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CORPORATE ENVIRONMENTAL SERVICES

AIR PROGRAMS REPORT

NITROGEN OXIDES - BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION
SOURCE EMISSION TEST #4

POLK POWER GENERATING STATION

AIRS # 1050233

UNIT NO.1 COMBUSTION TURBINE & HEAT RECOVERY STEAM GENERATOR FIRED ON SYNGAS

APRIL 17, 2000

Prepared by Tampa Electric Company
Corporate Environmental Services
April 28, 2000

REPORT CERTIFICATION

I have calculated and reviewed all data in this report, and hereby certify that the test report is authentic and accurate to the best of my knowledge.

Date 5/10/2000 Signature _____

QA/QC Coordinator
Senior Environmental Technician
Environmental Affairs
Tampa Electric Company

The sampling and analysis performed for this report were carried out under my direction, and I hereby certify that this test report is authentic and accurate.

Date 5/10/00 Signature _____

Test Team Leader
Coordinator- Air Services
Environmental Affairs
Tampa Electric Company

I have reviewed the testing details and results in this report, and hereby certify that the test report is authentic and accurate to the best of my knowledge.

Date 5/11/00 Signature _____

Administrator-Air Programs
Environmental Affairs
Tampa Electric Company

Permit File Scanning Request from Elizabeth

Priority: ☐-ASAP (Public Records Request, etc.) ☒-Place in Normal Scanning Queue

Facility ID	Project#	Type	PSD #	Submittal Date	Batch #
1050233	001	AV			

☒ File Approved For Disposal
☐ Return File to BAR

☒ Correspondence ☐ Intent ☐ Permit ☐ Draft
☐ Amendment ☐ Application ☐ OGC ☐ Proposed

Document Date 11-15-2000

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1.0 SUMMARY OF RESULTS

On April 17, 2000, Corporate Environmental Services, Air Services and Auditing group of Tampa Electric Company performed source emission tests on IGCC Unit No. 1 at the Polk Power Station. The combustion turbine was fired with syngas from a coal gasification system. This test was conducted to satisfy requirements in Title V permit no. 1050233-001-AV for NOx Best Available Control Technology (BACT) determinations. Testing was performed according to USEPA test methods as referenced in 40 CFR Part 60, Appendix A.

The Nitrogen Oxides (NO_x) emission rate was derived from three test runs. The calculated average was 17 ppm corrected to 15% oxygen on a dry basis.

During the tests on April 17, 2000, Unit No. 1 Combustion Turbine was operated at an average load of 191 megawatts. Details of turbine operation are included in Appendix C.

2.0 SOURCE DESCRIPTION/TEST PROCEDURES

Polk Power Station is located at County Road 630 approximately 13 miles southwest of Bartow, Polk County, Florida. Unit No. 1 is an IGCC generating unit, 192 MW capacity when fired with Syngas fuel. The source sampling location consists of a circular stack 19 ft. in diameter with four sample ports located 90° apart on the stack circumference. A diagram of the stack sampling location is included in Figure 1 and 2 along with other pertinent information on the test site.

Nitrogen Oxides sampling was performed in accordance with USEPA Reference Method 20 (40 CFR Part 60, Appendix A) "Determination of Nitrogen Oxides, Sulfur Dioxide, and Diluent Emissions from Stationary Gas Turbines". Testing was performed using a Thermo Environmental Model 10 A/R Chemiluminescent NO-NO_x Gas Analyzer. Details of fuel bound nitrogen is found in Appendix B.

Diluent sampling was performed in accordance with USEPA Reference Method 3-A (40 CFR Part 60, Appendix A), "Determination of Oxygen and Carbon Dioxide concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)". Testing was performed using a Servomex 1400 B Oxygen Analyzer.

TCEMS Description

The following discussion briefly outlines the operation principles of Corporate Environmental Services Transportable Continuous Emissions Monitoring System (TCEMS). Additional information on instrument operation may be found in the individual instrument manuals provided by the manufacturers. A schematic of the TCEMS set-up is presented in Figure 3.

Servomex Model 1400 B O_2 Analyzer

The Servomex 1400B oxygen analyzer measures the paramagnetic susceptibility of the sample gas by means of a magneto-dynamic type measuring cell.

Thermo Environmental Instruments Model 10A/R NO/NOx Analyzer

The Thermo Environmental Instruments model 10A/R NO/NOx analyzer automatically and continuously determines the concentration of nitric oxide (NO) and/or oxides of nitrogen (NO_x) in a flowing gas mixture. The analytical technique is chemiluminescence.

To measure NO concentrations, the gas sample to be analyzed is blended with ozone (O_3) in a reaction chamber. The resulting chemiluminescence activity is monitored through an optical filter by a high sensitivity photomultiplier tube positioned at one end of the chamber.

This filter and photomultiplier combination responds to light of a narrow wavelength band unique to the NO/O_3 reaction, producing an interference free signal. The output from the photomultiplier is linearly proportional to the NO concentration.

To measure NO_x concentrations (i.e., NO plus NO_2), the sample gas flow is diverted through an NO_2-to-NO converter. The chemiluminescent action in the reaction chamber to the converter effluent is linearly proportional to the NO_x concentration entering the converter.

Data Acquisition System

The data acquisition system (DAS) developed by Entropy Environmentalists Inc. uses a portable personal computer with an internal 32 bit analog-to-digital converter with an external 16 channel multiplexer. In addition to providing an instantaneous display of analyzer responses, the DAS can average data, calculate emission rates, and document analyzer calibrations. The test results and calibrations are stored on the hard disk and printed on a dot matrix printer.

TCEMS Sample Handling System

The extractive monitors utilized in the TCEMS require that the effluent stream be conditioned to eliminate any possible interference (i.e., water vapor and particulate matter), before being transported and injected into each analyzer. Figure 3 depicts a schematic of the entire sample handling system. The major components of this system are listed below:

- Gas transport tubing
- Moisture removal system
- Sampling pump

Gas Transport Tubing

Two separate 1/4 inch O.D. Teflon tubes were used for the sample gas transport.

Moisture Removal System

The moisture removal system was comprised of an ice bath condenser, constructed of a 30-foot section of 3/8 inch O.D. Teflon tubing wrapped in a 12-inch coil. Effluent travels through this coil and then passes, in series, through two stainless steel moisture traps where the condensate drops out and is removed via a condensate discharge pump. With the exception of the discharge pump, the entire assembly is chilled in an ice bath.

Sampling Pump

The Thomas Model 2107CE20-TFE pump is used to transport the effluent sample through the conditioning system to the analyzers. All internal parts of the pump that come into contact with the gas sample are constructed of 316 stainless steel or Teflon.

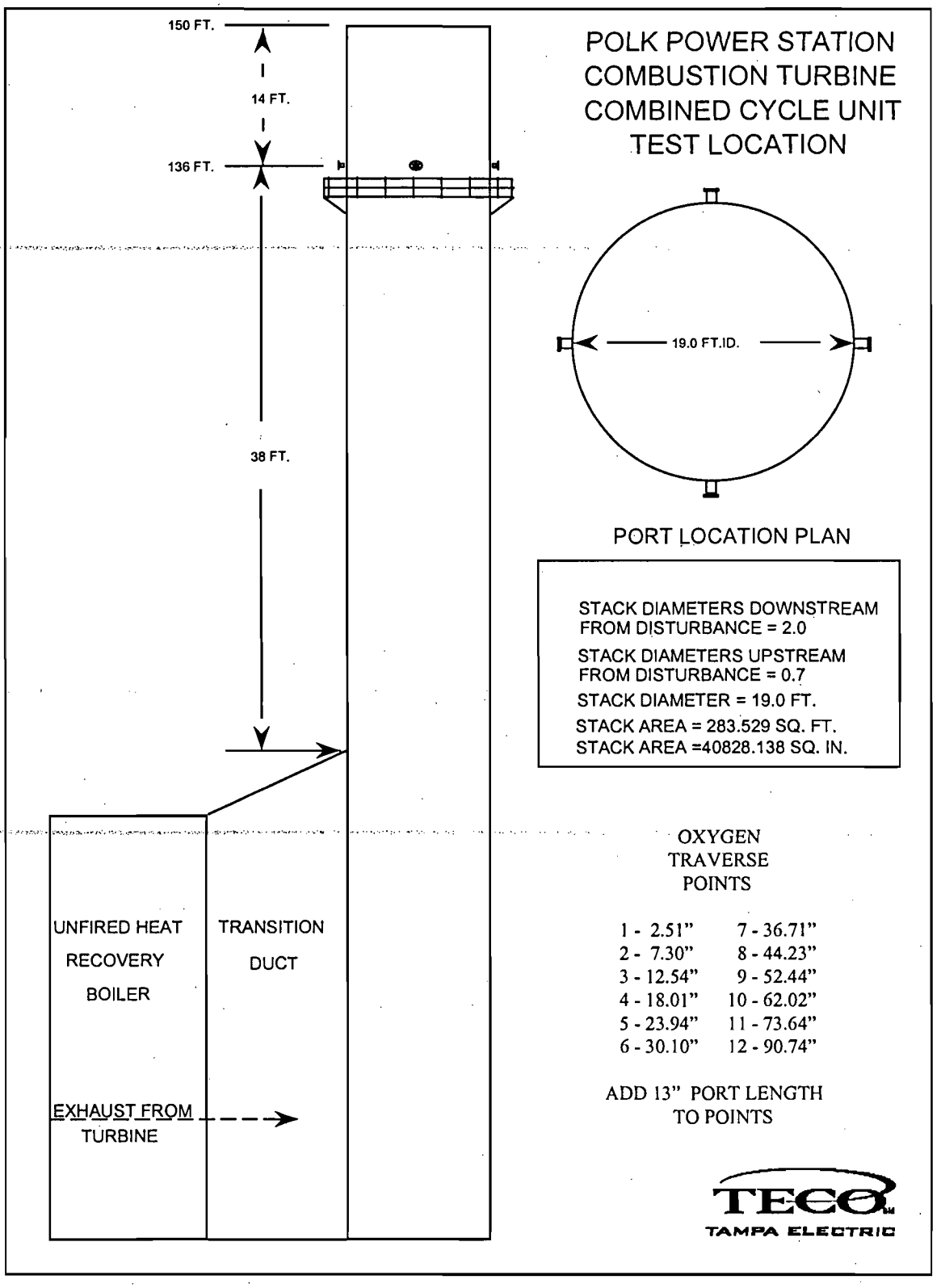
150 FT.
14 FT.
136 FT.
38 FT.
UNFIRED HEAT RECOVERY BOILER
TRANSITION DUCT
EXHAUST FROM TURBINE
POLK POWER STATION
COMBUSTION TURBINE
COMBINED CYCLE UNIT
TEST LOCATION
19.0 FT.ID.
PORT LOCATION PLAN
STACK DIAMETERS DOWNSTREAM FROM DISTURBANCE = 2.0
STACK DIAMETERS UPSTREAM FROM DISTURBANCE = 0.7
STACK DIAMETER = 19.0 FT.
STACK AREA = 283.529 SQ. FT.
STACK AREA =40828.138 SQ. IN.
OXYGEN TRAVERSE POINTS
1 - 2.51" 7 - 36.71"
2 - 7.30" 8 - 44.23"
3 - 12.54" 9 - 52.44"
4 - 18.01" 10 - 62.02"
5 - 23.94" 11 - 73.64"
6 - 30.10" 12 - 90.74"
ADD 13" PORT LENGTH TO POINTS
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FIGURE 1

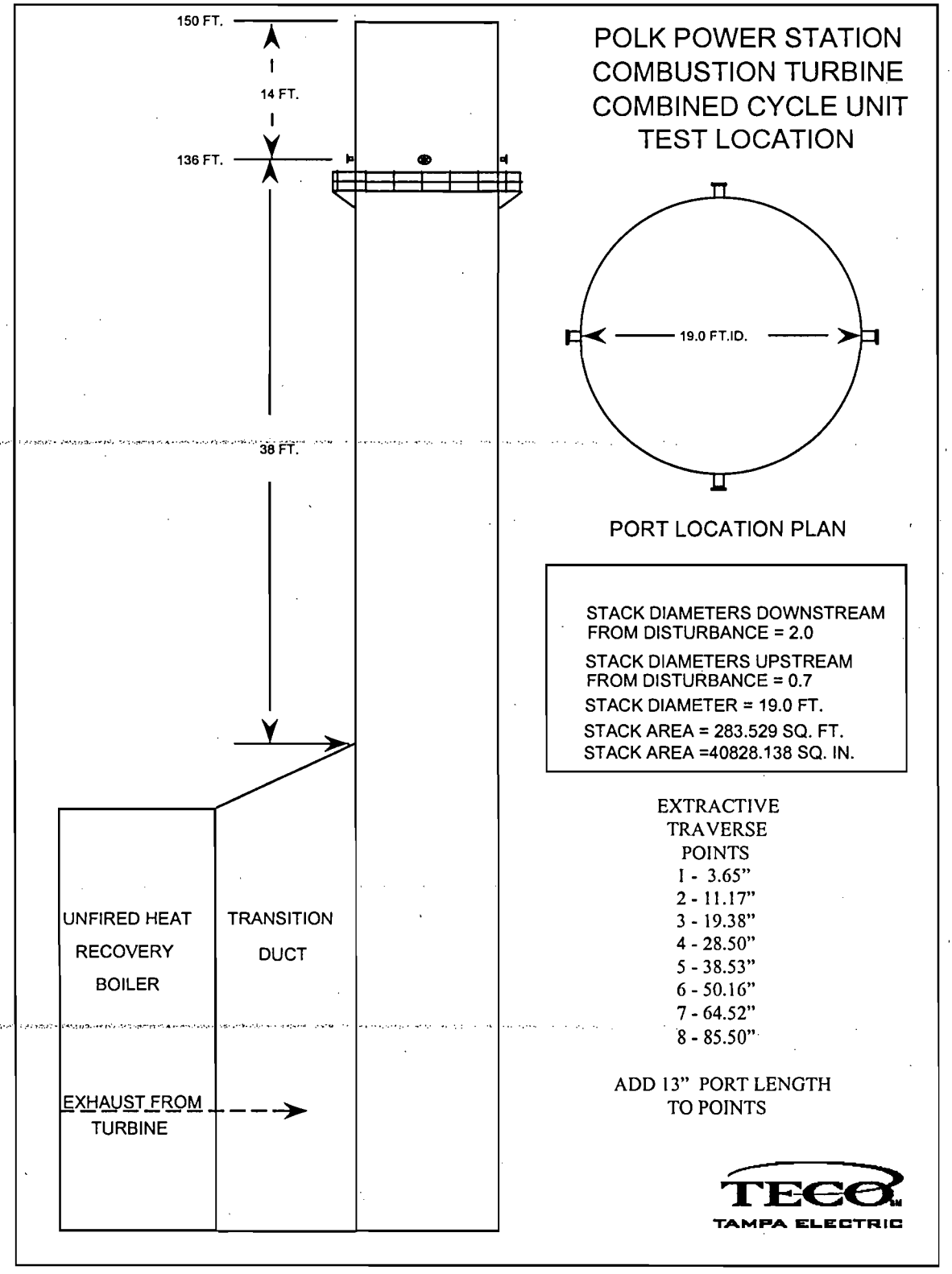
150 FT.
14 FT.
136 FT.
38 FT.
UNFIRED HEAT RECOVERY BOILER
TRANSITION DUCT
EXHAUST FROM TURBINE
POLK POWER STATION
COMBUSTION TURBINE
COMBINED CYCLE UNIT
TEST LOCATION
19.0 FT.ID.
PORT LOCATION PLAN
STACK DIAMETERS DOWNSTREAM FROM DISTURBANCE = 2.0
STACK DIAMETERS UPSTREAM FROM DISTURBANCE = 0.7
STACK DIAMETER = 19.0 FT.
STACK AREA = 283.529 SQ. FT.
STACK AREA =40828.138 SQ. IN.
EXTRACTIVE TRAVERSE POINTS
1 - 3.65"
2 - 11.17"
3 - 19.38"
4 - 28.50"
5 - 38.53"
6 - 50.16"
7 - 64.52"
8 - 85.50"
ADD 13" PORT LENGTH TO POINTS
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FIGURE 2

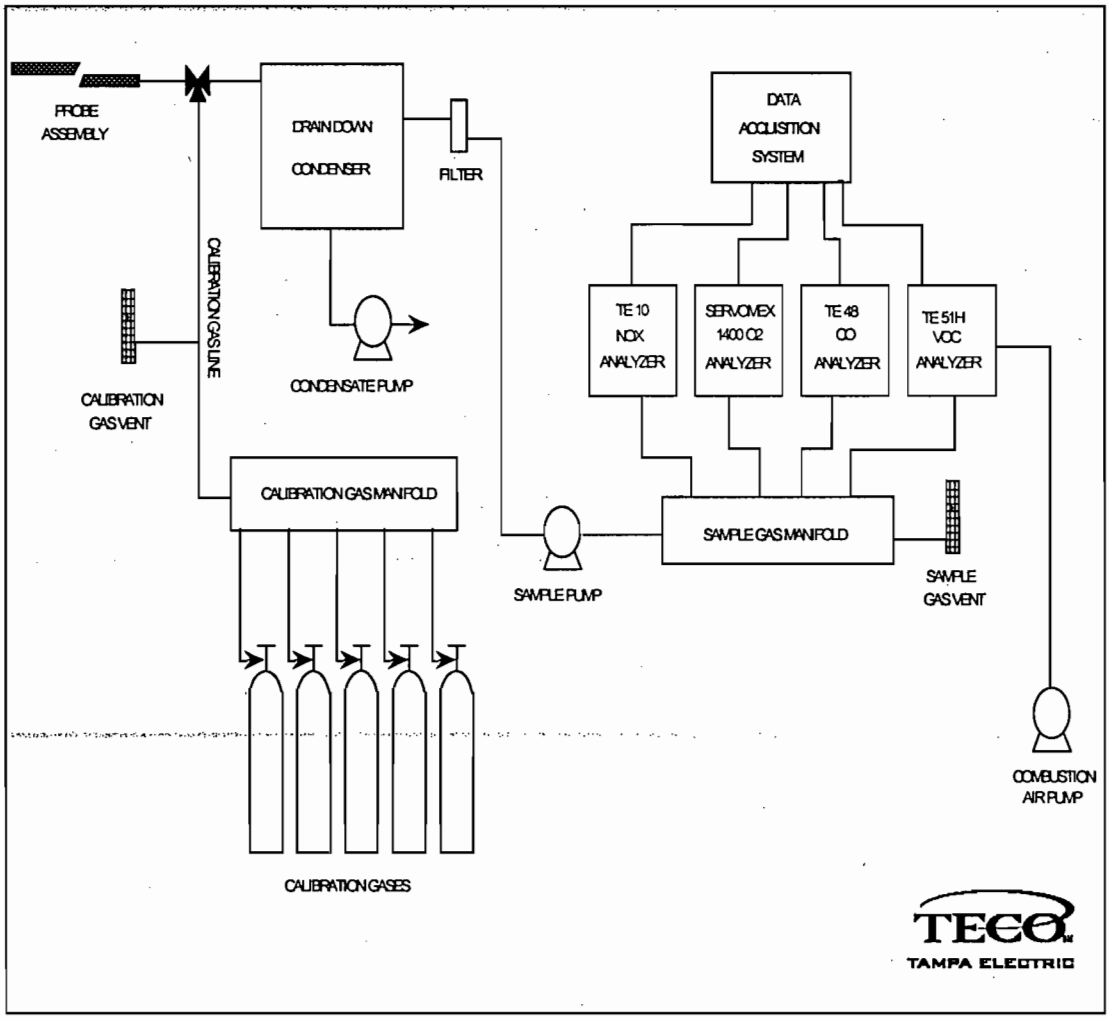

FIGURE 3
Extractive Method Sampling Trains
USEPA METHODS 3A, 10, 20, 25A

3.0 TEST RESULTS

POLK POWER ELECTRICAL GENERATING STATION
NITROGEN OXIDES BACT TESTING

IGCC COMBUSTION TURBINE UNIT 1
FEBRUARY 7, 2000

RUN NO.	TIME	O2%	ppm NOx Dry	CORRECTED 15% O2
1	1123 – 1222	12.1	26.0	17.4
2	1228 – 1327	11.9	26.0	17.0
3	1334 – 1433	12.0	25.0	16.6
	Average	12.0	25.7	17.0

Corrected NOx calculated as:

Concentration (ppm NOx) x (Cd / (20.9 - $\%O_2$))

Where:

Cd = NOx coefficient of 5.9

APPENDIX A

SOURCE TEST CALCULATIONS

APPENDIX A - 1 NITROGEN OXIDE CALCULATIONS

APPENDIX A - 2 OXYGEN CALCULATIONS

APPENDIX A - 1

NITROGEN OXIDE CALCULATIONS

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 1

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	0.9	3.6	2.2
24.9 ppm NOx	24.6	27.3	25.9
0.00 % Oxygen	0.02	-0.02	0.00
11.96 % Oxygen	11.96	12.00	11.98
$\bar{C}$(NOx) =	26.8	$\bar{C}$(O2) =	12.09

CORRECTED RESULTS

26 ppm NOx
12.1 % Oxygen
17.4 ppm NOx @15% O2

Corr. Conc. = $\bar{C}ma(C - Co)/(Cm - Co)$ (for NOx)

Corr. Conc. = $[(Cma - Coa)/(Cm - Co)](C - \bar{C}m) + Cma$ (for O2)

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Coa = actual low-level calibration gas concentration
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

E = (ppm NOx)(5.9)/(20.9 - % Oxygen)

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CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 2

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	3.6	4.3	3.9
24.9 ppm NOx	27.3	27.6	27.4
0.00 % Oxygen	-0.02	0.04	0.01
11.96 % Oxygen	12.00	11.98	11.99

$\bar{C}$(NOx) = 28.1 $\bar{C}$(O2) = 11.91

CORRECTED RESULTS

26 ppm NOx
11.9 % Oxygen
17.0 ppm NOx @15% O2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Coa = actual low-level calibration gas concentration
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

E = (ppm NOx)(5.9)/(20.9 - % Oxygen)

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1.194E-07

CALCULATION OF AVERAGE NITROGEN OXIDES EMISSIONS

RUN: 3

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.0 ppm NOx	4.3	4.1	4.2
24.9 ppm NOx	27.6	27.5	27.6
0.00 % Oxygen	0.04	0.07	0.05
11.96 % Oxygen	11.98	12.03	12.00

$\bar{C}$(NOx) = 27.7 $\bar{C}$(O2) = 12.07

CORRECTED RESULTS

25 ppm NOx
12.0 % Oxygen
16.6 ppm NOx @15% O2

Corr. Conc. = $\bar{C}$ma(C - Co)/(Cm - Co) (for NOx)

Corr. Conc. = [(Cma - Coa)/(Cm - Co)](C - $\bar{C}$m) + Cma (for O2)

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Coa = actual low-level calibration gas concentration
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

E = (ppm NOx)(5.9)/(20.9 - % Oxygen)

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APPENDIX A - 2

OXYGEN CALCULATIONS

CALCULATION OF AVERAGE OXYGEN CONCENTRATION

RUN: 1

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.00 % Oxygen	0.02	-0.02	0.00
11.96 % Oxygen	11.96	12.00	11.98

$\bar{C}$ = 12.09

CORRECTED RESULTS

12.1 % Oxygen

Corrected Conc. = Cma(C - $\bar{Co}$)/(Cm - Co)

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE OXYGEN CONCENTRATION

RUN: 2

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.00 % Oxygen	-0.02	0.04	0.01
11.96 % Oxygen	12.00	11.98	11.99

$\bar{C}$ = 11.91

CORRECTED RESULTS

11.9 % Oxygen

Corrected Conc. = Cma(C - $\bar{Co}$)/(Cm - Co)

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

CALCULATION OF AVERAGE OXYGEN CONCENTRATION

RUN: 3

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

GAS VALUE	INITIAL CAL	FINAL CAL	MEAN CAL
0.00 % Oxygen	0.04	0.07	0.05
11.96 % Oxygen	11.98	12.03	12.00

$\bar{C}$ = 12.07

CORRECTED RESULTS

12.0 % Oxygen

Corrected Conc. = Cma(C - $\bar{Co}$)/(Cm - Co)

Where: $\bar{C}$ = mean reference measurement
Co = mean zero calibration response
Cm = mean mid or upscale calibration gas response
Cma = actual mid or upscale calibration gas concentration

APPENDIX B

TURBINE DATA

All values are averages for time period given

		TEST PERIOD 1
	START TIME	04/17/2000 8:00
	END TIME	04/17/2000 15:00

1TSYFI910	GT SYNGAS MASS FLOW	LB/SEC	102.1605453
1PWRJI900	GT GEN LOAD WATTS	MW	191.7917175
1GMLJI962	GT GENERATOR WATTS	MW	192.5525208
1TSYJYI910	GT SYNGAS LOWER HEATING VA	BTU/LB	216.7936401
1NITFI920A	GT N2 FLOW	LB/SEC	125.0782089
1TMSTI922M	GT CPRSR MAX INL FLANGE TE	F	75.98952484
1TMSPI909	AMBIENT BAR PRESS	IN HGA	29.82071877
spare	Tag not found: -5	Tag not found: -5	Tag not found: -5
spare	Tag not found: -5	Tag not found: -5	Tag not found: -5
spare	Tag not found: -5	Tag not found: -5	Tag not found: -5

1 MINUTE AVERAGES

TEST PERIOD 1
04/17/2000 8:00
04/17/2000 15:00

	GT SYNGAS MASS FLOW 1TSYFI910	GT GEN LOAD 1PWRJI900	WATTS	GT GENERATOR 1GMLJI962	WATTS	GT SYNGAS LOWER HEATING VA 1TSYJYI910	GT N2 FLOW 1NITFI920A	GT CPRSR MAX INL FLANGE TE 1TMSTI922M	AMBIENT BAR 1TMSPI909	PRESS
17-Apr-00 08:00:00	102.0800629		191.499939		192.7823334	174.954071	122.7038116	64.5271225		29.8343792
17-Apr-00 08:01:00	102.7190552		191.6508484		192.7787781	174.954071	122.7006149	64.73358154		29.83431625
17-Apr-00 08:02:00	101.9772263		191.8017731		192.7854767	174.954071	122.6974182	64.94003296		29.8342514
17-Apr-00 08:03:00	102.2221603		191.6301117		192.7927399	174.954071	122.6942215	64.32405853		29.83418846
17-Apr-00 08:04:00	102.4594116		191.8147278		192.7999878	174.954071	122.6910248	64.41249084		29.83412361
17-Apr-00 08:05:00	102.336235		191.5505219		192.8072357	174.954071	122.6878281	64.51459503		29.83406067
17-Apr-00 08:06:00	102.283699		191.6297607		192.8144836	174.954071	122.6846313	64.61670685		29.83399773
17-Apr-00 08:07:00	102.3144455		191.7090149		192.8217316	174.954071	122.6814346	64.87174225		29.83393288
17-Apr-00 08:08:00	102.3074417		191.788269		192.8289948	174.954071	122.6782379	64.79442596		29.83386993
17-Apr-00 08:09:00	102.4938278		191.8675079		192.8362427	174.954071	122.6750412	64.71711731		29.83380699
17-Apr-00 08:10:00	102.1940842		191.9315033		192.8434906	174.954071	122.6718445	64.63980103		29.83374214
17-Apr-00 08:11:00	102.1566544		191.9089813		192.8507385	174.954071	122.6686478	64.8878479		29.8336792
17-Apr-00 08:12:00	102.3242188		191.4641876		192.8298035	174.954071	122.665451	64.68876648		29.83361435
17-Apr-00 08:13:00	102.283699		192.0134583		192.8073883	174.954071	122.6622543	64.76607513		29.83355141
17-Apr-00 08:14:00	102.2116547		191.503067		192.7849731	174.954071	122.6590576	64.84339142		29.83348846
17-Apr-00 08:15:00	101.9756775		191.7552185		192.762558	174.954071	122.6558609	64.9207077		29.83342361
17-Apr-00 08:16:00	102.2350693		191.5054474		192.7401428	174.954071	122.6526642	64.85276794		29.83336067
17-Apr-00 08:17:00	102.4340057		192.0813599		192.7177124	174.954071	122.6494675	65.16075897		29.83329582
17-Apr-00 08:18:00	102.3279724		191.7792358		192.6952972	174.954071	122.6462708	64.99157715		29.83323288
17-Apr-00 08:19:00	102.3982239		191.733078		192.6728821	174.954071	122.643074	65.0688858		29.83316994
17-Apr-00 08:20:00	102.1888428		191.3323364		192.6504669	174.954071	122.6398773	65.14620209		29.83310509
17-Apr-00 08:21:00	102.0012283		191.5506439		192.6280518	174.954071	122.6366882	65.22351074		29.83304214
17-Apr-00 08:22:00	102.283699		191.4921112		192.6056213	174.954071	122.6334915	65.56626892		29.83297729
17-Apr-00 08:23:00	102.3620682		191.6027222		192.5832062	174.954071	122.6302948	65.56626892		29.83291435
17-Apr-00 08:24:00	102.1873398		192.1863556		192.560791	174.954071	122.6270981	65.3363266		29.83285141
17-Apr-00 08:25:00	102.1509476		191.6490936		192.5383759	174.954071	122.6239014	65.48756409		29.83278656
17-Apr-00 08:26:00	102.1188965		191.8101501		192.610199	174.954071	122.6207047	65.63879395		29.83272362
17-Apr-00 08:27:00	102.3359756		191.7957458		192.6887512	174.954071	122.6175079	65.79003143		29.83266068
17-Apr-00 08:28:00	102.1573563		191.8321228		192.7673187	174.954071	122.6143112	65.72863007		29.83259583
17-Apr-00 08:29:00	102.1113892		191.8412018		192.845871	174.954071	122.6111145	65.73370361		29.83253288
17-Apr-00 08:30:00	102.3012466		191.9809418		192.8135071	174.954071	122.6079178	65.91517639		29.83246803
17-Apr-00 08:31:00	102.5132904		191.5194244		192.7732239	174.954071	122.6047211	66.01783752		29.83240509
17-Apr-00 08:32:00	102.2418976		191.9303284		192.7329407	174.954071	122.6015244	66.12050629		29.83234215
17-Apr-00 08:33:00	102.1512527		191.7668915		192.6926422	174.954071	122.5983276	66.06575012		29.8322773
17-Apr-00 08:34:00	102.0916519		192.0357361		192.652359	174.954071	122.5951309	66.09654999		29.83221436
17-Apr-00 08:35:00	102.3254089		192.0222321		192.6120758	174.954071	122.5919342	66.38913727		29.83214951
17-Apr-00 08:36:00	101.991272		191.9484558		192.7458801	174.954071	122.5887375	65.96984863		29.83208656
17-Apr-00 08:37:00	102.0502319		191.5371552		192.8921356	174.954071	122.5855408	65.91726685		29.83202362
17-Apr-00 08:38:00	101.948761		191.4205933		192.5606537	174.954071	122.5823441	66.07254028		29.83195877
17-Apr-00 08:39:00	102.0822067		191.5961914		192.9429474	174.954071	122.5791473	66.41480255		29.83189583
17-Apr-00 08:40:00	102.0076828		191.821701		192.9132996	174.954071	122.5759506	66.23458862		29.83183289
17-Apr-00 08:41:00	102.0578613		191.5532379		192.8504486	174.954071	122.5727539	66.43769073		29.83176804
17-Apr-00 08:42:00	101.6354904		191.5085754		192.7876129	174.954071	122.5695572	66.64080048		29.83170509
17-Apr-00 08:43:00	102.2512131		191.6235809		192.724762	174.954071	122.5663605	66.53799438		29.83164024
17-Apr-00 08:44:00	101.7677231		191.8982544		192.6619263	174.954071	122.5631638	66.77352142		29.8315773
17-Apr-00 08:45:00	101.8529282		191.9258575		192.6619568	174.954071	122.559967	66.56879425		29.83151436
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17-Apr-00 08:47:00	102.011322		191.6120911		192.6710358	174.954071	122.5535736	66.87677765		29.83138657
17-Apr-00 08:48:00	102.2819824		191.7766724		192.6755676	174.954071	122.5503769	66.93837738		29.83132172
17-Apr-00 08:49:00	102.1990128		191.8847351		192.6801147	174.954071	122.5471802	66.99997711		29.83125877

17-Apr-00 08:50:00	102.4567413	191.5862885	192.6846466	174.954071	122.5439835	67.06156921	29.83119583
17-Apr-00 08:51:00	102.3704529	191.6628265	192.6891785	174.954071	122.5407867	67.12316895	29.83113098
17-Apr-00 08:52:00	102.3468094	191.728363	192.6937256	174.954071	122.53759	67.28361511	29.83106804
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17-Apr-00 08:58:00	102.4576569	191.8952026	192.7209473	174.954071	122.5184097	67.17367554	29.83068657
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17-Apr-00 11:04:00	101.9989624	191.832901	192.4885406	245.8966675	124.2947617	77.09410095	29.82266235
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17-Apr-00 11:13:00	102.2075272	191.844223	192.4885406	246.3468018	124.5197067	77.5714798	29.82208824
17-Apr-00 11:14:00	102.4164581	191.8988495	192.4885406	246.3968201	124.5447006	78.09481049	29.8220253
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17-Apr-00 11:23:00	102.2959442	191.8005981	192.4885406	246.834259	124.7696457	78.56150818	29.82145119
17-Apr-00 11:24:00	102.1523209	191.8377686	192.4885406	246.8365936	124.7946396	78.3572998	29.82138824
17-Apr-00 11:25:00	102.3104935	191.8161469	192.4885406	246.8389282	124.8196335	78.15309143	29.8213253
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17-Apr-00 13:37:00	102.0514297	191.9329529	192.4885406	247.1472015	128.0272064	83.51206207	29.8129158
17-Apr-00 13:38:00	102.0353546	192.1244965	192.4885406	247.1495361	128.0241547	82.99875641	29.81281853
17-Apr-00 13:39:00	102.1419449	192.31604	192.4885406	247.1518707	128.0210876	82.22878265	29.81271935

17-Apr-00 13:40:00	102.0811539	191.7586365	192.4885406	247.1542053	128.0180359	81.54094696	29.81262016
17-Apr-00 13:41:00	101.9602051	191.6984863	192.4885406	247.1565399	128.0149841	81.38695526	29.81252289
17-Apr-00 13:42:00	102.0525208	192.0344391	192.4885406	247.1588745	128.0119324	81.27915955	29.81242371
17-Apr-00 13:43:00	102.2257156	191.6316071	192.483963	247.1612091	128.0088806	81.31204224	29.81232452
17-Apr-00 13:44:00	102.117775	191.7712097	192.4787903	247.1635437	128.0058289	81.92079163	29.81222725
17-Apr-00 13:45:00	102.1597977	191.7171021	192.4736023	247.1658783	128.0027771	82.78315735	29.81212807
17-Apr-00 13:46:00	102.2037048	191.4559326	192.4684296	247.1682129	127.999733	81.87973022	29.81202888
17-Apr-00 13:47:00	102.156723	192.0646973	192.4632416	247.1705475	127.9966736	82.18772125	29.81193161
17-Apr-00 13:48:00	101.9626694	191.9206085	192.4580688	247.1728821	127.9936218	81.24835968	29.81183243
17-Apr-00 13:49:00	102.1746063	191.7765198	192.4528961	247.1752167	127.9905701	81.2637558	29.81173325
17-Apr-00 13:50:00	102.1612854	191.6902466	192.4477081	247.1775665	127.9875183	81.53622437	29.81163597
17-Apr-00 13:51:00	101.7664108	191.6969757	192.4425354	247.1799011	127.9844666	81.27445221	29.81153679
17-Apr-00 13:52:00	101.4349823	191.7037048	192.4373474	247.1822357	127.9814148	81.67184448	29.81143761
17-Apr-00 13:53:00	102.0572891	191.7104187	192.4321747	247.1845703	127.978363	82.13382721	29.81134033
17-Apr-00 13:54:00	101.8985596	191.7732239	192.4269867	247.1869049	127.9753113	82.40690613	29.81124115
17-Apr-00 13:55:00	101.9318924	191.9668427	192.421814	247.1892395	127.9722595	81.98570251	29.81114197
17-Apr-00 13:56:00	102.0714722	191.8114929	192.4166412	247.1915741	127.9692078	82.64173889	29.81104469
17-Apr-00 13:57:00	101.9820938	192.1286926	192.4124756	247.1939087	127.966156	82.48041534	29.81094551
17-Apr-00 13:58:00	102.0340576	191.860733	192.4084473	247.1962433	127.9631042	82.0719986	29.81084633
17-Apr-00 13:59:00	101.9651031	191.6864624	192.4044189	247.1985779	127.9600525	81.66358185	29.81074905
17-Apr-00 14:00:00	102.0268097	191.8566132	192.4003906	247.2009125	127.9570007	81.56147766	29.81064987
17-Apr-00 14:01:00	101.9965591	191.7000885	192.3963623	247.2032471	127.953949	81.56147766	29.81055069
17-Apr-00 14:02:00	101.6536026	191.5171661	192.392334	247.2055817	127.9508972	81.99984741	29.81045341
17-Apr-00 14:03:00	102.2682114	191.8443604	192.3883057	247.2079163	127.9478378	82.62608337	29.81035423
17-Apr-00 14:04:00	101.9142685	191.853302	192.3842773	247.2102509	127.9447861	82.29377747	29.81025505
17-Apr-00 14:05:00	102.1364594	191.8362274	192.380249	247.2125854	127.9417343	82.59477234	29.81015778
17-Apr-00 14:06:00	101.7645798	191.4868469	192.3762207	247.21492	127.9386826	83.32539368	29.81005859
17-Apr-00 14:07:00	101.4001923	192.0332947	192.3721924	247.2172546	127.9356308	82.93399048	29.80995941
17-Apr-00 14:08:00	102.1333084	191.9056396	192.3681641	247.2195892	127.932579	82.76177216	29.80986214
17-Apr-00 14:09:00	101.8838577	191.7993164	192.3810425	247.2219238	127.9295273	82.85436249	29.80976295
17-Apr-00 14:10:00	101.7857742	191.7975464	192.3961487	247.2242737	127.9264755	82.78829193	29.80966377
17-Apr-00 14:11:00	101.9056244	191.7975464	192.4112549	247.2266083	127.9234238	82.45977783	29.8095665
17-Apr-00 14:12:00	101.5624313	191.5381317	192.4263611	247.2289429	127.920372	82.38278198	29.80946732
17-Apr-00 14:13:00	101.9666901	191.9177094	192.4414673	247.2312775	127.9173203	82.3057785	29.80936813
17-Apr-00 14:14:00	101.9449463	192.0687714	192.4565735	247.2336121	127.9142685	82.22878265	29.80927086
17-Apr-00 14:15:00	101.6597748	191.7441254	192.4716797	247.2337036	127.9112167	81.87459564	29.80917168
17-Apr-00 14:16:00	102.0882797	191.8303833	192.4867859	247.2276764	127.908165	82.18772125	29.80907249
17-Apr-00 14:17:00	102.3992691	191.52948	192.4351654	247.2216339	127.9051132	82.44023895	29.80897522
17-Apr-00 14:18:00	101.799736	191.6264343	192.3747406	247.2155914	127.9020538	82.75492859	29.80887604
17-Apr-00 14:19:00	102.1361618	191.8029022	192.3143005	247.209549	127.8990021	82.60093689	29.80877686
17-Apr-00 14:20:00	101.8887024	192.084259	192.2538757	247.2035065	127.8959503	83.12194824	29.80867958
17-Apr-00 14:21:00	102.1665115	191.8776855	192.3179932	247.197464	127.8928986	83.45585632	29.8085804
17-Apr-00 14:22:00	101.6665192	192.2858429	192.3985748	247.1914368	127.8898468	82.31902313	29.80848122
17-Apr-00 14:23:00	101.8740997	191.7740936	192.4791412	247.1853943	127.886795	81.9021225	29.80838394
17-Apr-00 14:24:00	101.8483429	191.8308258	192.4904785	247.1793518	127.8837433	82.00534821	29.80828476
17-Apr-00 14:25:00	102.0470047	191.887558	192.4926758	247.1733093	127.8806915	82.10858154	29.80818558
17-Apr-00 14:26:00	101.6093292	192.0654449	192.494873	247.1672668	127.8776398	81.94132996	29.8080883
17-Apr-00 14:27:00	102.0706863	191.8274994	192.4970703	247.1612244	127.874588	82.24931335	29.80798912
17-Apr-00 14:28:00	101.9674149	191.7736206	192.4992676	247.1551971	127.8715363	82.44437408	29.80788994
17-Apr-00 14:29:00	102.1729355	191.7197266	192.5014648	247.1491547	127.8684845	82.01319122	29.80779266
17-Apr-00 14:30:00	101.9976273	191.6658478	192.5036469	247.1431122	127.8654327	82.79359436	29.80769348

O_2 Traverse Period

Record#	DATE	TIME	PC1NOX11	PC1CO212	PC1NOX13	PC1GEN14	PC1PRS15	PC1TMP16
1	04/17/2000	093500	0.086	7.960	24.768	190.876	29.883	293.037
2	04/17/2000	093600	0.086	7.954	24.717	191.150	29.885	295.198
3	04/17/2000	093700	0.086	7.955	24.811	191.352	29.886	299.718
4	04/17/2000	093800	0.087	7.951	24.954	191.507	29.884	294.631
5	04/17/2000	093900	0.087	7.941	25.151	191.421	29.885	289.548
6	04/17/2000	094000	0.087	7.949	25.137	191.203	29.886	289.637
7	04/17/2000	094100	0.087	7.945	24.955	191.087	29.886	289.565
8	04/17/2000	094200	0.087	7.947	24.964	191.319	29.886	298.250
9	04/17/2000	094300	0.088	7.945	25.226	191.189	29.887	299.211
10	04/17/2000	094400	0.088	7.939	25.213	191.287	29.884	295.912
11	04/17/2000	094500	0.088	7.942	25.202	191.069	29.884	295.403
12	04/17/2000	094600	0.087	7.949	25.087	191.040	29.884	295.391
13	04/17/2000	094700	0.086	7.947	24.848	191.508	29.883	295.537
14	04/17/2000	094800	0.086	7.942	24.830	191.288	29.882	297.248
15	04/17/2000	094900	0.087	7.919	25.035	191.110	29.881	295.615
16	04/17/2000	095000	0.087	7.915	25.033	191.096	29.883	281.927
17	04/17/2000	095100	0.088	7.920	25.213	191.194	29.881	281.926
18	04/17/2000	095200	0.088	7.925	25.358	191.708	29.881	281.912
19	04/17/2000	095300	0.089	7.914	25.438	191.325	29.883	285.662
20	04/17/2000	095400	0.088	7.938	25.432	191.544	29.883	297.704
21	04/17/2000	095500	0.088	7.942	25.288	191.527	29.883	296.179
22	04/17/2000	095600	0.088	7.935	25.398	191.121	29.882	293.986
23	04/17/2000	095700	0.089	7.942	25.516	191.120	29.884	294.046
24	04/17/2000	095800	0.089	7.960	25.574	191.133	29.882	294.033
25	04/17/2000	095900	0.088	7.978	25.517	190.925	29.883	294.164
26	04/17/2000	100000	0.088	7.978	25.447	190.928	29.883	294.410
27	04/17/2000	100100	0.088	7.980	25.402	191.139	29.881	293.887
28	04/17/2000	100200	0.088	7.981	25.492	191.368	29.881	293.766
29	04/17/2000	100300	0.088	7.994	25.588	191.772	29.880	293.746
30	04/17/2000	100400	0.089	7.991	25.693	191.013	29.883	293.825
31	04/17/2000	100500	0.089	7.985	25.633	191.289	29.881	295.683
32	04/17/2000	100600	0.089	7.984	25.635	190.989	29.883	294.689
33	04/17/2000	100700	0.088	7.975	25.506	191.082	29.883	293.105
34	04/17/2000	100800	0.089	7.974	25.695	190.945	29.882	293.081
35	04/17/2000	100900	0.090	7.972	25.919	191.386	29.882	293.098
36	04/17/2000	101000	0.089	7.981	25.860	191.373	29.881	294.747
37	04/17/2000	101100	0.089	7.978	25.848	191.481	29.880	296.388
38	04/17/2000	101200	0.090	7.978	25.946	191.228	29.883	289.069
39	04/17/2000	101300	0.089	7.972	25.864	191.245	29.883	285.570
40	04/17/2000	101400	0.089	7.974	25.862	191.037	29.883	285.490
41	04/17/2000	101500	0.090	7.982	25.909	191.312	29.882	285.492
42	04/17/2000	101600	0.089	7.988	25.816	191.277	29.882	285.458
43	04/17/2000	101700	0.089	7.985	25.784	190.852	29.881	285.450
44	04/17/2000	101800	0.089	7.981	25.874	190.828	29.883	285.596
45	04/17/2000	101900	0.089	7.986	25.884	191.167	29.886	285.561
46	04/17/2000	102000	0.090	7.981	25.961	191.243	29.885	285.522
47	04/17/2000	102100	0.089	7.981	25.768	191.127	29.885	286.745
48	04/17/2000	102200	0.089	7.989	25.679	191.399	29.885	286.699
49	04/17/2000	102300	0.089	7.989	25.885	191.192	29.883	286.697
50	04/17/2000	102400	0.089	7.984	25.842	190.992	29.883	290.437
51	04/17/2000	102500	0.089	7.992	25.835	191.241	29.885	300.306
52	04/17/2000	102600	0.090	7.993	25.945	190.938	29.881	297.816
53	04/17/2000	102700	0.090	7.982	25.948	190.949	29.881	289.897
54	04/17/2000	102800	0.090	7.978	26.021	191.327	29.880	289.914
55	04/17/2000	102900	0.091	7.973	26.174	191.099	29.877	289.877
56	04/17/2000	103000	0.091	7.967	26.362	190.904	29.879	293.439
57	04/17/2000	103100	0.092	7.965	26.448	191.312	29.882	296.726
58	04/17/2000	103200	0.091	7.963	26.372	191.049	29.883	289.217

59	04/17/2000	103300	0.090	7.965	26.052	190.583	29.881	286.809
60	04/17/2000	103400	0.090	7.969	25.887	190.962	29.880	286.800
61	04/17/2000	103500	0.090	7.974	25.876	191.166	29.880	286.829
62	04/17/2000	103600	0.090	7.978	25.983	191.282	29.880	292.973
63	04/17/2000	103700	0.090	7.974	25.992	191.178	29.881	292.603
64	04/17/2000	103800	0.091	7.973	26.238	191.385	29.881	284.648
65	04/17/2000	103900	0.091	7.965	26.420	191.468	29.878	284.643
66	04/17/2000	104000	0.092	7.953	26.589	191.226	29.879	284.649
67	/ /							
68	/ /	AVE	0.089	7.965	25.615	191.194	29.882	291.315

Run 1

Record#	DATE	TIME	PC1NOX11	PC1CO212	PC1NOX13	PC1GEN14	PC1PRS15	PC1TMP16
1	04/17/2000	112200	0.093	7.984	26.941	191.059	29.861	294.854
2	04/17/2000	112300	0.093	7.984	26.849	190.964	29.860	291.983
3	04/17/2000	112400	0.092	7.994	26.806	191.160	29.859	291.972
4	04/17/2000	112500	0.093	7.996	26.829	191.266	29.859	291.970
5	04/17/2000	112600	0.093	8.003	27.057	191.445	29.860	295.370
6	04/17/2000	112700	0.093	8.003	26.938	191.151	29.858	295.659
7	04/17/2000	112800	0.093	8.008	27.019	191.310	29.855	293.556
8	04/17/2000	112900	0.093	8.005	27.015	191.288	29.852	293.512
9	04/17/2000	113000	0.093	8.003	26.930	191.101	29.847	293.516
10	04/17/2000	113100	0.093	7.994	27.004	191.071	29.848	294.633
11	04/17/2000	113200	0.093	8.001	26.978	190.940	29.849	297.316
12	04/17/2000	113300	0.093	7.987	27.068	191.308	29.850	289.168
13	04/17/2000	113400	0.094	7.982	27.143	191.187	29.852	285.393
14	04/17/2000	113500	0.094	7.979	27.060	191.768	29.849	285.382
15	04/17/2000	113600	0.094	7.981	27.216	191.565	29.850	285.409
16	04/17/2000	113700	0.094	7.987	27.207	191.356	29.853	294.364
17	04/17/2000	113800	0.094	7.985	27.218	191.130	29.855	294.529
18	04/17/2000	113900	0.094	7.982	27.073	191.351	29.849	291.740
19	04/17/2000	114000	0.093	7.984	26.976	191.331	29.850	291.723
20	04/17/2000	114100	0.093	7.978	26.893	191.123	29.849	291.729
21	04/17/2000	114200	0.093	7.979	27.003	191.315	29.852	294.379
22	04/17/2000	114300	0.093	7.982	27.009	191.334	29.850	297.856
23	04/17/2000	114400	0.094	7.985	27.095	191.125	29.849	295.210
24	04/17/2000	114500	0.093	7.973	27.014	191.892	29.844	293.439
25	04/17/2000	114600	0.094	7.977	27.114	191.034	29.844	293.397
26	04/17/2000	114700	0.094	7.980	27.147	191.259	29.845	293.445
27	04/17/2000	114800	0.093	7.989	27.044	191.318	29.850	298.117
28	04/17/2000	114900	0.094	7.987	27.234	191.168	29.847	296.886
29	04/17/2000	115000	0.094	7.983	27.217	191.322	29.842	293.037
30	04/17/2000	115100	0.094	7.975	27.297	191.218	29.844	293.044
31	04/17/2000	115200	0.095	7.976	27.391	191.443	29.846	293.038
32	04/17/2000	115300	0.095	7.981	27.486	191.261	29.846	294.633
33	04/17/2000	115400	0.095	7.976	27.555	191.129	29.845	295.151
34	04/17/2000	115500	0.096	7.973	27.882	191.131	29.845	297.841
35	04/17/2000	115600	0.097	7.975	28.060	191.274	29.846	298.998
36	04/17/2000	115700	0.097	7.979	28.100	191.076	29.845	298.987
37	04/17/2000	115800	0.096	7.985	27.762	190.902	29.843	297.935
38	04/17/2000	115900	0.095	7.981	27.586	191.168	29.844	294.525
39	04/17/2000	120000	0.095	7.974	27.578	191.461	29.842	293.816
40	04/17/2000	120100	0.096	7.978	27.897	191.534	29.839	293.312
41	04/17/2000	120200	0.097	7.965	27.914	191.658	29.839	293.315
42	04/17/2000	120300	0.097	7.965	28.144	191.545	29.840	293.300
43	04/17/2000	120400	0.098	7.958	28.183	191.427	29.838	297.846
44	04/17/2000	120500	0.098	7.960	28.172	191.259	29.836	295.561
45	04/17/2000	120600	0.099	7.966	28.451	190.987	29.833	287.334
46	04/17/2000	120700	0.101	7.807	28.517	191.013	30.011	287.296
47	04/17/2000	120800	0.103	4.911	18.309	191.165	29.836	287.362
48	04/17/2000	120900	0.101	7.571	27.750	191.240	29.838	294.012
49	04/17/2000	121000	0.101	7.753	28.415	190.853	29.838	298.370
50	04/17/2000	121100	0.100	7.769	28.236	191.139	29.837	293.275
51	04/17/2000	121200	0.099	7.788	28.036	191.091	29.838	291.749
52	04/17/2000	121300	0.099	7.802	27.985	191.103	29.840	291.819
53	04/17/2000	121400	0.099	7.829	28.177	191.454	29.841	291.911
54	04/17/2000	121500	0.100	7.830	28.354	191.197	29.836	298.572
55	04/17/2000	121600	0.100	7.830	28.365	191.349	29.833	298.719
56	04/17/2000	121700	0.099	7.855	28.316	191.301	29.829	298.716
57	04/17/2000	121800	0.100	7.872	28.413	191.128	29.831	298.706
58	04/17/2000	121900	0.099	7.878	28.370	191.219	29.832	296.913

59	04/17/2000	122000	0.100	7.892	28.567	191.513	29.833	290.979
60	04/17/2000	122100	0.100	7.902	28.533	191.343	29.831	290.976
61	04/17/2000	122200	0.100	7.909	28.583	191.532	29.829	290.987
62	/ /							
63	/ /	AVE	0.096	7.892	27.418	191.258	29.847	293.747

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Record#	DATE	TIME	PC1NOX11	PC1CO212	PC1NOX13	PC1GEN14	PC1PRS15	PC1TMP16
1	04/17/2000	122700	0.100	7.942	28.790	190.911	29.833	289.675
2	04/17/2000	122800	0.100	7.956	28.709	190.924	29.834	292.955
3	04/17/2000	122900	0.100	7.962	28.871	191.365	29.833	296.381
4	04/17/2000	123000	0.100	7.962	28.810	191.383	29.831	294.171
5	04/17/2000	123100	0.100	7.961	28.756	191.174	29.828	293.621
6	04/17/2000	123200	0.100	7.964	28.822	191.151	29.830	293.771
7	04/17/2000	123300	0.100	7.965	28.791	191.533	29.827	293.725
8	04/17/2000	123400	0.100	7.951	28.926	191.193	29.825	297.116
9	04/17/2000	123500	0.101	7.949	29.030	191.503	29.825	296.852
10	04/17/2000	123600	0.100	7.948	28.941	191.367	29.825	292.818
11	04/17/2000	123700	0.100	7.943	28.893	190.984	29.823	292.823
12	04/17/2000	123800	0.099	7.960	28.647	191.071	29.825	292.836
13	04/17/2000	123900	0.099	7.954	28.454	191.126	29.826	293.464
14	04/17/2000	124000	0.099	7.967	28.596	190.944	29.825	294.157
15	04/17/2000	124100	0.099	7.963	28.680	191.388	29.824	291.967
16	04/17/2000	124200	0.099	7.970	28.744	191.554	29.827	290.778
17	04/17/2000	124300	0.100	7.968	28.831	191.401	29.820	290.774
18	04/17/2000	124400	0.101	7.973	29.061	191.059	29.820	290.791
19	04/17/2000	124500	0.100	7.972	28.897	191.199	29.824	297.415
20	04/17/2000	124600	0.100	7.980	29.017	191.350	29.824	297.655
21	04/17/2000	124700	0.100	7.969	28.984	191.363	29.821	282.596
22	04/17/2000	124800	0.100	7.966	28.934	191.502	29.823	282.563
23	04/17/2000	124900	0.100	7.983	28.941	191.197	29.818	282.714
24	04/17/2000	125000	0.100	7.987	28.900	191.045	29.820	286.082
25	04/17/2000	125100	0.099	7.996	28.826	191.260	29.821	294.058
26	04/17/2000	125200	0.099	7.999	28.764	191.355	29.820	294.055
27	04/17/2000	125300	0.099	7.993	28.609	191.455	29.815	294.055
28	04/17/2000	125400	0.098	7.988	28.447	191.264	29.812	294.059
29	04/17/2000	125500	0.099	7.977	28.598	190.899	29.814	294.030
30	04/17/2000	125600	0.098	7.979	28.484	190.990	29.815	297.020
31	04/17/2000	125700	0.098	7.987	28.498	191.032	29.812	297.690
32	04/17/2000	125800	0.099	7.991	28.540	190.903	29.817	293.078
33	04/17/2000	125900	0.098	7.988	28.505	191.068	29.813	292.147
34	04/17/2000	130000	0.099	7.989	28.579	191.262	29.810	292.119
35	04/17/2000	130100	0.099	7.974	28.627	191.253	29.825	293.031
36	04/17/2000	130200	0.122	4.956	21.907	191.519	29.888	297.005
37	04/17/2000	130300	0.408	0.189	2.790	191.380	29.892	297.007
38	04/17/2000	130400	1.224	0.059	2.612	191.274	29.897	293.456
39	04/17/2000	130500	1.413	0.050	2.549	191.058	29.903	293.473
40	04/17/2000	130600	1.554	0.045	2.526	191.386	29.909	293.471
41	04/17/2000	130700	1.673	0.042	2.552	191.335	29.916	294.543
42	04/17/2000	130800	1.725	0.040	2.471	191.128	29.926	297.080
43	04/17/2000	130900	1.839	0.036	2.427	190.981	29.942	297.018
44	04/17/2000	131000	1.907	0.034	2.358	191.166	29.960	297.006
45	04/17/2000	131100	1.917	0.033	2.294	191.195	29.976	297.005
46	04/17/2000	131200	1.939	0.032	2.283	191.570	29.990	296.998
47	04/17/2000	131300	2.009	0.030	2.202	191.356	30.003	297.004
48	04/17/2000	131400	1.968	0.030	2.175	191.148	30.015	297.018
49	04/17/2000	131500	1.932	0.030	2.097	191.347	30.016	296.968
50	04/17/2000	131600	1.884	0.032	2.164	191.145	30.015	296.969
51	04/17/2000	131700	1.700	0.035	2.135	190.923	30.016	296.924
52	04/17/2000	131800	1.607	0.036	2.101	191.362	30.016	296.927
53	04/17/2000	131900	1.661	0.034	2.060	191.374	30.013	296.879
54	04/17/2000	132000	1.643	0.035	2.095	191.388	30.008	296.990
55	04/17/2000	132100	1.787	0.032	2.067	190.981	30.004	297.015
56	04/17/2000	132200	1.823	0.031	2.043	191.529	30.080	297.012
57	04/17/2000	132300	0.203	0.293	2.151	191.365	29.889	296.967
58	04/17/2000	132400	0.088	6.116	19.582	191.183	29.805	296.989

59	04/17/2000	132500	0.096	7.585	26.456	191.519	29.803	296.992
60	04/17/2000	132600	0.096	7.686	26.788	191.743	29.803	297.015
61	04/17/2000	132700	0.096	7.698	26.855	191.270	29.804	296.984
62	/ /							
63	/ /	AVE	0.620	5.151	19.283	191.247	29.873	294.291

Run 3

Record#	DATE	TIME	PC1NOX11	PC1CO212	PC1NOX13	PC1GEN14	PC1PRS15	PC1TMP16
1	04/17/2000	133300	0.098	7.830	27.822	191.046	29.805	296.982
2	04/17/2000	133400	0.098	7.870	28.097	191.034	29.803	296.941
3	04/17/2000	133500	0.099	7.870	28.118	191.460	29.800	296.926
4	04/17/2000	133600	0.099	7.879	28.142	191.613	29.802	296.978
5	04/17/2000	133700	0.098	7.898	28.169	191.333	29.803	296.934
6	04/17/2000	133800	0.097	7.905	27.934	191.177	29.804	296.895
7	04/17/2000	133900	0.097	7.923	27.899	191.149	29.804	296.920
8	04/17/2000	134000	0.098	7.932	28.286	191.277	29.805	296.935
9	04/17/2000	134100	0.098	7.927	28.282	191.375	29.804	296.921
10	04/17/2000	134200	0.098	7.932	28.323	191.368	29.807	296.915
11	04/17/2000	134300	0.098	7.948	28.221	191.252	29.807	296.988
12	04/17/2000	134400	0.097	7.957	28.092	191.142	29.804	297.016
13	04/17/2000	134500	0.096	7.940	27.728	191.141	29.797	296.971
14	04/17/2000	134600	0.097	7.926	27.979	191.135	29.800	296.974
15	04/17/2000	134700	0.097	7.931	27.941	191.211	29.797	296.972
16	04/17/2000	134800	0.096	7.922	27.486	191.370	29.822	296.984
17	04/17/2000	134900	0.127	3.467	15.998	191.499	29.863	296.977
18	04/17/2000	135000	0.434	0.109	1.707	191.545	29.872	296.941
19	04/17/2000	135100	0.819	0.054	1.598	191.327	29.878	296.921
20	04/17/2000	135200	1.010	0.045	1.662	191.157	29.888	296.924
21	04/17/2000	135300	1.064	0.042	1.602	191.291	29.894	297.001
22	04/17/2000	135400	1.228	0.038	1.680	191.524	29.900	296.914
23	04/17/2000	135500	1.270	0.036	1.639	191.315	29.906	296.797
24	04/17/2000	135600	1.251	0.035	1.594	191.106	29.911	296.862
25	04/17/2000	135700	1.297	0.035	1.631	191.041	29.913	296.843
26	04/17/2000	135800	1.254	0.034	1.565	191.357	29.913	296.843
27	04/17/2000	135900	1.255	0.035	1.606	191.213	29.913	296.883
28	04/17/2000	140000	1.228	0.035	1.546	191.335	29.913	297.011
29	04/17/2000	140100	1.195	0.036	1.557	191.003	30.056	297.036
30	04/17/2000	140200	0.074	1.481	3.968	191.123	29.798	296.992
31	04/17/2000	140300	0.093	7.075	23.856	190.944	29.797	296.993
32	04/17/2000	140400	0.095	7.618	26.144	191.111	29.797	296.968
33	04/17/2000	140500	0.094	7.687	26.255	190.912	29.799	296.978
34	04/17/2000	140600	0.094	7.720	26.383	190.903	29.799	296.990
35	04/17/2000	140700	0.094	7.739	26.380	190.680	29.795	296.989
36	04/17/2000	140800	0.095	7.756	26.592	191.338	29.794	296.950
37	04/17/2000	140900	0.095	7.787	26.915	191.141	29.795	296.855
38	04/17/2000	141000	0.096	7.820	27.215	191.137	29.792	296.864
39	04/17/2000	141100	0.096	7.823	27.169	191.123	29.793	296.993
40	04/17/2000	141200	0.098	7.664	27.190	191.344	31.411	296.900
41	04/17/2000	141300	0.182	6.948	45.770	191.364	30.991	296.909
42	04/17/2000	141400	0.218	7.618	60.334	191.556	30.990	297.002
43	04/17/2000	141500	0.220	7.632	60.872	191.573	30.983	299.262
44	04/17/2000	141600	0.220	7.629	60.903	191.032	30.982	299.289
45	04/17/2000	141700	0.221	7.627	61.050	191.100	30.985	299.320
46	04/17/2000	141800	0.221	7.635	61.063	191.330	30.989	299.409
47	04/17/2000	141900	0.220	7.654	61.043	191.381	30.987	299.516
48	04/17/2000	142000	0.220	7.654	61.179	191.368	30.988	299.496
49	04/17/2000	142100	0.220	7.649	60.955	191.198	31.288	299.466
50	04/17/2000	142200	0.254	5.667	52.279	190.837	31.337	299.461
51	04/17/2000	142300	0.260	0.338	3.193	191.140	30.820	299.468
52	04/17/2000	142400	0.366	0.110	1.463	191.343	30.821	299.436
53	04/17/2000	142500	0.471	0.084	1.428	191.472	30.823	299.470
54	04/17/2000	142600	0.573	0.068	1.418	191.279	30.819	299.381
55	04/17/2000	142700	0.643	0.060	1.396	191.248	30.824	299.316
56	04/17/2000	142800	0.688	0.054	1.347	191.472	30.828	299.322
57	04/17/2000	142900	0.739	0.050	1.327	191.452	30.825	299.338
58	04/17/2000	143000	0.746	0.048	1.298	191.127	30.824	299.293

59	04/17/2000	143100		0.741	0.046	1.233	191.163	30.372	299.330
60	04/17/2000	143200		0.076	3.525	9.731	191.141	29.791	299.309
61	04/17/2000	143300		0.095	7.516	25.778	191.140	29.785	299.364
62	/ /								
63	/ /		AVE	0.387	4.826	22.738	191.234	30.198	297.702

APPENDIX C

UNCORRECTED REFERENCE METHOD DATA SHEETS

POLK POWER STATION BACT TEST #4 04-17-2000

TIME	CHAN 5 STACK %O2
09:36	12.15
09:37	12.15
09:38	12.15
09:39	12.16
09:40	12.16
09:41	12.17
09:42	12.17
09:43	12.17
09:44	12.15
09:45	12.14
09:46	12.17
09:47	12.17

AVERAGE VALUES FOR THE LAST 12 MINUTES

09:47	12.16

COMMENTS: O2 TRAVERSE
EAST PORT

POLK POWER STATION BACT TEST #4 04-17-2000

TIME	CHAN 5 STACK %02
09:55	12.19
09:56	12.18
09:57	12.18
09:58	12.17
09:59	12.18
10:00	12.17
10:01	12.13
10:02	12.13
10:03	12.13
10:04	12.14
10:05	12.15
10:06	12.16

AVERAGE VALUES FOR THE LAST 12 MINUTES

10:06	12.16

COMMENTS: O2 TRAVERSE
NORTH PORT

POLK POWER STATION BACT TEST #4 04-17-2000

TIME	CHAN 5 STACK %02
10:14	12.26
10:15	12.26
10:16	12.24
10:17	12.25
10:18	12.24
10:19	12.23
10:20	12.22
10:21	12.23
10:22	12.23
10:23	12.23
10:24	12.22
10:25	12.23

AVERAGE VALUES FOR THE LAST 12 MINUTES

10:25	12.24

COMMENTS: O2 TRAVERSE
SOUTH PORT

POLK POWER STATION BACT TEST #4 04-17-2000

TIME	CHAN 5 STACK %O2
10:29	12.24
10:30	12.23
10:31	12.21
10:32	12.19
10:33	12.18
10:34	12.20
10:35	12.20
10:36	12.22
10:37	12.24
10:38	12.26
10:39	12.27
10:40	12.27

AVERAGE VALUES FOR THE LAST 12 MINUTES

10:40	12.22

COMMENTS: O2 TRAVERSE
WEST PORT

Test Run 1 STRATA Version 1.2.1

	O2 %	NOx ppm
Begin calculating run averages		
04-17-2000 11:23:02	12.108	26.93
04-17-2000 11:24:01	12.107	26.84
04-17-2000 11:25:01	12.103	26.89
04-17-2000 11:26:02	12.107	26.86
04-17-2000 11:27:01	12.100	26.81
04-17-2000 11:28:02	12.094	26.76
04-17-2000 11:29:02	12.082	26.78
04-17-2000 11:30:01	12.090	26.76
04-17-2000 11:31:02	12.093	26.69
04-17-2000 11:32:02	12.086	26.65
04-17-2000 11:33:01	12.089	26.72
04-17-2000 11:34:02	12.083	26.70
04-17-2000 11:35:01	12.091	26.76
04-17-2000 11:36:01	12.084	26.63
04-17-2000 11:37:02	12.076	26.52
04-17-2000 11:38:01	12.069	26.52
04-17-2000 11:39:02	12.067	26.51
04-17-2000 11:40:01	12.083	26.50
04-17-2000 11:41:01	12.081	26.58
04-17-2000 11:42:02	12.093	26.50
04-17-2000 11:43:01	12.078	26.59
04-17-2000 11:44:02	12.071	26.54
04-17-2000 11:45:02	12.063	26.57
04-17-2000 11:46:01	12.071	26.59
04-17-2000 11:47:02	12.085	26.41
04-17-2000 11:48:02	12.076	26.52
04-17-2000 11:49:01	12.083	26.55
04-17-2000 11:50:02	12.078	26.62
04-17-2000 11:51:02	12.082	26.62
04-17-2000 11:52:01	12.089	26.84
04-17-2000 11:53:02	12.089	27.12
04-17-2000 11:54:01	12.089	26.92
04-17-2000 11:55:02	12.094	26.75
04-17-2000 11:56:02	12.074	26.60
04-17-2000 11:57:01	12.071	26.50
04-17-2000 11:58:02	12.079	26.60
04-17-2000 11:59:02	12.085	26.72
04-17-2000 12:00:01	12.079	26.86
04-17-2000 12:01:02	12.084	26.86
04-17-2000 12:02:01	12.086	26.87
04-17-2000 12:03:01	12.092	27.02
04-17-2000 12:04:02	12.093	27.10
04-17-2000 12:05:01	12.093	27.32
04-17-2000 12:06:02	12.098	27.54
04-17-2000 12:07:02	12.109	27.55
04-17-2000 12:08:01	12.117	27.28
04-17-2000 12:09:02	12.092	27.04
04-17-2000 12:10:02	12.093	26.90
04-17-2000 12:11:01	12.071	26.92
04-17-2000 12:12:02	12.090	26.91
04-17-2000 12:13:01	12.094	26.96
04-17-2000 12:14:01	12.081	26.88

Test Run 1 DB STRATA Version 1.2.1

	O2 %	NOx ppm
04-17-2000 12:15:02	12.070	26.87
04-17-2000 12:16:01	12.066	26.81
04-17-2000 12:17:01	12.074	26.91
04-17-2000 12:18:02	12.077	26.91
04-17-2000 12:19:01	12.078	26.81
04-17-2000 12:20:02	12.079	26.90
04-17-2000 12:21:02	12.093	26.92
04-17-2000 12:22:01	12.087	27.00

Run Averages	O2 %	NOx ppm
04-17-2000 12:22:01	12.086	26.80

Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG
Test Run 1 End

Test Run ~~0~~ 2 PBS STRATA Version 1.2.1

	O2 %	NOx ppm
Begin calculating run averages		
04-17-2000 12:28:01	3.832	51.97
04-17-2000 12:29:01	11.984	27.92
04-17-2000 12:30:01	12.005	27.48
04-17-2000 12:31:00	12.025	27.61
04-17-2000 12:32:01	12.027	27.72
04-17-2000 12:33:01	12.057	27.61
04-17-2000 12:34:00	12.049	27.57
04-17-2000 12:35:01	12.045	27.35
04-17-2000 12:36:01	12.036	27.29
04-17-2000 12:37:00	12.035	27.26
04-17-2000 12:38:01	12.044	27.30
04-17-2000 12:39:01	12.042	27.45
04-17-2000 12:40:01	12.045	27.56
04-17-2000 12:41:00	12.052	27.86
04-17-2000 12:42:01	12.048	27.69
04-17-2000 12:43:01	12.059	27.76
04-17-2000 12:44:01	12.070	27.81
04-17-2000 12:45:01	12.071	27.87
04-17-2000 12:46:00	12.057	27.94
04-17-2000 12:47:00	12.056	27.83
04-17-2000 12:48:01	12.057	27.76
04-17-2000 12:49:01	12.050	27.87
04-17-2000 12:50:01	12.065	27.77
04-17-2000 12:51:00	12.061	27.79
04-17-2000 12:52:01	12.059	27.82
04-17-2000 12:53:01	12.057	27.77
04-17-2000 12:54:00	12.047	27.76
04-17-2000 12:55:01	12.037	27.71
04-17-2000 12:56:01	12.045	27.61
04-17-2000 12:57:01	12.044	27.70
04-17-2000 12:58:00	12.064	27.79
04-17-2000 12:59:01	12.061	27.88
04-17-2000 13:00:01	12.061	28.00
04-17-2000 13:01:01	12.049	27.85
04-17-2000 13:02:00	12.050	27.66
04-17-2000 13:03:01	12.058	27.82
04-17-2000 13:04:01	12.069	27.79
04-17-2000 13:05:01	12.063	27.84
04-17-2000 13:06:00	12.070	27.79
04-17-2000 13:07:01	12.070	27.81
04-17-2000 13:08:01	12.059	27.78
04-17-2000 13:09:01	12.060	27.71
04-17-2000 13:10:00	12.062	27.75
04-17-2000 13:11:01	12.060	27.63
04-17-2000 13:12:01	12.082	27.70
04-17-2000 13:13:00	12.081	27.78
04-17-2000 13:14:01	12.078	27.71
04-17-2000 13:15:01	12.085	27.67
04-17-2000 13:16:01	12.073	27.70
04-17-2000 13:17:00	12.080	27.79
04-17-2000 13:18:01	12.086	28.02
04-17-2000 13:19:01	12.104	27.95

Test Run 5 2 DB STRATA Version 1.2.1

	O2 %	NOx ppm
04-17-2000 13:20:01	12.087	27.76
04-17-2000 13:21:01	12.053	27.55
04-17-2000 13:22:00	12.031	27.29
04-17-2000 13:23:01	12.030	27.38
04-17-2000 13:24:01	12.032	27.37
04-17-2000 13:25:00	12.042	27.49
04-17-2000 13:26:01	12.047	27.65
04-17-2000 13:27:01	11.843	29.83
Run Averages	O2 %	NOx ppm
04-17-2000 13:27:01	11.911	28.14

Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG
Test Run 5 2 End

Test Run 3 dtf STRATA Version 1.2.1

		O2 %	NOx ppm
Begin calculating run averages			
04-17-2000	13:34:02	12.021	28.54
04-17-2000	13:35:01	12.030	28.28
04-17-2000	13:36:01	12.030	28.24
04-17-2000	13:37:02	12.044	28.41
04-17-2000	13:38:01	12.055	28.47
04-17-2000	13:39:01	12.073	28.45
04-17-2000	13:40:01	12.067	28.35
04-17-2000	13:41:01	12.069	28.21
04-17-2000	13:42:02	12.064	28.00
04-17-2000	13:43:01	12.069	28.24
04-17-2000	13:44:02	12.068	28.12
04-17-2000	13:45:02	12.059	27.88
04-17-2000	13:46:01	12.051	28.01
04-17-2000	13:47:01	12.054	28.13
04-17-2000	13:48:01	12.046	27.97
04-17-2000	13:49:02	12.040	27.84
04-17-2000	13:50:01	12.041	27.80
04-17-2000	13:51:01	12.054	27.92
04-17-2000	13:52:02	12.060	27.89
04-17-2000	13:53:02	12.059	27.82
04-17-2000	13:54:01	12.055	27.69
04-17-2000	13:55:01	12.060	27.74
04-17-2000	13:56:02	12.080	27.82
04-17-2000	13:57:01	12.075	27.91
04-17-2000	13:58:01	12.076	27.77
04-17-2000	13:59:01	12.088	27.79
04-17-2000	14:00:02	12.067	27.61
04-17-2000	14:01:01	12.065	27.48
04-17-2000	14:02:01	12.048	27.51
04-17-2000	14:03:02	12.053	27.54
04-17-2000	14:04:02	12.052	27.54
04-17-2000	14:05:01	12.062	27.59
04-17-2000	14:06:01	12.068	27.76
04-17-2000	14:07:02	12.081	27.84
04-17-2000	14:08:02	12.066	27.79
04-17-2000	14:09:01	12.075	27.85
04-17-2000	14:10:01	12.075	27.84
04-17-2000	14:11:01	12.077	27.79
04-17-2000	14:12:02	12.087	27.76
04-17-2000	14:13:01	12.090	27.69
04-17-2000	14:14:01	12.082	27.62
04-17-2000	14:15:01	12.063	27.49
04-17-2000	14:16:02	12.075	27.51
04-17-2000	14:17:01	12.062	27.48
04-17-2000	14:18:01	12.071	27.40
04-17-2000	14:19:02	12.065	27.37
04-17-2000	14:20:02	12.067	27.32
04-17-2000	14:21:01	12.059	27.44
04-17-2000	14:22:01	12.069	27.45
04-17-2000	14:23:02	12.063	27.34
04-17-2000	14:24:02	12.078	27.42
04-17-2000	14:25:01	12.067	27.42

3 PB

Test Run ~~6~~ STRATA Version 1.2.1

	O2	NOx
	%	ppm
04-17-2000 14:26:01	12.053	27.35
04-17-2000 14:27:01	12.058	27.38
04-17-2000 14:28:02	12.081	27.32
04-17-2000 14:29:01	12.087	27.33
04-17-2000 14:30:01	12.079	27.34
04-17-2000 14:31:02	12.074	27.34
04-17-2000 14:32:02	12.083	27.37
04-17-2000 14:33:01	12.101	26.38

Run Averages	O2	NOx
	%	ppm
04-17-2000 14:33:02	12.065	27.73

Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: 3
Test Run ~~6~~ End

APPENDIX D

SAMPLING EQUIPMENT CALIBRATIONS

APPENDIX D-1 LINEARITY CALIBRATIONS

APPENDIX D-2 DRIFT ASSESSMENT CALS

APPENDIX D-3 CYLINDER GAS CERTIFICATION

APPENDIX D-4 CONVERTER EFFICIENCY RESULTS

APPENDIX D-1

LINEARITY CALIBRATIONS

Calibration Error Test, Run 4 STRATA Version 1.2.1

	O2	NOx
	%	ppm
04-17-2000 09:16:37	16.829	12.50
04-17-2000 09:17:37	20.893	0.30
04-17-2000 09:18:38	17.847	11.86
04-17-2000 09:19:37	11.935	0.46
04-17-2000 09:20:38	10.208	16.27
04-17-2000 09:21:37	0.101	79.75
04-17-2000 09:22:38	0.039	79.93
04-17-2000 09:23:38	0.763	52.39
04-17-2000 09:24:37	0.438	41.16
04-17-2000 09:26:02	-0.016	24.71

Calibration Error Test at Run 4

Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG

	Reference Cylinder Numbers			
	Zero	Low-range	Mid-range	High-range
O2	ALM017445		ALM031884	
NOx		ALM0245301	ALM017813	ALM020566

Date/Time 04-17-2000 09:26:04 PASSED

Analyte	O2	NOx
Units	%	ppm
Zero Ref Cyl	0.000	0.00
Zero Avg	0.046	0.28
Zero Error%	0.2%	0.3%
Low Ref Cyl		24.90
Low Avg		24.70
Low Error%		0.2%
Mid Ref Cyl	11.960	49.47
Mid Avg	12.046	47.58
Mid Error%	0.3%	1.9%
High Ref Cyl	20.900	81.82
High Avg	20.902	80.08
High Error%	0.0%	1.7%

Calibration Error Test End

APPENDIX D-2

DRIFT ASSESSMENT CALS

Initial System Bias Check, Run 4 STRATA Version 1.2.1

	O2	NOx
	%	ppm
04-17-2000 09:27:17	18.669	3.51
04-17-2000 09:28:17	11.930	0.91
04-17-2000 09:29:17	6.859	12.26
04-17-2000 09:30:16	0.023	24.57

Initial System Bias Check for Run 4
Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG

	Reference Cylinder Numbers	
	Zero	Span
O2	ALM017445	ALM031884
NOx		ALM0245301

Date/Time 04-17-2000 09:30:55 PASSED

Analyte	O2	NOx
Units	%	ppm
Zero Ref Cyl	0.000	0.00
Zero Cal	0.046	0.28
Zero Avg	0.019	0.91
Zero Bias%	0.1%	0.6%
Zero Drift%		
Span Ref Cyl	11.960	24.90
Span Cal	12.046	24.70
Span Avg	11.960	24.57
Span Bias%	0.3%	0.1%
Span Drift%		

System Bias Check End

Final System Bias Check, Run 4 STRATA Version 1.2.1

	O2 %	NOx ppm
04-17-2000 12:23:03	11.753	15.48
04-17-2000 12:24:02	11.990	3.61
04-17-2000 12:25:02	10.693	6.35
04-17-2000 12:26:03	0.024	26.73

Final System Bias Check for Run 4

Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG

	Reference Cylinder Numbers Zero	Span
O2	ALM017445	ALM031884
NOx		ALM0245301

Date/Time 04-17-2000 12:26:42 PASSED

Analyte	O2	NOx
Units	%	ppm
Zero Ref Cyl	0.000	0.00
Zero Cal	0.046	0.28
Zero Avg	-0.015	3.56
Zero Bias%	0.2%	3.3%
Zero Drift%	-0.1%	2.6%
Span Ref Cyl	11.960	24.90
Span Cal	12.046	24.70
Span Avg	11.996	27.25
Span Bias%	0.2%	2.5%
Span Drift%	0.1%	2.7%
Ini Zero Avg	0.019	0.91
Ini Span Avg	11.960	24.57
Run Avg	12.086	26.80
Co	0.002	2.23
Cm	11.978	25.91
Correct Avg	12.068	25.84

System Bias Check End

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

RUN NUMBER: 1

SPAN VALUES: 100 ppm NOx
25 % Oxygen

	——INITIAL VALUES——			——FINAL VALUES——		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.9	0.3	-0.63	3.6	2.65	3.28
NOx UP-SCALE	24.6	24.6	0.00	27.3	2.68	2.68
O2 LOW GAS	0.05	0.02	-0.12	-0.02	-0.28	-0.16
O2 UP-SCALE	11.96	11.96	0.00	12.00	0.14	0.14

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

RUN NUMBER: 1

SPAN VALUE: 25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
O2 ZERO GAS	0.02	0.02	0.00	-0.02	-0.16	-0.16
O2 UP-SCALE	11.96	11.96	0.00	12.00	0.14	0.14

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

Final System Bias Check, Run 2 STRATA Version 1.2.1

	O2 %	NOx ppm
04-17-2000 13:28:02	10.916	9.04
04-17-2000 13:29:02	11.972	4.37
04-17-2000 13:30:02	11.980	4.33
04-17-2000 13:31:02	7.893	13.05
04-17-2000 13:32:02	-0.067	27.80

Final System Bias Check for Run 2
Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG

	Reference Cylinder Numbers Zero	Span
O2	ALM017445	ALM031884
NOx		ALM0245301

Date/Time 04-17-2000 13:32:48 PASSED

Analyte	O2	NOx
Units	%	ppm
Zero Ref Cyl	0.000	0.00
Zero Cal	0.046	0.28
Zero Avg	0.037	4.32
Zero Bias%	0.0%	4.0%
Zero Drift%	0.2%	0.8%
Span Ref Cyl	11.960	24.90
Span Cal	12.046	24.70
Span Avg	11.980	27.61
Span Bias%	0.3%	2.9%
Span Drift%	-0.1%	0.4%
Ini Zero Avg	-0.015	3.56
Ini Span Avg	11.996	27.25
Run Avg	11.911	28.14
Co	0.011	3.94
Cm	11.988	27.43
Correct Avg	11.884	25.66

System Bias Check End

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

RUN NUMBER: 2

SPAN VALUES: 100 ppm NOx
25 % Oxygen

	-----INITIAL VALUES-----			-----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.9	3.6	2.65	4.3	3.41	0.76
NOx UP-SCALE	24.6	27.3	2.68	27.6	3.04	0.36
O2 LOW GAS	0.05	-0.02	-0.28	0.04	-0.05	0.23
O2 UP-SCALE	11.96	12.00	0.14	11.98	0.08	-0.06

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

RUN NUMBER: 2

SPAN VALUE: 25 % Oxygen

	------INITIAL VALUES------			------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
O2 ZERO GAS	0.02	-0.02	-0.16	0.04	0.07	0.23
O2 UP-SCALE	11.96	12.00	0.14	11.98	0.08	-0.06

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

Final System Bias Check, Run 3 (6) STRATA Version 1.2.1

	O2 %	NOx ppm
04-17-2000 14:34:03	10.875	7.79
04-17-2000 14:35:03	12.027	4.15
04-17-2000 14:36:03	6.905	14.84
04-17-2000 14:37:20	0.023	27.44

Final System Bias Check for Run 6
Operator: DAVID SMITH
Plant Name: POLK POWER STATION
Location: UNIT 1 HRSG

	Reference Cylinder Numbers Zero	Span
O2	ALM017445	ALM031884
NOx		ALM0245301

Date/Time 04-17-2000 14:37:20 PASSED

Analyte	O2	NOx
Units	%	ppm
Zero Ref Cyl	0.000	0.00
Zero Cal	0.046	0.28
Zero Avg	0.068	4.14
Zero Bias%	0.1%	3.9%
Zero Drift%	0.1%	-0.2%
Span Ref Cyl	11.960	24.90
Span Cal	12.046	24.70
Span Avg	12.027	27.49
Span Bias%	0.1%	2.8%
Span Drift%	0.2%	-0.1%
Ini Zero Avg	0.037	4.32
Ini Span Avg	11.980	27.61
Run Avg	12.065	27.73
Co	0.053	4.23
Cm	12.003	27.55
Correct Avg	12.021	25.10

System Bias Check End

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

RUN NUMBER: 3

SPAN VALUES: 100 ppm NOx
25 % Oxygen

	-----INITIAL VALUES----			----FINAL VALUES-----		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
NOx ZERO GAS	0.9	4.3	3.41	4.1	3.23	-0.18
NOx UP-SCALE	24.6	27.6	3.04	27.5	2.92	-0.12
O2 LOW GAS	0.05	0.04	-0.05	0.07	0.07	0.12
O2 UP-SCALE	11.96	11.98	0.08	12.03	0.27	0.19

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL. RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

SYSTEM CALIBRATION BIAS AND DRIFT CALCULATIONS

SOURCE: POLK POWER STATION UNIT 1 BACT STUDY

TEST DATE: 4/17/00

RUN NUMBER: 3

SPAN VALUE: 25 % Oxygen

	------INITIAL VALUES------			------FINAL VALUES------		
	ANALYZER CAL. RESPONSE	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	SYSTEM CAL. RESPONSE	SYSTEM CAL. BIAS (% OF SPAN)	DRIFT (% OF SPAN)
O2 ZERO GAS	0.02	0.04	0.07	0.07	0.19	0.12
O2 UP-SCALE	11.96	11.98	0.08	12.03	0.27	0.19

$$\text{SYSTEM CAL. BIAS} = \frac{\text{SYSTEM CAL: RESPONSE - ANALYZER CAL. RESPONSE}}{\text{SPAN}} \times 100$$

$$\text{DRIFT} = \frac{\text{FINAL SYSTEM CAL. RESPONSE - INITIAL CAL. RESPONSE}}{\text{SPAN}} \times 100$$

APPENDIX D-3

CYLINDER GAS CERTIFICATION

CEM DILUENT

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: N31923
Project No.: 12-33126-001

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM020393 **Certification Date:** 3/11/99 **Exp. Date:** 3/11/2002
Cylinder Pressure*:** 2015 PSIG

COMPONENT	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY**	TRACEABILITY
OXYGEN	11.96 %	+/- 1%	NIST
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2658	1/02/01	ALM031884	9.680 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN/3400/16804-O2	02/22/99	GC / TCD

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis | Second Triad Analysis | Calibration Curve

OXYGEN

First Triad Analysis		
Date: 03/11/99	Response Unit: AREA	
Z1 = 0.0000	R1 = 247696	T1 = 306452
R2 = 248148	Z2 = 0.0000	T2 = 306564
Z3 = 0.0000	T3 = 306567	R3 = 248251
Avg. Concentration:	11.96	%

Second Triad Analysis

Calibration Curve	
Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.99999	
Constants:	A = 0.00
B = 1.00	C = 0.00
D = 0.00	E = 0.00

Special Notes:

APPROVED BY: B. M. Becton
B.M. BECTON

ATTACHMENT 1

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: E-N31293
Project No.: 12-32332-014

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM045301 Certification Date: 2/08/99 Exp. Date: 2/07/2001
Cylinder Pressure***: 1940 PSIG

COMPONENT	CERTIFIED CONCENTRATION		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	24.0	PPM	+/- 1%	NIST
NITROGEN - OXYGEN FREE		BALANCE		
NOX	24.9	BALANCE		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is inclusive of usual known error sources which at least include precision of the measurement processes. Product certified as +/- 1% analytical accuracy is directly traceable to NIST standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2629	4/09/99	ALM067006	21.48 PPM	NITRIC OXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
HORIBA/CLA53A/850658093	02/08/99	CHEMILUMINESCENT

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

NITRIC OXIDE

First Triad Analysis			Second Triad Analysis			Calibration Curve	
Date: 02/01/99	Response Unit: PPM		Date: 02/08/99	Response Unit: PPM		Concentration = A + Bx + Cx2 + Dx3 + Ex4	
Z1 = 0.0500	R1 = 21.580	T1 = 24.100	Z1 = 0.1900	R1 = 21.400	T1 = 24.050	r = 0.999990	
R2 = 21.510	Z2 = 0.0300	T2 = 23.990	R2 = 21.410	Z2 = 0.1600	T2 = 24.040	Constants:	A = 0.000000
Z3 = 0.0300	T3 = 24.010	R3 = 21.520	Z3 = 0.1600	T3 = 24.010	R3 = 21.410	B = 1.000000	C = 0.000000
Avg. Concentration:	23.97	PPM	Avg. Concentration:	24.09	PPM	D = 0.000000	E = 0.000000

Special Notes:

APPROVED BY: Gregg T Bartlett
G BARTNETT

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: N75516
Project No.: 12-36341-002

Customer

TAMPA ELECTRIC CO
RAY MCDARBY
5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM017813 Certification Date: 10/29/99 Exp. Date: 10/28/2001
Cylinder Pressure***: 1912 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	48.56	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	49.47	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997.
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1683	4/03/03	ALM020566	48.90 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	10/22/99	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

NITRIC OXIDE

Date:10/22/99	Response Unit:PPM	
Z1 = -0.01310	R1 = 48.79556	T1 = 48.39187
R2 = 48.89616	Z2 = 0.16660	T2 = 48.61919
Z3 = 0.08300	T3 = 48.62870	R3 = 49.00827
Avg. Concentration:	48.55	PPM

Second Triad Analysis

Date: 10/29/99	Response Unit: PPM	
Z1 = 0.14850	R1 = 49.06593	T1 = 48.55658
R2 = 48.76309	Z2 = 0.12020	T2 = 48.59997
Z3 = 0.04920	T3 = 48.54071	R3 = 48.87097
Avg. Concentration:	48.57	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

APPROVED BY: _____
B.M. Becton

RATA CLASS CES-HARD-3

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1750 EAST CLUB BLVD,DURHAM,NC 27704 Phone: 919-220-0803 Fax: 919-220-0808

CERTIFICATE OF ACCURACY: Interference Free™ EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1750 EAST CLUB BLVD
DURHAM,NC 27704

P.O. No.: N31923
Project No.: 12-35046-001

Customer

TAMPA ELECTRIC CO

5010 CAUSEWAY BLVD
TAMPA FL 33619

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure #G1; September, 1997.

Cylinder Number: ALM019127 Certification Date: 7/19/99 Exp. Date: 7/18/2001
Cylinder Pressure***: 1994 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	81.13	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	81.82	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocal procedure G1, September 1997.
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM1683	4/03/03	ALM020566	48.90 PPM	NO/N2

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR System/8220/AAB9400252	07/15/99	Scott Enhanced FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

NITRIC OXIDE

First Triad Analysis

Date:07/12/99	Response Unit:PPM	
Z1 = 0.1222	R1 = 48.911	T1 = 80.909
R2 = 48.792	Z2 = -0.077	T2 = 81.157
Z3 = 0.1565	T3 = 81.343	R3 = 48.996
Avg. Concentration:	81.14	PPM

Second Triad Analysis

Date: 07/19/99	Response Unit: PPM	
Z1 = 0.2335	R1 = 48.805	T1 = 81.051
R2 = 48.938	Z2 = -0.005	T2 = 81.173
Z3 = 0.1145	T3 = 81.120	R3 = 48.957
Avg. Concentration:	81.11	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 0.999990	
Constants:	A = 0.000000
B = 1.000000	C = 0.000000
D = 0.000000	E = 0.000000

APPROVED BY: B.M. Becton

APPENDIX D-4

CONVERTER EFFICIENCY RESULTS

TECO
TAMPA ELECTRIC

CORPORATE ENVIRONMENTAL SERVICES
MEMORANDUM

TO: Quality Assurance File

FROM: R.A. Mc Darby

DATE: 18, April, 2000

SUBJECT: NO2 to NO Converter Efficiency Test
40 CFR 60, Appendix A, Method 20
Section 5.6
Analyzer S/N 10A/R-19785-186

The following results detail the performance of the converter efficiency test on analyzer S/N 10A/R-19785-186:

Highest value recorded during the 30 minute test run =	38.4 ppm
Value recorded at the end of the 30 minute test run =	38.3 ppm
Percent of decrease =	0.3 %

These results indicate that the converter currently installed in the referenced analyzer meets the requirements of 40 CFR 60, Appendix A, Reference Method 20, § 5.6.

In accordance with the instructions contained in 40 CFR 60, Appendix A, Reference Method 20, sub-section 5.6.1; A sample was prepared using gas cylinder S/N ALM-017813 (certificate attached), diluted approximately 1:1 with 20.9% purified air. The sample was introduced into the analyzer through the sample port, and allowed to run for 30 minutes (10:46 – 11:16). The results from this run are attached for reference.

Raymond A. Mc Darby
Senior Environmental Technician
Corporate Environmental Services
Air & Audit Services

POLK POWER STATION BACT TEST #4 04-17-2000

TIME	CHAN 3 INLET ppmNOX
10:47	37.5
10:48	37.7
10:49	37.8
10:50	37.8
10:51	37.9
10:52	37.9
10:53	38.0
10:54	38.0
10:55	38.1
10:56	38.1
10:57	34.5
10:58	35.0
10:59	38.3
11:00	38.3
11:01	38.3
11:02	38.3
11:03	38.3
11:04	38.4
11:05	38.4
11:06	38.4
11:07	38.4
11:08	38.4
11:09	38.4
11:10	38.3
11:11	38.4
11:12	38.3
11:13	38.3
11:14	38.3
11:15	38.3
11:16	38.3

NO mode

AVERAGE VALUES FOR THE LAST 30 MINUTES

11:16	38.0

COMMENTS: END CONVERTER EFFICIENCY TEST

38.2 ppm on 28 points.

APPENDIX E

PROJECT PARTICIPANTS

TEST PARTICIPANTS

Corporate Environmental Services

Robert Barthelette, Jr.	Environmental Technician
David Smith	Senior Environmental Technician

Polk Power Station

Tom Berry	Operations Manager