Nesson Gathering System, LLC
22777 Springwoods Village Parkway
Spring, TX 77389

August 8, 2025

North Dakota Department of Environmental Quality
Division of Air Quality
918 E. Divide Ave. – 2nd Floor
Bismarck, ND 58501

RE: Flickertail Compressor Station – Williams County, ND
Nesson Gathering System, LLC

Air Quality Division:

Nesson Gathering System, LLC (Nesson) is submitting an updated application to modify the existing permit for the Flickertail Compressor Station in Williams County. Engine emission factors for eight (8) 3608 TALE compressor engines are being updated. The fuel membrane skid burner rating is being corrected to 2.5 MMBTU/HR burner,

If you have any questions or require additional information to process this application, please contact Tammy Wallace at 346-502-7988 or by email at tammy.h.wallace@exxonmobil.com.

Sincerely,

Tammy H. Wallace

Tammy H. Wallace
Environmental and Regulatory Advisor
XTO Energy Inc. (Subsidiary of Exxonmobil)

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
WILLIAMS COUNTY, NORTH DAKOTA

PREPARED BY:

TAMMY WALLACE

ENVIRONMENTAL AND REGULATORY ADVISOR

XTO ENERGY INC.

8/6/2025

Table of Attachments

Attachment # 1

Project Description & Flow Diagram

PROJECT DESCRIPTION
FLICKERTAIL COMPRESSOR STATION – MODIFICATION

Nesson Gathering System, LLC (Nesson) is submitting an permit to construct application to modify the Flickertail Compressor Station in Williams County. The compressor station receives up to 100 MMSCFD and compresses and dehydrates natural gas collected from surrounding production facilities. The compressor station will includes two 50 MMSCFD dehydration units each with a 0.75 MMBTU/hr reboiler burner and BTEX condenser, a fuel membrane skid containing a 2.5 MMBTU/hr burner, a combustor for dehy emissions, a combustor for tank/loading emissions, an emergency flare and eight (8) 3608 TALE compressor engines. Each of the compressor engines located at the facility is equipped with oxidation catalysts to meet the requested permit limits specified in the enclosed application. Additionally, the compressor station has tanks at atmospheric pressure including a 500-bbl gun barrel, four 400-bbl condensate storage tanks and two 400-bbl produced water storage tanks. All tank vapors are controlled by a combustor.

Under the guidance documents published on October 6, 2014 and January 23, 2015, air dispersion modeling is required at this facility due to the stack heights of the compressor engines. The results of the air dispersion modeling are included in Attachment 9.

Enclosed is a process flow diagram, emission calculations, and other supporting documentation.

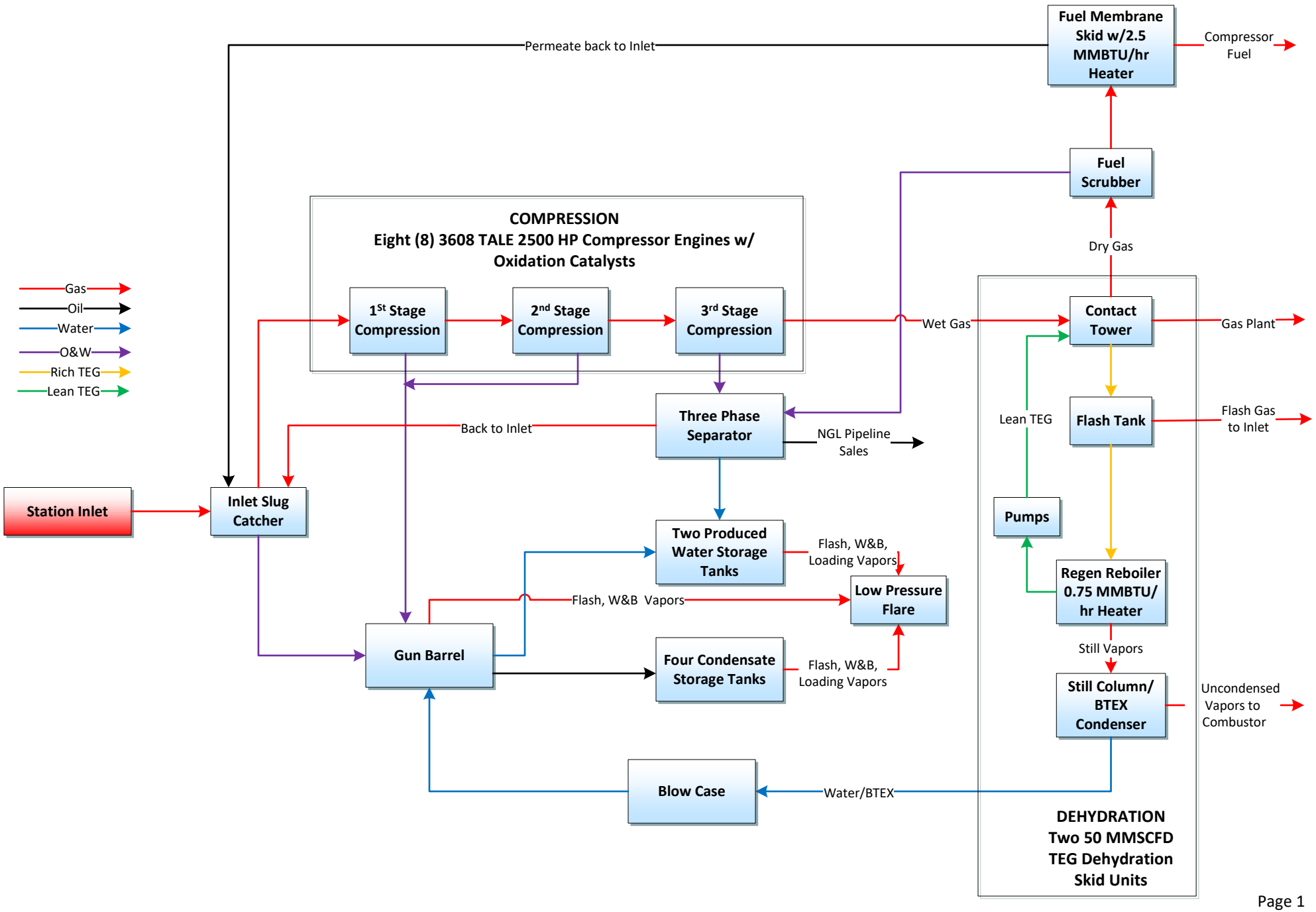
TITLE V APPLICABILITY
ROUGHRIDER COMPRESSOR STATION – NEW APPLICATION

The facility is not a Title V facility. The facility does not have the potential to emit more than 100 TPY of NOx, CO, or VOCs, 10 TPY of any Hazardous Air Pollutants (HAPs) or 25 TPY of total combined HAPs.

PSD APPLICABILITY
ROUGHRIDER COMPRESSOR STATION – NEW APPLICATION

The facility is not be a PSD facility because the facility does not have the potential to emit more than 250 TPY of NOx, CO, or VOCs, 10 TPY of any Hazardous Air Pollutants (HAPs) or 25 TPY of total combined HAPs.

Flickertail Compressor Station
April 2025



Attachment # 2
Facility Application Fee

Fee Paid Online

Attachment # 3
Application Forms

Attachment # 4

Applicability Determinations

Forms Uploaded in CERIS

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

Federal Regulations: Applicability Determinations

Applicability Determinations

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP): MACT STANDARDS	
40 CFR 63 Subpart HH	This facility is a minor source for HAPs emissions. Individual HAPs are less than 10 TPY & Total Combined HAPs are less than 25 TPY. The dehydration units processes more than 3 MMSCFD, but the Benzene emissions are less than 1 TPY. Title 40 CFR Part 63, entitled National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Source Categories, is incorporated into the North Dakota rules at NDAC 33.1-15-22-01. Only the requirements that are applicable to major sources of hazardous air pollutants are adopted from 40 CFR Part 63 Subpart HH and ZZZZ. The facility is not a major source of hazardous air pollutants therefore, the facility is not an affected facility under Section 33.1-15-22-03 and is not subject to this regulation.
40 CFR 63 Subpart ZZZZ	This facility is a minor source for HAPs emissions. Individual HAPs are less than 10 TPY & Total Combined HAPs are less than 25 TPY. The dehydration units processes more than 3 MMSCFD, but the Benzene emissions are less than 1 TPY. Title 40 CFR Part 63, entitled National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Source Categories, is incorporated into the North Dakota rules at NDAC 33.1-15-22-01. Only the requirements that are applicable to major sources of hazardous air pollutants are adopted from 40 CFR Part 63 Subpart HH and ZZZZ. The facility is not a major source of hazardous air pollutants therefore, the facility is not an affected facility under Section 33.1-15-22-03 and is not subject to this regulation.
40 CFR 63 Subpart DDDDD	N/A - This regulation is not applicable to this facility because the facility does not have the potential to emit more than 25 tons per year or more of any combination of hazardous air pollutants.

NEW SOURCE PERFORMANCE STANDARDS (NSPS)	
40 CFR 60 Subpart Ka/Kb	N/A - This facility does not contain any storage vessels for petroleum liquids with a capacity of ≥75 m3 for which construction, reconstruction, or modification commenced after July 23, 1984, and is not subject to this regulation
40 CFR 60 Subpart KKK	N/A - This facility is not a natural gas processing plant and is not subject to this regulation.
40 CFR 60 Subpart LLL	N/A - This facility is not a natural gas processing plant and is not subject to this regulation.
40 CFR 60 Subpart JJJJ	Eight (8) Compressor engines at the facility will be constructed after the applicable date for NSPS JJJJ and are therefore subject to the requirements of this regulation.
40 CFR 60 Subpart IIII	N/A - There are no compression-ignition internal combustion engines located at this facility that are subject to this regulation.
40 CFR 60 Subpart GG or KKKK	N/A - There are no stationary combustion turbines with a peak load equal to or greater than 10 MMBtu/hr located at this facility that are subject to this regulation
40 CFR 60 Subpart OOOO & OOOOa (Storage Tanks & Compressors)	This Facility was constructed after September 18, 2015 and therefore will be subject to LDAR provisions of NSPS OOOOa.

MANDATORY GREENHOUSE GAS REPORTING	
40 CFR 98 Subpart C	The facility is subject to this regulation and will comply by complying with the requirements of 40 CFR 98, Subpart W.
40 CFR 98 Subpart W	The facility is an affected source that is subject to this regulation because it contains onshore petroleum and natural gas production sources subject to reporting under Subpart W.

EPA RISK MANAGEMENT PLAN	
40 CFR 68 Subpart G	N/A - This facility does not store more than 10,000 pounds of a regulated material, thus it is not subject to the provisions of the EPA RMP Requirements.

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

State Regulations: Applicability Determinations

POTENTIALLY APPLICABLE NORTH DAKOTA REGULATIONS

Applicability Determinations

NDAC 33.1-15-01 - General Provisions	This facility is subject to general requirements of this section (i.e., inspection, circumvention, shutdown/malfunction, compliance, enforcement, confidentiality of records, etc.).
NDAC 33.1-15-02 - Ambient Air Quality Standards	The air quality of the area is classified as "Better than National Standards" or unclassifiable/attainment of the National Ambient Air Quality Standards (NAAQS) for criteria pollutants (40 CFR 81.327). There are no nonattainment areas within a reasonable distance of the site. Nesson will comply with the requirements of this chapter.
NDAC 33.1-15-03 - Restriction of Emission of Visible Air Contaminants	NDAC 33-15-03 contains regulations governing particulate matter and opacity limits from new and existing sources. Nesson will comply with all applicable standards.
NDAC 33.1-15-04 - Open Burning Restrictions	Nesson will comply with all open burning regulations at the facility.
NDAC 33.1-15-05 – Emissions of Particulate Matter Restricted	This facility operates three natural gas-fired stationary combustion units; however, they do not have an aggregate heat input of greater than ten million Btu/hr and are exempt from this regulation [NDAC 33.1-15-05-02.2(e)].
NDAC 33.1-15-06 - Emissions of Sulfur Compounds Restricted	This facility does not combust pipeline quality natural gas and will comply with the sulfur dioxide emissions limit of 3 lb/MMBtu heat input of this chapter.
NDAC 33.1-15-07 - Control of Organic Compounds Emissions	There is submerged fill loading, a low pressure flare and a combustor for the TEG dehy units at this facility. Nesson will comply with the applicable provisions of Sections 33.1-15-07-01 and 33.1-15-07-02, respectively.
NDAC 33.1-15-08 - Control of Air Pollution From Vehicles and Other Internal Combustion Engines	Nesson will comply with all requirements of this regulation at the facility.
NDAC 33.1-15-11 - Prevention of Air Pollution Emergency Episodes	Nesson will comply with any applicable source curtailment regulations when notified by the Department of an Air Pollution Emergency Episode.
NDAC 33.1-15-12 - Standards of Performance for New Stationary Sources	The facility qualifies as a designated source for NSPS per Subpart OOOOa and Subpart JJJJ of 40 CFR 60. Subpart OOOOa has yet to be incorporated by reference in NDAC Section 33.1-15-12-01.1 and remains administered by EPA Region 8.
NDAC 33.1-15-13 - Emissions Standards for Hazardous Air Pollutants	The process fluids at this facility (field gas or tank vapors) are not greater than 10% Volatile Hazardous Air Pollutant (VHAP) as defined by §61.241 of 40 CFR 61; therefore, this facility is not subject to Subpart J or Subpart V, as incorporated by Section 33.1-15-13-01.1.
NDAC 33.1-15-14 -Designated Air Contaminant Sources, Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate	The facility does not have the potential to emit more than 100 tons per year of a criteria pollutant and the facility is a minor source for HAPs emissions. Individual HAPs are less than 10 TPY & Total Combined HAPs are less than 25 TPY. Therefore, the facility is not subject to the operating permit program per NDAC 33.1-15-14-06. Nesson will comply with the requirements of NDAC 33.1-15-14-02.
NDAC 33.1-15-15 - Prevention of Significant Deterioration of Air Quality	The facility does not have the potential to emit greater than 250 tons per year of any regulated pollutant and is not a new facility with greater than 100,000 tons per year of carbon dioxide equivalent emissions, therefore PSD is not applicable.
NDAC 33.1-15-16 - Restriction of Odorous Air Contaminants	Nesson will comply with all requirements concerning odorous air contaminants at the facility as it applies to sources outside a city or outside the area over which a city has exercised extraterritorial zoning as defined in North Dakota Century Code Section 40-47-01.1

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

State Regulations: Applicability Determinations

POTENTIALLY APPLICABLE NORTH DAKOTA REGULATIONS

Applicability Determinations	
NDAC 33.1-15-17 - Restriction of Fugitive Emissions	Nesson will comply with all requirements for taking reasonable precautions to prevent fugitive emissions from causing air pollution as defined in NDAC 33.1-15-01-04.
NDAC 33.1-15-18 - Stack Heights	Air dispersion modeling is required for this facility. The potential to emit for NOx is less than 100 tpy however the engine stack heights will not be at least 1.5 times the building height. Refer to Attachment 9 for the air dispersion modeling results.
NDAC 33.1-15-19 - Visibility Protection	The facility is not a major stationary source as defined by Section 33.1-15-15-01; therefore, these regulations do not apply per Section 33.1-15-19-01.
NDAC 33.1-15-20 - Control of Emissions from Oil and Gas Well Production Facilities	The facility is not a "production facility" because an oil or gas well is not located at the facility or more contiguous or adjacent surface properties; therefore, these regulations do not apply
NDAC 33.1-15-21 - Acid Rain Program	This facility is not a listed source per 40 CFR 72 and 73, as incorporated by Section 33-15-21-08.1; therefore, these rules do not apply.
NDAC 33.1-15-22 - Emissions Standards for Hazardous Air Pollutants for Source Categories	Title 40 CFR Part 63, entitled National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Source Categories, is incorporated into the North Dakota rules at NDAC 33.1-15-22-01. The facility is not a major source of hazardous air pollutants therefore 40 CFR Part 63 Subpart HH and ZZZZ do not apply under Section 33.1-15-22-03 and the facility is not subject to this regulation.
NDAC 33.1-15-23 - Fees	Nesson will pay the required annual operating fees based on the specifications in Section 33.1-15-23-04.
NDAC 33.1-15-24 – Standards for Lead-Base Paint Activities	This facility is not involved in lead-based paint activities as defined in 40 CFR 745 Subpart 745.223 as incorporated in NDAC 33.1-15-24-01; therefore, the requirements of this chapter do not apply.
NDAC 33.1-15-25 – Regional Haze Requirements	The facility is not an existing stationary facility as defined in 40 CFR 51.301; therefore, the requirements of this chapter do not apply.

DISPERSION MODELING REQUIREMENTS	
DISPERSION MODELING REQUIREMENTS: COMPRESSOR ENGINERS & GLYCOL DEHYDRATION UNITS & CRITERIA POLLUTANT MODELING REQUIREMENTS FOR A PTC	Under the guidance documents published on October 6, 2014 and January 23, 2015, dispersion modeling is required at this facility due to the stack heights of the compressor engines. However the following criteria are satisfied at this facility: 1. Emissions from all compressor engines at the facility will be controlled with catalytic emission control systems which is designed to reduce non-methane hydrocarbon emissions by at least 50%. 2. Emissions from all glycol dehy units at the facility are controlled by a control device with a VOC destruction and removal efficiency of at least 90% (BTEX condenser est 80% efficiency and combustion device with 98% VOC DRE). 3. The facility is greater than 1/4 mile from a residence. 4. The facility has the potential to emit less than 100 tpy in NOx, 100 tpy in SO_2, 40 tpy in PM_{10} and 25 tpy in PM_{25}.

Attachment # 5
Facility Emission Summary Table

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

FACILITY EMISSION SUMMARY

EMISSION SUMMARY TABLE*

EMISSION SOURCE DESCRIPTION	FACILITY IDENTIFICATION NUMBER (FIN)	EMISSION POINT NUMBER (EPN)	NOx		CO		VOC (INCLUDES HAPs)		SO_2		$PM_{10\ \&\ 2.5}$		HCHO		HAPs	
			lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG1	ENG1	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG2	ENG2	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG3	ENG3	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG4	ENG4	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG5	ENG5	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG6	ENG6	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG7	ENG7	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG8	ENG8	2.20	9.66	2.43	10.62	2.31	10.14	0.01	0.05	0.20	0.86	0.22	0.97	0.39	1.70
COMPRESSOR BLOWDOWNS: MSS EMISSIONS	MSS	BD VENT	---	---	---	---	83.59	4.01	---	---	---	---	---	---	8.65	0.42
FUGITIVE EMISSIONS: EQUIPMENT LEAKS	FUG	FUG	---	---	---	---	4.56	19.99	---	---	---	---	---	---	0.22	0.94
GUN BARREL: 500 BBL	T-001	LP COMB	EMISSIONS REPRESENTED @ EPN: LP COMB													
OIL STORAGE TANKS: 400 BBL	T-002 T-003 T-004 T-005	LP COMB	EMISSIONS REPRESENTED @ EPN: LP COMB													
WATER STORAGE TANKS: 400 BBL	T-006 T-007	LP COMB	EMISSIONS REPRESENTED @ EPN: LP COMB													
TRUCK LOADING: OIL & WATER (CONTROLLED)	LOAD	LP COMB	EMISSIONS REPRESENTED @ EPN: LP COMB													
50 MMSCFD TEG DEHY #1 FLASH TANK - RECYCLED TO INLET	DEHY1	HP FLARE	MSS EMISSIONS REPRESENTED @ EPN: HP FLARE													
50 MMSCFD TEG DEHY #2 FLASH TANK - RECYCLED TO INLET	DEHY2	HP FLARE	MSS EMISSIONS REPRESENTED @ EPN: HP FLARE													
50 MMSCFD TEG DEHY # 1 STILL COLUMN (CONTROLLED W/ BTEX CONDENSER)	DEHY1	DEHY COMB	EMISSIONS REPRESENTED @ EPN: DEHY COMB													
50 MMSCFD TEG DEHY # 2 STILL COLUMN (CONTROLLED W/ BTEX CONDENSER)	DEHY2	DEHY COMB	EMISSIONS REPRESENTED @ EPN: DEHY COMB													
LOW PRESSURE COMBUSTOR - NORMAL OPERATIONS	LP COMB	LP COMB	0.59	2.59	1.18	5.17	2.60	11.40	0.00	0.00	0.02	0.07	---	---	0.11	0.47
TEG DEHY COMBUSTOR - COMBINED STILL COLUMN EMISSIONS	DEHY COMB	DEHY COMB	0.01	0.05	0.02	0.09	0.25	1.08	0.00	0.00	0.00	0.00	---	---	0.09	0.39
EMERGENCY FLARE *	HP FLARE	HP FLARE	277.14	0.50	553.28	1.00	589.96	0.60	0.00	0.00	10.81	0.02	---	---	19.64	0.01
DEHY REBOILER: 0.75 MMBTU/HR BURNER	HTR-01	HTR-01	0.11	0.46	0.09	0.39	0.01	0.03	0.00	0.01	0.01	0.03	---	---	0.00	0.01
DEHY REBOILER: 0.75 MMBTU/HR BURNER	HTR-02	HTR-02	0.11	0.46	0.09	0.39	0.01	0.03	0.00	0.01	0.01	0.03	---	---	0.00	0.01
FUEL MEMBRANE HEATER: 2.5 MMBTU/HR BURNER	HTR-03	HTR-03	0.35	1.53	0.29	1.29	0.02	0.08	0.01	0.02	0.03	0.12	---	---	0.01	0.03

TOTAL FACILITY WIDE EMISSIONS	NOx		CO		VOC** (INCLUDES HAPs)		SO_2		$PM_{10\ \&\ 2.5}$		HCHO		HAPs	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
	295.94	**82.84**	**574.36**	**93.29**	**694.95**	**98.34**	**0.10**	**0.44**	**12.44**	**7.16**	**1.76**	**7.72**	**31.60**	**14.91**

***Hourly Rates Include Instantaneous Flow Rates**

****PTE does not include fugitive emissions as defined in 40 CFR 70.2**

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

GHG (as CO_2e) FACILITY EMISSION SUMMARY

EMISSION SUMMARY TABLE

EMISSION SOURCE DESCRIPTION	FACILITY IDENTIFICATION NUMBER (FIN)	EMISSION POINT NUMBER (EPN)	CO_2e	
			lb/hr	TPY
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG1	ENG1	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG2	ENG2	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG3	ENG3	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG4	ENG4	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG5	ENG5	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG6	ENG6	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG7	ENG7	2915.56	11585.02
Caterpillar G3608 TALE Compressor Engine (Controlled - Oxidation Catalyst)	ENG8	ENG8	2915.56	11585.02
LOW PRESSURE COMBUSTOR - NORMAL OPERATIONS	LP COMB	LP COMB	517.96	2058.12
TEG DEHY COMBUSTOR - COMBINED STILL COLUMN EMISSIONS	DEHY COMB	DEHY COMB		
EMERGENCY FLARE	HP FLARE	HP FLARE	7628.91	179.94
DEHY REBOILER: 0.75 MMBTU/HR BURNER	HTR-01	HTR-01	90.44	360.27
DEHY REBOILER: 0.75 MMBTU/HR BURNER	HTR-02	HTR-02	90.44	360.27
FUEL MEMBRANE HEATER: 2.5 MMBTU/HR BURNER	HTR-03	HTR-03	301.47	1200.89

TOTAL FACILITY WIDE EMISSIONS (CO_2e)	CO_2e	
	lb/hr	TPY
	31,953.74	**96,839.67**

***Hourly Rates Include Instantaneous Flow Rates**

Attachment # 6
Component Analyses

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
FACILITY INLET GAS ANALYSIS

Conversion of Mole Percent to Weight Percent

Component	Mole %	Weight %
Triethylene Glycol	0.00	0.00
Carbon Dioxide	0.74	1.32
Nitrogen	1.58	1.79
Methane	64.41	41.71
Ethane	16.97	20.60
Propane	7.94	14.14
Isobutane	1.01	2.37
n-Butane	2.78	6.53
Isopentane	0.64	1.85
n-Pentane	0.95	2.76
n-Hexane	0.30	1.05
Cyclohexane	0.01	0.05
i-C6	0.36	1.24
iC7	0.43	1.73
Methylcyclohexane	0.01	0.04
n-Octane	0.15	0.67
L MEMBRANE HEATER: 2.5 MMBTU	0.04	0.18
Benzene	0.03	0.10
Toluene	0.03	0.10
Ethylbenzene	0.00	0.02
o-Xylene	0.02	0.08
Hydrogen Sulfide	0.00	0.00
Water	1.54	1.12
2,2,4-Trimethylpentane	0.00	0.00
Decanes Plus	0.06	0.55
Total	100.00	100.00

MOLECULAR WEIGHT	24.77
SATURATED BTU	1417
NMHC	54.053%
VOCs (NMNEHC)	33.457%
HAPs	1.340%
H2S Mole Percentage	0.000%

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
COMPRESSOR INLET GAS ANALYSIS

Conversion of Mole Percent to Weight Percent

Component	Mole %	Weight %
Triethylene Glycol	0.00	0.00
Carbon Dioxide	0.78	1.40
Nitrogen	1.55	1.77
Methane	65.20	42.79
Ethane	17.53	21.56
Propane	8.17	14.73
Isobutane	1.03	2.45
n-Butane	2.81	6.67
Isopentane	0.62	1.82
n-Pentane	0.91	2.68
n-Hexane	0.25	0.90
Cyclohexane	0.01	0.04
i-C6	0.32	1.12
iC7	0.31	1.28
Methylcyclohexane	0.01	0.03
n-Octane	0.05	0.24
L MEMBRANE HEATER: 2.5 MMBTU	0.00	0.03
Benzene	0.03	0.08
Toluene	0.02	0.06
Ethylbenzene	0.00	0.01
o-Xylene	0.01	0.02
Hydrogen Sulfide	0.00	0.00
Water	0.41	0.30
2,2,4-Trimethylpentane	0.00	0.00
Decanes Plus	0.00	0.00
Total	100.00	100.00

MOLECULAR WEIGHT	24.44
SATURATED BTU	1411
NMHC	53.727%
VOCs (NMNEHC)	32.165%
HAPs	1.071%
H2S Mole Percentage	0.000%

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
COMPRESSOR FUEL GAS ANALYSIS

Conversion of Mole Percent to Weight Percent

Component	Mole %	Weight %
Triethylene Glycol	0.00	0.00
Carbon Dioxide	0.46	1.01
Nitrogen	2.84	4.02
Methane	79.42	64.39
Ethane	12.41	18.86
Propane	3.90	8.69
Isobutane	0.22	0.66
n-Butane	0.55	1.61
Isopentane	0.08	0.30
n-Pentane	0.10	0.35
n-Hexane	0.01	0.05
Cyclohexane	0.00	0.00
i-C6	0.01	0.04
iC7	0.00	0.02
Methylcyclohexane	0.00	0.00
n-Octane	0.00	0.00
L MEMBRANE HEATER: 2.5 MMBTU	0.00	0.00
Benzene	0.00	0.00
Toluene	0.00	0.00
Ethylbenzene	0.00	0.00
o-Xylene	0.00	0.00
Hydrogen Sulfide	0.00	0.00
Water	0.00	0.00
2,2,4-Trimethylpentane	0.00	0.00
Decanes Plus	0.00	0.00
Total	100.00	100.00

MOLECULAR WEIGHT	19.79
SATURATED BTU	1153
NMHC	30.584%
VOCs (NMNEHC)	11.723%
HAPs	0.055%
H2S Mole Percentage	0.000%

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
SALES CONDENSATE ANALYSIS

Conversion of Mole Percent to Weight Percent

Component	Mole %	Weight %
Triethylene Glycol	0.00	0.00
Carbon Dioxide	0.37	0.30
Nitrogen	0.06	0.03
Methane	11.60	3.46
Ethane	17.71	9.89
Propane	19.99	16.37
Isobutane	4.35	4.69
n-Butane	14.69	15.85
Isopentane	4.94	6.62
n-Pentane	8.22	11.01
n-Hexane	3.97	6.35
Cyclohexane	0.21	0.32
i-C6	4.30	6.88
iC7	6.42	11.94
Methylcyclohexane	0.16	0.29
n-Octane	1.76	3.73
Nonane	0.23	0.54
Benzene	0.39	0.57
Toluene	0.39	0.67
Ethylbenzene	0.05	0.09
o-Xylene	0.20	0.39
Hydrogen Sulfide	0.00	0.00
Water	0.02	0.01
2,2,4-Trimethylpentane	0.00	0.00
Decanes Plus	0.00	0.00
Total	100.00	100.00

MOLECULAR WEIGHT	53.85
SATURATED BTU	3012
NMHC	96.205%
VOCs (NMNEHC)	86.314%
HAPs	8.065%
H2S Mole Percentage	0.000%

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
SALES GAS ANALYSIS

Conversion of Mole Percent to Weight Percent

Component	Mole %	Weight %
Triethylene Glycol	0.00	0.00
Carbon Dioxide	0.79	1.43
Nitrogen	1.57	1.82
Methane	66.01	43.87
Ethane	17.61	21.93
Propane	8.10	14.81
Isobutane	1.01	2.42
n-Butane	2.71	6.52
Isopentane	0.58	1.73
n-Pentane	0.84	2.50
n-Hexane	0.21	0.75
Cyclohexane	0.01	0.03
i-C6	0.27	0.97
iC7	0.23	0.95
Methylcyclohexane	0.00	0.02
n-Octane	0.03	0.12
Nonane	0.00	0.01
Benzene	0.02	0.07
Toluene	0.01	0.04
Ethylbenzene	0.00	0.00
o-Xylene	0.00	0.01
Hydrogen Sulfide	0.00	0.00
Water	0.01	0.01
2,2,4-Trimethylpentane	0.00	0.00
Decanes Plus	0.00	0.00
Total	100.00	100.00

MOLECULAR WEIGHT	24.14
SATURATED BTU	1399
NMHC	52.866%
VOCs (NMNEHC)	30.935%
HAPs	0.862%
H2S Mole Percentage	0.000%

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
DEHY STILL GAS ANALYSIS

Conversion of Mole Percent to Weight Percent

Component	Mole %	Weight %
Triethylene Glycol	0.00	0.00
Carbon Dioxide	5.58	4.85
Nitrogen	0.02	0.01
Methane	8.25	2.61
Ethane	15.92	9.45
Propane	17.36	15.11
Isobutane	2.73	3.13
n-Butane	13.41	15.38
Isopentane	3.89	5.53
n-Pentane	7.11	10.12
n-Hexane	2.46	4.19
Cyclohexane	0.44	0.73
i-C6	2.95	5.01
iC7	2.34	4.63
Methylcyclohexane	0.12	0.22
n-Octane	0.15	0.34
Nonane	0.00	0.01
Benzene	7.18	11.07
Toluene	2.37	4.30
Ethylbenzene	0.05	0.11
o-Xylene	0.27	0.56
Hydrogen Sulfide	0.00	0.00
Water	7.42	2.64
2,2,4-Trimethylpentane	0.00	0.00
Decanes Plus	0.00	0.00
Total	100.00	100.00

MOLECULAR WEIGHT	50.67
SATURATED BTU	2583
NMHC	89.893%
VOCs (NMNEHC)	80.444%
HAPs	20.225%
H2S Mole Percentage	0.000%

Attachment # 7
Emission Calculation Methodologies

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

Methodology for Fugitives

Calculation Methodology

Fugitives (Equipment Leaks) - VOC Emissions

Fugitives were calculated using AP-42 factors based on the type of fitting, valve, line, etc. and based on how the line is used (i.e. gas, light liquid service, etc.). Since these emission factors are for estimating total hydrocarbon emissions, the calculated emissions are multiplied by the VOC or HAP Weight Percentage of the service type.

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

Methodology for Engine Calculations

Engine Emission Calculations

Manufacturer's Data or NSPS Subpart JJJJ Limit Calculations

$$\text{Emission Rate}_X \text{ (lb/hr)} = \text{Emission Factor}_X \text{ (g/hp-hr)} * \text{Rated hp} / 453.6 \text{ (g/lb)}$$

$$\text{Annual Emission Rate}_X \text{ (TPY)} = \text{Emission Rate (lb/hr)} * 8760 \text{ (hour/year)} / 2000 \text{ (lb/ton)}$$

AP 42 Emission Factors

$$\text{Emission Rate}_X \text{ (lb/hr)} = \text{Fuel Consumption (MMBTU/hp-hr)} * EF_X \text{ (lb/MMBTU)} * \text{Rated hp}$$

$$\text{Annual Emission Rate}_X \text{ (TPY)} = \text{Emission Rate}_X \text{ (lb/hr)} * 8760 \text{ (hour/year)} / 2000 \text{ (lb/ton)}$$

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

Methodology for Gun Barrel & Tank Emissions

Calculation Methodology

Storage Tank Emissions - VOC Emissions

Storage Tank emissions were estimated using BR&E's ProMax 5.0 for Flash, Working, & Breathing Losses. Liquids sent to the storage tanks on location will be controlled by a low pressure combustor. A 98% control efficiency was assumed for the low pressure combustor.

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
Methodology for Burner Calculations

Burner Emission Calculations

AP 42 Emission Factors: Tables 1.4-1, 1.4-2, & 1.4-3

$Emission\ Rate_X\ (lb/hr) = Burner\ Rating\ (MMBTU/hr) * EF_X\ (lb/MMSCF) / Heating\ Value\ of\ Fuel\ Gas\ (BTU/SCF)$

$Annual\ Emission\ Rate_X\ (TPY) = Emission\ Rate\ (lb/hr) * 8760\ (hour/year) / 2000\ (lb/ton)$

Mass Balance - SO_2 & H_2S Calculations

$H_2S\ Mass\ Flow\ Rate\ (lb/hr) = P * V / 10.73 / T * MW_{GAS} * H_2S_{WEIGHT\ \%} * (1 - DRE)$

P = Pressure (psia), V = Fuel Consumed in a hour (ft^3/hr), 10.73 = Ideal Gas Constant, T = Temperature (°R)

$Uncontrolled\ H_2S\ Mass\ Flow\ Rate\ (lb/hr) = P * V / 10.73 / T * MW_{GAS} * H_2S_{WEIGHT\ \%}$

$SO_2\ Emission\ Rate\ (lb/hr) = Uncontrolled\ H_2S\ Mass\ Rate\ (lb/hr) * SO_2\ Conversion\ Efficiency * (MW\ of\ SO_2\ (lb/lb\text{-}mol) / MW\ of\ H_2S\ (lb/lb\text{-}mol))$

$Annual\ Emission\ Rate\ (TPY) = Emission\ Rate\ (lb/hr) * 8760\ (hour/year) / 2000\ (lb/ton)$

MW_{GAS} = Molecular Weight of the Gas, $H_2S_{WEIGHT\%}$ = Weight Percent of the H_2S in the Fuel Gas, DRE = Burner Combustion Efficiency of H_2S

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

Methodology for Flare/Combustor Calculations

Flare/Combustor Calculations

VOC Combustor Calculations - Uses the Ideal Gas Law for Mixtures

VOC Mass Flow Rate (lb/day) = P * V / 10.73 / T * MW_{GAS} * $VOC_{WEIGHT\ \%}$ * (1 - DRE)

P = Pressure (psia), V = Volume of Gas in a Day (ft^3/day), 10.73 = Ideal Gas Constant, T = Temperature (°R)

MW_{GAS} = Molecular Weight of the Gas, $VOC_{WEIGHT\%}$ = Weight Percent of the Total VOC, DRE = Flare Destruction Efficiency

NOx & CO Calculations - TCEQ Emission Factors Used

NOx (lb/day) = Heating Value (BTU/ft^3) * EF (lb/MMBTU) * V (ft^3/Day) / 10^6 (BTU/MMBTU)

CO (lb/day) = Heating Value (BTU/ft^3) * EF (lb/MMBTU) * V (ft^3/Day) / 10^6 (BTU/MMBTU)

COEF = 0.5496 or 0.2755, NOxEF = 0.138, EF = Emission Factor, V = Volume of Gas in a Day

*NOx and CO Emission Factors are the highest of Low BTU and High BTU options for TCEQ Flare Emission Factors - Calculating emissions using these factors overestimates either NOx or CO depending on the Heating Value of the Gas

SO_2 & H_2S Calculations - Mass Balance

H_2S Mass Flow Rate (lb/hr) = P * V / 10.73 / T * MW_{GAS} * $H_2S_{WEIGHT\ \%}$ * (1 - DRE)

P = Pressure (psia), V = Fuel Consumed in a hour (ft^3/hr), 10.73 = Ideal Gas Constant, T = Temperature (°R)

Uncontrolled H_2S Mass Flow Rate (lb/hr) = P * V / 10.73 / T * MW_{GAS} * $H_2S_{WEIGHT\ \%}$

SO_2 Emission Rate (lb/hr) = Uncontrolled H_2S Mass Rate (lb/hr) * SO_2 Conversion Efficiency * (MW of SO_2 (lb/lb-mol) / MW of H_2S (lb/lb-mol))

Annual Emission Rate (TPY) = Emission Rate (lb/hr) * 8760 (hour/year) / 2000 (lb/ton)

MW_{GAS} = Molecular Weight of the Gas, $H_2S_{WEIGHT\%}$ = Weight Percent of the H_2S in Gas Stream, DRE = Flare Destruction Efficiency of H_2S

Attachment # 8
Emission Calculations

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
LEAN BURN ENGINES

Emission Calculations - Compressor Engines

					Manufacturer's Data g/hp-hr				AP-42 Factors lb/MMBtu		lb/hr						tpy					
Source ID	Unit Description	Yearly Operating Hours	Rated HP	MMbtu/hp-hr[1] (HHV)	NOx	CO	VOC[2]	HCHO	SO_2[3]	$PM_{10\ \&\ 2.5}$[4]	NOx	CO	VOC	HCHO	SO_2	$PM_{10\ \&\ 2.5}$	NOx	CO	VOC	HCHO	SO_2	$PM_{10\ \&\ 2.5}$
ENG1	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG2	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG3	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG4	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG5	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG6	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG7	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86
ENG8	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.40	0.44	0.42	0.04	0.00059	0.01006	2.20	2.43	2.31	0.22	0.01	0.20	9.66	10.62	10.14	0.97	0.05	0.86

[1]HHV is based on the Fuel Consumption Rate @ 75% Load from the Gas Engine Rating Pro Report

[2]Emission Factor Includes HCHO

[3]SO_2 Emissions were calculated using the emission factor from Table 3.2-2

[4]PM Emission Factor = 7.71E-05 lb/MMBTU + 7.71E-05 lb/MMBTU + 9.91E-03 lb/MMBTU = 0.01006 lb/MMBTU

Total Emissions Per Pollutant (TPY)	NOx	CO	VOC	HCHO	SO_2	$PM_{10\ \&\ 2.5}$
	77.25	**84.97**	**81.11**	**7.72**	**0.40**	**6.88**

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
LEAN BURN ENGINES - HAP EMISSIONS

Emission Calculations - Compressor Engines

					Mfr's Data	AP-42 Factors[2]							lb/hr[3]								tpy[3]							
					g/hp-hr	lb/MMBtu																						
Source ID	Unit Description	Yearly Operating Hours	Rated HP	MMbtu/hp-hr[1] (HHV)	HCHO	Methanol	Benzene	Toluene	Acetaldehyde	Acrolein	Xylene	n-hexane	HCHO	Methanol	Benzene	Toluene	Acetaldehyde	Acrolein	Xylene	n-hexane	HCHO	Methanol	Benzene	Toluene	Acetaldehyde	Acrolein	Xylene	n-hexane
ENG1	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG2	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG3	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG4	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG5	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG6	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG7	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04
ENG8	CATERPILLAR G3608 TALE COMPRESSOR ENGINE	8760	2500	0.007807	0.04	0.0025	0.0004	0.0004	0.0084	0.0051	0.0002	0.0011	0.220	0.023	0.004	0.004	0.077	0.047	0.002	0.010	0.97	0.10	0.02	0.02	0.34	0.21	0.01	0.04

[1]HHV is based on the Fuel Consumption Rate @ 75% Load from the Gas Engine Rating Pro Report

[2]AP-42 Emission Factors are from Table 3.2-2

[3]AP-42 Factors are uncontrolled rates: A controlled rate was derived by the Controlled VOC Emission Factor / Uncontrolled Emission Factor

Total Emissions Per Pollutant (TPY)	HCHO	Methanol	Benzene	Toluene	Acetaldehyde	Acrolein	Xylene	n-hexane
	7.72	**0.81**	**0.14**	**0.13**	**2.70**	**1.66**	**0.06**	**0.36**

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
COMPRESSOR BLOWDOWNS - ATMOSPHERE

Total Estimated Quantity Released	4113	(SCF/Blowdown)
Estimated Planned Number of Blowdowns	96	(Blowdowns/Year)
Duration	1	(Hours/Blowdown)

Component	Estimated Quantity Blowdown (lbs)	Total Estimated Quantity Emitted (lbs)	Emission Rate (lb/Hour)	Annualized Emission Rate (TPY)
Total VOCs (Includes Total HAPs)	83.59	8024.95	83.59	4.01
Total HAPs	8.65	830.75	8.65	0.42
BENZENE	0.69	65.80	0.69	0.03

Compressor blowdowns are routed to inlet suction or the Emergency HP flare. However, during maintenance activities the full volume of the unit could go to atmosphere to bleed off the pressure. XTO utilizes best management practices to minimize venting and direct as much volume to process or controls as possible. One event per month of maintenance (per compressor) for startup, shutdown or maintenance is included to be conservative.

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

ESTIMATED COMPRESSOR BLOWDOWN VOLUME

Estimated Compressor Blowdown Volume

Standard Conditions	
14.7	psia
70	°F

Estimated Pressures & Temperatures		
Suction	35	psig
1st Stage Discharge	157	psig
2nd Stage Discharge	465	psig
3rd Stage Discharge	1123	psig
1st Stage Suction	54	°F
1st Stage Discharge	244	°F
2nd Stage Suction	110	°F
2nd Stage Discharge	248	°F
3rd Stage Suction	110	°F
3rd Stage Discharge	272	°F
Final Discharge from AC	110	°F

Total Estimated Blowdown Volumes		
Estimated Suction Volume	214.47	Standard ft^3
Estimated 1st Stage Discharge Volume	473.27	Standard ft^3
Estimated 2nd Stage Suction Volume	671.42	Standard ft^3
Estimated 2nd Stage Discharge Volume	631.19	Standard ft^3
Estimated 3rd Stage Suction Volume	871.44	Standard ft^3
Estimated 3rd Stage Discharge Volume	545.14	Standard ft^3
Estimated Final Discharge Volume	706.50	Standard ft^3

Estimated Blowdown Volume	**4113**	**Standard ft^3**

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
FUGITIVE EMISSIONS - VOCs

Fugitive Emission Calculations

Component Type	Service	Estimated Components Count	Hours	Factors	Total VOC Weight %	Emissions		
						lb/hour	lb/year	tons/year
Valves	Gas/Vapor	950	8760	0.00992000	33.46%	3.15	27620.37	13.81
	Light Oil	0	8760	0.00550000	86.31%	0.00	0.00	0.00
	Heavy Oil	0	8760	0.00001900	86.31%	0.00	0.00	0.00
	Water/Light Oil	700	8760	0.00021600	86.31%	0.13	1143.23	0.57
Pump Seals	Gas/Vapor	50	8760	0.00529000	33.46%	0.09	775.21	0.39
	Light Oil	10	8760	0.02866000	86.31%	0.25	2167.00	1.08
	Heavy Oil	0	8760	0.00113000	86.31%	0.00	0.00	0.00
	Water/Light Oil	20	8760	0.00005300	86.31%	0.00	8.01	0.00
Connectors	Gas/Vapor	1000	8760	0.00044000	33.46%	0.15	1289.58	0.64
	Light Oil	50	8760	0.00046300	86.31%	0.02	175.04	0.09
	Heavy Oil	0	8760	0.00001700	86.31%	0.00	0.00	0.00
	Water/Light Oil	188	8760	0.00024300	86.31%	0.04	345.42	0.17
Flanges	Gas/Vapor	750	8760	0.00086000	33.46%	0.22	1890.40	0.95
	Light Oil	20	8760	0.00024300	86.31%	0.00	36.75	0.02
	Heavy Oil	0	8760	0.00000086	86.31%	0.00	0.00	0.00
	Water/Light Oil	100	8760	0.00000620	86.31%	0.00	4.69	0.00
Open-ended Lines	Gas/Vapor	100	8760	0.00441000	33.46%	0.15	1292.51	0.65
	Light Oil	10	8760	0.00309000	86.31%	0.03	233.64	0.12
	Heavy Oil	0	8760	0.00030900	86.31%	0.00	0.00	0.00
	Water/Light Oil	5	8760	0.00055000	86.31%	0.00	20.79	0.01
Other:	Gas/Vapor	10	8760	0.01940000	33.46%	0.06	568.59	0.28
	Light Oil	10	8760	0.01650000	86.31%	0.14	1247.58	0.62
	Heavy Oil	0	8760	0.00006800	86.31%	0.00	0.00	0.00
	Water/Light Oil	5	8760	0.03090000	86.31%	0.13	1168.19	0.58

Emission Component	lb/hr	lb/year	TPY
Total VOC	4.56	39986.99	19.99

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
FUGITIVE EMISSIONS - HAPs

Fugitive Emission Calculations

Component Type	Service	Estimated Components Count	Hours	Factors	Total HAPs Weight %	Emissions		
						lb/hour	lb/year	tons/year
Valves	Gas/Vapor	950	8760	0.00992000	1.34%	0.126	1106.470	0.553
	Light Oil	0	8760	0.00550000	8.06%	0.000	0.000	0.000
	Heavy Oil	0	8760	0.00001900	8.06%	0.000	0.000	0.000
	Water/Light Oil	700	8760	0.00021600	8.06%	0.012	106.820	0.053
Pump Seals	Gas/Vapor	50	8760	0.00529000	1.34%	0.004	31.055	0.016
	Light Oil	10	8760	0.02866000	8.06%	0.023	202.478	0.101
	Heavy Oil	0	8760	0.00113000	8.06%	0.000	0.000	0.000
	Water/Light Oil	20	8760	0.00005300	8.06%	0.000	0.749	0.000
Connectors	Gas/Vapor	600	8760	0.00044000	1.34%	0.004	30.996	0.015
	Light Oil	50	8760	0.00046300	8.06%	0.002	16.355	0.008
	Heavy Oil	0	8760	0.00001700	8.06%	0.000	0.000	0.000
	Water/Light Oil	188	8760	0.00024300	8.06%	0.004	32.275	0.016
Flanges	Gas/Vapor	300	8760	0.00086000	1.34%	0.003	30.292	0.015
	Light Oil	20	8760	0.00024300	8.06%	0.000	3.434	0.002
	Heavy Oil	0	8760	0.00000086	8.06%	0.000	0.000	0.000
	Water/Light Oil	100	8760	0.00000620	8.06%	0.000	0.438	0.000
Open-ended Lines	Gas/Vapor	100	8760	0.00441000	1.34%	0.006	51.778	0.026
	Light Oil	10	8760	0.00309000	8.06%	0.002	21.830	0.011
	Heavy Oil	0	8760	0.00030900	8.06%	0.000	0.000	0.000
	Water/Light Oil	5	8760	0.00055000	8.06%	0.000	1.943	0.001
Other:	Gas/Vapor	10	8760	0.01940000	1.34%	0.003	22.778	0.011
	Light Oil	10	8760	0.01650000	8.06%	0.013	116.570	0.058
	Heavy Oil	0	8760	0.00006800	8.06%	0.000	0.000	0.000
	Water/Light Oil	5	8760	0.03090000	8.06%	0.012	109.152	0.055

Emission Component	lb/hr	lb/year	TPY
Total HAPs	0.22	1885.41	0.94

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
FUGITIVE EMISSIONS - BENZENE

Fugitive Emission Calculations

Component Type	Service	Estimated Components Count	Hours	Factors	Total Benzene Weight %	Emissions		
						lb/hour	lb/year	tons/year
Valves	Gas/Vapor	950	8760	0.00992000	0.10%	0.009	81.657	0.041
	Light Oil	0	8760	0.00550000	0.57%	0.000	0.000	0.000
	Heavy Oil	0	8760	0.00001900	0.57%	0.000	0.000	0.000
	Water/Light Oil	700	8760	0.00021600	0.57%	0.001	7.562	0.004
Pump Seals	Gas/Vapor	50	8760	0.00529000	0.10%	0.000	2.292	0.001
	Light Oil	10	8760	0.02866000	0.57%	0.002	14.334	0.007
	Heavy Oil	0	8760	0.00113000	0.57%	0.000	0.000	0.000
	Water/Light Oil	20	8760	0.00005300	0.57%	0.000	0.053	0.000
Connectors	Gas/Vapor	1000	8760	0.00044000	0.10%	0.000	3.813	0.002
	Light Oil	50	8760	0.00046300	0.57%	0.000	1.158	0.001
	Heavy Oil	0	8760	0.00001700	0.57%	0.000	0.000	0.000
	Water/Light Oil	188	8760	0.00024300	0.57%	0.000	2.285	0.001
Flanges	Gas/Vapor	750	8760	0.00086000	0.10%	0.001	5.589	0.003
	Light Oil	20	8760	0.00024300	0.57%	0.000	0.243	0.000
	Heavy Oil	0	8760	0.00000086	0.57%	0.000	0.000	0.000
	Water/Light Oil	100	8760	0.00000620	0.57%	0.000	0.031	0.000
Open-ended Lines	Gas/Vapor	100	8760	0.00441000	0.10%	0.000	3.821	0.002
	Light Oil	10	8760	0.00309000	0.57%	0.000	1.545	0.001
	Heavy Oil	0	8760	0.00030900	0.57%	0.000	0.000	0.000
	Water/Light Oil	5	8760	0.00055000	0.57%	0.000	0.138	0.000
Other:	Gas/Vapor	10	8760	0.01940000	0.10%	0.000	1.681	0.001
	Light Oil	10	8760	0.01650000	0.57%	0.001	8.252	0.004
	Heavy Oil	0	8760	0.00006800	0.57%	0.000	0.000	0.000
	Water/Light Oil	5	8760	0.03090000	0.57%	0.001	7.727	0.004

Emission Component	lb/hr	lb/year	TPY
Total HAPs	0.016	142.18	0.071

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
BURNER CALCULATIONS

CRITERIA & REGULATED POLLUTANTS

				AP-42 Factors[1] lb/MMSCF					lb/hr					tpy				
Source ID	Fuel Gas (BTU/SCF)	Operating Hours	Burner Rating (MMBTU/Hr)	NOx	CO	VOC	SO_2	$PM_{10\ \&\ 2.5}$	NOx	CO	VOC	SO_2	$PM_{10\ \&\ 2.5}$	NOx	CO	VOC	SO_2	$PM_{10\ \&\ 2.5}$
HTR-01	1153.5	8760	0.75	113	95	6.2	1.81	8.6	0.105	0.088	0.006	0.002	0.008	0.460	0.386	0.025	0.007	0.035
HTR-02	1153.5	8760	0.75	113	95	6.2	1.81	8.6	0.105	0.088	0.006	0.002	0.008	0.460	0.386	0.025	0.007	0.035
HTR-03	1153.5	8760	2.50	113	95	6.2	1.81	8.6	0.350	0.294	0.019	0.006	0.027	1.534	1.288	0.084	0.025	0.117

***Source: AP-42 Table 1.4-1, 1.4-2, & 1.4-3**

****Burners - 70% Efficiency**

Total (tpy)	NOx	CO	VOC	SO_2[1]	$PM_{10\ \&\ 2.5}$
	2.454	**2.061**	**0.135**	**0.039**	**0.186**

[1]Factors are adjusted for Site Fuel Heating Value: Example Calculation - Nox Factor = 100 * 1184.4/ 1020 = 116 lb/MMSCF

NESSON GATHERING SYSTEM, LLC

FLICKERTAIL COMPRESSOR STATION

BURNER CALCULATIONS

HAZARDOUS AIR POLLUTANTS (HAPs)

				AP-42 Factors lb/MMSCF					lb/hr					tpy				
Source ID	Fuel Gas (BTU/SCF)	Operating Hours	Burner Rating (MMBTU/Hr)	Benzene	Toluene	N-Hexane	HCHO	Diclorobenz.	Benzene	Toluene	N-Hexane	HCHO	Diclorobenz.	Benzene	Toluene	N-Hexane	HCHO	Diclorobenz.
FUEL MEMBRANE HEATER: 2.5 MMBTU/HR	1153.5	8760.0	0.75	0.0024	0.0038	2.0	0.0848	0.0014	0.000002	0.000004	0.001891	0.000079	0.000001	0.000010	0.000016	0.008282	0.000345	0.000006
HTR-02	1153.5	8760.0	0.75	0.0024	0.0038	2.0	0.0848	0.0014	0.000002	0.000004	0.001891	0.000079	0.000001	0.000010	0.000016	0.008282	0.000345	0.000006
HTR-03	1153.5	8760.0	2.5	0.0024	0.0038	2.0	0.0848	0.0014	0.000007	0.000012	0.006303	0.000263	0.000004	0.000032	0.000052	0.027605	0.001150	0.000018

***Source: AP-42 Table 1.4-1, 1.4-2, & 1.4-3**

****Burners - 70% Efficiency**

[1]Factors are adjusted for Site Fuel Heating Value: Example Calculation - Nox Factor = 100 * 1184.4/ 1020 = 116 lb/MMSCF

Total Individual HAPS (tpy)	Benzene	Toluene	Hexane	HCHO	Diclorobenz.
	0.000052	**0.000083**	**0.044168**	**0.001840**	**0.000029**

Total Combined HAPS (tpy)	**0.04617**

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
BURNER - TOTAL EMISSION SUMMARY

Total Burner Emissions

Stream Source	NOx		CO		Total VOC (Includes Total HAPs)		SO_2		$PM_{10 \& 2.5}$		Total HAPs	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
HTR-01	0.11	0.46	0.09	0.39	0.01	0.03	0.00	0.01	0.01	0.03	0.00	0.01
HTR-02	0.11	0.46	0.09	0.39	0.01	0.03	0.00	0.01	0.01	0.03	0.00	0.01
HTR-03	0.35	1.53	0.29	1.29	0.02	0.08	0.01	0.02	0.03	0.12	0.01	0.03
Total Emissions	**0.56**	**2.45**	**0.47**	**2.06**	**0.03**	**0.13**	**0.01**	**0.04**	**0.04**	**0.19**	**0.01**	**0.05**

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
TEG DEHYDRATOR #1 STILL VENT - HOURLY EMISSIONS

TEG Dehydrator Still Vent Hourly Emissions - BTEX Condenser

Hourly Still Vent Emissions Routed to BTEX Condenser & Dehy Combustor[a]			
Component	Uncontrolled Still Vent Vapors	BTEX Condenser Control Efficiency	Excess Condenser Vapors
	(lb/hr)	(%)	(lb/hr)
Triethylene Glycol	0.16	80%	0.03
Carbon Dioxide	1.12	80%	0.22
Nitrogen	0.00	80%	0.00
Methane	0.60	80%	0.12
Ethane	2.17	80%	0.43
Propane	3.51	80%	0.70
Isobutane	0.75	80%	0.15
n-Butane	3.74	80%	0.75
Isopentane	1.46	80%	0.29
n-Pentane	2.78	80%	0.56
n-Hexane	1.55	80%	0.31
Cyclohexane	0.32	80%	0.06
i-C6	1.66	80%	0.33
iC7	2.43	80%	0.49
Methylcyclohexane	0.16	80%	0.03
n-Octane	0.55	80%	0.11
Nonane	0.04	80%	0.01
Benzene	5.11	80%	1.02
Toluene	4.07	80%	0.81
Ethylbenzene	0.30	80%	0.06
o-Xylene	1.46	80%	0.29
Hydrogen Sulfide	0.00	80%	0.00
Water	152.79	80%	30.56
2,2,4-Trimethylpentane	0.00	80%	0.00
Decanes Plus	0.00	80%	0.00
Total	**186.71**	-	**37.34**
Total VOC	**29.87**	-	**5.97**
Total HAP	**12.48**	-	**2.50**
Heating Value (Btu/scf)	2583.33	-	2583.33
Molecular Weight	50.67	-	50.67
SO2 Emissions (lb/hr)	0.00	-	0.00
Volumetric Flow (scf/hr)	171.09	-	171.09
Heat Release (MMBtu/hr)	0.44	-	0.44

Still Vent Vapor Controls	
BTEX Condenser Control Efficiency	80%
Combustor Destruction Efficiency	98%

Footnotes:

[a] Uncontrolled stream properties determined via ProMax.

[b] Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
TEG DEHYDRATOR #2 STILL VENT - HOURLY EMISSIONS

TEG Dehydrator Still Vent Hourly Emissions - BTEX Condenser

Hourly Still Vent Emissions Routed to BTEX Condenser & Dehy Combustor[a]			
Component	Uncontrolled Still Vent Vapors	BTEX Condenser Control Efficiency	Excess Condenser Vapors
	(lb/hr)	(%)	(lb/hr)
Triethylene Glycol	0.16	80%	0.03
Carbon Dioxide	1.12	80%	0.22
Nitrogen	0.00	80%	0.00
Methane	0.60	80%	0.12
Ethane	2.17	80%	0.43
Propane	3.51	80%	0.70
Isobutane	0.75	80%	0.15
n-Butane	3.74	80%	0.75
Isopentane	1.46	80%	0.29
n-Pentane	2.78	80%	0.56
n-Hexane	1.55	80%	0.31
Cyclohexane	0.32	80%	0.06
i-C6	1.66	80%	0.33
iC7	2.43	80%	0.49
Methylcyclohexane	0.16	80%	0.03
n-Octane	0.55	80%	0.11
Nonane	0.04	80%	0.01
Benzene	5.11	80%	1.02
Toluene	4.07	80%	0.81
Ethylbenzene	0.30	80%	0.06
o-Xylene	1.46	80%	0.29
Hydrogen Sulfide	0.00	80%	0.00
Water	152.79	80%	30.56
2,2,4-Trimethylpentane	0.00	80%	0.00
Decanes Plus	0.00	80%	0.00
Total	**186.71**	-	**37.34**
Total VOC	**29.87**	-	**5.97**
Total HAP	**12.48**	-	**2.50**
Heating Value (Btu/scf)	2583.33	-	2583.33
Molecular Weight	50.67	-	50.67
SO2 Emissions (lb/hr)	0.00	-	0.00
Volumetric Flow (scf/hr)	171.09	-	171.09
Heat Release (MMBtu/hr)	0.44	-	0.44

Still Vent Vapor Controls	
BTEX Condenser Control Efficiency	80%
Combustor Destruction Efficiency	98%

Footnotes:

[a] Uncontrolled stream properties determined via ProMax.

[b] Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
DEHY 1 & 2 COMBUSTOR - HOURLY EMISSIONS

TEG Dehydrator Still Vent Hourly Emissions

Hourly Still Vent Emissions Routed to BTEX Condenser & Dehy Combustor[a]

Component	Dehy 1 Still Vent Vapors from BTEX Cond.	Dehy 2 Still Vent Vapors from BTEX Cond.	Pilot	Total	Combustor Destruction Efficiency	Combustor Exhaust (controlled)
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(%)	(lb/hr)
Triethylene Glycol	0.03	0.03	0.00	0.06	0%	**0.06**
Carbon Dioxide	0.22	0.22	0.03	0.48	0%	**0.48**
Nitrogen	0.00	0.00	0.14	0.14	0%	**0.14**
Methane	0.12	0.12	2.18	2.42	98%	**0.05**
Ethane	0.43	0.43	0.64	1.51	98%	**0.03**
Propane	0.70	0.70	0.29	1.70	98%	**0.03**
Isobutane	0.15	0.15	0.02	0.32	98%	**0.01**
n-Butane	0.75	0.75	0.05	1.55	98%	**0.03**
Isopentane	0.29	0.29	0.01	0.59	98%	**0.01**
n-Pentane	0.56	0.56	0.01	1.12	98%	**0.02**
n-Hexane	0.31	0.31	0.00	0.62	98%	**0.01**
Cyclohexane	0.06	0.06	0.00	0.13	98%	**0.00**
i-C6	0.33	0.33	0.00	0.66	98%	**0.01**
iC7	0.49	0.49	0.00	0.97	98%	**0.02**
Methylcyclohexane	0.03	0.03	0.00	0.06	98%	**0.00**
n-Octane	0.11	0.11	0.00	0.22	98%	**0.00**
Nonane	0.01	0.01	0.00	0.02	98%	**0.00**
Benzene	1.02	1.02	0.00	2.04	98%	**0.04**
Toluene	0.81	0.81	0.00	1.63	98%	**0.03**
Ethylbenzene	0.06	0.06	0.00	0.12	98%	**0.00**
o-Xylene	0.29	0.29	0.00	0.58	98%	**0.01**
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0%	**0.00**
Water	30.56	30.56	0.00	61.12	0%	**61.12**
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00	98%	**0.00**
Decanes Plus	0.00	0.00	0.00	0.00	98%	**0.00**
Total	37.34	37.34	3.39	78.07	-	**62.12**
Total VOC	5.97	5.97	0.40	12.35	-	**0.25**
Total HAP	2.50	2.50	0.00	4.99	-	**0.09**
Heating Value (Btu/scf)	2583.33	2583.33	1153.46	2355.07		
Molecular Weight	50.67	50.67	19.79	--		
SO2 Emissions (lb/hr)	0.00	0.00	0.00	0.00		
Volumetric Flow (scf/hr)	171.09	171.09	65.00	407.19		
Heat Release (MMBtu/hr)	0.44	0.44	0.07	0.96		

Criteria Pollutant Emissions from Combustor [b]

Component	Emission Rate	Emission Factor	Emission Factor Units
	(lb/hr)		
NO_X	0.01	0.138	lb/MMBtu
CO	0.02	0.2755	lb/MMBtu
SO_2	0.00	--	--
PM_{10}	0.00	7.60	lb/MMscf
$PM_{2.5}$	0.00	7.60	lb/MMscf
H_2S	0.00	--	--

Still Vent Vapor Controls	
BTEX Condenser Control Efficiency	80%
Combustor Destruction Efficiency	98%

Footnotes:

[a] Uncontrolled stream properties determined via ProMax.

[b] Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

[c] The combustor VOC destruction efficiency is 98% per manufacturer specifications.

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
DEHY 1 & 2 COMBUSTOR - ANNUAL EMISSIONS

TEG Dehydrator Still Vent Annual Emissions

Annual Still Vent Emissions Routed to BTEX Condenser & Dehy Combustor[a]

Component	Dehy 1 Still Vent Vapors from BTEX Cond.	Dehy 2 Still Vent Vapors from BTEX Cond.	Pilot	Total	Combustor Destruction Efficiency	Combustor Exhaust (controlled)
	(ton/year)	(ton/year)	(ton/year)	(ton/year)	(%)	(ton/year)
Triethylene Glycol	0.14	0.14	0.00	0.28	0%	**0.28**
Carbon Dioxide	0.98	0.98	0.15	2.11	0%	**2.11**
Nitrogen	0.00	0.00	0.60	0.60	0%	**0.60**
Methane	0.52	0.52	9.56	10.60	98%	**0.21**
Ethane	1.90	1.90	2.80	6.60	98%	**0.13**
Propane	3.08	3.08	1.29	7.44	98%	**0.15**
Isobutane	0.65	0.65	0.10	1.40	98%	**0.03**
n-Butane	3.28	3.28	0.24	6.80	98%	**0.14**
Isopentane	1.28	1.28	0.04	2.60	98%	**0.05**
n-Pentane	2.43	2.43	0.05	4.92	98%	**0.10**
n-Hexane	1.36	1.36	0.01	2.72	98%	**0.05**
Cyclohexane	0.28	0.28	0.00	0.55	98%	**0.01**
i-C6	1.45	1.45	0.01	2.91	98%	**0.06**
iC7	2.13	2.13	0.00	4.26	98%	**0.09**
Methylcyclohexane	0.14	0.14	0.00	0.27	98%	**0.01**
n-Octane	0.48	0.48	0.00	0.97	98%	**0.02**
Nonane	0.04	0.04	0.00	0.07	98%	**0.00**
Benzene	4.48	4.48	0.00	8.96	98%	**0.18**
Toluene	3.56	3.56	0.00	7.13	98%	**0.14**
Ethylbenzene	0.26	0.26	0.00	0.52	98%	**0.01**
o-Xylene	1.28	1.28	0.00	2.55	98%	**0.05**
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0%	**0.00**
Water	133.85	133.85	0.00	267.69	0%	**267.69**
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00	98%	**0.00**
Decanes Plus	0.00	0.00	0.00	0.00	98%	**0.00**
Total	163.56	163.56	14.85	341.96	-	**272.11**
Total VOC	26.17	26.17	1.74	54.07	-	**1.08**
Total HAP	10.93	10.93	0.01	21.88	-	**0.39**
Heating Value (Btu/scf)	2583.33	2583.33	1153.46	2355.07		
Molecular Weight	50.67	50.67	19.79	--		
SO2 Emissions (lb/hr)	0.00	0.00	0.00	0.00		
Volumetric Flow (scf/hr)	171.09	171.09	65.00	407.19		
Heat Release (MMBtu/hr)	0.44	0.44	0.07	0.96		

Criteria Pollutant Emissions from Combustor [b]

Component	Emission Rate	Emission Factor	Emission Factor Units
	(ton/year)		
NO_X	0.05	0.138	lb/MMBtu
CO	0.09	0.2755	lb/MMBtu
SO_2	0.00	--	--
PM_{10}	0.00	7.60	lb/MMscf
$PM_{2.5}$	0.00	7.60	lb/MMscf
H_2S	0.00	--	--

Still Vent Vapor Controls	
BTEX Condenser Control Efficiency	80%
Combustor Destruction Efficiency	98%

Footnotes:

[a] Uncontrolled stream properties determined via ProMax.

[b] Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

[c] The combustor VOC destruction efficiency is 98% per manufacturer specifications.

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
LP COMBUSTOR HOURLY EMISSIONS - NORMAL OPERATIONS

LP COMBUSTOR HOURLY - NORMAL OPERATIONS

Maximum Hourly Emission Rates and Composition to Combustor[a,b]

Component	Pilot [c]	Compressor Rod Packing[d]	OT, WT, GB Flash Vapors	OT, WT, GB Working Vapors	OT, WT, GB Breathing Vapors	OT & WT Truck Loading	Total	Destruction Efficiency	Flare Exhaust (controlled)
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(%)	(lb/hr)
Triethylene Glycol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	**0.00**
Carbon Dioxide	0.03	0.29	1.15	0.34	0.04	0.13	1.98	0%	**1.98**
Nitrogen	0.14	0.37	0.13	0.00	0.00	0.00	0.65	0%	**0.65**
Methane	2.18	8.91	11.71	1.29	0.20	0.48	24.77	98%	**0.50**
Ethane	0.64	4.46	28.75	5.30	0.66	1.44	41.24	98%	**0.82**
Propane	0.29	3.01	38.04	6.47	0.82	1.79	50.43	98%	**1.01**
Isobutane	0.02	0.49	7.96	1.30	0.17	0.36	10.30	98%	**0.21**
n-Butane	0.05	1.33	23.11	3.70	0.48	1.05	29.72	98%	**0.59**
Isopentane	0.01	0.35	6.70	1.04	0.14	0.30	8.53	98%	**0.17**
n-Pentane	0.01	0.51	9.98	1.54	0.20	0.44	12.67	98%	**0.25**
n-Hexane	0.00	0.15	3.46	0.51	0.07	0.15	4.33	98%	**0.09**
Cyclohexane	0.00	0.01	0.17	0.03	0.00	0.01	0.21	98%	**0.00**
i-C6	0.00	0.20	4.27	0.64	0.08	0.18	5.38	98%	**0.11**
iC7	0.00	0.19	4.94	0.72	0.09	0.21	6.15	98%	**0.12**
Methylcyclohexane	0.00	0.00	0.10	0.01	0.00	0.00	0.13	98%	**0.00**
n-Octane	0.00	0.02	0.95	0.13	0.02	0.04	1.16	98%	**0.02**
Nonane	0.00	0.00	0.10	0.01	0.00	0.00	0.12	98%	**0.00**
Benzene	0.00	0.01	0.38	0.08	0.01	0.03	0.51	98%	**0.01**
Toluene	0.00	0.01	0.25	0.05	0.01	0.02	0.34	98%	**0.01**
Ethylbenzene	0.00	0.00	0.02	0.00	0.00	0.00	0.03	98%	**0.00**
o-Xylene	0.00	0.00	0.09	0.02	0.00	0.01	0.12	98%	**0.00**
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	**0.00**
Water	0.00	0.03	1.16	0.26	0.03	0.10	1.57	0%	**1.57**
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98%	**0.00**
Decanes Plus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98%	**0.00**
Total	**3.39**	**20.35**	**143.39**	**23.44**	**3.02**	**6.74**	**200.33**	**--**	**8.12**
Total VOC	**0.40**	**6.29**	**100.50**	**16.25**	**2.09**	**4.58**	**130.12**	**--**	**2.60**
Total HAP	**0.00**	**0.18**	**4.20**	**0.67**	**0.09**	**0.21**	**5.33**	**--**	**0.11**
Heating Value (Btu/scf)	1153.46	1397.13	2262.01	2287.24	2264.81	2209.38	**2092.78**		
Molecular Weight	19.79	24.14	40.18	41.04	40.54	39.94	**--**		
SO2 Emissions (lb/hr)	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**		
Hours/Year	8760.00	8760.00	8760.00	8760.00	8760.00	8760.00	**--**		
Volumetric Flow (scf/hr)	65.00	320.00	1354.27	216.71	28.31	64.00	**2048.29**		
Heat Release (MMBtu/hr)	0.07	0.45	3.06	0.50	0.06	0.14	**4.29**		

Criteria Pollutant Emissions from Combustor e

Component	Emission Rate	Emission Factor	Emission Factor Units
	(lb/hr)		
NO_X	0.59	0.138	lb/MMBtu
CO	1.18	0.2755	lb/MMBtu
SO_2	0.00	--	--
PM_{10}	0.02	7.60	lb/MMscf
$PM_{2.5}$	0.02	7.60	lb/MMscf
H_2S	0.00	--	--

Storage Tank Vapor Controls	
Combustor Destruction Efficiency	98%

Footnotes:

[a] Uncontrolled stream properties determined via ProMax.

[b] Tank emissions determined in ProMax are calculated at the maximum daily liquid surface temperature. Truck loading vapors are routed to the LP combustor.

[c] Pilot fuel gas emissions are calculated based on a 65 scfh flow rate.

[d] Compressor Rod Packing is routed to the LP Combustor to minimize venting. 40 scfh per unit is assumed to go to the LP Combustor.

[e] Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H_2S to SO_2. The combustor VOC destruction efficiency is 98% per manufacturer specifications

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
LP COMBUSTOR ANNUAL EMISSIONS - NORMAL OPERATIONS

LP COMBUSTOR ANNUAL - NORMAL OPERATIONS

Maximum Annual Emission Rates and Composition to Combustor[a,b]

Component	Pilot [c]	Compressor Rod Packing[d]	OT, WT, GB Flash Vapors	OT, WT, GB Working Vapors	OT, WT, GB Breathing Vapors	OT & WT Truck Loading	Total	Destruction Efficiency	Flare Exhaust (controlled)
	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(ton/yr)	(%)	(ton/yr)
Triethylene Glycol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	**0.00**
Carbon Dioxide	0.15	1.28	5.03	1.47	0.17	0.56	8.67	0%	**8.67**
Nitrogen	0.60	1.62	0.59	0.02	0.00	0.01	2.83	0%	**2.83**
Methane	9.56	39.04	51.27	5.64	0.87	2.12	108.50	98%	**2.17**
Ethane	2.80	19.53	125.91	23.21	2.89	6.30	180.63	98%	**3.61**
Propane	1.29	13.18	166.59	28.35	3.61	7.85	220.88	98%	**4.42**
Isobutane	0.10	2.16	34.85	5.67	0.73	1.59	45.10	98%	**0.90**
n-Butane	0.24	5.81	101.23	16.20	2.09	4.58	130.15	98%	**2.60**
Isopentane	0.04	1.54	29.33	4.57	0.59	1.30	37.37	98%	**0.75**
n-Pentane	0.05	2.23	43.70	6.72	0.88	1.91	55.49	98%	**1.11**
n-Hexane	0.01	0.67	15.14	2.24	0.29	0.64	18.99	98%	**0.38**
Cyclohexane	0.00	0.03	0.73	0.11	0.01	0.03	0.91	98%	**0.02**
i-C6	0.01	0.86	18.70	2.81	0.37	0.80	23.56	98%	**0.47**
iC7	0.00	0.85	21.62	3.14	0.41	0.90	26.93	98%	**0.54**
Methylcyclohexane	0.00	0.02	0.45	0.07	0.01	0.02	0.56	98%	**0.01**
n-Octane	0.00	0.11	4.15	0.57	0.08	0.17	5.07	98%	**0.10**
Nonane	0.00	0.01	0.45	0.06	0.01	0.02	0.54	98%	**0.01**
Benzene	0.00	0.06	1.64	0.35	0.04	0.13	2.24	98%	**0.04**
Toluene	0.00	0.04	1.10	0.23	0.03	0.09	1.48	98%	**0.03**
Ethylbenzene	0.00	0.00	0.10	0.02	0.00	0.01	0.13	98%	**0.00**
o-Xylene	0.00	0.01	0.40	0.08	0.01	0.03	0.53	98%	**0.01**
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%	**0.00**
Water	0.00	0.11	5.07	1.13	0.14	0.44	6.89	0%	**6.89**
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98%	**0.00**
Decanes Plus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98%	**0.00**
Total	**14.85**	**89.14**	**628.06**	**102.66**	**13.25**	**29.50**	**877.46**	**--**	**35.58**
Total VOC	**1.74**	**27.57**	**440.18**	**71.19**	**9.17**	**20.08**	**569.93**	**--**	**11.40**
Total HAP	**0.01**	**0.78**	**18.39**	**2.92**	**0.38**	**0.90**	**23.36**	**--**	**0.47**
Heating Value (Btu/scf)	1153.46	1397.13	2262.01	2287.24	2264.81	2209.38	**2092.78**		
Molecular Weight	19.79	24.14	40.18	41.04	40.54	39.94	**--**		
SO2 Emissions (ton/yr)	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**		
Hours/Year	8760.00	8760.00	8760.00	8760.00	8760.00	8760.00	**--**		
Volumetric Flow (scf/hr)	65.00	320.00	1354.27	216.71	28.31	64.00	**2048.29**		
Heat Release (MMBtu/yr)	0.07	0.45	3.06	0.50	0.06	0.14	**4.29**		

Criteria Pollutant Emissions from Combustor [d]

Component	Emission Rate	Emission Factor	Emission Factor Units
	(ton/year)		
NO_X	2.59	0.138	lb/MMBtu
CO	5.17	0.2755	lb/MMBtu
SO_2	0.00	--	--
PM_{10}	0.07	7.60	lb/MMscf
$PM_{2.5}$	0.07	7.60	lb/MMscf
H_2S	0.00	--	--

Storage Tank Vapor Controls	
Combustor Destruction Efficiency	98%

Footnotes:

a Uncontrolled stream properties determined via ProMax.

b Tank emissions determined in ProMax are calculated at the maximum daily liquid surface temperature. Truck loading vapors are routed to the LP combustor.

c Pilot fuel gas emissions are calculated based on a 65 scfh flow rate.

d Compressor Rod Packing is routed to the LP Combustor to minimize venting. 40 scfh per unit is assumed to go to the LP Combustor.

e Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2. The combustor VOC destruction efficiency is 98% per manufacturer specifications

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
EMERGENCY HP FLARE HOURLY EMISSIONS - NORMAL OPERATIONS

EMERGENCY HP FLARE HOURLY - NORMAL OPERATIONS

Maximum Hourly Emission Rates and Composition to Flare[a,b]

Component	Pilot & Purge - Normal Operations [b]	Pigging - Upset Conditions [c]	Compressor Blowdown [d]	Slug Catcher Recycle Valve Failure - Emergency Condition[f]	Total	Destruction Efficiency	Flare Exhaust (controlled)
	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(%)	(lb/hr)
Triethylene Glycol	0.00	0.01	0.00	0.00	0.01	0%	**0.01**
Carbon Dioxide	0.27	6.25	3.75	1281.93	1292.20	0%	**1292.20**
Nitrogen	1.07	0.37	4.75	1616.82	1623.01	0%	**1623.01**
Methane	17.12	27.87	114.57	39045.76	39205.33	98%	**784.11**
Ethane	5.02	31.04	57.30	19674.17	19767.52	98%	**395.35**
Propane	2.31	27.00	38.69	13445.44	13513.45	98%	**270.27**
Isobutane	0.17	4.29	6.34	2237.52	2248.32	98%	**44.97**
n-Butane	0.43	14.79	17.05	6086.52	6118.78	98%	**122.38**
Isopentane	0.08	3.74	4.52	1665.03	1673.37	98%	**33.47**
n-Pentane	0.09	6.03	6.53	2444.42	2457.08	98%	**49.14**
n-Hexane	0.01	1.67	1.96	818.69	822.32	98%	**16.45**
Cyclohexane	0.00	0.12	0.09	38.62	38.83	98%	**0.78**
i-C6	0.01	2.17	2.53	1020.68	1025.39	98%	**20.51**
iC7	0.01	2.12	2.49	1166.09	1170.71	98%	**23.41**
Methylcyclohexane	0.00	0.05	0.05	23.95	24.05	98%	**0.48**
n-Octane	0.00	0.23	0.31	221.66	222.20	98%	**4.44**
Nonane	0.00	0.01	0.02	23.66	23.69	98%	**0.47**
Benzene	0.00	0.45	0.19	77.41	78.04	98%	**1.56**
Toluene	0.00	0.20	0.11	55.19	55.49	98%	**1.11**
Ethylbenzene	0.00	0.01	0.01	5.14	5.16	98%	**0.10**
o-Xylene	0.00	0.03	0.02	20.88	20.94	98%	**0.42**
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0%	**0.00**
Water	0.00	1.03	0.32	276.69	278.05	0%	**278.05**
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00	0.00	98%	**0.00**
Decanes Plus	0.00	0.00	0.00	0.01	0.01	98%	**0.00**
Total	**26.59**	**129.47**	**261.59**	**91246.28**	**91663.94**	**--**	**4962.67**
Total VOC	**3.12**	**62.90**	**80.89**	**29350.91**	**29497.83**	**--**	**589.96**
Total HAP	**0.01**	**2.35**	**2.28**	**977.31**	**981.95**	**--**	**19.64**
Heating Value (Btu/scf)	1153.46	1721.39	1397.13	1411.24	**1411.45**		
Molecular Weight	19.79	31.30	24.14	24.44	**--**		
SO2 Emissions (lb/hr)	0.00	0.00	0.00	0.00	**0.00**		
Hours/Year	8760.00	156.00	288.00	--	**--**		
Volumetric Flow (scf/hr)	510.00	1569.61	4113.00	1.42E+06	**1.42E+06**		
Heat Release (MMBtu/hr)	0.59	2.70	5.75	1999.25	**2008.29**		

Criteria Pollutant Emissions from Combustor [e]

Component	Emission Rate	Emission Factor	Emission Factor Units
	(lb/hr)		
NO_X	277.14	0.138	lb/MMBtu
CO	553.28	0.2755	lb/MMBtu
SO_2	0.00	--	--
PM_{10}	10.81	7.60	lb/MMscf
$PM_{2.5}$	10.81	7.60	lb/MMscf
H_2S	0.00	--	--

Storage Tank Vapor Controls	
Combustor Destruction Efficiency	98%

Footnotes:

[a] Uncontrolled stream properties determined via ProMax.

[b] Pilot & Purge fuel gas emissions are calculated based on a 510 scfh flow rate. Two pilots at 65 scf/hr and purge at 380 scf/hr.

[c] During normal operations, the dehy flash tanks are routed back to suction at the slug catcher. However, during pigging events, it is possible that the pressure of the slug catcher will exceed the pressure of the flash tank. In this case the vapors of the flash tank may be routed to the emergency HP flare. Although this is not expected to occur on a frequent basis, three one hour events per week are included to be conservative.

[d] Compressor blowdowns are routed to inlet suction or the Emergency HP flare. Three blowdown events per month per compressor is included.

[e] Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

[f] Hourly Rates Include Instantaneous Flow Rates; the maximum design rate for instantaneous flow rate is 34 MMSCFD during Slug Catcher Recycle Valve Failure. Expected duration is less than 5 minutes, and is only expected to occur in the event of an emergency.

NESSON GATHERING SYSTEM, LLC
FLICKERTAIL COMPRESSOR STATION
EMERGENCY HP FLARE ANNUAL EMISSIONS - NORMAL OPERATIONS

EMERGENCY HP FLARE ANNUAL - NORMAL OPERATIONS

Maximum Annual Emission Rates and Composition to Flare[a,b]

Component	Pilot & Purge - Normal Operations [b]	Pigging - Upset Conditions [c]	Compressor Blowdown [d]	Total	Destruction Efficiency	Flare Exhaust (controlled)
	(ton/year)	(ton/year)	(ton/year)	(ton/year)	(%)	(ton/year)
Triethylene Glycol	0.00	0.00	0.00	0.00	0%	**0.00**
Carbon Dioxide	1.18	0.49	0.54	2.21	0%	**2.21**
Nitrogen	4.68	0.03	0.68	5.39	0%	**5.39**
Methane	75.00	2.17	16.50	93.67	98%	**1.87**
Ethane	21.97	2.42	8.25	32.64	98%	**0.65**
Propane	10.13	2.11	5.57	17.80	98%	**0.36**
Isobutane	0.76	0.33	0.91	2.01	98%	**0.04**
n-Butane	1.87	1.15	2.46	5.48	98%	**0.11**
Isopentane	0.35	0.29	0.65	1.29	98%	**0.03**
n-Pentane	0.41	0.47	0.94	1.82	98%	**0.04**
n-Hexane	0.06	0.13	0.28	0.47	98%	**0.01**
Cyclohexane	0.00	0.01	0.01	0.02	98%	**0.00**
i-C6	0.04	0.17	0.36	0.58	98%	**0.01**
iC7	0.02	0.17	0.36	0.55	98%	**0.01**
Methylcyclohexane	0.00	0.00	0.01	0.01	98%	**0.00**
n-Octane	0.00	0.02	0.04	0.06	98%	**0.00**
Nonane	0.00	0.00	0.00	0.00	98%	**0.00**
Benzene	0.00	0.03	0.03	0.07	98%	**0.00**
Toluene	0.00	0.02	0.02	0.03	98%	**0.00**
Ethylbenzene	0.00	0.00	0.00	0.00	98%	**0.00**
o-Xylene	0.00	0.00	0.00	0.01	98%	**0.00**
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0%	**0.00**
Water	0.00	0.08	0.05	0.13	0%	**0.13**
2,2,4-Trimethylpentane	0.00	0.00	0.00	0.00	98%	**0.00**
Decanes Plus	0.00	0.00	0.00	0.00	98%	**0.00**
Total	**116.48**	**10.10**	**37.67**	**164.25**	**--**	**10.86**
Total VOC	**13.65**	**4.91**	**11.65**	**30.21**	**--**	**0.60**
Total HAP	**0.06**	**0.18**	**0.33**	**0.58**	**--**	**0.01**
Heating Value (Btu/scf)	1153.46	1721.39	1397.13	**1459.25**		
Molecular Weight	19.79	31.30	24.14	**--**		
SO2 Emissions (lb/hr)	0.00	0.00	0.00	**0.00**		
Hours/Year	8760.00	156.00	288.00	**--**		
Annualized Vol. Flow (scf/hr)	510.00	27.95	135.22	**673.17**		
Volumetric Flow (MMscf/yr)	4.47	0.24	1.18	**5.90**		
Heat Release (MMBtu/hr)	0.59	0.05	0.19	**0.83**		

Criteria Pollutant Emissions from Combustor [e]

Component	Emission Rate	Emission Factor	Emission Factor Units
	(ton/year)		
NO_X	0.50	0.138	lb/MMBtu
CO	1.00	0.2755	lb/MMBtu
SO_2	0.00	--	--
PM_{10}	0.02	7.60	lb/MMscf
$PM_{2.5}$	0.02	7.60	lb/MMscf
H_2S	0.00	--	--

Storage Tank Vapor Controls	
Combustor Destruction Efficiency	98%

Combustion Emissions From Flare[e]

	Pilot & Purge - Normal Operations	Pigging - Upset Conditions	Compressor Blowdown	Total
	(ton/year)	(ton/year)	(ton/year)	(ton/year)
Total NOx	0.36	0.03	0.11	0.50
Total CO	0.71	0.06	0.23	1.00
Total PM10 & 2.5	0.02	0.00	0.00	0.02

Footnotes:

a Uncontrolled stream properties determined via ProMax.

bPilot & Purge fuel gas emissions are calculated based on a 510 scfh flow rate. Two pilots at 65 scf/hr and purge at 380 scf/hr.

cDuring normal operations, the dehy flash tanks are routed back to suction at the slug catcher. However, during pigging events, it is possible that the pressure of the slug catcher will exceed the pressure of the flash tank. In this case the vapors of the flash tank may be routed to the emergency HP flare. Although this is not expected to occur on a frequent basis, three one hour events per week are included to be conservative.

dCompressor blowdowns are routed to inlet suction or the Emergency HP flare. Three blowdown events per month per compressor is included.

e Flare CO and NOx emission factors from TCEQ Air Permit Technical Guidance for Chemical Sources. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

Attachment # 9
Air Dispersion Modeling

Air Dispersion Modeling Analysis

XTO Energy, Inc.

Flickertail and Rough Rider Compressor Stations

Williams County, North Dakota

March 2025

Prepared by:
FC&E Engineering, LLC
917 Marquette Road
Brandon, MS 39047

Contents

Tables

Figures

1.0 Introduction

1.1 Summary

XTO Energy, Inc. (XTO) is submitting an air permit application to modify emission factors and permitted emissions of two compressor stations, Flickertail Compressor Station and Rough Rider Compressor Station, which are in Williams County, ND. The two compressor stations are identical minor sources. The compressor stations are separated by approximately 10 km. A single analysis was performed due to the proximity of the sources and the shared surrounding sources.

The emissions change request does not exceed the thresholds for projects not subject to PSD contained in the October 2, 2016, NDDEQ memo "Criterial Pollutant Modeling Requirements for a Permit to Construct." NDDEQ has requested, however, that the NO_2 impacts from the facility be evaluated. The analysis followed the methodology of the modeling conducted in 2020, except as noted in this report. No protocol was submitted prior to the analysis.

Heaters and reboilers were not included in the 2020 initial analysis for the facility following the January 23, 2015, State issued guidance regarding Dispersion Modeling Requirements, Compressor Engines and Glycol Dehydration Units. The guidance was rescinded December 18, 2023. Glycol reboilers and heaters were, therefore, included in this analysis.

The initial analysis did not include the emergency flare. Emergency flares are exempt from the NAAQS analysis per the October 6, 2014, NDDEQ guidance "Air Dispersion Modeling Emergency Engines/Flares." Flare emissions not attributable to emergencies were included in the analysis, i.e., pilot & purge normal operations, pigging upset conditions and compressor blowdown.

1.2 Facility Identification and Location

Flickertail and the Rough Rider Compressor Stations are in Williams County, ND at the following coordinates as shown in Figure 1. The emission source layout for each compressor station is depicted in Figure 2 and Figure 3.

Flickertail Compressor Station - UTM Coordinates (UTM Zone 13) with NAD83 Datum and an elevation of 1,888 feet above mean sea level:

UTME: 647,509.02 m
UTMN: 5,339,985.74 m

Lat: 48 degrees, 11 minutes, 45.40 seconds N
Lon: 103 degrees, 00 minutes, 53.81 seconds W

Rough Rider Compressor Station - UTM Coordinates (UTM Zone 13) with NAD83 Datum and an elevation of 1,973 feet above mean sea level:

UTME: 657,502.99 m
UTMN: 5,340,485.34 m

Lat: 48 degrees, 11 minutes, 52.92 seconds N
Lon: 102 degrees, 52 minutes, 49.34 seconds W

1.3 Process Description

The Flickertail and Rough Rider Compressor Stations are natural gas compressor stations with natural gas entering the stations through an inlet separator. The gas is then compressed and sent to two dehydration units that remove water (H_2O) from the gas to meet sales specifications. Associated BTEX emissions are combusted in a vapor combustor. The sites operate continuously (8760 hours per year).

2.0 Model Setup

2.1 Models and Model Versions

The analysis was conducted using the latest version of the US EPA preferred regulatory model for near field impacts, AERMOD (VERSION 24142). The preprocessor AERMAP (VERSION 24142) was used to determine hill heights for all receptors, buildings, and sources. The preprocessor BPIPPRM (VERSION 04274) was used to determine building downwash parameters.

The Lakes AERMOD – View Graphical User Interface (GUI) version 13.0.0 was used to develop the input files. The model was executed using US EPA executable files.

2.2 Receptor Network

Receptors were placed at 25-meter spacing along the fence line surrounding each facility. A cartesian coordinate system was used for the receptors outside the fence line. The spacing of the receptors varied based on the distance from the facility center as summarized in Table 3. Public access to the Flickertail and Rough Rider Compressor Stations is restricted by a fence. No receptors were placed within the fenced area.

The resulting receptor network is depicted in Figure 4.

2.3 Elevation Data

One-third arc second National Elevation Dataset (NED) files were downloaded from the USGS at https://apps.nationalmap.gov/downloader/#/. The files were converted to GeoTiff without data compression following the EPA guidance “Data Sources and Conversion of Elevation Data for AERMAP, Updated 4/7/2020.” The coverage of the NED files extends more than 10 km beyond the receptor network.

The NED files were processed in AERMAP and used to assign elevations to receptors, sources, and buildings.

2.4 Meteorological Data

Preprocessed meteorological data was provided by the NDDEQ for use in the analysis. The meteorological data covered the years 2019 to 2023 of surface data from KD60– Tioga Municipal Airport (Station ID: 00289) and upper air data from KBIS-Bismarck Municipal Airport; Station ID: 24011.

The met data was processed with AERMET version 23132 using the ADJ_U* option to adjust surface friction velocity for low wind speed conditions.

2.5 Emission Rates and Source Parameters

All NO_x emissions from the facility are released through stacks and were modeled as point sources except for the flare which was modeled as a pseudo point source. The sources were modeled using the stack parameters and emissions presented in the application. The modeled source parameters are summarized in Table 1 and Table 2 for the Rough Rider and Flickertail Compressor Stations, respectively.

The November 10, 2010, NDDEQ guidance "Model Input for Flares" was used to determine the pseudo stack parameters for the flare. The exit velocity was set at 40 m/s, the stack temperature was set at 1000 K, and the effective stack height and diameter were calculated using equation (5) and (6) of the NDDEQ guidance.

The total combined heat release for the pilot & purge, pigging, and compressor blowdown of 9.04 MMBtu/hr was used to determine the effective diameter and effective height as:

$$Ds = 7.29x10^{-4}[0.45 \times 9.04 \text{ MMBu/hr} \times 70{,}045.56 \text{ (cal/s)/(MMBtu/hr)}]^{0.5}$$
$$=0.3891 \text{ meters}$$

$$h_f = 4.56x10^{-3}[9.04 \text{ MMBu/hr} \times 70{,}045.56 \text{ (cal/s)/(MMBtu/hr)}]^{0.478}$$
$$= 2.7041 \text{ meters}$$

$$He = 24.384 \text{ m} + 2.7041 \text{ m} = 27.0881 \text{ m}$$

2.6 NO_2 Conversion

The significant and cumulative impact analyses were performed using the Ambient Ratio Method Version 2 (ARM2) to account for the conversion of NOx to NO_2. The default upper and lower limits on the ambient ratio applied to the modeled NOx concentration of 0.9 and 0.5, respectively, were used.

2.7 Downwash

A single structure, the compressor building, was included in the downwash analysis for each facility. The Building Profile Input Program (BPIP) with the PRIME algorithms was used to determine the building downwash parameters input for AERMOD.

2.8 Model Control Options

The model was run with the DFAULT model option to ensure regulatory default options were selected, CONC to indicate a concentration output, NODRYDPLT and NOWETDPLT to ensure plume depletion was not used and ARM2 to account for the conversion of NOx to NO2. The regulatory default ambient ratios of 0.5 for the minimum and 0.9 for the maximum were used.

2.9 Source Options

All the sources were modeled as point sources using the POINT source options except for one surrounding source emission unit which was modeled using the POINTHOR source option.

The SOURCGRP options was used to group the individual facilities. A source group ALL was also included to determine the combined impact of all facilities.

3.0 Significant Impact Analysis

The significant impact analysis was performed in a single modeling run including both the Flickertail and Rough Rider Compressor Stations. All NOx emitting sources at each facility were included in the analysis. The impacts of each facility were determined by using source groups containing individual facility's emission sources.

The significant impact area was determined as the circular area with a radius from the facility center to the most distance receptor exceeding the significance level, plus the receptor spacing at the most distant.

For the NO_2 1-hr averaging period the 1st-highest Max daily 1-hr value, averaged over 5 years, was compared to the modeling significance level of 7.5 ug/m^3 to determine if the significance level was exceeded at the receptor. For the NO_2 annual averaging period, the highest annual average of the 5 years modeled was compared to the modeling significance level of 1 ug/m^3 to determine if the significance level was exceeded at the receptor.

Table 5 summarizes the significant impact analysis for the two facilities. Figure 5 through Figure 8 show the area of significant impact determined for each compressor station and averaging period.

4.0 Cumulative Impact Analysis

The cumulative impact analysis consisted of modeling the proposed facility emissions, surrounding sources provided by NDDEQ and adding a monitored background value. The cumulative impacts were determined within the area where the Rough Rider or Flickertail Compressor Stations produce modeled impacts above the significant impact area as described in Section 3.

4.1 Monitored Background and Ambient Air Quality Standards

The monitored background and Ambient Air Quality Standards are summarized in Table 6, as posted on the NDDEQ website at https://deq.nd.gov/AQ/Modeling/ under AAQS Modeling Values (5 Years of NWS MET).

4.2 Surrounding Sources

The surrounding source inventory provided by the NDDEQ is summarized in Table 4. Each facility is denoted by an alphabetical prefix. Source groups were created for each surrounding source facility using the same prefix to determine the surrounding facility impact to any modeled exceedances.

4.3 Modeled Impact

The maximum modeled 8th highest max daily 1-hr value averaged over 5 years and the maximum modeled annual impact of the five years occurred at the fence line of the Rough Rider Compressor Station. The maximum annual average impact occurred in the modeled year 2020.

Modeled impacts above 50% of the standard were within 1,500 meters of the center of the Flickertail or Rough Rider Compressor Stations within 100-meter grid spacing. The maximum modeled impacts were within 100-meter spacing and no further refinement was made to the cumulative receptor grid.

5.0 Conclusion

The cumulative impacts from the proposed facility, surrounding sources and monitored background were below the North Dakota and National Ambient Air Quality Standards. The operations of the Flickertail and Rough Rider Compressor Stations, therefore, do not cause or contribute to any exceedance of the NO_2 air quality standards. This air quality analysis demonstrates compliance with the applicable regulatory requirements.

6.0 Modeling Files

The modeling files have been provided in the following zip files

- NO2.zip – significant impact analysis
- NO2 CIA.zip – cumulative impact analysis

The files within the zipped files are named according to the Lakes AERMOD-View naming convention. Table 8 contains a description of the files.

Due to the size, the NED terrain files have not been included but can be provided if requested. The files downloaded from the USGS and used in the analysis are listed below:

- USGS_13_n48w103_20240723.tif
- USGS_13_n48w104_20241024.tif
- USGS_13_n49w103_20241024.tif
- USGS_13_n49w104_20241024.tif

TABLES

TABLE 1- EMISSION SOURCE PARAMETERS - ROUGH RIDER COMPRESSOR STATION

Release Type	Model ID	Description	Base Elevation (m)	Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)	Release Orientation	Emission Rate (g/s)	UTM-x (m)	UTM-y (m)
POINT	RRENG1	Caterpillar G3608 TALE Compressor Engine	602.4	9.27	0.612	24.64	658.15	VERTICAL	0.278	657514.00	5340459.76
POINT	RRENG2	Caterpillar G3608 TALE Compressor Engine	602.28	9.27	0.612	24.64	658.15	VERTICAL	0.278	657528.07	5340459.80
POINT	RRENG3	Caterpillar G3608 TALE Compressor Engine	602.11	9.27	0.612	24.64	658.15	VERTICAL	0.278	657541.22	5340459.76
POINT	RRENG4	Caterpillar G3608 TALE Compressor Engine	601.96	9.27	0.612	24.64	658.15	VERTICAL	0.278	657554.31	5340460.69
POINT	RRENG5	Caterpillar G3608 TALE Compressor Engine	601.79	9.27	0.612	24.64	658.15	VERTICAL	0.278	657566.96	5340460.69
POINT	RRENG6	Caterpillar G3608 TALE Compressor Engine	601.68	9.27	0.612	24.64	658.15	VERTICAL	0.278	657581.62	5340461.27
POINT	RRENG7	Caterpillar G3608 TALE Compressor Engine	601.42	9.27	0.612	24.64	658.15	VERTICAL	0.278	657595.32	5340461.29
POINT	RRENG8	Caterpillar G3608 TALE Compressor Engine	601.33	9.27	0.612	24.64	658.15	VERTICAL	0.278	657609.37	5340461.29
POINT	RRLPCOMB	Low Pressure Combustor Normal Operations	599.13	4.57	0.762	0.00	533.15	VERTICAL	0.001	657599.64	5340534.35
POINT	RRCOMB	Teg Dehy Combustor Combined Still Column Emissions	598.69	12.19	2.134	0.04	322.04	VERTICAL	0.075	657678.84	5340491.42
POINT	RRHPFLR	Emergency Flare	599.87	27.09	0.389	40.00	1000.00	VERTICAL	0.157	657452.99	5340557.27
POINT	RRHTR1	Dehy Reboiler 0.75 Mmbtu/Hr Burner	599.37	3.66	0.406	0.22	477.59	VERTICAL	0.013	657545.00	5340539.00
POINT	RRHTR2	Dehy Reboiler 0.75 Mmbtu/Hr Burner	599.46	3.66	0.406	0.22	477.59	VERTICAL	0.013	657545.00	5340536.00
POINT	RRHTR3	Fuel Membrane Heater 2.5 Mmbtu/Hr Burner	599.54	4.57	0.610	0.06	699.82	VERTICAL	0.044	657547.00	5340533.00

English Units

Release Type	Model ID	Description	Base Elevation (ft)	Height (ft)	Diameter (ft)	Velocity (ft/s)	Temp (F)	Release Orientation	Emission Rate (lb/hr)	UTM-x (m)	UTM-y (m)
POINT	RRENG1	Caterpillar G3608 TALE Compressor Engine	1976	30.41667	2.0	80.8	725	VERTICAL	2.2	657514.00	5340459.76
POINT	RRENG2	Caterpillar G3608 TALE Compressor Engine	1976	30.41667	2.0	80.8	725	VERTICAL	2.2	657528.07	5340459.80
POINT	RRENG3	Caterpillar G3608 TALE Compressor Engine	1975	30.41667	2.0	80.8	725	VERTICAL	2.2	657541.22	5340459.76
POINT	RRENG4	Caterpillar G3608 TALE Compressor Engine	1975	30.41667	2.0	80.8	725	VERTICAL	2.2	657554.31	5340460.69
POINT	RRENG5	Caterpillar G3608 TALE Compressor Engine	1974	30.41667	2.0	80.8	725	VERTICAL	2.2	657566.96	5340460.69
POINT	RRENG6	Caterpillar G3608 TALE Compressor Engine	1974	30.41667	2.0	80.8	725	VERTICAL	2.2	657581.62	5340461.27
POINT	RRENG7	Caterpillar G3608 TALE Compressor Engine	1973	30.41667	2.0	80.8	725	VERTICAL	2.2	657595.32	5340461.29
POINT	RRENG8	Caterpillar G3608 TALE Compressor Engine	1973	30.41667	2.0	80.8	725	VERTICAL	2.2	657609.37	5340461.29
POINT	RRLPCOMB	Low Pressure Combustor Normal Operations	1966	15	2.5	0.0	500	VERTICAL	0.01	657678.84	5340491.42
POINT	RRCOMB	Teg Dehy Combustor Combined Still Column Emissions	1964	40	7	0.1	120	VERTICAL	0.59	657599.64	5340534.35
POINT	RRHPFLR	Emergency Flare	1968	88.9	1.3	131.2	1340	VERTICAL	1.25	657452.99	5340557.27
POINT	RRHTR1	Dehy Reboiler 0.75 Mmbtu/Hr Burner	1966	12	1.333	0.7	399.67	VERTICAL	0.11	657545.00	5340539.00
POINT	RRHTR2	Dehy Reboiler 0.75 Mmbtu/Hr Burner	1967	12	1.333	0.7	399.67	VERTICAL	0.11	657545.00	5340536.00
POINT	RRHTR3	Fuel Membrane Heater 2.5 Mmbtu/Hr Burner	1967	15	2	0.2	799.67	VERTICAL	0.35	657547.00	5340533.00

TABLE 2 - EMISSION SOURCE PARAMETERS - FLICKERTAIL COMPRESSOR STATION

Release Type	Model ID	Description	Base Elevation (m)	Height (m)	Diameter (m)	Velocity (m/s)	Temp (K)	Release Orientation	Emission Rate (g/s)	UTM-x (m)	UTM-y (m)
POINT	FTENG1	Caterpillar G3608 TALE Compressor Engine	575.46	9.27	0.612	24.64	658.15	VERTICAL	0.278	647536.61	5339999.23
POINT	FTENG2	Caterpillar G3608 TALE Compressor Engine	575.92	9.27	0.612	24.64	658.15	VERTICAL	0.278	647549.24	5339997.13
POINT	FTENG3	Caterpillar G3608 TALE Compressor Engine	576.32	9.27	0.612	24.64	658.15	VERTICAL	0.278	647562.84	5339995.07
POINT	FTENG4	Caterpillar G3608 TALE Compressor Engine	576.74	9.27	0.612	24.64	658.15	VERTICAL	0.278	647576.67	5339994.07
POINT	FTENG5	Caterpillar G3608 TALE Compressor Engine	577.13	9.27	0.612	24.64	658.15	VERTICAL	0.278	647590.39	5339991.97
POINT	FTENG6	Caterpillar G3608 TALE Compressor Engine	577.54	9.27	0.612	24.64	658.15	VERTICAL	0.278	647604.22	5339990.08
POINT	FTENG7	Caterpillar G3608 TALE Compressor Engine	577.91	9.27	0.612	24.64	658.15	VERTICAL	0.278	647617.60	5339988.28
POINT	FTENG8	Caterpillar G3608 TALE Compressor Engine	578.27	9.27	0.612	24.64	658.15	VERTICAL	0.278	647631.53	5339986.76
POINT	FTLPCOMB	Low Pressure Combustor Normal Operations	573.92	4.57	0.762	0.00	533.15	VERTICAL	0.001	647535.59	5339922.44
POINT	FTCOMB	Teg Dehy Combustor Combined Still Column Emissions	573.18	12.19	2.134	0.04	322.04	VERTICAL	0.075	647464.05	5339977.55
POINT	FTHPFLR	Emergency Flare	576.7	27.09	0.389	40.00	1000.00	VERTICAL	0.157	647673.62	5339888.14
POINT	FTHTR1	Dehy Reboiler 0.75 Mmbtu/Hr Burner	575.35	3.66	0.406	0.22	477.59	VERTICAL	0.013	647586.13	5339911.35
POINT	FTHTR2	Dehy Reboiler 0.75 Mmbtu/Hr Burner	575.54	3.66	0.406	0.22	477.59	VERTICAL	0.013	647586.37	5339917.65
POINT	FTHTR3	Fuel Membrane Heater 2.5 Mmbtu/Hr Burner	575.89	4.57	0.610	0.06	699.82	VERTICAL	0.044	647588.25	5339925.11
					English Units						
Release Type	**Model ID**	**Description**	**Base Elevation (ft)**	**Height (ft)**	**Diameter (ft)**	**Velocity (ft/s)**	**Temp (F)**	**Release Orientation**	**Emission Rate (lb/hr)**	**UTM-x (m)**	**UTM-y (m)**
POINT	FTENG1	Caterpillar G3608 TALE Compressor Engine	1888	30.41667	2.0	80.8	725	VERTICAL	2.2	657514.00	5340459.76
POINT	FTENG2	Caterpillar G3608 TALE Compressor Engine	1890	30.41667	2.0	80.8	725	VERTICAL	2.2	657528.07	5340459.80
POINT	FTENG3	Caterpillar G3608 TALE Compressor Engine	1891	30.41667	2.0	80.8	725	VERTICAL	2.2	657541.22	5340459.76
POINT	FTENG4	Caterpillar G3608 TALE Compressor Engine	1892	30.41667	2.0	80.8	725	VERTICAL	2.2	657554.31	5340460.69
POINT	FTENG5	Caterpillar G3608 TALE Compressor Engine	1893	30.41667	2.0	80.8	725	VERTICAL	2.2	657566.96	5340460.69
POINT	FTENG6	Caterpillar G3608 TALE Compressor Engine	1895	30.41667	2.0	80.8	725	VERTICAL	2.2	657581.62	5340461.27
POINT	FTENG7	Caterpillar G3608 TALE Compressor Engine	1896	30.41667	2.0	80.8	725	VERTICAL	2.2	657595.32	5340461.29
POINT	FTENG8	Caterpillar G3608 TALE Compressor Engine	1897	30.41667	2.0	80.8	725	VERTICAL	2.2	657609.37	5340461.29
POINT	FTLPCOMB	Low Pressure Combustor Normal Operations	1883	15	2.5	0.0	500	VERTICAL	0.01	657678.84	5340491.42
POINT	FTCOMB	Teg Dehy Combustor Combined Still Column Emissions	1881	40	7	0.1	120	VERTICAL	0.59	657599.64	5340534.35
POINT	FTHPFLR	Emergency Flare	1892	88.9	1.3	131.2	1340	VERTICAL	1.25	657452.99	5340557.27
POINT	FTHTR1	Dehy Reboiler 0.75 Mmbtu/Hr Burner	1888	12	1.333	0.7	399.67	VERTICAL	0.11	657545.00	5340539.00
POINT	FTHTR2	Dehy Reboiler 0.75 Mmbtu/Hr Burner	1888	12	1.333	0.7	399.67	VERTICAL	0.11	657545.00	5340536.00
POINT	FTHTR3	Fuel Membrane Heater 2.5 Mmbtu/Hr Burner	1889	15	2	0.2	799.67	VERTICAL	0.35	657547.00	5340533.00

TABLE 3 - RECEPTOR NETWORK

Distance from Facility Center	Spacing
Fenceline	25 m
From 0 to 1.5 km	100 m
From 1.5 to 3 km	250 m
From 3 to 6 km	500 m
From 6 to 12 km	1000 m

TABLE 4 - SURROUNDING SOURCE INVENTORY

EP ID	Source Description	Source Type	UTM X (m)	UTM Y (m)	Base Elevation (m)	Stack Height (f)	Exit Temperature (F)	Exit Velocity (f/s)	Exit Diameter (f)	NOx (lb/hr)
NGP1	Nesson Gas Plant - Engine#2	Vertical	645082.30	5358751.90	724.23	32.0	731	52.2	1.25	1.07
NGP2	Nesson Gas Plant - Engine#3	Vertical	645096.30	5358752.03	724.43	32.0	759	81.5	1.31	1.57
NGP3	Nesson Gas Plant - Engine#4	Vertical	645110.36	5358752.95	724.74	32.0	767	91.2	1.29	0.84
NGP4	Nesson Gas Plant - Engine#5	Vertical	645123.82	5358753.85	724.99	32.0	615	72.3	1.38	0.70
NGP5	Nesson Gas Plant - Engine#6	Vertical	645137.61	5358753.65	725.16	32.0	618	75.4	1.38	0.79
NGP6	Nesson Gas Plant - Heater#1	Vertical	645024.03	5358688.79	724.04	15.0	600	8.4	0.60	0.28
NGP7	Nesson Gas Plant - Heater#2	Vertical	645024.03	5358671.15	724.03	15.0	600	8.4	0.60	1.46
NGP8	Nesson Gas Plant - Oil Heater#1	Vertical	645108.01	5358665.03	725.59	15.0	1000	101.7	1.00	1.71
NGP9	Nesson Gas Plant - Oil Heater#2	Vertical	645108.01	5358665.03	725.59	15.0	1000	181.3	1.00	3.38
RG1	Whiting - Ray Gas Dehy Unit Flare	Vertical	639766.70	5357319.88	692.19	12.0	1273	27.1	0.33	0.53
RG2	Whiting - Ray Gas Hot Oil Heater	Vertical	639766.70	5357319.88	692.19	35.0	250	1.2	3.00	0.64
SC1	Hess - Silurian Compressor Engine#1	Vertical	651864.12	5350731.50	713.07	26.5	870	134.0	1.33	1.13
SC2	Hess - Silurian Compressor Engine#2	Vertical	651808.41	5351082.41	713.08	29.5	847	113.0	1.50	1.87
SC3	Hess - Silurian Compressor Heater	Vertical	651894.19	5350734.50	714.12	20.0	700	8.0	0.75	0.07
SC4	Hess - Silurian Compressor Reboiler	Vertical	651902.31	5350733.00	713.79	30.0	1000	8.0	0.67	0.07
EN1	Hess - East Nesson 1 Heater#1	Vertical	661709.11	5339518.38	634.55	10.0	1021	114.6	0.83	0.05
EN2	Hess - East Nesson 1 Heater#2	Vertical	661709.11	5339518.38	634.55	10.0	1021	114.6	0.83	0.15
ORC1	ONEOK - Riverside Compressor Engine#1	Vertical	662112.78	5324644.86	684.92	30.0	1078	130.3	1.34	0.60
ORC2	ONEOK - Riverside Compressor Engine#2	Vertical	662128.42	5324645.64	684.49	30.0	950	120.8	1.34	1.71
ORC3	ONEOK - Riverside Compressor Engine#3	Vertical	662142.69	5324644.60	684.30	30.0	1066	134.0	1.34	1.91
ORC4	ONEOK - Riverside Compressor Engine#4	Vertical	662155.88	5324644.97	684.06	30.0	1089	138.5	1.50	1.50
ORC5	ONEOK - Riverside Compressor Engine#5	Vertical	662168.96	5324649.34	683.80	30.0	1100	149.2	1.50	2.93
ODL1	ONEOK - Demicks Lake Compressor Engine	Vertical	649066.33	5307509.13	710.51	20.0	984	107.6	0.70	13.07
ODL2	ONEOK - Demicks Lake Compressor Heater	Vertical	649059.59	5307515.40	710.80	10.0	400	5.3	1.00	0.08
ETB1	Energy Transfer - Brause Compressor Engine#1	Vertical	634549.83	5319173.33	606.05	25.8	834	69.7	1.33	1.19
ETB2	Energy Transfer - Brause Compressor Engine#2	Horizontal	634549.83	5319173.33	606.05	25.8	834	69.7	1.33	1.17
ETB3	Energy Transfer - Brause Compressor Engine#3	Vertical	634549.83	5319173.33	606.05	22.5	813	113.0	1.50	1.13
ETB4	Energy Transfer - Brause Compressor Engine#4	Vertical	634549.83	5319173.33	606.05	25.8	834	97.4	1.33	0.76
ETB5	Energy Transfer - Brause Compressor Engine#5	Vertical	634549.83	5319173.33	606.05	25.8	834	97.4	1.33	0.77
ETB6	Energy Transfer - Brause Compressor Engine#8	Vertical	634549.83	5319173.33	606.05	25.8	834	97.4	1.33	1.18
ETB7	Energy Transfer - Brause Compressor Engine#10	Vertical	634549.83	5319173.33	606.05	25.8	834	97.4	1.33	1.33
GCB1	Grayson - Central Banks CDP Compressor Engine#1	Vertical	631877.00	5317243.00	662.40	12.0	958	88.8	1.33	0.32
GCB2	Grayson - Central Banks CDP Compressor Engine#2	Vertical	631886.00	5317244.00	662.17	12.0	947	85.2	1.33	0.87
GCB3	Grayson - Central Banks CDP Compressor Engine#3	Vertical	631898.00	5317244.00	662.38	12.0	866	70.2	1.33	0.56
GCB4	Grayson - Central Banks CDP Compressor Engine#4	Vertical	631908.00	5317245.00	662.36	12.0	955	108.9	1.17	0.52
GCB5	Grayson - Central Banks CDP Compressor Engine#5	Vertical	631922.00	5317245.00	662.05	12.0	908	97.1	1.17	1.28
GCB6	Grayson - Central Banks CDP Compressor Engine#24	Vertical	631905.00	5317165.00	656.36	12.0	866	145.0	1.00	1.09
GCB7	Grayson - Central Banks CDP Compressor Engine#25	Vertical	631899.00	5317165.00	656.44	12.0	850	146.0	1.00	1.00
GCB8	Grayson - Central Banks CDP Compressor Engine#26	Vertical	631892.00	5317165.00	656.49	12.0	749	83.4	1.67	1.59
ETN1	Energy Transfer - North Compressor Engine#1	Vertical	634248.68	5314754.63	603.98	27.5	1091	26.9	1.50	1.45
ETN2	Energy Transfer - North Compressor Engine#3	Vertical	634248.68	5314754.63	603.98	27.5	1259	44.9	1.50	1.44
ETN3	Energy Transfer - North Compressor Engine#4	Vertical	634248.68	5314754.63	603.98	27.5	1276	55.1	1.33	1.01
ETN4	Energy Transfer - North Compressor Engine#5	Vertical	634248.68	5314754.63	603.98	27.5	1083	33.2	1.33	1.40
ETN5	Energy Transfer - North Compressor Engine#6	Vertical	634248.68	5314754.63	603.98	27.5	1123	34.9	1.33	1.24
ETN6	Energy Transfer - North Compressor Engine#7	Vertical	634248.68	5314754.63	603.98	27.5	1158	36.1	1.33	1.19
ETN7	Energy Transfer - North Compressor Engine#8	Vertical	634248.68	5314754.63	603.98	27.5	1168	35.6	1.33	0.94
ETN8	Energy Transfer - North Compressor Engine#10	Vertical	634248.68	5314754.63	603.98	27.5	1089	34.2	1.33	1.18
HPR1	Hiland Partners - 4Runner Compressor Engine#1	Vertical	619729.84	5323844.03	582.90	40.0	795	108.1	1.13	0.43
HPR2	Hiland Partners - 4Runner Compressor Engine#2	Vertical	619729.84	5323844.03	582.90	40.0	821	93.4	1.10	1.11
HPR3	Hiland Partners - 4Runner Compressor Engine#3	Vertical	619729.84	5323844.03	582.90	40.0	853	95.4	1.10	1.46
HPR4	Hiland Partners - 4Runner Compressor Engine#4	Vertical	619729.84	5323844.03	582.90	40.0	667	78.4	1.67	2.05
HPR5	Hiland Partners - 4Runner Compressor Engine#5	Vertical	619729.84	5323844.03	582.90	40.0	663	87.2	1.67	2.14
HPR6	Hiland Partners - 4Runner Compressor Engine#6	Vertical	619729.84	5323844.03	582.90	40.0	943	115.9	1.13	1.98
HPR7	Hiland Partners - 4Runner Compressor Reboiler	Vertical	619729.84	5323844.03	582.90	32.0	400	9.3	1.00	0.10

TABLE 5 - SIGNIFICANT IMPACT RESULTS

Facility	Pollutant	Averaging Period	SIL ($\mu g/m^3$)	Maximum Concentration ($\mu g/m^3$)	Significant? (Y/N)	ROI (km)
Rough Rider	NO_2	1-hr	7.5	151.32488	Y	14.567
		Annual	1	22.5565	Y	1.266
Flickertail		1-hr	7.5	147.13223	Y	14.596
		Annual	1	19.49989	Y	1.348

TABLE 6 - AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	SIL	Background	North Dakota	Federal
		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
NO_2	1-hr	7.5	35	188	188
NO_2	Annual	1	5	100	100

TABLE 7 - CUMULATIVE IMPACTS

Pollutant, Time Period and Standard	Background Concentration ($\mu g/m^3$)	Cumulative Modeled Concentration ($\mu g/m^3$)	Cumulative Concentration ($\mu g/m^3$)	Value of Standard ($\mu g/m3$)	Percent of Standard	Location		
						UTM E (m)	UTM N (m)	Elevation (m)
NO_2 Annual Avg NAAQS/NDAAQS	5	22.67	34.67	100	34.7%	657623.87	5340410.84	609.97
NOx 1-hr (H8H) NAAQS/NDAAQS	35	139.53	174.53	188	92.8%	657472.51	5340579.40	598.75

TABLE 8 - FILE KEY

Significant Impact Analysis - NO2.zip		
File	Description	Note
NO2.ADI	AERMOD Input File	
NO2.ADO	AERMOD Output File	
NO2.api	AERMAP Input File	
NO2.ast	AERMAP Input File	
NO2.bpi	BPIP Input File	
NO2.pro	BPIP Output File	
NO2.sup	BPIP Processing File	
NO2.AD/	Plot File Folder	
Plot file Format	[xx -Avg Period]	01=1hr avg period, AN=Multiyear Annual Average
	[xx-Rank]	H1-1st high, H8=8th high
	[XXX-Group].PLT	G001 = Rough Rider Sources, G002 = Flickertail Sources, ALL = All sources
ANNUAL_G001.PLT	Individual annual average source group ALL	
ANNUAL_G002.PLT	Individual annual average source group Rough Rider	
ANNUAL_G003.PLT	Individual annual average source group Flickertail	
Cumulative Analysis - NO2 CIA.zip		
NO2 CIA.zip		
NO2 CIA.ADI	AERMOD Input File	
NO2 CIA.ADO	AERMOD Output File	
Plot file Format	[xx -Avg Period]	01=1hr avg period, AN=Multiyear Annual Average
	[xx-Rank]	H1-1st high, H8=8th high
	[XXX-Group].PLT	G021 = Rough Rider Sources, G012 = Flickertail Sources, ALL = All sources
ANNUAL_G001.PLT	Individual annual average source group ALL	
ANNUAL_G012.PLT	Individual annual average source group Rough Rider	
ANNUAL_G013.PLT	Individual annual average source group Flickertail	

FIGURES

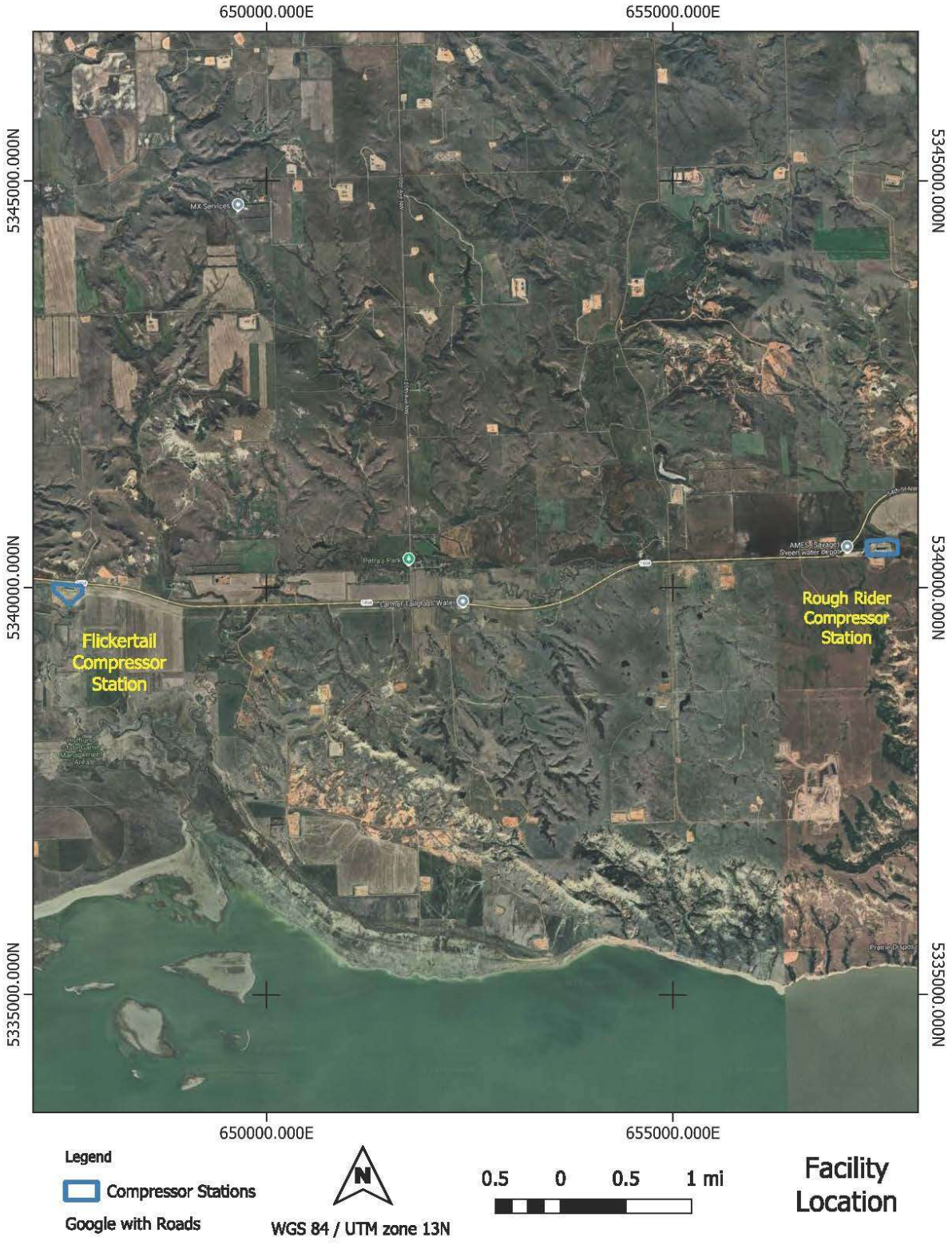


FIGURE 1 - FACILITY LOCATION

FIGURE 2 - SOURCE LAYOUT FLICKERTAIL COMPRESSOR STATION

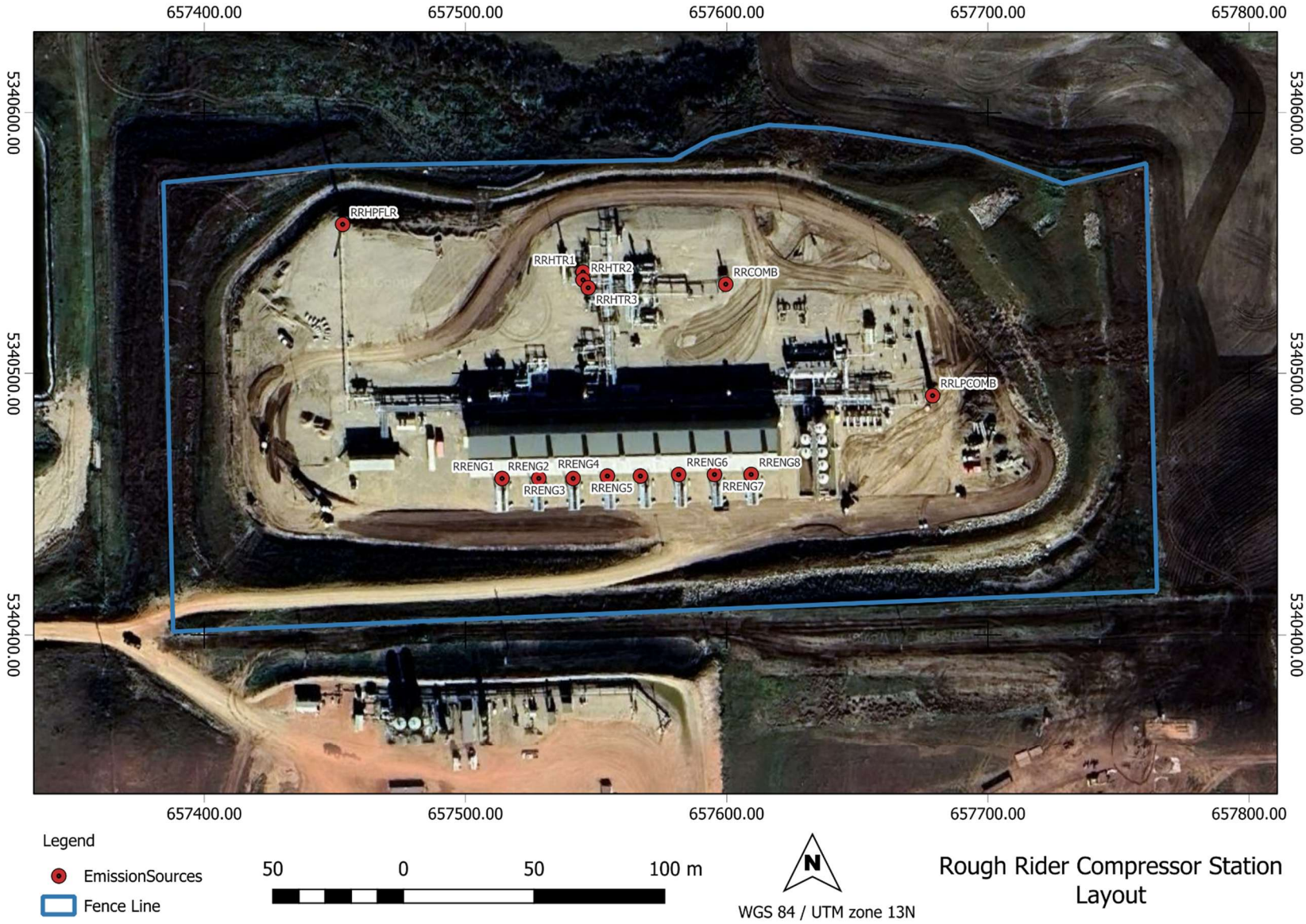


FIGURE 3 - SOURCE LAYOUT - ROUGH RIDER COMPRESSOR STATION

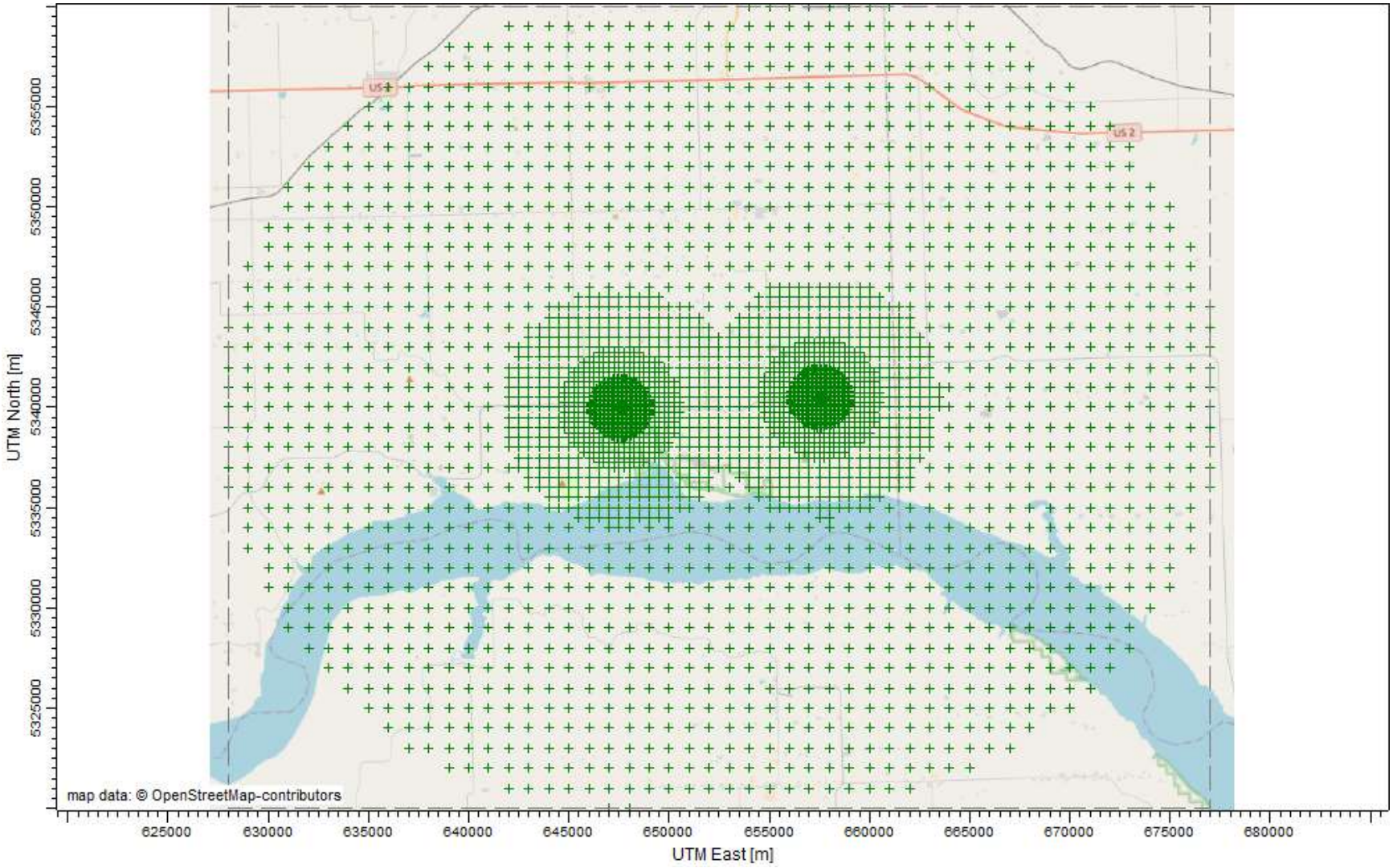


FIGURE 4 - SIA RECEPTOR NETWORK

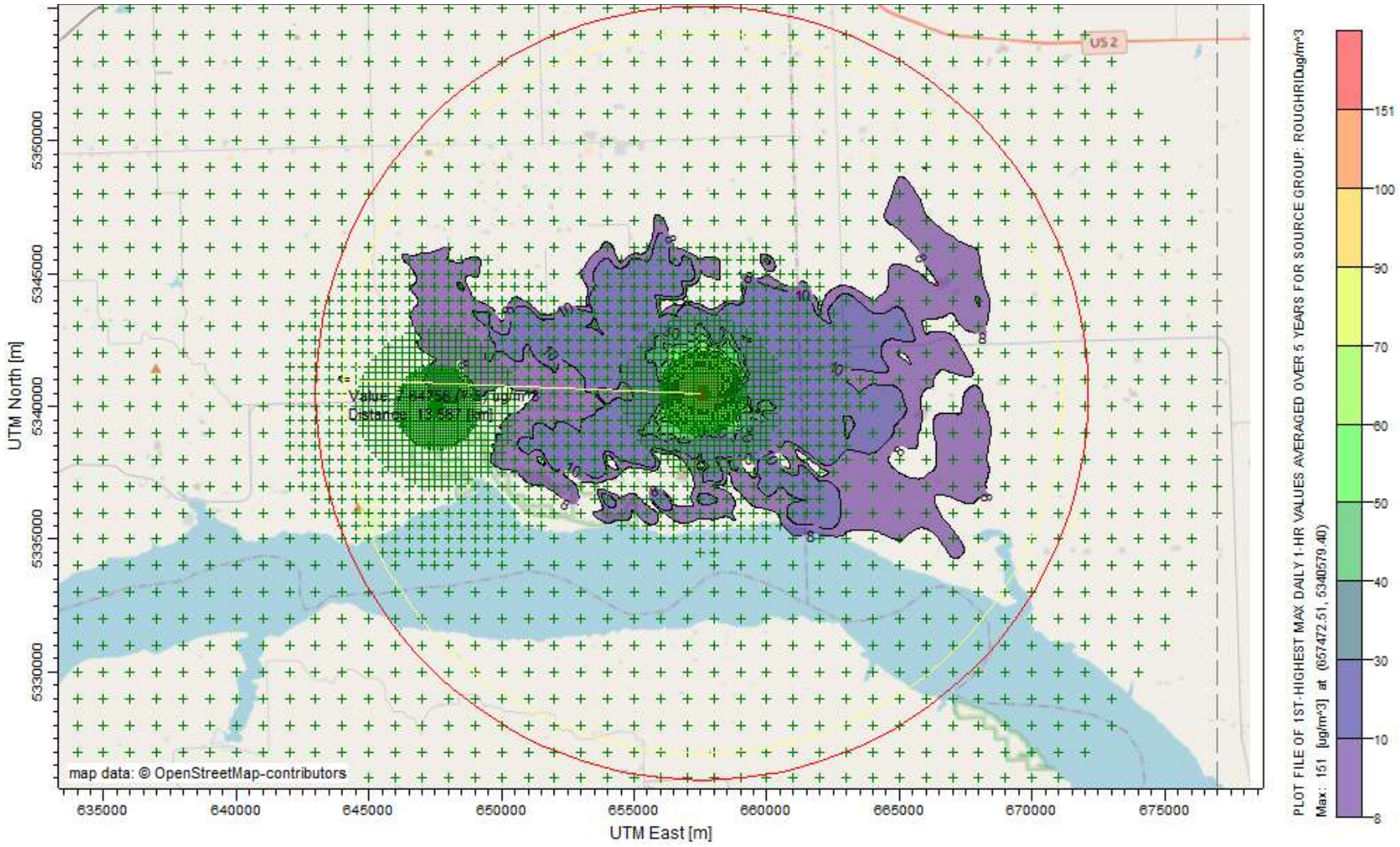


FIGURE 5 - ROUGH RIDER 1-HR NO2 SIA

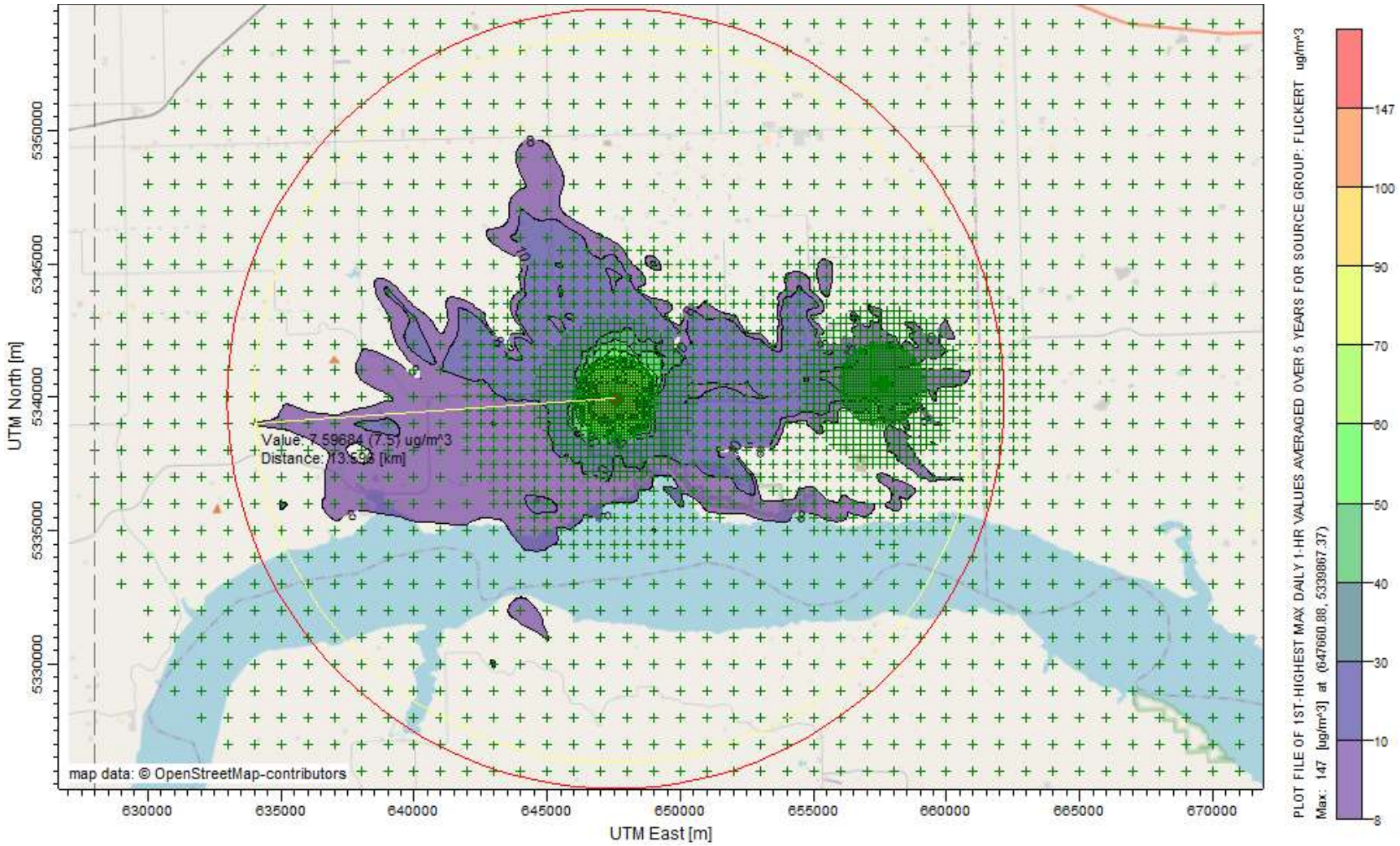


FIGURE 6 - FLICKERTAIL 1-HR NO2 SIA

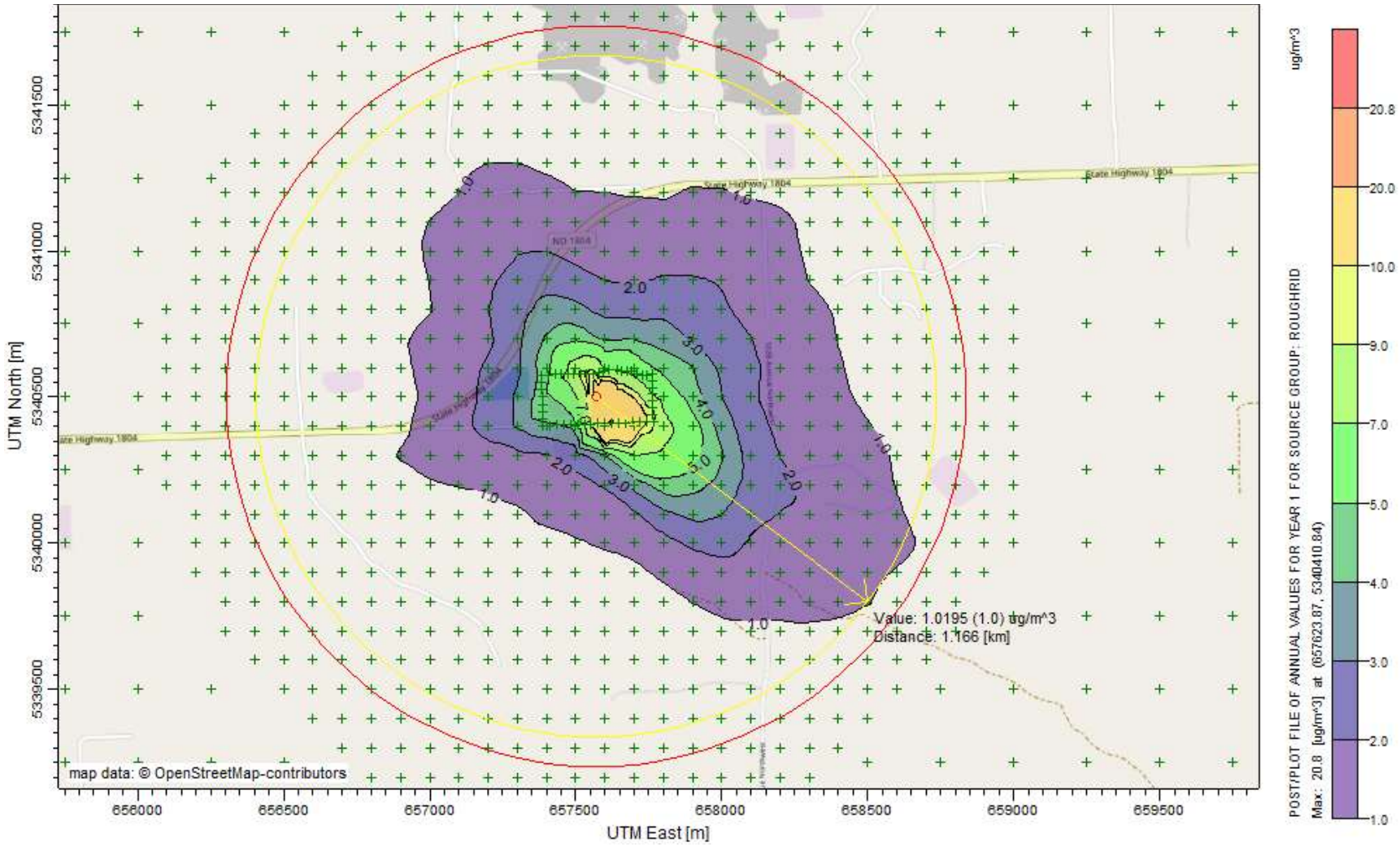


FIGURE 7 - ROUGH RIDER NO2 ANNUAL SIA

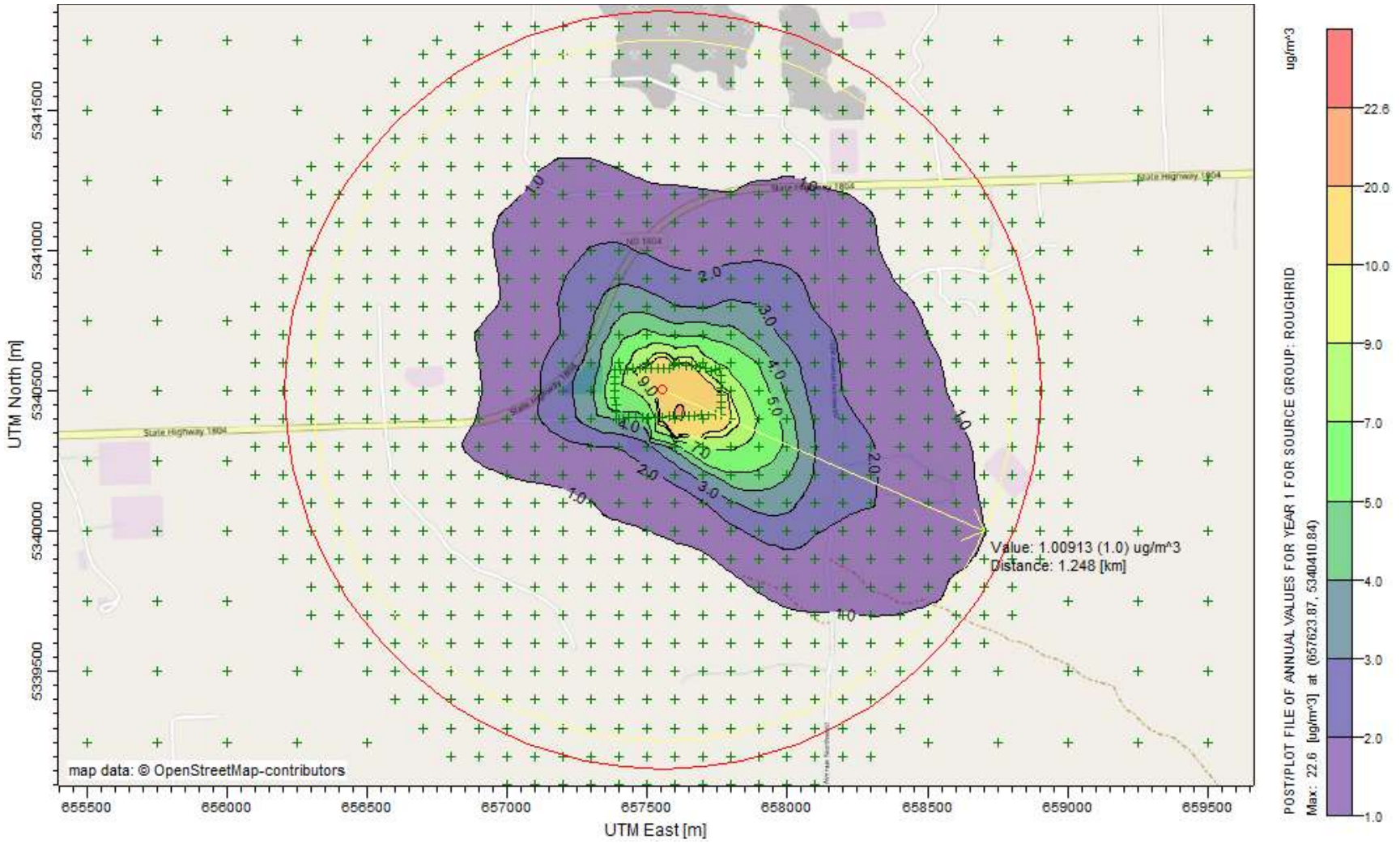


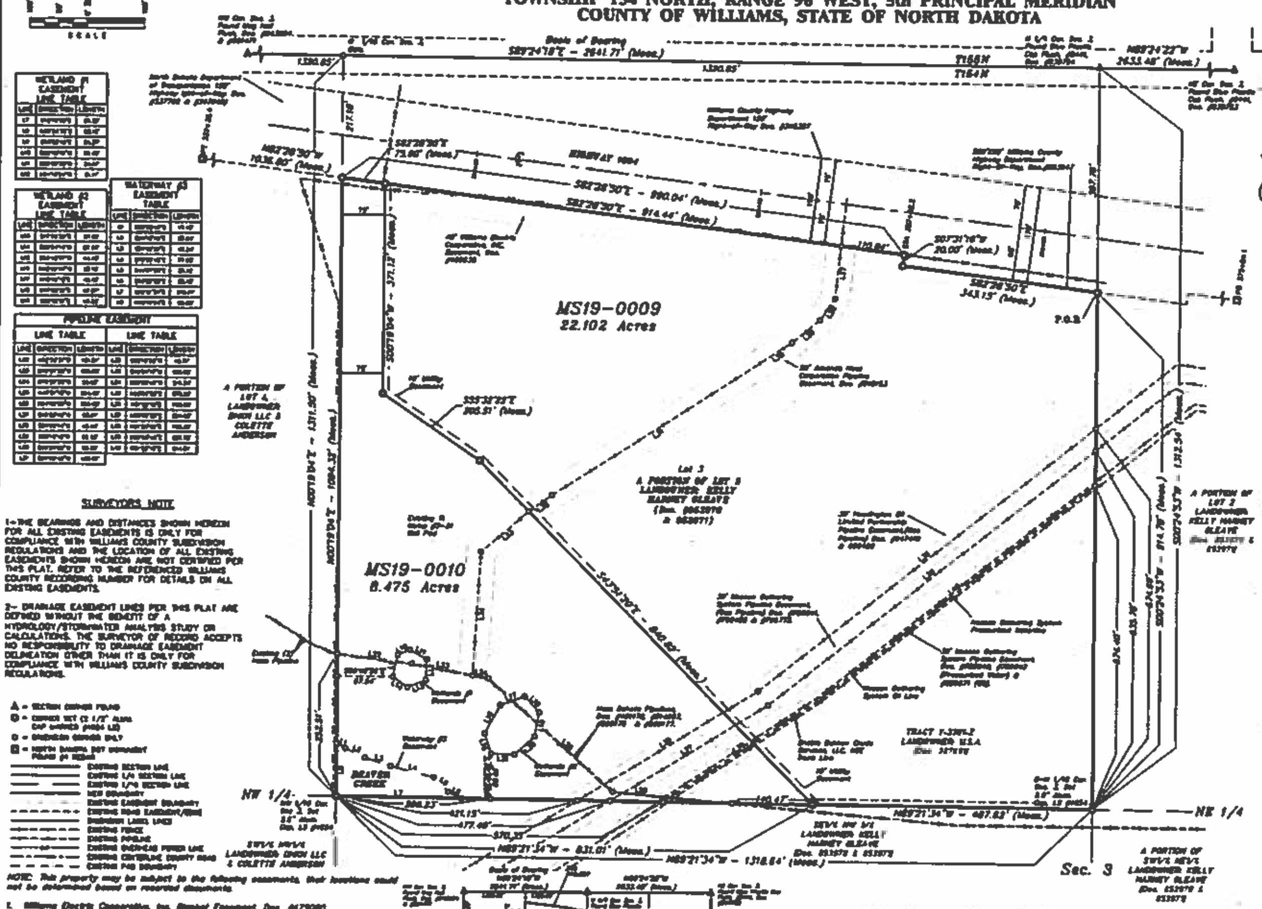
FIGURE 8 - FLICKERTAIL NO2 ANNUAL SIA

Attachment # 10
Supporting Documentation

MS19-0009 & MS19-0010

A MINOR SUDIVISION

LOCATED IN GOVERNMENT LOT 3 OF SECTION 3,
TOWNSHIP 154 NORTH, RANGE 96 WEST, 5th PRINCIPAL MERIDIAN
COUNTY OF WILLIAMS, STATE OF NORTH DAKOTA



SURVEYORS NOTE

1–THE BEARINGS AND DISTANCES SHOWN HEREON FOR ALL EXISTING EASEMENTS IS ONLY FOR COMPLIANCE WITH WILLIAMS COUNTY SUBDIVISION REGULATIONS AND THE LOCATION OF ALL EXISTING EASEMENTS SHOWN HEREON ARE NOT CERTIFIED PER THIS PLAT. REFER TO THE REFERENCED WILLIAMS COUNTY RECORDING NUMBER FOR DETAILS ON ALL EXISTING EASEMENTS.

2– DRAINAGE EASEMENT LINES PER THIS PLAT ARE DEFINED WITHOUT THE BENEFIT OF A HYDROLOGY/STORMWATER ANALYSIS STUDY OR CALCULATIONS. THE SURVEYOR OF RECORD ACCEPTS NO RESPONSIBILITY TO DRAINAGE EASEMENT DELINEATION OTHER THAN IT IS ONLY FOR COMPLIANCE WITH WILLIAMS COUNTY SUBDIVISION REGULATIONS.

NOTE: This property may be subject to the following easements, their locations could not be determined based on recorded documents.

1. Williams Electric Cooperative, Inc. Blanket Easement, Doc. #473085
2. Williams Rural Water Association, All Existing and to be Established Right-of-Way Easement, Doc #822733 Not Plottable

OLD LEGAL DESCRIPTION

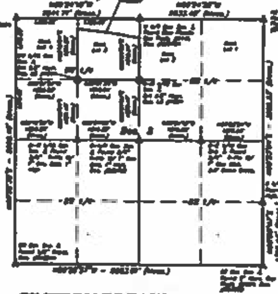
A PORTION OF LOT 3 OF SECTION 3, T154N, R96W, 5th P.M., WILLIAMS COUNTY, NORTH DAKOTA (Doc. #653670 & #653671)

LEGAL DESCRIPTION

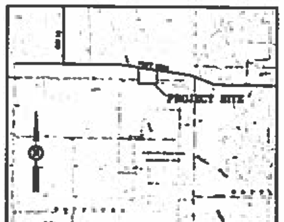
TO BE KNOWN AS MS19–0009 AND MS19–0010, LOCATED IN A PORTION OF LOT 3 OF SECTION 3, T154N, R96W, 5th P.M., WILLIAMS COUNTY, NORTH DAKOTA AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH 1/4 CORNER OF SAID SECTION 3, THENCE S00°24'53"W ALONG THE EAST LINE OF OF GOVT LOT 3 TO A POINT OF INTERSECTION WITH THE SOUTH RIGHT–OF–WAY LINE OF HIGHWAY 1804, A DISTANCE OF 307.76' WHICH IS THE POINT OF BEGINNING.

THENCE S00°24'53"W ALONG THE EAST LINE OF OF GOVT LOT 3 A DISTANCE OF 834.93' TO THE C–N 1/16 CORNER OF SAID SECTION 3, THENCE N89°21'34"W ALONG THE SOUTH LINE OF GOVT LOT 3 A DISTANCE OF 1318.64' TO THE NW 1/16 CORNER OF SAID SECTION 3, THENCE N00°18'36"E ALONG THE WEST LINE OF GOVT LOT 3 TO A POINT OF INTERSECTION WITH THE SOUTH RIGHT–OF–WAY LINE OF HIGHWAY 1804, A DISTANCE OF 1084.32'; THENCE EASTERLY ALONG SAID HIGHWAY 1804 RIGHT–OF–WAY THE FOLLOWING (3) COURSES, (1) S82°28'30"E A DISTANCE OF 914.44'; THENCE (2) S07°31'10"W A DISTANCE OF 20.00'; THENCE (3) S82°28'30"E A DISTANCE OF 343.15' TO THE POINT OF BEGINNING. SUBJECT TO ALL ENCUMBRANCES. SAID TRACT CONTAINS 30.577 ACRES, MORE OR LESS. BASIS OF BEARINGS IS S89°24'18"E BETWEEN THE NORTHWEST CORNER AND THE NORTH 1/4 CORNER OF SAID SECTION 3.



SECTION BREAKDOWN



VICINITY MAP

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE SOLE OWNER OF THE LAND PLATTED HEREON, DO HEREBY VOLUNTARILY CONSENT TO THE EXECUTION OF SAID PLAT, AND DO DEDICATE THE ROAD EASEMENTS, ALLEYS, PARKS, AND PUBLIC GROUNDS AS SHOWN HEREON, INCLUDING ALL SEWERS, CULVERTS, BRIDGES, WATER DISTRIBUTION LINES AND SIDEWALK GROUNDS WHETHER SUCH IMPROVEMENTS ARE SHOWN OR NOT, TO THE PUBLIC USE FOREVER. I AGREE NOT TO VACATE ANY PORTION OF THIS PLAT WITHOUT THE CONSENT OF THE WILLIAMS COUNTY COMMISSION. I ALSO HEREBY DEDICATE EASEMENTS TO RUN WITH THE LAND FOR WATER, SEWER, GAS, ELECTRIC, TELEPHONE, OR OTHER PUBLIC UTILITY LINES OR SERVICES UNDER, ON, OR OVER THOSE CERTAIN STRIPS OF LAND DESIGNATED HEREON AS "UTILITY EASEMENTS", WHETHER SHOWN OR EXISTING.

KELLY HARNEY CLEAVE, OWNER — DATE 6-6-19

STATE OF NORTH DAKOTA) S.S.
COUNTY OF WILLIAMS)

BE IT KNOWN THAT ON THIS 6th DAY OF June 2019 A.D. BEFORE ME PERSONALLY APPEARED KELLY HARNEY CLEAVE, KNOWN TO ME TO BE THE PERSON DESCRIBED HEREIN, AND WHO EXECUTED AND ACKNOWLEDGED THE ABOVE OWNER'S CERTIFICATE TO BE HIS/HER VOLUNTARY ACT AND DEED.

NOTARY PUBLIC

WILLIAMS COUNTY BOARD OF COMMISSIONERS

THE ATTACHED PLAT AS SHOWN HEREON IS HEREBY APPROVED BY WILLIAMS COUNTY COMMISSION, STATE OF NORTH DAKOTA AND ACCEPTED THIS 11th DAY OF June 2019 IN ACCORDANCE WITH THE LAWS OF THE STATE OF NORTH DAKOTA, AND THE ORDINANCE OF WILLIAMS COUNTY.

WILLIAMS COUNTY DOES NOT ACCEPT RESPONSIBILITY FOR THE CONSTRUCTION, REPAIR, OR MAINTENANCE, INCLUDING SNOW REMOVAL, UPON ANY STREETS, ROADS, ACCESS EASEMENTS, OR OTHER PUBLIC WAYS PERTAINING TO THIS SUBDIVISION, UNTIL SUCH TIME AS PETITIONED AND ACCEPTED BY WILLIAMS COUNTY COMMISSION.

DAVID MONTGOMERY, CHAIRMAN, WILLIAMS COUNTY COMMISSION
ATTEST: BETH M. INNIS, WILLIAMS COUNTY AUDITOR

STATE OF NORTH DAKOTA) S.S.
COUNTY OF WILLIAMS)

BE IT KNOWN THAT ON THIS 11th DAY OF June 2019 A.D. BEFORE ME PERSONALLY APPEARED DAVID MONTGOMERY, CHAIRMAN, WILLIAMS COUNTY COMMISSION AND BETH M. INNIS, WILLIAMS COUNTY AUDITOR, KNOWN TO ME TO BE THE PERSONS WHO EXECUTED THE ABOVE CERTIFICATE AND ACKNOWLEDGED TO ME THAT HE/SHE EXECUTED THE SAME.

NOTARY PUBLIC

AUDITOR'S CERTIFICATE OF TAXES

I, BETH M. INNIS, AUDITOR OF WILLIAMS COUNTY, DO HEREBY CERTIFY THAT CURRENT TAXES, DELINQUENT TAXES, OR DELINQUENT SPECIAL ASSESSMENTS OR INSTALLMENTS OF SPECIAL ASSESSMENTS OR TAX ESTIMATES FOR THE PROPERTY DESCRIBED ON THE ATTACHED INSTRUMENT ARE UNPAID IN THE AMOUNT OF $ –0– PLUS PENALTY AND INTEREST.

CERTIFIED THIS 7th DAY OF June

BETH M. INNIS, WILLIAMS COUNTY AUDITOR
DEPUTY, WILLIAMS COUNTY AUDITOR

CERTIFICATE OF WILLIAMS COUNTY RECORDER

THIS PLAT WAS FILED AND RECORDED IN THE OFFICE OF THE WILLIAMS COUNTY RECORDER IN THE STATE OF NORTH DAKOTA AT 3:56 O'CLOCK P. M. ON THE 11th DAY OF June 2019 A.D., AND WAS RECORDED AS DOCUMENT NO. 862064

PATTI OGURCHAK, WILLIAMS COUNTY RECORDER
DEPUTY, WILLIAMS COUNTY RECORDER

862064
WILLIAMS COUNTY, ND

CERTIFICATE OF SURVEYOR

THIS IS TO CERTIFY THAT THE ABOVE PLAT WAS PREPARED FROM FIELD NOTES OF ACTUAL SURVEYS MADE BY ME OR UNDER MY SUPERVISION AND THAT THE SAME ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

TROY JENSEN, NORTH DAKOTA REGISTRATION NO. 4654 LS
UINTAH ENGINEERING AND LAND SURVEYING

STATE OF MONTANA) S.S.
COUNTY OF RICHLAND)

ON THIS 5th DAY OF June 2019 A.D., BEFORE ME A NOTARY PUBLIC FOR SAID COUNTY AND STATE, PERSONALLY APPEARED, TROY JENSEN KNOWN TO ME TO BE THE PERSON DESCRIBED HEREIN, AND WHO EXECUTED THE SAME AS THEIR FREE ACT AND DEED.

NOTARY PUBLIC

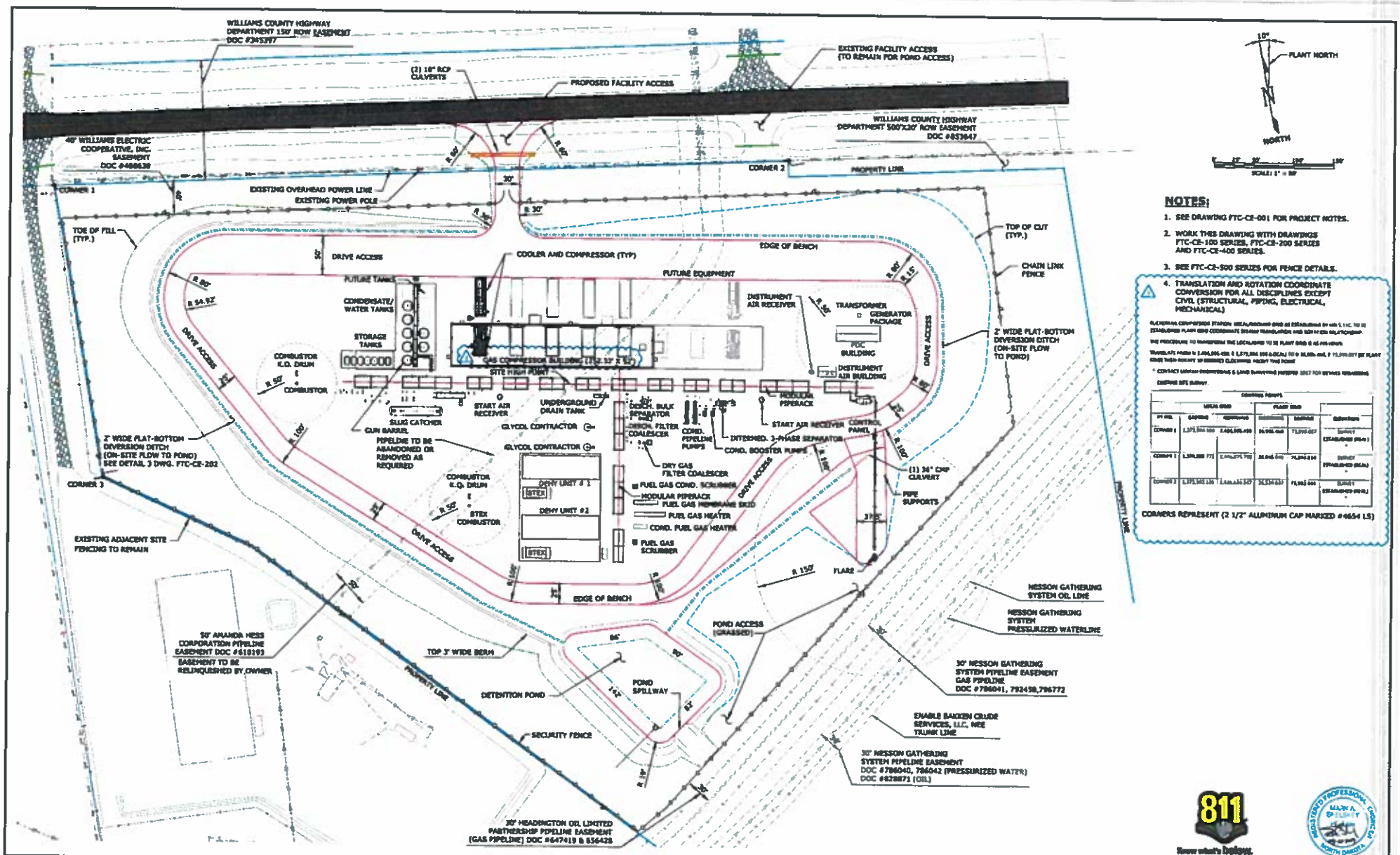
FLICKERTAIL COMPRESSION STATION
NESSON GATHERING SYSTEM, LLC

SECTION 3, T154N, R96W, 5th P.M., WILLIAMS COUNTY, NORTH DAKOTA

UINTAH

UELS, LLC
Corporate Office * 85 South 200 East
Vernal, UT 84078 * (435) 789-1017

MINOR SUBDIVISION PLAT



NOTES:

1. SEE DRAWING FTC-CE-001 FOR PROJECT NOTES.
2. WORK THIS DRAWING WITH DRAWINGS FTC-CE-100 SERIES, FTC-CE-200 SERIES AND FTC-CE-400 SERIES.
3. SEE FTC-CE-500 SERIES FOR FENCE DETAILS.
4. TRANSLATION AND ROTATION COORDINATE CONVERSION FOR ALL DISCIPLINES EXCEPT CIVIL (STRUCTURAL, PIPING, ELECTRICAL, MECHANICAL)

CORNERS REPRESENT (2 1/2" ALUMINUM CAP MARKED #4654 LS)

811 Know what's Below. Call before you dig.

REFERENCE DRAWINGS

REVISIONS

1	ISSUED ISSUED FOR CONSTRUCTION	08-01-19	BAC
0	ISSUED FOR CONSTRUCTION	07-30-19	BAC

REVISIONS

SCALE: 1" = 50'
DESIGNED: E. CURTIS 05/21/19
DRAWN: B. SMALLWOOD 05/24/19
CHECKED: M. SKELSKEY 05/28/19
PE APPROVED:
QA APPROVED:

XTO ENERGY
WILLIAMS COUNTY, ND

SAMUEL ENGINEERING

TITLE: FLICKERTAIL COMPRESSOR STATION
CIVIL
SITE PLAN

PROJECT NUMBER: 19015
DRAWING NUMBER: FTC-CE-101
SHT 1

G3608

GAS COMPRESSION APPLICATION

GAS ENGINE SITE SPECIFIC TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED (rpm):	1000	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	7.6	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	GAV
AFTERCOOLER - STAGE 2 INLET (°F):	130		WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 1 INLET (°F):	174	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	190	FUEL:	Gas Analysis
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig): (See note 1)	58.0-70.3
COOLING SYSTEM:	JW+1AC, OC+2AC	FUEL METHANE NUMBER:	61.9
CONTROL SYSTEM:	ADEM4	FUEL LHV (Btu/scf):	1077
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	1900
COMBUSTION:	LOW EMISSION	INLET AIR TEMPERATURE(°F):	55
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.3	STANDARD RATED POWER:	2500 bhp@1000rpm
SET POINT TIMING:	17		

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
ENGINE POWER	(WITHOUT FAN)	(2)	bhp	2500	2500	1875	1250
INLET AIR TEMPERATURE			°F	55	55	55	55
ENGINE DATA							
FUEL CONSUMPTION (LHV)		(3)	Btu/bhp-hr	6851	6851	7078	7577
FUEL CONSUMPTION (HHV)		(3)	Btu/bhp-hr	7557	7557	7807	8357
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(4)(5)	ft3/min	6067	6067	4598	3126
AIR FLOW	(WET)	(4)(5)	lb/hr	28050	28050	21257	14452
FUEL FLOW (60°F, 14.7 psia)			scfm	265	265	205	147
INLET MANIFOLD PRESSURE		(6)	in Hg(abs)	103.8	103.8	78.4	54.7
EXHAUST TEMPERATURE - ENGINE OUTLET		(7)	°F	822	822	865	929
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(8)(5)	ft3/min	16084	16084	12612	9012
EXHAUST GAS MASS FLOW	(WET)	(8)(5)	lb/hr	28925	28925	21934	14935
EMISSIONS DATA - ENGINE OUT							
NOx (as NO2)		(9)(10)	g/bhp-hr	0.30	0.30	0.30	0.30
CO		(9)(10)	g/bhp-hr	2.84	2.84	2.84	2.84
THC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	4.43	4.43	4.70	4.77
NMHC (mol. wt. of 15.84)		(9)(10)	g/bhp-hr	1.87	1.87	1.98	2.01
NMNEHC (VOCs) (mol. wt. of 15.84)		(9)(10)(11)	g/bhp-hr	0.73	0.73	0.77	0.78
HCHO (Formaldehyde)		(9)(10)	g/bhp-hr	0.16	0.16	0.17	0.20
CO2		(9)(10)	g/bhp-hr	465	465	481	514
EXHAUST OXYGEN		(9)(12)	% DRY	11.6	11.6	11.3	10.9
HEAT REJECTION							
HEAT REJ. TO JACKET WATER (JW)		(13)	Btu/min	27730	27730	23112	19010
HEAT REJ. TO ATMOSPHERE		(13)	Btu/min	9086	9086	9600	9375
HEAT REJ. TO LUBE OIL (OC)		(13)	Btu/min	12881	12881	12249	11170
HEAT REJ. TO A/C - STAGE 1 (1AC)		(13)(14)	Btu/min	21322	21322	10763	3035
HEAT REJ. TO A/C - STAGE 2 (2AC)		(13)(14)	Btu/min	8029	8029	5188	2729
COOLING SYSTEM SIZING CRITERIA							
TOTAL JACKET WATER CIRCUIT (JW+1AC)		(14)(15)	Btu/min	52892			
TOTAL STAGE 2 AFTERCOOLER CIRCUIT (OC+2AC)		(14)(15)	Btu/min	23888			

A cooling system safety factor of 0% has been added to the cooling system sizing criteria.

CONDITIONS AND DEFINITIONS

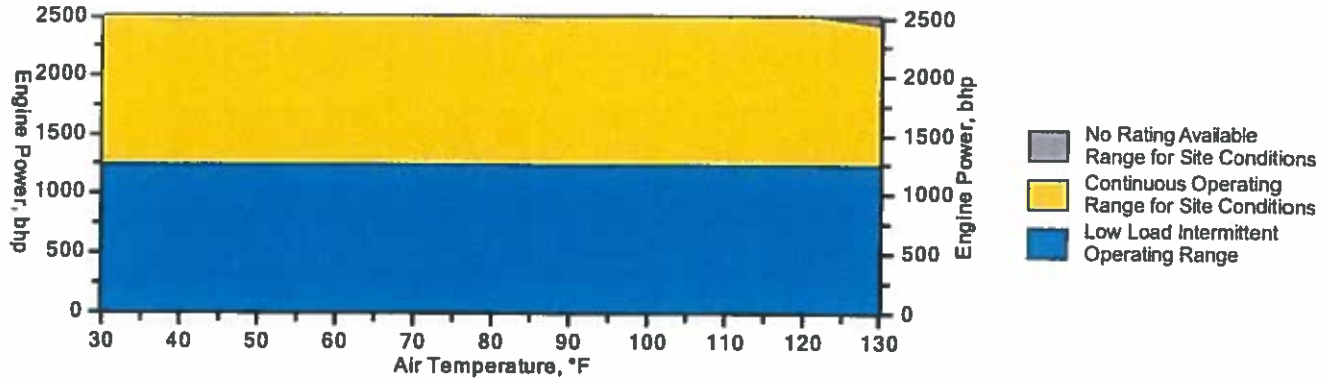
Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

For notes information consult page three.

PREPARED BY:
Data generated by Gas Engine Rating Pro Version 6.09.03
Ref. Data Set EM1410-04-001, Printed 09Apr2019

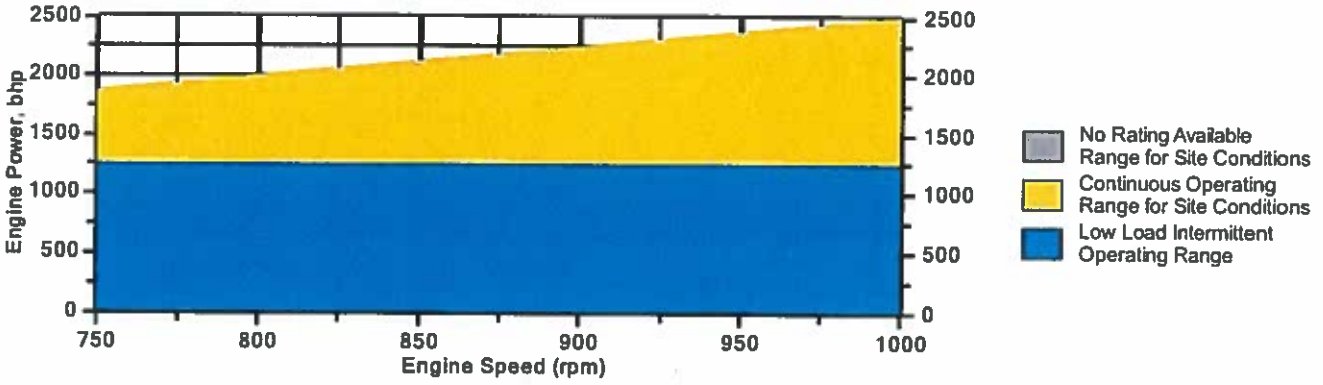
Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 1900 ft and 1000 rpm



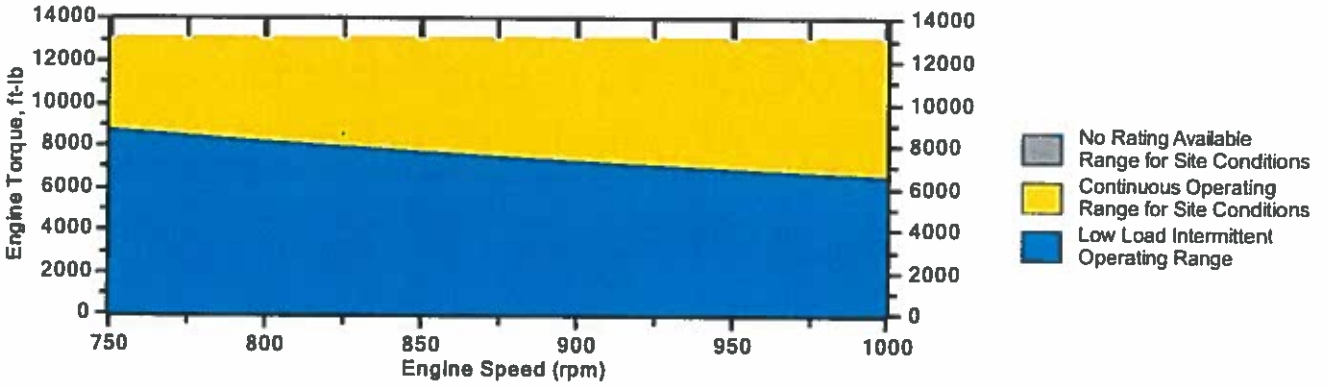
Engine Power vs. Engine Speed

Data represents speed sweep at 1900 ft and 55 °F



Engine Torque vs. Engine Speed

Data represents speed sweep at 1900 ft and 55 °F



Note: At site conditions of 1900 ft and 55°F inlet air temp., constant torque can be maintained down to 750 rpm. The minimum speed for loading at these conditions is 750 rpm.

NOTES

1. Fuel pressure range specified is to the engine gas shutoff valve (GSOV). Additional fuel train components should be considered in pressure and flow calculations.

2. Engine rating is with two engine driven water pumps. Tolerance is ± 3% of full load.

3. Fuel consumption tolerance is ± 2.5% of full load data.

4. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

5. Inlet and Exhaust Restrictions must not exceed A&I limits based on full load flow rates from the standard technical data sheet.

6. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

7. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

8. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

9. Emissions data is at engine exhaust flange prior to any after treatment.

10. Values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate the maximum values expected under steady state conditions. Fuel methane number cannot vary more than ± 3. THC, NMHC, and NMNEHC do not include aldehydes. An oxidation catalyst may be required to meet Federal, State or local CO or HC requirements.

11. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

12. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

13. Heat rejection values are nominal. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for radiation, ± 20% for lube oil circuit, and ± 5% for aftercooler circuit.

14. Aftercooler heat rejection includes an aftercooler heat rejection factor for the site elevation and inlet air temperature specified. Aftercooler heat rejection values at part load are for reference only. Do not use part load data for heat exchanger sizing.

15. Cooling system sizing criteria are maximum circuit heat rejection for the site, with applied tolerances.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	72.1700	72.1772
Ethane	C2H6	16.0100	16.0116
Propane	C3H8	5.4700	5.4705
Isobutane	iso-C4H1O	0.2400	0.2400
Norbutane	nor-C4H1O	0.6400	0.6401
Isopentane	iso-C5H12	0.0600	0.0600
Norpentane	nor-C5H12	0.0600	0.0600
Hexane	C6H14	0.0000	0.0000
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	4.7800	4.7805
Carbon Dioxide	CO2	0.5600	0.5601
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		99.9900	100.0000

Fuel Makeup:	Gas Analysis
Unit of Measure:	English
Calculated Fuel Properties	
Caterpillar Methane Number:	61.9
Lower Heating Value (Btu/scf):	1077
Higher Heating Value (Btu/scf):	1187
WOBBE Index (Btu/scf):	1265
THC: Free Inert Ratio:	17.72
Total % Inerts (% N2, CO2, He):	5.34%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.997
Stoich A/F Ratio (Vol/Vol):	11.17
Stoich A/F Ratio (Mass/Mass):	15.41
Specific Gravity (Relative to Air):	0.725
Fuel Specific Heat Ratio (K):	1.285

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

Emission Guarantee

Date: 8/12/2019

Allison Ginger
XTO Energy Inc.

RE: Emission Specs for Bakken Compressor Catalyst

Allison,

I am pleased to provide this guarantee based on the following information. If you have any questions or concerns please feel free to contact myself or any of my associates at DCL America.

Please note: This guarantee is subject to DCL's standard terms and conditions of sale attached. Copies of the limited warranty statement are available from DCL upon request (DCL doc. No. X0000-0000-K1).

Best Regards,

Michael Kourkoubes
Regional Sales Manager
DCL America Inc.
Cell: 713-897-1596
mkourkoubes@dcl-inc.com

Catalyst Element (Table 1)		
Application	Fuel Membrane	
Engine Model	CAT 3608A4	
Engine Mechanical Power	2500 hp	
Fuel	High BTU Fuel	
Exhaust Flowrate	28925 lb/hr	
Exhaust Temperature	725 deg. F	
Silencer Housing Model	12ARC3W24-20/24HGS	
Catalyst Model	2DC3W	
Catalyst Part Number	C39J-01-4F3W-32	
Number of Elements	6 (capacity of 12)	
Catalyst Code	0F / 300 cpsi	
Dimensions	48"x15"x3.7"	
Pre-Catalyst Emissions g/bhp-h	NOx	0.30
	CO	2.84
	NMNEHC	0.73
	CH2O	0.16
Post-Catalyst g/bhp-h / % Reduction	NOx	0.30 / 0%
	CO	0.14 / 95%
	NMNEHC	0.18 / 76%
	CH2O	0.01 / 93.75%
Limited Warranty	(doc. X0000-0000-K1) one year or 8000 hours operation, whichever first	

Global Leader in Emission Control Solutions
DCL America Inc. 27603 Commerce Oaks Drive, Oak Ridge North, TX 77385
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