

TAMPA ELECTRIC

June 30, 2003

Mr. Scott M. Sheplak, P.E.  
Florida Department of Environmental Protection  
Division of Air Resource Management  
111 South Magnolia Drive, Suite 4  
Tallahassee, Florida 32301

RECEIVED

JUL 01 2003

BUREAU OF AIR REGULATION  
Via FedEx  
Airbill No. 7916 2290 7129

**Re: Tampa Electric Company  
Polk Power Station  
Unit 1 Combustion Turbine  
Permit No. 1050233-009-AV  
Petcoke Additional Monitoring Report**

Dear Mr. Sheplak:

Enclosed, please find the additional monitoring emissions compliance report for tests performed on May 20, 2003.

As stated in the Summary of Results, below is a list of results:

- Nitrogen Oxides (NO<sub>x</sub>) - calculated average was 85.7 pounds per hour and 30-day rolling average was 106.9 pounds per hour; 30-day rolling average permit limit is 220.25 pounds per hour
- Sulfur Dioxide (SO<sub>2</sub>) - calculated average was 274.7 pounds per hour and 30-day rolling average was 188.0 pounds per hour; 30-day rolling average permit limit is 357 pounds per hour
- Sulfuric Acid Mist (H<sub>2</sub>SO<sub>4</sub>) - calculated average was 27 pounds per hour; 30-day rolling average permit limit is 55 pounds per hour

Per Conditions A.54 and A.55, Tampa Electric Company (Tampa Electric) shall annually maintain and submit to the Department Continuous Emissions Monitor (CEMs) data demonstrating the gasification of a blend of petcoke and coal up to 60% petcoke did not result in a significant emissions increase of NO<sub>x</sub> and SO<sub>2</sub> when compared to the past actual coal levels. Per Condition A.56, Tampa Electric shall annually maintain and submit to the Department test results demonstrating the gasification of a blend of petcoke and coal up to 60% petcoke did not result in a significant emissions increase of sulfuric acid mist when compared to the past actual coal levels. The following sections demonstrate Tampa Electric's compliance with these conditions.

TAMPA ELECTRIC COMPANY  
P. O. BOX 111 TAMPA, FL 33601-0111

(813) 228-4111

AN EQUAL OPPORTUNITY COMPANY  
HTTP://WWW.TAMPAELECTRIC.COM

CUSTOMER SERVICE:  
HILLSBOROUGH COUNTY (813) 223-0800  
OUTSIDE HILLSBOROUGH COUNTY 1 (888) 223-0800

Presented below in Table 1 is Polk Power Station's historical NO<sub>x</sub> and SO<sub>2</sub> data from 1998 and 1999, before Unit 1 was permitted to gasify blends of petcoke and coal.

**TABLE 1. Historical Emissions (Based on 1998 and 1999 AOR's)**

AOR Year	NO <sub>x</sub> [tons/yr]	SO <sub>2</sub> [tons/yr]	Oil Fired Hours	Syngas Fired Hours
1998	589	1,321	665	5,171
1999	608	1,183	680	5,989
<b>Average</b>	<b>599</b>	<b>1,252</b>	<b>673</b>	<b>5,580</b>

Table 2 provides Polk Power Station's analyses based on 2003 CEMs data compared to the past actual coal levels, as requested by the Department, to demonstrate the gasification of a blend of petcoke and coal up to 60% petcoke did not result in a significant emissions increase of NO<sub>x</sub> and SO<sub>2</sub>.

**TABLE 2. Analysis - 55% Petcoke, 45% Coal Blend (Based on 2003 data)**

Parameter	2-year Average Historical Emissions	2003 Actual Emissions <sup>(1)</sup> (55% Petcoke 45% Coal Blend)	Difference	Above Actual Coal Levels?
NO <sub>x</sub> [tons/yr]	599	335	-264	No
SO <sub>2</sub> [tons/yr]	1,252	742	-510	No

(1) Sample Calculation for 2003 NO<sub>x</sub> Emissions:

$$0.048 \frac{\text{lb NO}_x}{\text{MMBtu}} * 1,699 \frac{\text{MMBtu}}{\text{hr}} * 5,580 \frac{\text{Hours}}{\text{yr}} + 2,000 \frac{\text{tons}}{\text{lb}} + \left( 16 \frac{\text{tons NO}_x}{\text{hr}} * 673 \frac{\text{Oil fired hrs}}{\text{yr}} \right) = 335 \frac{\text{tons NO}_x}{\text{yr}}$$

Sample Calculation for 2003 SO<sub>2</sub> Emissions:

$$0.150 \frac{\text{lb SO}_2}{\text{MMBtu}} * 1,699 \frac{\text{MMBtu}}{\text{hr}} * 5,580 \frac{\text{Hours}}{\text{yr}} + 2,000 \frac{\text{tons}}{\text{lb}} + \left( 0.0461 \frac{\text{tons SO}_2}{\text{hr}} * 673 \frac{\text{Oil fired hrs}}{\text{yr}} \right) = 742 \frac{\text{tons SO}_2}{\text{yr}}$$

Table 3 provides Polk Power Station's analyses based on the 2003 stack test data compared to the past actual coal levels, as requested by the Department, to demonstrate the gasification of a blend of petcoke and coal up to 60% petcoke did not result in a significant emissions increase of sulfuric acid mist.

**TABLE 3. Analysis - 55% Petcoke, 45% Coal Blend (Based on 2003 Stack Test Data)**

Parameter	2000 Baseline Historical Emissions	2003 Actual Emissions <sup>(2)</sup> (55% Petcoke 45% Coal Blend)	Difference	Above Actual Coal Levels?
H <sub>2</sub> SO <sub>4</sub> [tons/yr]	86.8	76.2	-11	No

(2) Sample Calculation for 2003 H<sub>2</sub>SO<sub>4</sub> Emissions:

$$27.3 \frac{\text{lb H}_2\text{SO}_4}{\text{hr}} * 5,580 \frac{\text{Hours}}{\text{yr}} + 2,000 \frac{\text{tons}}{\text{lb}} = 76.2 \frac{\text{tons H}_2\text{SO}_4}{\text{yr}}$$

Mr. Scott Sheplak, P.E.

June 30, 2003

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As evidenced by the data above, NO<sub>x</sub>, SO<sub>2</sub> and H<sub>2</sub>SO<sub>4</sub> emissions resulting from the combustion of syngas produced from the gasification of petcoke and coal blends do not increase above the past actual coal levels. If you have any questions, please telephone Raiza Calderon or me at (813) 641-5261.

Sincerely,

A handwritten signature in cursive script that reads "Laura Crouch".

Laura Crouch  
Manager - Air Programs  
Environmental Affairs

EA/bmr/RC160

c/enc: Mr. Jerry Kissel, FDEP SW

**EMISSIONS TEST REPORT**

**SULFURIC ACID MIST (SAM)**

**May 20, 2003**

**POLK POWER STATION**

**FACILITY ID NUMBER: 1050233**

**EMISSION UNIT ID NO: -001**

**UNIT 1**

**RECEIVED**

JUL 01 2003

DEPARTMENT OF AIR REGULATION

Prepared For:  
Tampa Electric Company  
Polk Power Station  
P.O. Box 111  
Tampa, Florida 33601-0111

Prepared By:  
Tampa Electric Company  
Environmental Affairs Department  
Environmental Services, Air Services Group



Environmental Services  
Air Services Group  
5010 Causeway Boulevard  
Tampa, Florida 33619- 6130

# **EMISSIONS TEST REPORT**

**SULFURIC ACID MIST (SAM)**

**May 20, 2003**

**POLK POWER STATION**

**FACILITY ID NUMBER: 1050233**

**EMISSION UNIT ID NO: -001**

**UNIT 1**

Prepared For:

Tampa Electric Company  
Polk Power Station  
P.O. Box 111  
Tampa, Florida 33601-0111

Prepared By:

Tampa Electric Company  
Environmental Affairs Department  
Environmental Services, Air Services Group



Environmental Services  
Air Services Group  
5010 Causeway Boulevard  
Tampa, Florida 33619- 6130

**Responsible Official Certification**

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

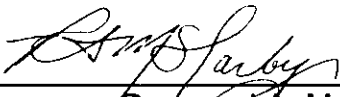
Date 6/26/03

Signature *Mark Hornick*  
Mark Hornick  
General Manager  
Polk and Phillips Power Stations

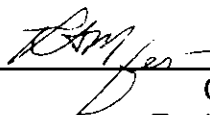
## REPORT CERTIFICATION

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I have reviewed the test performance, the resulting calculations, and contents of this report, and verified that all project quality objectives have been met.

Date 6/23/2003 Signature   
Raymond A. McDarby, Jr.  
Senior Environmental Technician  
Quality Assurance/ Quality Control Specialist  
Air Services Group  
Environmental Services  
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 to the best of my knowledge.

Date 6/23/2003 Signature   
Charles R. Dufeny  
Environmental Technician  
Air Services Group  
Environmental Services  
Tampa Electric Company

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

Date 6/24/03 Signature   
David A. Smith  
Coordinator – Air Services Group  
Environmental Services  
Tampa Electric Company

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## 1.0 SUMMARY OF RESULTS

On May 20, 2003, the Environmental Services group of Tampa Electric Company performed source emission tests on Unit No. 1 at the Polk Power Station. Unit No. 1 is an integrated coal gasification combined cycle (IGCC) generating unit. The combustion turbine was fired with syngas from the coal gasification system. A blend of petroleum coke and bituminous coal was gasified for this test. Testing was conducted according to United States Environmental Protection Agency (USEPA) test methods stipulated in 40 CFR Part 60, Appendix A and Florida Department of Environmental Protection (FDEP) Permit No. 1050233-009-AV. Sulfur Dioxide and Nitrogen Oxides data were measured and recorded using a Continuous Emission Monitoring System (CEMS) during the test.

The Sulfuric Acid Mist ( $H_2SO_4$ ) concentrations and emission rates were derived from three 1-hour test runs. The calculated average  $H_2SO_4$  concentration was  $5.32E-07$  lbs/dscf, and the average  $H_2SO_4$  emission rate was 27 lbs/hr. In accordance with condition A.5, the FDEP permitted emission rate is 55 lbs/hr based on a 30-day rolling average.

The Sulfur Dioxide ( $SO_2$ ) concentrations and emission rates were derived from CEMS data corresponding to the test period. The calculated average  $SO_2$  concentration was 0.15 lbs/MMBtu; the average  $SO_2$  emission rate was 274.72 lbs/hr. In accordance with condition A.5, the FDEP permitted emission rate is 357 lbs/hr based on a 30-day rolling average.

The Nitrogen Oxides ( $NO_x$ ) concentrations and emission rates were derived from CEMS data corresponding to the test period. The calculated average concentration was 10 ppmvd @ 15%  $O_2$ , the average emission rate was 86 lbs/hr. In accordance with condition A.5, the FDEP permitted emission rate is 220.25 lbs/hr based on a 30-day rolling average. Effective July 1, 2003, the permitted concentration becomes 15 ppmvd @ 15%  $O_2$ , and 132 lbs/hr based on a 30 day rolling average.

During the tests on May 20, 2003, Unit No. 1 Combustion Turbine was operated at an average load of 190 megawatts and an average heat input of 1699 MMBtu/hr. The average quantity of fuel burned was 369,447 lbs/hour of syngas. Details of turbine operation are included in Appendix D.

## **2.0 SOURCE DESCRIPTION/TEST PROCEDURES**

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

Sulfuric acid mist sampling and analysis was performed in accordance with USEPA Reference Method 8 (40 CFR Part 60, Appendix A) "Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources", and FDEP Permit No. 1050233-009-AV, Condition A.56.

Sulfur Dioxide (SO<sub>2</sub>) and Nitrogen Oxides (NO<sub>x</sub>) concentrations and emission rates were derived from the CEMS data as directed in FDEP permit 1050233-009-AV, Conditions A.54 and A.55.

The SO<sub>2</sub> emission rates for the test period were derived from the report titled "Daily EPA CEM Summary". All data averages were calculated over the time frame corresponding to the sulfuric acid mist test (08:00 through 12:00, DST). The SO<sub>2</sub> 30-day rolling average was taken from the report titled "Polk County Quarterly Emission Report". Both reports are included in Appendix C of this report.

The NO<sub>x</sub> concentration was derived from the CEMS report titled "Daily NO<sub>x</sub> O<sub>2</sub> Summary", representing hourly NO<sub>x</sub> concentrations corrected to 15% O<sub>2</sub>. The NO<sub>x</sub> emission rate was derived from the CEMS report titled "Daily EPA CEM Summary". All data averages were calculated over the time frame corresponding to the sulfuric acid mist test (09:00 through 14:00). The NO<sub>x</sub> 30-day rolling average was taken from the report titled "Polk County Quarterly Emission Report". All reports are included in Appendix C of this report.

3.0 TEST RESULTS



40 CFR 60, Appendix A - Test Methods  
Reference Method 8  
Test Summary

Customer: Polk Power Station  
 Facility: Unit 1 - HRSG  
 Sampling Location: Stack  
 Operating Conditions: Based at Full Load  
 Test Date: May 20, 2003

	<u>Run #1</u>	<u>Run #2</u>	<u>Run #3</u>	<u>Average</u>
Gas Flow Rates				
Q <sub>s</sub> , acfm:	1352037.7	1323765.9	1301556.4	1325786.65
Q <sub>s(std)</sub> , dscfm:	866622.3	863383.9	843906.6	857970.92
Sampled Volume, V <sub>m(std)</sub> , dscf:	38.76	38.07	37.52	38.117
Stack Moisture, B <sub>ws</sub> x 100, %:	6.11	4.39	5.18	5.228
Isokinetic Sampling Rate, I, %:	99.9	98.4	99.3	99.2
<hr/>				
C <sub>H2SO4</sub> , lb/dscf:	4.732E-07	4.745E-07	6.488E-07	5.322E-07
E <sub>H2SO4</sub> , lb/mmBtu:	0.01002	0.00657	0.00885	0.00848
E <sub>H2SO4</sub> , lbs/hr:	24.60407	24.58285	32.85067	27.34586



**POLK POWER STATION  
SULFUR DIOXIDE and NITROGEN OXIDES from CEMS**

**COMBINED CYCLE COMBUSTION TURBINE SYSTEM - SYNGAS  
May 20, 2003**

Time of Day	Sulfur Dioxide (SO <sub>2</sub> )		Nitrogen Oxides (NO <sub>x</sub> )			
	lbs/MMBtu	lbs/hr	ppmvd @ 15% O <sub>2</sub>	lbs/MMBtu	Heat Input	lbs/hr
8:00	0.150	266.5	10.3	0.050	1769	88.450
9:00	0.150	280.3	10.1	0.049	1822	89.278
10:00	0.160	294.6	9.9	0.048	1821	87.408
11:00	0.150	278.6	9.5	0.046	1800	82.800
12:00	0.140	253.6	9.4	0.046	1756	80.776
Averages:	0.1500	274.72	9.84	0.0478	1794	85.7424

Notes to data:

Sulfur Dioxide data from DAILY EPA CEM SUMMARY report from CEM data acquisition and handling system. Nitrogen Oxides ppmvd @15% O<sub>2</sub> data from Daily NO<sub>x</sub> O<sub>2</sub> Summary report from CEM data acquisition and handling system. Nitrogen Oxides in lbs/MMBtu and Heat input from DAILY EPA CEM SUMMARY report from CEM data acquisition and handling system.

Nitrogen Oxides lbs/hr calculated as:

$$\text{lbs NO}_x/\text{MMBtu} \times \text{Heat Input in MMBtu/hr}$$



**POLK POWER STATION  
HEAT INPUT CALCULATIONS**

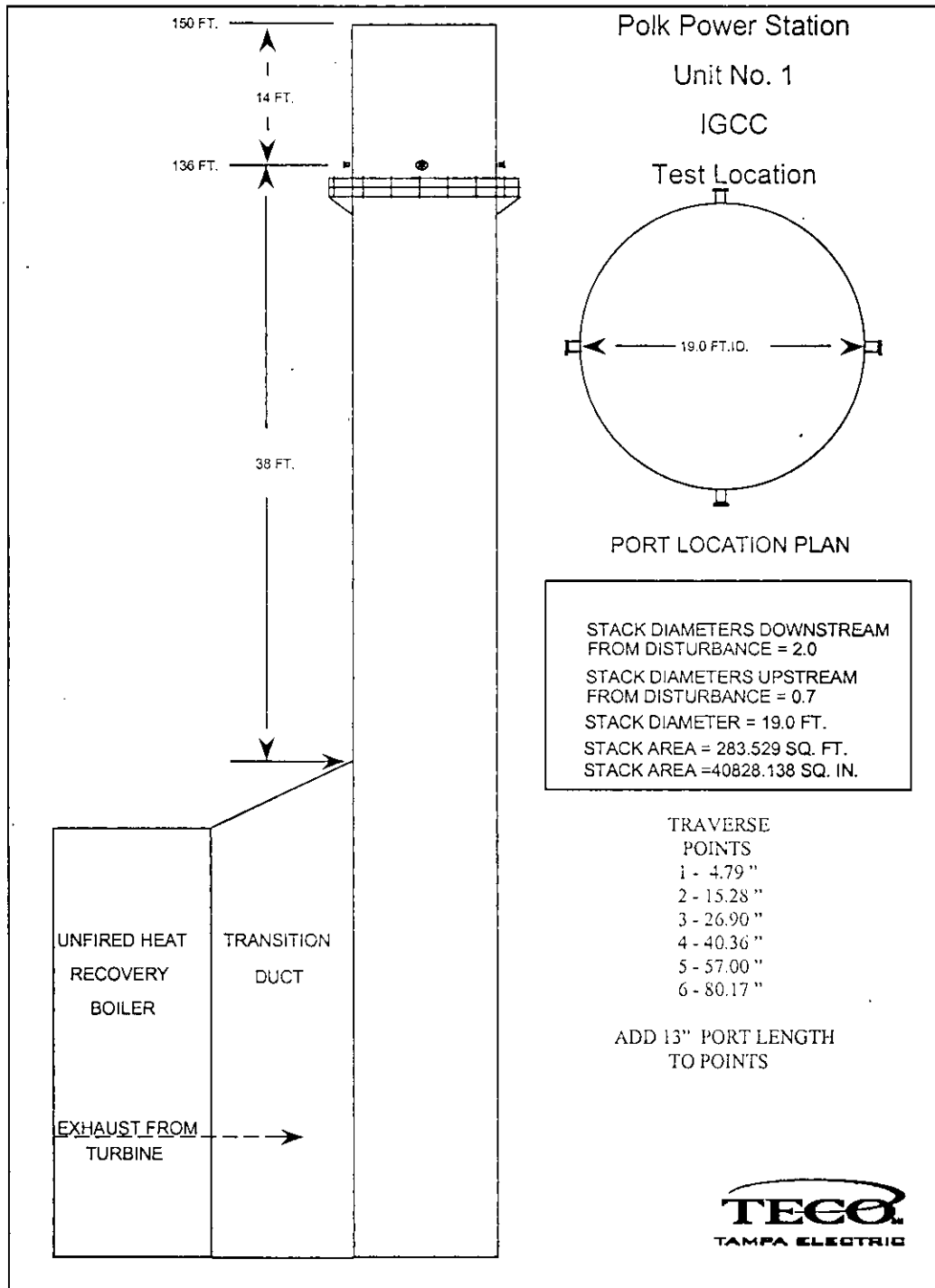
**COMBINED CYCLE COMBUSTION TURBINE SYSTEM - SYNGAS  
05/20/03**

<u>Gaseous Component</u>	Mole %	Molecular Weight	Density lbs/ft <sup>3</sup>	Volume Density lbs/ft <sup>3</sup>
Hydrogen	34.05667	2.016	0.0053	0.0018050
Oxygen	0.00000	32.000	0.0846	0.0000000
Nitrogen	4.16667	28.016	0.0744	0.0031000
CO <sub>2</sub>	14.05000	44.010	0.1170	0.0164385
CO	46.90333	28.010	0.0740	0.0347085
Argon	0.84000	39.948	0.1065	0.0008946
COS	0.00000	60.070	0.1602	0.0000000
Methane	0.02000	16.041	0.0424	0.0000085
				0.0569551 lbs/ft <sup>3</sup>

Average Fuel Flow for Test Period = 102.62417 lbs/sec  
 Volumetric Fuel Flow Rate, F = 6.487E+06 ft<sup>3</sup>/hr  
 Higher Heating Value of syngas fuel, H<sub>g</sub> = 262 Btu/ft<sup>3</sup>  
 Average Heat Input = H<sub>g</sub> x F  
 = 1.699E+09 Btu/hr  
 = 1699.0 mmBtu/hr

4.0 SAMPLING LOCATION TRAVERSE DIAGRAM





APPENDIX A

SULFURIC ACID MIST CALCULATIONS



**40 CFR 60, Appendix A - Test Methods**  
**Reference Method 8**  
**Test Calculations**

Customer: Polk Power Station  
Facility: Unit 1 - HRSG  
Sampling Location: Stack  
Operating Conditions: Based at Full Load  
Run Number: 1  
Date: 05/20/03

Sample Time, $\theta$ :	60 minutes	Nozzle Diameter, $D_n$ :	0.197 inches
Barometric Pressure, $P_b$ :	29.75 "Hg	Nozzle Area, $A_n$ :	0.0002117 ft <sup>2</sup>
Stack Pressure, $P_s$ :	29.70 "Hg	Average Orifice Meter $\Delta H$ :	1.402 "H <sub>2</sub> O
Effective Stack Area, $A_s$ :	283.529 ft <sup>2</sup>	Sample Volume, $V_m$ :	40.352 ft <sup>3</sup>
Pitot Coefficient, $C_p$ :	0.84 dimensionless	Average Meter Temp., $T_m$ :	85.7 °F
Gas Analysis:	8.5 % CO <sub>2</sub>	Average Stack Temp., $T_s$ :	307.8 °F
	13.0 % O <sub>2</sub>	Average $\sqrt{\Delta p}$ :	1.175 "H <sub>2</sub> O
	0.0 % CO	Condensate Volume, $V_c$ :	53.5 ml
	78.5 % N <sub>2</sub>	Meter Box Y:	0.995 dimensionless

**Data Calculated from Source Measurements:**

$V_{w(std)} = 4.714E-02 \times V_c$	2.522 scf
$V_{m(std)} = 17.647 \times V_m \times Y \times (P_b + (\Delta H / 13.6)) / (T_m + 460)$	38.760 dscf
$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$	0.061 %
$FDA = 1.0 - B_{ws}$	0.939 %
$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times (\%N_2 + \%CO))$	29.88 lb./lb. mole
$M_s = (M_d \times FDA) + (18.0 \times B_{ws})$	29.15 lb./lb. mole
$v_s = 85.49 \times C_p \times (\sqrt{\Delta p}) \times (\sqrt{(T_s + 460)} / (M_s \times P_s))$	79.48 ft/second
$Q_s = v_s \times A_s \times 60$	1352037.7 acf/minute
$Q_{s(std)} = Q_s \times FDA \times (528 / (T_s + 460)) \times (P_s / 29.92)$	866622.3 dscf/minute
$I = (T_s + 460) \times ((2.67E-03 \times V_c) + (V_{m(std)} / 17.647)) \times 100 / (\theta \times P_s \times A_n \times v_s \times 60)$	99.9 %

**Data from Laboratory Analysis:**

	H <sub>2</sub> SO <sub>4</sub>
Normality of Barium Chloride titrant, N	0.01019
Volume Titrant Blank, $V_b$	0.02
Volume Titrant Sample, $V$	3.35
Volume of Sample Aliquot, $V_a$	100
Total Volume of Solution, $V_{soln}$	500

**Calculated Concentration and Emission Rate Data:**

$$C_{H_2SO_4} = 1.081E-04 \times (N \times (V - V_b) \times (V_{soln} / V_a)) / V_{m(std)} = 4.732E-07 \text{ lb/dscf}$$

$$F_c\text{-factor} = 1800 \text{ dscf/mmBtu}$$

$$E_{H_2SO_4} = C_{H_2SO_4} \times F_c\text{-factor} \times (100/\%CO_2) = 0.01002 \text{ lb/mmBtu}$$

$$E_{H_2SO_4} = C_{H_2SO_4} \times Q_{s(std)} \times 60 = 24.6041 \text{ lb/hr}$$



40 CFR 60, Appendix A - Test Methods  
Reference Method 8  
Test Calculations

Customer: Polk Power Station  
Facility: Unit 1 - HRSG  
Sampling Location: Stack  
Operating Conditions: Based at Full Load  
Run Number: 2  
Date: 05/20/03

Sample Time, $\theta$ :	60 minutes	Nozzle Diameter, $D_n$ :	0.197 inches
Barometric Pressure, $P_b$ :	29.74 "Hg	Nozzle Area, $A_n$ :	0.0002117 ft <sup>2</sup>
Stack Pressure, $P_s$ :	29.69 "Hg	Average Orifice Meter $\Delta H$ :	1.393 "H <sub>2</sub> O
Effective Stack Area, $A_s$ :	283.529 ft <sup>2</sup>	Sample Volume, $V_m$ :	40.097 ft <sup>3</sup>
Pitot Coefficient, $C_p$ :	0.84 dimensionless	Average Meter Temp., $T_m$ :	91.9 °F
Gas Analysis:	13.0 % CO <sub>2</sub>	Average Stack Temp., $T_s$ :	308.0 °F
	8.5 % O <sub>2</sub>	Average $\sqrt{\Delta p}$ :	1.164 "H <sub>2</sub> O
	0.0 % CO	Condensate Volume, $V_c$ :	37.1 ml
	78.5 % N <sub>2</sub>	Meter Box Y:	0.995 dimensionless

Data Calculated from Source Measurements:

$V_{w(std)} = 4.714E-02 \times V_c$	1.749 scf
$V_{m(std)} = 17.647 \times V_m \times Y \times (P_b + (\Delta H / 13.6)) / (T_m + 460)$	38.069 dscf
$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$	0.044 %
$FDA = 1.0 - B_{ws}$	0.956 %
$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times (\%N_2 + \%CO))$	30.42 lb./lb. mole
$M_s = (M_d \times FDA) + (18.0 \times B_{ws})$	29.87 lb./lb. mole
$v_s = 85.49 \times C_p \times (\sqrt{\Delta p}) \times (\sqrt{(T_s + 460)}) / (M_s \times P_s)$	77.81 ft/second
$Q_s = v_s \times A_s \times 60$	1323765.9 acf/minute
$Q_{s(std)} = Q_s \times FDA \times (528 / (T_s + 460)) \times (P_s / 29.92)$	863383.9 dscf/minute
$I = (T_s + 460) \times ((2.67E-03 \times V_c) + (V_{m(std)} / 17.647)) \times 100 / (\phi \times P_s \times A_n \times v_s \times 60)$	98.4 %

Data from Laboratory Analysis:

	H <sub>2</sub> SO <sub>4</sub>
Normality of Barium Chloride titrant, N	0.01019
Volume Titrant Blank, $V_b$	0.02
Volume Titrant Sample, $V$	3.3
Volume of Sample Aliquot, $V_a$	100
Total Volume of Solution, $V_{soln}$	500

Calculated Concentration and Emission Rate Data:

$C_{H_2SO_4} = 1.081E-04 \times (N \times (V - V_b) \times (V_{soln} / V_a)) / V_{m(std)}$	= 4.745E-07 lb/dscf
$F_c\text{-factor}$	= 1800 dscf/MMBtu
$E_{H_2SO_4} = C_{H_2SO_4} \times F_c\text{-factor} \times (100/\%CO_2)$	= 0.00657 lb/MMBtu
$E_{H_2SO_4} = C_{H_2SO_4} \times Q_{s(std)} \times 60$	= 24.5828 lb/hr



40 CFR 60, Appendix A - Test Methods  
Reference Method 8  
Test Calculations

Customer: Polk Power Station  
Facility: Unit 1 - HRSG  
Sampling Location: Stack  
Operating Conditions: Based at Full Load  
Run Number: 3  
Date: 05/20/03

Sample Time, $\theta$ :	60 minutes	Nozzle Diameter, $D_n$ :	0.197 inches
Barometric Pressure, $P_b$ :	29.80 "Hg	Nozzle Area, $A_n$ :	0.0002117 ft <sup>2</sup>
Stack Pressure, $P_s$ :	29.75 "Hg	Average Orifice Meter $\Delta H$ :	1.360 "H <sub>2</sub> O
Effective Stack Area, $A_s$ :	283.529 ft <sup>2</sup>	Sample Volume, $V_m$ :	39.836 ft <sup>3</sup>
Pitot Coefficient, $C_p$ :	0.84 dimensionless	Average Meter Temp., $T_m$ :	97.4 °F
Gas Analysis:	13.2 % CO <sub>2</sub>	Average Stack Temp., $T_s$ :	307.8 °F
	8.5 % O <sub>2</sub>	Average $\sqrt{\Delta p}$ :	1.145 "H <sub>2</sub> O
	0.0 % CO	Condensate Volume, $V_c$ :	43.5 ml
	78.3 % N <sub>2</sub>	Meter Box Y:	0.995 dimensionless

Data Calculated from Source Measurements:

$V_{w(std)} = 4.714E-02 \times V_c$	2.051 scf
$V_{m(std)} = 17.647 \times V_m \times Y \times (P_b + (\Delta H / 13.6)) / (T_m + 460)$	37.523 dscf
$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$	0.052 %
$FDA = 1.0 - B_{ws}$	0.948 %
$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times (\%N_2 + \%CO))$	30.45 lb./lb. mole
$M_s = (M_d \times FDA) + (18.0 \times B_{ws})$	29.81 lb./lb. mole
$v_s = 85.49 \times C_p \times (\sqrt{\Delta p}) \times (\sqrt{T_s + 460}) / (M_s \times P_s)$	76.51 ft/second
$Q_s = v_s \times A_s \times 60$	1301556.4 acf/minute
$Q_{s(std)} = Q_s \times FDA \times (528 / (T_s + 460)) \times (P_s / 29.92)$	843906.6 dscf/minute
$I = (T_s + 460) \times ((2.67E-03 \times V_c) + (V_{m(std)} / 17.647)) \times 100 / (\theta \times P_s \times A_n \times v_s \times 60)$	99.3 %

Data from Laboratory Analysis:

	H <sub>2</sub> SO <sub>4</sub>
Normality of Barium Chloride titrant, N	0.01019
Volume Titrant Blank, $V_b$	0.02
Volume Titrant Sample, $V_t$	4.44
Volume of Sample Aliquot, $V_a$	100
Total Volume of Solution, $V_{soln}$	500

Calculated Concentration and Emission Rate Data:

$C_{H_2SO_4} = 1.081E-04 \times (N \times (V_t - V_b) \times (V_{soln} / V_a)) / V_{m(std)}$	6.488E-07 lb/dscf
$F_c\text{-factor} =$	1800 dscf/MMBtu
$E_{H_2SO_4} = C_{H_2SO_4} \times F_c\text{-factor} \times (100/\%CO_2)$	0.00885 lb/MMBtu
$E_{H_2SO_4} = C_{H_2SO_4} \times Q_{s(std)} \times 60 =$	32.8507 lb/hr

**APPENDIX B**

**SULFURIC ACID MIST LABORATORY ANALYTICAL DATA**



**Environmental Affairs  
Laboratory Services**

5012 Causeway Blvd \* Tampa Fl. 33619 \* Ph (813)630-7378 \* Fax (813)630-7360 \* CompQAP #910140G \* DOH #E54272

**Report For:** David Smith, Air Services  
E/A Causeway

**Report Date:** 05/27/03

**Laboratory ID: AA69850**

**Sample Information**

**Location Code:** PK-STK-S

**Sampled By:** C. DUFENY

**Location Description:** Polk Stack test ,SO3 analysis

**Date Collected:** 05/20/03

**Project Account Code:**

**Time Collected:** 10:45:00 AM

**Sample Collection Method:**

**Date of Sample Receipt:** 05/21/03

**Laboratory Results**

Parameter	Result	Units	MDL	Qualifier Code	Lower Limit	Upper Limit	Violation Check
Normality of BaCl2 * 2H2O	0.01019		0.0001				
SO3, Avg. of Blank Titrations	0.02	milliliters	0.01	PQL			
SO3, Run #1, Avg. of Titrations	3.35	milliliters	0.01				
SO3, Run #2, Avg. of Titrations	3.30	milliliters	0.01				
SO3, Run #3, Avg. of Titrations	4.44	milliliters	0.01				
SO3, Volume of Contained Sample	500	milliliters	1				
SO3, Volume of Sample Aliquot	100	milliliters	0.1				

**Comments:**

All results calculated on a wet to wet basis, unless otherwise indicated.

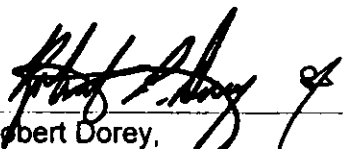
EPA Method 8

Polk Unit 1 Sulfuric Acid Mist Test

**Data Qualifier Codes Explanation:**

PQL - The reported value is between the laboratory method detection limit (MDL) and the laboratory practical quatitation limit (PQL). PQL = 4 x MDL.

**Subcontracted Laboratories:**

  
Robert Dorey,  
Manager, Environmental Services

**SO3 ANALYSIS  
EPA METHOD 8**

UNIT: Pow Unit 1 SAM

COLLECTION DATE: 5/20/03

Rundate 5-23-03 @ 13:00 IPA PORTION

IPA-C-771

30% H<sub>2</sub>O<sub>2</sub> - RW-2436

BaCl<sub>2</sub> - RW-2402

	Final Vol	Aliquot	BaCl <sub>2</sub> (ml)	BaCl <sub>2</sub> Avg (ml)
<u>AA69850</u>				
Field ISOP. BLANK	<u>already <sup>not</sup> over 500ml</u>	<u>100 mL</u>	<u>0.03</u>	<u>0.02</u>
Sample Number ISOP. BLANK - DUP	<u>"</u>	<u>100 mL</u>	<u>0.02</u>	
RUN 1	<u>500 ml</u>	<u>100 ml</u>	<u>3.35</u>	<u>3.35</u>
RUN 1 - DUP	<u>500 ml</u>	<u>100 ml</u>	<u>3.35</u>	
RUN 2	<u>500 ml</u>	<u>100 ml</u>	<u>3.30</u>	<u>3.30</u>
RUN 2 - DUP	<u>500 ml</u>	<u>100 ml</u>	<u>3.30</u>	
RUN 3	<u>500 ml</u>	<u>100 ml</u>	<u>4.42</u>	<u>4.44</u>
RUN 3	<u>500 ml</u>	<u>100 ml</u>	<u>4.45</u>	
RUN 4	_____	_____	_____	_____
RUN 4 - DUP	_____	_____	_____	_____
RUN 5	_____	_____	_____	_____
RUN 5 - DUP	_____	_____	_____	_____
RUN 6	_____	_____	_____	_____
RUN 6	_____	_____	_____	_____

Used standardized BaCl<sub>2</sub> from 5-13-03

405

20 ml of sample + 80 ml of 100% IPA #1 5.27 ml BaCl<sub>2</sub> → 409.5 101.1%  
#2 5.26 ml BaCl<sub>2</sub>  
attend #3 5.23 ml BaCl<sub>2</sub>

FV = 400

80% Lab IPA Blank 100 ml = 0.02 ml BaCl<sub>2</sub>

1/



**SOS ANALYSIS  
EPA METHOD 8**

NaOH - RW-1834  
AgL 5-14-03

H<sub>2</sub>SO<sub>4</sub> - RW-2403  
BaCl<sub>2</sub> - RW-2402

ANALYSIS DATE: 5-13-03

UNIT: Polk Acid PLANT

ANALYSIS TIME: 10:00

COLLECTION DATE: 5-13-03

ANALYST: Gail A. Harrison

NaOH STANDARDIZATION:

- 1) 0.0240 gm KHP ----> 12.60 mL NaOH RW-1834 <sup>0.0093265N</sup>
- 2) 0.0239 gm KHP ----> 12.91 mL NaOH <sup>0.0090696N</sup>
- 3) 0.0216 gm KHP ----> 11.78 mL NaOH <sup>0.0089781N</sup>
- 3) 0.0199 gm KHP ----> 11.10 mL NaOH <sup>0.0087782</sup>
- 2) 0.0185 gm KHP ----> 10.29 mL NaOH <sup>0.008993</sup>
- 1) 0.0194 gm KHP ----> 10.60 mL NaOH <sup>0.008961</sup>

$$\frac{0.021283 \text{ gm KHP}}{(0.20423 \times 11.5464 \text{ mL NaOH})}$$

0.00903 N. NaOH

H2SO4 STANDARDIZATION:

- 1) 10 mL H<sub>2</sub>SO<sub>4</sub> ----> 11.13 mL NaOH
- 2) 10 mL H<sub>2</sub>SO<sub>4</sub> ----> 11.42 mL NaOH
- 3) 10 mL H<sub>2</sub>SO<sub>4</sub> ----> 11.30 mL NaOH

$$\frac{(11.2833 \text{ mL NaOH})(0.00903 \text{ N. NaOH})}{10 \text{ mL H}_2\text{SO}_4}$$

0.010189  
~~0.0102~~ N. H<sub>2</sub>SO<sub>4</sub>

Avg = 11.2833

gah  
5-13-03

BaCl2 - 2H2O STANDARDIZATION:

- 1) 10 mL H<sub>2</sub>SO<sub>4</sub> + 40 mL ISOPROPANOL ----> 10.02 mL BaCl<sub>2</sub> - 2H<sub>2</sub>O
- 2) 10 mL H<sub>2</sub>SO<sub>4</sub> + 40 mL ISOPROPANOL ----> 10.01 mL BaCl<sub>2</sub> - 2H<sub>2</sub>O
- 3) 10 mL H<sub>2</sub>SO<sub>4</sub> + 40 mL ISOPROPANOL ----> 9.98 mL BaCl<sub>2</sub> - 2H<sub>2</sub>O

$$\frac{((0.010189) \text{ N. H}_2\text{SO}_4)(10 \text{ mL H}_2\text{SO}_4)}{10.00333 \text{ mL BaCl}_2 - 2\text{H}_2\text{O}} = \underline{0.01019} \text{ N. BaCl}_2 - 2\text{H}_2\text{O}$$

H<sub>2</sub>O<sub>2</sub> - C-796  
perchlorophthalate - RW-1947

APPENDIX C

DATA ACQUISITION AND HANDLING SYSTEM REPORTS

-----  
 Polk Station  
 HRSG  
 Tampa  
 -----

Today's Date: 06/17/2003  
 Time: 05:24:31

Reporting Period  
 Day: 05/20/2003

DAILY EPA CEM SUMMARY

Time	CO2 %	SO2 ppm	SO2 lb/mmBtu	SO2 lb/hr	NOX ppm	NOX lb/mmBtu	FLOW kscfh	Ht Inp mmBtu
0000	8.1	37.8	0.180	322.8	13.8	0.047	51438	1803
0100	8.2	36.1	0.170	306.7	14.0	0.047	51186	1816
0200	8.1	33.4	0.160	281.7	14.3	0.049	50802	1781
0300	8.2	30.9	0.140	262.0	14.7	0.049	51078	1813
0400	8.2	29.0	0.140	245.9	14.9	0.050	51084	1813
0500	8.2	28.8	0.130	245.3	14.8	0.050	51306	1821
0600	8.2	29.9	0.140	252.9	15.1	0.051	50952	1808
0700	8.3	30.8	0.140	302.7	15.0	0.050M	59208M	2127
0800	8.3	32.6	0.150	266.5	14.9	0.050	49242	1769
0900	8.3	33.3	0.150	280.3	14.6	0.049	50712	1822
1000	8.3	35.0	0.160	294.6	14.3	0.048	50700	1821
1100	8.3	33.5	0.150	278.6	13.7	0.046	50106	1800
1200	8.1	30.5	0.140	253.6	13.4	0.046	50094	1756
1300	8.0	26.3	0.130	215.7	12.5	0.043	49404	1710
1400	8.2	27.9	0.130	227.9	14.3	0.048	49200	1746
1500	8.3	32.8	0.150	270.6	14.8	0.049	49704	1785
1600	8.3	33.0	0.150	275.2	14.5	0.048	50244	1805
1700	8.2	32.1	0.150	267.1	14.2	0.048	50124	1779
1800	8.2	31.9	0.150	265.9	14.3	0.048	50220	1782
1900	8.2	31.8	0.150	265.5	14.3	0.048	50304	1785
2000	8.2	31.4	0.150	264.2	14.1	0.047	50694	1799
2100	8.2	30.9	0.140	260.2	14.0	0.047	50730	1800
2200	8.2	32.4	0.150	274.1	14.2	0.048	50970	1809
2300	8.2	33.5	0.160	283.6	13.8	0.046	51000	1810
AVRGE	8.2	31.9	0.148	269.3	14.3	0.048	50854	1807

Daily SO2 3.2 Tons  
 Daily CO2 5710.8 Tons

Legend

- C - Out of Control
- F - Fans Off
- D - Out of Service
- I - Insufficient Data
- M - Maintenance Fault
- A - Calibration Error
- X - Calibration Expired

=====  
Tampa Electric  
Polk Unit 1  
=====

Today's Date: 06/17/2003  
Time: 05:25:20

Reporting Period  
Day: 05/20/2003

Daily NOx O2 Summary

Dry Values are corrected to 7% moisture

Time	O2 %	O2 dry	NOx ppm	NOx dry	NOx @15% O2
0000	11.0	11.8	13.8	14.8	9.7
0100	11.0	11.8	14.0	15.1	9.8
0200	11.0	11.8	14.3	15.4	10.0
0300	11.0	11.8	14.7	15.8	10.3
0400	11.0	11.8	14.9	16.0	10.4
0500	11.0	11.8	14.8	15.9	10.3
0600	11.0	11.8	15.1	16.2	10.6
0700	10.9	11.7	15.0	16.1	10.4
0800	10.9	11.7	14.9	16.0	10.3
0900	10.9	11.7	14.6	15.7	10.1
1000	10.9	11.7	14.3	15.4	9.9
1100	10.9	11.7	13.7	14.7	9.5
1200	11.0	11.8	13.4	14.4	9.4
1300	11.1	11.9	12.5	13.4	8.8
1400	11.1	11.9	14.3	15.4	10.1
1500	11.0	11.8	14.8	15.9	10.3
1600	11.0	11.8	14.5	15.6	10.1
1700	11.0	11.8	14.2	15.3	9.9
1800	11.0	11.8	14.3	15.4	10.0
1900	11.0	11.8	14.3	15.4	10.0
2000	11.0	11.8	14.1	15.2	9.9
2100	11.0	11.8	14.0	15.1	9.8
2200	11.0	11.8	14.2	15.3	9.9
2300	11.0	11.8	13.8	14.8	9.7
AVRGE	11.0	11.8	14.3	15.3	10.0

Legend

C - Out of Control  
F - Fans Off  
D - Out of Service  
I - Insufficient Data  
M - Maintenance Fault  
A - Calibration Error  
X - Calibration Expired

POLK COUNTY QUARTERLY EMISSION REPORT  
HRSG

DATE	Nox	30-DAY Oil lbs/hr	30-DAY Gas lbs/hr	Daily Oil lbs/hr	Daily Gas lbs/hr	Hrs Oil	Hrs Gas	30-DAY Gas ppmvd	Daily Gas ppmvd	Gas&Oil Total tons/yr
04/19/2003		196.5	108.4	207.4	174.9	19	5	0.00	0.00	0.00
04/20/2003		197.0	109.0	196.5	142.2	7	15	0.00	0.00	0.00
04/24/2003		197.6	109.0	214.3	0.0	8	0	0.00	0.00	0.00
04/25/2003		196.0	109.0	165.8	0.0	5	0	0.00	0.00	0.00
04/26/2003		195.4	109.0	130.9	0.0	4	0	0.00	0.00	0.00
04/27/2003		196.2	108.3	180.0	98.6	8	7	0.00	0.00	0.00
04/28/2003		197.8	109.6	255.7	163.7	4	18	0.00	0.00	0.00
04/29/2003		198.7	110.4	232.6	142.4	2	22	0.00	0.00	0.00
04/30/2003		198.7	109.6	0.0	144.2	0	24	0.00	0.00	0.00
05/01/2003		198.7	110.3	0.0	161.8	0	24	0.00	0.00	0.00
05/02/2003		198.7	111.4	0.0	150.3	0	24	0.00	20.96	0.00
05/03/2003		199.2	111.6	186.1	118.5	1	23	0.00	16.28	0.00
05/04/2003		199.2	111.8	0.0	120.0	0	24	0.00	15.29	0.00
05/05/2003		199.8	113.1	231.2	146.5	3	21	0.00	20.06	0.00
05/06/2003		199.8	113.3	0.0	108.0	0	24	0.00	12.77	0.00
05/07/2003		199.8	113.1	0.0	98.6	0	24	0.00	11.49	0.00
05/08/2003		199.8	112.4	0.0	96.2	0	24	0.00	11.26	0.00
05/09/2003		199.8	111.7	0.0	94.1	0	24	0.00	10.90	0.00
05/10/2003		199.8	110.8	0.0	91.0	0	24	0.00	10.44	0.00
05/11/2003		199.8	108.6	0.0	75.8	0	24	0.00	8.93	0.00
05/12/2003		199.8	108.5	0.0	90.2	0	24	15.04	10.42	134.99
05/13/2003		199.8	108.5	0.0	91.3	0	24	15.04	10.55	136.09
05/14/2003		199.8	108.7	0.0	92.8	0	24	15.06	10.68	137.20
05/15/2003		199.8	108.0	0.0	93.0	0	24	14.86	10.73	138.32
05/16/2003		193.9	107.7	202.2	101.4	12	12	14.90	13.61	140.14
05/17/2003		193.9	107.1	0.0	98.1	0	24	14.85	11.58	141.27
05/18/2003		193.9	107.3	0.0	98.5	0	24	14.88	11.38	142.30
05/19/2003		193.9	107.1	0.0	95.1	0	24	14.87	10.86	143.35
05/20/2003		193.9	106.9	0.0	85.8	0	24	14.86	9.96	144.34

POLK COUNTY QUARTERLY EMISSION REPORT  
HRSG

DATE	30-DAY So2 Oil lbs	30-DAY Gas lbs	Daily Oil lbs	Daily Gas lbs	Hours Boiler
04/19/2003	44.9	283.2	42.3	118.0	24
04/20/2003	45.0	277.7	46.6	183.9	22
04/24/2003	44.7	277.7	45.5	0.0	8
04/25/2003	44.0	277.7	38.2	0.0	5
04/26/2003	43.5	277.7	21.0	0.0	4
04/27/2003	43.5	267.9	40.0	64.5	15
04/28/2003	43.6	257.8	54.6	54.1	22
04/29/2003	44.0	247.9	54.3	56.6	24
04/30/2003	44.0	242.4	0.0	48.2	24
05/01/2003	44.0	233.2	0.0	70.4	24
05/02/2003	44.0	224.9	0.0	82.8	24
05/03/2003	44.3	215.7	49.1	66.6	24
05/04/2003	44.3	207.5	0.0	77.6	24
05/05/2003	44.4	200.0	58.6	110.9	24
05/06/2003	44.4	196.5	0.0	253.2	24
05/07/2003	44.4	194.7	0.0	301.1	24
05/08/2003	44.4	197.2	0.0	367.5	24
05/09/2003	44.4	194.9	0.0	263.1	24
05/10/2003	44.4	195.2	0.0	326.5	24
05/11/2003	44.4	200.8	0.0	245.0	24
05/12/2003	44.4	202.0	0.0	312.9	24
05/13/2003	44.4	200.3	0.0	230.1	24
05/14/2003	44.4	200.5	0.0	310.0	24
05/15/2003	44.4	200.7	0.0	332.6	24
05/16/2003	43.3	196.8	47.9	218.9	24
05/17/2003	43.3	194.9	0.0	290.8	24
05/18/2003	43.3	191.8	0.0	256.1	24
05/19/2003	43.3	190.7	0.0	310.7	24
05/20/2003	43.3	188.0	0.0	267.8	24

APPENDIX D

TURBINE DATA

Polk Power Station Unit 1 SAM Compliance

May 20, 2003

Test Period: 05/20/2003 9:13

1 Min 05/20/2003 13:41

	CT Syngas Mass Flow Saturator Moisture, % CT Gen Watts			Mass Flow Corrected for Moisture
	1TSYFI910	1TSYAI202	1GMLJI962	
<b>Test Period Averages</b>	<b>108.9922193</b>	<b>5.8426679</b>	<b>189.7803389</b>	<b>102.624166</b>
20-May-03 09:13:00	109.658806	5.778050	192.111938	
20-May-03 09:14:00	109.290398	5.772137	192.055069	
20-May-03 09:15:00	109.047401	5.766224	191.600555	
20-May-03 09:16:00	108.666481	5.760312	191.513519	
20-May-03 09:17:00	108.367569	5.754398	190.643509	
20-May-03 09:18:00	108.598015	5.748486	191.308212	
20-May-03 09:19:00	108.856483	5.742573	191.819824	
20-May-03 09:20:00	109.147163	5.736660	191.507217	
20-May-03 09:21:00	109.357277	5.730747	192.139359	
20-May-03 09:22:00	108.750702	5.724833	191.695908	
20-May-03 09:23:00	109.277786	5.718921	191.373001	
20-May-03 09:24:00	109.362892	5.713008	191.726364	
20-May-03 09:25:00	109.020042	5.707095	190.778214	
20-May-03 09:26:00	109.324318	5.702879	191.365509	
20-May-03 09:27:00	109.233498	5.713943	191.912476	
20-May-03 09:28:00	109.328896	5.725006	192.154190	
20-May-03 09:29:00	109.107132	5.736068	192.348892	
20-May-03 09:30:00	109.407982	5.747131	192.187759	
20-May-03 09:31:00	109.092354	5.758194	192.026611	
20-May-03 09:32:00	109.311897	5.769258	191.947372	
20-May-03 09:33:00	109.483078	5.780320	192.388641	
20-May-03 09:34:00	109.756424	5.790036	192.183182	
20-May-03 09:35:00	109.492050	5.787624	192.069580	
20-May-03 09:36:00	109.585457	5.785213	192.364914	
20-May-03 09:37:00	109.429314	5.782802	191.558685	
20-May-03 09:38:00	109.797234	5.780390	191.668365	
20-May-03 09:39:00	109.428978	5.777978	191.715881	
20-May-03 09:40:00	109.223610	5.775567	191.443161	
20-May-03 09:41:00	110.256203	5.773156	191.805725	
20-May-03 09:42:00	110.338989	5.770744	192.063416	
20-May-03 09:43:00	109.802444	5.768332	191.527191	
20-May-03 09:44:00	110.039528	5.765921	191.084656	
20-May-03 09:45:00	108.948624	5.763510	191.332031	
20-May-03 09:46:00	108.906769	5.761098	191.919144	
20-May-03 09:47:00	109.135406	5.758687	190.932205	
20-May-03 09:48:00	108.916901	5.756275	191.362823	
20-May-03 09:49:00	109.086891	5.753864	191.195404	
20-May-03 09:50:00	108.991989	5.751452	191.804916	
20-May-03 09:51:00	109.216743	5.749041	191.539047	
20-May-03 09:52:00	109.559616	5.746629	191.345078	



20-May-03 09:53:00	109.548927	5.739188	191.695541
20-May-03 09:54:00	109.603394	5.693663	191.850266
20-May-03 09:55:00	108.290482	5.648138	190.690231
20-May-03 09:56:00	108.939781	5.608118	190.617722
20-May-03 09:57:00	109.050240	5.617635	190.618988
20-May-03 09:58:00	109.327370	5.627152	191.099731
20-May-03 09:59:00	109.812729	5.636669	191.580475
20-May-03 10:00:00	109.544708	5.646186	192.012177
20-May-03 10:01:00	109.850159	5.655704	192.072601
20-May-03 10:02:00	109.654289	5.665221	192.027878
20-May-03 10:03:00	108.901337	5.674738	191.186981
20-May-03 10:04:00	108.751572	5.685878	190.501358
20-May-03 10:05:00	108.639183	5.714870	190.824951
20-May-03 10:06:00	108.622612	5.750603	191.113632
20-May-03 10:07:00	109.318687	5.860469	191.137894
20-May-03 10:08:00	109.716949	5.957111	191.162140
20-May-03 10:09:00	109.683144	5.908282	191.186386
20-May-03 10:10:00	108.717003	5.859452	191.210648
20-May-03 10:11:00	108.992546	5.814522	191.276779
20-May-03 10:12:00	109.225395	5.812488	191.615173
20-May-03 10:13:00	109.846626	5.810453	191.953552
20-May-03 10:14:00	109.859924	5.806426	192.230713
20-May-03 10:15:00	109.896614	5.780485	192.109863
20-May-03 10:16:00	109.636681	5.757720	191.989014
20-May-03 10:17:00	110.001831	5.769876	191.868149
20-May-03 10:18:00	109.616409	5.782033	191.747299
20-May-03 10:19:00	109.464279	5.794190	191.564255
20-May-03 10:20:00	109.704964	5.806350	190.976974
20-May-03 10:21:00	109.144829	5.818557	190.570053
20-May-03 10:22:00	109.335655	5.830765	191.411545
20-May-03 10:23:00	109.772026	5.842972	191.491669
20-May-03 10:24:00	109.417480	5.853724	191.571793
20-May-03 10:25:00	109.686707	5.844086	191.614365
20-May-03 10:26:00	109.380783	5.834448	191.372650
20-May-03 10:27:00	109.846344	5.824811	191.257843
20-May-03 10:28:00	110.006111	5.815174	192.005127
20-May-03 10:29:00	109.516586	5.805536	192.005127
20-May-03 10:30:00	109.941063	5.795899	191.886688
20-May-03 10:31:00	109.258247	5.786262	191.036957
20-May-03 10:32:00	109.356888	5.776624	191.439804
20-May-03 10:33:00	109.848061	5.766986	191.842636
20-May-03 10:34:00	109.765884	5.757349	192.176865
20-May-03 10:35:00	109.871826	5.747712	191.991562
20-May-03 10:36:00	109.317497	5.738074	191.806244
20-May-03 10:37:00	109.422287	5.729482	191.670761
20-May-03 10:38:00	109.850761	5.732386	191.822235
20-May-03 10:39:00	109.669617	5.735291	191.368973
20-May-03 10:40:00	109.541725	5.738194	191.509964
20-May-03 10:41:00	109.648689	5.741099	191.650955
20-May-03 10:42:00	109.913742	5.744003	191.791962

20-May-03 10:43:00	109.874817	5.746907	191.932953
20-May-03 10:44:00	109.956276	5.749812	192.073944
20-May-03 10:45:00	109.567131	5.752716	192.194962
20-May-03 10:46:00	110.062485	5.755620	192.164749
20-May-03 10:47:00	109.810326	5.758524	192.134537
20-May-03 10:48:00	110.436195	5.761428	192.104324
20-May-03 10:49:00	110.256706	5.764333	191.928177
20-May-03 10:50:00	109.611877	5.767237	190.793777
20-May-03 10:51:00	110.080315	5.770141	190.769608
20-May-03 10:52:00	109.617302	5.773045	190.832840
20-May-03 10:53:00	109.796135	5.775949	191.366211
20-May-03 10:54:00	109.095428	5.778854	190.625977
20-May-03 10:55:00	109.550613	5.781758	191.235321
20-May-03 10:56:00	109.696854	5.784662	191.763428
20-May-03 10:57:00	110.103561	5.787566	191.763428
20-May-03 10:58:00	109.850327	5.789824	191.650635
20-May-03 10:59:00	109.516884	5.783030	190.843597
20-May-03 11:00:00	109.557175	5.776235	191.246445
20-May-03 11:01:00	110.394173	5.769441	191.649277
20-May-03 11:02:00	109.842506	5.762646	191.998077
20-May-03 11:03:00	109.738373	5.755852	191.937653
20-May-03 11:04:00	109.740746	5.749057	191.816605
20-May-03 11:05:00	109.896545	5.742263	191.321106
20-May-03 11:06:00	109.522690	5.735468	191.466125
20-May-03 11:07:00	109.715263	5.731958	191.532181
20-May-03 11:08:00	109.996338	5.764579	191.110016
20-May-03 11:09:00	110.289330	5.797200	191.517517
20-May-03 11:10:00	110.461716	5.829821	191.869720
20-May-03 11:11:00	110.202187	5.862441	191.724091
20-May-03 11:12:00	110.560318	5.895062	191.578461
20-May-03 11:13:00	110.549858	5.927682	191.432831
20-May-03 11:14:00	109.886261	5.955943	191.290207
20-May-03 11:15:00	109.644768	5.923155	191.170349
20-May-03 11:16:00	109.526688	5.890367	191.077026
20-May-03 11:17:00	109.857758	5.857579	191.222656
20-May-03 11:18:00	110.034172	5.824792	191.368286
20-May-03 11:19:00	109.777519	5.792004	191.513916
20-May-03 11:20:00	109.762260	5.759216	191.615753
20-May-03 11:21:00	109.669106	5.726429	191.385941
20-May-03 11:22:00	109.653839	5.693641	191.156113
20-May-03 11:23:00	109.828789	5.660853	190.949631
20-May-03 11:24:00	109.667801	5.628066	191.069824
20-May-03 11:25:00	109.412910	5.601563	191.190002
20-May-03 11:26:00	109.578972	5.644200	191.286057
20-May-03 11:27:00	109.640190	5.686837	190.951691
20-May-03 11:28:00	109.691048	5.729475	191.153107
20-May-03 11:29:00	110.188377	5.772111	191.354538
20-May-03 11:30:00	110.088806	5.814749	191.536301
20-May-03 11:31:00	109.926987	5.857386	191.344528
20-May-03 11:32:00	110.311600	5.900023	191.164551

20-May-03 11:33:00	110.224693	5.938597	191.326584
20-May-03 11:34:00	109.814140	5.920286	191.488632
20-May-03 11:35:00	110.575851	5.901975	191.615982
20-May-03 11:36:00	110.201263	5.883663	191.125916
20-May-03 11:37:00	110.147232	5.865352	191.428055
20-May-03 11:38:00	110.158134	5.847041	191.712509
20-May-03 11:39:00	109.968872	5.828730	191.661148
20-May-03 11:40:00	109.786827	5.810419	191.609787
20-May-03 11:41:00	110.018311	5.792108	191.558426
20-May-03 11:42:00	109.663078	5.773797	191.507065
20-May-03 11:43:00	109.450897	5.755486	191.455704
20-May-03 11:44:00	110.184937	5.742544	191.404343
20-May-03 11:45:00	110.194435	5.804771	191.352982
20-May-03 11:46:00	109.707275	5.866998	191.289078
20-May-03 11:47:00	109.727776	5.929225	190.986938
20-May-03 11:48:00	109.754784	5.991452	190.684799
20-May-03 11:49:00	109.470352	6.053679	190.382675
20-May-03 11:50:00	109.530319	6.110054	190.101593
20-May-03 11:51:00	110.150040	6.102042	190.246811
20-May-03 11:52:00	110.160042	6.094031	191.096909
20-May-03 11:53:00	109.514557	6.086020	190.818954
20-May-03 11:54:00	109.283119	6.078009	190.606857
20-May-03 11:55:00	110.194397	6.069998	191.592224
20-May-03 11:56:00	110.290886	6.061987	191.552155
20-May-03 11:57:00	110.819000	6.053976	191.512100
20-May-03 11:58:00	111.081017	6.049811	191.448792
20-May-03 11:59:00	110.746178	6.087959	190.678711
20-May-03 12:00:00	109.547104	6.126108	189.288071
20-May-03 12:01:00	109.107796	6.164256	188.046799
20-May-03 12:02:00	108.813019	6.196386	188.216705
20-May-03 12:03:00	108.526260	6.162319	188.386597
20-May-03 12:04:00	108.783737	6.128252	188.556503
20-May-03 12:05:00	108.376724	6.094184	188.708237
20-May-03 12:06:00	108.738991	6.060117	188.482254
20-May-03 12:07:00	107.997299	6.024320	187.675552
20-May-03 12:08:00	107.890129	5.964304	187.615128
20-May-03 12:09:00	107.881172	5.904287	187.636276
20-May-03 12:10:00	108.473671	5.844271	189.056305
20-May-03 12:11:00	107.913010	5.784255	187.709991
20-May-03 12:12:00	108.313545	5.729291	188.338440
20-May-03 12:13:00	108.640923	5.729901	188.885529
20-May-03 12:14:00	108.131813	5.730512	187.950104
20-May-03 12:15:00	107.843094	5.731122	188.782654
20-May-03 12:16:00	108.101456	5.731732	187.859970
20-May-03 12:17:00	107.563530	5.735554	187.620255
20-May-03 12:18:00	107.869049	5.774699	187.416733
20-May-03 12:19:00	108.475143	5.813843	188.239929
20-May-03 12:20:00	108.782082	5.852988	188.403091
20-May-03 12:21:00	109.148605	5.892133	188.566238
20-May-03 12:22:00	109.070442	5.931278	188.729401

20-May-03 12:23:00	109.382904	5.970423	188.862534
20-May-03 12:24:00	108.801628	6.007003	188.145676
20-May-03 12:25:00	108.124939	6.007683	187.819366
20-May-03 12:26:00	107.943359	6.008362	187.529922
20-May-03 12:27:00	108.425240	6.009042	187.973785
20-May-03 12:28:00	108.293121	6.009721	188.966995
20-May-03 12:29:00	108.803139	6.010401	187.814545
20-May-03 12:30:00	108.591873	6.011080	188.116684
20-May-03 12:31:00	108.643562	6.011760	188.391815
20-May-03 12:32:00	108.219246	6.012439	188.129761
20-May-03 12:33:00	108.278122	6.008313	187.219330
20-May-03 12:34:00	108.934067	5.951328	187.944458
20-May-03 12:35:00	108.395027	5.894344	188.635239
20-May-03 12:36:00	108.315826	5.837359	188.330582
20-May-03 12:37:00	108.404411	5.784587	188.076797
20-May-03 12:38:00	108.430603	5.790804	188.747177
20-May-03 12:39:00	108.048454	5.797021	188.174377
20-May-03 12:40:00	107.813660	5.803237	187.631439
20-May-03 12:41:00	107.387733	5.809454	187.655396
20-May-03 12:42:00	107.965843	5.815671	187.696854
20-May-03 12:43:00	108.597107	5.821888	188.245270
20-May-03 12:44:00	108.299133	5.828104	188.748444
20-May-03 12:45:00	108.626205	5.834321	188.391922
20-May-03 12:46:00	108.454163	5.840538	188.035400
20-May-03 12:47:00	107.600327	5.846755	187.678894
20-May-03 12:48:00	107.511520	5.852972	187.347855
20-May-03 12:49:00	107.778160	5.859188	187.500931
20-May-03 12:50:00	107.965508	5.865405	187.654007
20-May-03 12:51:00	108.618195	5.871622	187.776474
20-May-03 12:52:00	108.455368	5.877839	187.363159
20-May-03 12:53:00	108.278755	5.884055	187.853821
20-May-03 12:54:00	109.075600	5.890272	188.869141
20-May-03 12:55:00	108.342392	5.896489	188.509567
20-May-03 12:56:00	108.474686	5.902706	188.164688
20-May-03 12:57:00	108.163780	5.908922	188.245712
20-May-03 12:58:00	108.564560	5.915139	188.326736
20-May-03 12:59:00	108.438431	5.921356	188.373489
20-May-03 13:00:00	108.007957	5.927572	187.769211
20-May-03 13:01:00	107.780029	5.933789	187.218933
20-May-03 13:02:00	108.013931	5.940006	187.630234
20-May-03 13:03:00	107.588547	5.946223	186.228348
20-May-03 13:04:00	107.042107	5.951725	185.786942
20-May-03 13:05:00	107.065117	5.947233	186.078400
20-May-03 13:06:00	106.870628	5.942740	184.588730
20-May-03 13:07:00	107.066422	5.938248	185.152039
20-May-03 13:08:00	107.678612	5.933756	185.689697
20-May-03 13:09:00	107.485756	5.929263	185.483398
20-May-03 13:10:00	107.487579	5.924771	185.277084
20-May-03 13:11:00	107.316727	5.920279	185.070786
20-May-03 13:12:00	107.235504	5.915786	184.901367

20-May-03 13:13:00	107.311699	5.911294	185.433121
20-May-03 13:14:00	107.905769	5.906801	185.911926
20-May-03 13:15:00	106.704529	5.902309	185.384567
20-May-03 13:16:00	106.826759	5.897816	184.882034
20-May-03 13:17:00	106.303108	5.893324	185.076752
20-May-03 13:18:00	107.004860	5.888832	184.647888
20-May-03 13:19:00	107.558777	5.884339	184.944351
20-May-03 13:20:00	107.366608	5.879847	185.240814
20-May-03 13:21:00	107.483406	5.876507	185.515244
20-May-03 13:22:00	107.921951	5.885854	185.150650
20-May-03 13:23:00	106.894455	5.895200	184.786072
20-May-03 13:24:00	106.837837	5.904546	184.453812
20-May-03 13:25:00	107.064079	5.913893	184.735809
20-May-03 13:26:00	107.293762	5.923239	185.017792
20-May-03 13:27:00	107.007965	5.932585	185.327988
20-May-03 13:28:00	107.477951	5.941932	186.095703
20-May-03 13:29:00	107.212822	5.951278	185.376572
20-May-03 13:30:00	107.117065	5.960624	184.681412
20-May-03 13:31:00	107.699211	5.969971	184.718277
20-May-03 13:32:00	107.377457	5.979317	185.769104
20-May-03 13:33:00	107.685478	5.988663	185.216385
20-May-03 13:34:00	107.634445	5.998010	185.313080
20-May-03 13:35:00	107.765358	6.007356	185.430710
20-May-03 13:36:00	107.578934	6.016702	186.098877
20-May-03 13:37:00	106.976379	6.024380	185.167160
20-May-03 13:38:00	107.552727	6.013710	185.201584
20-May-03 13:39:00	107.445007	6.003039	184.506943
20-May-03 13:40:00	106.471756	5.992369	183.835449
20-May-03 13:41:00	106.701973	5.981699	183.835449

**APPENDIX E**

**FUEL ANALYSIS**



**Synthetic Gas and Heating Value Calculations**

**Client Tampa Electric Company - Polk Power Unit 1**  
**Sample ID Polk Laboratory**  
**Date 05/24/03**

**CALCULATION OF DENSITY AND HEATING VALUE @ 60°F and 30 in Hg**

Component	% Volume	Molecular Wt.	Density (lb/ft <sup>3</sup> )	% volume		Component Gross Btu/lb	Weight Fract. Btu	Gross Heating Value (Btu/SCF)	Volume Fract. Btu
				x Density	weight %				
Hydrogen	34.05667	2.016	0.0053	0.00181	3.1692	61100	1936.36	325.0	110.684178
Oxygen	0.00000	32.000	0.0846	0.00000	0.0000	0	0.00	0.0	0
Nitrogen	4.16667	28.016	0.0744	0.00310	5.4429	0	0.00	0.0	0
CO <sub>2</sub>	14.05000	44.010	0.1170	0.01644	28.8622	0	0.00	0.0	0
CO	46.90333	28.010	0.0740	0.03471	60.9401	4347	2649.07	322.0	151.028723
Argon	0.84000	39.948	0.1065	0.00089	1.5707	0	0.00	0.0	0
COS	0.00000	60.070	0.1602	0.00000	0.0000	0	0.00	0.0	0
Methane	0.02000	16.041	0.0424	0.00001	0.0149	23879	3.56	1013.0	0.2026
Ethane		30.067	0.0803	0.00000	0.0000	22320	0.00	1792.0	0
Ethylene		28.051	0.0746	0.00000	0.0000	21644	0.00	1614.0	0
Propane		44.092	0.1196	0.00000	0.0000	21661	0.00	2590.0	0
propylene		42.077	0.1110	0.00000	0.0000	21041	0.00	2336.0	0
Isobutane		58.118	0.1582	0.00000	0.0000	21257	0.00	3363.0	0
n-butane		58.118	0.1582	0.00000	0.0000	21308	0.00	3370.0	0
Isobutene		56.102	0.1480	0.00000	0.0000	20730	0.00	3068.0	0
Isopentane		72.144	0.1904	0.00000	0.0000	21052	0.00	4008.0	0
n-pentane		72.144	0.1904	0.00000	0.0000	21091	0.00	4016.0	0
n-hexane		86.169	0.2274	0.00000	0.0000	20940	0.00	4762.0	0
H <sub>2</sub> S	0.00000	34.076	0.0911	0.00000	0.0000	7100	0.00	647.0	0

Total: 100.04

Average Density	0.05696	100.0000
Specific Gravity	0.74451	

Gross Heating Value		Gross Heating Value
Btu/lb	4589	Btu/SCF 262



**Synthetic Gas and Heating Value Calculations**

**Client Tampa Electric Company - Polk Power Unit 1**  
**Sample ID Polk Laboratory**  
**Date 05/24/03**

**CALCULATION OF F FACTORS**

Component	Mol. Wt.	C Factor	H Factor	% volume	Fract. Wt.	Weight Percents				
						Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur
Hydrogen	2.016	0	1	34.057	68.6582	3.191370898				
Oxygen	32.000	0	0	0.000	0.0000	0				
Nitrogen	28.016	0	0	4.167	116.7334	5.426000206				
CO2	44.010	0.272273	0	14.050	618.3405	7.825585501	20.89520687			
CO	28.010	0.42587	0	46.903	1313.7623	26.00629026	35.09478247			
Argon	39.948	0	0	0.840	33.5563	0				
COS	60.070	0.1998	0	0.000	0.0000	0				
Methane	16.041	0.75	0.25	0.020	0.3208	0.01118426	0.003728087			
Ethane	30.067	0.8	0.2	0.000	0.0000	0				
Ethylene	28.051	0.85714	0.14286	0.000	0.0000	0				
Propane	44.092	0.81818	0.181818	0.000	0.0000	0				
Propene	42.077	0.85714	0.14286	0.000	0.0000	0				
Isobutane	58.118	0.82759	0.17247	0.000	0.0000	0				
n-butane	58.118	0.82759	0.17247	0.000	0.0000	0				
Isobutene	56.102	0.85714	0.14286	0.000	0.0000	0				
Isopentane	72.144	0.83333	0.16667	0.000	0.0000	0				
n-pentane	72.144	0.83333	0.16667	0.000	0.0000	0				
n-hexane	86.169	0.83721	0.16279	0.000	0.0000	0				
H2S	34.076	0	0.058692335	0.000	0.0000	0				
Totals				100.03667	2151.3716	33.84306002	3.20	5.426000206	55.98998933	0

<b>CALCULATED VALUES</b>		
<b>O2 F Factor (dry), Fd</b>	<b>8371</b>	DSCF of Exhaust/mm Btu of Fuel Burned @ 0% excess air
<b>O2 F Factor (wet), Fw</b>	<b>9715</b>	SCF of Exhaust/mm Btu of Fuel Burned @ 0% excess air
<b>Moisture F Factor</b>	<b>1344</b>	SCF of Water/mm Btu of Fuel Burned @ 0% excess air
<b>Combust. Moisture</b>	<b>13.83</b>	volume % water in flue gas @ 0% excess air
<b>CO2 F Factor, Fc</b>	<b>2367</b>	DSCF of CO2/mm Btu of Fuel Burned @ 0% excess air
<b>Carbon Dioxide</b>	<b>28.28</b>	volume % CO2 in flue gas @ 0% O2
<b>Predicted Fo Factor</b>	<b>0.74</b>	EPA Method 3a Fo value



**APPENDIX F**

**FIELD DATA SHEETS**

Sulfuric Acid Mist Field Data Form

Polk  
 Unit 1  
 5-20-03  
 Method No. 8  
 Run No. 1  
 Box Operator (no)  
 Probe Operator JAY/JFR  
 Time - Start: 913 End: 1019  
 Sampling Time 60  
 Min. \ Pt. 2.5  
 Meter Box No. M007  
 Stack Area Ft.<sup>2</sup>  
 Meter Cal. (Δ H) 1.766  
 Meter Cal. (Δ Y) 0.995

Nozzle I.D. No. 6  
 Nozzle Diameter 0.197  
 Pitot Tube No. P109  
 Pitot Tube (C<sub>p</sub>) 0.84  
 Probe Length 8'  
 Probe Liner Material P/NOX  
 Probe Heater Setting 250  
 Pressure Pb (\*Hg): 29.75 Pg (\*H<sub>2</sub>O): -0.65 Ps (\*Hg): 29.70  
 Ambient Temperature 89  
 Assumed Moisture (%) 6.5  
 Filter Holder No.  
 Comments O<sub>2</sub> -13  
 CO<sub>2</sub> -8.5

Dry Gas Meter Volume  
 Final 391.599 Ft.<sup>3</sup>  
 Initial 351.247 Ft.<sup>3</sup>  
 Net 40.352 Ft.<sup>3</sup>

Equipment Leak Checks  
 Initial 0.00 CFM @ 15 \*Hg  
 Final 0.00 CFM @ 7 \*H<sub>2</sub>O  
 Pitot Tube OK 5 \*H<sub>2</sub>O

Moisture Determination  
 Impinger 36.0 ml  
 Silica Gel 17.5 gm  
 Total 53.5

Traverse Point No.	Clock Time	Gas Sample Volume (Ft <sup>3</sup> )	Δ P (In. H <sub>2</sub> O)	Δ H (In. H <sub>2</sub> O)	Probe Temp. (°F)	Stack Temp. Ts (°F)	Meter Temp. (°F)	Umbilical Temp. Tm (°F)	Last Imp. Temp. (°F)	Vacuum (In. Hg)
1	913	352.87	1.3	1.31	259	308	83	266	60	4
2		354.46	1.3	1.31	259	308	83	267	60	4
3		356.15	1.4	1.41	258	308	83	265	58	4
4		357.88	1.6	1.62	259	308	84	266	58	5
5		359.55	1.4	1.41	259	308	84	267	58	4
6	928	361.187	1.3	1.32	259	308	85	268	56	4
1	936	362.76	1.3	1.21	260	308	85	267	61	3
2		364.39	1.3	1.32	261	308	85	268	64	3
3		366.06	1.4	1.42	261	308	85	268	65	4
4		367.74	1.3	1.32	263	308	85	268	62	4
5		369.44	1.4	1.42	262	308	86	268	63	4
6	945	371.073	1.3	1.32	262	308	86	268	64	4

Sulfuric Acid Mist Field Data Form (Continued)

Traverse Point No.	Clock Time	Gas Sample Volume (F <sup>3</sup> )	Δ P (In. H <sub>2</sub> O)	Δ H (In. H <sub>2</sub> O)	Probe Temp. (°F)	Stack Temp. Ts (°F)	Meter Temp. (°F)	Umbilical Temp. Tm (°F)	Last Imp. Temp. (°F)	Vacuum (In. Hg)
1	947	372.79	1.4	1.42	257	308	86	269	58	4
2		374.43	1.3	1.32	257	308	86	269	60	3
3	376.14	<del>372.88</del>	1.4	1.42	256	308	86	268	61	4
4		377.78	1.5	<del>1.52</del> 1.52	257	308	87	267	63	<del>4</del> 5
5		379.51	1.3	1.32	258	307	87	266	63	4
6	1002	381.145	1.3	1.32	258	307	87	266	63	4
	-	-	-	-	-	-	-	-	-	-
1	1004	382.87	1.4	1.42	260	307	87	269	63	4
2		384.62	1.5	1.53	260	307	87	270	64	5
3		386.43	1.6	1.63	260	307	87	270	64	5
4		388.19	1.5	1.52	258	308	87	268	65	5
5		389.96	1.5	1.53	258	308	88	268	65	5
6	1019	391.599	1.3	1.32	260	308	88	269	65	4

Sulfuric Acid Mist Field Data Form

Plant POLK Nozzle I.D. No. MV06 Dry Gas Meter Volume  
 Location UNIT 1 Nozzle Diameter .197 Final 441.161 Ft.<sup>3</sup>  
 Date 5/20/03 Pitot Tube No. PT.09 Initial 401.064 Ft.<sup>3</sup>  
 Method No. Am 8 H2SO4 Pitot Tube (C<sub>p</sub>) .84 Net ~~401.16~~ 40.97 Ft.<sup>3</sup>  
 Run No. 2 Probe Length 8"  
 Box Operator 3AV Probe Liner Material PIVEX Equipment Leak Checks  
 Probe Operator LAD/3FR Probe Heater Setting 250 Initial 0.000 CFM @ 10 \*Hg  
 Time - Start: 1058 End: 1205 Pressure Pb ("Hg): 29.74g ("H2O): -.7 Ps ("Hg): Final 0.000 CFM @ 4.0 \*H2O  
 Sampling Time 60 Ambient Temperature 89 Pitot Tube OK @ 3.6 \*H2O  
 Min. \ Pt. 2.5 Assumed Moisture (%) 6.5  
 Meter Box No. MB07 Filter Holder No. Moisture Determination  
 Stack Area Ft.<sup>2</sup> 1149.089 Comments O2 - 13 1.70 Impinger 38 16.0 ml  
 Meter Cal. (Δ H) 1.766 CO2 - 8.5 2.134 Silica Gel 17.5 21.1 gm  
 Meter Cal. (Δ Y) .993 312 Total 37.1

Traverse Point No.	Clock Time	Gas Sample Volume (Ft <sup>3</sup> )	Δ P (In. H <sub>2</sub> O)	Δ H (In. H <sub>2</sub> O)	Probe Temp. (°F)	Stack Temp. Ts (°F)	Meter Temp. (°F)	Umbilical Temp. Tm (°F)	Last Imp. Temp. (°F)	Vacuum (In. Hg)
1	1058	402.8	1.4	1.59	307	308	90	276	46	3.5
2		404.7	1.5	1.71	300	<del>308</del>	90	276	47	3.5
3		406.5	1.5	1.71	308	<del>308</del>	90	270	48	3.5
4		408.4	1.6	1.82	298	308	90	266	50	3.5
5		410.26	1.5	1.71	294	307	90	266	50	3.5
6	11:14	411.848	1.1	1.25	284	308	90	266	50	3.0
1	11:16	413.45	1.2	1.23	266	307	90	266	47	2.0
2		415.1	1.4	1.44	266	308	92	266	48	2.3
3		416.8	1.4	1.44	266	308	92	267	48	2.3
4		418.38	1.3	1.33	266	309	92	266	49	2.0
5		420.03	1.4	1.44	266	307	92	266	49	2.3
6	1131	421.643	1.3	1.34	266	307	92	266	49	2.0

## Sulfuric Acid Mist Field Data Form (Continued)

Traverse Point No.	Clock Time	Gas Sample Volume (F <sup>3</sup> )	$\Delta P$ (In. H <sub>2</sub> O)	$\Delta H$ (In. H <sub>2</sub> O)	Probe Temp. (°F)	Stack Temp. Ts (°F)	Meter Temp. (°F)	Umbilical Temp. Tm (°F)	Last Imp. Temp. (°F)	Vacuum (In. Hg)
1	1133	423.27	1.3	1.34	268	307	92	269	48	2.0
2		424.92	1.4	1.44	269	307	92	268	49	2.2
3		426.41	1.2	1.23	270	308	92	270	50	2.0
4		428.1	1.4	1.44	270	308	92	270	50	2.2
5		429.8	1.4	1.44	272	308	93	269	51	2.2
6	1147	431.300	1.2	1.23	271	308	93	267	51	2.0
1	<del>1149</del> 1150	432.8	1.3	1.34	266	308	93	269	49	2.3
2		434.42	1.3	1.34	266	308	93	269	50	2.3
3		436.12	1.4	1.44	263	309	93	268	50	2.5
4		437.82	1.4	1.44	264	310	94	266	51	2.5
5		439.52	1.4	1.44	266	309	94	270	50	2.5
6	1205	441.161	1.3	1.34	266	310	94	264	51	2.0

Sulfuric Acid Mist Field Data Form

Plant	<u>Folk Power</u>	Nozzle I.D. No.	<u>NW 06</u>	Dry Gas Meter Volume	
Location	<u>Unit 1 Stack</u>	Nozzle Diameter	<u>0.157</u>	Final	<u>489.525</u> Ft. <sup>3</sup>
Date	<u>20 May 03</u>	Pitot Tube No.	<u>PT09</u>	Initial	<u>449.689</u> Ft. <sup>3</sup>
Method No.	<u>Rm 8</u>	Pitot Tube (C <sub>p</sub> )	<u>0.84</u>	Net	<u>39.836</u> Ft. <sup>3</sup>
Run No.	<u>3.</u>	Probe Length	<u>3' wnk.</u>	Equipment Leak Checks	
Box Operator	<u>JER</u>	Probe Liner Material	<u>PVC</u>	Initial	<u>0.000 CFM @ 10</u> "Hg
Probe Operator	<u>JAY CRD</u>	Probe Heater Setting	<u>250°F</u>	Final	<u>0.000 CFM @ 10</u> "Hg
Time - Start:	<u>1235</u> End: <u>1341</u>	Pressure	Pb ("Hg): <u>29.80</u> Pg ("H <sub>2</sub> O): <u>1.68</u> Ps ("Hg): <u>29.75</u>	Pitot Tube	<u>3.7 / 5.2 @ 0.00 H<sub>2</sub>O</u>
Sampling Time	<u>60 min</u>	Ambient Temperature	<u>88°F</u>	Moisture Determination	<u>20.0</u>
Min. \ Pt.	<u>2.5 min</u>	Assumed Moisture (%)	<u>65</u>	Impinger	<u>80/131/109</u> ml
Meter Box No.	<u>M307</u>	Filter Holder No.	<u>-</u>	Silica Gel	<u>23.5</u> gm
Stack Area Ft. <sup>2</sup>	<u>1149.089</u>	Comments	<u>602-8.5</u>	Total	<u>43.5</u>
Meter Cal. (Δ H)	<u>1.766</u>		<u>0.2-13.2</u>		
Meter Cal. (Δ Y)	<u>0.575</u>				

Traverse Point No.	Clock Time	Gas Sample Volume (Ft <sup>3</sup> )	Δ P (In. H <sub>2</sub> O)	Δ H (In. H <sub>2</sub> O)	Probe Temp. (°F)	Stack Temp. Ts (°F)	Meter Temp. (°F)	<del>Unofficial</del> Temp. Tm (°F)	Last Imp. Temp. (°F)	Vacuum (In. Hg)
A1	1235	449.689	1.25	1.29	268	307	96	269	62	2.0
2	1237.5	451.46	1.25	1.27	267	307	96	269	58	2.0
3	1240	452.91	1.30	1.35	266	307	96	268	58	2.0
4	1242.5	454.6	1.30	1.34	257	308	96	258	58	2.0
5	1245	456.32	1.30	1.34	257	308	96	258	58	2.0
6	1247.5	457.95	1.25	1.29	258	308	96	257	58	2.0
END	1250	459.582	-	-	-	-	-	-	-	-
B1	1252	459.582	1.30	1.35	255	308	97	263	58	2.0
2	1254.5	461.25	1.30	1.35	254	308	97	263	54	2.0
3	1257	462.88	1.35	1.40	257	308	97	261	55	2.0
4	1259.2	464.38	1.35	1.40	257	308	97	261	59	2.0
5	1302	466.15	1.35	1.40	258	308	97	262	62	2.0
6	1304.5	467.81	1.30	1.34	258	309	97	261	64	2.0

END 1307 469.754  
shardata\air&wast\testform\sam\df

## Sulfuric Acid Mist Field Data Form (Continued)

Traverse Point No.	Clock Time	Gas Sample Volume (Ft <sup>3</sup> )	$\Delta P$ (In. H <sub>2</sub> O)	$\Delta H$ (In. H <sub>2</sub> O)	Probe Temp. (°F)	Stack Temp. Ts (°F)	Meter Temp. (°F)	Umbilical Temp. Tm (°F)	Last Imp. Temp. (°F)	Vacuum (In. Hg)
C1	1309	469.354	1.25	1.30	252	308	99	263	68	2.0
2	13011.5	471.00	1.35	1.42	252	308	98	263	65	2.0
3	1314	472.72	1.20	1.24	254	308	98	261	64	2.0
4	1316.5	474.30	1.35	<del>1.40</del> 1.35	254	308	98	260	62	2.0
5	1319	475.98	1.35	1.40	253	308	98	262	60	2.0
6	1321.5	477.66	1.20	1.25	255	307	98	262	64	2.0
END	1324	479.266	—	—	—	—	—	—	—	—
D1	1324	479.266	1.25	1.30	252	307	98	262	64	2.0
2	1328.5	480.90	1.35	1.40	253	308	98	264	62	2.0
3	1331	482.57	1.50	1.56	254	308	98	261	67	2.0
4	1333.5	484.35	1.50	1.56	254	307	98	261	67	2.0
5	1336	486.14	1.50	1.56	250	307	98	263	67.64	2.0
6	1338.5	487.92	1.20	1.25	<del>255</del> 256	307	98	264	62	2.0
END	1341	489.525	—	—	—	—	—	—	—	—

**APPENDIX G**

**SAMPLING EQUIPMENT CALIBRATIONS**



## SUMMARY OF EQUIPMENT CALIBRATIONS

<b>EQUIPMENT</b>	<b>CAL DATE</b>	<b>METHOD</b>	<b>RESULTS</b>
CONSOLE (MB 07)		USEPA RM 5	
INITIAL	04/02/2003	(ORIFICE)	0.995
POST TEST	05/21/2003		1.000
NOZZLE (MN 06)		CALIPER	
INITIAL	04/07/2003	MEASUREMENTS	0.197
POST TEST	05/21/2003		0.196
PYROMETER (PY 09)	04/02/2003	ASTM THERMOMETER	$\pm 2^{\circ}$ F
PITOT TUBE (PT 09)	04/08/2003	USEPA RM 2	$C_p = 0.84$
BAROMETER (BR 01)	05/07/2003	NWS COMPARISON	$\pm 0.01$ " Hg



**EPA Method 5  
Meter Box Calibration  
Post-Test Orifice Method  
English Meter Box Units, English K' Factor**

Revised: 7/25/95 Version: 2.2

Model #: ThermoAnderson MST  
Instrument Code No. MB07  
Sample No.  
Test Designation Polk Unit1 SAM

Date: -----> 05/21/2003  
Barometric Pressure: -----> 30.07 (in. Hg)  
Theoretical Critical Vacuum:----> 14.18 (in. Hg)  
Calibration By: -----> crd

!!!!!!  
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.  
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)<sup>3</sup>\*(deg F)<sup>0.5</sup>/((in.Hg)\*(min)).  
!!!!!!

----- DRY GAS METER READINGS -----

----- CRITICAL ORIFICE READINGS -----

dH (in H2O)	Time (min)	Volume			Initial Temps.		Final Temps.		Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature		
		Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)				Initial (deg F)	Final (deg F)	Average (deg F)
1.15	11	505.500	512.211	6.711	73	74	74	76	55	0.466	17.5	72	72	72
1.15	10	512.211	518.307	6.096	74	76	74	77	55	0.466	17.5	72	73	72.5
1.15	10	518.307	524.427	6.12	74	77	74	77	55	0.466	17.5	73	73	73

\*\*\*\*\* RESULTS \*\*\*\*\*

--- DRY GAS METER ---

----- ORIFICE -----

-- DRY GAS METER --

----- ORIFICE -----

VOLUME CORRECTED	VOLUME CORRECTED
Vm(std) (cu.ft)	Vm(std) (liters)
6.682	189.23
6.058	171.57
6.079	172.16

VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL
Vcr(std) (cu.ft)	Vcr(std) (liters)	Vcr (cu.ft)
6.683	189.26	6.702
6.072	171.97	6.096
6.070	171.89	6.099

CALIBRATION FACTOR	
Value	Variation
(number)	(number)
1.000	0.000
1.002	0.002
0.998	-0.002

CALIBRATION FACTOR		
Value	dH@	Variation
(in H2O)	(mm H2O)	(in H2O)
1.741	44.22	-0.001
1.739	44.18	-0.001
1.740	44.20	0.000

Average Y ----->  
Prior Y  
% Difference

1.000  
0.995  
-0.53%

1.740 44.20 <----- Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H2O that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +0.2.

REVIEWED BY: \_\_\_\_\_

*BTMS Farby*

Date: 5/27/2003

# NOZZLE CALIBRATION DATA FORM

## STAINLESS STEEL NOZZLE SET

DATE: 04/07/03

CALIBRATOR: JAV

NOZZLE I. D.	NOZZLE DIAMETER (IN.)			D. diff.	D avg
	D1	D2	D3		
^SN01	0.114	0.114	0.113	0.001	0.114
^SN04	0.126	0.126	0.126	0.000	0.126
^SN05	0.150	0.150	0.150	0.000	0.150
^SN06	0.197	0.197	0.197	0.000	0.197
^SN09	0.277	0.276	0.276	0.001	0.276
^SN10	0.295	0.295	0.295	0.000	0.295
^SN12	0.390	0.390	0.388	0.002	0.389
^SN15	0.169	0.169	0.171	0.002	0.170
^SN16	0.199	0.200	0.200	0.001	0.200
^SN19	0.285	0.287	0.289	0.004	0.287
^SN22	0.368	0.370	0.370	0.002	0.369
^SN30	0.315	0.315	0.315	0.000	0.315
^SN36	0.187	0.189	0.189	0.002	0.188
^SN37	0.215	0.216	0.216	0.001	0.216
^SN38	0.256	0.256	0.254	0.002	0.255
^SN46	0.192	0.191	0.193	0.002	0.192
^SN47	0.205	0.205	0.205	0.000	0.205
^SN48	0.253	0.254	0.253	0.001	0.253
^SN50	0.313	0.314	0.314	0.001	0.314
^SN58	0.246	0.246	0.248	0.002	0.247
^SN68	0.242	0.244	0.242	0.002	0.243

where:

D<sub>1,2,3</sub> = three different nozzle diameters, (in.); each diameter must be measured to the nearest 0.001 in.

D. diff. = maximum difference between any two diameters, (in.); must be .004 in. or less.

D. avg. = average of D<sub>1</sub>, D<sub>2</sub>, and D<sub>3</sub>.

REVIEWED BY: 

DATE: 4/11/2005

Page 1  
OF 1

**POST TEST NOZZLE CALIBRATION DATA FORM**

DATE: 5/218/03 CALIBRATOR: crd

SAMPLE NO. \_\_\_\_\_ TEST DESIGNATION: Polk 1 SAM

NOZZLE i. D.	NOZZLE DIAMETER (IN.)			D. diff.	D. avg.
	D1	D2	D3		
Mn06	0.197	0.196	0.196	0.001	0.196

where:

D 1,2,3 = three different nozzle diameters, (in), each diameter must be measured to the nearest 0.001 in.

D. diff. = maximum difference between any two diameters, (in.) must be .004 in. or less

D. avg. = average of D1, D2, and D3.

REVIEWED BY: *RAM*  
 DATE: 5/27/2003



Pyrometer Calibration

Pyrometer Under Test

Pyrometer Serial Number/IMC Number: ^PY09  
Labworks Sample # AA69365<sup>42214</sup>  
Calibration Date: 04/02/2003

Calibrator Information

Calibrator Type/Manufacturer: Hart Scientific  
Calibrator Serial Number: AOA024  
Date of Last Calibration: 02/10/2003  
Calibration Personnel (Typed and Signature): R A Barthelette Jr.

Calibration Data

Calibration Point	Reference Temperature	Pyrometer Indication	Difference
1	32	33	-1
2	212	213	-1
3	400	399	1

Reference temperatures must encompass the expected range of measurement. These three points should be ~ 32 degrees, ~212 degrees, and ~ 400 degrees Farenheit. Difference is calculated as follows:

(reference temperature ) – (pyrometer indication )

Quality Control Data

Calibration Point	Difference
1	Pass
2	Pass
3	Pass

This data has been reviewed and is certified as meeting all project quality objectives.

Reviewer: *R A Barthelette Jr.* Date: 4/10/2003



PITOT TUBE CALIBRATION DATA SHEET

Pitot Tube ID # pt09

Calibration Date: 04/08/2003

Operating Quarter: Qtr2

Openings Damaged?  Y  N

Repaired?  Y  N  N/A

Alpha and Beta Angle Determinations

$\alpha 1$	<u>1.7</u>	degrees	Pass
$\alpha 2$	<u>0.8</u>	degrees	Pass
$\beta 1$	<u>1.1</u>	degrees	Pass
$\beta 2$	<u>0.7</u>	degrees	Pass

Gamma, Theta, A, Z, and W Determinations

$\psi$	<u>0.1</u>	degrees	
A	<u>2.32</u>	cm	
Z	<u>0.004</u>	cm	Pass
$\phi$	<u>1.6</u>	degrees	
W	<u>0.065</u>	cm	Pass

Acceptable Limits:
Dt 0.48 < Dt > 0.95 cm
$\alpha < 10$ degrees ( $\alpha 1$ measured across top impact openings) ( $\alpha 2$ measured across bottom impact openings)
$\beta 1 < 5$ degrees (alongside top impact openings)
$\beta 2 < 5$ degrees (alongside bottom impact openings)
Z < 0.32 cm (Asin $\psi$ )
W < 0.08 cm (Asino)
A distance between tips
$\phi$ angle of plane on side of pitots
$\psi$ angle between tips

**NOTES**

All measurements are taken in accordance with the requirements of 40 CFR 60 Appendix A - Test Methods, Method 2, "Determination of stack gas velocity and volumetric flow rate (Type S pitot tube)". Measurement details are found in EPA/600/4-77/027b, "Quality Assurance Handbook for Air Pollution Measurement Systems: Stationary Source Specific Methods", sub-section 3.1.1. Procurement of Apparatus and Supplies.

Comments: \_\_\_\_\_

Calibrated by:

Printed Name: CHARLES DUFENY

Date: 04/08/2003

Quality Assurance Review / Approval:

Date: 4/9/2003

**BAROMETER CALIBRATION DATA FORM**

05/07/2003

CALIBRATOR: RAB

INST. NO: ^BR01

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TIME OF READING	BAROMETER READING (HG)	REFERENCE STANDARD READING (HG)	DIFFERENCE (HG)
12:13	30.12	30.12	0
13:21	30.10	30.11	-0.01
14:15	30.08	30.09	-0.01

**\*NOTE: BAROMETRIC READINGS MUST AGREE WITHIN 0.1 INCHES HG OF READINGS OBTAINED FROM THE REFERENCE STANDARD, THE NATIONAL WEATHER SERVICE, RUSKIN FL. TO BE DEEMED ACCEPTABLE.**

REVIEWED BY: 

DATE: 5/27/2003

G:\Environmental Services\Air\Calibration Data\Barometer\2003\05-07-03.xls\^BR02  
REVISED 5-9-96



APPENDIX H

CHAIN OF CUSTODY



# ANALYSIS REQUEST & CHAIN OF CUSTODY

## ENVIRONMENTAL SERVICES

5012 CAUSEWAY BLVD., TAMPA, FL, 33619 PHONE: (813)228-4111

PROJECT REFERENCE <i>Polk - Unit 1 SAM</i>		PROJECT NO.	PROJECT LOCATION (STATE) <i>FL</i>		REQUIRED ANALYSIS				DUE DATE <div style="border: 1px solid black; width: 100px; height: 20px;"></div>	
SAMPLER'S PRINTED NAME <i>Charles DeFeny</i>		SAMPLER'S SIGNATURE <i>[Signature]</i>								
P.O. NUMBER		CONTRACT NO.	SITE <i>Polk</i>		PRESERVATIVE				NUMBER OF COOLERS SUBMITTED PER SHIPMENT:	
CLIENT NAME <i>TEC - Polk</i>		CLIENT PHONE		CLIENT FAX						
CLIENT EMAIL		CLIENT ADDRESS								
SAMPLE ID	SAMPLE DESCRIPTION	SAMPLING		* MATRIX	NUMBER OF CONTAINERS SUBMITTED				REMARKS	
		DATE	TIME							
<i>Run 1</i>	<i>Impover #1 and Rinse</i>	<i>5/20/03</i>	<i>1045</i>	<i>LPG</i>	<i>1</i>					<i>AA69850</i>
<i>Run 2</i>	<i>"</i>	<i>5/20/03</i>	<i>1215</i>	<i>LPG</i>	<i>1</i>					
<i>Run 3</i>	<i>"</i>	<i>5/20/03</i>	<i>1410</i>	<i>"</i>	<i>1</i>					
<i>Blank</i>	<i>20% IPA Blank</i>	<i>5/20/03</i>	<i>1410</i>	<i>"</i>	<i>1</i>					

GW - GROUND WATER  
  SW - SURFACE WATER  
  DW - DRINKING WATER  
  WW - WASTE WATER  
  C - COAL  
  O - OIL  
  SO - SOLID SOIL  
  SL - SLUDGE  
  W - WASTE SAMPLE  
  A - AIR

CONTAINERS/SEALS INTACT <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	ON ICE/4°C <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
--	---

### SAMPLE TRANSFERS

RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME:
PERSON'S NAME: <i>[Signature]</i> FACILITY NAME: <i>[Signature]</i>	PERSON'S NAME: <i>Kail A. Harrison</i> FACILITY NAME: <i>Laboratory Services</i>	<i>5-21-03</i>	<i>8:00 AM</i>
PERSON'S NAME: FACILITY NAME:	PERSON'S NAME: FACILITY NAME:		
PERSON'S NAME: FACILITY NAME:	PERSON'S NAME: FACILITY NAME:		
PERSON'S NAME: FACILITY NAME:	PERSON'S NAME: FACILITY NAME:		

*COLD*

**APPENDIX I**

**TEST PARTICIPANTS**

**TEST PARTICIPANTS**

AIR SERVICES GROUP  
ENVIRONMENTAL SERVICES

Charles R. Dufeny	Environmental Technician
Juan Ramirez	Environmental Technician
Jorge Varino	Technician

POLK POWER STATION

Michael Perkins	Environmental Coordinator
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