Post / MACES — Monica

Pfizer

Pfizer Inc
7000 Portage Road
Kalamazoo, MI 49001

March 8, 2019

Via **FedEx TRK#** 774654440653

Michigan Department of Environmental Quality
Air Quality Division – Technical Programs Unit
Constitution Hall, 2nd Floor, South
525 West Allegan Street
Lansing, MI 48933

RE: NOx RATA Test Report

To Whom It May Concern:

Please find two copies of the NOx stack test report for EUEBLR43-8-S1, as required by Renewable Operating Permit (ROP) No. MI-ROP-B3610-2014.

The stack test was performed on February 6, 2019. The NOx emissions were 0.126 lb/MMBTU versus an allowable limit of 0.20 lb/MMBTU.

The boiler is located at our facility at 7000 Portage Road, Kalamazoo, Michigan. If you need any additional information or have any questions, please feel free to contact me at (269) 833-3842 or e-mail jeffrey.robey@pfizer.com.

Sincerely,

Jeff Robey

Jeff Robey
Manager EHS
PGS Kalamazoo Site

c: Ms. Monica Brothers, MDEQ-AQD

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: Pharmacia & Upjohn Company, LLC — County: Kalamazoo

Source Address: 7000 Portage Road — City: Kalamazoo

AQD Source ID (SRN): B3610 — ROP No.: MI-ROP-B3610-2014 — ROP Section No.: 1

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 3/7/2019 To 3/7/2019

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

Boiler 8 NOx Stack Test Report

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

Ron Perry	Site Leader	269-833-0196
Name of Responsible Official (print or type)	Title	Phone Number

Signature of Responsible Official — Date: 7 MARCH 2019

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

Stack Test Group, Inc.
Air Compliance & Emissions Solutions

Chicago Office:
1500 Boyce Memorial Dr.
Ottawa, IL 61350
Phone 815-433-0545
888 STACK TEST
Fax 815-433-0592

REPORT OF NOx EMISSION TESTING ON THE #8 BOILER EXHAUST STACK AT THE PFIZER FACILITY LOCATED IN KALAMAZOO, MI

Prepared for:

PFIZER, INC.
7000 PORTAGE ROAD
KALAMAZOO, MI 49001

Prepared by:

STACK TEST GROUP, INC.
1500 BOYCE MEMORIAL DRIVE
OTTAWA, IL 61350

FEBRUARY 6, 2019
STACK TEST GROUP, INC. PROJECT NO. 18-3114A

Report Prepared By:

Gary A. Kohnke
Project Manager

Report Reviewed By:

Nicholas M. Sergenti, QSTI
Project Manager

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

On February 6, 2019, The Stack Test Group, Inc. performed nitrogen oxides (NOx) emission testing on the #8 boiler at the Pfizer facility located in Kalamazoo, Michigan. Testing was conducted on the exhaust stack of the #8 boiler serving this facility. Three one-hour tests were conducted on this stack. Testing was conducted while firing with natural gas. Presented below are the average results of these tests.

NOx Concentration:	93.1 Parts per Million
NOx Emission Rate:	0.126 Pounds per MMBTU
NOx Emission Limit:	0.20 lb/MMBTU

2.0 INTRODUCTION

The Stack Test Group, Inc. conducted NOx emission testing on the exhaust stack of the #8 boiler (EUEBLR43-8-S1). Testing was performed at the Pharmacia & Upjohn Company, LLC, a subsidiary of Pfizer, Inc., located in Kalamazoo, MI on February 6, 2019. The Portage Steam Generating System is located at 7000 Portage Road, Kalamazoo, MI 49001. The facility generates 175 pounds per square inch gauge pressure steam at 377 degrees Fahrenheit utilizing six boilers. Three of the boilers are stoker coal boilers. Three use natural gas as the primary fuel.

Three NOx tests lasting one-hour in duration were conducted on the #8 boiler. The purpose of this testing was to determine the concentrations and emission rates of the NOx exhausting from the #8 boiler per the requirements of the renewable operating permit (ROP) for this source. The ROP number is MI-ROP-B361002008c. The ROP specifies the NOx testing be completed once during the five year term of this permit.

The exhaust stack for the #8 boiler shares a common stack with the #7 boiler. During this test series, the #7 boiler remained off.

Testing was conducted while Pfizer personnel operated the boiler at the maximum routine operating conditions. Testing was conducted while firing the boiler with natural gas. All pollutant emissions were calculated using the EPA Oxygen F-Factor found in U.S. EPA Reference Method 19. The F-Factor for the #8 boiler was determined to be 8,710 based on the published number in 40 CFR 60 Appendix A Method 19, for natural gas.

Testing was supervised by Mr. Gary A. Kohnke of the Stack Test Group, Inc. and coordinated by Mr. Jeff Robey, Pfizer Environmental of Pharmacia & Upjohn Company, LLC.

All testing followed the guidelines of U.S. EPA Reference Methods 3A and 7E. This report contains a summary of results for the above mentioned tests and all the supporting field, process, and computer generated data.

3.0 SAMPLING AND ANALYTICAL PROCEDURES

3.1 Oxygen (O_2) & Nitrogen Oxides (NOx)

3.1.1 Sample Collection

Oxygen concentrations and nitrogen oxides (NOx) emissions were determined using U.S. EPA Methods 3A & 7E. A gas sample was drawn from the exhaust duct through a filter and transported to a Universal gas conditioner through a heated Teflon line set to 250°F. The gas conditioner removed moisture from the gas stream and pumped a dry gas sample through a Teflon line and manifold flow system to a Servomex Model 1440C paramagnetic oxygen analyzer and a Thermal Electron Corporation (TECO) Model 42C Chemiluminescent NO-NO_2 gas analyzer.

3.1.2 Sample Duration and Frequency

The samples were collected in triplicate with each test lasting sixty minutes in duration. A sample was drawn at least twice as long as the response time before the beginning of each test. The response time was approximately 40 seconds.

3.1.3 Calibration

At the beginning of the test series, the analyzers were calibrated and then checked for calibration error by introducing zero, mid-range and high-range calibration gases to the back of each analyzer. Following each test run, a system bias was performed by introducing a zero and mid-range calibration gases to the outlet of the probe. Calibration gases used were U.S. EPA Protocol 1 certified.

3.1.4 Data Reduction

The analyzer outputs were recorded on a data logger and laptop computer. These one-minute data logger readings were then average using an Excel spreadsheet. The raw data logger readings are included in Appendix E.

4.0 TEST RESULTS

Presented in this section are the results of this test series. Test results are reported in Table 4.1. Table 4.1 presents the NOx results from the #8 boiler exhaust stack. The NOx results in parts per million (ppm) and lb/MMBTU and the oxygen results in terms of percent.

Copies of the calculations used to determine these emission rates may be found in Appendix A. Copies of the calibration data are presented in Appendix B. Copies of the NOx and O_2 data are presented in Appendix C. Copies of the calibration gas certification sheets are presented in Appendix D.

Table 4.1

NOx Test Results
Pfizer
02/06/19
#8 Boiler Exhaust Stack
Firing Natural Gas

Test No:	T1	T2	T3	Avg.
Start Time:	08:05 AM	09:15 AM	10:22 AM	
Finish Time:	09:05 AM	10:15 AM	11:22 AM	
% Oxygen:	4.8	4.8	4.8	4.8
NOx Results:				
NOx, ppmv:	94.0	93.7	91.6	93.1
NOx, lb/DSCF:	1.12E-05	1.12E-05	1.09E-05	1.11E-05
LBS/MMBTU (F-Factor = 8,710):	0.127	0.126	0.124	0.126

APPENDIX A

SAMPLE CALCULATIONS

PFIZER INC.
KALAMAZOO, MI

STG PROJECT No: 18-3114A

SAMPLE CALCULATIONS

The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04707)(V_{lc})$$

Where:

V_{lc}	total volume of liquid collected in impingers and silica gel (ml)
V_{wstd}	volume of water collected at standard conditions (ft^3)
0.04707	conversion factor (ft^3/ml)

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P_{bar}	barometric pressure (in. Hg)
T_m	average dry gas meter temperature (°F)
V_m	volume of gas sample through the dry gas meter at meter conditions (ft^3)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
Y_d	gas meter correction factor (dimensionless)
ΔH	average pressure drop across meter box orifice (in. H_2O)
17.64	conversion factor (°R/in. Hg)
13.6	conversion factor (in. H_2O/in. Hg)
460	°F to °R conversion constant

SAMPLE CALCULATIONS (CONTINUED)

3. Volume of gas metered, standard conditions (dscm)

$$V_{mstd(m)} = \frac{\left(V_{mstd(ft)}\right)}{35.35}$$

Where:

$V_{mstd(ft)}$	volume of gas sample through the dry gas meter at standard conditions (ft^3)
$V_{mstd(m)}$	volume of gas sample through the dry gas meter at standard conditions (m^3)
35.35	conversion factor (ft^3 to m^3)
13.6	conversion factor (in. H_2O/in. Hg)

4. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

P_{bar}	barometric pressure (in. Hg)
P_g	sample gas static pressure (in. H_2O)
P_s	absolute sample gas pressure (in. Hg)
13.6	conversion factor (in. H_2O/in. Hg)

5. Actual vapor pressure (in. Hg)[1]

$$P_v = P_s$$

Where:

P_v	vapor pressure, actual (in. Hg)
P_s	absolute sample gas pressure (in. Hg)

6. Moisture content (%)

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume (%)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
V_{wstd}	volume of water collected at standard conditions (ft^3)

[1] For effluent gas temperatures over 212°F, P_v is assumed to be equal to P_s.

SAMPLE CALCULATIONS (CONTINUED)

7. Saturated moisture content (%)

$$B_{ws} = \frac{(P_v)}{(P_s)}$$

Where:

B_{ws}	proportion of water vapor in the gas stream by volume at saturated conditions (%)
P_s	absolute sample gas pressure (in. Hg)
P_v	vapor pressure, actual (in. Hg)

Whichever moisture value is smaller is used for B_{wo} in the following calculations.

8. Molecular weight of dry gas stream (lb/lb·mole)

$$M_d = M_{CO_2}\frac{(CO_2)}{(100)} + M_{O_2}\frac{(O_2)}{(100)} + M_{CO+N_2}\frac{(CO+N_2)}{(100)}$$

Where:

Md	dry molecular weight of sample gas (lb/lb·mole)
M_{CO_2}	molecular weight of carbon dioxide (lb/lb·mole)
M_{O_2}	molecular weight of oxygen (lb/lb·mole)
$M_{CO}+N_2$	molecular weight of carbon monoxide and nitrogen (lb/lb·mole)
CO_2	proportion of carbon dioxide in the gas stream by volume (%)
O_2	proportion of oxygen in the gas stream by volume (%)
$CO+N_2$	proportion of carbon monoxide and nitrogen in the gas stream by volume (%)
100	conversion factor (%)

9. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_{wo}) + (M_{H_2O})(B_{wo})$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
M_d	dry molecular weight of sample gas (lb/lb·mole)
M_{H_2O}	molecular weight of water (lb/lb·mole)
M_s	molecular weight of sample gas, wet basis (lb/lb·mole)

SAMPLE CALCULATIONS (CONTINUED)

10. Velocity of sample gas (ft/sec)

$$V_s = (K_p)(C_P)(\overline{\sqrt{\Delta P}})\left(\sqrt{\frac{(\overline{T_s} + 460)}{(M_s)(P_s)}}\right)$$

Where:

K_p	velocity pressure coefficient (dimensionless)
C_p	pitot tube constant
M_s	molecular weight of sample gas, wet basis (lb/lb·mole)
P_s	absolute sample gas pressure (in. Hg)
T_s	average sample gas temperature (°F)
V_s	sample gas velocity (ft/sec)
$\sqrt{\Delta P}$	average square roots of velocity heads of sample gas (in. H_2O)
460	°F to °R conversion constant

11. Total flow of sample gas (acfm)

$$Q_a = (60)(A_s)(V_s)$$

Where:

A_s	cross sectional area of sampling location (ft^2)
Q_a	volumetric flow rate at actual conditions (acfm)
V_s	sample gas velocity (ft/sec)
60	conversion factor (sec/min)

12. Total flow of sample gas (dscfm)

$$Q_{std} = \frac{(Q_a)(P_s)(17.64)(1 - B_{wo})}{(\overline{T_s} + 460)}$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
P_s	absolute sample gas pressure (in. Hg)
Q_a	volumetric flow rate at actual conditions (acfm)
Q_{std}	volumetric flow rate at standard conditions, dry basis (dscfm)
T_s	average sample gas temperature (°F)
17.64	conversion factor (°R/in. Hg)
460	°F to °R conversion constant

SAMPLE CALCULATIONS (CONTINUED)

13. NOx concentration (lb/dscf)

$$E_{lb/dscf} = \frac{(ppm)(MW)}{(385.3 \times 10^6)}$$

Where:

$E_{lb/dscf}$	emission rate
C_{ppm}	measured concentration in the gas stream (ppmdv)
MW	molecular weight of NOx (46)
385.3	conversion factor

14. NOx emission (lb/hr)

$$E_{lb/hr} = (lb/dscf)(60)(dscfm)$$

Where:

$E_{lb/hr}$	emission rate
$E_{lb/dscf}$	concentration
E_{dscf}	concentration
$60_{min/hr}$	conversion factor

15. NOx emission (lb/MMBTU)

$$E_{lb/MMBTU} = (lb/dscf)(F-Factor)(20.9/(20.9-O2))$$

Where:

$E_{lb/MMBTU}$	emission rate
$E_{lb/dscf}$	concentration

APPENDIX B

CALIBRATION DATA

Pfizer Inc. Project #18-3114A
Kalamazoo, MI
2/6/2019
Boiler #8

Analyte	Oxygen		Dry
Initial Calibration	Value	Response	Calibration Error
High	24.01	24	0.04%
Mid	12.18	12.2	0.08%
Low (Zero)	0	0.1	0.42%

*Corrected Run Average and Upscale System Bias cell formulas must be adjusted if the high calibration gas is used for post calibration upscale checks.

Type	Run Average	Pre Zero	Post Zero	Pre Upscale	Post Upscale	*Corrected Run Average	Zero System Bias	*Upscale System Bias	Zero Drift	Upscale Drift
Initial System Bias Check			0.1		12.2		0.00%	0.00%		
Run 1	4.9	0.1	0.2	12.2	12.3	4.8	0.42%	0.42%	0.42%	0.42%
Run 2	4.9	0.2	0.1	12.3	12.1	4.8	0.00%	0.42%	0.42%	0.83%
Run 3	4.8	0.1	0.1	12.1	12.1	4.8	0.00%	0.42%	0.00%	0.00%

Pfizer Inc. Project #18-3114A
Kalamazoo, MI
2/6/2019
Boiler #8

Analyte	Nitrous Oxides		Dry
Initial Calibration	Value	Response	Calibration Error
High	97.5	97.8	0.31%
Mid	50.25	50.3	0.05%
Low (Zero)	0	0.3	0.31%

*Corrected Run Average and Upscale System Bias cell formulas must be adjusted if the high calibration gas is used for post calibration upscale checks.

Type	Run Average	Pre Zero	Post Zero	Pre Upscale	Post Upscale	*Corrected Run Average	Zero System Bias	*Upscale System Bias	Zero Drift	Upscale Drift	lb/dscf
Initial System Bias Check			0.4		50.6		0.10%	0.31%			
Run 1	94.0	0.4	0.2	50.6	50.2	**94.0**	0.10%	0.10%	0.21%	0.41%	1.12E-05
Run 2	94.1	0.2	0.2	50.2	50.9	**93.7**	0.10%	0.62%	0.00%	0.72%	1.12E-05
Run 3	91.9	0.2	0.3	50.9	50.2	**91.6**	0.00%	0.10%	0.10%	0.72%	1.09E-05

APPENDIX C

DATALOGGER DATA

Pfizer
Kalamazoo, MI
Boiler #8

Run #1

Date	Time	02	CO2	NOX
2019/02/06	08:05:00	4.7	9.0	95.2
2019/02/06	08:06:00	4.7	8.9	95.2
2019/02/06	08:07:00	4.8	8.9	94.7
2019/02/06	08:08:00	5.0	8.8	94.2
2019/02/06	08:09:00	5.1	8.7	94.2
2019/02/06	08:10:00	5.0	8.8	93.2
2019/02/06	08:11:00	5.0	8.8	93.2
2019/02/06	08:12:00	4.9	8.8	94.2
2019/02/06	08:13:00	4.8	8.9	94.7
2019/02/06	08:14:00	5.0	8.7	94.7
2019/02/06	08:15:00	5.0	8.7	93.2
2019/02/06	08:16:00	5.0	8.8	94.2
2019/02/06	08:17:00	4.9	8.8	94.2
2019/02/06	08:18:00	4.8	8.9	95.7
2019/02/06	08:19:00	4.9	8.9	95.2
2019/02/06	08:20:00	4.8	8.9	94.7
2019/02/06	08:21:00	4.8	8.9	95.2
2019/02/06	08:22:00	4.9	8.8	95.2
2019/02/06	08:23:00	5.0	8.8	93.7
2019/02/06	08:24:00	4.8	8.8	94.2
2019/02/06	08:25:00	4.9	8.8	94.2
2019/02/06	08:26:00	4.9	8.8	94.2
2019/02/06	08:27:00	5.0	8.8	94.2
2019/02/06	08:28:00	4.9	8.8	93.7
2019/02/06	08:29:00	5.1	8.7	93.7
2019/02/06	08:30:00	5.1	8.6	92.7
2019/02/06	08:31:00	5.0	8.8	95.2
2019/02/06	08:32:00	4.9	8.8	89.7
2019/02/06	08:33:00	4.9	8.8	93.7
2019/02/06	08:34:00	4.9	8.8	94.2
2019/02/06	08:35:00	4.9	8.9	94.2
2019/02/06	08:36:00	4.9	8.8	94.7
2019/02/06	08:37:00	4.9	8.8	94.2
2019/02/06	08:38:00	4.9	8.8	93.2
2019/02/06	08:39:00	4.8	8.9	94.2
2019/02/06	08:40:00	5.0	8.8	94.2
2019/02/06	08:41:00	5.0	8.8	94.2
2019/02/06	08:42:00	4.9	8.9	93.7
2019/02/06	08:43:00	4.8	8.9	94.2
2019/02/06	08:44:00	5.1	8.7	92.7
2019/02/06	08:45:00	5.0	8.8	93.7
2019/02/06	08:46:00	5.0	8.8	93.7
2019/02/06	08:47:00	5.0	8.7	93.2
2019/02/06	08:48:00	5.1	8.7	93.2
2019/02/06	08:49:00	4.9	8.8	93.2
2019/02/06	08:50:00	5.0	8.7	93.7
2019/02/06	08:51:00	5.0	8.7	93.2
2019/02/06	08:52:00	4.8	8.8	93.7
2019/02/06	08:53:00	4.9	8.8	94.2
2019/02/06	08:54:00	4.9	8.8	89.2
2019/02/06	08:55:00	4.8	8.9	93.7
2019/02/06	08:56:00	4.9	8.8	93.7
2019/02/06	08:57:00	4.8	8.8	95.2
2019/02/06	08:58:00	4.8	8.9	94.2
2019/02/06	08:59:00	4.9	8.8	94.2
2019/02/06	09:00:00	4.8	8.9	94.7
2019/02/06	09:01:00	4.8	8.8	94.7
2019/02/06	09:02:00	4.9	8.8	94.7
2019/02/06	09:03:00	5.0	8.8	94.2
2019/02/06	09:04:00	5.0	8.7	94.7
	Average=	4.9	8.8	94.0

Pfizer
Kalamazoo, MI
Boiler #8

Run #2

Date	Time	02	CO2	NOX
2019/02/06	09:15:00	4.8	9.2	93.7
2019/02/06	09:16:00	4.7	9.2	94.7
2019/02/06	09:17:00	4.7	9.2	94.2
2019/02/06	09:18:00	4.7	9.2	95.2
2019/02/06	09:19:00	4.7	9.2	95.2
2019/02/06	09:20:00	4.6	9.3	94.7
2019/02/06	09:21:00	4.7	9.3	94.7
2019/02/06	09:22:00	4.8	9.2	96.2
2019/02/06	09:23:00	4.8	9.2	95.7
2019/02/06	09:24:00	4.8	9.2	94.7
2019/02/06	09:25:00	4.9	9.1	94.2
2019/02/06	09:26:00	4.9	9.1	94.2
2019/02/06	09:27:00	4.8	9.2	95.2
2019/02/06	09:28:00	4.8	9.2	93.7
2019/02/06	09:29:00	4.8	9.2	94.2
2019/02/06	09:30:00	5.1	9.0	92.2
2019/02/06	09:31:00	4.9	9.1	86.7
2019/02/06	09:32:00	5.0	9.1	93.7
2019/02/06	09:33:00	4.9	9.1	89.7
2019/02/06	09:34:00	4.9	9.1	94.2
2019/02/06	09:35:00	4.9	9.1	94.7
2019/02/06	09:36:00	4.8	9.2	95.2
2019/02/06	09:37:00	4.8	9.2	94.2
2019/02/06	09:38:00	4.8	9.2	95.2
2019/02/06	09:39:00	4.9	9.1	94.7
2019/02/06	09:40:00	4.7	9.2	95.2
2019/02/06	09:41:00	4.8	9.2	95.2
2019/02/06	09:42:00	4.9	9.1	94.2
2019/02/06	09:43:00	4.8	9.2	94.7
2019/02/06	09:44:00	4.8	9.2	95.7
2019/02/06	09:45:00	4.8	9.2	94.7
2019/02/06	09:46:00	4.8	9.2	94.7
2019/02/06	09:47:00	4.9	9.1	94.7
2019/02/06	09:48:00	4.8	9.2	95.2
2019/02/06	09:49:00	4.7	9.2	94.7
2019/02/06	09:50:00	4.8	9.2	95.2
2019/02/06	09:51:00	4.9	9.1	93.7
2019/02/06	09:52:00	4.8	9.2	95.2
2019/02/06	09:53:00	4.8	9.2	94.2
2019/02/06	09:54:00	4.8	9.2	94.7
2019/02/06	09:55:00	4.8	9.1	94.7
2019/02/06	09:56:00	4.9	9.1	94.7
2019/02/06	09:57:00	5.0	9.0	95.2
2019/02/06	09:58:00	5.0	9.0	93.7
2019/02/06	09:59:00	5.0	9.1	93.2
2019/02/06	10:00:00	5.0	9.1	94.2
2019/02/06	10:01:00	5.0	9.0	93.2
2019/02/06	10:02:00	5.0	9.0	93.7
2019/02/06	10:03:00	5.1	9.0	93.7
2019/02/06	10:04:00	5.1	9.0	93.7
2019/02/06	10:05:00	5.0	9.1	93.2
2019/02/06	10:06:00	5.0	9.0	94.2
2019/02/06	10:07:00	5.1	9.0	93.2
2019/02/06	10:08:00	5.0	9.1	94.2
2019/02/06	10:09:00	5.0	9.0	94.2
2019/02/06	10:10:00	5.1	9.0	92.2
2019/02/06	10:11:00	5.0	9.0	92.7
2019/02/06	10:12:00	5.1	9.0	93.2
2019/02/06	10:13:00	5.0	9.1	93.2
2019/02/06	10:14:00	5.0	9.0	93.7
	Average=	4.9	9.1	94.1

Pfizer
Kalamazoo, MI
Boiler #8

Run #3

Date	Time	02	CO2	NOX
2019/02/06	10:22:00	4.7	9.1	93.2
2019/02/06	10:23:00	4.6	9.1	93.2
2019/02/06	10:24:00	4.7	9.1	92.2
2019/02/06	10:25:00	4.6	9.1	93.2
2019/02/06	10:26:00	4.6	9.2	92.7
2019/02/06	10:27:00	4.5	9.3	94.2
2019/02/06	10:28:00	4.5	9.2	94.2
2019/02/06	10:29:00	4.5	9.3	93.7
2019/02/06	10:30:00	4.5	9.2	93.7
2019/02/06	10:31:00	4.6	9.1	93.2
2019/02/06	10:32:00	4.7	9.1	93.7
2019/02/06	10:33:00	4.9	9.0	92.2
2019/02/06	10:34:00	4.9	9.0	92.2
2019/02/06	10:35:00	4.8	9.0	92.2
2019/02/06	10:36:00	4.8	9.0	92.2
2019/02/06	10:37:00	4.8	9.0	91.7
2019/02/06	10:38:00	4.7	9.0	92.7
2019/02/06	10:39:00	4.7	9.0	92.7
2019/02/06	10:40:00	4.8	9.0	92.2
2019/02/06	10:41:00	4.8	9.0	91.7
2019/02/06	10:42:00	4.9	9.0	90.2
2019/02/06	10:43:00	4.9	9.0	90.2
2019/02/06	10:44:00	4.8	9.0	91.7
2019/02/06	10:45:00	4.9	9.0	91.2
2019/02/06	10:46:00	4.8	9.0	91.2
2019/02/06	10:47:00	4.7	9.1	91.8
2019/02/06	10:48:00	4.9	9.0	91.2
2019/02/06	10:49:00	4.8	9.0	92.2
2019/02/06	10:50:00	4.8	9.0	92.2
2019/02/06	10:51:00	4.8	9.0	92.2
2019/02/06	10:52:00	4.7	9.1	87.7
2019/02/06	10:53:00	4.7	9.1	92.7
2019/02/06	10:54:00	4.8	9.0	92.2
2019/02/06	10:55:00	4.9	9.0	91.2
2019/02/06	10:56:00	4.6	9.1	92.2
2019/02/06	10:57:00	4.6	9.2	93.8
2019/02/06	10:58:00	4.7	9.1	93.2
2019/02/06	10:59:00	4.6	9.2	92.7
2019/02/06	11:00:00	4.6	9.2	92.7
2019/02/06	11:01:00	4.7	9.1	92.2
2019/02/06	11:02:00	4.8	9.1	92.7
2019/02/06	11:03:00	4.8	9.1	92.2
2019/02/06	11:04:00	4.7	9.1	92.2
2019/02/06	11:05:00	4.7	9.1	92.2
2019/02/06	11:06:00	4.7	9.1	91.7
2019/02/06	11:07:00	4.7	9.1	91.2
2019/02/06	11:08:00	4.8	9.0	91.7
2019/02/06	11:09:00	4.8	9.0	91.7
2019/02/06	11:10:00	4.9	9.0	90.7
2019/02/06	11:11:00	4.8	9.1	90.7
2019/02/06	11:12:00	4.9	9.0	90.7
2019/02/06	11:13:00	5.0	8.9	94.7
2019/02/06	11:14:00	5.3	8.8	90.2
2019/02/06	11:15:00	5.0	8.9	90.3
2019/02/06	11:16:00	5.1	8.9	91.7
2019/02/06	11:17:00	5.0	8.9	88.7
2019/02/06	11:18:00	5.2	8.8	90.2
2019/02/06	11:19:00	5.1	8.9	90.2
2019/02/06	11:20:00	5.1	8.9	90.2
2019/02/06	11:21:00	5.1	8.9	90.7
	Average=	4.8	9.0	91.9

Pfizer Inc. Project# 18-3114A
Kalamazoo, MI
Boiler #8

Stratification Check

Date	Time	02	NOX	
2019/02/05	13:52:00	4.8	91.7	
2019/02/05	13:53:00	4.8	91.7	
2019/02/05	13:54:00	4.7	93.7	
2019/02/05	13:55:00	5.1	94.2	
2019/02/05	13:56:00	5.2	93.2	
2019/02/05	13:57:00	5.1	93.7	
2019/02/05	13:58:00	5.0	95.2	
2019/02/05	13:59:00	5.1	91.7	
2019/02/05	14:00:00	5.0	91.7	
2019/02/05	14:01:00	4.8	91.7	
2019/02/05	14:02:00	4.7	91.2	
2019/02/05	14:03:00	4.5	97.2	
2019/02/05	14:05:00	4.6	96.2	
2019/02/05	14:06:00	4.5	96.2	
2019/02/05	14:07:00	4.5	96.2	
2019/02/05	14:08:00	4.5	98.2	
2019/02/05	14:09:00	4.7	94.2	
2019/02/05	14:10:00	4.7	94.7	
2019/02/05	14:11:00	4.9	98.2	
2019/02/05	14:12:00	5.0	96.7	
2019/02/05	14:13:00	4.8	93.2	
2019/02/05	14:14:00	4.9	94.2	
2019/02/05	14:15:00	4.9	94.2	
2019/02/05	14:16:00	4.9	98.7	
		89.8	94.6	99.3

APPENDIX D

CALIBRATION GAS CERTIFICATION SHEETS

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI76E15A0295	Reference Number:	54-124528695-1
Cylinder Number:	CC100644	Cylinder Volume:	152.5 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Dec 15, 2015

Expiration Date: Dec 15, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	12.00 %	12.26 %	G1	+/- 1.0% NIST Traceable	12/15/2015
OXYGEN	12.00 %	12.18 %	G1	+/- 1.0% NIST Traceable	12/15/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06120402	CC184369	19.66 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016
NTRM	98051016	SG9163074BAL	12.05 % OXYGEN/NITROGEN	+/- 0.7%	Dec 02, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Dec 04, 2015
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Dec 12, 2015

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas Specialty Gases
Airgas USA, LLC
12722 South Wentworth Ave.
Chicago, IL 60628
773-785-3000 Fax: 773-785-1928
Airgas.com

Part Number:	E03NI52E15A38Q7	Reference Number:	54-124572686-1
Cylinder Number:	CC7607	Cylinder Volume:	163.9 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12016	Valve Outlet:	296
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 26, 2016

Expiration Date: Aug 26, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	24.00 %	23.62 %	G1	+/- 1.2% NIST Traceable	08/26/2016
OXYGEN	24.00 %	24.01 %	G2	+/- 0.6% NIST Traceable	08/26/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060817	CC416652	24.04 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 16, 2019
NTRM	06120112	CC195607	9.898 % OXYGEN/NITROGEN	+/- 0.7%	Jun 26, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Aug 13, 2016
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Aug 22, 2016

Triad Data Available Upon Request

Approved for Release

Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0147	Reference Number:	54-124496423-1
Cylinder Number:	CC349435	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Jun 11, 2015

Expiration Date: Jun 11, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	50.00 PPM	50.25 PPM	G1	+/- 0.9% NIST Traceable	06/04/2015, 06/11/2015
NITRIC OXIDE	50.00 PPM	50.25 PPM	G1	+/- 0.9% NIST Traceable	06/04/2015, 06/11/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13061007	CC422721	99.86 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Nov 19, 2019
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 14, 2012
GMIS	0207201402	CC500987	4.845 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 07, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nexus 470 AEP0000428	FTIR	May 28, 2015
Nexus 470 AEP0000428	FTIR	May 28, 2015

Triad Data Available Upon Request

Approved for Release

LIQUID TECHNOLOGY CORPORATION

"INDUSTRY LEADER IN SPECIALTY GASES"

Certificate of Analysis

- EPA PROTOCOL GAS -

Customer	Stack Test Group (Ottawa, IL)
Date	February 14, 2013
Delivery Receipt	DR-45816
Gas Standard	100 ppm Nitric Oxide/Nitrogen - EPA PROTOCOL
Final Analysis Date	February 11, 2013
Expiration Date	February 11, 2021
Component	Nitric Oxide
Balance Gas	Nitrogen

Analytical Data:

DO NOT USE BELOW 100 psig

EPA Protocol, Section No. 2.2, Procedure G-1

Reported Concentrations

Nitric Oxide: 96.5 ppm +/- 0.47 ppm

Nitrogen: Balance

Total Oxides of Nitrogen: 97.5 ppm

** Total NOX for Reference Use Only **

Reference Standards:

SRM/GMIS:	GMIS
Cylinder Number:	ND-45697
Concentration:	97.47 ppm NO/Nitrogen
Expiration Date:	07/18/14

Certification Instrumentation

Component:	Nitric Oxide
Make/Model:	Thermo 42i-LS
Serial Number:	1033445889
Principal of Measurement:	Chemiluminescence
Last Calibration:	January 31, 2013

Cylinder Data

Cylinder Serial Number:	EB-0040614	Cylinder Outlet:	CGA 660
Cylinder Volume:	140 Cubic Feet	Cylinder Pressure:	2000 psig, 70°F

Analytical Uncertainty and NIST Traceability are in compliance with EPA-600/R-12/531.

Certified by: David Scott

PGVP Vendor ID: E12013

2048 APEX COURT APOPKA, FLORIDA 32703 ~ PHONE (407)-292-2990 FAX (407)-292-3313
WWW.LIQUIDTECHCORP.COM

APPENDIX E

BOILER OPERATING DATA

Pfizer Kalamazoo, MI
ROP# MI-ROP-B3610-2014h
EUEBLR43-1-S1 NOx Testing
Boiler 8

Run 1 Process Data

Date/Time	Steam Flow (lb/hr)	Natural Gas Usage (SCFH)
2/6/19 8:05 AM	83,118	102,545
2/6/19 8:06 AM	83,011	102,515
2/6/19 8:07 AM	82,904	102,485
2/6/19 8:08 AM	82,898	102,479
2/6/19 8:09 AM	82,771	102,526
2/6/19 8:10 AM	82,922	102,433
2/6/19 8:11 AM	82,984	102,578
2/6/19 8:12 AM	82,650	102,452
2/6/19 8:13 AM	82,659	102,553
2/6/19 8:14 AM	82,750	102,535
2/6/19 8:15 AM	83,062	102,528
2/6/19 8:16 AM	83,214	102,558
2/6/19 8:17 AM	82,930	102,613
2/6/19 8:18 AM	82,925	102,601
2/6/19 8:19 AM	82,853	102,503
2/6/19 8:20 AM	82,817	102,582
2/6/19 8:21 AM	83,207	102,521
2/6/19 8:22 AM	82,980	102,536
2/6/19 8:23 AM	82,700	102,513
2/6/19 8:24 AM	82,659	102,461
2/6/19 8:25 AM	83,158	102,531
2/6/19 8:26 AM	83,194	102,509
2/6/19 8:27 AM	83,064	102,488
2/6/19 8:28 AM	82,933	102,468
2/6/19 8:29 AM	82,943	102,500
2/6/19 8:30 AM	83,258	102,599
2/6/19 8:31 AM	82,927	102,470
2/6/19 8:32 AM	82,559	102,487
2/6/19 8:33 AM	83,010	102,562
2/6/19 8:34 AM	83,233	102,609
2/6/19 8:35 AM	83,086	102,422
2/6/19 8:36 AM	83,069	102,504
2/6/19 8:37 AM	83,093	102,551
2/6/19 8:38 AM	83,150	102,492
2/6/19 8:39 AM	83,154	102,505
2/6/19 8:40 AM	83,244	102,535
2/6/19 8:41 AM	83,070	102,429
2/6/19 8:42 AM	82,810	102,464
2/6/19 8:43 AM	82,900	102,538
2/6/19 8:44 AM	82,957	102,484
2/6/19 8:45 AM	83,203	102,416
2/6/19 8:46 AM	82,931	102,578
2/6/19 8:47 AM	83,448	102,469
2/6/19 8:48 AM	83,143	102,478
2/6/19 8:49 AM	82,838	102,487
2/6/19 8:50 AM	82,855	102,489
2/6/19 8:51 AM	83,643	102,552
2/6/19 8:52 AM	83,660	102,500
2/6/19 8:53 AM	83,692	102,498
2/6/19 8:54 AM	83,454	102,523
2/6/19 8:55 AM	83,315	102,518
2/6/19 8:56 AM	83,202	102,579
2/6/19 8:57 AM	82,661	102,481
2/6/19 8:58 AM	82,839	102,509
2/6/19 8:59 AM	83,387	102,559
2/6/19 9:00 AM	83,408	102,556
2/6/19 9:01 AM	83,800	102,505
2/6/19 9:02 AM	83,330	102,507
2/6/19 9:03 AM	83,678	102,530
2/6/19 9:04 AM	83,898	102,579

Pfizer Kalamazoo, MI
ROP# MI-ROP-B3610-2014h
EUEBLR43-1-S1 NOx Testing
Boiler 8

Run 2 Process Data

Date/Time	Steam Flow (lb/hr)	Natural Gas Usage (SCFH)
2/6/19 9:15 AM	82,123	102,255
2/6/19 9:16 AM	83,171	102,251
2/6/19 9:17 AM	83,167	102,234
2/6/19 9:18 AM	83,442	102,388
2/6/19 9:19 AM	83,220	102,431
2/6/19 9:20 AM	83,108	102,552
2/6/19 9:21 AM	83,106	102,555
2/6/19 9:22 AM	83,143	102,585
2/6/19 9:23 AM	83,558	102,608
2/6/19 9:24 AM	83,838	102,601
2/6/19 9:25 AM	83,825	102,558
2/6/19 9:26 AM	83,418	102,600
2/6/19 9:27 AM	83,295	102,622
2/6/19 9:28 AM	83,127	102,554
2/6/19 9:29 AM	83,075	102,506
2/6/19 9:30 AM	83,170	102,475
2/6/19 9:31 AM	83,265	102,443
2/6/19 9:32 AM	83,274	102,441
2/6/19 9:33 AM	83,560	102,497
2/6/19 9:34 AM	83,262	102,532
2/6/19 9:35 AM	82,726	102,477
2/6/19 9:36 AM	82,797	102,512
2/6/19 9:37 AM	83,379	102,570
2/6/19 9:38 AM	83,099	102,534
2/6/19 9:39 AM	83,092	102,587
2/6/19 9:40 AM	83,258	102,630
2/6/19 9:41 AM	82,302	102,523
2/6/19 9:42 AM	82,296	102,522
2/6/19 9:43 AM	82,919	102,653
2/6/19 9:44 AM	82,995	102,694
2/6/19 9:45 AM	83,051	102,632
2/6/19 9:46 AM	83,177	102,480
2/6/19 9:47 AM	83,059	102,539
2/6/19 9:48 AM	83,037	102,596
2/6/19 9:49 AM	83,548	102,491
2/6/19 9:50 AM	83,251	102,488
2/6/19 9:51 AM	83,105	102,542
2/6/19 9:52 AM	82,960	102,596
2/6/19 9:53 AM	82,962	102,576
2/6/19 9:54 AM	83,201	102,555
2/6/19 9:55 AM	83,487	102,420
2/6/19 9:56 AM	83,223	102,472
2/6/19 9:57 AM	83,112	102,502
2/6/19 9:58 AM	83,306	102,437
2/6/19 9:59 AM	83,253	102,455
2/6/19 10:00 AM	83,408	102,458
2/6/19 10:01 AM	84,246	102,424
2/6/19 10:02 AM	84,134	102,428
2/6/19 10:03 AM	84,110	102,438
2/6/19 10:04 AM	83,176	102,504
2/6/19 10:05 AM	83,310	102,548
2/6/19 10:06 AM	83,767	102,481
2/6/19 10:07 AM	83,735	102,514
2/6/19 10:08 AM	83,473	102,493
2/6/19 10:09 AM	83,663	102,576
2/6/19 10:10 AM	83,435	102,537
2/6/19 10:11 AM	82,815	102,476
2/6/19 10:12 AM	82,980	102,511
2/6/19 10:13 AM	83,144	102,547
2/6/19 10:14 AM	83,156	102,548

Pfizer Kalamazoo, MI
ROP# MI-ROP-B3610-2014h
EUEBLR43-1-S1 NOx Testing
Boiler 8

Run 3 Process Data

Date/Time	Steam Flow (lb/hr)	Natural Gas Usage (SCFH)
2/6/19 10:22 AM	83,409	102,510
2/6/19 10:23 AM	82,919	102,474
2/6/19 10:24 AM	82,908	102,474
2/6/19 10:25 AM	83,107	102,518
2/6/19 10:26 AM	83,251	102,556
2/6/19 10:27 AM	84,711	102,496
2/6/19 10:28 AM	84,274	102,561
2/6/19 10:29 AM	83,842	102,598
2/6/19 10:30 AM	83,236	102,529
2/6/19 10:31 AM	83,145	102,555
2/6/19 10:32 AM	82,898	102,569
2/6/19 10:33 AM	83,121	102,524
2/6/19 10:34 AM	83,344	102,480
2/6/19 10:35 AM	83,362	102,476
2/6/19 10:36 AM	84,118	102,316
2/6/19 10:37 AM	84,509	102,378
2/6/19 10:38 AM	84,275	102,374
2/6/19 10:39 AM	83,914	102,482
2/6/19 10:40 AM	83,250	102,448
2/6/19 10:41 AM	82,018	102,558
2/6/19 10:42 AM	82,466	102,570
2/6/19 10:43 AM	83,622	102,563
2/6/19 10:44 AM	83,321	102,561
2/6/19 10:45 AM	83,312	102,560
2/6/19 10:46 AM	83,310	102,498
2/6/19 10:47 AM	83,461	102,471
2/6/19 10:48 AM	84,089	102,351
2/6/19 10:49 AM	83,774	102,493
2/6/19 10:50 AM	83,196	102,606
2/6/19 10:51 AM	82,775	102,619
2/6/19 10:52 AM	82,676	102,587
2/6/19 10:53 AM	82,788	102,593
2/6/19 10:54 AM	83,305	102,572
2/6/19 10:55 AM	83,823	102,551
2/6/19 10:56 AM	83,671	102,550
2/6/19 10:57 AM	83,114	102,581
2/6/19 10:58 AM	83,289	102,609
2/6/19 10:59 AM	83,295	102,617
2/6/19 11:00 AM	83,597	102,489
2/6/19 11:01 AM	83,212	102,466
2/6/19 11:02 AM	83,126	102,527
2/6/19 11:03 AM	82,953	102,440
2/6/19 11:04 AM	83,184	102,470
2/6/19 11:05 AM	83,224	102,479
2/6/19 11:06 AM	83,251	102,479
2/6/19 11:07 AM	82,838	102,465
2/6/19 11:08 AM	82,941	102,421
2/6/19 11:09 AM	83,030	102,535
2/6/19 11:10 AM	83,881	102,485
2/6/19 11:11 AM	84,243	102,415
2/6/19 11:12 AM	83,442	102,441
2/6/19 11:13 AM	83,874	102,536
2/6/19 11:14 AM	83,289	102,444
2/6/19 11:15 AM	83,307	102,454
2/6/19 11:16 AM	83,326	102,463
2/6/19 11:17 AM	83,232	102,463
2/6/19 11:18 AM	83,644	102,389
2/6/19 11:19 AM	83,427	102,434
2/6/19 11:20 AM	84,476	102,391
2/6/19 11:21 AM	83,276	102,299

Pfizer Kalamazoo, MI
ROP# MI-ROP-B3610-2014h
EUEBLR43-1-S1 NOx Testing
Boiler 8

Stratification Test Process Data

Date/Time	Steam Flow (lb/hr)	Natural Gas Usage (SCFH)
2/5/19 1:52 PM	80,598	99,168
2/5/19 1:53 PM	80,528	99,124
2/5/19 1:54 PM	80,444	99,131
2/5/19 1:55 PM	80,393	99,137
2/5/19 1:56 PM	80,494	99,143
2/5/19 1:57 PM	80,493	99,144
2/5/19 1:58 PM	80,195	99,206
2/5/19 1:59 PM	80,370	99,652
2/5/19 2:00 PM	80,786	100,612
2/5/19 2:01 PM	81,315	101,254
2/5/19 2:02 PM	81,775	101,721
2/5/19 2:03 PM	81,946	101,927
2/5/19 2:04 PM	82,200	102,233
2/5/19 2:05 PM	82,565	102,416
2/5/19 2:06 PM	82,587	102,443
2/5/19 2:07 PM	82,618	102,477
2/5/19 2:08 PM	82,642	102,426
2/5/19 2:09 PM	83,076	102,559
2/5/19 2:10 PM	83,098	102,522
2/5/19 2:11 PM	83,149	102,501
2/5/19 2:12 PM	83,149	102,471
2/5/19 2:13 PM	82,512	102,456
2/5/19 2:14 PM	81,855	102,467
2/5/19 2:15 PM	81,611	102,423
2/5/19 2:16 PM	81,413	102,388

APPENDIX F

FIELD PARAMETER SHEET

STACK TEST GROUP, INC.
Air Quality Services

NOx Sampling Train Calculations

Client:	Pfizer			
Project No:	18-3114A			
Date:	02/06/19			
Source:	Boiler #8 Firing Natural Gas			
Test No:	T1	T2	T3	Avg.
Start Time	08:05 AM	09:15 AM	10:22 AM	
Finish Time	09:05 AM	10:15 AM	11:22 AM	

NOx Calculations:

Oxygen, %:	4.8	4.8	4.8	4.8
NOx, ppmv:	94.0	93.7	91.6	93.1
NOx, lb/DSCF:	1.12E-05	1.12E-05	1.09E-05	1.11E-05
LBS/MMBTU (F-Factor = 8,710):	0.127	0.126	0.124	0.126