CONTENTS

TABLES

FIGURES

APPENDICES

A – Field Test Data
B – Process Operating Data
C – Gas Certifications
D – Correspondence
E – Sample Calculations

1. INTRODUCTION

This report presents the results of the source emissions testing conducted by Environmental Quality Management, Inc. (EQM) for TC Energy's Great Lakes Gas Transmission Ltd. Partnership (GLGT) at Farwell compressor station, near Lake George, MI, which is located in Clare County.

The primary purpose of this testing program was to conduct emissions testing to determine compliance with operating permit No. MI-ROP-N5581-2018 for Stationary Unit EU-UNIT 1206 Turbine (EU 1206) at GLGT's gas compressor facility.

EQM's responsibility was to conduct the compliance testing for the O2, CO and NOx emissions rates and perform data reduction for conformance evaluation. GLGT's responsibility was to maintain process operating parameters and to assist in providing process operating data per compliance test requirements.

The following report provides information pertaining to TC Energy's process operations, and Compliance testing. The Compliance testing conducted on the Turbine 1206 was performed on Thursday, December 17, 2020, from 9:35 A.M. to 2:37 P.M.

The following requirements were specific for the testing program:

1. Equipment calibrations were performed and calibration data provided.
2. Three (3) twenty (20) -minute, minimum, O_2 and NOx test runs performed at the Turbine 1206 at four load conditions pursuant to EPA, Title 40, Code of Federal Regulations, Part 60, Appendix A.
3. Process manufacturing operations maintained at 100% of capacities and production and fuel consumption rates recorded during the emissions testing periods based on pipeline conditions.
4. All testing and analyses performed in accordance with current EPA test methodologies and analytical procedures for O_2 and NOx emissions determinations.
5. Stratification was found to be less than 5% in the turbine exhaust.

The testing program was approved by and coordinated with Tyrah Lydia, TC Energy's GLGT Company. The emission testing was overseen by Karl Mast, Manager, Emission Measurement & Project Manager, EQM. The testing was performed by Zach Hill, Field Test Activity Lead, EQM and Kameron King, Test Technician I, EQM. The emission testing was observed by Lindsey Wells of Michigan EGLE.

2. TEST RESULTS SUMMARY

The compliance testing was performed on the EU 1206 system in accordance with the requirements of the Title 40, Code of Federal Regulations, Part 60 (40 CFR 60, Appendix A) A summary of the test results is given below:

Table 1. Test Results Summary-NO_x (25 ppmvd @ 15% O_2)-EU 1206

EU-UNIT 1206 Average NOx Test Results (NOx 25 ppmvd @ 15% O2)		
Load Condition	Measured Limit	Pass/Fail
High	8.4465	Pass
Mid-High	6.7620	Pass
Mid-Low	8.2950	Pass
Low	4.0732	Pass
Permit Limit	25	N.A.

Table 2. Test Results Summary-NO_x (lb/hr)-EU 1206

EU-UNIT 1206 Average NOx Test Results (lb/hr)		
Load Condition	Measured Limit	Pass/Fail
High	2.5328	Pass
Mid-High	1.9285	Pass
Mid-Low	2.1827	Pass
Low	0.9866	Pass
Permit Limit	8.0	N.A.

Based on the information provided above, the Turbine 1206 met the acceptance criteria during the course of the testing. A complete list of performance parameters for each test run that was performed at the stack sampling locations can be found in Table 3-12.

Additional testing information may be found in Appendix A.

Table 3. Operating Parameters and Ambient Conditions-High Load-EU 1206

Run	1	2	3	
Date	12/17/20	12/17/20	12/17/20	
Time	9:35	9:56	10:17	
Engine Operating Conditions	High	High	High	Averages
Unit Horsepower from Control Panel	9,782.9	9,781.0	9,758.8	9,774.2
% Load	100.9	100.8	100.6	100.8
Unit Speed (rpm) CT/GG/GP/Jet	15,010.0	15,008.0	15,010.0	15,009.3
% CT Speed	100.1	100.1	100.1	100.1
Gas Compressor Speed (rpm) PT/Booster	9,809.0	9,812.0	9,812.0	9,811.0
% CT Speed	81.7	81.8	81.8	81.8
Turbine Exhaust Temp T5	1,383.0	1,384.0	1,383.0	1,383.3
Compressor Suction Pressure (PSIG)	718.5	717.3	716.7	717.5
Compressor Suction Temperature (°F)	42.2	42.4	42.4	42.3
Compressor Discharge Pressure (PSIG)	792.8	798.2	802.6	797.8
Compressor Discharge Temperature (°F)	72.5	73.4	73.7	73.2
Compressor Flow (MMSCF/D)	350.6	321.3	301.2	324.4
Pressure Ratio	1.10	1.11	1.12	1.1
Ambient Conditions				
Ambient Temperature (°F)	25.26	25.52	25.78	25.52
Barometric Pressure (psi)	14.15	14.15	14.14	14.14
Ambient Relative Humidity (%)	86.00	86.00	83.00	85.00
Absolute Humidity (grains/LB)	17.9432	18.1388	17.6991	17.9270

Table 4. Emissions Concentrations & Calculated Mass Emissions/Calculated Emissions Concentrations/Calculated Flows- High Load-EU 1206

Run	1	2	3	
Date	12/17/20	12/17/20	12/17/20	
Time	9:35	9:56	10:17	
Emissions Concentrations & Calculated Mass Emissions				Averages
NO_x ppm (BIAS Corrected)	8.620	8.310	8.050	8.327
NO_X LB/HR	2.6272	2.5241	2.4471	2.5328
NO_X (ppm @ 15% O_2)	8.7686	8.4242	8.1467	8.4465
NO_X (ppm @ 15% O_2, ISO)	9.2140	8.8496	8.5420	8.8685
NOx LB/MMBTU	0.0323	0.0310	0.0300	0.0311
NO_X Tons/Year	11.5074	11.0554	10.7184	11.0937
NO_X LB/SCF Fuel	3.3554E-05	3.2236E-05	3.1174E-05	3.2321E-05
CO ppm (BIAS Corrected)	21.450	18.580	16.700	18.910
CO LB/HR	3.9795	3.4352	3.0902	3.5017
CO LB/MMBTU **	4.8899E-02	4.2211E-02	3.7875E-02	4.2995E-02
CO (ppm @ 15% O_2)	21.8198	18.8354	16.9005	19.1852
CO (ppm @ 15% O_2, ISO)	22.9282	19.7865	17.7207	20.1451
CO Tons/Year	17.4303	15.0463	13.5351	15.3373
CO LB/SCF Fuel	5.0824E-02	4.3873E-02	3.9366E-02	4.4688E-02
% O_2 (BIAS Corrected)	15.100	15.080	15.070	15.083
Calculated Emissions Concentrations				
% CO_2 (Wet) *	3.0920	3.1009	3.1057	3.0995
%CO_2 (Dry) *	3.3044	3.3147	3.3198	3.3130
% H_2O *	6.4277	6.4490	6.4495	6.4421
% O_2 (Wet) *	14.1294	14.1075	14.0981	14.1117
% N_2 + CO (Wet) *	76.3509	76.3426	76.3467	76.3467
Calculated Flows				
Fuel Flow - (SCFM)	1305.00	1305.00	1308.33	1306.1111
Fuel Flow - (SCFH)	78,300	78,300	78,500	78366.6667
Exhaust Flow (LB/HR)	169722.9187	169156.0194	169107.2681	169328.7354
Exhaust Flow (WSCFM)	43,707.7650	43,580.0177	43,627.6231	43,638.4686
Air Flow (WSCFM)	40,920.6044	40,781.2703	40,815.9483	40,839.2743
Exhaust Flow Method 19 (wscfm)	42,458.6878	42,312.7816	42,348.0972	42,373.1888
Exhaust Flow Method 19 (lbm/min)	1,912.4987	1,905.9559	1,907.4807	1,908.6451
Exhaust Flow Carbon Balance (lbm/min)	3,269.4076	3,258.6169	3,261.5587	3,263.1944
Air flow Beshouri (scfm)	42,536.9758	42,396.5815	42,434.8567	42,456.1380
BSAC, #/BHP-hr	19.0634	19.0022	19.0616	19.0424
Fuel Flow Measurements				
Fuel Flow From Screen(MSCFH)	78.30	78.30	78.50	78.37
** BASED ON FUEL SPECIFIC DRY F-FACTOR CALCULATION	Run 1	Run 2	Run 3	
* BASED ON CARBON BALANCE (STOICH. + O2)				
- A/F IS TOTAL MASS RATIO				

Table 5. Operating Parameters and Ambient Conditions- Mid-High Load-EU 1206

Run	4	5	6	
Date	12/17/20	12/17/20	12/17/20	
Time	11:08	11:29	11:50	
Engine Operating Conditions	Mid High	Mid High	Mid High	Averages
Unit Horsepower from Control Panel	8,918.2	8,962.1	8,770.3	8,883.5
% Load	91.9	92.4	90.4	91.6
Unit Speed (rpm) CT/GG/GP/Jet	14,416.0	14,413.0	14,413.0	14,414.0
% CT Speed	96.1	96.1	96.1	96.1
Gas Compressor Speed (rpm) PT/Booster	9,514.0	9,508.0	9,513.0	9,511.7
% CT Speed	79.3	79.2	79.3	79.3
Turbine Exhaust Temp T5	1,369.0	1,373.0	1,371.0	1,371.0
Compressor Suction Pressure (PSIG)	711.4	710.1	709.1	710.2
Compressor Suction Temperature (^{0}F)	42.2	42.1	42.5	42.2
Compressor Discharge Pressure (PSIG)	808.0	808.8	810.2	809.0
Compressor Discharge Temperature (^{0}F)	73	73.4	73.5	73.4
Compressor Flow (MMSCF/D)	757.5	755.2	751.2	754.6
Pressure Ratio	1.13	1.14	1.14	1.1
Ambient Conditions				
Ambient Temperature (^{0}F)	25.90	26.03	26.29	26.07
Barometric Pressure (psi)	14.14	14.14	14.14	14.14
Ambient Relative Humidity (%)	87.00	87.00	88.00	87.33
Absolute Humidity (grains/LB)	18.6525	18.7550	19.1749	18.8608

Table 6. Emissions Concentrations & Calculated Mass Emissions/Calculated Emissions Concentrations/Calculated Flows - Mid-High Load-EU 1206

Run	4	5	6	
Date	12/17/20	12/17/20	12/17/20	
Time	11:08	11:29	11:50	
Emissions Concentrations & Calculated Mass Emissions				Averages
NO_x ppm (BIAS Corrected)	5.820	6.050	6.090	5.987
NO_X LB/HR	1.8814	1.9468	1.9574	1.9285
NO_X (ppm @ 15% O_2)	6.5908	6.8381	6.8571	6.7620
NO_X (ppm @ 15% O_2, ISO)	6.9267	7.1859	7.2076	7.1067
NOx LB/MMBTU	0.0243	0.0252	0.0252	0.0249
NO_X Tons/Year	8.2406	8.5269	8.5735	8.4470
NO_X LB/SCF Fuel	2.5220E-05	2.6166E-05	2.6239E-05	2.5875E-05
CO ppm (BIAS Corrected)	20.590	18.720	18.930	19.413
CO LB/HR	4.0516	3.6667	3.7036	3.8073
CO LB/MMBTU **	5.2254E-02	4.7417E-02	4.7766E-02	4.9146E-02
CO (ppm @ 15% O_2)	23.3169	21.1586	21.3143	21.9299
CO (ppm @ 15% O_2, ISO)	24.5051	22.2347	22.4039	23.0479
CO Tons/Year	17.7461	16.0603	16.2220	16.6761
CO LB/SCF Fuel	5.4311E-02	4.9284E-02	4.9647E-02	5.1081E-02
% O_2 (BIAS Corrected)	15.690	15.680	15.660	15.677
Calculated Emissions Concentrations				
% CO_2 (Wet) *	2.8202	2.8248	2.8338	2.8262
%CO_2 (Dry) *	2.9974	3.0026	3.0131	3.0044
% H_2O *	5.9131	5.9242	5.9504	5.9292
% O_2 (Wet) *	14.7622	14.7511	14.7282	14.7472
% N_2 + CO (Wet) *	76.5045	76.5000	76.4876	76.4974
Calculated Flows				
Fuel Flow - (SCFM)	1243.33	1240.00	1243.33	1242.2222
Fuel Flow - (SCFH)	74,600	74,400	74,600	74533.3333
Exhaust Flow (LB/HR)	179159.593	178342.979	178225.328	178575.967
Exhaust Flow (WSCFM)	45,649.1477	45,451.5825	45,423.8520	45,508.1941
Air Flow (WSCFM)	43,357.1093	43,158.8700	43,111.3790	43,209.1194
Exhaust Flow Method 19 (wscfm)	45,033.3135	44,826.5414	44,775.4892	44,878.4480
Exhaust Flow Method 19 (lbm/min)	2,028.5837	2,019.2857	2,017.0532	2,021.6409
Exhaust Flow Carbon Balance (lbm/min)	3,453.3635	3,437.7546	3,434.3329	3,441.8170
Air flow Beshouri (scfm)	44,930.3530	44,727.2718	44,682.7529	44,780.1259
BSAC, #/BHP-hr	22.1569	21.9476	22.4029	22.1691
Fuel Flow Measurements				
Fuel Flow From Screen(MSCFH)	74.60	74.40	74.60	74.53
** BASED ON FUEL SPECIFIC DRY F-FACTOR CALCULATION	Run 4	Run 5	Run 6	
* BASED ON CARBON BALANCE (STOICH. + O2)				
- A/F IS TOTAL MASS RATIO				

Table 7. Operating Parameters and Ambient Conditions- Mid-Low Load-EU 1206

Run	7	8	9	
Date	12/17/20	12/17/20	12/17/20	
Time	12:24	12:45	13:05	
Engine Operating Conditions	Mid Low	Mid Low	Mid Low	Averages
Unit Horsepower from Control Panel	7,544.1	7,499.1	7,481.8	7,508.3
% Load	77.8	77.3	77.1	77.4
Unit Speed (rpm) CT/GG/GP/Jet	13,921.0	13,921.0	13,924.0	13,922.0
% CT Speed	92.8	92.8	92.8	92.8
Gas Compressor Speed (rpm) PT/Booster	8,977.0	8,976.0	8,970.0	8,974.3
% CT Speed	74.8	74.8	74.8	74.8
Turbine Exhaust Temp T5	1,371.0	1,372.0	1,372.0	1,371.7
Compressor Suction Pressure (PSIG)	711.7	712.8	713	712.6
Compressor Suction Temperature (°F)	42.3	42.4	43	42.4
Compressor Discharge Pressure (PSIG)	809.9	810.6	812	810.8
Compressor Discharge Temperature (°F)	71.3	71.1	71	71.2
Compressor Flow (MMSCF/D)	698.0	699.6	699	698.8
Pressure Ratio	1.14	1.13	1.14	1.1
Ambient Conditions				
Ambient Temperature (°F)	26.16	26.03	25.9	26.03
Barometric Pressure (psi)	14.14	14.14	14.14	14.14
Ambient Relative Humidity (%)	89.00	89.00	89.0	89.00
Absolute Humidity (grains/LB)	19.2893	19.1826	19.0805	19.1841

Table 8. Emissions Concentrations & Calculated Mass Emissions/Calculated Emissions Concentrations/Calculated Flows - Mid-Low Load-EU 1206

Run	7	8	9	
Date	12/17/20	12/17/20	12/17/20	
Time	12:24	12:45	13:05	
Emissions Concentrations & Calculated Mass Emissions				Averages
NO_x ppm (BIAS Corrected)	6.100	7.430	7.450	6.993
NO_X LB/HR	1.9103	2.3255	2.3123	2.1827
NO_X (ppm @ 15% O_2)	7.2560	8.8203	8.8086	8.2950
NO_X (ppm @ 15% O_2, ISO)	7.6294	9.2746	9.2638	8.7226
NOx LB/MMBTU	0.0267	0.0325	0.0324	0.0305
NO_X Tons/Year	8.3670	10.1856	10.1278	9.5601
NO_X LB/SCF Fuel	2.7766E-05	3.3751E-05	3.3707E-05	3.1741E-05
CO ppm (BIAS Corrected)	22.600	22.590	18.900	21.363
CO LB/HR	4.3081	4.3038	3.5707	4.0609
CO LB/MMBTU **	6.0246E-02	6.0098E-02	5.0080E-02	5.6808E-02
CO (ppm @ 15% O_2)	26.8831	26.8171	22.3467	25.3490
CO (ppm @ 15% O_2, ISO)	28.2777	28.2097	23.5111	26.6662
CO Tons/Year	18.8695	18.8505	15.6398	17.7866
CO LB/SCF Fuel	6.2618E-02	6.2464E-02	5.2051E-02	5.9044E-02
% O_2 (BIAS Corrected)	15.940	15.930	15.910	15.927
Calculated Emissions Concentrations				
% CO_2 (Wet) *	2.7024	2.7072	2.7167	2.7088
%CO_2 (Dry) *	2.8657	2.8710	2.8815	2.8727
% H_2O *	5.6971	5.7042	5.7206	5.7073
% O_2 (Wet) *	15.0319	15.0213	14.9999	15.0177
% N_2 + CO (Wet) *	76.5686	76.5673	76.5629	76.5662
Calculated Flows				
Fuel Flow - (SCFM)	1146.67	1148.33	1143.33	1146.1111
Fuel Flow - (SCFH)	68,800	68,900	68,600	68766.6667
Exhaust Flow (LB/HR)	173346.030	173271.143	171860.238	172825.804
Exhaust Flow (WSCFM)	43,928.2613	43,915.3740	43,572.2650	43,805.3001
Air Flow (WSCFM)	41,980.2480	41,957.5692	41,609.2077	41,849.0083
Exhaust Flow Method 19 (wscfm)	43,625.4139	43,600.9179	43,237.0813	43,487.8044
Exhaust Flow Method 19 (lbm/min)	1,965.2631	1,964.1428	1,947.7367	1,959.0475
Exhaust Flow Carbon Balance (lbm/min)	3,339.3023	3,337.6741	3,310.3108	3,329.0957
Air flow Beshouri (scfm)	43,446.3479	43,425.1632	43,069.1510	43,313.5540
BSAC, #/BHP-hr	25.3609	25.4993	25.3460	25.4021
Fuel Flow Measurements				
Fuel Flow From Screen(MSCFH)	68.80	68.90	68.60	68.77
** BASED ON FUEL SPECIFIC DRY F-FACTOR CALCULATION	Run 7	Run 8	Run 9	
* BASED ON CARBON BALANCE (STOICH. + O2)				
- A/F IS TOTAL MASS RATIO				

Table 9. Operating Parameters and Ambient Conditions- Low Load-EU 1206

Run	10	11	12	
Date	12/17/20	12/17/20	12/17/20	
Time	13:35	13:56	14:17	
Engine Operating Conditions	Low	Low	Low	Averages
Unit Horsepower from Control Panel	6,110.2	6,067.4	6,116.8	6,098.1
% Load	63.0	62.6	63.1	62.9
Unit Speed (rpm) CT/GG/GP/Jet	13,536.0	13,533.0	13,535.0	13,534.7
% CT Speed	90.2	90.2	90.2	90.2
Gas Compressor Speed (rpm) PT/Booster	8,415.0	8,411.0	8,403.0	8,409.7
% CT Speed	70.1	70.1	70.0	70.1
Turbine Exhaust Temp T5	1,386.0	1,386.0	1,386.0	1,386.0
Compressor Suction Pressure (PSIG)	717	718	719.4	718.4
Compressor Suction Temperature (^{o}F)	43	43	42.6	42.6
Compressor Discharge Pressure (PSIG)	811	811	811.5	811.1
Compressor Discharge Temperature (^{o}F)	68	68	68.3	68.3
Compressor Flow (MMSCF/D)	643	645	645.8	644.7
Pressure Ratio	1.13	1.13	1.13	1.1
Ambient Conditions				
Ambient Temperature (^{o}F)	25.9	25.8	25.78	25.82
Barometric Pressure (psi)	14.14	14.15	14.15	14.15
Ambient Relative Humidity (%)	91.0	91.0	91.00	91.00
Absolute Humidity (grains/LB)	19.5070	19.4057	19.4002	19.4377

Table 10. Emissions Concentrations & Calculated Mass Emissions/Calculated Emissions Concentrations/Calculated Flows - Low Load-EU 1206

Run	10	11	12	
Date	12/17/20	12/17/20	12/17/20	
Time	13:35	13:56	14:17	
Emissions Concentrations & Calculated Mass Emissions				Averages
NO_x ppm (BIAS Corrected)	3.400	3.320	3.290	3.337
NO_X LB/HR	1.0081	0.9818	0.9699	0.9866
NO_X (ppm @ 15% O_2)	4.1618	4.0471	4.0105	4.0732
NO_X (ppm @ 15% O_2, ISO)	4.3833	4.2608	4.2233	4.2891
NOx LB/MMBTU	0.0153	0.0149	0.0148	0.0150
NO_X Tons/Year	4.4154	4.3005	4.2482	4.3213
NO_X LB/SCF Fuel	1.5925E-05	1.5486E-05	1.5347E-05	1.5586E-05
CO ppm (BIAS Corrected)	13.260	12.580	12.640	12.827
CO LB/HR	2.3932	2.2646	2.2682	2.3087
CO LB/MMBTU **	3.6374E-02	3.4366E-02	3.4530E-02	3.5090E-02
CO (ppm @ 15% O_2)	16.2311	15.3351	15.4083	15.6582
CO (ppm @ 15% O_2, ISO)	17.0948	16.1511	16.2256	16.4905
CO Tons/Year	10.4820	9.9190	9.9349	10.1120
CO LB/SCF Fuel	3.7807E-02	3.5720E-02	3.5890E-02	3.6472E-02
% O_2 (BIAS Corrected)	16.080	16.060	16.060	16.067
Calculated Emissions Concentrations				
% CO_2 (Wet) *	2.6359	2.6455	2.6455	2.6423
%CO_2 (Dry) *	2.7915	2.8021	2.8021	2.7986
% H_2O *	5.5723	5.5888	5.5887	5.5832
% O_2 (Wet) *	15.1840	15.1624	15.1625	15.1696
% N_2 + CO (Wet) *	76.6078	76.6033	76.6034	76.6048
Calculated Flows				
Fuel Flow - (SCFM)	1055.00	1056.67	1053.33	1055.0000
Fuel Flow - (SCFH)	63,300	63,400	63,200	63300.0000
Exhaust Flow (LB/HR)	164110.661	163723.031	163207.020	163680.237
Exhaust Flow (WSCFM)	41,433.9413	41,350.2558	41,219.8133	41,334.6701
Air Flow (WSCFM)	39,733.9340	39,634.0354	39,509.0069	39,625.6588
Exhaust Flow Method 19 (wscfm)	41,303.7488	41,198.0533	41,068.0910	41,189.9644
Exhaust Flow Method 19 (lbm/min)	1,860.7081	1,855.9315	1,850.0760	1,855.5718
Exhaust Flow Carbon Balance (lbm/min)	3,158.2905	3,150.6820	3,140.7429	3,149.9051
Air flow Beshouri (scfm)	41,091.2745	40,992.2825	40,862.9693	40,982.1754
BSAC, #/BHP-hr	29.6369	29.7709	29.4373	29.6151
Fuel Flow Measurements				
Fuel Flow From Screen(MSCFH)	63.30	63.40	63.20	63.30
** BASED ON FUEL SPECIFIC DRY F-FACTOR CALCULATION	Run 10	Run 11	Run 12	
* BASED ON CARBON BALANCE (STOICH. + O2)				
- A/F IS TOTAL MASS RATIO				

3. PROCESS DESCRIPTION

TC Energy's GLGT Farwell Compressor Station is located in Lake George, Michigan and operates a Solar Taurus 70 stationary gas turbine burning only pipeline quality natural gas labeled as EU-UNIT 1206. The unit peak load HP rating is 9,700 at ISO conditions. The plant is located at 3400 Hickory Road, Lake George, MI.

The Solar Taurus 70 is a simple cycle, natural gas fired, single-shaft turbine. In a simple cycle turbine, filtered atmosphere air is first compressed by the axial with natural gas in the combustor. The hot exhaust gases expand through two turbine stages. The gas producer (G.P.) turbine drives the axial flow air while the power turbine (P.T.) drives the centrifugal pipeline compressor. The pipeline gas compressor moves natural gas through the pipeline by compressing it from an initial "suction" state to more compressed "discharge" state.

The following tables provide a summary of the production data and general information for the Turbine 1206:

Table 11. Production Data Horsepower -EU 1206

Run No.	High Load	Mid-High Load	Mid-Low Load	Low Load
1	9,782.9	8,918.2	7,544.1	6,110.2
2	9,781.0	8,962.1	7,499.1	6,067.4
3	9,758.8	8,770.3	7,481.8	6,116.8
Average	9,774.2	8,883.5	7,508.3	6,098.1
Peak Load Rated HP	9,700	9,700	9,700	9,700

Additional information may be found in Appendix B.

Table 12. General Information-EU 1206

General Information

Date:	17-Dec-20
Company:	TC Energy
Station:	Farwell MI
Unit:	1206
Engine Type:	Solar Taurus

CT Rated RPM:	15000	RPM
PT Rated RPM:	12000	RPM
Rated BHP:	9700	BHP

Permit Limits

	ppm@15% O2	g/Bhp-Hr	lb/hr	TPY
NOx:	25		8	
CO:				
VOC:				
H2CO:				

Limits are actuallly listed as average values

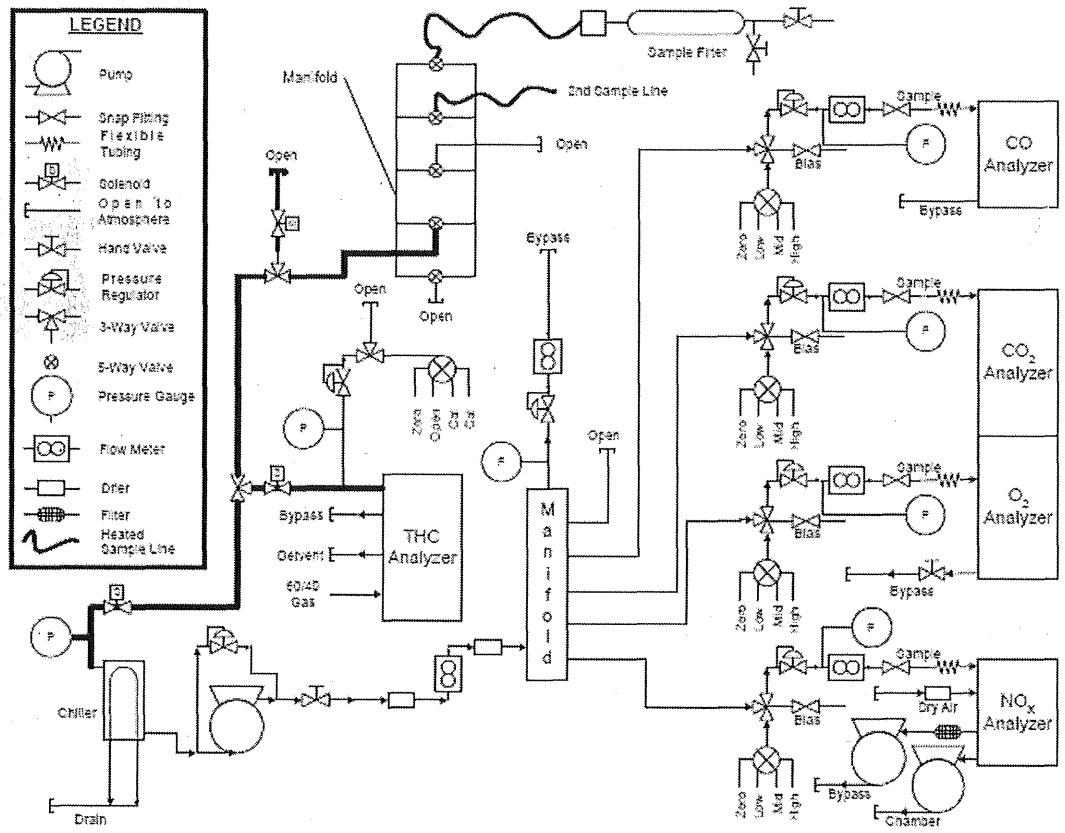
Fuel Gas Analysis

Constituent	Mole Percent
Nitrogen	0.541
Carbon Dioxide	0.680
Methane	93.909
Ethane	4.586
Propane	0.240
I-Butane	0.017
N-Butane	0.021
I-Pentane	0.002
N-Pentane	0.000
Hexane +	0.002
Total	100.00

Fuel Meter Type

Enter Type from List Below	2
Orifice Meter (upstream pressure tap):	1
Orifice Meter (downstream pressure tap):	2
Electronic Flow Meter (EFM):	3
Venturi (Nozzle) Meter:	4
Roots Meter w/ Accumulator:	5
Pipe I.D.:	2
Orifice I.D.:	1.5

Figure 1. Flow Schematic



Additional Information pertaining to the Fuel Flows may be found in Appendix B.

4. TEST PROCEDURES

EQM and EQM's affiliates and subcontractors use current U.S. EPA accepted testing methodologies in their Air Quality Programs as listed in the U.S. Code of Federal Regulations, Title 40, Part 60, Appendix A. For this testing program, the following specific methodologies were utilized:

- U.S EPA Method 1 – Sample and Velocity Traverses for Stationary Sources
- U.S EPA Method 2 – Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
- U.S. EPA Method 3A – Determination of Oxygen and Carbon Dioxide Concentrations in Emissions From Stationary Sources (Instrumental Analyzer Procedure)
- U.S. EPA Method 7E – Determination of Nitrogen Oxides Emissions From Stationary Sources (Instrumental Analyzer Procedure)
- U.S. EPA Method 10 – Determination of Carbon Monoxide Emissions From Stationary Sources (Instrumental Analyzer Procedure)

USEPA Methods 3A, 7E and 10 were performed at the Exhaust Stack sampling location by continuously extracting a gas sample from the stack through a single point stainless steel sample probe. The extracted sample was pulled through a series of filters to remove any particulate matter. Directly after the probe, the sample was conditioned by a series of refrigeration dryers to remove moisture from the gas stream. After the refrigeration dryers, the sample was transported through a Teflon® line to the analyzers. The flow of the stack gas sample was regulated at a constant rate to minimize drift.

At the start of the day, each monitor was checked for calibration error by introducing zero, mid-range and high-range EPA Protocol 1 gases to the measurement system at a point upstream of the analyzers. In this report, the calibration error test is referred to as instrument calibration. The gas was injected into the sampling valve located at the outlet of the sampling probe. The bias test was conducted before and after each consecutive test run by introducing zero and upscale calibration gases for each monitor. The upscale calibration gases used for each monitor were the high calibration gases.

Measurement System Performance Specifications were as follows:

- Analyzer Calibration Error - Less than +/- 2% of the span of the zero, mid-range and high-range calibration gases.
- Sampling System Bias - Less than +/-5% of the span for the zero, mid-range and high-range calibration gases.
- Zero Drift - Less than +/-3% of the span over the period of each test run.

- Calibration Drift - Less than +/-3% of the span over the period of each set of runs.

Calculations that were used in this testing event for the Turbine EU 1206 are as follows:

Calibration Correction

$$C_{GAS} = (C_R - C_O)\frac{C_{MA}}{C_M - C_O}$$

Where:

C_{GAS}:	Corrected flue gas concentration (ppmvd)
C_R:	Flue gas concentration (ppmvd)
C_O:	Average of initial and final zero checks (ppmvd)
C_M:	Average of initial and final span checks (ppmvd)
C_{MA}:	Actual concentration of span gas (ppmvd)

EPA F-Factor

$$F_d = \frac{\left[\left(3.64 \cdot H_{Wt\%} \cdot 100\right) + \left(1.53 \cdot C_{Wt\%} \cdot 100\right)\right]}{\frac{GCV}{\rho_{FuelGas}}} \cdot 10^6 + \frac{\left[\left(0.14 \cdot N_{2Wt\%} \cdot 100\right) - \left(0.46 \cdot O_{2Wt\%} \cdot 100\right)\right]}{\frac{GCV}{\rho_{FuelGas}}} \cdot 10^6$$

Where:

F_d:	Fuel specific F-factor, dscf/MMBtu
$H_{Wt\%}$:	Hydrogen weight percent
$C_{Wt\%}$:	Carbon weight percent
$N_{2Wt\%}$:	Nitrogen weight percent
$O_{2Wt\%}$:	Oxygen weight percent
GCV:	Heating value of the fuel, BTU/dscf
$\rho_{Fuel\ Gas}$:	Density of the fuel gas, lb/scf

NO_x Corrected to 15% O_2

$$Em = NO_X\left(\frac{5.9}{20.9 - \%O_2}\right)$$

Where:

E_m:	Pollutant concentration corrected to 15% O_2, ppm
NO_x:	Pollutant concentration, ppm
$\%O_2$:	Oxygen concentration in percent, measured on a dry basis

Mass Emissions Calculations

The F-factor Method and guidance from Part 75 will be used to calculate the mass emissions rates.

$$Em = Cd \times Fd \times \frac{20.9}{(20.9 - \%O_2)} \times Qh \times \frac{GCV}{10^6}$$

Where:

E_m:	Pollutant emission rate, lb/hr
C_d:	Pollutant concentration, lb/scf
F_d:	Fuel specific F-factor, dscf/MMBtu
$\%O_2$:	Oxygen concentration, dry basis
Q_h:	Fuel rate from calibrated AGA specified Meter, scfh.
GCV:	Heating value of the fuel, Btu/scf

To Convert from:	To	Multiply by:
ppm CO	lb/scf	7.268×10^{-8}
ppm NO_x	lb/scf	1.194×10^{-7}

5. QUALITY ASSURANCE PROCEDURES

Each reference method presented in the U.S. Code of Federal Regulations details the instrument calibration requirements, sample recovery and analysis, data reduction and verification, types of equipment required, and the appropriate sampling and analytical procedures to ensure maximum performance and accuracy. EQM and EQM's affiliates and subcontractors adhere to the guidelines for quality control set forth by the United States Environmental Protection Agency. These procedures are outlined in the following documents:

- Code of Federal Regulations, Title 40, Part 51
- Code of Federal Regulations, Title 40, Part 60
- Quality Assurance Handbook, Volume 1, EPA 600/9-76-005
- Quality Assurance Handbook, Volume 2, EPA 600/4-77-027a
- Quality Assurance Handbook, Volume 3, EPA 600/4-77-027b

6. CONCLUSIONS

An Emissions Test was conducted on the Turbine EU-1206 at TC Energy's GLGT Company's Farwell Compressor Station located in Lake George, MI. The testing was conducted on December 17, 2020.

During the course of the testing, the Turbine EU-1206 conformed to the requirements of Code Of Federal Regulations, Title 40, Part 60, Appendix A.

The usefulness and/or significance of the emissions values presented in this document as they relate to the compliance status of the Turbine EU-1206 emissions shall be determined by others.

For additional information pertaining to the testing program see Appendix E of this report.

A. FIELD TEST DATA