

Raw NOx		Raw CO		Stack O2	
VR_931AIC1112D_NOX		VR_931AIC1112C_CO		VR_931AIC1112B_O2	
23-Mar-21 15:30:00	10.94	23-Mar-21 15:30:00	21.16	23-Mar-21 15:30:00	15.16
23-Mar-21 15:31:00	10.76	23-Mar-21 15:31:00	21.36	23-Mar-21 15:31:00	15.16
23-Mar-21 15:32:00	10.83	23-Mar-21 15:32:00	21.52	23-Mar-21 15:32:00	15.16
23-Mar-21 15:33:00	10.97	23-Mar-21 15:33:00	21.57	23-Mar-21 15:33:00	15.16
23-Mar-21 15:34:00	11.07	23-Mar-21 15:34:00	21.63	23-Mar-21 15:34:00	15.13
23-Mar-21 15:35:00	11.62	23-Mar-21 15:35:00	21.68	23-Mar-21 15:35:00	15.11
23-Mar-21 15:36:00	11.97	23-Mar-21 15:36:00	21.75	23-Mar-21 15:36:00	15.12
23-Mar-21 15:37:00	11.08	23-Mar-21 15:37:00	21.86	23-Mar-21 15:37:00	15.12
23-Mar-21 15:38:00	10.89	23-Mar-21 15:38:00	21.97	23-Mar-21 15:38:00	15.13
23-Mar-21 15:39:00	10.88	23-Mar-21 15:39:00	21.95	23-Mar-21 15:39:00	15.14
23-Mar-21 15:40:00	10.99	23-Mar-21 15:40:00	21.89	23-Mar-21 15:40:00	15.15
23-Mar-21 15:41:00	10.92	23-Mar-21 15:41:00	21.83	23-Mar-21 15:41:00	15.15
23-Mar-21 15:42:00	8.83	23-Mar-21 15:42:00	19.22	23-Mar-21 15:42:00	15.88
23-Mar-21 15:43:00	1.00	23-Mar-21 15:43:00	3.16	23-Mar-21 15:43:00	20.51
23-Mar-21 15:44:00	0.08	23-Mar-21 15:44:00	0.93	23-Mar-21 15:44:00	17.35
23-Mar-21 15:45:00	0.06	23-Mar-21 15:45:00	0.81	23-Mar-21 15:45:00	1.21
23-Mar-21 15:46:00	0.06	23-Mar-21 15:46:00	0.87	23-Mar-21 15:46:00	0.08
23-Mar-21 15:47:00	0.06	23-Mar-21 15:47:00	0.92	23-Mar-21 15:47:00	-0.06
23-Mar-21 15:48:00	0.06	23-Mar-21 15:48:00	0.97	23-Mar-21 15:48:00	-0.09
23-Mar-21 15:49:00	0.06	23-Mar-21 15:49:00	0.99	23-Mar-21 15:49:00	-0.09
23-Mar-21 15:50:00	0.06	23-Mar-21 15:50:00	0.94	23-Mar-21 15:50:00	-0.09
23-Mar-21 15:51:00	0.06	23-Mar-21 15:51:00	0.87	23-Mar-21 15:51:00	-0.09
23-Mar-21 15:52:00	0.06	23-Mar-21 15:52:00	0.81	23-Mar-21 15:52:00	-0.09
23-Mar-21 15:53:00	0.06	23-Mar-21 15:53:00	1.00	23-Mar-21 15:53:00	-0.09
23-Mar-21 15:54:00	0.08	23-Mar-21 15:54:00	1.04	23-Mar-21 15:54:00	-0.09
23-Mar-21 15:55:00	0.13	23-Mar-21 15:55:00	1.07	23-Mar-21 15:55:00	-0.09
23-Mar-21 15:56:00	0.18	23-Mar-21 15:56:00	1.09	23-Mar-21 15:56:00	-0.09
23-Mar-21 15:57:00	0.23	23-Mar-21 15:57:00	1.11	23-Mar-21 15:57:00	-0.09
23-Mar-21 15:58:00	0.28	23-Mar-21 15:58:00	1.14	23-Mar-21 15:58:00	-0.08
23-Mar-21 15:59:00	0.34	23-Mar-21 15:59:00	1.16	23-Mar-21 15:59:00	-0.03
23-Mar-21 16:00:00	0.39	23-Mar-21 16:00:00	1.18	23-Mar-21 16:00:00	0.03
23-Mar-21 16:01:00	0.44	23-Mar-21 16:01:00	1.21	23-Mar-21 16:01:00	3.68
23-Mar-21 16:02:00	0.50	23-Mar-21 16:02:00	1.29	23-Mar-21 16:02:00	19.72
23-Mar-21 16:03:00	8.21	23-Mar-21 16:03:00	15.45	23-Mar-21 16:03:00	17.66
23-Mar-21 16:04:00	8.53	23-Mar-21 16:04:00	25.59	23-Mar-21 16:04:00	15.21
23-Mar-21 16:05:00	7.41	23-Mar-21 16:05:00	22.94	23-Mar-21 16:05:00	15.06
23-Mar-21 16:06:00	7.50	23-Mar-21 16:06:00	22.88	23-Mar-21 16:06:00	15.04
23-Mar-21 16:07:00	7.58	23-Mar-21 16:07:00	22.81	23-Mar-21 16:07:00	15.04
23-Mar-21 16:08:00	7.66	23-Mar-21 16:08:00	22.75	23-Mar-21 16:08:00	15.04
23-Mar-21 16:09:00	7.74	23-Mar-21 16:09:00	22.75	23-Mar-21 16:09:00	15.04
23-Mar-21 16:10:00	7.87	23-Mar-21 16:10:00	22.87	23-Mar-21 16:10:00	15.04



## **APPENDIX B.3 - Calibration Gas Certificates**



**CERTIFICATE OF ANALYSIS**  
**Grade of Product: EPA Protocol**

TRAILER 4

Part Number: E02NI99E15W0030      Reference Number: 48-401368218-1  
Cylinder Number: CC506715      Cylinder Volume: 144.0 CF  
Laboratory: 124 - Los Angeles (SAP) - CA      Cylinder Pressure: 2015 PSIG  
PGVP Number: B32018      Valve Outlet: 660  
Gas Code: NO2,BALN      Certification Date: Dec 18, 2018

**Expiration Date: Dec 18, 2021**

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
NITROGEN DIOXIDE	50.00 PPM	51.29 PPM	G1	+/- 1.7% NIST Traceable	12/07/2018, 12/18/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	7282017111	CC511377	60.68 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.6%	Sep 03, 2021
PRM	12378	D562913	100.1 PPM NITROGEN DIOXIDE/AIR	+/- 1.0%	Sep 04, 2018


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
MKS FTIR NO2 018335821	FTIR	Nov 29, 2018

Triad Data Available Upon Request

PERMANENT NOTES: OXYGEN ADDED TO MAINTAIN STABILITY.



  
Approved for Release

## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA Protocol

Part Number: E03NI99E15A0259	Reference Number: 48-401909622-1
Cylinder Number: CC435204	Cylinder Volume: 144.3 Cubic Feet
Laboratory: 124 - Los Angeles (SAP) - CA	Cylinder Pressure: 2015 PSIG
PGVP Number: B32020	Valve Outlet: 660
Gas Code: CO,NO,NOX,BALN	Certification Date: Sep 25, 2020

TRAILER #4

**Expiration Date: Sep 25, 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 mole/mole 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	45.00 PPM	43.59 PPM	G1	+/- 1.1% NIST Traceable	09/18/2020, 09/25/2020
CARBON MONOXIDE	45.00 PPM	45.28 PPM	G1	+/- 0.7% NIST Traceable	09/18/2020
NITRIC OXIDE	45.00 PPM	43.42 PPM	G1	+/- 1.1% NIST Traceable	09/18/2020, 09/25/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12011211	KAL003771	49.24 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Aug 31, 2024
PRM	12386	D685025	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 20, 2020
NTRM	12010722	KAL004440	50.03 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Mar 12, 2024
GMIS	401203436104	CC513876	4.653 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.1%	May 02, 2022

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
Nicolet 6700 AHR0801551 CO	FTIR	Sep 14, 2020
Nicolet 6700 AHR0801551 NO	FTIR	Sep 11, 2020
Nicolet 6700 AHR0801551 NO2	FTIR	Sep 11, 2020

Triad Data Available Upon Request



  
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 Approved for Release

## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA Protocol

Part Number:	E03NI99E15AC0A7	Reference Number:	48-401560775-1
Cylinder Number:	CC206354	Cylinder Volume:	144.4 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32019	Valve Outlet:	660
Gas Code:	CO,NO,NOX,BALN	Certification Date:	Aug 09, 2019

RULE 1110.2

**Expiration Date: Aug 09, 2027**

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	50.69 PPM	G1	+/- 1.4% NIST Traceable	08/02/2019, 08/09/2019
NITRIC OXIDE	50.00 PPM	50.55 PPM	G1	+/- 1.4% NIST Traceable	08/02/2019, 08/09/2019
CARBON MONOXIDE	400.0 PPM	409.4 PPM	G1	+/- 0.7% NIST Traceable	08/02/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12010705	KAL003450	50.03 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Mar 15, 2024
PRM	12386	D685025	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 20, 2020
GMIS	401203436104	CC513876	4.653 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.1%	May 02, 2022
NTRM	15060536	CC453475	491.9 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jan 08, 2021

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
Nicolet 6700 AHR0801551 CO	FTIR	Jul 16, 2019
Nicolet 6700 AHR0801551 NO	FTIR	Jul 17, 2019
Nicolet 6700 AHR0801551 NO2	FTIR	Jul 17, 2019

Triad Data Available Upon Request



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# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

Part Number: E02NI99E15A3506 Reference Number: 48-401600797-1  
 Cylinder Number: EB0011494 Cylinder Volume: 144.3 CF  
 Laboratory: 124 - Los Angeles (SAP) - CA Cylinder Pressure: 2015 PSIG  
 PGVP Number: B32019 Valve Outlet: 350  
 Gas Code: CO,BALN Certification Date: Sep 20, 2019

*LINEARITY*

Expiration Date: Sep 20, 2027

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 MONOXIDE	55.00 PPM	57.22 PPM	G1	+/- 0.7% NIST Traceable	09/20/2019
NITROGEN	Balance				


CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060759	CC434472	49.88 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Feb 22, 2020

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 CO	FTIR	Sep 06, 2019

Triad Data Available Upon Request



  
 Approved for Release



**CERTIFICATE OF ANALYSIS**  
**Grade of Product: EPA Protocol**

Part Number: E03NI99E15A0260 Reference Number: 48-401176369-1  
Cylinder Number: SG9166651 Cylinder Volume: 144.3 CF  
Laboratory: 124 - Los Angeles (SAP) - CA Cylinder Pressure: 2015 PSIG  
PGVP Number: B32018 Valve Outlet: 660  
Gas Code: CO,NO,NOX,BALN Certification Date: Apr 20, 2018

*Trailer #4*

Expiration Date: Apr 20, 2026

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	90.00 PPM	89.84 PPM	G1	+/- 1.1% NIST Traceable	04/13/2018, 04/20/2018
CARBON MONOXIDE	90.00 PPM	89.63 PPM	G1	+/- 0.7% NIST Traceable	04/13/2018
NITRIC OXIDE	90.00 PPM	89.71 PPM	G1	+/- 1.0% NIST Traceable	04/13/2018, 04/20/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062227	CC365470	97.56 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	May 25, 2018
PRM	12367	APEX1099237	9.82 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Jun 02, 2017
NTRM	13010425	KAL004033	97.6 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	May 09, 2019
GMS	0224201602	CC500997	5.100 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 24, 2019

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

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 CO	FTIR	Mar 19, 2018
Nicolet 6700 AHR0801551 NO	FTIR	Apr 02, 2018
Nicolet 6700 AHR0801551 NO2	FTIR	Apr 17, 2018

Triad Data Available Upon Request



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**CERTIFICATE OF ANALYSIS**  
**Grade of Product: EPA Protocol**

Part Number: E03NI78E15A1066 Reference Number: 48-401978075-1  
 Cylinder Number: CC277372 Cylinder Volume: 151.1 CF  
 Laboratory: 124 - Los Angeles (SAP) - CA Cylinder Pressure: 2015 PSIG  
 PGVP Number: B32020 Valve Outlet: 590  
 Gas Code: CO2,O2,BALN Certification Date: Dec 08, 2020

*Trailer #4*

**Expiration Date: Dec 08, 2028**

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 mole/mole 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	10.00 %	10.16 %	G1	+/- 0.6% NIST Traceable	12/08/2020
OXYGEN	12.00 %	12.06 %	G1	+/- 0.7% NIST Traceable	12/08/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08010611	K005428	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024
NTRM	98051002	SG9150866BAL	12.05 % OXYGEN/NITROGEN	+/- 0.7%	Dec 14, 2023

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Nov 20, 2020
SIEMENS OXYMAT 6	PARAMAGNETIC	Nov 17, 2020

Triad Data Available Upon Request



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Approved for Release

## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA Protocol

Part Number:	E03NI60E15A0005	Reference Number:	48-401800367-1
Cylinder Number:	CC321198	Cylinder Volume:	157.4 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32020	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Apr 28, 2020

TRAILER #4

**Expiration Date: Apr 28, 2028**

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 mole/mole 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	17.00 %	16.93 %	G1	+/- 0.7% NIST Traceable	04/28/2020
OXYGEN	22.50 %	22.46 %	G1	+/- 0.5% NIST Traceable	04/28/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061520	CC354777	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	18060508	CC446539	23.204 % OXYGEN/NITROGEN	+/- 0.5%	Dec 24, 2021

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Apr 14, 2020
SIEMENS OXYMAT 6	PARAMAGNETIC	Apr 09, 2020

Triad Data Available Upon Request



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 Approved for Release

TR. 4

# CERTIFICATE OF ANALYSIS

## Grade of Product: EPA Protocol

Part Number: E02NI99E15A0529      Reference Number: 48-401700534-1  
 Cylinder Number: EB0091572      Cylinder Volume: 144.3 Cubic Feet  
 Laboratory: 124 - Los Angeles (SAP) - CA      Cylinder Pressure: 2015 PSIG  
 PGVP Number: B32020      Valve Outlet: 660  
 Gas Code: NO,NOX,BALN      Certification Date: Jan 30, 2020

Expiration Date: Jan 30, 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 mole/mole 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	24.00 PPM	24.33 PPM	G1	+/- 0.9% NIST Traceable	01/23/2020, 01/30/2020
NITRIC OXIDE	24.00 PPM	24.21 PPM	G1	+/- 0.9% NIST Traceable	01/23/2020, 01/30/2020
NITROGEN	Balance				

### CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12010710	KAL004079	50.03 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Mar 24, 2024
NTRM	12010710	KAL004079-NOx	50.08 PPM NOx/NITROGEN	+/- 0.8%	Mar 24, 2024

### ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Thermo 42-ILS 1115848421 NO	Chemiluminescence	Jan 08, 2020
Thermo 42-ILS 1115848421 NOx	Chemiluminescence	Jan 08, 2020

Triad Data Available Upon Request



*[Signature]*  
Approved for Release

**CERTIFICATE OF ANALYSIS**

**Grade of Product: EPA Protocol**

Part Number:	E02NI99E15AC000	Reference Number:	48-124610714-1
Cylinder Number:	CC330807	Cylinder Volume:	144 Cubic Feet
Laboratory:	124 - Los Angeles - CA	Cylinder Pressure:	2000 PSIG
PGVP Number:	B32017	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Mar 30, 2017

**Expiration Date: Mar 30, 2025**

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 MONOXIDE	18.00 PPM	18.12 PPM	G1	+/- 0.8% NIST Traceable	03/30/2017
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062136	CC367595	25.24 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	May 15, 2018

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 CO	FTIR	Mar 27, 2017

Triad Data Available Upon Request



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Approved for Release

**CERTIFICATE OF ANALYSIS**

**Grade of Product: EPA Protocol**

Part Number: E02NI94E15A0017      Reference Number: 48-124605136-1  
 Cylinder Number: CC159523      Cylinder Volume: 144.9 CF  
 Laboratory: 124 - Los Angeles - CA      Cylinder Pressure: 2015 PSIG  
 PGVP Number: B32017      Valve Outlet: 590  
 Gas Code: O2,BALN      Certification Date: Mar 01, 2017

*LINEARITY*

**Expiration Date: Mar 01, 2025**

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
OXYGEN	6.000 %	6.008 %	G1	+/- 0.6% NIST Traceable	03/01/2017
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	98051209	SG9168777	7.015 % OXYGEN/NITROGEN	+/- 0.6%	Mar 07, 2019

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6	PARAMAGNETIC	Feb 06, 2017

Triad Data Available Upon Request



*[Signature]*

Approved for Release

**CERTIFICATE OF ANALYSIS**  
**Grade of Product: EPA Protocol**

Part Number: E03NI91E15A0003 Reference Number: 48-401773793-1  
 Cylinder Number: CC230906 Cylinder Volume: 148.3 CF  
 Laboratory: 124 - Los Angeles (SAP) - CA Cylinder Pressure: 2015 PSIG  
 PGVP Number: B32020 Valve Outlet: 580  
 Gas Code: CO2,O2,BALN Certification Date: Apr 02, 2020

*Rule 1110.2*

Expiration Date: Apr 02, 2028

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 mole/mole 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
OXYGEN	2.000 %	2.001 %	G1	+/- 0.8% NIST Traceable	04/02/2020
CARBON DIOXIDE	7.000 %	7.035 %	G1	+/- 0.5% NIST Traceable	04/02/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	041905	K011522	2.003 % OXYGEN/NITROGEN	+/- 0.80	May 14, 2021
NTRM	06010637	K004892	7.016 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	Jan 13, 2022

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Mar 13, 2020
SIEMENS OXYMAT 6	PARAMAGNETIC	Mar 12, 2020

Triad Data Available Upon Request



*[Signature]*  
Approved for Release

## CERTIFICATE OF ANALYSIS

### Grade of Product: PRIMARY STANDARD

Part Number:	X02NI99P15A3503	Reference Number:	48-401933267-1
Cylinder Number:	CC511574	Cylinder Volume:	144.3 Cubic Feet
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Oct 22, 2020	Valve Outlet:	705
Lot Number:	48-401933267-1		

Expiration Date: Oct 22, 2021

*BACK*

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Primary Standard Gas Mixtures are traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

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### ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
AMMONIA	9.000 PPM	8.380 PPM	+/- 5%
NITROGEN	Balance		



*[Signature]*  
Approved for Release



## **APPENDIX C - Reference Method Descriptions**



**CONTINUOUS EMISSIONS MONITORING SYSTEM - Trailer No. 4**  
EPA Methods 3A, 6C, 7E and 10

The continuous emissions monitoring system consists of a Thermo Environmental Model 42i-LS chemiluminescence NO/NO<sub>x</sub> analyzer, a Servomex Model 1440 paramagnetic O<sub>2</sub> analyzer, a Thermo Environmental Model 48C CO gas filter correlation analyzer, a Thermo Environmental Model 43C-High Level pulsed fluorescent SO<sub>2</sub> analyzer, and a Horiba Model AIA-210 non-dispersive infrared (NDIR) CO<sub>2</sub> analyzer. All analyzer specifications are provided in Table 1. All concentrations are determined on a dry basis. Concentrations of NO<sub>x</sub>, CO, O<sub>2</sub> and CO<sub>2</sub> are continuously recorded on a Yokogawa 10-inch strip chart recorder. The extractive monitoring system conforms with the requirements of EPA Methods 3A, 6C, 7E and 10.

The sampling probe (heated to 250°F), constructed of 1/2 inch-diameter 316 stainless steel, is connected to a condenser with a six foot length of 3/8 inch Teflon line (heated to 250°F). A Nupro stainless steel filter (10 micron) is connected at the tip of the probe and maintained at stack temperature.

The condenser consists of a series of two stainless steel moisture knock-out bottles immersed in an ice water bath. The system is designed to minimize contact between the sample and the condensate. Condensate is continuously removed from the knock-out bottles via a peristaltic pump. The condenser outlet temperature is monitored either manually at 10-minute intervals or on a strip chart recorder/DAS system. The sample exiting the condenser is then transported through a filter, housed in a stainless steel holder, followed by 3/8 inch O.D. Teflon tubing and a Teflon coated (or stainless steel/viton) diaphragm pump to the sample manifold. The sample manifold is constructed of stainless steel tubing and directs the sample through each of four rotameters to the NO<sub>x</sub> monitor, O<sub>2</sub> monitor, CO monitor, CO<sub>2</sub> monitor and excess sample exhaust line, respectively. Sample flow through each channel is controlled by a back pressure regulator and by stainless steel needle valves on each rotameter. All components of the sampling system that contact the sample are composed of stainless steel, Teflon or glass.

Immediately upstream of the NO<sub>x</sub> analyzer(s) is an ammonia scrubber which removes all ammonia from the sample gas stream prior to introduction to the NO<sub>x</sub> analyzer to avoid interference. The ammonia scrubber consists of a stainless steel or other nonreactive cylindrical housing which contains 135cc of Perma Pure ammonia scrubbing Media A and 65cc of scrubbing Media B.

The calibration system is comprised of two parts: the analyzer calibration and the system bias check. The calibration gases are, at a minimum, certified to ± 1% by the manufacturer. Where necessary to comply with the reference method requirements, EPA Protocol 1 gases are used. The cylinders are equipped with pressure regulators which supply the calibration gas to the analyzers at the same pressure and flow rate as the sample. The selection of zero, span or sample gas directed to each analyzer is accomplished by operation of the zero, calibration or sample selector knobs located on the main flow control panel.

For EPA Methods 3A, 6C, 7E and 10 testing, the following procedures are conducted before and after each series of test runs:

Leak Check:

The leak check is performed by plugging the end of the sampling probe, evacuating the system to at least 20 inches of Hg. The leak check is deemed satisfactory if the system holds 20 inches of Hg vacuum for five minutes with less than one inch Hg loss.

Linearity Check:

The NO<sub>x</sub>, CO, CO<sub>2</sub> and O<sub>2</sub> analyzers linearity check is performed by introducing, at a minimum, zero gas, mid range calibration gas (40-60% scale) and high range calibration gas (80-100% scale). Instrument span value is set on each instrument with the mid range gas. The high range calibration gas (80-100% scale) is then introduced into each instrument without any calibration adjustments. Linearity is confirmed, if all values agree with the calibration gas value to within 2% of the calibration span.

#### Stratification Check:

A stack stratification check is performed (pre-test only) by traversing the stack with the appropriate number of traverse alternately with the reference point (center). If the gas composition is homogenous, <10% variation between any traverse points in the gas stream and the normalized average point, single point gas sampling is performed at the reference point. If stratification exceeds the 10% criteria, then the stack cross section is traversed during sampling.

#### System Bias Check:

The system bias check is accomplished by transporting the same gases used to zero and span the analyzers to the sample system as close as practical to the probe inlet. This is accomplished by opening a valve located on the probe, allowing the gas to flow to the probe and back through the moisture knockout and sample line to the analyzers. During this check the system is operated at the normal sampling rate with no adjustments. The system bias check is considered valid if the difference between the gas concentration exhibited by the measurement system which a known concentration gas is introduced at the sampling probe tip and when the sample gas is introduced directly to the analyzer, does not exceed  $\pm 5\%$  of the analyzer range.

#### Response Time:

Response time (upscale and downscale) for each analyzer is recorded during the system bias check. Upscale response time is defined as the time it takes the subject analyzer gas to reach 95% of the calibration gas value after introducing the upscale gas to the sample bias calibration system. Downscale response time is defined as the time it takes the subject analyzer to return to zero after the zero gas is introduced into the sample system bias calibration system.

#### NO<sub>x</sub> Conversion Efficiency

The NO<sub>x</sub> analyzer NO<sub>2</sub> conversion efficiency is determined by injecting a NO<sub>2</sub> gas standard directly into the NO<sub>x</sub> analyzer (after initial calibration). The analyzer response must be a least 90% of the NO<sub>2</sub> standard gas value.

#### NO<sub>x</sub> Converter Efficiency (alternate method)

The mid level NO gas standard is directly injected into a clean leak-free Tedlar bag. The bag is then diluted 1:1 with air (20.9 % O<sub>2</sub>). The bag is immediately attached to the NO<sub>x</sub> sample line. The initial NO<sub>x</sub> concentration is recorded on the strip chart. After at least 30 minutes the Tedlar bag is reattached to the NO<sub>x</sub> sample line. Analyzer response must be at 98% of the initial Tedlar bag NO<sub>x</sub> value to be acceptable.

In between each sampling run the following procedures are conducted:

#### Zero and Calibration Drift Check:

Upon the completion of each test run, the zero and calibration drift check is performed by introducing zero and mid range calibration gases to the instruments, with no adjustments (with the exception of flow to instruments) after each test run. The analyzer response must be within  $\pm 3\%$  of the actual calibration gas value.

#### Analyzer Calibration:

Upon completion of the drift test, the analyzer calibration is performed by introducing the zero and mid range gases to each analyzer prior to the upcoming test run and adjusting the instrument calibration as necessary.

#### System Bias Check

(same as above)

A schematic of the sample system and specific information of the analytical equipment is provided in the following pages.

**TABLE 1**

**CONTINUOUS EMISSIONS MONITORING LABORATORY - TRAILER**

**NO<sub>x</sub> CHEMILUMINESCENT ANALYZER - THERMO ENVIRONMENTAL MODEL 42i-LS**

Response Time (0-90%)	1 minute
Zero Drift	Negligible (24 hours)
Span Drift	± 1% of full scale (24 hours)
Linearity	± 1% of full scale
Accuracy	0.5% of full scale
Preset Operating Ranges (ppm)	0 - 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100
Custom Operating Ranges (ppm)	0 - 0.2 - 500
Output	0-10 volt

**O<sub>2</sub> PARAMAGNETIC ANALYZER - SERVOMEX MODEL 1440**

Response Time (0-90%)	15 seconds
Zero Drift	<1% in 24 hours
Accuracy	0.1% oxygen
Linearity	± 1% scale
Operating Ranges (%)	0-5, 0-25
Output	0-1 volt

**CO GAS FILTER CORRELATION ANALYZER - THERMO ENVIRONMENTAL MODEL 48C**

Response Time (0-95%)	1 minute
Zero Drift	+ 0.2 ppm CO
Span Drift	Less than 1% full scale in 24 hours
Linearity	+ 1% full scale, all ranges
Accuracy	± 0.1 ppm CO
Preset Operating Ranges (ppm)	10, 50, 100, 200, 500, 1000, 2000, 5000, 10000
Custom Operating Ranges (ppm)	10 to 10000
Output	0-10 volt

**CO<sub>2</sub> NON-DISPERSIVE INFRARED (NDIR) ANALYZER - HORIBA MODEL AIA-210**

Response Time (0-90%)	1 second
Zero Drift	± 1% of full scale in 24 hours
Span Drift	± 1% of full scale in 24 hours
Linearity	± 2% of full scale
Resolution	Less than 1% of full scale
Operating Ranges (%)	0-5, 0-10, 0-20
Output	0-10 volts

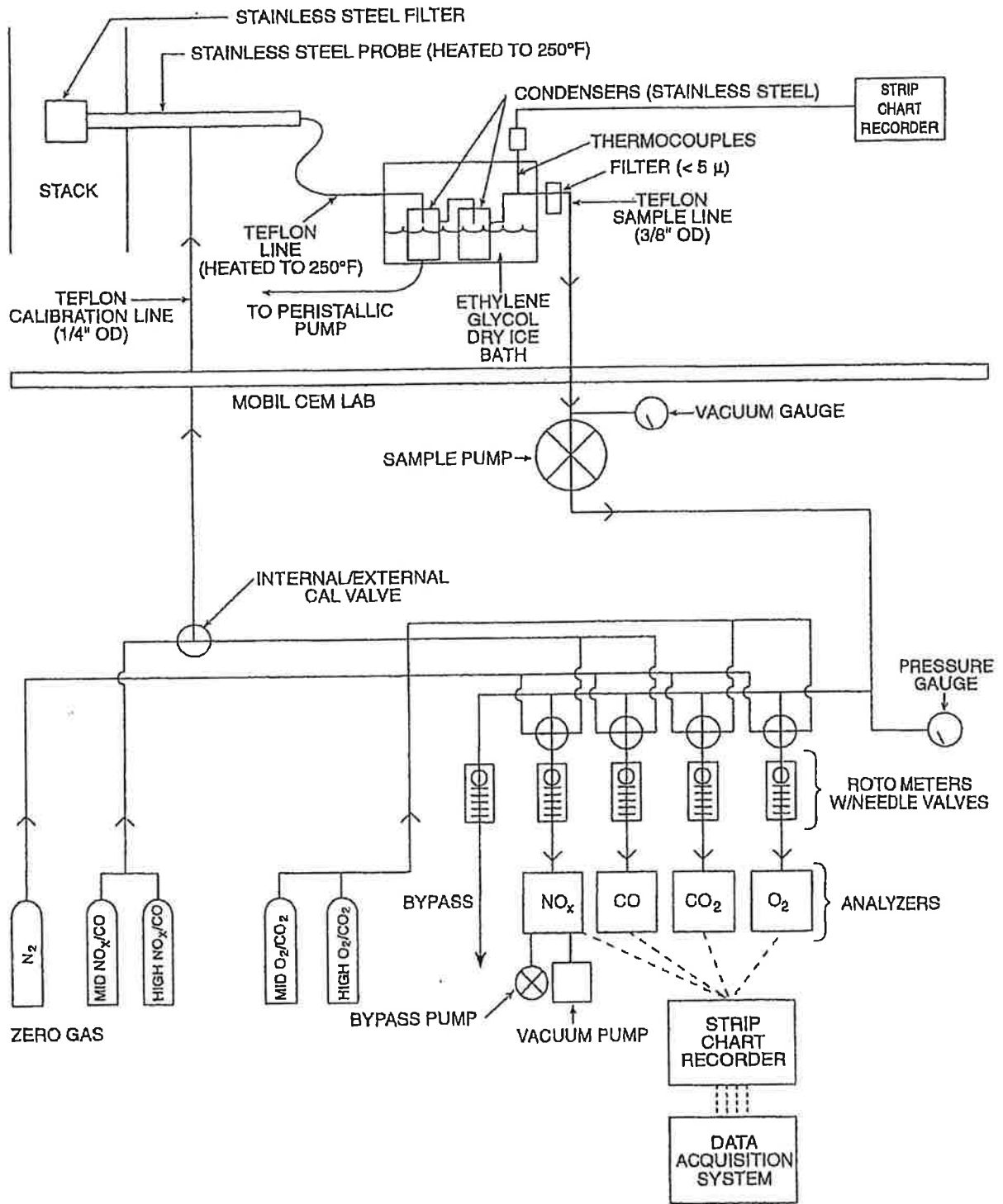
**TABLE 1 (Cont.)**

**SO<sub>2</sub> PULSED FLUORESCENT ANALYZER - THERMO ENVIRONMENTAL MODEL 43C**

Response Time	80 seconds
Zero Drift	± 1% of full scale in 24 hours
Span Drift	± 1% of full scale in 24 hours
Linearity	± 2% of full scale
Resolution	less than 1% of full scale
Preset Operating Ranges (ppm)	10, 20, 50, 100, 200, 500, 1000, 2000, 5000
Custom Operating Ranges (ppm)	10 to 5000
Output	0-10 volt

**STRIP CHART RECORDER - YOKOGAWA MODEL LR8100**

Pen Speed	up to 120 cm/min
Measuring Response	0-20 volts
Linearity Error	0.25%
Accuracy	0.3%
Zero Suppression	Manual (from 1 to 10X full scale)



**CEM System Schematic**

Method:	<b>NO/NO<sub>x</sub> by Continuous Analyzer</b>
Applicable Reference Methods:	EPA 7E, EPA 20; CARB 100, BAAQMD ST-13A, SCAQMD 100.1
Principle:	A sample is continuously withdrawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of NO or NO <sub>x</sub> .
Analyzer:	Thermo Environmental Model 42i-LS
Measurement Principle:	Chemiluminescence
Accuracy:	0.5% of full scale
Preset Ranges:	0 - 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100
Custom Ranges:	0 - 0.2 - 500
Output:	0-10 V
Interferences:	Compounds containing nitrogen (other than ammonia) may cause interference.
Response Time:	95%, 1 minute in NO or NO <sub>x</sub> mode only
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously.
Analytical Procedure:	<p>The oxides of nitrogen monitoring instrument is a chemiluminescent nitric oxide analyzer. The operational basis of the instrument is the chemiluminescent reaction of NO and ozone (O<sub>3</sub>) to form NO<sub>2</sub> in an excited state. Light emission results chemiluminescence is monitored through an optical filter by a high sensitivity photomultiplier tube, the output of which is electronically processed so it is linearly proportional to the NO concentration. The output of the instrument is in ppmV.</p> <p>When NO<sub>2</sub> is expected to be present in the flue gas, a supercooled water dropout flask will be placed in the sample line to avoid loss of NO<sub>2</sub>. Since NO<sub>2</sub> is highly soluble in water, "freezing out" the water will allow the NO<sub>2</sub> to reach the analyzers for analysis. The analyzer measures NO only. In the NO<sub>x</sub> mode, the gas is passed through a stainless steel converter which converts NO<sub>2</sub> to NO and a total NO<sub>x</sub> measurement is obtained. NO<sub>2</sub> is determined as the difference between NO and NO<sub>x</sub>.</p>



Method:	<b>Oxygen (O<sub>2</sub>) by Continuous Analyzer</b>
Applicable Reference Methods:	EPA 3A, EPA 20, CARB 100, BAAQMD ST-14, SCAQMD 100.1
Principle:	A sample is continuously withdrawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of O <sub>2</sub> concentration.
Analyzer:	Servomex Model 1440
Measurement Principle:	Paramagnetic
Ranges:	0-5%, 0-25%
Accuracy:	1% of full scale
Output:	0-1 V
Interferences:	None
Response Time:	90% <10 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. Stratification checks are performed at the start of a test program to select single or multiple-point sample locations.
Analytical Procedure:	The Servomex 1440 oxygen analyzer measures the paramagnetic susceptibility of the sample gas by means of a magnetodynamic type measuring cell. The measuring cell consists of a dumbbell of diamagnetic material, which is temperature controlled electronically at 50°C. The higher the oxygen concentration, the greater the dumbbell is deflected from its rest position. This deflection is detected by an optical system connected to an amplifier. Surrounding the dumbbell is a coil of wire. A current is passed through this coil to return the dumbbell to its original position. The current applied is linearly proportional to the percent oxygen concentration in the sample gas.

<b>Method:</b>	<b>Carbon Dioxide (CO<sub>2</sub>) by Continuous Analyzer</b>
<b>Applicable Reference</b>	EPA 3A, CARB 100, BAAQMD ST-5, SCAQMD 100.1
<b>Principle:</b>	A sample is continuously drawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of CO <sub>2</sub> concentration.
<b>Analyzer:</b>	Horiba Model AIA-210
<b>Measurement Principle:</b>	Non-dispersive infrared (NDIR)
<b>Accuracy:</b>	1% of full scale
<b>Ranges:</b>	0-5, 0-10, 0-20%
<b>Output:</b>	0-10 V
<b>Interferences:</b>	A possible interference includes water. Since the instrument receives dried sample gas, this interference is not significant.
<b>Response Time:</b>	1 second
<b>Sampling Procedure:</b>	A representative flue gas sample is collected and conditioned using the CEM system described previously.
<b>Analytical Procedure:</b>	Carbon dioxide concentrations are measured by short path length non-dispersive infrared analyzers. These instruments measure the differential in infrared energy absorbed from energy beams passed through a reference cell (containing a gas selected to have minimal absorption of infrared energy in the wavelength absorbed by the gas component of interest) and a sample cell through which the sample gas flows continuously. The differential absorption appears as a reading on a scale of 0-100%.

Method:	<b>Carbon Monoxide (CO) by NDIR/Gas Filter Correlation</b>
Applicable Reference Methods:	EPA 10; CARB 1-100; BAAQMD ST-6, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of CO concentration.
Analyzer:	Thermo Environmental Model 48C
Measurement Principle:	NDIR/Gas Filter Correlation
Precision:	0.1% ppm
Preset Ranges:	0-10, 0-20, 0-50, 0-100, 0-200, 0-500, 0-1000, 0-2000, 0-5000, 0-10000
Custom Ranges:	0-10 to 0-10000
Output:	0-10 V
Interferences:	Negligible interference from water and CO <sub>2</sub>
Rise/Fall times (0-95%)	1 minute @ 1 lpm flow, 30 second integration time
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. Sample point selection has been described previously.
Analytical Procedure:	Radiation from an infrared source is chopped and then passed through a gas filter which alternates between CO and N <sub>2</sub> due to rotation of a filter wheel. The radiation then passes through a narrow band-pass filter and a multiple optical pass sample cell where absorption by the sample gas occurs. The IR radiation exits the sample cell and falls on a solid state IR detector.

Method:	<b>Sulfur Dioxide (SO<sub>2</sub>) by Pulsed Fluorescent</b>
Applicable Reference Methods:	EPA 6C; CARB 1-100; BAAQMD ST-6, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned and conveyed to the instrument for direct readout of SO <sub>2</sub> concentration.
Analyzer:	Thermo Environmental Model 43C-High Level
Measurement Principle:	Pulsed fluorescence
Precision:	0.1% ppm
Preset Ranges:	0-10, 0-20, 0-50, 0-100, 0-200, 0-500, 0-1000, 0-2000, 0-5000 ppm
Custom Ranges:	0-10 to 0-5000 ppm
Output:	0-10 V
Interferences:	Less than lower detectable limit except for the following: NO <3 ppb, m-xylene <2 ppm, H <sub>2</sub> O <2% of reading.
Response Time:	80 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. Sample point selection has been described previously.
Analytical Procedure:	The sample flows into the fluorescent chamber, where pulsating UV light excites the SO <sub>2</sub> molecules. The condensing lens focuses the pulsating UV light into the mirror assembly. The mirror assembly contains four selecting mirrors that reflect only the wavelengths which excite SO <sub>2</sub> molecules. As excited SO <sub>2</sub> molecules decay to lower energy states they emit UV light that is proportional to the SO <sub>2</sub> concentration. The PMT (photomultiplier tube) detects UV light emission from decaying SO <sub>2</sub> molecules. The PMT continuously monitors pulsating UV light source and is connected to a circuit that compensates for fluctuating in the light.