Consumers Energy

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40 CFR 63 Subpart ZZZZ
Annual Compliance Demonstration

EUENGINE2-3 & EUENGINE2-4

St. Clair Compressor Station
10021 Marine City Highway
Ira Township, Michigan 48023

Test Date: September 21, 2016

Report Submitted:
October 20, 2016

Work Order No. 26579058
Revision 0

Test Performed by the Consumers Energy Company
Regulatory Compliance Testing Section – Air Emissions Testing Body
Engineering Services Department
Compiled by G. A. Koteskey, Technical Analyst

DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: Consumers Energy Company – St. Clair Compressor Station County: St. Clair

Source Address: 10021 Marine City Highway City: Ira Township

AQD Source ID (SRN): B6637 ROP No.: MI-ROP-B6637-2015 ROP Section No.:

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From _____ To _____

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

40 CFR 63 Subpart ZZZZ Annual Compliance Demonstration for EUENGINE2-3 and EUENGINE2-4

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Gregory Baustian	Ex. Manager, Gas Compression & Storage	(616) 237-4009
Name of Responsible Official (print or type)	Title	Phone Number

Signature of Responsible Official Date: 10/18/2016

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

1.0 INTRODUCTION

Identification, location and dates of tests

This report summarizes the results of testing, conducted on September 21, 2016, at Consumers Energy Company's (CEC) St. Clair Compressor Station. CEC's Regulatory Compliance Testing Section (RCTS) performed carbon monoxide (CO) reduction efficiency testing on EUENGINE2-3 and EUENGINE2-4, installed and operating at CEC's St. Clair Compressor Station, located in Ira Township, Michigan. A third identical unit, identified as EUENGINE2-2, was scheduled to be tested; however, mechanical constraints prohibited it from operating. This unit will be tested at a later date.

Please note this document follows the MDEQ format described in the December, 2013, *Format for Submittal of Source Emission Test Plans and Reports* and reproducing only a portion may omit critical substantiating documentation or cause information to be taken out of context. If any portion of this report is reproduced, please exercise due care in this regard.

Purpose of testing

The purpose of the testing was to demonstrate compliance with 40 CFR Part 63, Subpart ZZZZ National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Reciprocating Internal Combustion Engines (RICE) and to comply with the facility Renewable Operating Permit (ROP), No. MI-ROP-B6637-2015. The engines are categorized as existing, non-emergency, 4SLB stationary RICE >500 HP located at an area source of HAP that are not remote stationary RICE and that are operated more than 24 hours per calendar year. As defined, the RICE must be capable of reducing CO emissions by 93 percent or greater, or by verifying average exhaust CO concentrations are less than or equal to 47 ppm by volume on a dry basis, corrected to 15% oxygen (O_2).

Brief description of source

The St. Clair Compressor Station is a natural gas compressor station. The purpose of the facility is to maintain pressure of natural gas in order to move it in and out of storage reservoirs and along the pipeline system. The units tested consisted of two (2) identical Delaval HVC-16C 4,000 horsepower, natural gas-fired, 4-Stroke, Lean Burn (4SLB) RICE engines (EUENGINE2-3 and EUENGINE2-4). Each of the engines is equipped with oxidation catalysts to reduce CO emissions (per §63.6603(a) and Table 2d).

Contact names, addresses, and telephone numbers for information regarding the test and the test report, and personnel names and affiliations of those involved in conducting the testing

A test notification containing a sampling protocol describing the test program sampling, calibration, and quality assurance procedures specified in U.S. EPA Reference Methods (RM) 7E with specific applications, as necessary, from Method 10, dated June 24, 2016, was submitted to the Michigan Department of Environmental Quality – Air Quality Division (MDEQ-AQD). The protocol was subsequently approved by Mr. Thomas Maza in his letter dated August 17, 2016. This test was performed by RCTS Technical Analysts Gregg Koteskey, and Joe Mason. Mr. Brian Mauzy, St. Clair Compressor Station Field Leader, coordinated the emission test in conjunction with CEC Site Environmental and Technical Support Manager Mr. Richard Hall and Senior Engineer Ms. Amy Kapuga, whom also coordinated engine operating data collection, which was assembled by compressor station operators and is contained in Attachment 1 of this report. MDEQ representative Mr. Sebastian Kallumkal witnessed a portion of this test event.

TABLE 1
St. Clair Compressor Station RICE Test Program Participants

Responsible Party	Address	Contact
Test Facility	St. Clair Compressor Station 10021 Marine City Highway Ira Township, Michigan 48023	Mr. Brian Mauzy Compression Field Leader 586-716-3331 brian.mauzy@cmsenergy.com
Corporate Air Quality Contact	Consumers Energy Company Environmental Services Department 1945 West Parnall Road Jackson, Michigan 49201	Ms. Amy Kapuga Senior Engineer 517-788-2201 amy.kapuga@cmsenergy.com
Emission Test Representative	Consumers Energy Company RCTS - AETB 17010 Croswell Street West Olive, Michigan 49460	Mr. Gregg Koteskey, QSTI Technical Analyst 616-738-3712 gregg.koteskey@cmsenergy.com
Regulatory Agency Representative	Michigan Department of Environmental Quality Air Quality Division Southeast Michigan District 27700 Donald Court Warren, MI 48092-2793	Mr. Sebastian Kallumkal Senior Environmental Engineer 586-753-3738 kallumkals@michigan.gov

2.0 SUMMARY AND DISCUSSION

Operating Data

The engines are equipped with continuous parameter monitoring systems (CPMS), which are designed to continuously monitor and record the RICE exhaust gas temperature at the catalyst inlet point. Prior to the performance tests, the catalyst inlet temperature CPMS were calibrated according the manufacturer recommendations. Unit operating data, including engine speed (RPM), horsepower, fuel flow (scf/hr), suction and discharge pressures (psi), catalyst inlet temperature (degrees Fahrenheit), pressure drop across the catalyst, ambient temperature (degrees Fahrenheit), barometric pressure (inches of mercury), and fuel BTU value, were recorded during the test events and are included in Attachment 1.

Applicable Permit Number

The St. Clair Compressor Station is currently operating pursuant to the terms and conditions of ROP No. MI-ROP-B6637-2015. Performance tests were conducted, as required, on two (2), identical Delaval HVC-16C 4,000 horsepower, natural gas-fired, 4-Stroke, Lean Burn (4SLB) RICE engines identified as EUENGINE2-3 and EUENGINE2-4 (collectively identified as FGENGINES-P2).

Results

Based on the measured CO exhaust concentrations, the individual engines are operating within the applicable ROP CO emissions limits. The test result summaries are presented below.

TABLE 2
Summary of 40 CFR 63 Subpart ZZZZ Results

Source	CO Reduction Efficiency (%) [ZZZZ Limit = ≥93%]	CO Exhaust Concentration (ppmvd) [ZZZZ Limit = ≤47 ppmvd]	Catalyst Inlet Temperature (°F) [ZZZZ Limit = ≥450°F and ≤1350°F]
EUENGINE2-3	89.77	12.00	805
EUENGINE2-4	86.51	13.01	812

Please note that the CO compliance demonstration criteria in 40 CFR Part 63, Subpart ZZZZ, Table 5 allows the source to meet either ≥ 93 percent reduction efficiency **or** ≤ 47 ppmvd at 15% O_2 criteria. EUENGINE2-3 and EUENGINE2-4 did not meet the established reduction efficiency criteria, but met the ≤ 47 ppmvd at 15% O_2.

3.0 SOURCE DESCRIPTION

Description of Process

The purpose of the facility is to maintain pressure of natural gas in order to move it in and out of storage reservoirs and along the pipeline system. The units tested consisted of two (2) identical Delaval HVC-16C 4,000 horsepower, natural gas-fired, 4-Stroke, Lean Burn (4SLB) RICE engines (EUENGINE2-3 and EUENGINE2-4). Each of the engines is equipped with Dresser Rand oxidation catalysts comprised of eight (8) modular elements. A low-NO_2 coating was specially formulated to promote the oxidation of CO and Volatile Organic Compounds (VOCs) while suppressing the conversion of Nitric Oxides (NO) to Nitrogen Dioxide (NO_2). The catalyst vendor has guaranteed a CO emission concentration of ≤47 ppmvd @ 15% O_2.

Process Flow Sheet or Diagram

N/A

Type and Quantity of Raw Material Processed During the Tests

N/A

Maximum and Normal Rated Capacity of the Process

EUENGINE2-3 and EUENGINE2-4 are limited to a maximum output of approximately 4,000 horsepower each. At this achievable output, the heat input rating of each engine is approximately 27 million Btu/hr.

Description of Process Instrumentation Monitored During the Test

Station operators entered engine operating data into a spreadsheet from control room displays during each run. The following operating parameters were recorded: engine speed (rpm), horsepower, fuel flow (scf/hr), suction and discharge pressures (psi), catalyst inlet temperature (degrees Fahrenheit), pressure drop across the catalyst, ambient temperature (degrees Fahrenheit), barometric pressure (inches of mercury), and fuel BTU value. This data was provided to RCTS to assist with emissions rate calculations and is included in Attachment 1.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Description of sampling train(s) and field procedures

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with 40 CFR Part 60, Appendix A, Methods 3A (O_2/CO_2 – Instrumental), 7E (NO_x – Instrumental), and 10 (Carbon Monoxide – Instrumental). Although Method 7E is generally associated with NO_x concentration measurements, it is being listed as a test method due to the fact that several sections of Method 7E are incorporated into Methods 3A and 10 via reference. Although Table 4 of 40 CFR Part 63, Subpart ZZZZ allows the use of a portable analyzer and ASTM Method D6522-00 (2005) for purposes of determining the CO and O_2 concentrations, Consumers Energy RCTS did not use a portable analyzer for this testing program.

All testing was conducted with the engines operating within ±10% of rated capacity (i.e. 90 to 110% of engine load). Per §63.6640(c), each test run duration was at least 15 minutes. Please note that O_2 was the diluent gas used to correct CO concentrations to 15% O_2 when determining percent CO reduction. CO_2 was measured as well since Subpart ZZZZ allows for CO_2 correction factors based on O_2 to CO_2 fuel factor ratios described in §63.6620 (e)(2)(ii)(Eq.3). In the event O_2 diluent measurements were not possible, CO concentrations could be corrected to 15% O_2 based on dry basis CO_2 concentrations as described in Equation 4, §63.6620(e)(2)(iii).

During each test, the engine brake horsepower was documented (along with other required operating parameters) and subsequently divided by the vendor supplied engine rating to ensure that the engines operate within ±10 percent of capacity (100 percent load). As required by 40 CFR §63.6620(i), information regarding the method used to determine the engine percent load, including a description of any associated measurement devices during the test is presented in this report.

4.1 Traverse Points

On February 27, 2014, the US EPA promulgated revisions to various sections of 40 CFR Parts 51, 60, 61 and 63 in order to change specific testing requirements and Federal Reference Methods. Among these changes was a revision to Table 4 of 40 CFR Part 63, Subpart ZZZZ which allowed CO and diluent testing to be conducted at sampling points located at 16.7%, 50.0% and 83.3% of the measurement line if the following criteria are met: 1) duct is greater than 12 inches in diameter and 2) the test ports are located at least 2 duct diameters

downstream and ½ duct diameter upstream from the nearest flow disturbances. The outlet test locations of Units 2-3 and 2-4 met the preceding criteria, and RCTS conducted sampling along the allowed 3-point measurement line and was not required to conduct stratification testing according to the criteria of Section 8.1.2 of Method 7E.

The test locations at the oxidation catalyst inlet are a-typical (relative to U.S. EPA Method 1 *"Sample and Velocity Traverses for Stationary Sources"* criteria), due to the proprietary nature and design of that abatement equipment. The design and dimension of inlet ducts preclude the use of more than 2 traverse points. Therefore, RCTS conducted sampling from a single traverse point of the catalyst inlet locations and did not conduct stratification testing according to the criteria of Section 8.1.2 of Method 7E. Figure 1 shows the exhaust stack configuration.

4.2 Diluent / Molecular Weight

O_2/CO_2 diluent concentrations were monitored using a non-dispersive infrared (NDIR) Thermo Model 410i analyzer equipped with paramagnetic O_2 analysis capacity following the guidelines of U.S. EPA Method 3A, *Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from a Stationary Source (Instrumental Analyzer Procedure).*

4.3 Carbon Monoxide

The CO concentrations were measured using an NDIR Thermo Model 58i gas filter correlation analyzer following the guidelines of U.S. EPA Reference Method 10, *Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure).*

Quality Assurance Procedures

Each U.S. EPA reference method performed during this test contains specific language stating that to obtain reliable results, persons using these methods should have a thorough knowledge of the techniques associated with each method. To that end, CEC RCTS minimized factors which could cause sampling errors by implementing a quality assurance (QA) program into every component of field testing, including the following information.

U.S. EPA Protocol gas standards certified according to the U.S. EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997 and certified to have a total relative uncertainty of ±1 percent were used to calibrate the analyzers during the test program. Although not required in the context of this test program, the vendors providing the calibration gases also participate in the Protocol Gas Verification Program (PGVP), an EPA audited program recently developed for 40 CFR Part 75.

The extractive sample system instruments were calibrated and operated following the appropriate method guidelines, based on specifications contained in Method 7E (as referenced in Methods 3A and 10). Before daily testing began, an analyzer calibration error (ACE) test was conducted by introducing the calibration gases directly into each analyzer. Prior to beginning the first run, an initial system bias was conducted by introducing the low and upscale calibration gases into the sampling system at the probe outlet and drawing it through the sample conditioning system in the same manner as the exhaust gas sample, while measuring the instrument response. Each instrument response met the specification of ≤ 5.0 percent of instrument span.

Low and upscale bias calibrations were performed after each run thereafter to quantify system calibration drift and bias. During the initial system bias tests, system response time was measured and the sample flow rate throughout the remainder of the test was monitored to maintain the sample rate within 10 percent of the average flow rate observed during the response time test. Sampling for each run began after twice the system response time had elapsed.

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with 40 CFR, Part 60, Appendix A. The CO concentrations from the engines were determined in accordance with EPA Reference Method 7E, using specific applications, as necessary from Method 10. The oxygen (O_2) and carbon dioxide (CO_2) concentrations from the engines were determined in accordance with EPA Reference Method 3A.

The exhaust gases were extracted from the catalyst inlets and stacks (as applicable) with a non-heated Type 316 stainless steel probe (due to the high exhaust gas temperatures) into a heated Teflon sample line which prevented moisture from condensing until the exhaust gases were run through an electronic chiller unit which removed the moisture prior to being

distributed from a gas manifold into the respective analyzers (CO and O_2 / CO_2). The output signal from each analyzer was connected to a computerized data acquisition system (DAS). The data measured from the pollutant and diluent analyzers were averaged for each run and corrected for drift and bias. A diagram of the extractive sampling system is presented as Figure 2.

The associated gas analyzer calibration error, system bias, zero and calibration drift data, and the Certificates of Analysis (COA) of the calibration gases used during this performance demonstration are included in Attachment 4.

Description of recovery and analytical procedures

N/A

Dimensioned sketch showing all sampling ports in relation to breeching and to upstream and downstream disturbances or obstructions of gas flow and a sketch of cross-sectional view of stack indicating traverse point locations and exact stack dimensions

Figure 2 shows the engine exhaust stack arrangement and location of test ports (same for each of Units 2-3 and 2-4).

5.0 TEST RESULTS AND DISCUSSION

Detailed tabulation of results, including process operating conditions and exhaust gas conditions

Table 2 contains a summary of the individual engine CO emission rates from the September 21, 2016 performance tests. Operational data, individual run concentrations and emissions, calculation spreadsheets, field data sheets, calibration information and equations used to calculate results are contained in Attachments 1 - 5.

Discussion of significance of results relative to operating parameters and emission regulations

The comprehensive test results demonstrate that Units 2-3 and 2-4 are operating within compliance of the CO emissions requirements established in 40 CFR Part 63, Subpart ZZZZ and the facility ROP.

Discussion of any variations from normal sampling procedures or operating conditions, which could have affected the results

N/A

Documentation of any process or control equipment upset condition which occurred during the testing

N/A

Description of any major maintenance performed on the air pollution control device(s) during the three month period prior to testing

N/A

In the event of a re-test, a description of any changes made to the process or air pollution control device(s)

N/A

Results of any quality assurance audit sample analyses required by the reference method

N/A

Calibration sheets for the dry gas meter, orifice meter, pitot tube, and any other equipment or analytical procedures which require calibration

Attachment 4 contains the analyzer calibration data, response time test results, and calibration gas Certificates of Analysis.

Sample calculations of all the formulas used to calculate the results

Sample calculations for all formulas used in the test report are contained in Attachment 5.

Copies of all field data sheets, including any pre-testing, aborted tests, and/or repeat attempts

Please refer to Attachment 1 for process data collected during the test runs; Attachment 2 for calculation spreadsheets for each of the test runs; and Attachment 3 for data sheets with the measured concentrations for each test run.

Copies of all laboratory data including QA/QC

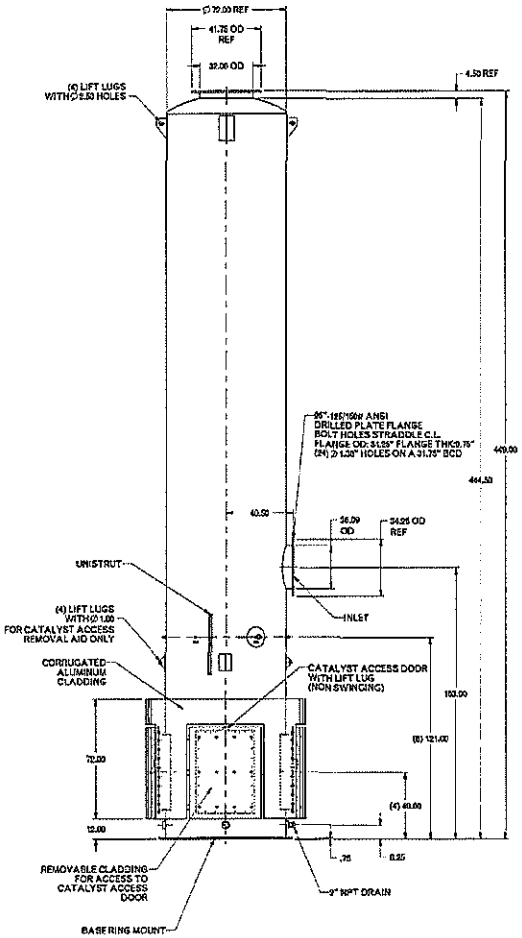
N/A

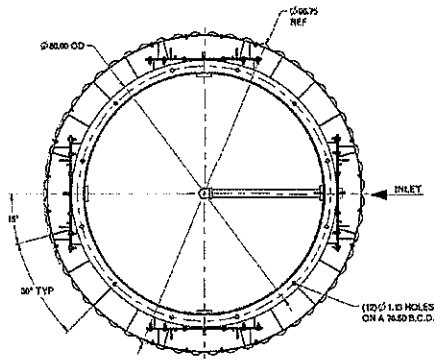
TABLE 3
SUMMARY OF RICE EFFICIENCY AND EMISSIONS
ST CLAIR COMPRESSOR STATION
EUENGINE2-3
September 21, 2016

Time Period	Run 1 0836-0855	Run 2 0908-0927	Run 3 0939-0958	Averages
Process Conditions				
Engine Speed, Revolutions Per Minute:	460	460	460	**460**
Engine Torque, Percent	96	96	96	**96**
Engine Brake Horsepower:	2944	2930	2955	**2943**
Fuel Flow, SCFH	22.3	22.3	22.4	**22.3**
Catalyst Inlet Temperature, degrees F:	801	805	809	**805**
Inlet Gas Conditions				
Oxygen Concentration, percent:	10.37	10.23	10.07	**10.15**
Drift Corrected Carbon Monoxide Concentration (ppmdv):	208.39	211.72	216.81	**212.30**
Corrected Carbon Monoxide Concentration (ppmdv @ 15% O2):	116.79	117.09	118.10	**117.33**
Outlet Gas Conditions				
Oxygen Concentration, percent:	10.33	10.20	9.93	**10.15**
Drift Corrected Carbon Monoxide Concentration (ppmdv):	22.75	21.64	21.12	**21.84**
Corrected Carbon Monoxide Concentration (ppmdv @ 15% O2):	12.70	11.93	11.36	**12.00**
Percent Reduction Efficiency:	89.13	89.81	90.38	**89.77**

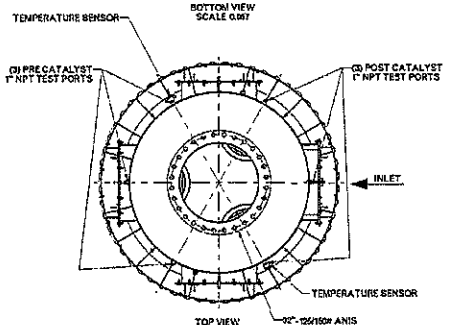
TABLE 4
SUMMARY OF RICE EFFICIENCY AND EMISSIONS
ST CLAIR COMPRESSOR STATION
EUENGINE2-4
September 21, 2016

Time Period	Run 1 1035-1054	Run 2 1107-1126	Run 3 1139-1158	Averages
Process Conditions				
Engine Speed, Revolutions Per Minute:	460	460	460	**460**
Engine Torque, Percent	92	92	91	**92**
Engine Brake Horsepower:	2837	2849	2838	**2841**
Fuel Flow, SCFH	20.9	20.9	21.0	**21.0**
Catalyst Inlet Temperature, degrees F:	812	812	812	**812**
Inlet Gas Conditions				
Oxygen Concentration, percent:	9.21	9.17	9.12	**9.15**
Drift Corrected Carbon Monoxide Concentration (ppmdv):	194.18	193.10	188.13	**191.80**
Corrected Carbon Monoxide Concentration (ppmdv @ 15% O2):	97.99	97.15	94.22	**96.46**
Outlet Gas Conditions				
Oxygen Concentration, percent:	9.07	9.11	9.11	**9.10**
Drift Corrected Carbon Monoxide Concentration (ppmdv):	26.65	26.09	25.37	**26.04**
Corrected Carbon Monoxide Concentration (ppmdv @ 15% O2):	13.29	13.05	12.70	**13.01**
Percent Reduction Efficiency:	86.43	86.57	86.53	**86.51**

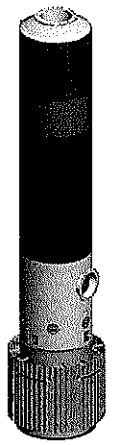




BOTTOM VIEW
SCALE 0.007



TOP VIEW
SCALE 0.050



PICTORIAL VIEW
SCALE 0.020

REVISION RECORD			
NO	CHANGE DESCRIPTION	DRAWN	APP'D
1	[illegible]	LJS	MR
F	ADDED CATALYST REMOVAL AID LUGS	ALV	MR
4	[illegible]	ALV	MR

TABLE 1 - LOAD TABLE (1997 UNIFORM BUILDING CODE)									
SUPPORT	DEAD LOAD	FORCE DIRECTION	WIND LOAD			SEISMIC LOAD			
			X	Y	Z	X	Y	Z
ALL BOLTS	-1.0	X	.9	--	12.0	-2	--	1.0
		Y	--	.9	12.0	--	-2	1.0

NOTES:
1. ALL FORCES ARE IN K/PS (1,000 LBS)
2. UNLESS OTHERWISE NOTED FORCES ARE ±
3. MAX OVERTURNING MOMENT: MOMENT: 222.05 kip-ft
4. MAX HORIZONTAL SHEAR: SHEAR: 10.75 kip
5. MAX WIND SPEED 105 MPH
WIND EXPOSURE D
SEISMIC ZONE 4, SOURCE TYPE A
SEISMIC SOURCE DISTANCE 101 km
SOIL TYPE SD
OCCUPANCY CATEGORY 1

NOTES:

1. SENSOR COMPONENTS TO BE MOUNTED IN THE FIELD TO UNIT.

2. THE LOAD TABLE INCLUDES PROVISIONS FOR AN OUTLET STACK TO BE ADDED TO THE TOP FLANGE (BY OTHERS). THIS STACK IS DESIGNED TO BE Ø 32" X 120" LONG AT A WEIGHT OF 850 LBS.

3. (4) CATALYST ACCESS DOOR(S) 36" WIDE X 50" HIGH, 124 LBS EACH. 1/2" STAINLESS STEEL. ING HARDWARE.

4. CATALYSTS: (8) 17 X 21 X 3.50. WEIGHT 45 LBS EACH.

5. FINISH(EXTERNAL): SURFACE PREP.-NEAR WHITE BLAST CLEAN PER SSPC-SP10,1-3 MILS BLAST PROFILE.
PRIME- (1) COAT CARBOLINE CARBOZINC 11, 2-3 MILS DFT.
COLOR-GREEN PER UNIVERSAL SPEC 88-0109.
TOPCOAT-(1) COAT CARBOLINE THERMALINE 4700, 1.25-1.75 MIL DFT.
COLOR-ALUMINUM PER UNIVERSAL SPEC 88 0143.
CURE TO DRY TO HANDLE PER CARBOLINE CURING SCHEDULE.

6. INTERNAL BAFFLES TO HAVE VENT HOLES TO PREVENT BUILD UP OF NATURAL GAS.

Contact for all issues: Purchased from:
Pollution Control Associates, Inc. Crystal Lake IL
PH 815-356-7488
email: dennisk@pcaincorporated.com

REPLACEMENT PARTS	
CATALYST	PCACD- 132105
CATALYST GASKET	PCAGS - 20M TYPE F - 3.5750 AW X 16 CIRC. CONTINUOUS
DOOR GASKET	UNIVERSAL P/N 310915
22" FLANGE / GASKET / BOLT KIT	UNIVERSAL P/N 65-1647

DIMENSIONS CERTIFIED FOR:	TOLERANCES UNLESS STATED - SEE FULL SPEC. 88-0075			
	(mm)	US customary [ ]	(mm)	US customary [ ]
Consumers Energy - St Clair	0-300	0-12	±1.5	±1/16
	>300-600	>12-24	±2	±1/8
P.O. NO. 4400025474	>600-1800	>24-72	±5	±3/16
	>1800-4600	>72-180	±8	±1/4
U.S. S.O. NO.	>4600	>180	±12	±1/2
BY	ANGULAR TOL.		±2°	
DATE October 22, 2012	APPROX. WT. 1,800 LBS		MATERIAL CARBON STEEL	
	FINISH SEE NOTE			

	NAME	DATE
DRAWN	ALV	15-JUL-12
CHECKED	TOH	15-JUL-12

UNIVERSAL Aerotec & Emissions Technologies

DESIGN CONTROL: STOUGHTON
SCALE: DO NOT SCALE

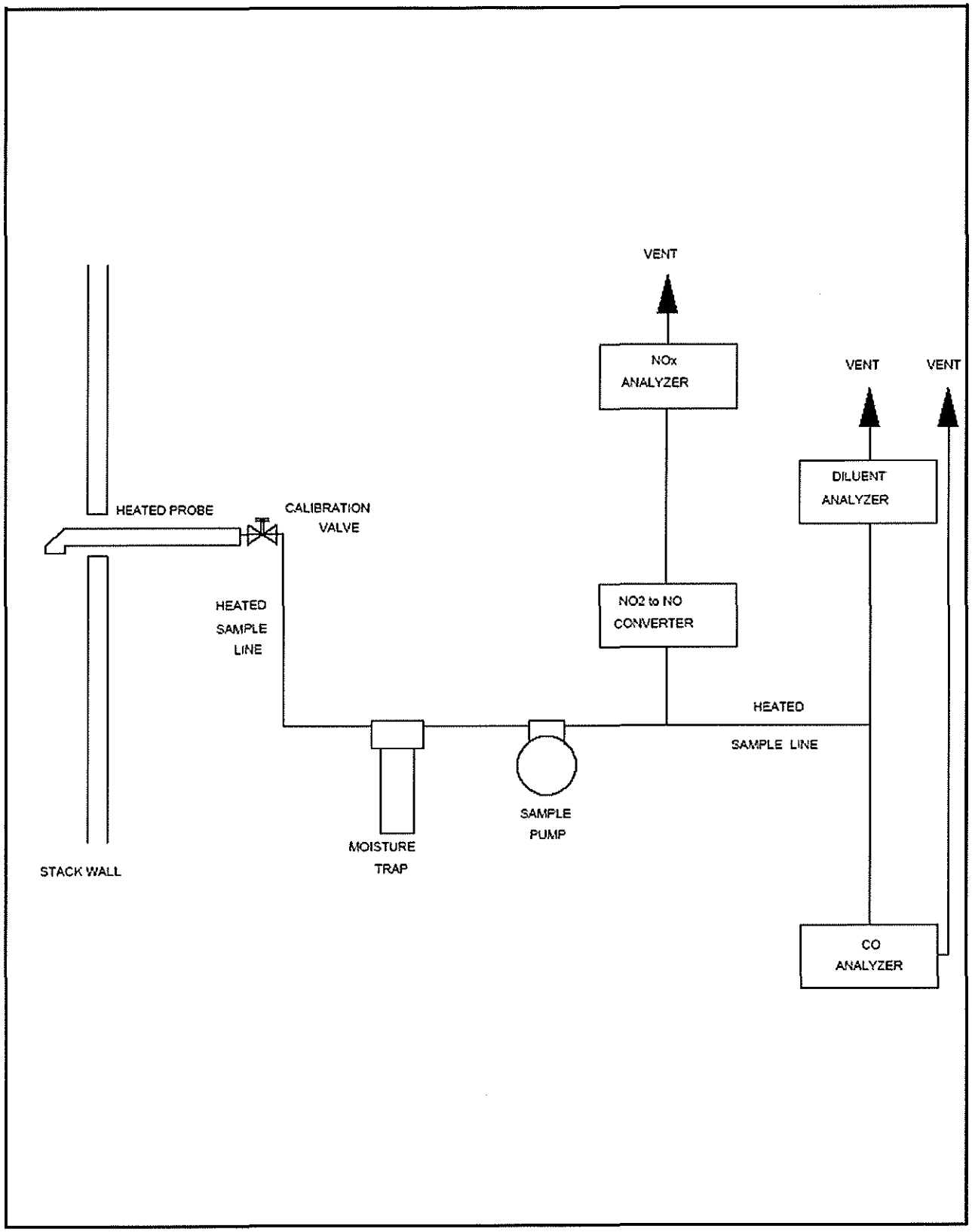
DESCRIPTION
SPECIAL
CATALYST SILENCER

THIRD ANGLE PROJECTION

DIMENSIONAL DWG NO: 18-510875

SHEET: 1 OF 1

REV: 3


VENT
NOx
ANALYZER
VENT
VENT
DILUENT
ANALYZER
HEATED PROBE
CALIBRATION
VALVE
HEATED
SAMPLE
LINE
NO2 to NO
CONVERTER
HEATED
SAMPLE LINE
SAMPLE
PUMP
MOISTURE
TRAP
STACK WALL
CO
ANALYZER