initial Volume	10.9 cf
Standard Volume	13.0 scf
Total Vented Volume	0.001 MMscf

Uncontrolled Emissions Estimate

Component	MW	Mole%	tpy
VOC	56.8	56.782	0.029
CO_2	44.0	1.294	0.001
Methane	16.0	54.941	0.008
2,2,4-Trimethylpentane	114.2	0.213	0.000
Benzene	78.1	0.026	0.000
Toluene	92.1	0.050	0.000
Ethylbenzene	106.2	0.026	0.000
Xylenes	106.2	0.125	0.000
n-Hexane	86.2	0.721	0.001

Total Emissions Pigging Activities

Component	Uncontrolled tpy	Controlled tpy
VOC	0.21	0.00
CO_2	0.00	0.00
Methane	0.06	0.00
2,2,4-Trimethylpentane	0.00	0.00
Benzene	0.00	0.00
Toluene	0.00	0.00
Ethylbenzene	0.00	0.00
Xylenes	0.00	0.00
n-Hexane	0.00	0.00

2.6 Facility Fugitives

Engine and compressor component counts are based on a set of P&IDs for a Caterpillar 3516 LE driving an Ariel compressor. Other Equipment counts are based on actual counts for similar units at other locations. The total number of components listed by service can be seen in Table 12.

Table 12: Roush Estimated Fugitive Component Count

Unit	Component	Counts				Source	Quantity	Notes
		Gas	Heavy Liquid	Light Liquid Condensate	Water/ Ethlyene Glycol			
Ariel JGE4-2	Valves	18	6	0	8	Unit 410217 Compressor	4	Water/EG counts for engine and compressor are shared only the count for the engine is totaled
	pump seals	0	2	0	2			
	others	0	1	0	0			
	Connectors	80	60	0	125			
	Flanges	20	0	0	6			
	Open ended lines	3	0	0	0			
Compressor Engine	Valves	18	4	0	8	Unit 410217 Engine	4	
	pump seals	0	1	0	2			
	others	0	0	0	0			
	Connectors	78	20	0	125			
	Flanges	9	0	0	6			
	Open ended lines	2	0	0	0			
Meters/ Piping	Valves	14	0	0	0		2	
	pump seals	0	0	0	0			
	others	1	0	0	0			
	Connectors	51	0	0	0			
	Flanges	11	0	0	0			
	Open ended lines	1	0	0	0			
Total components by service	Valves	172	40	0	64	Total components by service		
	pump seals	0	12	0	16			
	others	2	4	0	0			
	Connectors	734	320	0	1000			
	Flanges	138	0	0	48			
	Open ended lines	22	0	0	0			

The total number of components in each service was multiplied by the kilogram per hour emission factors obtained from, EPA -453/R-95-017: Protocol for Equipment Leak Emissions Estimates Table 2-4 to find the total mass emitted from each component by service. A summary of the total mass emissions are presented in Table 13.

Table 13: Total Mass Emissions by Service

Service	Component	Emission Factor kg/hr/each*	Count	lb/hr Emitted	tpy Emitted
Gas	Valves	4.50E-03	172	1.703	7.458
	Pump Seals	2.40E-03	0	0.000	0.000
	Others	8.80E-03	2	0.039	0.170
	Connectors	2.00E-04	734	0.323	1.415
	Flanges	3.90E-04	138	0.118	0.519
	Open Ended Pipes	2.00E-03	22	0.097	0.424
Total Gas				2.280	**9.985**
Heavy Liquid	Valves	8.40E-06	40	0.001	0.003
	Pump Seals	0.00E+00	12	0.000	0.000
	Others	3.20E-05	4	0.000	0.001
	Connectors	7.50E-06	320	0.005	0.023
	Flanges	3.90E-07	0	0.000	0.000
	Open Ended Pipes	1.40E-04	0	0.000	0.000
Total Heavy Liquid				0.006	**0.028**
Light Liquid Condensate/NGL	Valves	2.50E-03	0	0.000	0.000
	Pump Seals	1.30E-02	0	0.000	0.000
	Others	7.50E-03	0	0.000	0.000
	Connectors	2.10E-04	0	0.000	0.000
	Flanges	1.10E-04	0	0.000	0.000
	Open Ended Pipes	1.40E-03	0	0.000	0.000
Total Light Liquid				0.000	**0.000**
Water/Ethylene Glycol	Valves	8.40E-06	64	0.001	0.005
	Pump Seals	0.00E+00	16	0.000	0.000
	Others	3.20E-05	0	0.000	0.000
	Connectors	7.50E-06	1000	0.017	0.072
	Flanges	3.90E-07	48	0.000	0.000
	Open Ended Pipes	1.40E-04	0	0.000	0.000
Total water/EG				0.018	**0.078**

* Emission Factors obtained from EPA-453/R-95-017: 1995 Protocol for Equipmnet Leak Emissions Estimates Table 2-4: Oil and Gas Operations Average Emission Factors

Once total mass emissions were calculated the average composition of each stream (service) was used to determine the emissions based on species. Compositions based on weight percent are presented in Table 14 and a summary of emissions is presented in Table 15. The example equation below outlines the calculations made.

$$\frac{lb}{hr} Species = \#Components * Emission\ Factor \frac{kg}{hr} * 2.2 \frac{lb}{kg} * Weight\ \%\ Species * \frac{1}{100}$$

Table 14: Fugitive Service Composition

Component	Service		
	Gas	Heavy Liquid	Water/ Ethlyene Glycol
	Weight%	Weight%	Weight%
Carbon Dioxide	2.64	0.00	0.00
Nitrogen	1.82	0.00	0.00
Methane	41.10	0.00	0.00
Ethane	11.21	0.00	0.00
Propane	17.12	0.00	0.00
Isobutane	2.90	0.00	0.00
n-Butane	8.83	0.00	0.00
Isopentane	2.81	0.00	0.00
n-Pentane	2.99	0.00	0.00
Cyclopentane	0.15	0.00	0.00
n-Hexane	1.20	0.00	0.00
Cyclohexane	0.56	0.00	0.00
Other Hexanes	1.66	0.00	0.00
Heptanes	2.84	0.00	0.00
Methylcyclohexane	0.64	0.00	0.00
2,2,4-Trimethylpentane	0.37	0.00	0.00
Benzene	0.06	0.00	0.00
Toluene	0.11	0.00	0.00
Ethylbenzene	0.06	0.00	0.00
Xylenes	0.27	0.00	0.00
C8+	0.66	100.00	0.00
Water	0.00	0.00	50.00
Triethylene Glycol	0.00	0.00	0.00
Ethylene Glycol	0.00	0.00	50.00
Total	100	100	100
VOC wt%	43.23	100.00	50.00

Table 15: Fugitive Emission Summary

Component	(lb/hr)	(tpy)
VOC	1.00	4.38
CO_2	0.06	0.26
CH_4	0.94	4.10
CO_2e	23.49	102.87
Benzene	0.0013	0.006
Toluene	0.002	0.011
Ethylbenzene	0.001	0.006
Xylenes	0.006	0.027
n-hexane	0.027	0.119
2,2,4 TMP	0.008	0.037

2.7 Insignificant Emission Sources

After modeling anticipated water stream compositions using ProMax, it was predicted that the water purity will be in excess of 99.9 percent. The water tanks at the facility are, therefore, expected to have negligible emissions. ProMax output can be reviewed in Attachment C.

2.8 Station Inlet Composition

An extended analysis from a nearby wellsite is considered to be representative of the gas that will be entering the Roush Compressor Station. This composition is presented in Table 16 below and the analysis has been included as Attachment E. This gas composition was used in the attached ProMax model and to calculate the emissions from all sources that can potentially vent gas sharing the inlet composition to the atmosphere (packing vents, blow down, purge gas).

Table 16: Representative Inlet Composition

Input Gas

Source: CE Low Pressure Gas Analysis (10/7/2014)

Species	MW	Vol%	WT%	Mole%
Carbon Dioxide	44.0	1.29	2.639	1.57
Nitrogen	28.0	0.90	1.817	1.70
Methane	16.0	54.94	41.103	67.05
Ethane	30.1	12.61	11.212	9.76
Propane	44.1	13.53	17.121	10.16
Isobutane	58.1	2.06	2.896	1.30
n-Butane	58.1	6.06	8.828	3.98
Isopentane	72.2	1.80	2.815	1.02
n-Pentane	72.2	1.90	2.991	1.09
Cyclopentane	70.1	0.08	0.150	0.06
n-Hexane	86.2	0.72	1.195	0.36
Cyclohexane	84.2	0.29	0.563	0.18
Other Hexanes	86.2	1.00	1.660	0.50
Heptanes	100.2	1.65	2.841	0.74
Methylcyclohexane	98.2	0.33	0.642	0.17
2,2,4-Trimethylpentane	114.2	0.21	0.371	0.09
Benzene	78.1	0.03	0.057	0.02
Toluene	92.1	0.05	0.109	0.03
Ethylbenzene	106.2	0.03	0.057	0.01
Xylenes	106.2	0.13	0.272	0.07
C8+	114.2	0.38	0.663	0.15
Total		100.00	100.00	100.00
VOC %		30.25	43.23	19.93
HAPs		1.16	2.06	0.58
Average VOC MW	56.78	lb/lbmole		

3.0 AMBIENT IMPACT ANALYSIS

An air dispersion modeling analysis was performed to demonstrate compliance with the NO_2 ambient air quality standard and the NO_2 ambient air increment. A formaldehyde modeling analysis was also performed for this facility per the State of Wyoming Modeling Protocol. Each of the engines will be located in individual buildings. The EPA BPIP Prime program was utilized to determine the appropriate direction-specific building downwash parameters to use for each source. BPIP input and output files have been included on the enclosed compact disc. Modeling stack parameters for the facility are summarized in Table 17. All modeling coordinate input was in NAD 83.

Table 17: Exhaust Stack Modeling Parameters

ID	Source Strength (g/s)		Stack Height (m)	Temp. (K)	Velocity (m/s)	Diam. (m)	UTMH (m)	UTMV (m)	Elev. (m)
	NO_2	CH_2O							
E1	0.0778	0.0056	6.7056	811	15.424	0.2023	441875.881	441875.881	1562.4
E2	0.1769	0.0124	6.7056	706	25.670	0.2540	441888.815	4841129.007	1562.4
E3	0.1769	0.0124	6.7056	706	25.670	0.2540	441864.468	4841130.334	1562.4
E4	0.1769	0.0124	6.7056	706	25.670	0.2540	441852.294	4841130.998	1562.4
Flare	0.0176	0.00000635	3.048	1273	20	0.9513	441845.537	4841159.057	1562.4

3.1 Meteorology

The Campbell County meteorological data set provided by WDEQ was utilized to conduct the ambient impact analyses. AERMET surface boundary layer parameters are contained in the file CAMP*XX.sfc*, and wind profile data are contained in the file *CAMPXX.pfl*, where XX represents the year.

3.2 Modeling Receptors

Receptor elevation information was derived from USGS National Elevation Dataset maps (NED). A 400-square kilometer modeling domain was established for this project. The USGS NED files used contain elevation data by UTM coordinate on a 10-meter interval. All UTM coordinates utilized herein are based on the NAD 83 Zone 13 UTM projection. Discrete modeling receptors were defined on a 25-meter interval in the first 100 meters surrounding the facility and on the facility limit of public access. Receptors were then defined on a 100-meter interval out to 1,000 meters and a 500-meter interval out to 5 kilometers. Receptors were defined on a 1,000-meter interval for the remainder of the modeling domain. The receptor coordinates and the DEM files were processed through AERMAP to create a receptor data file suitable for use as input to the AERMOD model.

3.3 Nearby Sources

Existing source information was provided by WDEQ. Existing sources located within 10 kilometers of the proposed facility were included in the modeling analysis, as specified by WDEQ policy. This data included base elevations for existing facilities that were valued at 0 meters. This data was corrected using AERMAP to input specified stack locations and obtain the missing elevations for nearby sources located within the established project domain.

3.4 Modeling Results

Model input and output files are included on the enclosed compact disc. Model input files were developed with a single source group (ALL), which includes the subject facility and nearby sources, and a source group for the subject facility (FAC). All NO_2 modeling results were adjusted by a factor of 0.75 to account for partial conversion of NO to NO_2 as set forth by the ambient ratio method (ARM) and then a background concentration of 13.2 $\mu g/m^3$ was incorporated.

The maximum ambient air NO_2 concentration within the facility's limit of significant impact (including background concentration) was predicted to be 23.977 $\mu g/m^3$. This value demonstrates compliance with the NO_2 ambient air increment of 25 $\mu g/m^3$. The facility radius of significant impact was determined to be 0.413 kilometers. The ten highest NO_2 concentrations modeled within the facility's limit of significant impact are presented in Table 18. The NO_2 concentration isopleth is presented as Figure 3.

Table 18: Maximum Predicted NO_2 Ambient Air Increment Consumption

Rank	Year	UTM (E)	UTM (N)	Concentration $\mu g/m^3$	
				Total	Facility Contribution
1	2005	441900	4841075	23.977	9.445
2	2008	441900	4841075	23.870	9.415
3	2005	441900	4841100	23.677	9.142
4	2011	441900	4841107	23.318	8.897
5	2010	441900	4841075	23.298	8.708
6	2008	441900	4841100	23.260	8.796
7	2010	441900	4841100	23.007	8.411
8	2005	441900	4841107	22.859	8.324
9	2005	441925	4841075	22.854	8.295
10	2011	441900	4841100	22.724	8.306

The ten highest formaldehyde concentrations modeled are presented in Table 19. The formaldehyde concentration isopleth is presented in Figure 4. The facility radius of impact for ambient air at a concentration above the 1-in-1-million formaldehyde excess risk concentration is approximately 0.552 kilometers. This excess risk concentration is calculated using a unit risk factor of 1.3×10^{-5} per $\mu g/m^3$ published by EPA. The unit risk factor has been derived to quantify the number of people that could contract cancer per million people in an average population. Taking into account the anticipated 20 year project life, as specified by WDEQ

Modeling Protocol, the 1-in-1-million formaldehyde excess risk concentration radius for the project is approximately 184.7 meters. It is unlikely that the public would experience risk levels greater than one in one million because of the remoteness of the Roush Compressor Station. There is no WAAQS set forth by Wyoming air quality regulations for formaldehyde. The formaldehyde modeling provided in this analysis was for informational purposes only.

Table 19: Maximum Predicted Annual Formaldehyde Impacts

Rank	Year	UTM (E)	UTM (N)	Concentration µg/m^3		1 – in – 1 Million Excess Risk	
				Total	Facility Contribution	EPA 70 year Project	20 year Project
1	2005	441900	4841075	0.980	0.886	12.740	3.640
2	2008	441900	4841075	0.971	0.883	12.628	3.608
3	2005	441900	4841100	0.952	0.858	12.381	3.537
4	2011	441900	4841107	0.923	0.835	11.998	3.428
5	2010	441900	4841075	0.916	0.816	11.909	3.403
6	2008	441900	4841100	0.915	0.826	11.895	3.398
7	2010	441900	4841100	0.890	0.789	11.565	3.304
8	2005	441900	4841107	0.876	0.782	11.394	3.256
9	2005	441925	4841075	0.874	0.778	11.365	3.247
10	2011	441900	4841100	0.867	0.779	11.273	3.221

A compact disc containing all modeling files is included with this report.

4.0 REGULATORY APPLICABILITY

The following table summarizes the results of the regulatory analysis performed on the Roush Compressor Station. Detailed explanations are below.

Table 20: Regulatory Analysis Summary

NESHAP	APPLICABLE?	BRIEF EXPLANATION
HH	NO	No dehydration units
ZZZZ	TBD	Engines TBD
NSPS	**APPLICABLE?**	**BRIEF EXPLANATION**
Db/Dc	NO	No heaters meeting definition of an affected facility
Kb	NO	No tanks at facility with capacity greater than 75 m^3
GG	NO	No turbines
KKK	NO	Facility does not meet the definition of a natural gas processing plant
LLL	NO	
IIII	NO	No diesel-powered engines will be used on site
JJJJ	TBD	Engines TBD
KKKK	NO	No turbines
OOOO	See Below	Subpart may apply to pneumatic devices
GHG REPORTING SUBPART	**APPLICABLE?**	**BRIEF EXPLANATION**
C	NO	Facility PTE does not exceed 25,000 metric tpy reporting threshold
W	NO	Facility PTE does not exceed 25,000 metric tpy reporting threshold, and facility is not considered a processing facility under Subpart W

4.10 NESHAP HH

The facility does not include any dehydration units on site; therefore, there are no applicable requirements for the facility under NESHAP HH.

4.11 NSPS Db & Dc

The facility does not have any steam generated units rated at greater than or equal to 10 MMBtu/hr [§60.40c(a)].

4.12 NSPS Kb

The facility will not have a tank greater than or equal to 75 cubic meters that will be used to store volatile organic liquids with a designed operating pressure of less than 204.9 kPa [§60.110b(a) and (b)(2)]. Therefore, facility tanks are exempt from the requirements of NSPS Kb.

4.13 NSPS KKK

The facility does not meet the definition of a natural gas processing plant under §60.631 [§60.630(a)(1)].

4.14 NSPS LLL

The facility does not meet the definition of a natural gas processing plant [§60.640(c)].

4.15 NSPS OOOO

Natural gas-driven, continuous-bleed pneumatic devices installed at the facility after August 23, 2011 will be subject to the 6 scfh leak limit set forth in §60.5390(c)(1) unless exemption from the requirement can be demonstrated as outlined in §60.5390(a). The corresponding tagging, recordkeeping, and reporting requirements set forth in §§60.5390(c)(2), 60.5390(d), 60.5390(e), and 60.5390(f) will also apply. The Roush Compressor Station has no tanks that emit greater than 6 tpy of VOC to the atmosphere as set forth by §60.5395(a).

The requested compressors at the Roush Compressor Station are screw compressors and, therefore, exempt from the requirements for reciprocating compressors under NSPS OOOO [§60.5365(b) & (c)]. Since the facility does not include any processing or fractionation of NGLs, there are no equipment leak monitoring requirements under NSPS OOOO [§60.5365(f)(2)]. There is no other equipment located at the Roush Compressor Station that would be subject to the Rule.

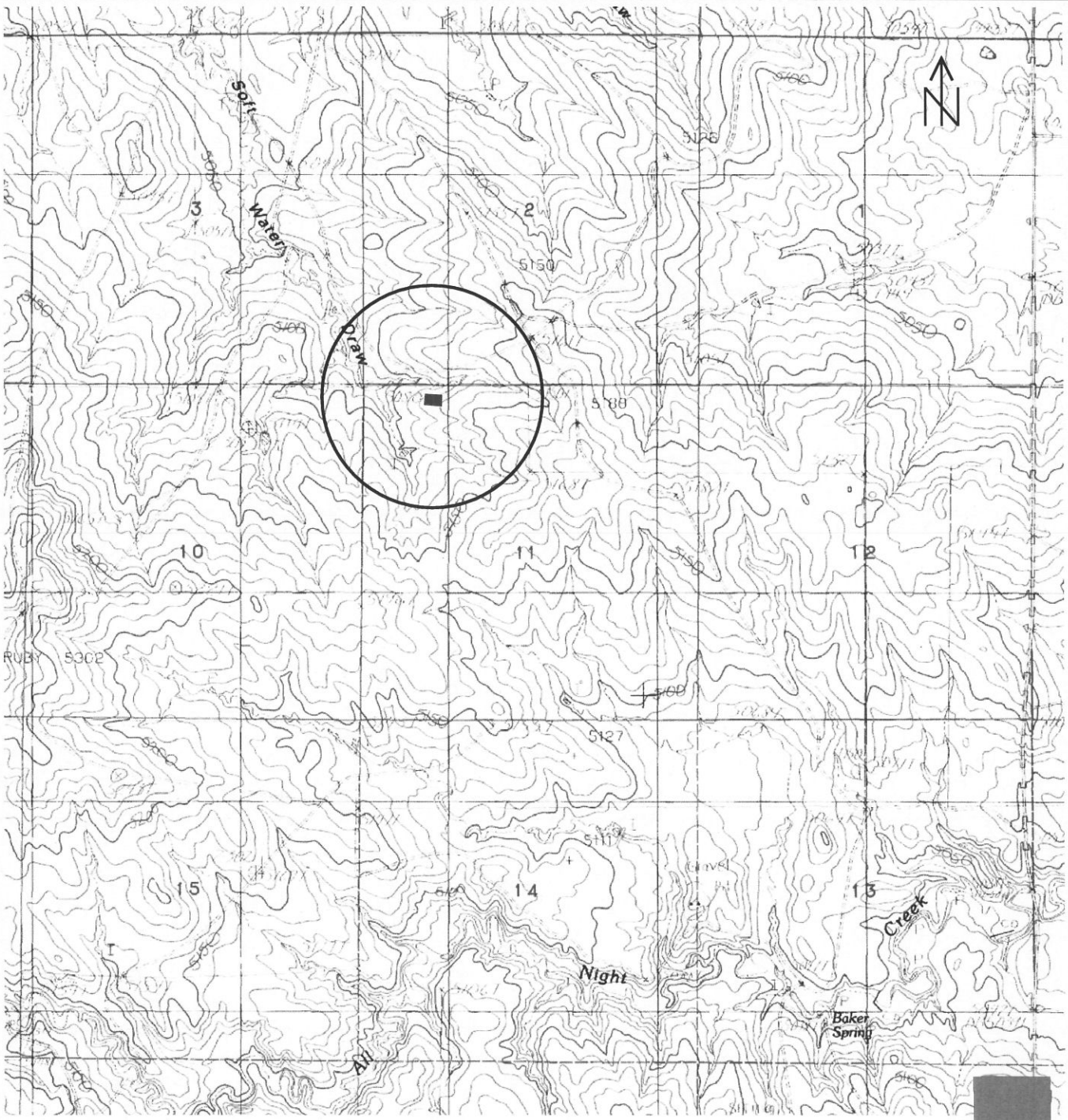
4.16 Mandatory Greenhouse Gas Reporting (40 CFR 98 Subparts C & W)

The Roush Compressor Station does not emit greater than 25,000 metric tons per year of CO_2e and does, therefore, does not exceed the reporting threshold. The Station does not operate an amine unit or engage in CO_2 removal; therefore, it is not considered a processing facility under subpart W. Roush is subject to neither Subpart C nor Subpart W.

4.17 NESHAP ZZZZ & NSPS JJJJ

The applicability of NESHAP ZZZZ and NSPS JJJJ will be determined when specific engines are identified for the facility. Applicability determinations will be made prior to installation.

Attachment A
Figures



USGS 7.5-minute Quadrangle:
Baker Spring

General Vicinity
Campbell County, WY

Compliance Partners, Inc.
4038 Timberline Rd., Suite 100
Fort Collins, CO 80525 (970) 206-4443
www.compliance-partners.com

ROWDY PIPELINE, L.L.C.

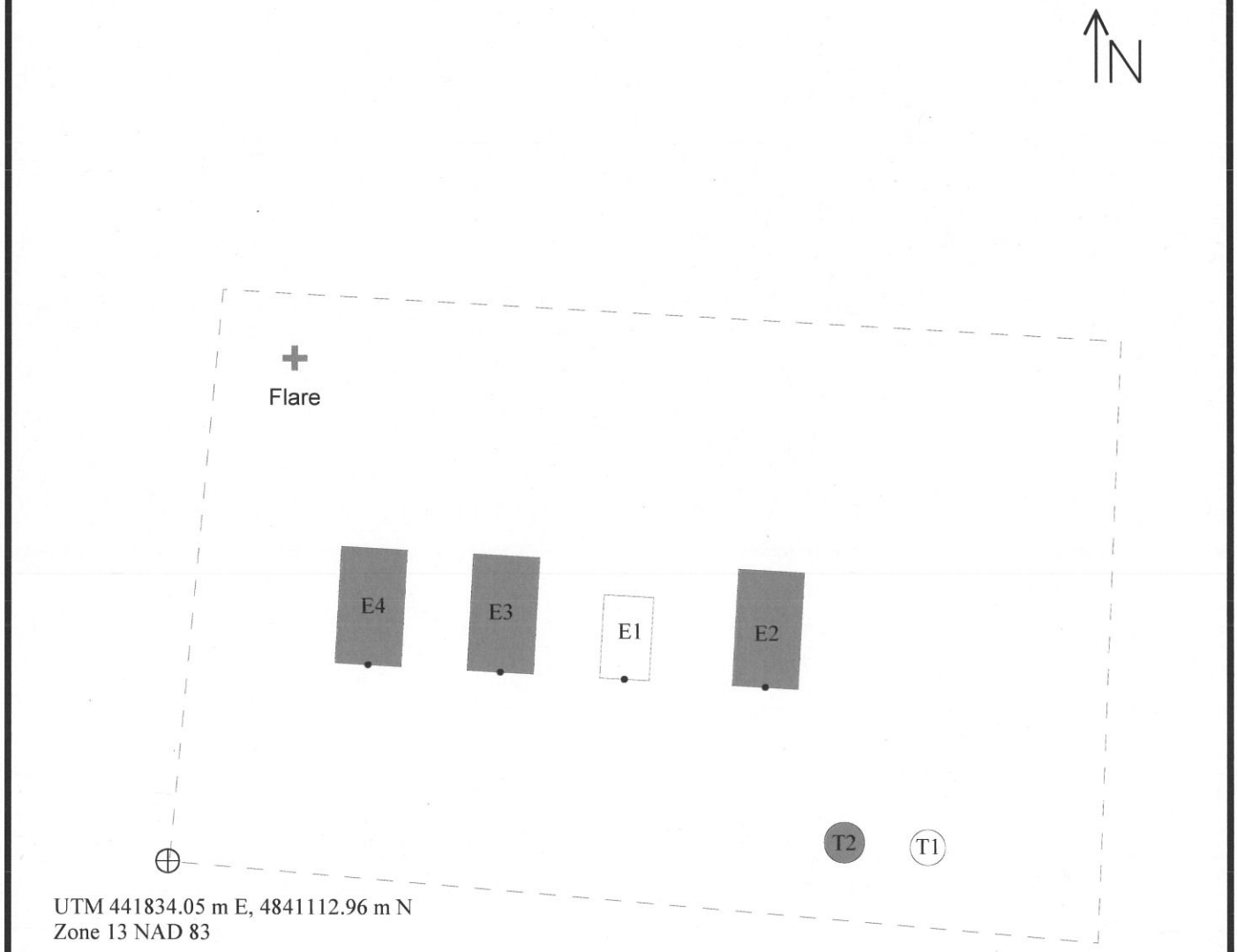
Roush Compressor Station

General Location Map

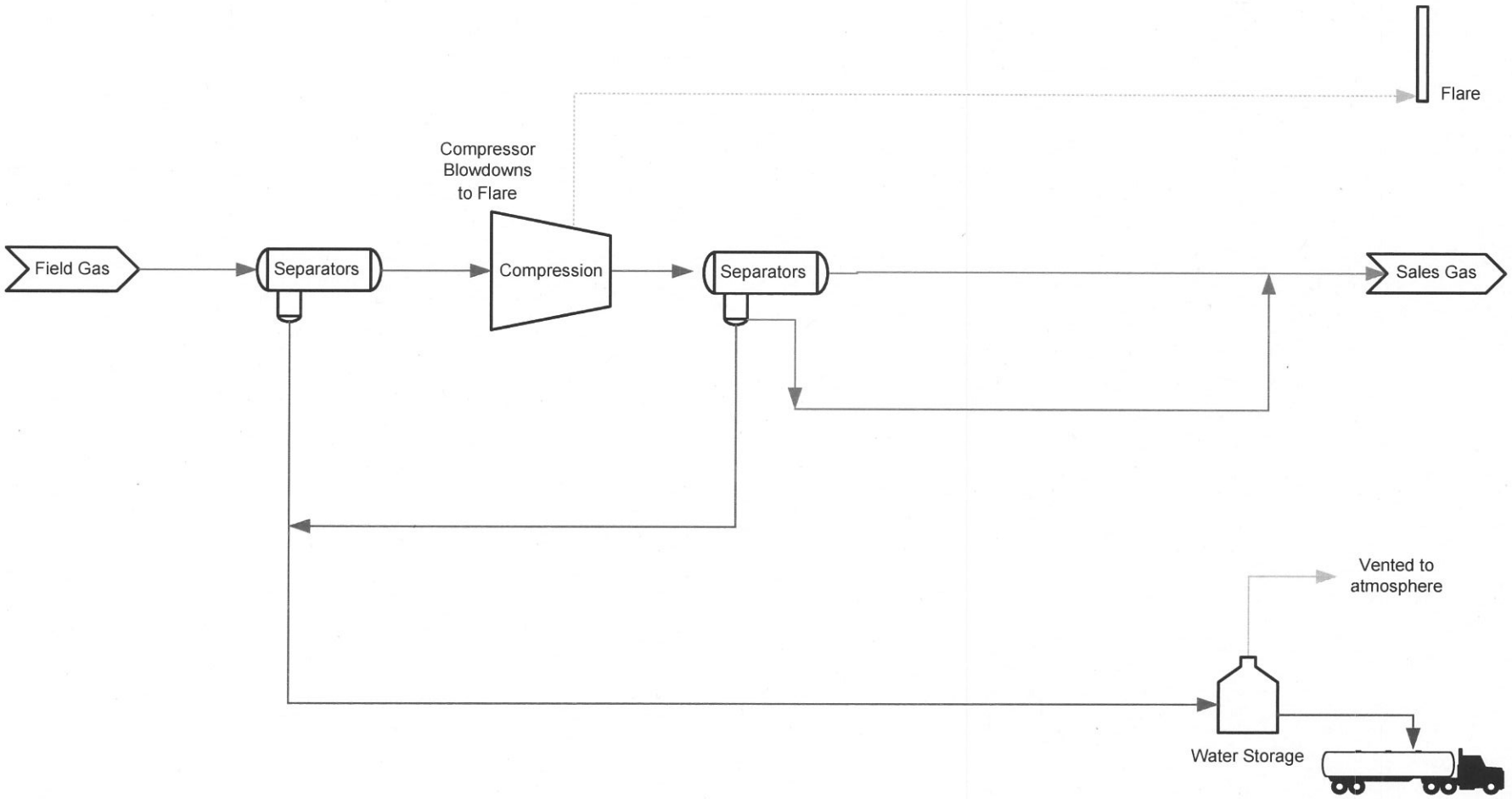
NW/4, Section 11, T43N, R74W

Campbell County, WY

PROJECT NAME	FILENAME	SCALE	REVISED	FIGURE NUMBER
Rowdy: Roush	Loc.srf	1" = 700 m	1/20/2015	1



Compliance Partners Inc. 4038 Timberline Rd., Suite 100 Fort Collins, CO 80525 (970) 206-4443 www.compliance-partners.com		**Simplified Plot Plan**		
ROWDY PIPELINE, L.L.C. **Roush Compressor Station**				
PROJECT NAME **Rowdy: Roush**	FILE NAME **Plot plan.srf**	SCALE **1 in = 15 meters**	REVISED **1/25/2015**	FIGURE NUMBER **2**



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Ft. Collins, CO 80525 970/206-4443
www.compliance-partners.com

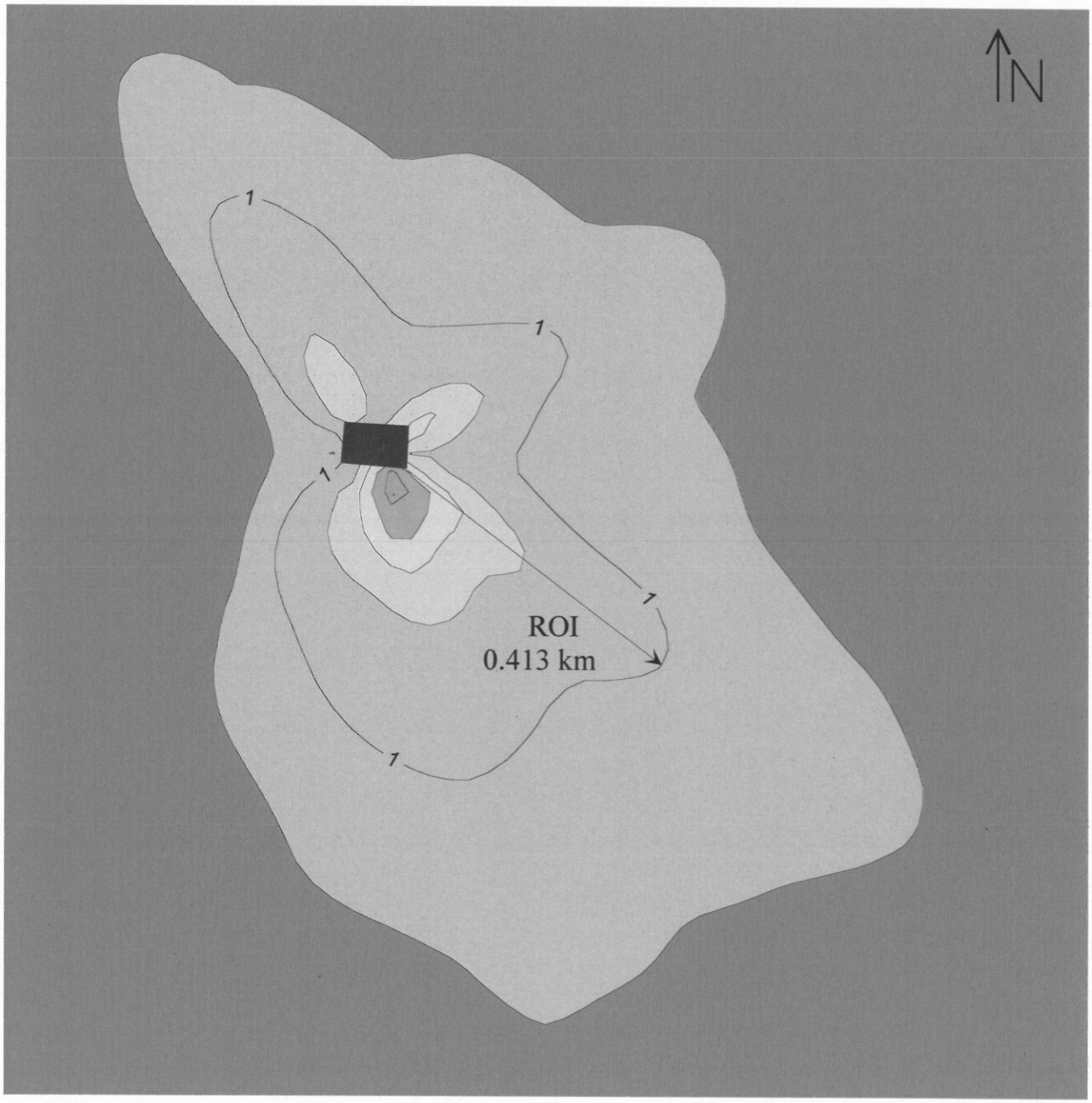
ROWDY PIPELINE, L.L.C.

Roush Compressor Station

TITLE

Simplified Process Flow Diagram

PROJECT NAME	FILE NAME	SCALE	REVISED	FIGURE NUMBER
Rowdy: Roush	Roush PFD.vsd	None	4/24/2015	3



Facility

Facility Impact (NOx - 1 μg/m³)

1 3 5 7 9 11 13 15 17 19 21 23 25

NO_2 μg/m³

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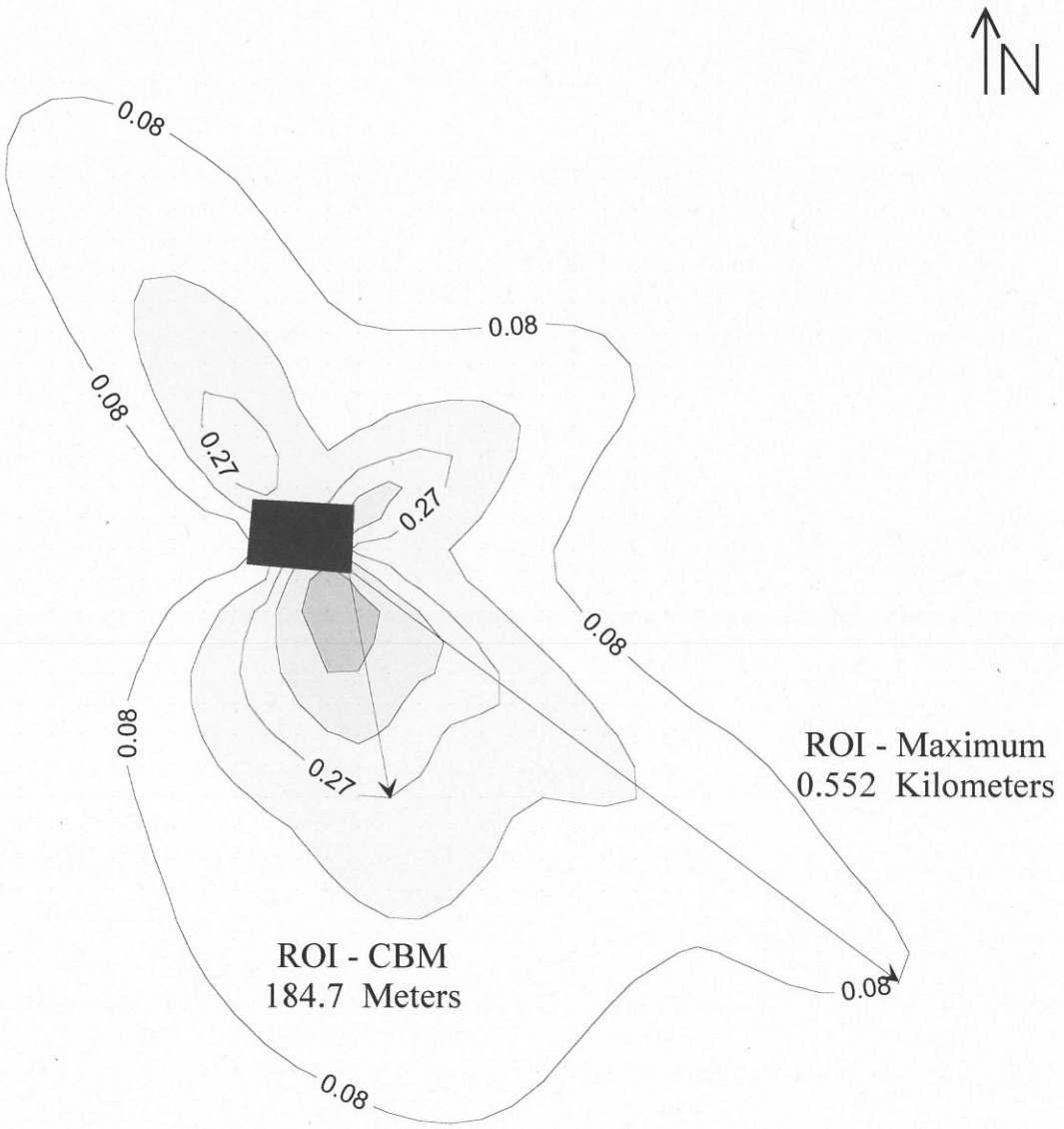
Fort Collins, CO 80525 (970) 206-4443
www.compliance-partners.com

thunder creek Gas Services, LLC

Roush Compressor Station

NO_2 Ambient Air Increment
(including 13.2 μg/m³ background)
Campbell County, Wyoming

PROJECT NAME	FILE NAME	SCALE	REVISED	FIGURE NUMBER
Rowdy: Roush	Roush NOX05.srf	1 in = 200 meters	4/24/2015	4



Facility

Facility Impact - CBM 20 year Project Life

Facility Impact - 70 year exposure

0.077 0.25 0.5 0.75 1

Formaldehyde µg/m³

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Fort Collins, CO 80525 (970) 206-4443
www.compliance-partners.com

ROWDY PIPELINE, L.L.C.

Roush Compressor Station

CH_2O Ambient Air Increment
Campbell County, Wyoming

PROJECT NAME	FILE NAME	SCALE	REVISED	FIGURE NUMBER
Rowdy: Roush	Roush FORM05.srf	1 in = 150 meters	3/6/2015	5

Attachment B
Application Forms

WYOMING

Department of Environmental Quality Air Quality Division

Permit Application Form

Is this a revision to an existing application?

Yes _____ No X

Previous Application #:

Date of Application: Apr-15

COMPANY INFORMATION:

Company Name: Rowdy Pipeline, LLC

Address: 326 West Quay Street

City: Artesia State: New Mexico Zip Code: 88210

Country: USA Phone Number:

FACILITY INFORMATION:

Facility Name: Roush Compressor Station

New Facility or Existing Facility: Existing

Facility Description:

Facility Class: Minor Operating Status: Operating

Facility Type: Compressor Station

For Oil & Gas Production Sites ONLY:

First Date of Production (FDOP)/Date of Modification:

Does production at this facility contain H2S?*

If yes, contact the Division.

API Number(s):

NAICS Code: 486210 Pipeline Transportation of Natural Gas

FACILITY LOCATION:

Enter the facility location in either the latitude/longitude area or section/township/range area. Both are not required.

Physical Address:

City: Zip Code:

State: WY County:

OR

Latitude: 43.72120 Longitude: 105.72104 County: Campbell

Quarter Quarter: Quarter: NW

Section: 11 Township: 43N Range: 74W

For longitude and latitude, use NAD 83/WGS84 datum and 5 digits after the decimal (i.e. 41.12345, -107.56789)

CONTACT INFORMATION:

Note that an Environmental AND NSR Permitting Contact is required for your application to be deemed complete by the agency.

Title: Mr. First Name: Kerry

Last Name: Egan

Company Name: Agave Energy Company

Job Title: Engineering Technician

Address: 326 West Quay Street

City: Artesia State: New Mexico

Zip Code: 88210

Primary Phone No.: 575-748-4469 E-mail: kegan@agaveenergy.com

Mobile Phone No.: 575-513-8988 Fax No.: 575-748-4275

Contact Type: Environmental contact Start Date:

Additional Contact Type (if needed): NSR Permitting contact

Title: Mr. First Name: Kerry

Last Name: Egan

Company Name: Agave Energy Company

Job Title: Engineering Technician

Address: 326 West Quay Street

City: Artesia State: New Mexico

Zip Code: 88210

Primary Phone No.: 575-748-4469 E-mail: kegan@agaveenergy.com

Mobile Phone No.: 575-513-8988 Fax No.: 575-748-4275

Contact Type: NSR Permitting contact Start Date:

FACILITY APPLICATION INFORMATION:

General Info:

Has the facility changed location or is it a new/ greenfield facility?	No
Has a Land Use Planning document been included in this application?	No
Is the facility located in a sage grouse core area?*	No
If the facility is in a sage grouse core area, what is the WER number?	Not applicable

** For questions about sage grouse core area, contact WY Game & Fish Department.*

Federal Rules Applicability - Facility Level:

Prevention of Significant Deterioration (PSD):	No
Non-Attainment New Source Review:	No

Modeling Section:

Has the Air Quality Division been contacted to determine if modeling is required?	Yes
Is a modeling analysis part of this application?	Yes
Is the proposed project subject to Prevention of Significant Deterioration (PSD) requirements?	No
Has the Air Quality Division been notified to schedule a pre-application meeting?	No
Has a modeling protocol been submitted to and approved by the Air Quality Division?	No
Has the Air Quality Division received a Q/D analysis to submit to the respective FLMs to determine the need for an AQRV analysis?	No

Required Attachments:

Facility Map	☑
Process Flow Diagram	☑
Modeling Analysis (if applicable)	☑
Land Use Planning Document	☐
Detailed Project Description	☑
Emissions Calculations	☑

I, Kerry Egan (Responsible Official (Printed Name)) Environmental Technician (Title)

an Official Representative of the Company, state that I have knowledge of the facts herein set forth and that the same are true and correct to the best of my knowledge and belief. I further certify that the operational information provided and emission rates listed on this application reflect the anticipated emissions due to the operation of this facility. The facility will operate in compliance with all applicable Wyoming Air Quality Standards and Regulations.

Signature: Kerry Egan (ink) Date: 5/14/2015

Specific Emission Unit Attributes:

Blowdown/Venting/Well Completion

Company Equipment ID: **BD**

Company Equipment Description: **Compressor Blowdowns**

Operating Status: **Not Yet Installed** Except for one screw compressor

Initial Construction Commencement Date: **TBD**

Initial Operation Commencement Date: **TBD**

Most Recent Construction/ Modification **TBD**

Most Recent Operation Commencement Date: **TBD**

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Type of Event: **Blow-down**

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

30600401

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: **24**

Hours/year: **8760**

Control Equipment: Yes **flare (high pressure)**

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Not Effected**

New Source Performance Standard are listed under 40 CFR 60-Standards of Performance for New Stationary Sources.

NSPS Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Effected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Not Effected**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: _____

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Revised 4/24/2015

Specific Emission Unit Attributes:

Engine

Company Equipment ID: **E2 - E4**
Company Equipment Description: **Any Lean Burn or Rich Burn Engine**

Operating Status: **Not Yet Installed**
Initial Construction Commencement Date:
Initial Operation Commencement Date:
Most Recent Construction/ Modification
Most Recent Operation Commencement Date:

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Name Plate Rating: **< 637** Units: **hp**
Site Rating: **< 637** Units: **hp**
Primary Fuel Type: **Field Gas**
Secondary Fuel Type:
Model Name and Number: **To Be Determined**
Engine Type: **4 Stroke Lean Burn**
Serial Number Tracking Table:
Serial Number: Order Date:
Manufacturer Name:
Construction/Installation Commencement Date:
Operation Commencement/ Start-up Date:
Manufacture Date:
Btu Content: **1488** Units: **BTU/scf**
Fuel Sulfur Content: Units:
Type of Service:

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

20200254

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: **24**
Hours/year: **8760**

Control Equipment: Yes **Oxidation Catalyst**

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Unknown**

New Source Performance Standard are listed under 40 CFR 60- Standards of Performance for New Stationary Sources.

NSPS Subpart: **JJJJ applicability to be determined when specific engines identified**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Affected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Unknown**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: **ZZZZ applicability to be determined after engines identified**

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Revised 4/24/2015

Specific Emission Unit Attributes:

Engine

Company Equipment ID: **E2 - E4**
Company Equipment Description: **Any Lean Burn or Rich Burn Engine**

Operating Status: **Not Yet Installed**
Initial Construction Commencement Date:
Initial Operation Commencement Date:
Most Recent Construction/ Modification
Most Recent Operation Commencement Date:

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Name Plate Rating: **< 637** Units: **hp**
Site Rating: **< 637** Units: **hp**
Primary Fuel Type: **Field Gas**
Secondary Fuel Type:
Model Name and Number: **To Be Determined**
Engine Type: **4 Stroke Rich Burn**
Serial Number Tracking Table:
Serial Number: Order Date:
Manufacturer Name:
Construction/Installation Commencement Date:
Operation Commencement/ Start-up Date:
Manufacture Date:
Btu Content: **1488** Units: **BTU/scf**
Fuel Sulfur Content: Units:
Type of Service:

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

20200253

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: **24**
Hours/year: **8760**

Control Equipment: Yes **AFRC/NSCR Catalyst**

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Unknown**

New Source Performance Standard are listed under 40 CFR 60- Standards of Performance for New Stationary Sources.

NSPS Subpart: **JJJJ applicability to be determined when specific engines identified**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Affected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Unknown**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: **ZZZZ applicability to be determined after engines identified**

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Flare

Company Equipment ID: **Flare**

Company Equipment Description: **Flare with low pressure feed**

Operating Status: **Not Yet Installed**

Initial Construction Commencement Date:

Initial Operation Commencement Date:

Most Recent Construction/ Modification

Most Recent Operation Commencement Date:

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Maximum Design Capacity (MMSCF/hr): **TBD**

Minimum Design Capacity (MMSCF/hr): **TBD**

Pilot Gas Volume (scf/min):

Emergency Flare Only:

Ignition Device Type:

Btu Content (Btu/scf):

Smokeless Design:

Assist Gas Utilized?

Continuously Monitored?

Waste Gas Volume:

Units:

Installation Date:

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

30600903

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: **24**

Hours/year: 8760

Control Equipment: Yes

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

☐ ☐

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

☐ ☐

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Subject to subpart**

New Source Performance Standard are listed under 40 CFR 60-Standards of Performance for New Stationary Sources.

NSPS Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Affected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Not Effected**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: _____

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Fugitives

Company Equipment ID: **Fugitives**

Company Equipment Description: **Fugitive Leaks**

Operating Status: **Operating** **Some equipment included in Fugitives, not yet installed.**

Initial Construction Commencement Date: **Facility Start of Construction - Unknown**

Initial Operation Commencement Date: **Facility Startup - Unknown**

Most Recent Construction/ Modification Commencement Date:

Most Recent Operation Commencement Date:

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Type of Fugitive Emission: **Fugitive Leaks at O&G**

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

31000220

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: **24**

Hours/year: **8760**

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Not Affected**

New Source Performance Standard are listed under 40 CFR 60- Standards of Performance for New Stationary Sources.

NSPS Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Affected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Not Affected**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: _____

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Process Vent

Company Equipment ID: **PW**

Company Equipment Description: **Produced Water Tank Atmospheric Vent**

Operating Status: **Operating**

Initial Construction Commencement Date: **TBD**

Initial Operation Commencement Date: **TBD**

Most Recent Construction/ Modification Commencement Date: **TBD**

Most Recent Operation Commencement Date: **TBD**

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Flow Rate or Throughput: **0.76217** Units: **scf/hr**

VOC Concentration (%): **31.3** HAPs Concentration (%): **0.8301**

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

40400315

Potential Operating Schedule: Provide the operating schedule for this emission unit.

Hours/day: **24**

Hours/year: **8760**

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Subject, but exempt**

New Source Performance Standard are listed under 40 CFR 60-Standards of Performance for New Stationary Sources.

NSPS Subpart: **OOOO**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Effected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Not Effected**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: _____

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Separator/Treater

Company Equipment ID: **3-phase Separator**
Company Equipment Description: **3-phase Separator**

Operating Status: **Not Yet Installed**
Initial Construction Commencement Date: **TBD**
Initial Operation Commencement Date: **TBD**
Most Recent Construction/ Modification Commencement Date: **TBD**

Most Recent Operation Commencement Date: **TBD**

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Type of Vessel: **3-Phase Separator** Is Vessel Heated? **No**
Operating Temperature (F): **55**
Operating Pressure (psig): **1 - 5**

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

31000299

Potential Operating Schedule: Provide the operating schedule for this emission unit.
Hours/day: **24**
Hours/year: **8760**

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Not Affected**

New Source Performance Standard are listed under 40 CFR 60- Standards of Performance for New Stationary Sources.

NSPS Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Affected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Not Affected**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: _____

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Specific Emission Unit Attributes:

Storage Tank/Silo

Company Equipment ID: **PW**
Company Equipment Description: **Produced Water Storage Tank**

Operating Status: **Operating**
Initial Construction Commencement Date: **TBD**
Initial Operation Commencement Date: **TBD**
Most Recent Construction/ Modification Commencement Date: **TBD**

Most Recent Operation Commencement Date: **TBD**

Select reason(s) for this emissions unit being included in this application (must be completed regardless of date of installation or modification):

Reason: **Modification**

If reason is ***Reconstruction*** or ***Temporary Permit*** or ***Other,*** please explain below:

Material Type: **Liquid**
Description of Material Stored: **Produced Water**

Capacity: **400 (or less)** Units: **barrels**
Maximum Throughput: **15** Units: **barrels/day**
Maximum Hourly Throughput: Units: **barrels/hr**
Is Tank Heated?: **No**

SCC Codes: List all Source Classification Code(s) (SCC) that describe the process(es) performed by the emission source (e.g., 1-02-002-04).

40400315

Potential Operating Schedule: Provide the operating schedule for this emission unit.
Hours/day: **24**
Hours/year: **8760**

Control Equipment: No

If yes, please fill out and attach the appropriate Control Device and Release Point Information worksheets.

Best Available Control Technology (BACT): Was a BACT Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed BACT: _____

*If yes, attach BACT Analysis with this application.

Lowest Achievable Emission Rate (LAER): Was a LAER Analysis completed for this emission unit?

☐ Yes ☑ No

Pollutant: _____

Proposed LAER: _____

*If yes, attach LAER Analysis with this application.

Federal and State Rule Applicability:

New Source Performance Standards (NSPS): **Subject to subpart**

New Source Performance Standard are listed under 40 CFR 60-Standards of Performance for New Stationary Sources.

NSPS Subpart: ***OOOO***

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 61): **Not Effected**

National Emissions Standards for Hazardous Air Pollutants (NESHAP Part 61) are listed under 40 CFR 61. (These include asbestos, benzene, beryllium, mercury, and vinyl chloride).

Part 61 NESHAP Subpart: _____

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63): **Not Effected**

National Emission Standards for Hazardous Air Pollutants (NESHAP Part 63) standards are listed under 40 CFR 63

Part 63 NESHAP Subpart: _____

Prevention of Significant Deterioration (PSD): **Not Affected**

These rules are found under WAQSR Chapter 6, Section 4.

Non-Attainment New Source Review: **Not Affected**

These rules are found under WAQSR Chapter 6, Section 13.

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Criteria Pollutants:							
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)				**0.06**	**0.25**	**AP-42**
2.)	PM #10 microns in diameter (PE/PM10)				**0.06**	**0.25**	**AP-42**
3.)	PM #2.5 microns in diameter (PE/PM2.5)				**0.06**	**0.25**	**AP-42**
4.)	Sulfur dioxide (SO2)				**0**	**0.01**	**AP-42**
5.)	Nitrogen Oxides (NOx)				**0.62**	**2.7**	**Other**
6.)	Carbon monoxide (CO)				**1.76**	**7.73**	**Other**
7.)	Volatile organic compounds (VOC)				**0.62**	**2.7**	**Other**
8.)	Lead (Pb)						
9.)	Total Hazardous Air Pollutants (HAPs)				**0.06**	**0.3**	**AP-42**
10.)	Fluoride (F)						
11.)	Hydrogen Sulfide (H2S)						
12.)	Mercury (Hg)						
13.)	Total Reduced Sulfur (TRS)						
14.)	Sulfuric Acid Mist (SAM)						

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

E1: Caterpillar G3408TA
Existing permitted engine

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**Formaldehyde**				**0.04**	**0.19**	
2.)	**n-Hexane**				**0.00**	**0.01**	
3.)	**Benzene**				**0.00**	**0.02**	
4.)	**Toluene**				**0.00**	**0.01**	
5.)	**Acrolein**				**0.01**	**0.03**	
6.)	**Acetaldehyde**				**0.01**	**0.04**	
7.)							
8.)							

Greenhouse Gases (GHGs)

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**CO_2**				**349.97**	**1532.85**	
2.)	**CH_4**				**0.01**	**0.03**	
3.)	**N_2O**				**0.001**	**0.003**	
4.)							
5.)							
6.)							
7.)							
8.)							

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

Criteria Pollutants:

		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)				**0.12**	**0.52**	**AP-42**
2.)	PM #10 microns in diameter (PE/PM10)				**0.12**	**0.52**	**AP-42**
3.)	PM #2.5 microns in diameter (PE/PM2.5)				**0.12**	**0.52**	**AP-42**
4.)	Sulfur dioxide (SO2)				**0**	**0.02**	**AP-42**
5.)	Nitrogen Oxides (NOx)				**0.98**	**4.31**	**Other**
6.)	Carbon monoxide (CO)				**1.4**	**6.15**	**Other**
7.)	Volatile organic compounds (VOC)				**0.98**	**4.31**	**Other**
8.)	Lead (Pb)						
9.)	Total Hazardous Air Pollutants (HAPs)				**0.13**	**0.53**	**AP-42**
10.)	Fluoride (F)						
11.)	Hydrogen Sulfide (H2S)						
12.)	Mercury (Hg)						
13.)	Total Reduced Sulfur (TRS)						
14.)	Sulfuric Acid Mist (SAM)						

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**Formaldehyde**				**0.07**	**0.31**	
2.)	**n-Hexane**				**0.01**	**0.03**	
3.)	**Benzene**				**0.01**	**0.04**	
4.)	**Toluene**				**0.00**	**0.01**	
5.)	**Acrolein**				**0.02**	**0.07**	
6.)	**Acetaldehyde**				**0.02**	**0.07**	
7.)							
8.)							

Greenhouse Gases (GHGs)

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**CO_2**				**714.8**	**3130.82**	
2.)	**CH_4**				**0.01**	**0.06**	
3.)	**N_2O**				**0.001**	**0.006**	
4.)							
5.)							
6.)							
7.)							
8.)							

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Criteria Pollutants:							
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)				**0.06**	**0.27**	**AP-42**
2.)	PM #10 microns in diameter (PE/PM10)				**0.06**	**0.27**	**AP-42**
3.)	PM #2.5 microns in diameter (PE/PM2.5)				**0.06**	**0.27**	**AP-42**
4.)	Sulfur dioxide (SO2)				**0.00**	**0.02**	**AP-42**
5.)	Nitrogen Oxides (NOx)				**1.40**	**6.15**	**Other**
6.)	Carbon monoxide (CO)				**0.70**	**3.08**	**Other**
7.)	Volatile organic compounds (VOC)				**0.98**	**4.31**	**Other**
8.)	Lead (Pb)						
9.)	Total Hazardous Air Pollutants (HAPs)				**0.19**	**0.84**	**AP-42**
10.)	Fluoride (F)						
11.)	Hydrogen Sulfide (H2S)						
12.)	Mercury (Hg)						
13.)	Total Reduced Sulfur (TRS)						
14.)	Sulfuric Acid Mist (SAM)						

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**Formaldehyde**				**0.10**	**0.43**	
2.)	**n-Hexane**				**0.01**	**0.03**	
3.)	**Benzene**				**0.00**	**0.01**	
4.)	**Toluene**				**0.00**	**0.01**	
5.)	**Acrolein**				**0.03**	**0.14**	
6.)	**Acetaldehyde**				**0.05**	**0.22**	
7.)							
8.)							

Greenhouse Gases (GHGs)

Pollutants:		Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**CO_2**				**714.8**	**3130.82**	
2.)	**CH_4**				**0.01**	**0.06**	
3.)	**N_2O**				**0.001**	**0.006**	
4.)							
5.)							
6.)							
7.)							
8.)							

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Criteria Pollutants:							
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)						
2.)	PM #10 microns in diameter (PE/PM10)						
3.)	PM #2.5 microns in diameter (PE/PM2.5)						
4.)	Sulfur dioxide (SO2)						
5.)	Nitrogen Oxides (NOx)						
6.)	Carbon monoxide (CO)						
7.)	Volatile organic compounds (VOC)	**4.568**				**0.1**	**Other**
8.)	Lead (Pb)						
9.)	Total Hazardous Air Pollutants (HAPs)	**0.289**				**0.01**	
10.)	Fluoride (F)						
11.)	Hydrogen Sulfide (H2S)						
12.)	Mercury (Hg)						
13.)	Total Reduced Sulfur (TRS)						
14.)	Sulfuric Acid Mist (SAM)						

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Pollutants:							
1.)	**2,2,4-TMP**	**0.065**				**0.00**	
2.)	**n-Hexane**	**0.165**				**0.00**	
3.)	**Benzene**	**0.005**				**0.00**	
4.)	**Toluene**	**0.012**				**0.00**	
5.)	**Ethylbenzene**	**0.007**				**0.00**	
6.)	**Xylenes**	**0.035**				**0.00**	
7.)							
8.)							

Greenhouse Gases (GHGs)

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Pollutants:							
1.)	**CO_2**	**0.151**				**0.151**	
2.)	**CH_4**	**2.338**				**0.047**	
3.)							
4.)							
5.)							
6.)							
7.)							
8.)							

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Criteria Pollutants:							
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)						
2.)	PM #10 microns in diameter (PE/PM10)						
3.)	PM #2.5 microns in diameter (PE/PM2.5)						
4.)	Sulfur dioxide (SO2)						
5.)	Nitrogen Oxides (NOx)						
6.)	Carbon monoxide (CO)						
7.)	Volatile organic compounds (VOC)	**0.21**				**0.0**	**Other**
8.)	Lead (Pb)						
9.)	Total Hazardous Air Pollutants (HAPs)	**0**				**0.00**	**Other**
10.)	Fluoride (F)						
11.)	Hydrogen Sulfide (H2S)						
12.)	Mercury (Hg)						
13.)	Total Reduced Sulfur (TRS)						
14.)	Sulfuric Acid Mist (SAM)						

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

	Pollutants:	Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**2,2,4-TMP**	**0.00**				**0.00**	
2.)	**n-Hexane**	**0.01**				**0.00**	
3.)	**Benzene**	**0.00**				**0.00**	
4.)	**Toluene**	**0.00**				**0.00**	
5.)	**Ethylbenzene**	**0.00**				**0.00**	
6.)	**Xylenes**	**0.00**				**0.00**	
7.)							
8.)							

Greenhouse Gases (GHGs)

	Pollutants:	Pre-Controlled Potential Emissions (tons/yr)	Efficiency Standards: Potential to Emit (PTE)	Efficiency Standards: Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
1.)	**CO_2**					**0**	
2.)	**CH_4**					**0**	
3.)							
4.)							
5.)							
6.)							
7.)							
8.)							

Emissions Information- The following tables request information needed to determine the applicable requirements and the compliance status of this emission unit with those requirements.

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Criteria Pollutants:							
1.)	Particulate emissions (PE/PM) (formerly particulate matter, PM)						
2.)	PM #10 microns in diameter (PE/PM10)						
3.)	PM #2.5 microns in diameter (PE/PM2.5)						
4.)	Sulfur dioxide (SO2)						
5.)	Nitrogen Oxides (NOx)						
6.)	Carbon monoxide (CO)						
7.)	Volatile organic compounds (VOC)				**1.0**	**4.4**	**Other**
8.)	Lead (Pb)						
9.)	Total Hazardous Air Pollutants (HAPs)				**0.05**	**0.21**	
10.)	Fluoride (F)						
11.)	Hydrogen Sulfide (H2S)						
12.)	Mercury (Hg)						
13.)	Total Reduced Sulfur (TRS)						
14.)	Sulfuric Acid Mist (SAM)						

Provide your calculations as an attachment and explain how all process variables and emissions factors were selected.

Hazardous Air Pollutants (HAPs) and Toxic Air Contaminents

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Pollutants:							
1.)	**n-hexane**				**0.03**	**0.12**	
2.)	**2,2,4-TMP**				**0.01**	**0.04**	
3.)	**benzene**				**0.00**	**0.01**	
4.)	**toluene**				**0.00**	**0.01**	
5.)	**ethylbenzene**				**0.00**	**0.01**	
6.)	**xylenes**				**0.01**	**0.03**	
7.)							
8.)							

Greenhouse Gases (GHGs)

			Efficiency Standards				
		Pre-Controlled Potential Emissions (tons/yr)	Potential to Emit (PTE)	Units	Potential to Emit (lbs/hr)	Potential to Emit (tons/yr)	Basis for Determination
Pollutants:							
1.)	**CO_2**				**0.06**	**0.26**	
2.)							
3.)							
4.)							
5.)							
6.)							
7.)							
8.)							

Control Equipment:

Catalytic NOx Control Technology

Manufacturer: _____ Date Installed: **TBD**

Model Name and Number: _____ Company Control Equipment ID: _____

Company Control Equipment Description: **AFRC/NSCR Catalyst**

Pollutant(s) Controlled:

☑ CO	☑ NOx	☐ Pb	☐ SO2	☑ VOC	☐ PM						
☐ PM (FIL)	☐ PM Condensible	☐ PM 10 (FIL)	☐ PM 2.5 (FIL)	☐ PM 10	☐ PM 2.5						
☑ Other (Formaldehyde and other HAP)											

NOTE: The following fields require numeric values unless otherwise denoted with an asterisk*

Design Control Efficiency (%): _____ Capture Efficiency (%): _____

Operating Control Efficiency (%):

Catalytic Reduction Type:* **Nonselective Catalytic**

Reagent Type: _____

Reagent Injection Rate- specify units: _____

Reagent Slip Concentration (ppbv): _____

Reagent Slip Concentration % O2: **2**

Inlet Gas Flow Rate (acfm): **2473.7**

Inlet Gas Temp (F): _____ Outlet Gas Temp (F): **1000**

Air Fuel Ratio Controller:* **Yes**

☑ This is the only control equipment on this air contaminant source ☐

If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other emission units that are also vented to this control equipment:* **Not applicable**

List all release point IDs associated with this control equipment:* **E1 Cat3408TA and E2 - E4 Rich (each engine equipped with an AFRC/NSCR catalyst)**

Control Equipment:

Flare/Combustor

Manufacturer: _____ Date Installed: _____

Model Name and Number: _____ Company Control Equipment ID: _____

Company Control Equipment Description: _____

Pollutant(s) Controlled:

☐ CO	☐ NOx	☐ Pb	☐ SO2	☐ VOC	☐ PM	
☐ PM (FIL)	☐ PM Condensible	☐ PM 10 (FIL)	☐ PM 2.5 (FIL)		☐ PM 10	☐ PM 2.5
☐ Other						

Design Control Efficiency (%): _____ Capture Efficiency (%): _____

Operating Control Efficiency (%): _____

Flare Type: _____ Elevated Flare Type: _____

Ignition Device: _____ Flame Presence Sensor: _____

Inlet Gas Temp (F): _____ Flame Presence Type: _____

Gas Flow Rate (acfm): _____ Outlet Gas Temp (F): _____

☐ This is the only control equipment on this air contaminant source

If not, this control equipment is: ☐ Primary ☐ Secondary ☐ Parallel

List all other emission units that are also vented to this control equipment: _____

List all release point IDs associated with this control equipment: _____

Control Equipment:

Oxidation Catalyst

Manufacturer: _____ Date Installed: _____

Model Name and Number: _____ Company Control Equipment ID: _____

Company Control Equipment Description: **Oxidation Catalytic control for lean burn engines**

Pollutant(s) Controlled:	☑ CO	☐ NOx	☐ Pb	☐ SO2	☑ VOC	☐ PM	
☐ PM (FIL)	☐ PM Condensible	☐ PM 10 (FIL)		☐ PM 2.5 (FIL)		☐ PM 10	☐ PM 2.5
☑ Other **(HAP)**							

NOTE: The following fields require numeric values unless otherwise denoted with an asterisk*

Design Control Efficiency (%): _____ Capture Efficiency (%): _____

Operating Control Efficiency (%): _____

Catalyst Type:* **Oxidation Catalyst** **Air Fuel Ratio Controller:*** **No**

☐ This is the only control equipment on this air contaminant source

If not, this control equipment is: ☑ Primary ☐ Secondary ☐ Parallel

List all other emission units that are also vented to this control equipment:* **Not applicable**

List all release point IDs associated with this control equipment:* **E2 - E4 lean burn (each engine equipped with a catalyst)**

Revised 4/24/2015

Release Point Information:

Complete the table below for ***each*** release point. Please include release point information for each emission unit. Multiple attachments may be necessary. A release point is a point at which emissions from an emission unit are released into the ambient (outside)air. List each individual release point on a separate pair of lines (release point ID and description). ***For longitude and latitude, use NAD 83/WGS84 datum and 5 digits after the decimal (i.e. 41.12345, -107.56789)***

Stack Release Point Information		
Company Release Point ID:	Release Point Type:	**Vertical**
E1	Release Point Latitude:	**43.72092**
	Release Point Longitude:	**105.72160**
Company Release Point Description:	Base Elevation (ft):	**5126.0**
Caterpillar G3408TA	Stack Height (ft):	**22**
	Stack Diameter (ft):	**0.7**
	Exit Gas Velocity (ft/s):	**51**
	Exit Gas Temp (F):	**1000**
	Exit Gas Flow Rate (acfm):	
Company Release Point ID:	Release Point Type:	**Vertical**
E2	Release Point Latitude:	**43.72091**
	Release Point Longitude:	**105.72144**
Company Release Point Description:	Base Elevation (ft):	**5126.0**
<637 hp	Stack Height (ft):	**22**
	Stack Diameter (ft):	**0.8**
	Exit Gas Velocity (ft/s):	**79**
	Exit Gas Temp (F):	**811**
	Exit Gas Flow Rate (acfm):	
Company Release Point ID:	Release Point Type:	**Vertical**
E3	Release Point Latitude:	**43.72092**
	Release Point Longitude:	**105.72174**
Company Release Point Description:	Base Elevation (ft):	**5126.0**
<637 hp	Stack Height (ft):	**22**
	Stack Diameter (ft):	**0.8**
	Exit Gas Velocity (ft/s):	**79**
	Exit Gas Temp (F):	**811**
	Exit Gas Flow Rate (acfm):	
Company Release Point ID:	Release Point Type:	**Vertical**
E4	Release Point Latitude:	**43.72093**
	Release Point Longitude:	**105.72189**
Company Release Point Description:	Base Elevation (ft):	**5126.0**
<637 hp	Stack Height (ft):	**22**
	Stack Diameter (ft):	**0.8**
	Exit Gas Velocity (ft/s):	**79**
	Exit Gas Temp (F):	**811**
	Exit Gas Flow Rate (acfm):	
Company Release Point ID:	Release Point Type:	**Vertical**
F1	Release Point Latitude:	**43.72118**
	Release Point Longitude:	**105.72198**

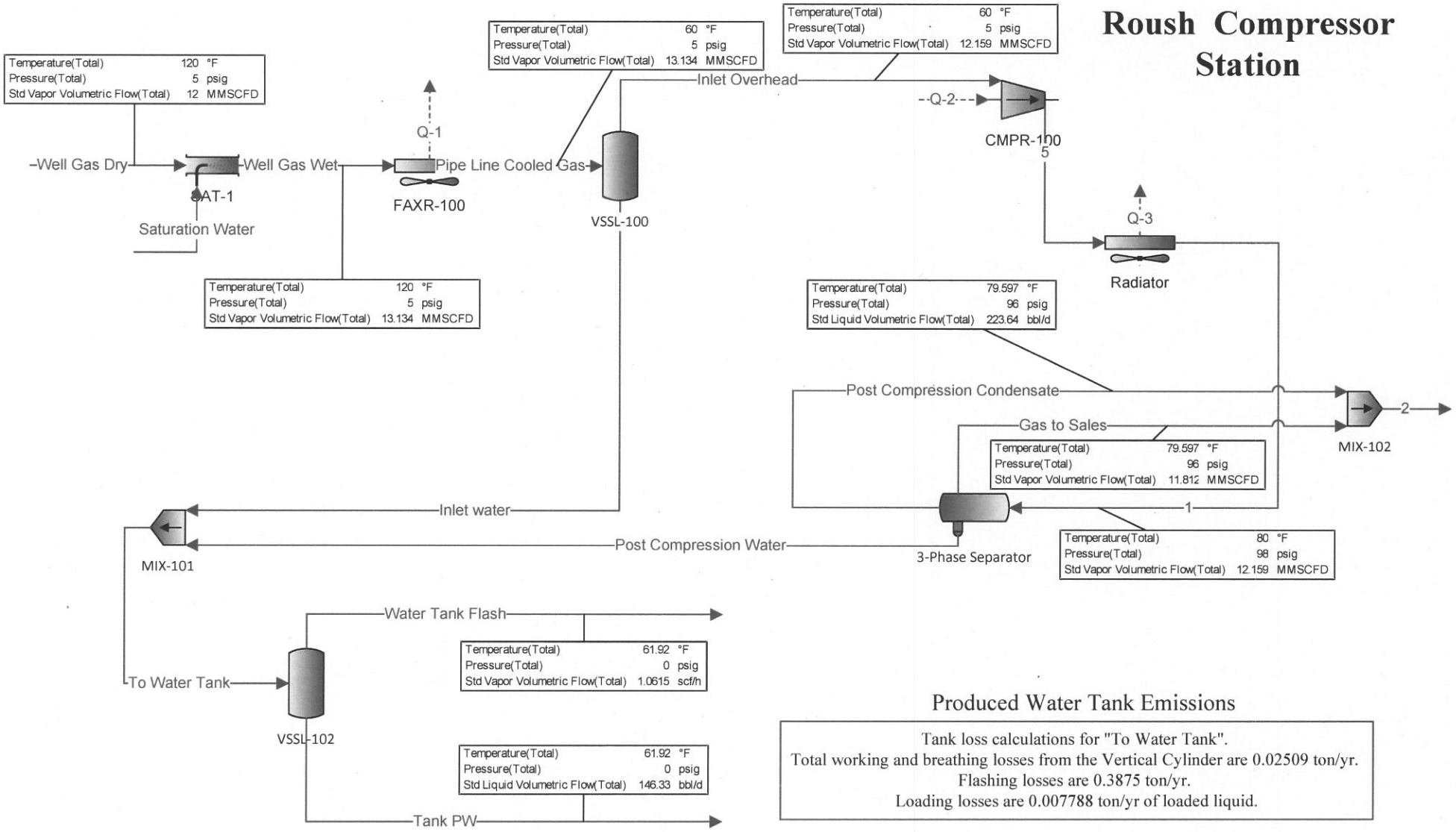
Company Release Point Description:	Base Elevation (ft): 5126.0
Flare	Stack Height (ft): 10
	Stack Diameter (ft): 3.1
	Exit Gas Velocity (ft/s): 66
	Exit Gas Temp (F): 1832
	Exit Gas Flow Rate (acfm):

Complete the table below for each fugitive (area, volume, line) release point. List each individual release point on a separate line.

Fugitive Release Point Information	
Company Release Point ID:	Release Point Latitude: 43.2212
FUG	Release Point Longitude: 105.72104
	Release Height (ft):
Company Release Point Description:	
Fugitive Leak Emissions (VOC)	
Company Release Point ID:	Release Point Latitude:
	Release Point Longitude:
	Release Height (ft):
Company Release Point Description:	
Company Release Point ID:	Release Point Latitude:
	Release Point Longitude:
	Release Height (ft):
Company Release Point Description:	
Company Release Point ID:	Release Point Latitude:
	Release Point Longitude:
	Release Height (ft):
Company Release Point Description:	

Attachment C
ProMax Report

Roush Compressor Station



Produced Water Tank Emissions

Tank loss calculations for "To Water Tank".
Total working and breathing losses from the Vertical Cylinder are 0.02509 ton/yr.
Flashing losses are 0.3875 ton/yr.
Loading losses are 0.007788 ton/yr of loaded liquid.

Compliance Partners Inc.

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Connections

	Gas to Sales	Inlet Overhead	Inlet water	Pipe Line Cooled Gas	Post Compression Condensate
From Block	3-Phase Separator	VSSL-100	VSSL-100	FAXR-100	3-Phase Separator
To Block	MIX-102	CMPR-100	MIX-101	VSSL-100	MIX-102

Stream Composition

Mole Fraction	Gas to Sales %	Inlet Overhead %	Inlet water %	Pipe Line Cooled Gas %	Post Compression Condensate %
Carbon Dioxide	1.59053	1.54839	0.00121364	1.43352	0.160078
Hydrogen Sulfide	0	0	0	0	0
Nitrogen	1.72359	1.67482	2.94429E-05	1.55047	0.0202998
Methane	68.0658	66.1743	0.00238367	61.2613	2.52667
Ethane	9.8679	9.63041	0.000420304	8.91542	2.20482
Propane	10.1694	10.0281	0.000540256	9.28362	7.45411
Isobutane	1.27586	1.28695	2.31678E-05	1.1914	2.37762
Butane	3.82743	3.92303	0.000150114	3.63177	10.252
Isopentane	0.915446	1.00765	2.81588E-05	0.932839	5.92312
Pentane	0.936753	1.07082	2.80731E-05	0.991313	8.04881
Cyclopentane	0.0453108	0.0552672	1.02962E-05	0.0511645	0.563102
n-Hexane	0.23028	0.358255	3.53598E-06	0.331656	6.73508
Cyclohexane	0.100623	0.17271	3.01179E-05	0.159889	3.75222
2-Methylpentane	0.256123	0.357268	4.37712E-06	0.330742	5.42891
3-Methylpentane	0.0970981	0.140143	4.87617E-06	0.129739	2.29345
Heptane	0.278221	0.7323	1.11504E-05	0.67793	23.1278
Methylcyclohexane	0.0632937	0.168764	1.27149E-05	0.156235	5.37004
2,2,4-Trimethylpentane	0.0338401	0.0838889	1.06154E-07	0.0776605	2.55369
Benzene	0.0120836	0.0187429	0.000108731	0.0173594	0.350519
Toluene	0.010383	0.0305831	0.000146045	0.0283232	1.02594
Ethylbenzene	0.00200231	0.0138118	6.52512E-05	0.0127911	0.594009
meta-Xylene	0.00123387	0.00986552	4.69074E-05	0.00913653	0.433841
para-Xylene	0.00514359	0.0394633	0.000172057	0.0365461	1.72531
ortho-Xylene	0.00189976	0.0167693	0.000106262	0.0155321	0.74704
Octane	0.0252551	0.150013	1.17529E-06	0.138875	6.28123
Water	0.464538	1.3076	99.9945	8.63474	0.0503565

Molar Flow	Gas to Sales lbmol/h	Inlet Overhead lbmol/h	Inlet water lbmol/h	Pipe Line Cooled Gas lbmol/h	Post Compression Condensate lbmol/h
Carbon Dioxide	20.6282	20.6715	0.00129945	20.6728	0.0426919
Hydrogen Sulfide	0	0	0	0	0
Nitrogen	22.3538	22.3592	3.15247E-05	22.3593	0.00541386
Methane	882.771	883.446	0.0025522	883.448	0.67385
Ethane	127.98	128.569	0.000450022	128.569	0.588015
Propane	131.89	133.878	0.000578455	133.879	1.98797
Isobutane	16.5471	17.1812	2.48059E-05	17.1812	0.634099
Butane	49.6393	52.3735	0.000160728	52.3737	2.73415
Isopentane	11.8728	13.4524	3.01498E-05	13.4525	1.57966
Pentane	12.1491	14.2957	3.0058E-05	14.2957	2.14658
Cyclopentane	0.587653	0.737832	1.10241E-05	0.737843	0.150176
n-Hexane	2.98659	4.7828	3.78599E-06	4.7828	1.79621
Cyclohexane	1.30502	2.30573	3.22474E-05	2.30576	1.0007
2-Methylpentane	3.32176	4.76962	4.6866E-06	4.76963	1.44786
3-Methylpentane	1.2593	1.87095	5.22094E-06	1.87096	0.611652
Heptane	3.60835	9.77641	1.19388E-05	9.77642	6.16806
Methylcyclohexane	0.82088	2.25304	1.36139E-05	2.25306	1.43216
2,2,4-Trimethylpentane	0.438884	1.11994	1.1366E-07	1.11994	0.681056

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Molar Flow	Gas to Sales lbmol/h	Inlet Overhead lbmol/h	Inlet water lbmol/h	Pipe Line Cooled Gas lbmol/h	Post Compression Condensate lbmol/h
Benzene	0.156716	0.250223	0.000116419	0.25034	0.0934817
Toluene	0.134661	0.408292	0.000156372	0.408449	0.273614
Ethylbenzene	0.0259688	0.184391	6.98648E-05	0.184461	0.158419
meta-Xylene	0.0160025	0.131707	5.0224E-05	0.131758	0.115703
para-Xylene	0.0667092	0.526847	0.000184222	0.527031	0.46013
ortho-Xylene	0.0246387	0.223874	0.000113776	0.223988	0.199232
Octane	0.327543	2.00272	1.25839E-06	2.00272	1.67517
Water	6.02477	17.4568	107.065	124.521	0.0134298

Mass Fraction	Gas to Sales %	Inlet Overhead %	Inlet water %	Pipe Line Cooled Gas %	Post Compression Condensate %
Carbon Dioxide	2.80022	2.61454	0.0029646	2.47736	0.0866033
Hydrogen Sulfide	0	0	0	0	0
Nitrogen	1.93153	1.80012	4.57803E-05	1.70556	0.00699061
Methane	43.6821	40.7313	0.0021225	38.5919	0.498283
Ethane	11.8699	11.1105	0.000701479	10.5269	0.814986
Propane	17.9388	16.9662	0.00132229	16.075	4.04062
Isobutane	2.96652	2.86994	7.47409E-05	2.71919	1.6988
Butane	8.89923	8.74845	0.000484279	8.28895	7.32498
Isopentane	2.6422	2.78938	0.000112765	2.64287	5.25335
Pentane	2.70369	2.96423	0.000112422	2.80853	7.13867
Cyclopentane	0.127124	0.148716	4.00801E-05	0.140906	0.485474
n-Hexane	0.793859	1.18452	1.69131E-05	1.1223	7.13481
Cyclohexane	0.33877	0.557684	0.000140689	0.528398	3.88194
2-Methylpentane	0.88295	1.18126	2.09365E-05	1.11921	5.75112
3-Methylpentane	0.334732	0.463366	2.33235E-05	0.439028	2.42957
Heptane	1.11524	2.81535	6.20152E-05	2.66748	28.4883
Methylcyclohexane	0.248607	0.635765	6.92937E-05	0.602374	6.48162
2,2,4-Trimethylpentane	0.154636	0.36766	6.73042E-07	0.348348	3.58591
Benzene	0.0377586	0.0561723	0.000471414	0.0532465	0.336578
Toluene	0.0382708	0.108116	0.000746896	0.102476	1.16204
Ethylbenzene	0.00850388	0.0562598	0.000384505	0.0533249	0.775232
meta-Xylene	0.00524026	0.0401855	0.00027641	0.0380892	0.566199
para-Xylene	0.021845	0.160747	0.00101388	0.152357	2.25167
ortho-Xylene	0.00806832	0.0683067	0.00062617	0.0647516	0.97495
Octane	0.115406	0.657463	7.45166E-06	0.622929	8.82015
Water	0.334785	0.903822	99.9882	6.10843	0.011152

Mass Flow	Gas to Sales lb/h	Inlet Overhead lb/h	Inlet water lb/h	Pipe Line Cooled Gas lb/h	Post Compression Condensate lb/h
Carbon Dioxide	907.836	909.742	0.0571879	909.799	1.87885
Hydrogen Sulfide	0	0	0	0	0
Nitrogen	626.206	626.359	0.000883114	626.359	0.151661
Methane	14161.8	14172.6	0.0409436	14172.7	10.8102
Ethane	3848.25	3865.94	0.0135317	3865.95	17.6811
Propane	5815.78	5903.45	0.0255073	5903.48	87.6609
Isobutane	961.752	998.608	0.00144177	998.609	36.8552
Butane	2885.15	3044.06	0.00934187	3044.07	158.915
Isopentane	856.605	970.576	0.00217527	970.579	113.971
Pentane	876.542	1031.42	0.00216865	1031.42	154.873
Cyclopentane	41.2138	51.7463	0.000773155	51.7471	10.5323
n-Hexane	257.37	412.16	0.000326259	412.16	154.789
Cyclohexane	109.83	194.049	0.00271392	194.052	84.2183
2-Methylpentane	286.254	411.024	0.00040387	411.024	124.77
3-Methylpentane	108.521	161.23	0.000449916	161.231	52.7093

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station	
Location:	Roush Compressor Station		
Flowsheet:	Flowsheet1		

Mass Flow	Gas to Sales lb/h	Inlet Overhead lb/h	Inlet water lb/h	Pipe Line Cooled Gas lb/h	Post Compression Condensate lb/h
Heptane	361.564	979.615	0.00119629	979.616	618.051
Methylcyclohexane	80.599	221.217	0.00133669	221.219	140.618
2,2,4-Trimethylpentane	50.1331	127.929	1.29832E-05	127.929	77.796
Benzene	12.2414	19.5454	0.00909369	19.5545	7.30202
Toluene	12.4075	37.6194	0.0144078	37.6338	25.2104
Ethylbenzene	2.75697	19.5759	0.0074172	19.5833	16.8186
meta-Xylene	1.6989	13.9827	0.00533203	13.9881	12.2836
para-Xylene	7.08218	55.9327	0.019558	55.9522	48.8497
ortho-Xylene	2.61576	23.7676	0.012079	23.7797	21.1515
Octane	37.4147	228.767	0.000143745	228.767	191.352
Water	108.538	314.489	1928.8	2243.29	0.241942

Stream Properties

Property	Units	Gas to Sales	Inlet Overhead	Inlet water	Pipe Line Cooled Gas	Post Compression Condensate
Temperature	°F	79.5974	60	60	60 *	79.5974
Pressure	psia	110.696	19.6959	19.6959	19.6959	110.696
Mole Fraction Vapor	%	100	100	0	92.5754	0
Mole Fraction Light Liquid	%	0	0	100	7.42463	100
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	24.9975	26.0635	18.0164	25.466	81.3473
Mass Density	lb/ft^3	0.496588	0.0927909	62.362	0.0979271	41.4456
Molar Flow	lbmol/h	1296.94	1335.03	107.071	1442.1	26.6695
Mass Flow	lb/h	32420.2	34795.4	1929.03	36724.5	2169.49
Vapor Volumetric Flow	ft^3/h	65285.9	374988	30.9327	375019	52.3455
Liquid Volumetric Flow	gpm	8139.54	46751.7	3.85655	46755.6	6.5262
Std Vapor Volumetric Flow	MMSCFD	11.812	12.1589	0.975158	13.1341	0.242896
Std Liquid Volumetric Flow	sgpm	165.678	172.613	3.85663	176.469	6.52277
Compressibility		0.962861	0.992	0.00102031	0.918424	0.037543
Specific Gravity		0.863095	0.899901	0.999888		0.664522
API Gravity				10.0159		78.1061
Enthalpy	Btu/h	-4.93536E+07	-5.24087E+07	-1.31901E+07	-6.55987E+07	-2.03E+06
Mass Enthalpy	Btu/lb	-1522.31	-1506.19	-6837.68	-1786.24	-935.705
Mass Cp	Btu/(lb*°F)	0.465807	0.440679	0.984033	0.46922	0.508657
Ideal Gas CpCv Ratio		1.21385	1.21062	1.32631	1.21632	1.06821
Dynamic Viscosity	cP	0.0105234	0.00995128	1.13425		0.291852
Kinematic Viscosity	cSt	1.32294	6.69503	1.13545		0.439607
Thermal Conductivity	Btu/(h*ft*°F)	0.0165579	0.0152278	0.342219		0.0663995
Surface Tension	lbf/ft			0.00511919 ?		0.00115091 ?
Net Ideal Gas Heating Value	Btu/ft^3	1289.82	1335.4	0.0812419	1236.26	4123.77
Net Liquid Heating Value	Btu/lb	19494	19346.6	-1057.94	18274.8	19078.7
Gross Ideal Gas Heating Value	Btu/ft^3	1416.42	1465.25	50.3949	1360.2	4445.65
Gross Liquid Heating Value	Btu/lb	21415.9	21237.2	1.8329	20121.8	20580.2

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Connections

	Post Compression Water	Saturation Water	Tank PW	To Water Tank	Water Tank Flash
From Block	3-Phase Separator	--	VSSL-102	MIX-101	VSSL-102
To Block	MIX-101	SAT-1	--	VSSL-102	--

Stream Composition

Mole Fraction	Post Compression Water %	Saturation Water %	Tank PW %	To Water Tank %	Water Tank Flash %
Carbon Dioxide	0.00539819	0 *	0.00155292	0.00161698	2.71473
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	0.000150131	0 *	1.45281E-05	4.10759E-05	1.12455
Methane	0.0118798	0 *	0.00174529	0.00329898	65.8142
Ethane	0.00189946	0 *	0.000324119	0.000562877	10.1138
Propane	0.00203105	0 *	0.000426418	0.000683951	10.9092
Isobutane	8.65091E-05	0 *	1.04719E-05	2.92732E-05	0.796413
Butane	0.000572203	0 *	0.000103662	0.000190799	3.69113
Isopentane	8.90721E-05	0 *	1.57688E-05	3.40301E-05	0.773548
Pentane	9.11916E-05	0 *	1.53445E-05	3.4157E-05	0.796893
Cyclopentane	2.63695E-05	0 *	1.00742E-05	1.18454E-05	0.0750363
n-Hexane	8.17713E-06	0 *	9.37639E-07	3.98333E-06	0.129013
Cyclohexane	5.82454E-05	0 *	2.76879E-05	3.28291E-05	0.217802
2-Methylpentane	1.15775E-05	0 *	1.4033E-06	5.07115E-06	0.155368
3-Methylpentane	1.17837E-05	0 *	2.87815E-06	5.54197E-06	0.112839
Heptane	9.9042E-06	0 *	3.45981E-06	1.10303E-05	0.320681
Methylcyclohexane	1.45876E-05	0 *	9.00847E-06	1.28954E-05	0.164655
2,2,4-Trimethylpentane	1.68355E-07	0 *	4.32321E-09	1.12149E-07	0.00456741
Benzene	0.000219562	0 *	0.000118748	0.000119414	0.0283252
Toluene	0.000149945	0 *	0.000145432	0.000146421	0.0420364
Ethylbenzene	2.46319E-05	0 *	6.09134E-05	6.1336E-05	0.0179617
meta-Xylene	1.57273E-05	0 *	4.36026E-05	4.3902E-05	0.0127266
para-Xylene	6.04408E-05	0 *	0.0001601	0.000161299	0.0509309
ortho-Xylene	3.28849E-05	0 *	9.86826E-05	9.91896E-05	0.0215742
Octane	6.02609E-07	0 *	2.19021E-07	1.12009E-06	0.0381688
Water	99.9772	100 *	99.9951	99.9928	1.87377

Molar Flow	Post Compression Water lbmol/h	Saturation Water lbmol/h	Tank PW lbmol/h	To Water Tank lbmol/h	Water Tank Flash lbmol/h
Carbon Dioxide	0.000616538	0 *	0.00184004	0.00191598	7.59399E-05
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	1.71468E-05	0 *	1.72142E-05	4.86715E-05	3.14573E-05
Methane	0.00135681	0 *	0.00206798	0.00390902	0.00184104
Ethane	0.000216941	0 *	0.000384046	0.000666963	0.000282917
Propane	0.00023197	0 *	0.000505258	0.000810425	0.000305167
Isobutane	9.88038E-06	0 *	1.2408E-05	3.46863E-05	2.22783E-05
Butane	6.53525E-05	0 *	0.000122828	0.00022608	0.000103253
Isopentane	1.01731E-05	0 *	1.86842E-05	4.03229E-05	2.16387E-05
Pentane	1.04152E-05	0 *	1.81815E-05	4.04732E-05	2.22917E-05
Cyclopentane	3.01172E-06	0 *	1.19369E-05	1.40359E-05	2.09901E-06
n-Hexane	9.33926E-07	0 *	1.111E-06	4.71991E-06	3.60892E-06
Cyclohexane	6.65233E-06	0 *	3.28071E-05	3.88997E-05	6.09262E-06
2-Methylpentane	1.32229E-06	0 *	1.66276E-06	6.0089E-06	4.34614E-06
3-Methylpentane	1.34584E-06	0 *	3.41029E-06	6.56677E-06	3.15648E-06
Heptane	1.13118E-06	0 *	4.09949E-06	1.307E-05	8.97048E-06
Methylcyclohexane	1.66608E-06	0 *	1.0674E-05	1.528E-05	4.60594E-06
2,2,4-Trimethylpentane	1.92282E-08	0 *	5.12253E-09	1.32888E-07	1.27765E-07

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Molar Flow	Post Compression Water lbmol/h	Saturation Water lbmol/h	Tank PW lbmol/h	To Water Tank lbmol/h	Water Tank Flash lbmol/h
Benzene	2.50766E-05	0 *	0.000140703	0.000141495	7.92349E-07
Toluene	1.71255E-05	0 *	0.000172321	0.000173497	1.1759E-06
Ethylbenzene	2.81326E-06	0 *	7.21756E-05	7.26781E-05	5.02449E-07
meta-Xylene	1.79625E-06	0 *	5.16642E-05	5.20202E-05	3.56005E-07
para-Xylene	6.90307E-06	0 *	0.000189701	0.000191125	1.4247E-06
ortho-Xylene	3.75586E-06	0 *	0.000116928	0.000117531	6.03502E-07
Octane	6.88252E-08	0 *	2.59515E-07	1.32722E-06	1.0677E-06
Water	11.4186	124.521 *	118.483	118.483	5.24156E-05

Mass Fraction	Post Compression Water %	Saturation Water %	Tank PW %	To Water Tank %	Water Tank Flash %
Carbon Dioxide	0.0131852	0 *	0.0037934	0.00394983	4.72622
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	0.000233415	0 *	2.25895E-05	6.38676E-05	1.24619
Methane	0.0105772	0 *	0.00155407	0.0029375	41.7668
Ethane	0.00316988	0 *	0.000540949	0.000939423	12.0303
Propane	0.00497059	0 *	0.00104367	0.00167397	19.0296
Isobutane	0.000279059	0 *	3.3783E-05	9.44364E-05	1.83114
Butane	0.0018458	0 *	0.00033442	0.000615524	8.48677
Isopentane	0.000356667	0 *	6.31478E-05	0.000136276	2.20779
Pentane	0.000365154	0 *	6.14488E-05	0.000136784	2.27442
Cyclopentane	0.00010264	0 *	3.92163E-05	4.61106E-05	0.208178
n-Hexane	3.9109E-05	0 *	4.48488E-06	1.90527E-05	0.439803
Cyclohexane	0.000272055	0 *	0.000129338	0.000153352	0.725112
2-Methylpentane	5.53722E-05	0 *	6.71222E-06	2.42559E-05	0.529645
3-Methylpentane	5.6358E-05	0 *	1.37667E-05	2.65079E-05	0.384666
Heptane	5.50793E-05	0 *	1.92425E-05	6.13466E-05	1.27113
Methylcyclohexane	7.94923E-05	0 *	4.90945E-05	7.02768E-05	0.639537
2,2,4-Trimethylpentane	1.06732E-06	0 *	2.74103E-08	7.11049E-07	0.0206388
Benzene	0.000951844	0 *	0.000514843	0.000517725	0.0875249
Toluene	0.00076677	0 *	0.000743762	0.000748812	0.153217
Ethylbenzene	0.000145135	0 *	0.000358944	0.00036143	0.0754347
meta-Xylene	9.26677E-05	0 *	0.000256936	0.000258698	0.0534485
para-Xylene	0.000356126	0 *	0.000943419	0.000950473	0.213897
ortho-Xylene	0.000193763	0 *	0.000581505	0.000584487	0.0906062
Octane	3.82035E-06	0 *	1.38865E-06	7.10162E-06	0.172474
Water	99.9618	100 *	99.9889	99.9856	1.33536

Mass Flow	Post Compression Water lb/h	Saturation Water lb/h	Tank PW lb/h	To Water Tank lb/h	Water Tank Flash lb/h
Carbon Dioxide	0.0271335	0 *	0.0809794	0.0843215	0.00334208
Hydrogen Sulfide	0	0 *	0	0	0
Nitrogen	0.00048034	0 *	0.000482228	0.00136345	0.000881226
Methane	0.0217666	0 *	0.0331755	0.0627103	0.0295348
Ethane	0.00652322	0 *	0.0115479	0.0200549	0.00850705
Propane	0.0102289	0 *	0.0222797	0.0357362	0.0134565
Isobutane	0.000574269	0 *	0.00072118	0.00201604	0.00129486
Butane	0.00379843	0 *	0.00713901	0.0131403	0.00600128
Isopentane	0.000733977	0 *	0.00134804	0.00290925	0.0015612
Pentane	0.000751443	0 *	0.00131177	0.00292009	0.00160832
Cyclopentane	0.000211221	0 *	0.000837166	0.000984376	0.00014721
n-Hexane	8.04815E-05	0 *	9.57407E-05	0.00040674	0.000311
Cyclohexane	0.000559857	0 *	0.00276103	0.00327378	0.000512752
2-Methylpentane	0.000113949	0 *	0.000143289	0.000517819	0.00037453
3-Methylpentane	0.000115978	0 *	0.000293883	0.000565894	0.000272011

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Mass Flow	Post Compression Water lb/h	Saturation Water lb/h	Tank PW lb/h	To Water Tank lb/h	Water Tank Flash lb/h
Heptane	0.000113346	0 *	0.000410777	0.00130964	0.00089886
Methylcyclohexane	0.000163585	0 *	0.00104804	0.00150028	0.000452239
2,2,4-Trimethylpentane	2.19641E-06	0 *	5.85139E-07	1.51796E-05	1.45944E-05
Benzene	0.00195878	0 *	0.0109906	0.0110525	6.18918E-05
Toluene	0.00157792	0 *	0.0158774	0.0159857	0.000108345
Ethylbenzene	0.00029867	0 *	0.00766253	0.00771587	5.33424E-05
meta-Xylene	0.000190699	0 *	0.00548493	0.00552273	3.77953E-05
para-Xylene	0.000732864	0 *	0.0201396	0.0202908	0.000151254
ortho-Xylene	0.00039874	0 *	0.0124137	0.0124777	6.40708E-05
Octane	7.8618E-06	0 *	2.9644E-05	0.000151606	0.000121962
Water	205.709	2243.29 *	2134.51	2134.51	0.000944281

Stream Properties

Property	Units	Post Compression Water	Saturation Water	Tank PW	To Water Tank	Water Tank Flash
Temperature	°F	79.5974	227.18	61.9197	61.9085	61.9197
Pressure	psia	110.696	19.6959	14.6959	19.6959	14.6959 *
Mole Fraction Vapor	%	0	95.1286	0	0.00137174	100
Mole Fraction Light Liquid	%	100	4.87136	100	99.9986	0
Mole Fraction Heavy Liquid	%	0	0	0	0	0
Molecular Weight	lb/lbmol	18.018	18.0153	18.0164	18.0166	25.2789
Mass Density	lb/ft^3	62.1757	0.0511597	62.3466	61.5236	0.0667377
Molar Flow	lbmol/h	11.4212	124.521	118.489	118.492	0.00279733
Mass Flow	lb/h	205.788	2243.29	2134.74	2134.81	0.0707135
Vapor Volumetric Flow	ft^3/h	3.30978	43848.7	34.2399	34.6991	1.05957
Liquid Volumetric Flow	gpm	0.412647	5466.85	4.26888	4.32612	0.132103
Std Vapor Volumetric Flow	MMSCFD	0.10402	1.13409	1.07915	1.07918	2.5477E-05
Std Liquid Volumetric Flow	sgpm	0.411552	4.48449	4.26782	4.26818	0.000354987
Compressibility		0.00554307	0.940944	0.000758682	0.00103044	0.994471
Specific Gravity		0.996901		0.999641		0.872813
API Gravity		10.0242		10.0147		
Enthalpy	Btu/h	-1.40287E+06	-1.29043E+07	-1.45928E+07	-1.45929E+07	-113.788
Mass Enthalpy	Btu/lb	-6817.06	-5752.39	-6835.87	-6835.69	-1609.15
Mass Cp	Btu/(lb*°F)	0.98243	0.487025	0.98384	0.983829	0.439119
Ideal Gas CpCv Ratio		1.32535	1.31872	1.32622	1.32622	1.21907
Dynamic Viscosity	cP	0.884118		1.10559		0.0101129
Kinematic Viscosity	cSt	0.887705		1.10703		9.45983
Thermal Conductivity	Btu/(h*ft*°F)	0.351098		0.343169		0.015359
Surface Tension	lbf/ft	0.00496734 ?		0.0051044 ?		
Net Ideal Gas Heating Value	Btu/ft^3	0.239235	0	0.0664437	0.0964706	1271.98
Net Liquid Heating Value	Btu/lb	-1054.35	-1059.76	-1058.25	-1057.59	18996.3
Gross Ideal Gas Heating Value	Btu/ft^3	50.5603	50.31	50.379	50.4108	1397.03
Gross Liquid Heating Value	Btu/lb	5.47992	0	1.4931	2.18446	20873.5

Remarks

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Connections

	Well Gas Dry	Well Gas Wet			
From Block	--	SAT-1			
To Block	SAT-1	FAXR-100			

Stream Composition

Mole Fraction	Well Gas Dry %		Well Gas Wet %				
Carbon Dioxide	1.569	*	1.43352				
Hydrogen Sulfide	0	*	0				
Nitrogen	1.697	*	1.55047				
Methane	67.051	*	61.2613				
Ethane	9.758	*	8.91542				
Propane	10.161	*	9.28362				
Isobutane	1.304	*	1.1914				
Butane	3.975	*	3.63177				
Isopentane	1.021	*	0.932839				
Pentane	1.085	*	0.991313				
Cyclopentane	0.056	*	0.0511645				
n-Hexane	0.363	*	0.331656				
Cyclohexane	0.175	*	0.159889				
2-Methylpentane	0.362	*	0.330742				
3-Methylpentane	0.142	*	0.129739				
Heptane	0.742	*	0.67793				
Methylcyclohexane	0.171	*	0.156235				
2,2,4-Trimethylpentane	0.085	*	0.0776605				
Benzene	0.019	*	0.0173594				
Toluene	0.031	*	0.0283232				
Ethylbenzene	0.014	*	0.0127911				
meta-Xylene	0.01	*	0.00913653				
para-Xylene	0.04	*	0.0365461				
ortho-Xylene	0.017	*	0.0155321				
Octane	0.152	*	0.138875				
Water	0	*	8.63474				

Molar Flow	Well Gas Dry lbmol/h		Well Gas Wet lbmol/h				
Carbon Dioxide	20.6728	*	20.6728				
Hydrogen Sulfide	0	*	0				
Nitrogen	22.3593	*	22.3593				
Methane	883.448	*	883.448				
Ethane	128.569	*	128.569				
Propane	133.879	*	133.879				
Isobutane	17.1812	*	17.1812				
Butane	52.3737	*	52.3737				
Isopentane	13.4525	*	13.4525				
Pentane	14.2957	*	14.2957				
Cyclopentane	0.737843	*	0.737843				
n-Hexane	4.7828	*	4.7828				
Cyclohexane	2.30576	*	2.30576				
2-Methylpentane	4.76963	*	4.76963				
3-Methylpentane	1.87096	*	1.87096				
Heptane	9.77642	*	9.77642				
Methylcyclohexane	2.25306	*	2.25306				
2,2,4-Trimethylpentane	1.11994	*	1.11994				
Benzene	0.25034	*	0.25034				
Toluene	0.408449	*	0.408449				
Ethylbenzene	0.184461	*	0.184461				
meta-Xylene	0.131758	*	0.131758				
para-Xylene	0.527031	*	0.527031				
ortho-Xylene	0.223988	*	0.223988				
Octane	2.00272	*	2.00272				

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Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Molar Flow	Well Gas Dry lbmol/h	Well Gas Wet lbmol/h
Water	0 *	124.521

Mass Fraction	Well Gas Dry %	Well Gas Wet %
Carbon Dioxide	2.63854 *	2.47736
Hydrogen Sulfide	0 *	0
Nitrogen	1.81653 *	1.70556
Methane	41.1027 *	38.5919
Ethane	11.2118 *	10.5269
Propane	17.1209 *	16.075
Isobutane	2.8961 *	2.71919
Butane	8.82822 *	8.28895
Isopentane	2.81481 *	2.64287
Pentane	2.99125 *	2.80853
Cyclopentane	0.150073 *	0.140906
n-Hexane	1.19532 *	1.1223
Cyclohexane	0.562775 *	0.528398
2-Methylpentane	1.19203 *	1.11921
3-Methylpentane	0.46759 *	0.439028
Heptane	2.84102 *	2.66748
Methylcyclohexane	0.641564 *	0.602374
2,2,4-Trimethylpentane	0.371011 *	0.348348
Benzene	0.0567106 *	0.0532465
Toluene	0.109143 *	0.102476
Ethylbenzene	0.0567941 *	0.0533249
meta-Xylene	0.0405672 *	0.0380892
para-Xylene	0.162269 *	0.152357
ortho-Xylene	0.0689643 *	0.0647516
Octane	0.663456 *	0.622929
Water	0 *	6.10843

Mass Flow	Well Gas Dry lb/h	Well Gas Wet lb/h
Carbon Dioxide	909.799 *	909.799
Hydrogen Sulfide	0 *	0
Nitrogen	626.359 *	626.359
Methane	14172.7 *	14172.7
Ethane	3865.95 *	3865.95
Propane	5903.48 *	5903.48
Isobutane	998.609 *	998.609
Butane	3044.07 *	3044.07
Isopentane	970.579 *	970.579
Pentane	1031.42 *	1031.42
Cyclopentane	51.7471 *	51.7471
n-Hexane	412.16 *	412.16
Cyclohexane	194.052 *	194.052
2-Methylpentane	411.024 *	411.024
3-Methylpentane	161.231 *	161.231
Heptane	979.616 *	979.616
Methylcyclohexane	221.219 *	221.219
2,2,4-Trimethylpentane	127.929 *	127.929
Benzene	19.5545 *	19.5545
Toluene	37.6338 *	37.6338
Ethylbenzene	19.5833 *	19.5833
meta-Xylene	13.9881 *	13.9881
para-Xylene	55.9522 *	55.9522
ortho-Xylene	23.7797 *	23.7797
Octane	228.767 *	228.767
Water	0 *	2243.29

* User Specified Values
? Extrapolated or Approximate Values

Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	Rowdy Pipeline, LLC	Job: Roush Compressor Station
Location:	Roush Compressor Station	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Well Gas Dry	Well Gas Wet
Temperature	°F	120 *	120
Pressure	psia	19.6959 *	19.6959
Mole Fraction Vapor	%	100	100
Mole Fraction Light Liquid	%	0	0
Mole Fraction Heavy Liquid	%	0	0
Molecular Weight	lb/lbmol	26.1702	25.466
Mass Density	lb/ft^3	0.0833356	0.0810823
Molar Flow	lbmol/h	1317.58	1442.1
Mass Flow	lb/h	34481.2	36724.5
Vapor Volumetric Flow	ft^3/h	413763	452928
Liquid Volumetric Flow	gpm	51586	56469
Std Vapor Volumetric Flow	MMSCFD	12 *	13.1341
Std Liquid Volumetric Flow	sgpm	171.985	176.469
Compressibility		0.994278	0.994413
Specific Gravity		0.903584	0.879272
API Gravity			
Enthalpy	Btu/h	-4.96524E+07	-6.25566E+07
Mass Enthalpy	Btu/lb	-1439.98	-1703.4
Mass Cp	Btu/(lb*°F)	0.467705	0.46679
Ideal Gas CpCv Ratio		1.19474	1.20167
Dynamic Viscosity	cP	0.0109289	0.011163
Kinematic Viscosity	cSt	8.18702	8.5948
Thermal Conductivity	Btu/(h*ft*°F)	0.0176202	0.0174008
Surface Tension	lbf/ft		
Net Ideal Gas Heating Value	Btu/ft^3	1353.09	1236.26
Net Liquid Heating Value	Btu/lb	19532.7	18274.8
Gross Ideal Gas Heating Value	Btu/ft^3	1484	1360.2
Gross Liquid Heating Value	Btu/lb	21430.9	20121.8

Remarks

Attachment D
Blowdown Volume Estimate

Ariel JGE4-2 compressor blowdown volume calculation

Stage 1 Compressor inlet scrubber + bottle		
Property	Value	Unit
Pressure	200.0	psi
Temperature	150.0	F
Gas Constant	10.7	ft^3psi/(R*lbmole)
Volume	66.8	ft^3
Standard Temp	60.0	F
Standard Pressure	14.7	psi
Standard Volume	774.73	scf

Stage 2 Discharge bottle + Scrubber + Suction bottle		
Property	Value	Unit
Pressure	445.0	psi
Temperature	300.0	F
Gas Constant	10.7	ft^3psi/(R*lbmole)
Volume	50.4	ft^3
Standard Temp	60.0	F
Standard Pressure	14.7	psi
Standard Volume	1043.67	scf

Post Stage 2 Discharge Bottle + Scrubber		
Property	Value	Unit
Pressure	1200.0	psi
Temperature	300.0	F
Gas Constant	10.7	ft^3psi/(R*lbmole)
Volume	42.6	ft^3
Standard Temp	60.0	F
Standard Pressure	14.7	psi
Standard Volume	2380.12	scf

Total Volume	4198.52	scf/blowdown-event

Stage Volumes

Stage 1		
Suction Scrubber Dimensions		
O.D	3	ft
Length	6.5	ft
Volume	45.94579	ft^3
Suction Bottle		
O.D	1.5	ft
Length	5.5	ft
Volume	9.719302	ft^3
Pipe Volume		
	11.13302	ft^3

Stage 2		
Suction Scrubber Dimensions		
O.D	2.5	ft
Length	6	ft
Volume	29.45243	ft^3
Suction Bottle		
O.D	1.0625	ft
Length	5.5	ft
Volume	4.876525	ft^3
Discharge Bottle		
O.D	1.166667	ft
Length	7.166667	ft
Volume	7.661268	ft^3
Pipe Volume		
	8.398045	ft^3

Post Stage 2		
Discharge Bottle		
O.D	1.0625	ft
Length	6.833333	ft
Volume	6.058713	ft^3
Suction Scrubber Dimensions		
O.D	2.5	ft
Length	6	ft
Volume	29.45243	ft^3
Pipe Volume		
	7.102229	ft^3

** NOTE

Pipe lengths for the compressor were not given on the P&IDs so pipe volume was estimated as 20% of the total volume from all process vessels. Pipe volumes were added for each stage. This compressor is part of a skid with a 1340 HP Caterpillar G3516LE. Compressibility factor assumed to be 1

$$V_2 = \frac{\frac{P_1 V_1}{R T_1} R T_2}{P_2}$$

Attachment E
Gas Analysis

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EXTENDED HYDROCARBON GAS (GLYCALC) STUDY

CERTIFICATE OF ANALYSIS

Company ..... **TISDALE CREEK RANCH, INC.**
Lab Number CR-14758
Date Sampled 10-7-2014

Study Number CR-1
Date Sampled 10-8-2014

Sample Identification ..... **ROWDY PIPELINE - CLARKLEN LPG STATION GAS STATION NO. 5506**
Sample Location ..... CLARKLEN FIELD, GILLETTE, WYOMING.
Sample Pressure ..... 90 PSIG
Type Sample ..... SPOT
Test Method GPA-2286

Sample Temperature ..... 86 F
County ..... CAMPBELL
Moisture Content..... N/A

Components	Mole %	Weight %	Liq. Vol. %
Carbon Dioxide	1.569	2.639	1.294
Hydrogen Sulfide	0.000	0.000	0.000
Nitrogen	1.697	1.817	0.902
Methane	67.051	41.103	54.941
Ethane	9.758	11.212	12.613
Propane	10.161	17.121	13.530
iso-Butane	1.304	2.896	2.062
n-Butane	3.975	8.828	6.057
iso-Pentane	1.021	2.815	1.805
n-Pentane	1.085	2.991	1.901
Cyclopentane	0.056	0.150	0.080
n-Hexane	0.363	1.195	0.721
Cyclohexane	0.175	0.563	0.288
Other Hexanes	0.504	1.660	1.002
Heptanes	0.742	2.841	1.655
Methylcyclohexane	0.171	0.642	0.332
2,2,4-Trimethylpentane	0.085	0.371	0.213
Benzene	0.019	0.057	0.026
Toluene	0.031	0.109	0.050
Ethylbenzene	0.014	0.057	0.026
Xylenes	0.067	0.272	0.125
C8+ Heavies	0.152	0.663	0.376
Totals	**100.000**	**100.000**	**100.000**

ADDITIONAL BETX DATA

Components	Mole %	Weight %	Liq. Vol. %
Cyclopentane	0.056	0.150	0.080
Cyclohexane	0.175	0.563	0.288
2-Methylpentane	0.362	1.191	0.719
3-Methylpentane	0.142	0.469	0.283
n-Hexane	0.363	1.195	0.721
Methylcyclohexane	0.171	0.642	0.332
2,2,4-Trimethylpentane	0.085	0.371	0.213
Benzene	0.019	0.057	0.026
Toluene	0.031	0.109	0.050
Ethylbenzene	0.014	0.057	0.026
m-Xylene	0.010	0.041	0.019
p-Xylene	0.040	0.163	0.075
o-Xylene	0.017	0.068	0.031

SPECIFIC GRAVITY AT 60/60 F, calculated	0.9036
TOTAL GPM (ETHANE INCLUSIVE)	8.844
CALCULATED BTU / REAL CF AT 14.73 PSIA, dry basis	1499.877
CALCULATED BTU / REAL CF AT 14.73 PSIA, wet basis	1474.035
AVERAGE MOLECULAR WEIGHT	26.170
MOLAR MASS RATIO	0.9036
RELATIVE DENSITY (G x Z (Air) / Z), calculated	0.000
IDEAL GROSS HEATING VALUE, BTU / IDEAL CF AT 14.696 PSIA, calculated	1487.755
COMPRESSIBILITY FACTOR (Z)	0.99420

PROPANE GPM	2.7922
BUTANE GPM	1.6756
GASOLINE GPM (PENTANE AND HEAVIER)	1.7733

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

James A. Kane, President
American Mobile Research, Inc.