1.0 Introduction

A&L Iron and Metal (A&L Iron) owns and operates a metal shredding and recycling facility located in Gaylord, Otsego County, Michigan. The facility is powered by a General Electric locomotive diesel compression-ignition engine (CI RICE) that drives an electricity generator. The engine is subject to the emission standards and testing requirements in Title 40 of the Code of Federal Regulations Part 63 Subpart ZZZZ *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines* (40 CFR Part 63 Subpart ZZZZ) as an existing non-emergency, non-black start CI stationary RICE with a power output greater than 500 horsepower (hp), located at an area source of hazardous air pollutant (HAP) emissions.

Pursuant to 40 CFR Part 63 Subpart ZZZZ, an owner/operator of an existing non-emergency, non-black CI RICE >500 hp at an area source of HAP emissions must:

- Install an oxidation catalyst emission control system.
- Reduce carbon monoxide (CO) emissions by 70% or more, or reduce CO to an outlet concentration of 23 ppmvd at 15% oxygen.

In addition, EGLE Permit to install (PTI) No. 173-08B, issued January 7, 2021, limits emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOC) to the following emission rates:.

- NO_x : 69.4 pounds per hour (lb/hr)
- VOC : 17.4 (lb/hr)

A&L Iron has equipped the existing engine with an oxidation catalyst and is submitting this test report for the verification of its CO destruction efficiency (DE), and NO_x and VOC emission rates. CO Emissions were measured on the inlet and outlet of the catalyst in the exhaust gas stream, while NO_x and VOC emissions were measured in the outlet of the exhaust gas stream.

The compliance testing presented in this report was performed by Impact Compliance & Testing, Inc. (ICT), a Michigan-based environmental consulting and testing company. ICT representatives Clay Gaffey, Blake Beddow and Andrew Eisenberg performed the field sampling and measurements October 5, 2021.

The emission tests consisted of triplicate, one-hour sampling periods for NOx, CO DE, and VOC, as non-methane hydrocarbons; NMHC or NMOC. Exhaust gas velocity, moisture, oxygen (O_2) content, and carbon dioxide (CO_2) content were determined for each test period to calculate pollutant mass emission rates.

The exhaust gas sampling and analysis was performed using procedures specified in the Stack Test Protocol dated July 30, 2021 that was reviewed and approved by EGLE-AQD.

Ms. Sharon LeBlanc and Mr. Jeremy Howe of EGLE-AQD observed portions of the compliance testing.

Questions regarding this air emission test report should be directed to:

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2.0 Summary of Test Results and Operating Conditions

2.1 Purpose and Objective of the Tests

ICT was contracted to perform the CI RICE genset CO emissions testing specified in 40 CFR Part 63 Subpart ZZZZ, and the NO_x and VOC emissions testing specified in PTI No. 173-08B. Installation and operation of the existing General Electric model 7FDL16 CI RICE genset is described in PTI No. 173-08B.

2.2 Operating Conditions During the Compliance Tests

A&L representatives provided kWh readings in 15-minute increments for each test period. The starting kWh meter reading was subtracted from the final kWh reading for each test run to determine the CI RICE output for each one-hour test run. Generator output ranged between 425 and 630 kW for each test period. Operating Load (%) was also recorded once per test run by A&L representatives. The Operating Load ranged between 16.3% and 27.3%.

Catalyst inlet / outlet temperature (°F), catalyst pressure drop ("H_2O), and diesel fuel consumption (gal) were also recorded by A&L representatives at 15-minute intervals for each test period. Catalyst inlet temperature ranged between 517 and 810 °F, catalyst outlet temperature ranged between 493 and 789 °F, catalyst pressure drop ranged between 1 and 2 "H_2O, and diesel fuel consumption rate ranged between 53 and 56 gallons.

Appendix 2 provides operating records provided by A&L representatives for the test periods.

Table 2.1 presents a summary of the average engine operating conditions during the test periods.

2.3 Summary of Air Pollutant Sampling Results

The exhaust gas from the diesel-fueled CI RICE genset is routed to an oxidation catalyst for the control of CO and hydrocarbons in the exhaust gas. In order to determine the CO destruction efficiency, the exhaust gas was sampled prior to the oxidation catalyst (inlet) and after the catalyst (outlet) using instrumental analyzers. The exhaust gas was sampled at the catalyst outlet for NO_x and VOC using instrumental analyzers.

The compliance testing performed October 5, 2021 consisted of three (3) one-hour test periods during which the inlet and outlet gas streams were sampled and analyzed simultaneously. During each test period the inlet gas stream was sampled for an equal amount of time at twelve (12) points. The catalyst outlet gas stream is divided into three (3) vertical stacks. The three (3) stacks were sampled simultaneously using a raked sample probe during each one-hour test period.

Due to the variable engine load requirements demanded by the metal shredding process, the CI RICE exhausted a large range of pollutant concentrations. The CO concentrations exceeded the instrument ranges on five (5) instances throughout the three (3) test runs.

This resulted in null values within the raw data file. These null values were replaced manually with the concentration at which the instrument was set (5,000 ppm CO Outlet, and 2,000 ppm CO Inlet). Any manually entered data points have been highlighted in yellow within the raw data file.

Additionally, the CO and O_2 Inlet concentrations were recorded by the data logger two (2) minutes later than the CO and O_2 Outlet concentrations as a result of a longer system response time. The Inlet CO and O_2 channels have been moved back by two (2) minutes to account for the difference in the separate inlet system response time. This allowed for DE to be calculated at each one-minute average within the raw data file.

However, on data points that exceeded instrument ranges where catalyst inlet and outlet concentrations were manually entered at the set instrument range (5,000 ppm CO Outlet, and 2,000 ppm CO Inlet) the DE calculation resulted in a negative DE. Because negative DE is not possible, these negative DE data points have been set to 0% DE and then were included in the one-run average DE calculation.

The test results verify compliance with the 40 CFR Part 63 Subpart ZZZZ emission standard to achieve an emission reduction of 70% or more using an oxidation catalyst, and are less than (in compliance with) the NO_x and VOC emissions limitations permitted in PTI 173-08B.

Table 2.2 presents the average measured CO DE, NO_x, and VOC emission rates (average of the three test periods.

Test results for each one-hour sampling period and comparison to the permitted emission rates are presented in section 6.0 of this report.

Appendix 3 presents pollutant calculation sheets.

Table 2.1 Average CI RICE operating conditions during the test periods (three-test average)

Emission Unit ID	Operating Hours†	Average Output (kW)	Catalyst Inlet (°F)	Pressure Drop Catalyst ("H_2O)	Diesel Usage (gal)
EUGENERATOR	8,205	524	648	1.0	55

† Engine run hour meter reading at the beginning of Test 1

Table 2.2 Average measured emission rates for each engine (three-test average)

EUGENERATOR Catalyst	CO Destruction Efficiency (%)	NO_x (lb/hr)	VOC (lb/hr)
EUGENERATOR	79%	28.2	0.33
Limit	**>70%**	**69.4**	**17.4**

3.0 Source and Sampling Location Description

3.1 General Process Description

The diesel fueled CI RICE genset is a General Electric model 7FDL16 locomotive RICE connected to an electricity generator. The engine has a manufacture date of 1978 and a horsepower rating of approximately 3,506 hp. The generator has a rated maximum output of 2.6 MW.

3.2 Rated Capacities, Type and Quantity of Raw Materials Used

The CI RICE genset typically operates between 50 and 60% of its rated capacity of 2.6 MW. During the emission testing the three-run average recorded generator output was 524 kW (0.5 MW).

The CI RICE is currently fueled by diesel, but is permitted to use natural gas injection during times where a higher engine load is required. The three-run average diesel fuel consumption was 55 gallons.

Appendix 1 provides operating data recorded by A&L Iron representatives.

3.3 Emission Control System Description

The exhaust gas from the CI RICE is directed to an EST Diesel Oxidation/VOC Silencer/Converter. The emission control system reduces (oxidizes using a catalyst) CO and other hydrocarbon emissions prior to the release to the ambient air.

The CI RICE exhaust gas provides the heat necessary to initiate the catalytic reaction (an additional heat source is not used to preheat the gas prior to the catalyst).

The temperature at the catalyst inlet and pressure drop across the catalyst were monitored throughout the test periods to verify that the catalyst operating parameters are within the proper ranges as required by 40 CFR Part 63 Subpart ZZZZ. Table 2b to Subpart ZZZ specifies that for existing CI RICE with a power output greater than 500 HP, the catalyst:

- Must be maintained such that the pressure drop across the catalyst does not change more than 2 inches of water from the pressure drop across the catalyst that was measured during the initial performance test.
- Inlet temperature must be maintained between 450 and 1350°F.

3.4 Sampling Locations

A continuous sample of the CI RICE exhaust gas was obtained from the inlet and the outlet of the emission control catalyst. During each simultaneous, one-hour pollutant sampling period, a continuous sample of the CI RICE exhaust gas stream was extracted from each sampling location using a stainless steel probe connected to a Teflon® heated sample line. The sampled gas was conditioned by removing moisture prior to being introduced to the instrumental analyzers.

The oxidation catalyst inlet sample location is a rectangular plenum at the engine exhaust that is approximately 13.5 inches by 28 inches. This sampling location does not meet USEPA Method 1 requirements. Therefore, sampling was performed using a 12 point-grid across the rectangular cross section pursuant to Section 8.1.2 of USEPA Method 7E and Table 1-1 to USEPA Method 1. The sample points were configured in a 4-by-3 grid as presented in Appendix 2.

The catalyst outlet was sampled concurrently with the inlet. The catalyst exhaust gas is released to atmosphere by three (3) separate exhaust stacks. The three (3) stacks were sampled simultaneously using a raked sample probe during each one-hour test period.

Appendix 2 provides diagrams of the sampling locations.

4.0 Sampling and Analytical Procedures

A Stack Test Protocol for the air emission testing was reviewed and approved by EGLE-AQD. This section provides a summary of the sampling and analytical procedures that were used during the testing periods.

4.1 Summary of Sampling Methods

USEPA Method 1	Exhaust gas sampling locations were determined based on the physical stack arrangement and requirements in USEPA Method 1.
USEPA Method 4	Exhaust gas moisture was determined based on the water weight gain in chilled impingers.
USEPA Method 3A	Exhaust gas O_2 content was determined using paramagnetic analyzers.
USEPA Method 7E	Exhaust gas NOx concentration was determined using chemiluminescence instrumental analyzers.
USEPA Method 10	Exhaust gas CO concentration was measured using an infrared instrumental analyzer.
USEPA Method 25A / ALT-096	Exhaust gas VOC (as NMHC) concentration was determined using a flame ionization analyzer equipped with methane separation column.
USEPA Method 19	Exhaust gas flowrate was calculated by using the fuel F-Factor for diesel fuel (fuel oil).

4.2 Oxygen and CO Concentration Measurements (USEPA Methods 3A and 10)

The O_2 content and CO concentration in the RICE exhaust gas stream (inlet and outlet of catalyst) was measured continuously throughout each one-hour test period in accordance with USEPA Methods 3A and 10. For the catalyst inlet a Servomex 1440D oxygen analyzer with a paramagnetic sensor was used to measure the O_2 content; CO concentration was measured using a Thermo Environmental Instruments (TEI) Model 48i non-dispersive infrared (NDIR) analyzer. For the catalyst outlet a California Analytical Instruments (CAI) Model ZRE4 NDIR/zirconia analyzer was used to measure the O_2 and CO concentrations.

Instrument response for each analyzer was recorded on an ESC Model 8816 data logging system that monitored the analog output of the instrumental analyzers continuously and logged data as one-minute averages. Prior to, and at the conclusion of each test period, instrument calibration was verified using appropriate calibration gases to determine accuracy and system bias (described in Section 5.1 of this document).

Appendix 3 provides CO and Oxygen calculation sheets. Raw instrument response data (one-minute averages) are provided in Appendix 4.

4.3 Exhaust Gas Moisture Content (USEPA Method 4)

Moisture content was determined in accordance with USEPA Method 4 using a chilled impinger sampling train. Exhaust gas moisture content measurements were performed concurrently with the instrumental analyzer sampling periods. At the conclusion of each sampling period the moisture gain in the impingers was determined gravimetrically by weighing each impinger to determine net weight gain.

Appendix 3 provides field data sheets and calculations.

4.4 NO_x Concentration Measurements (USEPA Method 7E)

NO_X pollutant concentrations in the RICE exhaust gas streams were determined using a Thermo Environmental Instruments, Inc. (TEI) Model 42i High Level chemiluminescence NO_X analyzer.

Throughout each test period, a continuous sample of the engine exhaust gas was extracted from the stack using the Teflon® heated sample line and gas conditioning system and delivered to the instrumental analyzers. Instrument response for each analyzer was recorded on an ESC Model 8816 data acquisition system that logged data as one-minute averages. Prior to, and at the conclusion of each test, the instruments were calibrated using upscale calibration and zero gas to determine analyzer calibration error and system bias.

Appendix 3 provides NO_X calculation sheets. Raw instrument response data (one-minute averages) are provided in Appendix 4.

4.5 VOC Concentration Measurements (USEPA Method 25A / Alt 096)

The VOC emission rate was determined by measuring the nonmethane hydrocarbon (NMHC or NMOC) concentration in the engine exhaust gas. NMHC pollutant concentration was determined using a TEI Model 55i Methane / Nonmethane hydrocarbon analyzer. The TEI 55i analyzer contains an internal gas chromatograph column that separates methane from non-methane components. The concentration of NMHC in the sampled gas stream, after separation from methane, is determined relative to a propane standard using a flame ionization detector in accordance with USEPA Method 25A.

The USEPA Office of Air Quality Planning and Standards (OAQPS) has issued an alternate test method approving the use of the TEI 55i-series analyzer as an effective instrument for measuring NMOC from gas-fueled RICE (ALT-096).

Samples of the exhaust gas were delivered directly to the instrumental analyzer using the Teflon® heated sample line to prevent condensation. The sample to the NHMC analyzer was not conditioned to remove moisture. Therefore, VOC measurements correspond to standard conditions with no moisture correction (wet basis).

Prior to, and at the conclusion of each test, the instrument was calibrated using mid-range calibration (propane) and zero gas to determine analyzer calibration error and system bias (described in Section 5.0 of this document).

Appendix 4 provides VOC calculation sheets. Raw instrument response data for the NMHC analyzer is provided in Appendix 5.

4.6 Fuel F-Factor (USEPA Method 19)

Due to dangerous sampling location conditions (possibilities of scrap metal ejecting from the shredder), CI RICE exhaust flowrate was calculated using the diesel fuel (fuel oil) F-Factor in USEPA Method 19.

The fuel F-Factor for diesel fuel (fuel oil) and calculations in USEPA Reference Test Method 19 were used to determine CI RICE exhaust flowrate.

Appendix 3 provides F-Factor calculation sheets.

5.0 QA/QC Activities

5.1 Instrument Calibration and System Bias Checks

At the beginning of each day, initial three-point instrument calibrations were performed by injecting calibration gas directly into the inlet sample port for each instrument. System bias checks were performed prior to and at the conclusion of each sampling period by introducing the appropriate upscale calibration gas and zero gas into the sampling system (at the base of the stainless steel sampling probe prior to the particulate filter and Teflon® heated sample line) and verifying the instrument response against the initial instrument calibration readings.

The instrument analyzers were calibrated with USEPA Protocol 1 certified concentrations in nitrogen or air and zeroed using nitrogen. A STEC ten-step gas divider was used (as needed) to obtain intermediate calibration gas concentrations.

5.2 Sampling System Response Time Determination

The response time of the sampling system was determined prior to the compliance test program by introducing upscale gas and zero gas, in series, into the sampling system using a tee connection at the base of the sample probe. The elapsed time for the analyzer to display a reading of 95% of the expected concentration was determined using a stopwatch.

The CAI Model ZRE4 analyzer exhibited the longest system response time at 60 seconds. Results of the response time determinations were recorded on field data sheets. For each test period, test data were collected once the sample probe was in position for at least twice the maximum system response time.

5.3 Gas Divider Certification (USEPA Method 205)

The STEC 10-step gas divider was used in the field to obtain appropriate calibration span gases. The 10-step gas divider was NIST-certified (within the last 12 months) with a primary flow standard in accordance with Method 205. When cut with an appropriate zero gas, the ten-step gas divider delivers calibration gas values of 0 to 100% in (10% increments) of the USEPA Protocol 1 calibration gas that is introduced into the system. The field evaluation procedures presented in Section 3.2 of Method 205 were followed prior to use of the 10-step gas divider. The field evaluation yielded no errors greater than 2% of the triplicate measured average and no errors greater than 2% from the expected values.

5.4 NOx Converter Efficiency Test (USEPA Method 7E)

The NO_2 – NO conversion efficiency of the Model 42i analyzer was verified prior to the testing program. A USEPA Protocol 1 certified concentration of NO_2 was injected directly into the analyzer, following the initial three-point calibration, to verify the analyzer's conversion efficiency. The analyzer's NO_2 – NO converter uses a catalyst at high temperatures to convert the NO_2 to NO for measurement. The conversion efficiency of the analyzer is deemed acceptable if the measured NO_x concentration is within 90% of the expected value.

The NO_2 – NO conversion efficiency test satisfied the USEPA Method 7E criteria (measured NO_2 concentration was 93.2% of the expected value).

5.5 Determination of Exhaust Gas Stratification

A stratification test was performed for the CI RICE exhaust stacks. The stainless steel sample probe was positioned at sample points correlating to 16.7, 50.0 (centroid) and 83.3% of each stack diameter. Pollutant concentration data were recorded at each sample point for a minimum of twice the maximum system response time.

The recorded concentration data for each catalyst exhaust stack indicated that the measured O_2 concentrations did not vary by more than 5% of the mean across the stack diameters. Therefore, the CI RICE exhaust gas for EUGENERATOR was considered to be unstratified in each stack and the compliance test sampling was performed at a single sampling location within each exhaust stack of the CI RICE.

The catalyst inlet sampling location did not meet the USEPA Method 1 spacing requirements. Therefore, it was treated as a stratified stack using a 12 point-grid across the rectangular cross section pursuant to Section 8.1.2 of USEPA Method 7E and Table 1-1 to USEPA Method 1.

Appendix 5 presents test equipment quality assurance data (instrument calibration and system bias check records, calibration gas and gas divider certifications, interference test results).

5.6 Meter Box Calibrations

The dry gas meter sampling console used for moisture testing was calibrated prior to and after the testing program. This calibration uses the critical orifice calibration technique presented in USEPA Method 5. The metering console calibration exhibited no data outside the acceptable ranges presented in USEPA Method 5.

The digital pyrometer in the metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

Appendix 5 presents test equipment quality assurance data (NO_2 – NO conversion efficiency test data, instrument calibration and system bias check records, calibration gas certifications, interference test results, meter box calibration records, and field equipment calibration records).

6.0 Test Results

6.1 Results Summary and Allowable Emission Limits

Table 6.1 presents the operating data and air pollutant emission measurement results for each one-hour test period.

Catalyst CO DE was calculated for DE for each one-minute average within the raw data file by comparing the one-minute average measured CO concentration at the catalyst outlet to the average measured CO concentration at the catalyst inlet.

Destruction Efficiency, DE = $((C_{CO\text{-}in} / C_{CO\text{-}out}) / C_{CO\text{-}in}) \times 100$

The measured CO reduction across the catalyst averaged 79% across the three (3) one-hour test runs. This is greater than (in compliance with) the 40 CFR Part 63 Subpart ZZZZ emission standard that requires the catalyst emission control system achieve a CO emission reduction of at least 70%.

The measured NOx and VOC emission rates were 28.2 lb/hr and 0.33 lb/hr respectively. This is less than (in compliance with) the PTI No. 173-08B emission limits of 69.4 lb/hr for NOx and 17.4 lb/hr for VOC.

Engine operating data and air pollutant emission measurement results for each one-hour test period are presented in Table 6.1.

6.2 Variations from Normal Sampling Procedures or Operating Conditions

The testing for all pollutants was performed in accordance with USEPA methods and the approved test protocol.

The CI RICE exhaust gas flowrate was calculated by using the fuel F-Factor for diesel fuel (fuel oil) in USEPA Method 19 instead of measuring exhaust pressure by USEPA Method 2. This is because of the dangerous sampling location conditions (possibilities of scrap metal ejecting from the shredder) that did not allow for ICT representatives to be present at the sampling location while the metal shredder was running.

Due to the variable engine load requirements demanded by the metal shredding process, the CI RICE exhausted a large range of pollutant concentrations. The CO concentrations exceeded the instrument ranges on five (5) instances throughout the three (3) test runs. This resulted in null values within the raw data file. These null values were replaced manually with the concentration at which the instrument was set (5,000 ppm CO Outlet, and 2,000 ppm CO Inlet). Any manually entered data points have been highlighted in yellow within the raw data file.

Additionally, the CO and O_2 Inlet concentrations were recorded by the data logger two (2) minutes later than the CO and O_2 Outlet concentrations as a result of a longer system response time. The Inlet CO and O_2 channels have been moved back by two (2) minutes to account for the difference in the separate inlet system response time. This allowed for DE to be calculated at each one-minute average within the raw data file.

However, this created data points that resulted in negative DE (as if the catalyst was creating CO). Because negative DE is not possible, these negative DE data points have been set to 0% DE and then were included in the one-run average DE calculation.

Table 6.1. Measured pollutant concentrations and destruction efficiency for the CI RICE catalyst inlet and exhaust gas streams

Test Number Test Date Test Period (24-hr)	1 10/5/21 0942-1042	3 10/5/21 1134-1234	4 10/5/21 1309-1409	Three Test Average
Genset Operating Parameters				
Generator output (kW)	630	425	518	524
Operating Load (%)	27.3	16.3	19.9	21.2
Diesel Fuel Usage (gal)	55	56	53	55
Catalyst Data				
Inlet Temperature (°F)	669	638	638	648
Outlet Temperature (°F)	654	637	640	644
Pressure Drop (in.H_2O)	1.0	1.0	1.0	1.0
Exhaust Gas Measurements (Inlet)				
Oxygen content (%vol, dry)	13.6	15.1	15.7	14.1
CO concentration (ppmvd)	438	462	453	451
CO concentration (ppmvd 15% O_2)	383	430	397	403
Exhaust Gas Measurements (Outlet)				
Oxygen content (%vol, dry)	13.7	14.4	13.9	14.0
CO concentration (ppmvd)	126	154	158	146
CO concentration (ppmvd 15% O_2)	99.0	138	129	122
NOx concentration (ppmvd)	1,335	1,016	1,125	1,159
VOC concentration (ppmv as C_3)	9.82	15.3	14.1	13.1
Exhaust gas flowrate (dscfm)	3,280	3,689	3,275	3,415
Exhaust gas flowrate (scfm)	3,426	3,887	3,479	3,597
Catalyst CO Destruction Efficiency				
Calculated CO DE (%)[1]	75	83	80	79
Emission Standard (%)[2]	--	--	--	*70*
Nitrogen Oxides				
NOx emissions (lb/hr)	31.4	26.9	26.4	28.2
NOx permit limit (lb/hr)	--	--	--	*69.4*
Volatile Organic Compounds				
VOC emissions (lb/hr)	0.23	0.41	0.34	0.33
VOC permit limit (lb/hr)	--	--	--	*17.4*

Notes
1. DE was calculated at each one-minute average within the raw data file. Reasoning for this method of calculation is presented in sections 2.3 and 6.2 of this test report. Calculation data sheets are presented in Appendix 3.
2. 40 CFR Part 63 Subpart ZZZZ emission standard requires that the CI RICE emission control catalyst achieve a CO emission reduction of 70% or greater.

APPENDIX 1

- ENGINE OPERATING RECORDS

Internal Combustion Engine Process Operating Data

Facility: A&L Iron and Metal
Location: Gaylord, MI
Date: 10/5/21

Unit ID: EUGENERATOR
Operating Hours: 8,205

Test 1		Diesel Usage[1] (gal)	Catalyst Press. Drop ("H2O)	Catalyst Inlet Temp. (°F)	Catalyst Outlet Temp. (°F)	Electricity Production[2] (kWh)	Operating Load (%)
Start Time	9:42	0	1	797	767	489	
	9:57	13	1	785	764	686	
	10:12	15	1	700	688	946	
	10:27	16	2	520	505	1,160	
Stop Time	10:42	11	1	541	548	1,119	27.3
Run Average		**55**	**1**	**669**	**654**	**630**	**27.3**

Test 2		Diesel Usage[1] (gal)	Catalyst Press. Drop ("H2O)	Catalyst Inlet Temp. (°F)	Catalyst Outlet Temp. (°F)	Electricity Production[2] (kWh)	Operating Load (%)
Start Time	11:34	0	1	517	522	1,368	
	11:49	12	1	701	694	1,521	
	12:04	15	1	747	735	1,619	
	12:19	17	1	619	622	1,708	
Stop Time	12:34	12	1	607	613	1,793	16.3
Run Average		**56**	**1**	**638**	**637**	**425**	**16.3**

Test 3		Diesel Usage[1] (gal)	Catalyst Press. Drop ("H2O)	Catalyst Inlet Temp. (°F)	Catalyst Outlet Temp. (°F)	Electricity Production[2] (kWh)	Operating Load (%)
Start Time	13:09	0	1	486	493	1,840	
	13:24	11	1	621	625	1,943	
	13:39	14	1	596	611	2,088	
	13:54	13	1	810	789	2,262	
Stop Time	14:09	15	1	677	680	2,358	19.9
Run Average		**53**	**1**	**638**	**640**	**518**	**19.9**

1 - Diesel Usage was monitored every 15 minutes. The one-run diesel usage is an addition of each 15-minute reading.

2 - Electricity Production was monitored on a kilowatt-hour meter. The one-run electricity production is a subtraction of the ending meter reading from the beginning meter reading. This subtration presents the average one-run kilowatt production

AMOUNT (Run) OF HRS SINCE LAST TEST
OCT 24 -18

9

Impact Compliance & Testing, Inc.
Process Data Collection Sheet

Facility: A&L Iron and Metal
Source: EUGENERATOR
Serial No.: G94040010

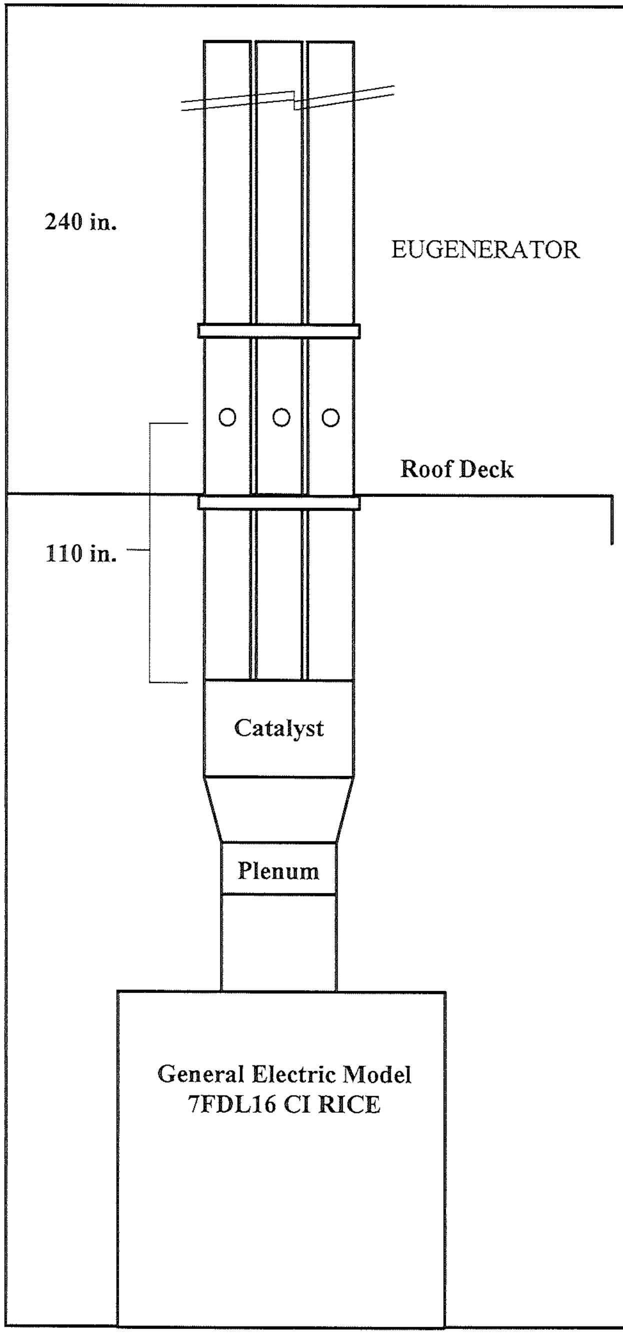
Date: 10/5/21
Operator: CHRIS EWING
Operating Hours*: 8205

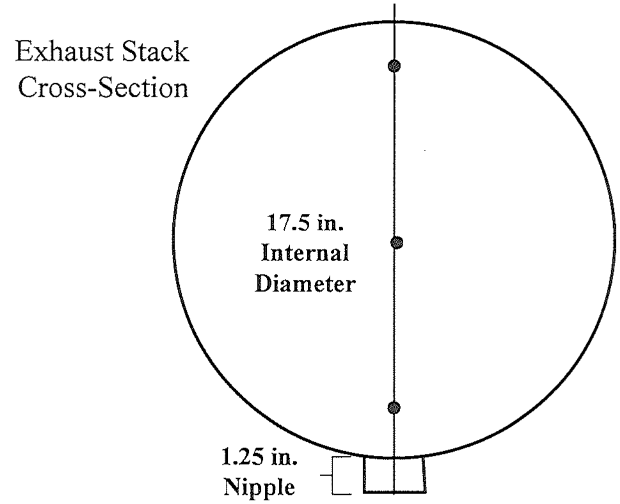
	Time (9:42am, 10:42am)		Natural Gas Usage	Diesel Usage	Catalyst Pressure Drop	Catalyst Inlet Temp	Catalyst Outlet Temp	Electricty Production	Operating Load	
	min.	24-hr	(cfm)	(gal)	"H2O	°F	°F	kW	%	
Test No. 1	0	9:42		0	1"	797	767	489 kwatt		
	15	9:57		13	1"	785	764	686		70%
	30	10:12		15	1"	700	688	946		
	45	10:27		16	2"	520	505	1160		
	60	10:42		11	1"	541	548	1199		
									27.3%	
Test No. 2	0	11:34		0	1"	517	522	1368		11:34
	15	11:49		12	1"	701	694	1521		
	30	12:04		15	1"	747	735	1619		79%
	45	12:19		17	1"	619	622	1768		
	60	12:34		12	1"	607	613	1793		
									16.3%	
Test No. 3	0	1:09		0	1"	486	493	1840		1:09
	15	1:24		11	1"	621	625	1943		
	30	1:39		14	1"	596	611	2088		
	45	1:54		13	1"	810	789	2262		77%
	60	2:09		15	1"	677	680	2358		
									19.9%	

*Operating hours at beginning of first test

APPENDIX 2

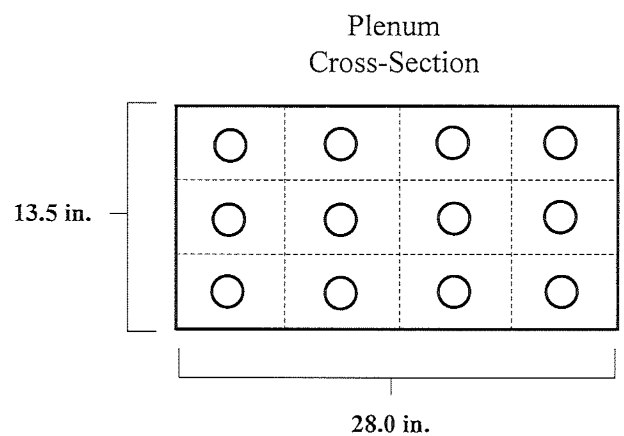
- SAMPLING LOCATION DIAGRAM





USEPA Method 7E Stack Gas Stratification Test Points

Pt. #	in.
1	2.92
2	8.75
3	14.58



11/1/18	**A&L Iron and Metal Exhaust Sampling Locations**		
	Scale None	Sheet 1 of 1	Impact Compliance & Testing, Inc.