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January 17, 2012

DOCKET
11-AFC-1
DATE 1-17-12
RECD. 1-17-12

VIA EMAIL

Mr. Eric Solorio, Siting Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Pio Pico Energy Center Project (11-AFC-01)
Comments on the San Diego Air Pollution Control District's Preliminary Determination of Compliance

Dear Mr. Solorio:

On behalf of Pio Pico Energy Center, LLC, please find enclosed herein Applicant's comments on the San Diego Air Pollution Control District's Preliminary Determination of Compliance. These comments were submitted to the District on January 17, 2012 by Applicant's consultant, Sierra Research.

Respectfully submitted,

Melissa A. Foster

MAF:jmw
Enclosure
cc: See Proof of Service List

71133778.1 0042399-00001

From: Steve Hill
Sent: Tuesday, January 17, 2012 10:38 AM
To: Moore, Steve
Cc: Dave Jenkins (Apex); 'Fitzgerald, Maggie'; McKinsey, John A.; Gary Rubenstein
Subject: PPEC comments on Pio Pico PDOC

Steve:

Our comments on the PDOC are attached.

Please do not hesitate to call me if you have any questions.

--Steve Hill

sierra
research

1801 J Street
Sacramento, CA 95811
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January 17, 2012

Steven Moore
Senior Air Pollution Control Engineer
San Diego Air Pollution Control District
10124 Old Grove Road
San Diego, CA 92131-1649

Subject: Proposed Pio Pico Energy Center Project – Comments on PDOC

Dear Dr. Moore:

On behalf of Pio Pico Energy Center, LLC (Applicant), we offer the comments provided below on the Preliminary Determination of Completeness (PDOC) for the Pio Pico Energy Center, dated December 16, 2011. We greatly appreciate the effort that the District staff has expended in evaluating the application and preparing the PDOC.

Annual Sulfur Dioxide Emissions

The District based its calculations of annual sulfur dioxide emissions on the hourly sulfur limit of 0.75 gr/100 scf of fuel. As noted by the District on page 9 of the PDOC, the sulfur content of SDG&E fuel is much lower. The Applicant has used an annual average concentration of 0.25 gr/100 scf in its calculations of annual emissions and its modeling. Although the higher level used by the District does not trigger new requirements under District regulations, it is expected that the California Energy Commission (CEC) will require the Applicant to provide offsets for its sulfur emissions. Furthermore, EPA has indicated that it will impose an annual average limit of 0.25 gr/100 scf in the PSD permit as part of its BACT determination for particulate emissions from the turbines. Therefore, we request that the District use the Applicant's annual emission estimates for SO_2; the District's proposed permit conditions will make this limit enforceable,

The corresponding changes that should be made are outlined below.

- On page 9, the last row of Table 1d should be revised to read:

SOx	1.37	4.12

- On Page 10, the SOx emissions in Table 2b should be revised to read:

SOx	4.12		4.12

- Condition 39.e. should be revised to read:

  e. SOx 4.1 ~~12.4~~

Commissioning Sulfur Dioxide Emissions

The calculations of sulfur dioxide emissions during commissioning, as represented in the AFC, are incorrect. The maximum daily emissions for a single turbine should be 25.2 lb/day, not 14.4. The correct calculations are shown below.

Activity	Duration (Hours)	Heat Input (MMBTU/hr)	SO_2 (lb/hr)	SO_2 (lb)
First Fire	16	75	0.16	2.5
Sync/AVR Testing	12	500	1.05	12.6
SCR Burnout/AVR Testing	20	500	1.05	21
Water Injection Mapping	32	500	1.05	33.6
Ammonia Injection Tuning	32	500	1.05	33.6
			Total	103.3

As a result, the following changes should be made to the PDOC:

- On page 12, the SOx emissions in Table 3b should be revised to read:

SOx	25.2	75.6

- On page 12, the SOx emissions in Table 3c should be revised to read:

SOx	0.05	0.15

NOx Offsets

The discussion of offsets on page 24 of the PDOC states that NOx offsets may be provided, and indicates that offsets will be provided from one of three sources: actual emission reductions, ERCs, and MERCs. It is not clear from the discussion, however,

that VOC reductions may be used as NOx offsets at a ratio of 2.0 to 1. Appendix D indicates that VOC offsets are part of the current offset plan.

We recommend that the discussion of offsets be revised as shown below.

> An offset ration of 1.2 to 1 is required [Rule 20.3(d)(8)(i)(B), so a total of 84.49 tons per year of NOx emission offsets will be required. Offsets may be actual emission reductions, Class A stationary source emission reduction credits (ERCs) issued under District rules 25.0-26.10, or mobile emission reduction credits (MERCs) issued under District Rule 27 (if approved by ARB and EPA). Under District regulations, VOC emission reductions may be used as NOx emission offsets, at an additional discount ratio of 2.0 tons of VOC for each ton of NOx. The Applicant has agreed to surrender ERCs sufficient to provide all the required offsets for the project prior to the initial operation of the first turbine. See Appendix D for the current offset plan.

Additionally, Appendix D indicates that the values of the VOC offsets are the same as the equivalent NOx offsets, implying an offset ratio for VOC to NOx of 1.0 to 1. The values in the NOx Equivalent Amount column are correct. The ERC amount for the VOC offsets should be corrected as follows:

ERC Certificate Number	ERC amount, TPY
00019-03	~~8.~~1 16.2
00039-03	~~5.~~6 11.2
090819-01	~~18.~~7 37.4

Acid Rain Permit Application

The PDOC indicates on page 33 that a requirement to submit the Acid Rain Program application is included in the PDOC permit conditions. The Acid Rain Permit application was submitted on September 14, 2011. Please revise the discussion on page 33 to reflect the previous submittal of the Acid Rain Program application, and delete Condition 7.

Turbine Exhaust Stack Temperature Monitoring

Condition 71 requires continuous monitoring of exhaust stack temperature. Because there is no process reason to monitor exhaust stack temperature, a temperature monitor and recorder would not normally be installed. There is no applicable regulatory requirement in District regulations that requires or would benefit from this information.

We understand that this requirement has been included in District permits for other turbine projects in order to provide data about stack conditions in the event that further modeling of stack emissions is needed. It is also our understanding that this condition originated with combined cycle plants, where the variable operation of duct burners and heat recovery steam generators can result in significant variations in stack temperatures, and that the District has included similar conditions in the permits for other simple cycle turbines.

Accurate estimation of stack temperatures is much simpler for simple cycle units than for combined cycle units. If additional modeling of actual stack conditions is needed in the future, turbine performance calculations can provide the temperature with accuracy sufficient for modeling.

Unnecessary permit requirements impose a burden on the operator, and they create artificial opportunities for noncompliance, with no environmental benefit. Because there is no regulatory requirement that is served by monitoring stack temperature, because the information collected has negligible value for the District, and because the condition imposes a burden and compliance risk on the Applicant without corresponding environmental benefit, we request that the requirement to monitor temperature be deleted.

Condition 71 should therefore be amended as follows:

71. Each combustion turbine shall be equipped with continuous monitors to measure, calculate, and record unit operating days and hours and the following operational characteristics:

a. Date and time;

b. Natural gas flow rate to the combustion turbine during each unit operating minute, in standard cubic feet per hour;

c. Total heat input to the combustion turbine based the fuels higher heating value during each unit operating minute, in million British thermal units per hour (MMBtu/hr);

d. Higher heating value of the fuel on an hourly basis, in million British thermal units per standard cubic foot (MMBtu/scf);

e. ~~Stack exhaust gas temperature during each unit operating minute, in degrees Fahrenheit;~~

~~f.~~ Combustion turbine electrical energy output during each unit operating minute in gross megawatts hours (MWh);

The values of these operational characteristics shall be recorded each unit operating minute. The monitors shall be installed, calibrated, and maintained in accordance with a turbine operation monitoring protocol, which may be part of the CEMS protocol, approved by the District, which shall include any relevant calculation methodologies. The monitors shall be in full operation at all times when the combustion turbine is in operation. Calibration records for the continuous monitors shall be maintained on site and made available to the District upon request. [Rules 69.3, 69.3.1, and 20.3(d)(1) and 40 CFR Part 60 Subpart KKKK, and 40 CFR Part 75]

Condition 75.1 should be deleted, for the same reasons.

<u>Cooling System Water Quality:</u>

The heading for the discussion of particulate emissions from the cooling system (page 34) should be revised as shown below. The cooling system will not be using desalinated water.

PARTICULATE EMISSION RELATING TO ~~THE USE OF DESALINATED WATER FOR~~ EVAPORATIVE COOLING

Accurate estimation of stack temperatures is much simpler for simple cycle units than for combined cycle units. If additional modeling of actual stack conditions is needed in the future, turbine performance calculations can provide the temperature with accuracy sufficient for modeling.

Unnecessary permit requirements impose a burden on the operator, and they create artificial opportunities for noncompliance, with no environmental benefit. Because there is no regulatory requirement that is served by monitoring stack temperature, because the information collected has negligible value for the District, and because the condition imposes a burden and compliance risk on the Applicant without corresponding environmental benefit, we request that the requirement to monitor temperature be deleted.

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a. Date and time;

b. Natural gas flow rate to the combustion turbine during each unit operating minute, in standard cubic feet per hour;

c. Total heat input to the combustion turbine based the fuels higher heating value during each unit operating minute, in million British thermal units per hour (MMBtu/hr);

d. Higher heating value of the fuel on an hourly basis, in million British thermal units per standard cubic foot (MMBtu/scf);

e. ~~Stack exhaust gas temperature during each unit operating minute, in degrees Fahrenheit;~~

~~f.~~ Combustion turbine electrical energy output during each unit operating minute in gross megawatts hours (MWh);

The values of these operational characteristics shall be recorded each unit operating minute. The monitors shall be installed, calibrated, and maintained in accordance with a turbine operation monitoring protocol, which may be part of the CEMS protocol, approved by the District, which shall include any relevant calculation methodologies. The monitors shall be in full operation at all times when the combustion turbine is in operation. Calibration records for the continuous monitors shall be maintained on site and made available to the District upon request. [Rules 69.3, 69.3.1, and 20.3(d)(1) and 40 CFR Part 60 Subpart KKKK, and 40 CFR Part 75]

Condition 75.1 should be deleted, for the same reasons.

<u>Cooling System Water Quality:</u>

The heading for the discussion of particulate emissions from the cooling system (page 34) should be revised as shown below. The cooling system will not be using desalinated water.

PARTICULATE EMISSION RELATING TO ~~THE USE OF DESALINATED WATER FOR~~ EVAPORATIVE COOLING

Sulfur Dioxide Impacts

Appendix A, Table 4-2 contains values taken from Applicant's AFC Table 5.2-26, as revised on 10/19/11. These values were calculated using a fuel sulfur content of 0.25 gr/100 scf. Because these are short-term averages, the maximum fuel sulfur content of 0.75 gr/100 scf should have been used, and the peak SO_2 impacts should be identical to the peak SO_2 impacts from normal operations.

Therefore the following changes should be made to Appendix A, Table 4-2:

SO_2	1-hr	~~3~~8	29	~~32~~37	196	655
	3-hr	~~1~~3	18	~~19~~21	1300	--
	24-hr	~~0~~1	10	~~10~~11	--	105
	Annual	--	5	--	NA	--

Appendix A, Table 5-1 contains values taken from Applicant's AFC Table 5.2-27, as revised on 10/19/11. The table shows that the maximum modeled 1-hour SO_2 impact at any receptor was 8.0 µg/cu m, which exceeds the SIL of 7.8 µg/cu m (3 ppb). The following discussion should be added at the bottom of page 10 of Appendix A.

> Because the maximum modeled 1-hour SO_2 impact exceeds the SIL, a further step is necessary to demonstrate that the project's impact is insignificant for PSD purposes. The same EPA guidance that provides the 3 ppb SIL value[1] also indicates that the SIL is to be compared to either the highest of the 5-year averages of the maximum modeled 1-hour SO_2 concentrations at each receptor, or the highest of the multi-year averages when fewer years are modeled.
>
> The highest modeled 1-hour SO_2 values for each of the three years 2008-2010 are shown in the table below. The average of these three values is 7.3 µg/cu m, which is below the SIL of 7.8 µg/cu m (3 ppb).

Year	Maximum 1-hour SO_2 Impact, µg/cu m
2008	7.2
2009	8.0
2010	6.7
3-year Average	7.3

Miscellaneous Revisions

On page 3, last paragraph: the raw water storage tank is 500,000 gallons, not 750,000.

[1] Anna Marie Wood, *General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significance Level.* (August 23, 2010)

On pages 9 and 22: cooling is provided by a hybrid cooling system. The wet component is a wet surface to air cooler (WSAC), not a cooling tower. We suggest replacing the phrase "cooling tower" with either "cooling system" or "WSAC" each time it occurs. In Condition 40, replace "cooling tower" with "WSAC".

If you have any questions or need additional information, please contact me, or David Jenkins at (317) 431-1004.

Respectfully,

Steve Hill

cc: David Jenkins, PPEC
Maggie Fitzgerald, URS
John McKinsey, Stoel Rives, LLP

Panoche Energy Center
43883 W. Panoche Road, Firebaugh CA 93622

Received
JUN 22 2011
SJVUAPCD

Mr. Sayed Sadredin
Air Pollution Control Officer (APCO)
San Joaquin Valley APCD
1990 E. Gettysburg Avenue,
Fresno, CA 93726-0244
Attn: John Copp

June 21, 2011

re: Source Test and RATA Reports for Permit #'s C-7220-1, -2, -3 &-4

Dear Mr. Sadredin:

Please find attached the Source Test and RATA reports for all of the four- 100 Megawatt GE turbines; Permit numbers C-7220-1,-2, -3 & -4 at the Panoche Energy Center.

If you have any questions or require additional information, please contact Roy Campbell, Wood Group's EHS manager for the facility at (559) 659-2270 ext. 103.

Sincerely,

Don Burkard
General Manager
Panoche Energy Center, LLC

cc: Robin Shropshire, PPMS
Steve Reinhardt, Wood Group
Roy Campbell, Wood Group

Dale Rundquist
Compliance Project Manager
California Energy Commission (MS-2000)
1516 Ninth Street
Sacramento, CA 95814

Steven Frey
US Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94015

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 1

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (SOx as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-7280D

Tested May 13, 2011

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 1

Project 280-7280D
May 13, 2011
Permit No. C-7220-1-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
NOx	2.69	2.02	6.44	0.0073	2.5 ppm @ 15% O_2 and 8.03 lb/hr
	2.73	2.04	6.51	0.0074	
	2.67	2.00	6.36	0.0073	
Mean	**2.70**	**2.02**	**6.44**	**0.0073**	
CO	2.51	1.88	3.66	0.0042	6.0 ppm @ 15% O_2 and 11.81 lb/hr
	2.11	1.58	3.07	0.0035	
	2.57	1.92	3.73	0.0043	
Mean	**2.40**	**1.79**	**3.49**	**0.0040**	
NH_3	2.61	1.96	2.31		10 ppm @ 15% O_2 and 11.90 lb/hr
	2.69	2.01	2.37		
	2.79	2.09	2.46		
Mean	**2.70**	**2.02**	**2.38**		
VOC	0.0	0.0	0.00	0.0000	2.0 ppm @ 15% O_2 and 2.67 lb/hr
	0.0	0.0	0.00	0.0000	
	0.0	0.0	0.00	0.0000	
Mean	**<0.30**	**<0.22**	**<0.24**	**<0.0003**	
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
Particulate	0.00091	0.00080	2.922	0.00298	0.1 gr/DSCF and 6.00 lb/hr
	0.00080	0.00070	2.581	0.00261	
	0.00051	0.00045	1.660	0.00167	
Mean	**0.00074**	**0.00065**	**2.388**	**0.00242**	
	gr/100 DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas		As SO_2 in Stack Exhaust	As SO_2 in Stack Exhaust	1 gr/100 DSCF and 2.51 lb/hr
	<0.06		**<0.143**	**<0.0002**	

Comments

VOC Reported Results Based on Detection Limit of Propane
2009 Historical HAPS to VOC Ratio=0.777
Calculated HAPS=0.186 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 1

Project 280-7280D
May 13, 2011
Permit No. C-7220-1-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	12.98	13.02	0.53	N/A	0.04	N/A	1% Difference
NOx @ 15%	2.00	1.89	6.61	5.28	0.11	N/A	20% RM or 10% AS
CO @ 15%	2.11	2.03	6.42	2.26	0.09	0.14	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	12.98	13.02	0.53	0.04	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0073	0.0069	6.35	0.0004	1.054		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 2

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (SOx as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-7280C

Tested May 12, 2011

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 2

Project 280-7280C
May 12, 2011
Permit No. C-7220-2-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
NOx	2.74	2.06	6.72	0.0075	2.5 ppm @ 15% O_2 and 8.03 lb/hr
	2.79	2.10	6.89	0.0076	
	2.80	2.11	6.90	0.0077	
Mean	**2.78**	**2.09**	**6.84**	**0.0076**	
CO	1.11	0.84	1.66	0.0019	6.0 ppm @ 15% O_2 and 11.81 lb/hr
	1.50	1.13	2.27	0.0025	
	1.51	1.14	2.27	0.0025	
Mean	**1.38**	**1.04**	**2.06**	**0.0023**	
NH_3	2.45	1.84	2.22		10 ppm @ 15% O_2 and 11.90 lb/hr
	2.41	1.82	2.21		
	2.41	1.81	2.19		
Mean	**2.42**	**1.82**	**2.21**		
VOC	0.0	0.0	0.00	0.0000	2.0 ppm @ 15% O_2 and 2.67 lb/hr
	0.0	0.0	0.00	0.0000	
	0.0	0.0	0.00	0.0000	
Mean	**<0.30**	**<0.22**	**<0.25**	**<0.0003**	
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
Particulate	0.00122	0.00107	4.098	0.00402	0.1 gr/DSCF and 6.00 lb/hr
	0.00059	0.00052	2.004	0.00192	
	0.00052	0.00046	1.844	0.00169	
Mean	**0.00077**	**0.00068**	**2.649**	**0.00254**	
	gr/100 DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas		As SO_2 in Stack Exhaust	As SO_2 in Stack Exhaust	1 gr/100 DSCF and 2.51 lb/hr
	<0.06		**<0.147**	**<0.0002**	

Comments

VOC Reported Results Based on Detection Limit of Propane

2009 Historical HAPS to VOC Ratio=0.777

Calculated HAPS=0.194 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 2

Project 280-7280C
May 12, 2011
Permit No. C-7220-2-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	13.01	13.03	0.27	N/A	0.01	N/A	1% Difference
NOx @ 15%	2.08	2.04	3.10	2.58	0.03	N/A	20% RM or 10% AS
CO @ 15%	1.58	1.49	11.79	3.10	0.09	0.19	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	13.01	13.03	0.27	0.01	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0075	0.0074	3.21	0.0001	1.016		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 3

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (SOx as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-7280B

Tested May 11, 2011

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 3

Project 280-7280B
May 11, 2011
Permit No. C-7220-3-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
NOx	2.78	2.07	6.75	0.0075	2.5 ppm @ 15% O_2 and 8.03 lb/hr
	2.75	2.05	6.70	0.0075	
	2.75	2.05	6.67	0.0075	
Mean	**2.76**	**2.06**	**6.71**	**0.0075**	
CO	2.17	1.62	3.21	0.0036	6.0 ppm @ 15% O_2 and 11.81 lb/hr
	2.50	1.86	3.70	0.0041	
	2.28	1.70	3.37	0.0038	
Mean	**2.32**	**1.72**	**3.42**	**0.0038**	
NH_3	2.53	1.89	2.27		10 ppm @ 15% O_2 and 11.90 lb/hr
	3.22	2.40	2.89		
	2.92	2.17	2.61		
Mean	**2.89**	**2.15**	**2.59**		
VOC	0.0	0.0	0.00	0.0000	2.0 ppm @ 15% O_2 and 2.67 lb/hr
	0.0	0.0	0.00	0.0000	
	0.0	0.0	0.00	0.0000	
Mean	**<0.30**	**<0.22**	**<0.25**	**<0.0003**	
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
Particulate	0.00096	0.00085	3.185	0.00314	0.1 gr/DSCF and 6.00 lb/hr
	0.00130	0.00115	4.340	0.00420	
	0.00188	0.00164	6.146	0.00605	
Mean	**0.00138**	**0.00121**	**4.557**	**0.00446**	
	gr/100 DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas		As SO_2 in Stack Exhaust	As SO_2 in Stack Exhaust	1 gr/100 DSCF and 2.51 lb/hr
	<0.06		**<0.146**	**<0.0002**	

Comments

VOC Reported Results Based on Detection Limit of Propane

2009 Historical HAPS to VOC Ratio=0.777

Calculated HAPS=0.194 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 3

Project 280-7280B
May 11, 2011
Permit No. C-7220-3-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	12.94	12.79	1.38	N/A	0.15	N/A	1% Difference
NOx @ 15%	2.04	1.92	7.39	6.03	0.12	N/A	20% RM or 10% AS
CO @ 15%	1.69	1.89	15.00	4.22	0.20	0.25	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	12.94	12.79	1.38	0.15	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0074	0.0070	7.76	0.0005	1.066		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 4

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (SOx as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-7280A

Tested May 10, 2011

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 4

Project 280-7280A
May 10, 2011
Permit No. C-7220-4-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
NOx	2.80	2.08	6.72	0.0076	2.5 ppm @ 15% O_2 and 8.03 lb/hr
	2.88	2.15	6.97	0.0078	
	2.87	2.19	7.08	0.0080	
Mean	**2.85**	**2.14**	**6.92**	**0.0078**	
CO	2.63	1.95	3.84	0.0043	6.0 ppm @ 15% O_2 and 11.81 lb/hr
	2.05	1.53	3.02	0.0034	
	1.95	1.49	2.93	0.0033	
Mean	**2.21**	**1.66**	**3.26**	**0.0037**	
NH_3	3.08	2.29	2.73		10 ppm @ 15% O_2 and 11.90 lb/hr
	2.82	2.11	2.52		
	2.56	1.96	2.34		
Mean	**2.82**	**2.12**	**2.53**		
VOC	0.0	0.0	0.00	0.0000	2.0 ppm @ 15% O_2 and 2.67 lb/hr
	0.0	0.0	0.00	0.0000	
	0.0	0.0	0.00	0.0000	
Mean	**<0.30**	**<0.22**	**<0.25**	**<0.0003**	
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
Particulate	0.00056	0.00050	1.834	0.00184	0.1 gr/DSCF and 6.00 lb/hr
	0.00056	0.00049	1.837	0.00182	
	0.00057	0.00050	1.832	0.00185	
Mean	**0.00056**	**0.00050**	**1.834**	**0.00184**	
	gr/100 DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas		As SO_2 in Stack Exhaust	As SO_2 in Stack Exhaust	1 gr/100 DSCF and 2.51 lb/hr
	<0.06		**<0.145**	**<0.0002**	

Comments
VOC Reported Results Based on Detection Limit of Propane
2009 Historical HAPS to VOC Ratio=0.777
Calculated HAPS=0.194 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 4

Project 280-7280A
May 10, 2011
Permit No. C-7220-4-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	13.02	13.01	0.44	N/A	0.01	N/A	1% Difference
NOx @ 15%	2.13	2.03	6.05	5.16	0.11	N/A	20% RM or 10% AS
CO @ 15%	1.49	1.48	4.69	1.17	0.02	0.07	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	13.02	13.01	0.44	0.01	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0078	0.0074	6.05	0.0004	1.051		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 1

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (SOx as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-6747A

Tested May 11, 2010

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 1

Project 280-6747A
May 11, 2010
Permit No. C-7220-1-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
	2.63	1.96	6.50	0.0071	
NOx	2.57	1.91	6.35	0.0069	**2.5 ppm @ 15% O_2**
	2.60	1.94	6.44	0.0071	**and**
Mean	**2.60**	**1.94**	**6.43**	**0.0071**	**8.03 lb/hr**
	2.62	1.95	3.94	0.0043	
CO	2.02	1.50	3.04	0.0033	**6.0 ppm @ 15% O_2**
	3.88	2.90	5.85	0.0064	**and**
Mean	**2.84**	**2.12**	**4.28**	**0.0047**	**11.81 lb/hr**
	2.10	1.56	1.92		
NH_3	2.11	1.58	1.93		**10 ppm @ 15% O_2**
	2.17	1.62	1.98		**and**
Mean	**2.13**	**1.58**	**1.94**		**11.90 lb/hr**
	0.0	0.0	0.00	0.0000	
VOC	0.0	0.0	0.00	0.0000	**2.0 ppm @ 15% O_2**
	0.0	0.0	0.00	0.0000	**and**
Mean	**<0.15**	**<0.11**	**<0.13**	**<0.0001**	**2.67 lb/hr**
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
	0.00086	0.00076	2.769	0.00279	
Particulate	0.00065	0.00058	2.184	0.00213	**0.1 gr/DSCF**
	0.00052	0.00046	1.767	0.00169	**and**
Mean	**0.00068**	**0.00060**	**2.240**	**0.00220**	**6.00 lb/hr**
	gr/100DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas **<0.06**		As SO_2 in Stack Exhaust **<0.149**	As SO_2 in Stack Exhaust **<0.0002**	**1 gr/100 DSCF and 2.51 lb/hr**

Comments
VOC Reported Results Based on Detection Limit of Propane
2009 Historical HAPS to VOC Ratio=0.777
Calculated HAPS=0.10 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 1

Project 280-6747A
May 11, 2010
Permit No. C-7220-1-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	12.95	13.00	0.45	N/A	0.05	N/A	1% Difference
NOx @ 15%	1.95	1.98	2.43	1.90	0.03	N/A	20% RM or 10% AS
CO @ 15%	2.85	2.46	16.17	7.67	0.39	0.46	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	12.95	13.00	0.45	0.05	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0071	0.0072	2.25	0.00009	1.00		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 2

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (SOx as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-6747B

Tested May 12, 2010

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 2

Project 280-6747B
May 12, 2010
Permit No. C-7220-2-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
	2.82	2.11	7.01	0.0077	
NOx	2.87	2.14	7.14	0.0078	**2.5 ppm @ 15% O_2**
	2.89	2.15	7.19	0.0078	**and**
Mean	**2.86**	**2.13**	**7.11**	**0.0078**	**8.03 lb/hr**
	2.12	1.59	3.21	0.0035	
CO	2.06	1.54	3.12	0.0034	**6.0 ppm @ 15% O_2**
	1.97	1.47	2.99	0.0033	**and**
Mean	**2.05**	**1.53**	**3.11**	**0.0034**	**11.81 lb/hr**
	1.81	1.35	1.66		
NH_3	1.89	1.41	1.74		**10 ppm @ 15% O_2**
	1.84	1.37	1.69		**and**
Mean	**1.85**	**1.37**	**1.70**		**11.90 lb/hr**
	0.0	0.0	0.00	0.0000	
VOC	0.0	0.0	0.00	0.0000	**2.0 ppm @ 15% O_2**
	0.0	0.0	0.00	0.0000	**and**
Mean	**<0.15**	**<0.11**	**<0.13**	**<0.0001**	**2.67 lb/hr**
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
	0.00043	0.00039	1.430	0.00141	
Particulate	0.00033	0.00030	1.104	0.00107	**0.1 gr/DSCF**
	0.00047	0.00042	1.591	0.00155	**and**
Mean	**0.00041**	**0.00037**	**1.375**	**0.00134**	**6.00 lb/hr**
	gr/100DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas **<0.06**		As SO_2 in Stack Exhaust **<0.150**	As SO_2 in Stack Exhaust **<0.0002**	**1 gr/100 DSCF and 2.51 lb/hr**

Comments

VOC Reported Results Based on Detection Limit of Propane

2009 Historical HAPS to VOC Ratio=0.777

Calculated HAPS=0.10 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 2

Project 280-6747B
May 12, 2010
Permit No. C-7220-2-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	12.94	12.96	0.21	N/A	0.02	N/A	1% Difference
NOx @ 15%	2.12	2.14	3.56	3.02	0.02	N/A	20% RM or 10% AS
CO @ 15%	1.99	1.96	3.73	1.24	0.03	0.07	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	12.94	12.96	0.21	0.02	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0077	0.0078	3.59	0.00010	1.00		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 3

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (Sox as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-6747C

Tested May 18, 2010

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 3

Project 280-6747C
May 18, 2010
Permit No. C-7220-3-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
NOx	2.87	2.12	7.06	0.0077	**2.5 ppm @ 15% O_2 and 8.03 lb/hr**
	2.85	2.11	7.02	0.0077	
	2.85	2.10	6.99	0.0076	
Mean	**2.86**	**2.11**	**7.02**	**0.0077**	
CO	0.73	0.54	1.09	0.0012	**6.0 ppm @ 15% O_2 and 11.81 lb/hr**
	0.92	0.68	1.37	0.0015	
	0.87	0.64	1.30	0.0014	
Mean	**0.84**	**0.62**	**1.25**	**0.0014**	
NH_3	1.81	1.34	1.65		**10 ppm @ 15% O_2 and 11.90 lb/hr**
	1.99	1.46	1.80		
	2.04	1.51	1.86		
Mean	**1.95**	**1.44**	**1.77**		
VOC	0.0	0.0	0.00	0.0000	**2.0 ppm @ 15% O_2 and 2.67 lb/hr**
	0.0	0.0	0.00	0.0000	
	0.0	0.0	0.00	0.0000	
Mean	**<0.15**	**<0.11**	**<0.13**	**<0.0001**	
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
Particulate	0.00051	0.00046	1.747	0.00168	**0.1 gr/DSCF and 6.00 lb/hr**
	0.00054	0.00048	1.845	0.00176	
	0.00046	0.00041	1.580	0.00149	
Mean	**0.00051**	**0.00045**	**1.724**	**0.00164**	
	gr/100DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas **<0.06**		As SO_2 in Stack Exhaust **<0.150**	As SO_2 in Stack Exhaust **<0.0002**	**1 gr/100 DSCF and 2.51 lb/hr**

Comments

VOC Reported Results Based on Detection Limit of Propane

2009 Historical HAPS to VOC Ratio=0.777

Calculated HAPS=0.10 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 3

Project 280-6747C
May 18, 2010
Permit No. C-7220-3-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	12.91	12.93	0.27	N/A	0.02	N/A	1% Difference
NOx @ 15%	2.09	2.02	3.96	3.31	0.07	N/A	20% RM or 10% AS
CO @ 15%	0.63	0.41	37.37	3.94	0.22	0.24	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	12.91	12.93	0.27	0.02	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0076	0.0074	4.09	0.00026	1.04		7.5% RM or 0.015 lb/MMBtu Difference

San Joaquin Valley Air Pollution Control District

Compliance Source Test Report

Panoche Energy Center

Panoche Facility
Turbine 4

Prepared by
Aeros Environmental, Inc.

Determination of Concentrations and Emissions of Particulate, NOx, CO, VOC, NH_3, Fuel Sulfur (Sox as SO_2) and Relative Accuracy Test Audit (RATA)

Project 280-6747D

Tested May 19, 2010

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 4

Project 280-6747D
May 19, 2010
Permit No. C-7220-4-0

Pollutant	ppm	ppm @ 15% O_2	lb/hr	lb/MMBtu	Permit Limits
	2.84	2.11	6.95	0.0077	
NOx	2.84	2.11	6.91	0.0077	**2.5 ppm @ 15% O_2**
	2.79	2.08	6.77	0.0076	**and**
Mean	**2.82**	**2.10**	**6.88**	**0.0077**	**8.03 lb/hr**
	2.25	1.67	3.34	0.0037	
CO	1.38	1.03	2.04	0.0023	**6.0 ppm @ 15% O_2**
	1.53	1.14	2.26	0.0025	**and**
Mean	**1.72**	**1.28**	**2.55**	**0.0028**	**11.81 lb/hr**
	1.78	1.32	1.60		
NH_3	1.89	1.41	1.70		**10 ppm @ 15% O_2**
	1.80	1.34	1.61		**and**
Mean	**1.82**	**1.36**	**1.63**		**11.90 lb/hr**
	0.0	0.0	0.00	0.0000	
VOC	0.0	0.0	0.00	0.0000	**2.0 ppm @ 15% O_2**
	0.0	0.0	0.00	0.0000	**and**
Mean	**<0.15**	**<0.11**	**<0.13**	**<0.0001**	**2.67 lb/hr**
	gr/DSCF	**gr/SCF**	**lb/hr**	**lb/MMBtu**	
	0.00076	0.00068	2.529	0.00249	
Particulate	0.00061	0.00054	2.021	0.00198	**0.1 gr/DSCF**
	0.00095	0.00085	3.128	0.00310	**and**
Mean	**0.00077**	**0.00069**	**2.559**	**0.00252**	**6.00 lb/hr**
	gr/100DSCF		**lb/hr**	**lb/MMBtu**	
Fuel Sulfur	As S in Fuel Gas		As SO_2 in Stack Exhaust	As SO_2 in Stack Exhaust	**1 gr/100 DSCF**
	<0.06		**<0.148**	**<0.0002**	**and**
					2.51 lb/hr

Comments

VOC Reported Results Based on Detection Limit of Propane

2009 Historical HAPS to VOC Ratio=0.777

Calculated HAPS=0.10 lb/hr

AEROS ENVIRONMENTAL, INC.

Summary Of Results

Panoche Energy Center
Panoche Facility
Turbine 4

Project 280-6747D
May 19, 2010
Permit No. C-7220-4-0

RATA Results Part 60							
Instrument	Aeros	Client	RM	AS	Difference	Difference+CC	Limits
O_2 %	12.98	12.99	0.11	N/A	0.00	N/A	1% Difference
NOx @ 15%	2.09	2.12	2.25	1.89	0.03	N/A	20% RM or 10% AS
CO @ 15%	1.27	1.24	6.31	1.33	0.03	0.08	10% RM or 5% AS or Difference+CC<5ppm

RATA Results Part 75							
Instrument	Aeros	Client	RM	Difference	Bias Adjustment		Annual Limits
O_2 %	12.98	12.99	0.11	0.00	N/A		7.5% RM or 0.7% Difference
NOx lb/MMBtu	0.0076	0.0077	1.69	0.00008	1.00		7.5% RM or 0.015 lb/MMBtu Difference

The Avogadro Group, LLC

SOURCE TEST REPORT
2009 INITIAL COMPLIANCE TESTS
KIEWIT POWER CONSTRUCTORS
PANOCHE ENERGY CENTER
FIREBAUGH, CALIFORNIA

Prepared For:

Kiewit Power Constructors
43833 West Panoche Road
Firebaugh, California 93622

For Submittal To:

San Joaquin Valley Air Pollution Control District
1990 E. Gettysburg Avenue
Fresno, California 93726

Prepared By:

Jeremy Klosinski & Shane Mascitelli
The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, California 94509
(925) 680-4300

June 25, 2009

REVIEW AND CERTIFICATION

All work, calculations, and other activities and tasks performed and documented in this report were carried out under my direction and supervision.

Name: Jeremy S. Klosinski Title: Project Manager

Sign: [signature] Date: 6/25/09

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein, and hereby certify that the presented material is authentic and accurate to the best of my knowledge.

Name: Dan Duncan Title: IT/Lab Director

Sign: [signature] Date: 6/26/09

Int. _____ Int. _____

SUMMARY INFORMATION

Source Information

Source Location:	Panoche Energy Center 43833 West Panoche Road Firebaugh, CA 93622	
Plant Contacts:	Mr. Don Burkhard	Mr. Bob Brown, P.E.
Telephone:	(925) 759-0457	(913) 928-7033
Project Coordinator:	Kevin Hazelbaker	
Company:	Kiewit Power Constructors	
Telephone:	(913) 238-8418	
Regulatory Agency:	San Joaquin Valley Air Pollution Control District	
Inspector:	Mr. John Copp	
Telephone:	(559) 230-6062	
Unit:	Four 100 MW GE Model LMS100 combustion turbines	
Purpose:	Determination of initial emissions compliance	
Permits:	Final Determination of Compliance Evaluation No. C1062518 Application for Certification Docket No. 06-AFC-5	
Procedures:	EPA Methods 1, 2, 3A, 4, 5/202, 7E, 10, 19, TO-12 and TO-15 BAAQMD Method ST-1B, CARB Methods 429 and 430	

Testing Company Information

Testing Firm:	The Avogadro Group, LLC 2825 Verne Roberts Circle Antioch, Ca 94509	
Certification:	ARB Independent Tester	
Contact:	Mr. Jeremy Klosinski Project Manager	Mr. Kevin Crosby Technical Director
Telephone:	(925) 429-9013	(925) 680-4337
Facsimile:	(925) 680-4416	(925) 680-4416
Test Date (s):	April 23rd - 24th and April 27th – May 1st 2009	

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SECTION 1.0

INTRODUCTION

The Avogadro Group, LLC (Avogadro) was contracted by Kiewit Power Constructors (Kiewit) to perform a series of initial air emission tests at the Panoche Energy Center (PEC) facility in Firebaugh, California. The test were conducted on April 23rd -24th and April 27th – May 1st, 2009.

The tests were conducted on four 100 MW turbine engine / generators (Application Nos. C-7220-1-0, C-7220-2-0, C-7220-3-0 and C-7220-4-0) to determine compliance with the initial source testing limitations of San Joaquin Valley Air Pollution Control District (SJVAPCD) Final Determination of Compliance Evaluation (DOC) No. C1062518. The scope of work is presented below.

Compliance Tests - Emission measurements were made at each of the four turbine stacks during operations at full load conditions. The tests included the listed parameters in the units shown in italics as required by District Rules 2201, 4102, 4201 and 4703, as well as 40CFR60. The specific emissions limitations as they pertain to source testing can be found in the permit: Conditions 26, 28, 29 and 30.

- CO and NO_X - *ppm @ 15% O_2, lb/hr*
- VOC as CH_4 - *ppm @ 15% O_2, lb/hr*
- NH_3 - *ppm @ 15% O_2, lb/hr*
- PM as PM_{10} - *gr/dscf, lb/hr*

Startup and Shutdown Tests - Emissions measurements were conducted during startup and shutdown events from one of the four turbine units. Startup is defined in the permit as "the period of time during which a unit is brought from a shutdown status to its SCR operating temperature and pressure, including the time required by the unit's emissions control system to reach full operations." Shutdown is defined in the permit as "the period of time during which a unit is taken from operational to non-operational status as the fuel supply to the unit is completely turned off (District Rules 2201 and 4703).

The test results include the listed parameters as required by District Rule 2201 (the units shown in italics). The specific emissions limitations as they pertain to source testing can be found in the permit under Conditions 31 and 32. A relative accuracy audit (RAA) is sufficient to demonstrate compliance with 40 CFR 60, Appendix B. The RAA will consist of three test runs utilizing a combination of startup and shutdown emission data.

Avogadro performed three test runs during startup conditions and one test run during shutdown conditions for comparison with the unit's CEMS. Only three of the four test runs were used.

- CO and NO_X - ppmvd, *lb/hr*
- VOC as CH_4 - ppmvd, *lb/hr*

HAPs Tests - The emissions of hazardous air pollutants (HAPs) were determined from one of the four turbine units during operation at full load. The tests included the listed parameters as required by District Rules 2201, 4102, 4201 and 4703, as well as 40CFR60 (the units shown in italics). The specific permit references can be found in Conditions 43 and 44.

- Aldehydes - concentrations, *lb/hr*
- VOCs - concentrations, *lb/hr*
- PAH - concentrations, *lb/hr*

This report includes results from the test program, descriptions of the testing procedures, descriptions of the facility and sampling locations, target test conditions, and the program schedule. The average results summaries can be found in Tables 1-1 through 1-10. All the supplemental material can be found in the following: Appendix A contains generic descriptions and diagrams of the test methods. Appendix B contains a summary of the quality assurance procedures used by Avogadro and our CARB certification for source testing.

Relative Accuracy Test Audit (RATA) - Tests were conducted on four 100-MW GE Model LMS100 turbine engine / generators to provide a relative accuracy test audit (RATA) as part of the initial analyzer certification. The RATA were conducted to meet the requirements of the Environmental Protection Agency (EPA) 40 CFR Parts 60 and 75, and the applicable conditions of Determination of Compliance Permit No. 06-AFC-5 (Appendix A) issued by the San Joaquin Valley Air Pollution Control District (SJVAPCD). Please refer to Avogadro's *Source Test Report, 2009 Relative Accuracy Test Audit, Panoche Energy Center*, dated June 3, 2009 (No. 09028) for additional information on the RATA tests.

TABLE 1-1
AVERAGE RESULTS SUMMARY
PM EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 23-24, 27, 30-MAY 1, 2009

Parameter	Unit 1	Unit 2	Unit 3	Unit 4	Permit Limit
Process Data:					
Gas turbine gross load, MW	105.1	103.7	104.7	103.0	--
Fuel flow rate, scfh	873,000	879,889	878,267	864,044	--
Stack Gas Data:					
O_2, % volume dry	13.13	13.13	13.09	13.28	--
CO_2, % volume dry	4.58	4.59	4.61	4.51	--
Stack gas temperature, ºF	766.3	776.9	775.9	775.7	--
Stack gas moisture, % volume	10.86	10.14	11.35	10.32	--
Stack gas flow rate, dscfm	362,873	369,398	344,871	355,055	--
Filterable PM_{10}:					
grains/dscf	0.0001	0.0000	0.0012	0.0002	--
lb/hr	0.21	0.07	3.58	0.49	--
lb/MMBtu	0.000	0.000	0.004	0.001	--
Condensable PM_{10}:					
grains/dscf	0.0007	0.0008	0.0005	0.0014	--
lb/hr	2.31	2.61	1.39	4.13	--
lb/MMBtu	0.002	0.003	0.002	0.005	--
Total PM_{10}					
grains/dscf	0.0008	0.0009	0.0017	0.0015	0.1
lb/hr	2.53	2.69	4.98	4.63	6.00
lb/MMBtu	0.003	0.003	0.005	0.005	--

TABLE 1-2
AVERAGE RESULTS SUMMARY
GASEOUS EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 23-24, 27, 30, 2009

Parameter	Unit 1	Unit 2	Unit 3	Unit 4	Permit Limit
Process Data:					
Gas turbine gross load, MW	105.1	104.9	105.1	103.5	--
Fuel flow rate, scfh	872,700	888,433	880,733	866,900	--
Stack Gas Data:					
O_2, % volume dry	13.17	13.12	13.10	13.32	--
CO_2, % volume dry	4.57	4.62	4.60	4.50	--
Stack gas moisture, % volume	767.7	775.3	774.2	774.3	--
Stack gas temperature, ºF	10.96	10.26	11.18	10.51	--
Stack gas flow rate, dscfm	337,886	341,857	338,229	342,283	--
Carbon Monoxide:					
ppm volume dry	3.1	0.4	1.1	0.6	--
ppm @ 15% O_2	2.4	0.3	0.9	0.5	6.0
lb/hr	4.62	0.62	1.70	0.95	11.81
lb/MMBtu	0.005	0.001	0.002	0.001	--
Nitrogen Oxides:					
ppm volume dry	2.6	2.9	2.9	3.1	--
ppm @ 15% O_2	2.0	2.2	2.2	2.4	2.5
lb/hr as NO_2	6.30	7.16	7.23	7.67	8.03
lb/MMBtu as NO_2	0.007	0.008	0.008	0.009	--
Sulfur Oxides:					
grains/100scf	0.059	0.0591	0.0591	0.0591	--
ppm volume dry	0.0	0.0	0.0	0.0	--
ppm @ 15% O_2	0.0	0.0	0.0	0.0	--
lb/hr as SO_2	0.15	0.15	0.15	0.15	2.51
lb/MMBtu as SO_2	0.000	0.000	0.000	0.000	--
Volatile Organic Compounds:					
ppm volume dry as CH_4	0.4	0.2	0.5	0.2	--
ppm @ 15% O_2	0.3	0.2	0.4	0.2	2.0
lb/hr as CH_4	0.30	0.18	0.44	0.20	2.67
lb/MMBtu as CH_4	0.000	0.000	0.000	0.000	--
Ammonia:					
ppm volume dry	1.6	3.5	2.9	3.0	--
ppm @ 15% O_2	1.2	2.7	2.2	2.4	10.0
lb/hr	1.45	3.23	2.66	2.80	11.90
lb/MMBtu	0.002	0.004	0.003	0.003	--

TABLE 1-3
AVERAGE RESULTS SUMMARY
NO_X, CO, & VOC EMISSIONS
STARTUP
PANOCHE ENERGY CENTER
APRIL 28-29, 2009

Parameter	Unit 2	Permit Limit
Process Conditions:		
Gas turbine gross load, MW	67.7	--
Fuel flow rate, scfh	601,600	--
Stack Gas Data:		
O_2, % volume dry	16.04	--
CO_2, % volume dry	2.97	--
Stack gas flow rate, dscfm*	262,968	--
Carbon Monoxide:		
ppm volume dry	8.8	--
ppm @ 15% O_2*	27.6	--
lb/hr*	5.63	106.60
lb/MMBtu*	0.024	--
Nitrogen Oxides:		
ppm volume dry	18.4	--
ppm @ 15% O_2*	16.9	--
lb/hr as NO_2*	42.78	44.40
lb/MMBtu as NO_2*	0.050	--
Volatile Organic Compounds:		
ppm volume dry as CH_4	0.9	--
ppm @ 15% O_2*	1.1	--
lb/hr as CH_4*	0.47	7.60
lb/MMBtu as CH_4*	0.003	--

Note: 1) Results presented here were calculated on a minute by minute basis for the test runs. The average of those calculations are presented in this table.

TABLE 1-4
AVERAGE RESULTS SUMMARY
NO_X, CO, & VOC EMISSIONS
SHUTDOWN
PANOCHE ENERGY CENTER
APRIL 29, 2009

Parameter	Unit 2	Permit Limit
Process Conditions:		
Gas turbine gross load, MW	23.6	--
Fuel flow rate, scfh	213,900	--
Stack Gas Data:		
O_2, % volume dry	17.04	--
CO_2, % volume dry	2.35	--
Stack gas flow rate, dscfm*	117,793	--
Carbon Monoxide:		
ppm volume dry	1.4	--
ppm @ 15% O_2*	3.9	--
lb/hr*	0.58	268.57
lb/MMBtu*	0.005	--
Nitrogen Oxides:		
ppm volume dry	1.6	--
ppm @ 15% O_2*	3.4	--
lb/hr as NO_2*	1.89	34.29
lb/MMBtu as NO_2*	0.006	--
Volatile Organic Compounds:		
ppm volume dry as CH_4	0.7	--
ppm @ 15% O_2*	1.1	--
lb/hr as CH_4*	0.22	17.14
lb/MMBtu as CH_4*	0.002	--

Note:1) Results presented here were calculated on a minute by minute basis for the test run. The average of those calculations are presented in this table.

TABLE 1-5
AVERAGE RESULTS SUMMARY
NO_X, CO, & O_2 RAA
STARTUP/SHUTDOWN
PANOCHE ENERGY CENTER
APRIL 29, 2009

Parameter	Accuracy %	Performance Specification
NO_X Analyzer:		
ppmvd @ 15% O_2	-7.97 %	± 15 %
lb/hr as NO_2	12.64 %	± 15 %
CO Analyzer:		
ppmvd @ 15% O_2	-10.52 %	± 15 %
lb/hr	-0.47 %	± 7.5 %
O_2 Analyzer::		
% volume dry	-4.59 %	± 15 %

Note: The RAA is calculated using the reference method (RM) criteria of ±15 %, or the applicable standard (AS) criteria of ±7.5 %. The applicable standard for CO, in terms of lb/hr, was calculated using the difference between the CEMS and RM divided by the AS. The more restrictive AS of 106.6 lb/hr (startup permit limit) as utilized.

TABLE 1-6
AVERAGE RESULTS SUMMARY
PAH EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 28-29, 2009

Parameter	Unit 2	Permit Limit
Process Data:		
Gas turbine gross load, MW	104.9	--
Fuel flow rate, scfh	888,433	--
Flue Gas Data:		
O_2, % volume dry	13.16	--
CO_2, % volume dry	4.59	--
Stack temperature, ºF	773.5	--
H_2O, % by volume	9.97	--
Stack flow rate, dscfm	364,261	--
Sample volume, dscf	146.97	--
Benzo(a)anthracene:		
ng/dscm	ND< 2.57	--
lb/hr	ND< 3.49E-06	--
Benzo(a)pyrene:		
ng/dscm	ND< 2.40	--
lb/hr	ND< 3.28E-06	--
Benzo(b)fluoranthene:		
ng/dscm	< 10.33	--
lb/hr	< 1.40E-05	--
Benzo(k)fluoranthene:		
ng/dscm	ND< 2.40	--
lb/hr	ND< 3.28E-06	--

Note: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Results denoted with a "<" symbol had a minimum of one fraction below the detection limit but not all.
3) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.

TABLE 1-7
AVERAGE RESULTS SUMMARY
PAH EMISSIONS (CONTINUED)
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 28-29, 2009

Parameter	Unit 2	Permit Limit
Process Data:		
Gas turbine gross load, MW	104.9	--
Fuel flow rate, scfh	888,433	--
Flue Gas Data:		
O_2, % volume dry	13.16	--
CO_2, % volume dry	4.59	--
Stack temperature, ºF	773.5	--
H_2O, % by volume	9.97	--
Stack flow rate, dscfm	364,261	--
Sample volume, dscf	146.97	--
Chrysene:		
ng/dscm	ND< 9.71	--
lb/hr	ND< 1.31E-05	--
Dibenz(a,h)anthracene:		
ng/dscm	ND< 2.40	--
lb/hr	ND< 3.28E-06	--
Indeno(1,2,3-cd)pyrene:		
ng/dscm	< 5.56	--
lb/hr	< 7.62E-06	--
Naphthalene:		
ng/dscm	ND< 237.7	--
lb/hr	ND< 3.22E-04	--
TOTAL PAH:		
ng/dscm	< 272.1	--
lb/hr	< 3.70E-04	--

Note: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Results denoted with a "<" symbol had a minimum of one fraction below the detection limit but not all.
3) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.
4) Total PAH is the summation of naphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene.

TABLE 1-8
AVERAGE RESULTS SUMMARY
VOLATILE HAPs EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 28-29, 2009

Parameter	Unit 2	Permit Limit
Process Data:		
Gas turbine gross load, MW	104.9	--
Fuel flow rate, scfh	888,433	--
Flue Gas Data:		
O_2, % volume dry	13.16	--
CO_2, % volume dry	4.59	--
Stack temperature, ºF	773.5	--
H_2O, % by volume	9.97	--
Stack flow rate, dscfm	364,261	--
1,3-Butadiene:		
µg/dscm	ND< 1.87	--
lb/hr	ND< 0.003	--
Benzene:		
µg/dscm	ND< 2.73	--
lb/hr	ND< 0.004	--
Ethyl Benzene:		
µg/dscm	ND< 3.70	--
lb/hr	ND< 0.005	--
Hexane:		
µg/dscm	ND< 3.00	--
lb/hr	ND< 0.004	--

Note: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Stack gas data is derived from the concurrent PAH test runs.

TABLE 1-9
AVERAGE RESULTS SUMMARY
VOLATILE HAPs EMISSIONS (CONTINUED)
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 28-29, 2009

Parameter	Unit 2	Permit Limit
Process Data:		
Gas turbine gross load, MW	104.9	--
Fuel flow rate, scfh	888,433	--
Flue Gas Data:		
O_2, % volume dry	13.16	--
CO_2, % volume dry	4.59	--
Stack temperature, ºF	773.5	--
H_2O, % by volume	9.97	--
Stack flow rate, dscfm	364,261	--
Propylene:		
µg/dscm	*ND< 6.04*	--
lb/hr	*ND< 0.008*	--
Propylene Oxide:		
µg/dscm	*ND< 8.34*	--
lb/hr	*ND< 0.011*	--
Toluene:		
µg/dscm	ND< 3.20	--
lb/hr	ND< 0.004	--
m,p-Xylene:		
µg/dscm	ND< 3.70	--
lb/hr	ND< 0.005	--
o-Xylene:		
µg/dscm	ND< 3.70	--
lb/hr	ND< 0.005	--

Notes: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Stack gas data is derived from the concurrent PAH test runs.
3) The lab analysis reported propylene and propylene oxide below the detection limit as tentatively identified compounds (TICs) with no reporting limit. The reporting limit in terms of µg/dscm was estimated using the highest reporting limit given by the laboratory report and the corresponding molecular weights. Results were calculated using the estimated reporting limit and are presented here in italics. Please refer to Appendix E.6 for further details.

TABLE 1-10
AVERAGE RESULTS SUMMARY
ALDEHYDE EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER
APRIL 28-29, 2009

Parameter	Unit 2	Permit Limit
Process Data:		
Gas turbine gross load, MW	104.9	--
Fuel flow rate, scfh	888,433	--
Flue Gas Data:		
O_2, % volume dry	13.16	--
CO_2, % volume dry	4.59	--
Stack temperature, ºF	773.5	--
H_2O, % by volume	9.97	--
Stack flow rate, dscfm	364,261	--
Formaldehyde:		
µg/dscm	< 13.78	--
lb/hr	< 1.88E-02	--
Acetaldehyde:		
µg/dscm	ND< 11.08	--
lb/hr	ND< 1.51E-02	--
Acrolein:		
µg/dscm	ND< 11.08	--
lb/hr	ND< 1.51E-02	--

Note: 1) Stack gas data is derived from the concurrent PAH test runs.
2) Formaldehyde, acetaldehyde, and acrolein results presented are non-blank corrected.
3) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
4) Results denoted with a "<" symbol had a minimum of one fraction below the detection limit but not all.

SECTION 2.0

TESTING CONTRACTOR

The test program was conducted by Avogadro. Portions of the sample analyses were subcontracted to qualified analytical laboratories. The contact persons for the project are:

- The Avogadro Group, LLC: Kevin Crosby (925) 680-4337
  Jeremy Klosinski (925) 429-9013
- Kiewit Power Constructors: Kevin Hazelbaker (913) 238-8418
  Bob Brown, P.E. (913) 928-7033
- Panoche Energy Center Gary Chandler (801) 253-1278
  Don Burkhard (925) 759-0457
- SJVAPCD: John Copp (559) 230-5977

Avogadro is a recognized independent contractor that was approved to conduct emission source testing on behalf of the California Air Resources Board (CARB), pursuant to Section 91200-21220, Title 17, of the California Code of Regulations. Avogadro is a full service source testing and combustion engineering consulting firm with extensive experience in air quality management and pollution control.

Avogadro provided a professional source test team to conduct the testing as described in this test plan. The test team members assigned to this project were familiar with the testing of natural gas-fired turbines and have successfully conducted hundreds of similar source tests in the SJVAPCD jurisdiction. Table 2-1 outlines the assigned key test program personnel.

TABLE 2-1
KEY TEST PROGRAM PERSONNEL
2009 INITIAL COMPLIANCE TEST PROGRAM
PANOCHE ENERGY CENTER

PERSONNEL	TITLE	ASSIGNMENT	EXPERIENCE
Kevin Crosby	Scientist IV	Principal in Charge	31 years
Dan Duncan	Engineer IV	QA/QC Officer	21 years
Jeremy Klosinski	Scientist II	Project Manager	9 years

Mr. Kevin Crosby, Technical Director for Avogadro, provided complete project oversight as Principal in Charge. With over 31 years in the industry, Kevin is one of the most experienced source testers in the country. Kevin specializes in large, complex programs, and regularly oversees numerous turbine start-up tests at other facilities throughout the United States. Kevin's primary objective is to ensure that the results generated by this test program exceed the expectations and requirements of all end-users of the data.

Mr. Jeremy Klosinski was Project Manager for the air sampling activities at PEC. Jeremy specializes in turbine testing and he continuously strives to maintain some of the lowest blank levels and detection limits in the industry, while still maintaining cost-effective projects. Jeremy's responsibilities included overseeing the execution and planning of all air sampling efforts including testing, reporting, and project coordination. Jeremy was responsible for assuring proper laboratory and sample glassware preparation, sample custody, and that both the field and laboratory efforts comply with the EPA and CARB approved procedures.

Mr. Dan Duncan was appointed as the Quality Assurance Officer. Dan reviewed and validated all test results, lab analyses, and the final report. The technicians and support personnel were chosen based on specific experience of the methods to be used throughout the program. Their main objectives were the execution of the wet-chemical tests and the setup and teardown of the equipment. Only the most qualified technicians participated in this test program.

SECTION 3.0

SOURCE LOCATION INFORMATION

3.1 FACILITY DESCRIPTION

The Panoche Energy Center facility is located on West Panoche Road near Firebaugh, California, approximately 2 miles east of Interstate 5, in Fresno County. The facility includes four 100 megawatt General Electric Model LMS100 simple-cycle natural gas-fired turbine engine/generators (CTG), each equipped with water injection to the combustors for reducing production of oxides of nitrogen (NOx), a selective catalytic reduction (SCR) system with 19 percent aqueous ammonia injection to further reduce NO_X emissions, and an oxidation catalyst to reduce carbon monoxide (CO).

3.1.1 Combustion Turbine Generators

The GE LMS100 turbines are inter-cooled systems developed especially for the power generation industry, utilizing heavy-duty gas turbine and aero-derivative gas turbine technologies. The turbines are specifically designed for cyclic applications providing flexible power and 10-minute start-ups. A CTG's power output is defined by its capacity factor. The capacity factor averages the engine's output and divides that by the engine's rated output for a typical day. Each CTG can generate 100 MW net at summer design ambient conditions. The project has an annual capacity factor of approximately 57 percent, depending on dispatch to meet annual demand.

Electricity generated by PEC is delivered to the existing Pacific Gas and Electric electrical transmission system at the adjacent Panoche Substation. Interconnection at this substation minimizes impacts to the PG&E transmission system while providing efficient peaking power for use during peak demand. Auxiliary equipment includes inlet air filters, evaporative coolers, inter-coolers, cooling towers, water pumps and treatment equipment, natural gas compressors, generator step-up and auxiliary transformers, etc.

3.1.2 CEM System Description

All flue gas pollutant and diluent measurements are made on a dry basis. Effluent gas from the sampling location is filtered and transported through a heated sample line to the sample conditioning system in the main analyzer cabinet. The sample conditioning system again filters the effluent gas and a chilled condenser removes the moisture. The dry, particulate-free effluent gas is then routed to the analyzers. The analog outputs of the analyzers and certain plant inputs are transmitted to a system controller.

A programmable logic controller (PLC) controls the CEMS and provides timing and control of the sampling system, receives analog inputs from the analyzers, and provides

corrected and calculated analog outputs. Automatic zero and span calibrations are performed on the CEMS monitors every twenty-four hours when the units are operating. Certified EPA protocol calibration gases are injected at a valve box in back of the probe. Table 3-1 outlines the make, model, and operating ranges of the individual analyzers.

TABLE 3-1
ANALYZER INFORMATION
PANOCHE ENERGY CENTER

ANALYZER	MANUFACTURER / MODEL	ANALYZER RANGE
CO / O_2	Teledyne/API, Model 300E/02	0-10 / 0-1000 ppm, 0-25%
NO_X	Teledyne/API, Model 200EM	0-10 / 0-150 ppm

3.1.3 Data Acquisition System

The CEMS data acquisition and reporting system is controlled by the data acquisition and handling system (DAHS). The DAHS is a PC-based, multi-user, multi-tasking system. The DAHS provides automated data monitoring and management capabilities to the CEMS using CISCO supplied software. The DAHS is utilized for operator interface, data storage, report generation, and data display. The PLC transmits data from the analyzers, and plant data to the DAHS. The DAHS polls the PLC every ten seconds. The system generates one-minute averages, from which 15-minute and 1-hour average values are then calculated to comply with 40 CFR, Part 75.10 (d1).

The DAHS indicates any occurrence of specification limit exceedances or CEM operational problems and generates reports in the required format for submittal to the applicable regulatory agencies. These reports may be produced in either hard copy or electronic format and can be made available for telemetry transmission.

3.2 SAMPLING LOCATIONS

Samples were collected at the exhaust stacks, from sampling ports that meet EPA Method 1 criteria. The identical stacks are vertical, cylindrical ducts, with port access provided by ladders to permanent platforms approximately 75 feet above the ground. Four ports (6 inches in diameter), each 90° apart from one another, are installed 288 inches (2.4 diameters) downstream from the nearest flow disturbance and 60 inches (0.5 diameters) upstream from the stack exit. The stacks are 90 feet tall and measure 162 inches outside diameter. All stack measurements were verified by Avogadro personnel prior to testing. Appendix E includes schematics of the turbine, SCR, and exhaust stack. Additional information, including traverse point locations, are included in the report.

SECTION 4.0

TEST DESCRIPTION

4.1 PROGRAM OBJECTIVES

There were two objectives of this test program. Some of the tests determined compliance with the source testing conditions of the ATCs issued by the SJVAPCD. Additional tests were performed to audit the performance of the CEM systems (40 CFR Parts 60 and 75 RATAs). The results of the RATA are presented in a separate test report.

This report presents the results of the emission tests and compares them to the applicable performance specifications and permit limits. The results were presented in units consistent with those reported by the CEMS and those listed in the ATCs. The permit limits are presented in Table 4-1.

TABLE 4-1
EMISSION PERMIT LIMITATIONS
PANOCHE ENERGY CENTER

EMISSION PARAMETER	UNITS OF MEASUREMENT	PERMIT LIMITS	PERMIT REFERENCE
Oxides of Nitrogen (NO_X)	ppm @ 15% O_2 lb/hr as NO_2	2.5 8.03	Condition 29 Condition 29
Carbon Monoxide (CO)	ppm @ 15% O_2 lb/hr	6.0 11.81	Condition 29 Condition 29
Volatile Organic Compounds (VOCs)	ppm @ 15% O_2 lb/hr as CH_4	2.0 2.67	Condition 29 Condition 29
Oxides of Sulfur (SO_X)	lb/hr as SO_2 lb/day as SO_2	2.51 60.2	Condition 29 Condition 29
Particulate Matter (total PM as PM_{10})	gr/dscf lb/hr	0.1 6.00	Condition 26 Condition 29
Ammonia (NH_3)	ppm @ 15% O_2 lb/hr	10.0 11.90	Condition 30 Condition 30

4.2 TEST CONDITIONS

With the exception of the start-up and shut-down tests, the compliance tests were conducted while the turbines were operating at normal full-load conditions. The test conditions were established by Panoche Energy Center personnel. Start-up and shut-down tests were performed under conditions defined by the District.

4.3 TEST PROGRAM SCHEDULE

The test program schedule is presented in Tables 4-2 and 4-3.

TABLE 4-2
TEST SCHEDULE
2009 INITIAL COMPLIANCE TEST PROGRAM
PANOCHE ENERGY CENTER

DATE	PARAMETER	SAMPLE RUNS	SAMPLE DURATION
April 22, 2009	Mobilization, safety orientation Set-up on Unit 3	--	--
April 23, 2009	**Compliance Tests, Unit 3**		
	O_2, CO_2, CO, NO_X	1-11	30 minutes
	NH_3	FB, 1, 2, 3 of 3	30 minutes
	VOC	1, 2, 3 of 3	30 minutes
	PM as PM_{10}	FB, 1, 2, 3 of 3	120 minutes
	Setup on Unit 4	--	--
April 24, 2009	**Compliance Tests, Unit 4**		
	O_2, CO_2, CO, NO_X	1-10	30 minutes
	NH_3	FB, 1, 2, 3 of 3	30 minutes
	VOC	1, 2, 3 of 3	30 minutes
	PM as PM_{10}	FB, 1, 2, 3 of 3	120 minutes
	Setup on Unit 2	--	--
April 27, 2009	**Compliance Tests, Unit 2**		
	O_2, CO_2, CO, NO_X	1-10	30 minutes
	NH_3	FB, 1, 2, 3 of 3	30 minutes
	VOC	1, 2, 3 of 3	30 minutes
	PM as PM_{10}	FB, 1, 2, 3 of 3	120 minutes-

TABLE 4-3
TEST SCHEDULE
2009 INITIAL COMPLIANCE TEST PROGRAM
PANOCHE ENERGY CENTER

DATE	PARAMETER	SAMPLE RUNS	SAMPLE DURATION
	VOC/HAPs Tests, Unit 2		
April 28, 2009	Startup tests (CO, NO_X, VOC)	1 of 3	~21 minutes
	O_2, CO_2	Various	60 minutes
	VOCs (HAPs)	FB, 1 of 3	60 minutes
	Aldehydes (HAPs)	FB, 1 of 3	240 minutes
	PAH (HAPs)	FB, 1 of 3	240 minutes
	VOC/HAPs Tests, Unit 2		
April 29, 2009	Startup tests (CO, NO_X, VOC)	2, 3 of 3	~ 21 minutes
	O_2, CO_2	Various	60 minutes
	VOCs (HAPs)	2, 3 of 3	60 minutes
	Aldehydes (HAPs)	2, 3 of 3	240 minutes
	PAH (HAPs)	2, 3 of 3	240 minutes
	Shutdown tests (CO, NO_X, VOC)	1 of 1	~21 minutes
	Compliance Tests, Unit 1		
April 30, 2009	O_2, CO_2, CO, NO_X	1-4	30 minutes
	NH_3	FB, 1, 2, 3 of 3	30 minutes
	VOC	1, 2, 3 of 3	30 minutes
	PM as PM_{10}	FB, 1 of 3	120 minutes
	Compliance Tests, Unit 4		
May 1, 2009	O_2, CO_2, CO, NO_X	5-10	30 minutes
	PM as PM_{10}	FB, 2, 3 of 3	120 minutes

4.4 AVOGADRO TEST PROCEDURES

The test procedures to be used by Avogadro in this testing program are summarized in Table 4-4. Descriptions of standard procedures are included in Appendix A. Additional information on specific applications or modifications to standard procedures is presented in the following sub-sections. Where any conflicts exist in the descriptions, the specific descriptions here in Section 4.4 will take precedence.

TABLE 4-4
EMISSION TEST METHODS
2009 INITIAL COMPLIANCE TEST PROGRAM
PANOCHE ENERGY CENTER

TEST PARAMETER	REFERENCE METHOD	ANALYTICAL APPROACH	DETECTION LIMITS
O_2 / CO_2	EPA 3A	Paramagnetism/NDIR	< 2% of full scale
CO	EPA 10	Gas filter correlation	< 2% of full scale
NO_X	EPA 7E	Chemiluminescence	< 2% of full scale
NH_3	BA ST-1B*	Ion selective electrode	0.2 ppm
VOCs	EPA 18 or EPA TO-12*	Gas chromatography or Pre-concentration GC-FID	0.1 ppm or 0.1 ppm
Particulate matter	EPA 5 / 202	Gravimetric filtration	0.0002 gr/dscf
Volumetric flow rate	EPA 1, 2, 19	Pitot traverse, F factor	--
Moisture content	EPA 4	Impinger weight gain	--
HAPs - VOCs[1]	EPA TO-15*	GC/MS	0.5 - 5.0 ppbv
HAPs - Aldehydes[2]	CARB 430	HPLC	0.05 *u*g/ml
HAPs - PAH[3]	CARB 429	HRGC/HRMS	0.2-2.0 *n*g/m^3

* - Alternative test methods approved by SJVAPCD, correspondence located in Appendix D.
[1] 1, 3-butadiene, benzene, ethyl benzene, hexane, propylene, propylene oxide, toluene, xylenes
[2] Formaldehyde, acetaldehyde, acrolein
[3] Naphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene

4.4.1 Gaseous Emissions

Concentrations of the gaseous constituents of the stack gas (CO, NO_X, O_2, and CO_2) were measured using Avogadro's dry extractive continuous emissions monitor system (CEMS) described in Appendix A. This system meets the requirements of EPA and CARB methods for gaseous species. A heated Teflon line and chilled knockout system were used to prevent loss of NO_2 in the sampling system. The NO_X analyzer were operated in the NO_X mode to measure NO plus NO_2. A molybdenum catalyst converter is used to convert NO_2 to NO for measurement of total NO_X. The converter efficiency were checked and documented as described in EPA Method 20.

Three 30-minute gaseous emission test runs (O_2, CO_2, CO, and NO_X) were performed for determination of compliance. These runs were used along with additional 30-minute test runs to determine relative accuracy of the facility's CEM system.

The sample conditioning and delivery system includes components to extract a representative sample from the source, remove the moisture and particulate matter from the sample stream, and transport the sample to the analyzers. The primary components of this subsystem are:

1) A titanium or glass probe - heated or insulated as necessary to avoid condensation,
2) Sample filtration - filters located on the probe, pump, and prior to all of the analyzers for removal of particulate matter,
3) Teflon tubing - connecting the probe to the sample conditioner and the sample conditioner to the analyzer manifold - heated or insulated as necessary to avoid condensation,
4) Sample conditioner - glass or stainless steel flasks immersed in an ice bath to remove the moisture from the sample gas stream,
5) Vacuum pump - a leak-free pump with Teflon diaphragm to transport the sample gas through the system,
6) Sample manifold - a distribution system, constructed of stainless steel and Teflon tubing, to direct sample gas to the analyzers, and
7) Sample flow rate control - a series of rotameters, vacuum gauges and pressure gauges connected to the manifold used to maintain the appropriate sample flow rates.

The calibration gas system utilizes only EPA Protocol gases to verify the operation, linearity, and range settings of the electronic analyzers. The sample gas system allows for the introduction of the protocol gases to the analyzers either directly through the manifold (calibration error check - performed once daily) or through the sampling system (system bias check - performed with each run).

The electronic analyzers are rack mounted and are maintained in the mobile lab. The data recording and acquisition system is based on a digital system known as STRATA. It includes software for controlling the collection of calibration and emission monitoring data, and hardware for connection of the analyzer outputs to the recording system. Test results can be provided in three forms: On-site printouts of the digitized data, diskette recordings of the digitized data, and printouts of strip charts from the monitoring data. For this test program all three formats are provided in the this report.

4.4.2 Volatile Organic Compounds

Volatile organic compounds (VOC) are defined in the ATC as “any compound of carbon, excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, carbonates and ammonium carbonate”. During steady load conditions (i.e.

compliance testing), the concentrations of VOC were measured using the sampling and analysis procedures of EPA Compendium Method TO-12 in order to provide low enough detection limits (note that the emission limits for VOC equate to approximately 1 ppm). This test method has already been approved by SJVAPCD.

Flue gas samples were collected in specially-prepared evacuated stainless-steel (SUMMA) canisters. Sample gas was drawn through a quartz probe and connecting line of Teflon tubing through a calibrated flow controller into each canister. Sampling ended when a residual vacuum of at least 5 inches of mercury was left to prevent condensation of water within the canister (note that stack gas moisture content is 8 to 14% by volume). The samples were analyzed by cryogenic pre-concentration and GC/FID.

Triplicate 30-minute sampling runs were conducted on each unit as specified in Tables 4-2 and 4-3. Each test run was performed at a flow rate of approximately 0.1 liters per minute at one atmosphere. After sample collection, the canisters were transported to the laboratory for cryogenic pre-concentration and flame ionization detection analysis as described in Method TO-12 within 14 calendar days. The expected detection limit is on the order of 10 ppb by volume.

Results were reported as concentrations of non-methane non-ethane organic compounds as heptane (and were converted to the basis “as methane”). The canisters were prepared and analyzed by Air Toxics, Ltd. of Folsom, California.

4.4.3 Particulate Matter Emissions

The emissions of total particulate matter (PM) were measured using a combination of EPA Methods 5 and 202. Triplicate test runs were 120 minutes in duration. The total particulate matter collected was reported as PM_{10} emissions. The apparatus included a titanium sampling probe attached to an oven containing a heated glass filter holder and filter. The probe was not heated as the expected flue gas temperature of about 800 °F was sufficient to heat the probe. If the stack temperature did not prove to be high enough to reduce probe condensation, the sampling probe was heated according to the method.

The filter holder was connected by a length of Teflon tubing to the impinger train. The impinger train was connected to the control box, which contains the sampling pump and dry gas meter. The sampling rate and nozzle size was chosen to allow isokinetic sampling at the calculated rate.

The filterable “front-half” PM was recovered from the sampling apparatus as described in EPA Method 5. The sample included the probe and nozzle wash, filter, and rinses from the front-half of the filter holder. The samples were analyzed gravimetrically to determine the concentration of filterable PM.

The "back-half" contents were recovered and analyzed as described in EPA Method 202. A separate sample container was used to collect the impinger contents and rinses, sample line, and the back-half filter holder wash. Each sample was extracted with dichloromethane in a separatory funnel. The analysis included gravimetric measurement of the residue from the aqueous and organic fractions. The corrected results were used to determine the concentration of condensable particulate matter.

4.4.4 Ammonia Slip Emissions

Concentrations of ammonia were determined using Bay Area AQMD Method ST-1B. This test method has been approved by SJVAPCD; correspondence can be found in Appendix D. Sample analysis was performed with an ion selective electrode according to the method. Three calibration standards and one audit sample were used to determine linearity and response factors. Triplicate sets of 30-minute tests runs were performed on each unit in concurrence with the NO_X compliance test runs. The measured results were compared to the facility's calculated results (using the equation outlined in Condition 23 of the ATC).]

The sampling apparatus included a probe of titanium connected by a short piece of Teflon tubing to a series of impingers immersed in an ice bath. The first two impingers were charged with 0.1N hydrochloric acid solution, the third was empty, and the fourth was charged with indicating silica gel. The probe tip was inserted into the stack to a point approximately one third of the stack diameter from the stack wall. Sample stack gas was drawn through the sampling apparatus with a leak-free pump, connected in series to a calibrated dry gas meter and flow metering orifice (i.e. a Method 5 type control box). Sample gas was drawn at a rate of approximately 0.8 cfm.

4.4.5 Volatile Hazardous Air Pollutants

Test Description: Measurements of the emissions of selected volatile hazardous air pollutants (HAPs) were performed according to the procedures of EPA Compendium TO-15. The target analytes, according to the permit, included :

HAPs

1,3-butadiene	propylene
benzene	propylene oxide
ethyl benzene	toluene
hexane	xylenes

Tests were conducted on only one of the turbine units. Triplicate test runs were 60 minutes in duration and the sampling was performed non-isokinetically at a single representative point on the sampling plane. The total sample volume for each run was approximately 5 liters.

Pre-test Cleaning Procedure: Each stainless steel (SUMMA) canister was cleaned, blank checked and evacuated by Air Toxics according to the strict procedures in the method. The flow controller was also cleaned. New Teflon tubing, used as the probe and connecting line, were rinsed prior to use. The line and controller were purged with flue gas prior to each test run.

Sample Train Operation: Pretest preparations, preliminary determinations, and leak check procedures were those outlined in the method. Flue gas samples were collected via new Teflon tubing in specially prepared evacuated SUMMA canisters. The flow rate was controlled using a pre-cleaned calibrated orifice supplied by Air Toxics. The vacuum was carefully monitored and recorded during the tests. After 60 minutes, the canister valve was closed off. Sealing greases were not used on the sample train.

Sample Recovery and Analysis: Avogadro collected the samples, protected them from contamination, and delivered them to the laboratory for analysis within the method's hold time. All QA/QC and chain of custody procedures were followed in strict accordance with the test method. Analyses were performed by Air Toxics Ltd. using high-resolution gas chromatography coupled with mass spectrometry (GC-MS). Note that propylene oxide is not a standard TO-15 compound; therefore, concentrations of this compound were reported as tentatively identified (TIC).

Reporting: The results are presented in terms of non-blank-corrected concentrations and mass emission rates. The non-detected hydrocarbons were calculated using the full reporting limit according to the method. Results were reported in units of concentration (µg/dscm) and mass emissions (lb/hr). Complete documentation of the calculations are provided in the appendices.

4.4.6 Aldehydes

Test Description: Measurements of the emissions of aldehydes were performed according to the procedures of CARB Method 430. The target analytes for this program are formaldehyde, acetaldehyde and acrolein.

Tests were conducted on only one of the turbine units. Triplicate test runs were 240 minutes in duration and the sampling was performed non-isokinetically at a single representative point on the sampling plane. The total sample volume for each run was approximately 93 liters.

The planned test duration was based on data from similar facilities and pre-test planning calculations according to the test method. Calculations were confirmed on-site after receipt of the sampling solution blank analysis. Field blanks were collected during every test run according to the method. A trip blank and field spike was also analyzed. Reagent blanks were collected and retained.

Pre-test Cleaning Procedure: All glassware and Teflon sampling apparatus being exposed to the sample were pre-cleaned using the following procedure according to the method:

a Soak in a hot solution of Liquinox detergent and water;
b Following soaking, rinse six times with hot tap water;
c Next, rinse three times with DI water;
d Next, rinse with methylene chloride and allow to air dry;
e Finally, seal all pieces with parafilm.

Sample Train Operation: Pretest preparations, preliminary determinations, and leak check procedures were those outlined in CARB Method 430. Borosilicate glass and Teflon were used throughout the sampling train to avoid possible contamination and sealing greases were not used on the sample train. Testing occured within 48 hours after the reagent blank analysis by the laboratory.

Gaseous emissions were drawn through a quartz probe and a 1/8" outer diameter Teflon sample line to three midget impingers in series. A pump and calibrated orifice were used to pull the sample through the impingers at a flow rate of 0.39 liters per minute. Each impinger contained 10 ml of an aqueous acidic solution of 2,4-dinitrophenyl-hydrazine (DNPH). To ensure that the organic extractions begin immediately, 5 milliliters of toluene were added to the impingers prior to sampling. The entire sample train was leak tested once prior to sampling and once following testing per the method.

Sample Recovery: The sample line was rinsed into the first impinger with 2 ml of DNPH followed by 1 ml of organic free water. The impingers were recovered in the same manner. Avogadro collected and recovered the samples into their original glass vials. After collection, the samples were transported to the Air Toxics laboratory for analysis within the method's hold-time. The samples were protected from light and kept below 4 ºC at all times. All QA/QC and chain of custody procedures were followed in strict accordance with the test method.

Sample Analysis: The DNPH sampling solution was prepared and analyzed by Air Toxics. Sample analysis included high-performance liquid chromatography (HPLC) in strict accordance with the method. Sample extraction took place within 7 days following testing. The analysis happened within 30 days of extraction. The laboratory QA/QC procedures outlined in the method were followed in strict accordance.

Reporting: The results were presented in terms of non-blank corrected concentrations. Results were also calculated and reported in comparison to the reporting limit using CARB Method 430. Results were reported in units of concentration (ug/dscm) and mass emissions (lb/hr). Complete documentation of the calculations are provided in the appendices.

4.4.7 Polycyclic Aromatic Hydrocarbons (PAH)

Test Description: Measurements of the emissions of selected polycyclic aromatic hydrocarbon (PAH) compounds were performed according to the procedures of CARB Method 429. The target analytes, according to the permit, included :

PAHs

benzo(a)anthracene	chrysene
benzo(a)pyrene	dibenz(a,h)anthracene
benzo(b)fluoranthene	indeno(1,2,3-cd)pyrene
benzo(k)fluoranthene	naphthalene

Tests were conducted on only one of the turbine units. Triplicate test runs were 240 minutes in duration and the sampling was performed isokinetically with a multi-point traverse of the sampling plane. The total sample volume for each run was approximately 132 dscf.

The planned test duration was based on data from similar facilities and pre-test planning calculations according to the test method. One field blank at each test condition was prepared, recovered, and analyzed according to the method. Reagent blanks were also collected; however, these samples were not analyzed.

Pre-test Cleaning Procedure: All glassware and Teflon sampling apparatus which were exposed to the sample (this includes the probe nozzle, probe liner, filter assembly, Teflon connecting tube, condenser, resin cartridge and impingers) were cleaned prior to use per the following procedures:

a Soak in a hot solution of Liquinox detergent and water;
b Following soaking, rinse six times with hot tap water;
c Next, soak in chromic acid cleaning solution for at least four hours;
d Next, rinse three times with DI water;
e Next, rinse with acetone, hexane, and methylene chloride;
f Next, dry in a 200 ºF oven.

All the cleaned glassware and Teflon parts were sealed in methylene chloride-rinsed aluminum foil. Sampling reagents include pre-cleaned glass fiber filters and XAD resin cartridges charged with pre-cleaned Amberlite XAD-2 resin. The filters and resin cartridges were pre-cleaned and screened for contamination by Vista Analytical Laboratory. Pesticide-grade (Fisher Scientific *Optima* grade or equivalent) acetone, hexane and methylene chloride reagents were used as recovery solvents.

Sample Train Operation: Pretest preparations, preliminary determinations, and leak check procedures were those outlined in EPA Method 5 and CARB 429. Borosilicate glass probe liners and nozzles were used to avoid possible contamination and sealing greases were not used on the sample train.

This train was operated in the same manner as a regular EPA Method 5 sampling train. The sampling apparatus included a heated glass probe equipped with an S-type pitot tube and thermocouple. The probe was attached to an oven containing a heated filter holder, Teflon frit, and toluene-rinsed glass-fiber filter. Both the probe exit temperature and oven were maintained at 248°F ± 25°F during sampling. We did not use the optional cyclone pre-separator since the grain loading of the flue gas was relatively low. The filter holder was connected by a length of new Teflon tubing to a condenser coil and XAD-2 sorbent trap. The temperature of the gas entering the sorbent trap was maintained below 68 °F at all times. The trap is connected directly to the impinger train containing four chilled impingers in series. The impinger train was connected to the control box containing the sampling pump and calibrated dry gas meter.

The first and second impingers each contained 100 ml of a sodium carbonate / bicarbonate solution, the third was empty, and the fourth impinger contained silica gel. The entire sample train was leak tested once prior to sampling and once following testing. The pre-test leak check was performed at a nominal vacuum to ensure that leakage did not exceed 0.02 cfm. The post-test leak check was performed at a vacuum greater than the highest vacuum recorded during the test to ensure that leakage did not exceed the lesser of a) 4 percent of the average sampling rate, or b) 0.02 cfm. The sampling rate and nozzle size was chosen to allow isokinetic sampling at 100% ±10%.

Sample Recovery: Avogadro collected and recovered the samples, protected them from contamination, and delivered them to the laboratory for analysis within the method's hold time. All exposed glassware openings in the sampling train were covered with hexane-rinsed foil, to avoid possible contamination, immediately following the final leak check. All QA/QC and chain of custody procedures were followed in strict accordance with the test method.

All sample fractions, except the resin cartridges, were collected in methylene chloride-rinsed amber glass jars with Teflon-lined lids. The liquid level (if applicable) was marked on each sample container. The contents of the impingers were weighed and recorded prior to recovery

The nozzle, probe and front-half of the filter holder were rinsed into Container 1 using measured volumes of acetone, hexane, and methylene chloride (three times each in that order). The filter was collected into Container 2a. The XAD sorbent trap was capped off and sealed in a plastic baggie labeled Container 2b. The back half of the filter holder, sample line and condenser coil were rinsed into Container 3 using the same procedure. The contents of the first three impingers were poured directly into Container 4. The

impingers were rinsed with the three solvents above for collection into Container 5. The silica gel impinger contents were weighed for moisture catch determination and returned to the original container.

All of the samples were protected from light and kept below 4 ºC at all times. The samples were delivered in ice chests packed with blue ice to the lab for analysis. The chain of custody and sample login were documented on suitable forms.

Sample Analysis: Analyses were performed by Vista Analytical Laboratory. The XAD resin trap, filter and rinses were analyzed for PAH compounds according to CARB Method 429. The analytical method entails the addition of internal standards in known quantities, matrix-specific extraction of the sample, preliminary fractionating and cleanup of extracts (if necessary) and analysis of the processed extract for PAH. The analyses were conducted using high-resolution capillary column gas chromatography coupled with high-resolution mass spectrometry (HRGC/HRMS).

Reporting: The results are presented in terms of non-blank-corrected concentrations, depending on the sample-to-blank concentration ratio. Results are also calculated and reported in comparison to the reporting limit. The non-detected species were calculated using the full reporting limit according to the method. Results were reported in units of concentration (ng/dscm) and mass emissions (lb/hr). Complete documentation of the calculations are provided in the appendices.

4.4.8 Relative Accuracy Test Audit

Each turbine unit incorporates its own continuous emissions monitoring system (CEMS) measuring dry-basis outlet concentrations of O_2, CO and NO_X. Results of the compliance test runs and the supplementary RATA test runs were used in the RATA of each system. Relative accuracy was calculated in units of ppm volume dry, ppm @ 15% O_2, and lb/hr for the CO and NO_X analyzers and % volume dry for the O_2 analyzers. Relative accuracy was also calculated in units of emission rate lb/MMBtu for the NO_X analyzer.

At least nine 30-minute test runs were performed to complete the RATA as specified in 40 CFR, Part 60, Appendices B and F and 40 CFR, Part 75, Appendix A. Specific RATA details can be found in the before-mentioned test report.

4.4.9 Volumetric Flow Rate

Stack gas volumetric flow rates were determined by stoichiometric calculations based on fuel flow rate (from the plant's certified fuel flow meters), fuel composition, and excess O_2 (%) measured from the flue gas. Calculations were performed using an "F" factor and higher heating value for natural gas as outlined in EPA Method 19. The results from the analyses were used with the measured emission concentrations to calculate mass

emission rates in lb/hr and lb/MMBtu. Example calculations were presented in the final report.

During the particulate matter and PAH tests, volumetric flow rates and moisture content were determined using EPA Methods 2 and 4 in conjunction with each test. The measured flow rates were used to calculate particulate matter emissions in lb/hr.

4.4.10 Fuel Analysis

PEC was responsible for conducting fuel analysis for HHV and LHV per Condition 48 of Permit 06-AFC-5. The plant was also responsible for fuel sulfur analysis, to demonstrate compliance with Condition 49 of the permit. The results for the analysis can be found in the appendices.

4.4.11 Process Data

The plant's unit operating data were used to document process conditions during the test runs. Unit operating data were provided by PEC personnel. Data presented in this report include fuel flow rates, steam production, and power output to document load conditions. The data also included CEMS data during the RATA runs required to calculate relative accuracy results. Avogadro provided barometric pressure and ambient temperature data throughout the day.

SECTION 5.0

RESULTS

The average test results are presented and compared to their respective permit limits or performance specifications in Tables 1-1 through 1-10 in the Introduction section of this report. Emissions have been reported in units consistent with the permit limits. The test results indicate compliance with the permit limits and the CEMS performance specifications.

The results of the individual test runs are presented in Tables 5-1 through 5-15 as listed below.

Turbine Unit 1

- PM emissions: Table 5-1
- Gaseous (NO_X, CO, SO_X, NH3, & VOC) emissions: Table 5-2

Turbine Unit 2

- PM emissions: Table 5-3
- Gaseous (NO_X, CO, SO_X, NH3, & VOC) emissions: Table 5-4
- NO_x, CO, & VOC startup emissions: Table 5-5
- NO_x, CO, & VOC shutdown emissions: Table 5-6
- PAH emissions: Table 5-7 & 5-8
- TO-15 emissions: Table 5-9 & 5-10
- Formaldehyde emissions: Table 5-11

Turbine Unit 3

- PM emissions: Table 5-12
- Gaseous (NO_X, CO, SO_X, NH3, & VOC) emissions: Table 5-13

Turbine Unit 4

- PM emissions: Table 5-14
- Gaseous (NO_X, CO, SO_X, NH3, & VOC) emissions: Table 5-15

Generic descriptions of the test methods are located in Appendix A. A summary of our quality assurance program, our CARB certifications, and our equipment calibration data are included in Appendix B. Supporting data sets are provided in Appendix C. Field data sheets are presented in Appendix D. Laboratory reports are located in Appendix E and result calculations in Appendix F. A copy of the applicable permit is presented in Appendix G.

TABLE 5-1
TURBINE UNIT 1
PM EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-PM-1	2-PM-1	3-PM-1	Average
Date:	4/30/09	5/1/09	5/1/09	--
Time:	1711-1923	0803-1423	1455-1702	--
Process Data:				
Gas turbine gross load, MW	105.1	105.1	104.9	105.1
Fuel flow rate, scfh	872,700	873,267	873,333	873,000
Stack Gas Data:				
O_2, % volume dry	13.16	13.13	13.09	13.13
CO_2, % volume dry	4.56	4.59	4.60	4.58
Stack gas temperature, ºF	767.7	755.3	776.0	766.3
Stack gas moisture, % volume	10.96	10.58	11.05	10.86
Stack gas flow rate, dscfm	360,233	370,586	357,800	362,873
Filterable PM_{10}:				
grains/dscf	0.0000	0.0001	0.0000	0.0001
lb/hr	0.10	0.46	0.09	0.21
lb/MMBtu	0.000	0.000	0.000	0.000
Condensable PM_{10}:				
grains/dscf	0.0005	0.0006	0.0011	0.0007
lb/hr	1.60	1.84	3.50	2.31
lb/MMBtu	0.002	0.002	0.004	0.002
Total PM_{10}				
grains/dscf	0.0005	0.0007	0.0012	0.0008
lb/hr	1.70	2.29	3.59	2.53
lb/MMBtu	0.002	0.002	0.004	0.003

Note: 1) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.

TABLE 5-2
TURBINE UNIT 1
GASEOUS EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	Run 1	Run 2	Run 3	Averages
Date:	4/30/09	4/30/09	4/30/09	--
Time:	1714-1755	1809-1843	1852-1926	--
Process Data:				
Gas turbine gross load, MW	105.1	105.1	105.1	105.1
Fuel flow rate, scfh	872,300	872,900	872,900	872,700
Stack Gas Data:				
O_2, % volume dry	13.17	13.17	13.16	13.17
CO_2, % volume dry	4.58	4.57	4.56	4.57
Stack gas temperature, ºF	767.7	767.7	767.7	767.7
Stack gas moisture, % volume	10.96	10.96	10.96	10.96
Stack gas flow rate, dscfm	337,800	338,033	337,596	337,810
Carbon Monoxide:				
ppm volume dry	4.2	2.8	2.3	3.1
ppm @ 15% O_2	3.2	2.1	1.7	2.4
lb/hr	6.30	4.16	3.40	4.62
lb/MMBtu	0.007	0.005	0.004	0.005
Nitrogen Oxides:				
ppm volume dry	2.8	2.5	2.4	2.6
ppm @ 15% O_2	2.1	1.9	1.8	2.0
lb/hr as NO_2	6.79	6.22	5.89	6.30
lb/MMBtu as NO_2	0.008	0.007	0.007	0.007
Sulfur Oxides:				
grains/100 scf (fuel content)	0.059	0.059	0.059	0.059
ppm volume dry	0.0	0.0	0.0	0.0
ppm @ 15% O_2	0.0	0.0	0.0	0.0
lb/hr as SO_2	0.15	0.15	0.15	0.15
lb/MMBtu as SO_2	0.000	0.000	0.000	0.000
Volatile Organic Compounds:				
ppm volume dry as CH_4	0.3	0.5	0.3	0.4
ppm @ 15% O_2	0.2	0.4	0.2	0.3
lb/hr as CH_4	0.22	0.45	0.23	0.30
lb/MMBtu as CH_4	0.000	0.001	0.000	0.000
Ammonia:				
ppm volume dry	1.5	1.6	1.6	1.6
ppm @ 15% O_2	1.2	1.2	1.2	1.2
lb/hr	1.40	1.48	1.47	1.45
lb/MMBtu	0.002	0.002	0.002	0.002

Note: 1) Stack gas flow rates were calculated using the appropriate fuel flow rates in accordance with EPA Method 19.
2) Stack gas temperature and moisture data are derived from the concurrent particulate matter test run, 1-PM-1.

TABLE 5-3
TURBINE UNIT 2
PM EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-PM-2	2-PM-2	3-PM-2	Average
Date:	4/27/09	4/27/09	4/27/09	--
Time:	1050-1303	1330-1540	1612-1838	--
Process Data:				
Gas turbine gross load, MW	104.9	104.4	101.8	103.7
Fuel flow rate, scfh	888,433	884,733	866,500	879,889
Stack Gas Data:				
O_2, % volume dry	13.12	13.12	13.16	13.13
CO_2, % volume dry	4.62	4.59	4.56	4.59
Stack gas temperature, ºF	775.3	778.4	776.9	776.9
Stack gas moisture, % volume	10.26	9.70	10.46	10.14
Stack gas flow rate, dscfm	361,027	368,081	379,087	369,398
Filterable PM_{10}:				
grains/dscf	0.0000	0.0000	0.0000	0.0000
lb/hr	0.04	0.05	0.13	0.07
lb/MMBtu	0.000	0.000	0.000	0.000
Condensable PM_{10}:				
grains/dscf	0.0014	0.0009	0.0003	0.0008
lb/hr	4.19	2.81	0.84	2.61
lb/MMBtu	0.004	0.003	0.001	0.003
Total PM_{10}				
grains/dscf	0.0014	0.0009	0.0003	0.0009
lb/hr	4.23	2.85	0.98	2.69
lb/MMBtu	0.005	0.003	0.001	0.003

Note: 1) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.

TABLE 5-4
TURBINE UNIT 2
GASEOUS EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	Run 1	Run 2	Run 3	Averages
Date:	4/27/09	4/27/09	4/27/09	--
Time:	1053-1135	1157-1227	1236-1306	--
Process Data:				
Gas turbine gross load, MW	104.9	105.0	104.8	104.9
Fuel flow rate, scfh	887,800	889,400	888,100	888,433
Stack Gas Data:				
O_2, % volume dry	13.13	13.13	13.10	13.12
CO_2, % volume dry	4.68	4.59	4.59	4.62
Stack gas temperature, ºF	775.3	775.3	775.3	775.3
Stack gas moisture, % volume	10.26	10.26	10.26	10.26
Stack gas flow rate, dscfm	341,857	342,649	340,833	341,780
Carbon Monoxide:				
ppm volume dry	0.6	0.3	0.4	0.4
ppm @ 15% O_2	0.4	0.2	0.3	0.3
lb/hr	0.85	0.45	0.55	0.61
lb/MMBtu	0.001	0.000	0.001	0.001
Nitrogen Oxides:				
ppm volume dry	2.8	2.8	3.1	2.9
ppm @ 15% O_2	2.1	2.1	2.3	2.2
lb/hr as NO_2	6.92	6.98	7.57	7.16
lb/MMBtu as NO_2	0.008	0.008	0.008	0.008
Sulfur Oxides:				
grains/100scf	0.0591	0.0591	0.0591	0.0591
ppm volume dry	0.0	0.0	0.0	0.0
ppm @ 15% O_2	0.0	0.0	0.0	0.0
lb/hr as SO_2	0.15	0.15	0.15	0.15
lb/MMBtu as SO_2	0.000	0.000	0.000	0.000
Volatile Organic Compounds:				
ppm volume dry as CH_4	0.2	0.2	0.2	0.2
ppm @ 15% O_2	0.1	0.2	0.1	0.2
lb/hr as CH_4	0.17	0.21	0.16	0.18
lb/MMBtu as CH_4	0.000	0.000	0.000	0.000
Ammonia:				
ppm volume dry	3.8	3.4	3.3	3.5
ppm @ 15% O_2	2.9	2.6	2.5	2.7
lb/hr	3.51	3.12	3.05	3.23
lb/MMBtu	0.004	0.004	0.003	0.004

Note: 1) Stack gas flow rates were calculated using the appropriate fuel flow rates in accordance with EPA Method 19.
2) Stack gas temperature and moisture data are derived from the concurrent particulate matter test run, 1-PM-2.

TABLE 5-5
TURBINE UNIT 2
NO_X, CO, & VOC EMISSIONS
STARTUP
PANOCHE ENERGY CENTER

Parameter	Run 1	Run 2	Run 3	Averages
Date:	4/28/09	4/28/09	4/29/09	--
Time:	0904-0918	1153-1205	0809-0823	--
Process Conditions:				
Gas turbine gross load, MW	74.1	69.1	60.0	67.7
Fuel flow rate, scfh	632,700	582,200	589,900	601,600
Stack Gas Data:				
O_2, % volume dry	15.16	15.77	17.19	16.04
CO_2, % volume dry	3.41	3.13	2.36	2.97
Stack gas flow rate, dscfm*	271,830	261,151	255,923	262,968
Carbon Monoxide:				
ppm volume dry	13.1	6.0	7.3	8.8
ppm @ 15% O_2*	38.5	19.7	24.6	27.6
lb/hr*	7.52	4.25	5.11	5.63
lb/MMBtu*	0.030	0.015	0.026	0.024
Nitrogen Oxides:				
ppm volume dry	22.2	19.7	13.4	18.4
ppm @ 15% O_2*	20.1	17.8	12.8	16.9
lb/hr as NO_2*	47.62	38.64	42.12	42.78
lb/MMBtu as NO_2*	0.051	0.050	0.048	0.050
Volatile Organic Compounds:				
ppm volume dry as CH_4	0.7	0.7	1.2	0.9
ppm @ 15% O_2*	0.7	0.7	2.0	1.1
lb/hr as CH_4*	0.44	0.42	0.56	0.47
lb/MMBtu as CH_4*	0.002	0.002	0.004	0.003

Note: 1) Results presented here were calculated on a minute by minute basis for the test runs. The average of those calculations are presented in this table.

TABLE 5-6
TURBINE UNIT 2
NO_X, CO, & VOC EMISSIONS
SHUTDOWN
PANOCHE ENERGY CENTER

Parameter	Run 1
Date:	4/29/09
Time:	1821-1835
Process Conditions:	
Gas turbine gross load, MW	23.6
Fuel flow rate, scfh	213,900
Stack Gas Data:	
O_2, % volume dry	17.04
CO_2, % volume dry*	2.35
Stack gas flow rate, dscfm*	117,793
Carbon Monoxide:	
ppm volume dry	1.4
ppm @ 15% O_2*	3.9
lb/hr*	0.58
lb/MMBtu*	0.005
Nitrogen Oxides:	
ppm volume dry	1.6
ppm @ 15% O_2*	3.4
lb/hr as NO_2*	1.89
lb/MMBtu as NO_2*	0.006
Volatile Organic Compounds:	
ppm volume dry as CH_4	0.7
ppm @ 15% O_2*	1.1
lb/hr as CH_4*	0.22
lb/MMBtu as CH_4*	0.002

Note: 1) Results presented here were calculated on a minute by minute basis for the test run. The average of those calculations are presented in this table.

TABLE 5-7
TURBINE UNIT 2
PAH EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-PAH-2	2-PAH-2	3-PAH-2	Average
Date:	4/28/09	4/29/09	4/29/09	--
Time:	1237-1656	0900-1308	1348-1759	--
Process Data:				
Gas turbine gross load, MW	104.9	105.0	104.8	104.9
Fuel flow rate, scfh	887,700	889,400	888,200	888,433
Flue Gas Data:				
O_2, % volume dry	13.18	13.17	13.14	13.16
CO_2, % volume dry	4.58	4.61	4.57	4.59
Stack temperature, ºF	773.8	770.3	776.3	773.5
H_2O, % by volume	9.85	10.11	9.95	9.97
Stack flow rate, dscfm	368,267	365,254	359,263	364,261
Sample volume, dscf	149.28	146.76	144.87	146.97
Benzo(a)anthracene:				
ng/dscm	ND< 2.365	ND< 2.406	ND< 2.925	ND< 2.57
lb/hr	ND< 3.26E-06	ND< 3.29E-06	ND< 3.93E-06	ND< 3.49E-06
Benzo(a)pyrene:				
ng/dscm	ND< 2.365	ND< 2.406	ND< 2.437	ND< 2.40
lb/hr	ND< 3.26E-06	ND< 3.29E-06	ND< 3.28E-06	ND< 3.28E-06
Benzo(b)fluoranthene:				
ng/dscm	4.210	ND< 2.406	ND< 24.37	< 10.33
lb/hr	5.80E-06	ND< 3.29E-06	ND< 3.28E-05	< 1.40E-05
Benzo(k)fluoranthene:				
ng/dscm	ND< 2.365	ND< 2.406	ND< 2.437	ND< 2.40
lb/hr	ND< 3.26E-06	ND< 3.29E-06	ND< 3.28E-06	ND< 3.28E-06

Note: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Results denoted with a "<" symbol had a minimum of one fraction below the detection limit but not all.
3) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.

TABLE 5-8
TURBINE UNIT 2
PAH EMISSIONS (CONTINUED)
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-PAH-2	2-PAH-2	3-PAH-2	Average
Date:	4/28/09	4/29/09	4/29/09	--
Time:	1237-1656	0900-1308	1348-1759	--
Process Data:				
Gas turbine gross load, MW	104.9	105.0	104.8	104.9
Fuel flow rate, scfh	887,700	889,400	888,200	888,433
Flue Gas Data:				
O_2, % volume dry	13.18	13.17	13.14	13.16
CO_2, % volume dry	4.58	4.61	4.57	4.59
Stack temperature, ºF	773.8	770.3	776.3	773.5
H_2O, % by volume	9.85	10.11	9.95	9.97
Stack flow rate, dscfm	368,267	365,254	359,263	364,261
Sample volume, dscf	149.28	146.76	144.87	146.97
Chrysene:				
ng/dscm	ND< 2.365	ND< 2.406	ND< 24.37	ND< 9.71
lb/hr	ND< 3.26E-06	ND< 3.29E-06	ND< 3.28E-05	ND< 1.31E-05
Dibenzo(a,h)anthracene:				
ng/dscm	ND< 2.365	ND< 2.406	ND< 2.437	ND< 2.40
lb/hr	ND< 3.26E-06	ND< 3.29E-06	ND< 3.28E-06	ND< 3.28E-06
Indeno(1,2,3-cd)pyrene:				
ng/dscm	11.83	ND< 2.406	ND< 2.437	< 5.56
lb/hr	1.63E-05	ND< 3.29E-06	ND< 3.28E-06	< 7.62E-06
Naphthalene:				
ng/dscm	ND< 233.0	ND< 240.1	ND< 240.1	ND< 237.73
lb/hr	ND< 3.21E-04	ND< 3.23E-04	ND< 3.23E-04	ND< 3.22E-04
TOTAL PAH:				
ng/dscm	< 260.9	ND< 253.8	ND< 301.5	< 272.1
lb/hr	< 3.59E-04	ND< 3.46E-04	ND< 4.06E-04	< 3.70E-04

Note: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Results denoted with a "<" symbol had a minimum of one fraction below the detection limit but not all.
3) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.
4) Total PAH is the summation of naphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene.

TABLE 5-9
TURBINE UNIT 2
VOLATILE HAPs EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-HAP	2-HAP	3-HAP	Average
Date:	4/28/09	4/29/09	4/29/09	--
Time:	1237-1337	0900-1000	1348-1448	--
Process Data:				
Gas turbine gross load, MW	104.9	105.0	104.8	104.9
Fuel flow rate, scfh	887,700	889,400	888,200	888,433
Flue Gas Data:				
O_2, % volume dry	13.18	13.17	13.14	13.16
CO_2, % volume dry	4.58	4.61	4.57	4.59
Stack temperature, ºF	773.8	770.3	776.3	773.5
H_2O, % by volume	9.85	10.11	9.95	9.97
Stack flow rate, dscfm	368,267	365,254	359,263	364,261
1,3-Butadiene:				
µg/dscm	ND< 1.90	ND< 1.80	ND< 1.90	ND< 1.87
lb/hr	ND< 0.003	ND< 0.002	ND< 0.003	ND< 0.003
Benzene:				
µg/dscm	ND< 2.80	ND< 2.70	ND< 2.70	ND< 2.73
lb/hr	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
Ethyl Benzene:				
µg/dscm	ND< 3.80	ND< 3.60	ND< 3.70	ND< 3.70
lb/hr	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
Hexane:				
µg/dscm	ND< 3.00	ND< 3.00	ND< 3.00	ND< 3.00
lb/hr	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004

Notes: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Stack gas data is derived from the concurrent PAH test runs.

TABLE 5-10
TURBINE UNIT 2
VOLATILE HAPs EMISSIONS (CONTINUED)
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-HAP	2-HAP	3-HAP	Average
Date:	4/28/09	4/29/09	4/29/09	--
Time:	1237-1337	0900-1000	1348-1448	--
Process Data:				
Gas turbine gross load, MW	104.9	105.0	104.8	104.9
Fuel flow rate, scfh	887,700	889,400	888,200	888,433
Flue Gas Data:				
O_2, % volume dry	13.18	13.17	13.14	13.16
CO_2, % volume dry	4.58	4.61	4.57	4.59
Stack temperature, ºF	773.8	770.3	776.3	773.5
H_2O, % by volume	9.85	10.11	9.95	9.97
Stack flow rate, dscfm	368,267	365,254	359,263	364,261
Propylene:				
µg/dscm	*ND< 6.04*	*ND< 6.04*	*ND< 6.04*	*ND< 6.04*
lb/hr	*ND< 0.008*	*ND< 0.008*	*ND< 0.008*	*ND< 0.008*
Propylene Oxide:				
µg/dscm	*ND< 8.34*	*ND< 8.34*	*ND< 8.34*	*ND< 8.34*
lb/hr	*ND< 0.011*	*ND< 0.011*	*ND< 0.011*	*ND< 0.011*
Toluene:				
µg/dscm	ND< 3.20	ND< 3.20	ND< 3.20	ND< 3.20
lb/hr	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
m,p-Xylene:				
µg/dscm	ND< 3.80	ND< 3.60	ND< 3.70	ND< 3.70
lb/hr	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
o-Xylene:				
µg/dscm	ND< 3.80	ND< 3.60	ND< 3.70	ND< 3.70
lb/hr	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005

Notes: 1) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
2) Stack gas data is derived from the concurrent PAH test runs.
3) The lab analysis reported propylene and propylene oxide below the detection limit as tentatively identified compounds (TICs) with no reporting limit. The reporting limit in terms of µg/dscm was estimated using the highest reporting limit given by the laboratory report and the corresponding molecular weights. Results were calculated using the estimated reporting limit and are presented here in italics. Please refer to Appendix E.6 for further details.

TABLE 5-11
TURBINE UNIT 2
ALDEHYDE EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	Form-1	Form-2	Form-3	Average
Date:	4/28/09	4/29/09	4/29/09	--
Time:	1308-1708	0914-1314	1402-1802	--
Process Data:				
Gas turbine gross load, MW	104.9	105.0	104.8	104.9
Fuel flow rate, scfh	887,700	889,400	888,200	888,433
Flue Gas Data:				
O_2, % volume dry	13.18	13.17	13.14	13.16
CO_2, % volume dry	4.58	4.61	4.57	4.59
Stack temperature, ºF	773.8	770.3	776.3	773.5
H_2O, % by volume	9.85	10.11	9.95	9.97
Stack flow rate, dscfm	368,267	365,254	359,263	364,261
Formaldehyde:				
µg/dscm	15.24	< 14.23	< 11.88	< 13.78
lb/hr	2.10E-02	< 1.95E-02	< 1.60E-02	< 1.88E-02
Acetaldehyde:				
µg/dscm	ND< 11.08	ND< 11.08	ND< 11.08	ND< 11.08
lb/hr	ND< 1.53E-02	ND< 1.52E-02	ND< 1.49E-02	ND< 1.51E-02
Acrolein:				
µg/dscm	ND< 11.08	ND< 11.08	ND< 11.08	ND< 11.08
lb/hr	ND< 1.53E-02	ND< 1.52E-02	ND< 1.49E-02	ND< 1.51E-02

Note:
1) Stack gas data is derived from the concurrent PAH test runs.
2) Formaldehyde, acetaldehyde, and acrolein results presented are non-blank corrected.
3) Results denoted with a "ND<" symbol were below the detection limit and are presented here at the reporting limit.
4) Results denoted with a "<" symbol had a minimum of one fraction below the detection limit but not all.

TABLE 5-12
TURBINE UNIT 3
PM EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-PM-3	2-PM-3	3-PM-3	Average
Date:	4/23/09	4/23/09	4/23/09	--
Time:	1005-1215	1255-	1620-1836	--
Process Data:				
Gas turbine gross load, MW	105.1	104.8	104.2	104.7
Fuel flow rate, scfh	880,733	879,867	874,200	878,267
Stack Gas Data:				
O_2, % volume dry	13.10	13.08	13.07	13.09
CO_2, % volume dry	4.60	4.61	4.61	4.61
Stack gas temperature, ºF	774.2	776.6	777.0	775.9
Stack gas moisture, % volume	11.18	11.10	11.76	11.35
Stack gas flow rate, dscfm	348,593	346,644	339,374	344,871
Filterable PM_{10}:				
grains/dscf	0.0030	0.0003	0.0002	0.0012
lb/hr	9.08	1.03	0.64	3.58
lb/MMBtu	0.010	0.001	0.001	0.004
Condensable PM_{10}:				
grains/dscf	0.0007	0.0004	0.0003	0.0005
lb/hr	2.08	1.20	0.89	1.39
lb/MMBtu	0.002	0.001	0.001	0.002
Total PM_{10}:				
grains/dscf	0.0037	0.0008	0.0005	0.0017
lb/hr	11.16	2.23	1.53	4.98
lb/MMBtu	0.012	0.002	0.002	0.005

Note: 1) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.

TABLE 5-13
TURBINE UNIT 3
GASEOUS EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	Run 1	Run 2	Run 3	Averages
Date:	4/23/09	4/23/09	4/23/09	--
Time:	1010-1040	1100-1130	1145-1215	--
Process Data:				
Gas turbine gross load, MW	105.1	105.1	105.0	105.1
Fuel flow rate, scfh	880,000	880,700	881,500	880,733
Stack Gas Data:				
O_2, % volume dry	13.14	13.09	13.08	13.10
CO_2, % volume dry	4.57	4.61	4.62	4.60
Stack gas temperature, ºF	774.2	774.2	774.2	774.2
Stack gas moisture, % volume	11.18	11.18	11.18	11.18
Stack gas flow rate, dscfm	339,465	337,560	337,434	338,153
Carbon Monoxide:				
ppm volume dry	1.0	0.9	1.4	1.1
ppm @ 15% O_2	0.8	0.7	1.1	0.9
lb/hr	1.53	1.40	2.16	1.70
lb/MMBtu	0.002	0.002	0.002	0.002
Nitrogen Oxides:				
ppm volume dry	2.9	2.9	3.0	2.9
ppm @ 15% O_2	2.2	2.2	2.2	2.2
lb/hr as NO_2	7.27	7.14	7.29	7.23
lb/MMBtu as NO_2	0.008	0.008	0.008	0.008
Sulfur Oxides:				
grains/100scf	0.0591	0.0591	0.0591	0.0591
ppm volume dry	0.0	0.0	0.0	0.0
ppm @ 15% O_2	0.0	0.0	0.0	0.0
lb/hr as SO_2	0.15	0.15	0.15	0.15
lb/MMBtu as SO_2	0.000	0.000	0.000	0.000
Volatile Organic Compounds:				
ppm volume dry as CH_4	0.3	1.1	0.2	0.5
ppm @ 15% O_2	0.2	0.8	0.1	0.4
lb/hr as CH_4	0.25	0.90	0.16	0.44
lb/MMBtu as CH_4	0.000	0.001	0.000	0.000
Ammonia:				
ppm volume dry	3.0	2.9	2.9	2.9
ppm @ 15% O_2	2.2	2.2	2.2	2.2
lb/hr	2.70	2.67	2.61	2.66
lb/MMBtu	0.003	0.003	0.003	0.003

Note: 1) Stack gas flow rates were calculated using the appropriate fuel flow rates in accordance with EPA Method 19.
2) Stack gas temperature and moisture data are derived from the concurrent particulate matter test run, 1-PM-3.

TABLE 5-14
TURBINE UNIT 4
PM EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	1-PM-4	2-PM-4	3-PM-4	Average
Date:	4/24/09	4/24/09	4/24/09	--
Time:	0955-1203	1225-1433	1500-1720	--
Process Data:				
Gas turbine gross load, MW	103.5	102.5	102.9	103.0
Fuel flow rate, scfh	866,900	861,400	863,833	864,044
Stack Gas Data:				
O_2, % volume dry	13.31	13.26	13.28	13.28
CO_2, % volume dry	4.51	4.52	4.51	4.51
Stack gas temperature, ºF	774.3	776.8	775.9	775.7
Stack gas moisture, % volume	10.51	10.38	10.08	10.32
Stack gas flow rate, dscfm	359,079	349,837	356,248	355,055
Filterable PM_{10}:				
grains/dscf	0.0002	0.0001	0.0001	0.0002
lb/hr	0.74	0.38	0.37	0.49
lb/MMBtu	0.001	0.000	0.000	0.001
Condensable PM_{10}:				
grains/dscf	0.0003	0.0021	0.0017	0.0014
lb/hr	0.86	6.32	5.22	4.13
lb/MMBtu	0.001	0.007	0.006	0.005
Total PM_{10}				
grains/dscf	0.0005	0.0022	0.0018	0.0015
lb/hr	1.60	6.69	5.59	4.63
lb/MMBtu	0.002	0.007	0.006	0.005

Note: 1) Stack gas flow rates were calculated using pitot measurements and moisture content as outlined in EPA Methods 2 and 4 respectively.

TABLE 5-15
TURBINE UNIT 4
GASEOUS EMISSIONS
FULL LOAD
PANOCHE ENERGY CENTER

Parameter	Run 1	Run 2	Run 3	Averages
Date:	4/24/09	4/24/09	4/24/09	--
Time:	0915-0945	1009-1039	1100-1130	--
Process Data:				
Gas turbine gross load, MW	105.0	102.9	102.6	103.5
Fuel flow rate, scfh	875,900	863,300	861,500	866,900
Stack Gas Data:				
O_2, % volume dry	13.33	13.31	13.31	13.32
CO_2, % volume dry	4.49	4.49	4.51	4.50
Stack gas temperature, ºF	774.3	774.3	774.3	774.3
Stack gas moisture, % volume	10.51	10.51	10.51	10.51
Stack gas flow rate, dscfm	346,364	340,482	339,772	342,206
Carbon Monoxide:				
ppm volume dry	1.1	0.4	0.4	0.6
ppm @ 15% O_2	0.8	0.3	0.3	0.5
lb/hr	1.64	0.59	0.61	0.95
lb/MMBtu	0.002	0.001	0.001	0.001
Nitrogen Oxides:				
ppm volume dry	2.8	3.5	2.9	3.1
ppm @ 15% O_2	2.2	2.8	2.3	2.4
lb/hr as NO_2	6.98	8.77	7.27	7.67
lb/MMBtu as NO_2	0.008	0.010	0.008	0.009
Sulfur Oxides:				
grains/100scf	0.0591	0.0591	0.0591	0.0591
ppm volume dry	0.0	0.0	0.0	0.0
ppm @ 15% O_2	0.0	0.0	0.0	0.0
lb/hr as SO_2	0.15	0.15	0.15	0.15
lb/MMBtu as SO_2	0.000	0.000	0.000	0.000
Volatile Organic Compounds:				
ppm volume dry as CH_4	0.3	0.1	0.2	0.2
ppm @ 15% O_2	0.3	0.1	0.2	0.2
lb/hr as CH_4	0.29	0.12	0.19	0.20
lb/MMBtu as CH_4	0.000	0.000	0.000	0.000
Ammonia:				
ppm volume dry	3.0	2.6	3.5	3.0
ppm @ 15% O_2	2.3	2.0	2.7	2.4
lb/hr	2.81	2.41	3.20	2.80
lb/MMBtu	0.003	0.003	0.004	0.003

Note: 1) Stack gas flow rates were calculated using the appropriate fuel flow rates in accordance with EPA Method 19.
2) Stack gas temperature and moisture data are derived from the concurrent particulate matter test run, 1-PM-4.

APPENDIX A

STANDARD MEASUREMENT PROCEDURES

Continuous Emissions Monitoring System

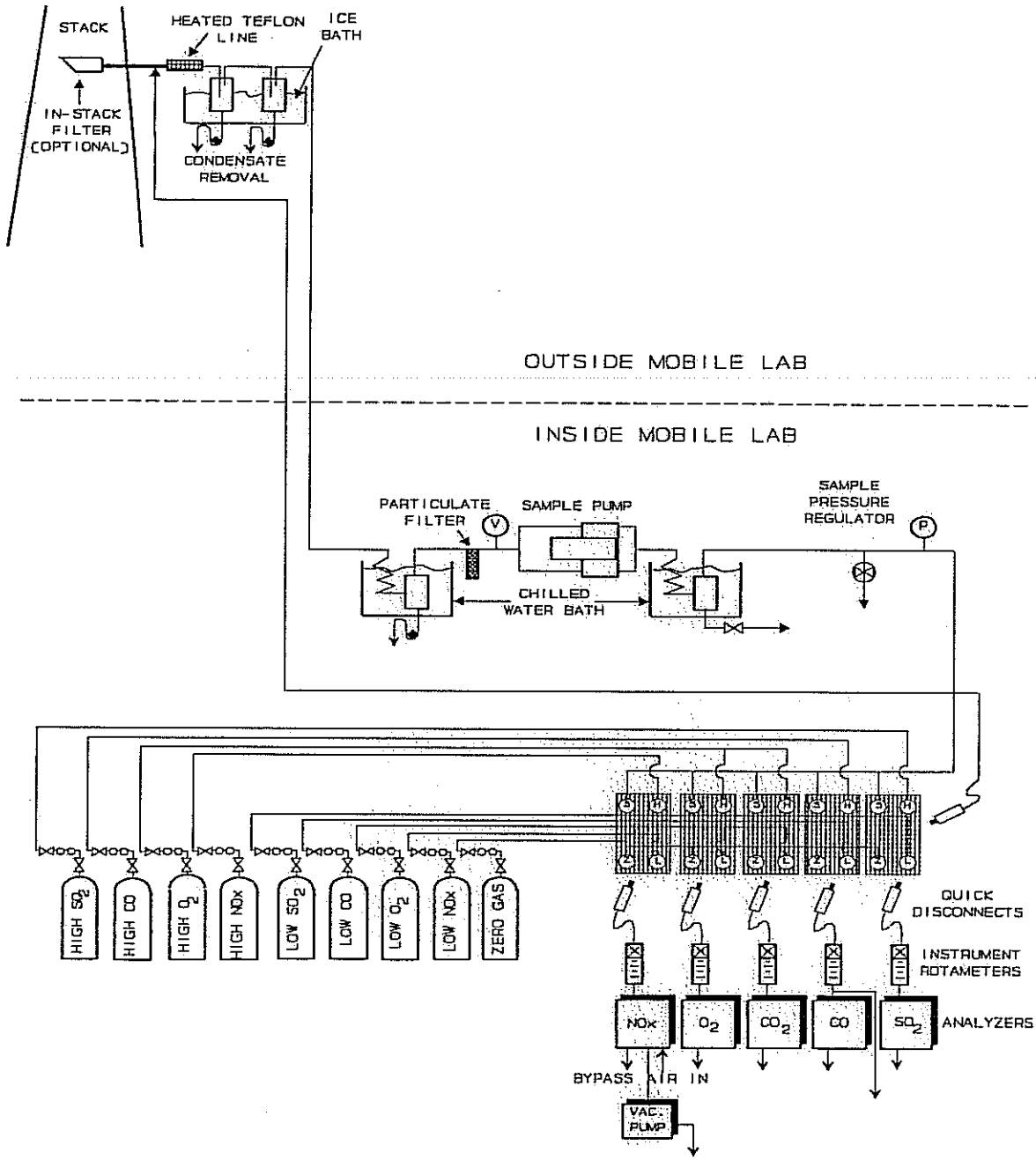
O_2, CO, CO_2, NO, NO_x and SO_2 are measured using an extractive continuous emissions monitoring (CEM) package, shown in the following figure. This package is comprised of three basic subsystems. They are: (1) the sample acquisition and conditioning system, (2) the calibration gas system, and (3) the analyzers themselves. This section presents a description of the sampling and calibration systems. Descriptions of the analyzers used in this program and the corresponding reference test methods follow. Information regarding quality assurance information on the system, including calibration routines and system performance data follows.

The sample acquisition and conditioning system contains components to extract a representative sample from the stack or flue, transport the sample to the analyzers, and remove moisture and particulate material from the sample. In addition to performing the tasks above, the system must preserve the measured species and deliver the sample for analysis intact. The sample acquisition system extracts the sample through a stainless steel probe. The probe is insulated or heated as necessary to avoid condensation. If the particulate loading in the stack is high, a sintered stainless steel filter is used on the end of the probe.

Where water soluble NO_2 and/or SO_2 are to be measured, the sample is drawn from the probe through a heated teflon sample line into an on-stack cooled (approximately 35-40°F) water removal trap. The trap consists of stainless steel flasks in a bath of ice and water. This design removes the water vapor by condensation. The contact between the sample and liquid water is minimized and the soluble NO_2 and SO_2 are conserved. This system meets the requirements of EPA Method 20. The sample is then drawn through a teflon transport line, particulate filter, secondary water removal and into the sample pump. The pump is a dual head, diaphragm pump. All sample-wetted components of the pump are stainless steel or teflon. The pressurized sample leaving the pump flows through a third condensate trap in a refrigerated water bath ($\approx$38°F) for final moisture removal. A drain line and valve are provided to constantly expel any condensed moisture from the dryer at this point. After the dryer, the sample is directed into a distribution manifold. Excess sample is vented through a back-pressure regulator, maintaining a constant pressure of 5-6 psig to the analyzer rotameters.

The calibration system is comprised of two parts: the analyzer calibration, and the system bias check (dynamic calibration). The analyzer calibration equipment includes pressurized cylinders of certified span gas. The gases used are, as a minimum, certified to 1% by the manufacturer. Where necessary to comply with reference method requirements EPA Protocol 1 gases are used. The cylinders are equipped with pressure regulators which supply the calibration gas to the analyzers at the same pressure and flow rate as the sample. The selection of zero, span, or sample gas directed to each analyzer is accomplished by operation of the sample/calibration selector fittings.

The system bias check is accomplished by transporting the same gases used to zero and span the analyzers to the sample system as close as practical to the probe inlet. This is done either by attaching the calibration gas supply line to the probe top with flexible tubing or by actuation of a solenoid valve located at the sample conditioner inlet (probe exit). The span gas is exposed to the same elements as the sample and the system response is documented. The analyzer indications for the system calibration check must agree within 5% of the analyzer calibration. Values are adjusted and changes/repairs are made to the system to compensate for any difference in analyzer readings. Specific information on the analytical equipment and test methods used is provided in the following pages.



Schematic of CEM System

Method:	**Oxygen (O_2) by Continuous Analyzer**
Reference:	EPA 3A, EPA 20, ARB 100, BA ST-14, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of O_2 concentration.
Analyzer:	California Analytical 110P
Measurement Principle:	Paramagnetism
Ranges:	0-5, 0-10, 0-25% O_2
Accuracy:	1% of full scale
Output:	0-10 V, linear
Interferences:	In comparison to oxygen, other gases have such a minor magnetic susceptibility that most of them are insignificant. Exceptions to this are the nitrogen oxides, which are generally present in ppm concentrations so that their contribution to the measurement is insignificant.
Response Time:	90% <2 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. If Method 20 is used, that method's specific procedures for selecting sample points are used. Otherwise, stratification checks are performed at the start of a test program to select single or multiple-point sample locations.
Analytical Procedure:	Oxygen is attracted by a magnetic field. This "paramagnetism" is measured in a special cell in which an electric current is produced that is proportional to the concentration of oxygen. This current is measured and conditioned by the instrument's electronic circuitry to give an output in percent O_2 by volume.

Method:	**Carbon Dioxide by (CO_2) by Continuous Analyzer**
Reference:	EPA 3A, ARB 100, BA ST-5, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of CO_2 concentration.
Analyzer:	Horiba PIR 2000
Measurement Principle:	Non-dispersive infrared (NDIR)
Accuracy:	1% of full scale
Ranges::	0-5, 0-10, 0-25%
Output:	0-10 mV
Interferences:	A possible interference includes water. Since the instrument receives dried sample gas, this interference is not significant.
Response Time:	1.2 seconds
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously.
Analytical Procedure:	Carbon dioxide concentrations are measured by short path length non-dispersive infrared analyzers. These instruments measure the differential in infrared energy absorbed from energy beams passed through a reference cell (containing a gas selected to have minimal absorption of infrared energy in the wavelength absorbed by the gas component of interest) and a sample cell through which the sample gas flows continuously. The differential absorption appears as a reading on a scale of 0 to 100%.

Method:	**NO/NO_x by Continuous Analyzer**
Reference:	EPA 7E, EPA 20, ARB 100, BA ST-13A, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of NO or NO_x.
Analyzer:	Teco Model No. 10AR
Measurement Principle:	Chemiluminescence
Ranges:	0-2.5, 0-10, 0-25, 0-100, 0-250, 0-1000, 0-2500, 0-10,000 ppm
Output:	0-10 mV
Interferences:	Compounds containing nitrogen (other than ammonia) may cause interference.
Response Time:	90%, 1.5 seconds (NO mode) and 1.7 seconds (NO_x mode)
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. If EPA Method 20 is used, that method's specific procedures for selecting sample points are used.
Analytical Procedure:	The oxides of nitrogen monitoring instrument is a chemiluminescent nitric oxide analyzer. The operational basis of the instrument is the chemiluminescent reaction of NO and ozone (O_3) to form NO_2 in an excited state. Light emission results when excited NO_2 molecules revert to their ground state. The resulting chemiluminescense is monitored through an optical filter by a high sensitivity photomultiplier tube, the output of which is electronically processed so it is linearly proportional to the NO concentration. The output of the instrument is in ppmV. When NO_2 is expected to be present in the flue gas, a supercooled water dropout flask will be placed in the sample line to avoid loss of NO_2. Since NO_2 is highly soluble in water, "freezing out" the water will allow the NO_2 to reach the analyzers for analysis. The analyzer measures NO only. In the NOx mode, the gas is passed through a moly converter which converts NO_2 to NO and a total NO_x measurement is obtained. NO_2 is determined as the difference between NO and NO_x. Use of a moly converter instead of a stainless steel converter eliminates NH_3 interference; NH_3 is converted to NO with a stainless converter, but not with a moly converter.

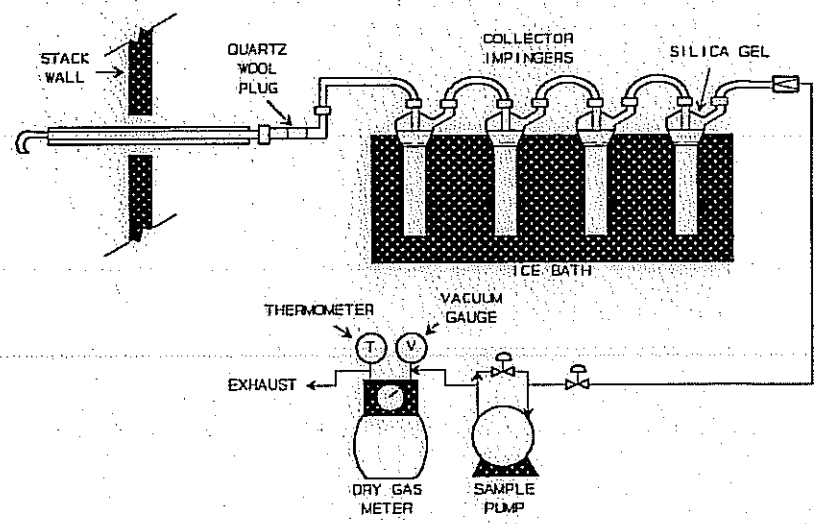
Method:	**Carbon Monoxide (CO) by NDIR/Gas Filter Correlation**
Reference:	EPA 10, ARB 100, BA ST-6, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of CO concentration.
Analyzer:	Teco Model 48
Measurement Principle:	NDIR/Gas Filter Correlation
Precision:	0.1% ppm
Ranges:	0-5, 0-10, 0-25, 0-50, 0-100, 0-250, 0-500, 0-1000, 0-5000 ppm
Output:	0-100 mV
Interferences:	Negligible interference from water and CO_2
Rise/Fall Times (0-95%):	1 minute @ 1 1pm flow, 30 second integration time
Sampling Procedure:	A representative flue gas sample is collected and conditioned using the CEM system described previously. Sample point selection has been described previously.
Analytical Procedure:	Radiation from an infrared source is chopped and then passed through a gas filter which alternates between CO and N2 due to rotation of a filter wheel. The radiation then passes through a narrow band-pass filter and a multiple optical pass sample cell where absorption by the sample gas occurs. The IR radiation exits the sample cell and falls on a solid state IR detector.

Method: **Ammonia**

Reference: Bay Area AQMD Method ST-1B; EPA Method 350.3

Principle: Ammonia emissions are determined by collecting a dry, metered volume of flue gas containing ammonia vapor in dilute acid solution. The ammonia concentration of the sample is then determined by ion selective electrode.

Sampling Procedure: The ammonia sampling probe/train arrangement used during the test program is shown schematically in the following figure.



Ammonia sampling probe/train arrangement

A sample is extracted through a Teflon or glass probe fitted with a glass wool plug used to remove particulate matter. The plug is located and/or heated to avoid condensation of moisture at the plug. The sample is then drawn through four impingers. The first two impingers each contain 100 ml of 0.1 N hydrochloric acid (HCl), the third is empty, and the fourth contains silica gel.

After each sample run, the contents of the impingers, probe, and sampling train glassware are rinsed with water into a polyethylene sample bottle. The sample bottles are returned to the laboratory for analysis.

Analytical Procedure:

The ammonia samples are analyzed by EPA Method 350.3 using an Orion Research Model 940 Microprocessor Ionanalyzer equipped with an ammonia ion selective electrode. The ammonia electrode is a glass electrode and reference electrode mounted behind a gas permeable membrane that separates the sample solution from the internal filling solution. After the addition of sodium hydroxide, ammonia in the sample diffuses across the electrode membrane. The measured pH change in the internal electrode solution is proportional to the concentration of ammonia in the sample solution.

The ammonia concentrations of the sample solutions are measured in units of ppm NH_3 by weight with the specific ion analyzer. By using the NH_3 concentration in ppm by weight, measuring the liquid volume of the sample solution, and obtaining the volume of the flue gas sample, the stack flue gas NH_3 concentration in ppm by volume is calculated using the equation:

$$NH_3\ ppmV = 0.049\ \frac{(ppm\ wt\ NH_3\ soln)(liq.\ vol.,\ ml)}{DSCF\ (at\ 60^\circ F)\ of\ sampled\ flue\ gas}$$

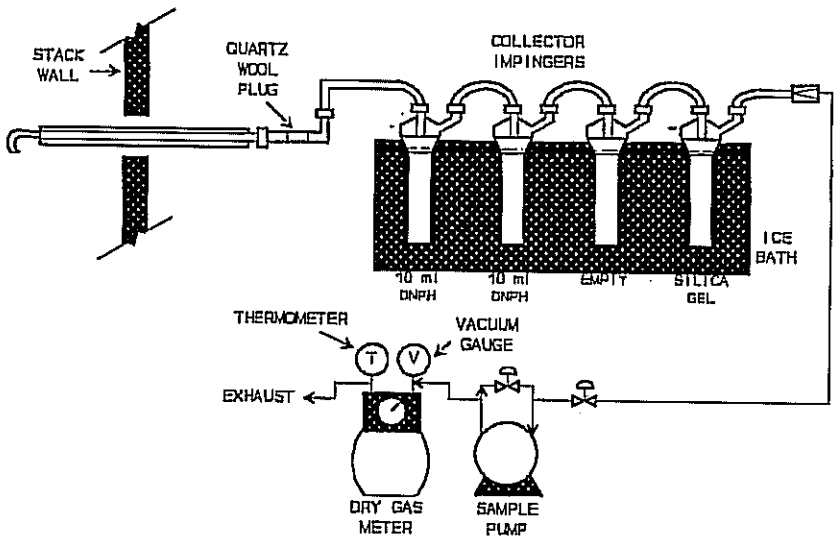
Method: **Formaldehyde by HPLC**

Reference: CARB Method 430

Principle: A metered gas sample is collected non-isokinetically in acidic 2,4-dinitrophenylhydrazine (DNPH) solution. Formaldehyde reacts with DNPH to form the 2,4-dinitrophenylhydrazone derivative. The concentration of this formaldehyde derivative is determined by reverse phase HPLC with an ultraviolet absorption detector.

Sampling Procedure: A dry metered gas sample is collected through teflon tubing into an iced midget impinger train containing 20 ml of aqueous acidic DNPH solution. Samples are recovered with DNPH solution into precleaned glass bottles, refrigerated and analyzed within 7 days.

Analytical Procedure: The concentration of the resulting formaldehyde derivative is quantitated after organic solvent extraction using reverse phase HPLC with an ultraviolet absorption detector. Formaldehyde in the sample is identified and quantitated by comparison of peak retention times and peak areas with those of standard solutions.



Formaldehyde Sampling Probe/Train Arrangement

Method:	**Determination of Volatile Organic Compounds (VOCs) by EPA Compendium Method TO-12 or TO-15**
Reference:	EPA Compendium Method TO-12 or TO-15
Principle:	An evacuated canister is filled with flue gas at a constant rate. The tank contents are analyzed for VOCs by preconcentration and gas chromatography (TO-12) or by gas chromatography/mass spectrometry (TO-15).
Sampling Procedure:	A sample is collected at the source (usually from a stack or vent) into a canister evacuated to 0.05 mm Hg. When the canister is opened to the source containing the VOCs to be sampled, the differential pressure causes the sample to flow into the canister. The flow rate is regulated so that it is constant and the period sampled is one hour if possible. Pitot and temperature measurements of the total stack or vent flow are made.
Analytical Procedure:	The canister is shipped immediately after sampling to the laboratory for analysis. For TO-12 analysis, a portion of the gaseous sample is drawn from the canister through a cryogenic trap. The sample is thermally desorbed from the trap and analyzed by GC/FID for low concentrations of organic compounds. For TO-15 analysis, a portion of the gaseous sample from the canister is drawn through a multisorbent packing. Next, the sample is thermally desorbed from the packing and backflushed from the trap onto a gas chromatographic column to separate the compounds. Compounds of interest are determined by mass spectrometry. The Avogadro Group, LLC subcontracts TO-12 and TO-15 analysis to qualified local laboratories experienced in the analytical procedures. These laboratories also supply the canisters for sampling.

Method: **PAH by CARB 429**

Reference: CARB Method 429, August 25, 1992 revision

Principle: A metered flue gas sample is collected isokinetically, and collected on a heated filter, on a water-cooled XAD-2 resin module, and in an iced impinger bath. The samples are analyzed for the target species listed in CARB 429 and high resolution gas chromatography/high resolution mass spectrometry with selective ion monitoring (HRGC/HRMS-SIM) or high resolution gas chromatograph/low resolution mass spectrometry with selective ion monitoring (HRGC/LRMS-SIM)

Sample Train Preparation: Because of the very low detection limits of the analytical techniques, thorough cleaning of sample train components prior to testing is vital. Prior to testing, all glassware is cleaned in Carnot's laboratory with high purity water, acetone, hexane and methylene chloride rinses, and then baked at high temperature. Resin modules are cleaned and loaded with purified resin by the contract laboratory within two weeks of the scheduled test date. Batches of teflon-coated fiberglass filters are toluene-extracted by the contract laboratory. Individual filters are then stored in petri dishes lined with hexane rinsed aluminum foil.

Sample train assembly is performed in an on-site clean room by experienced personnel.

Sampling: The sample train is shown in the attached figure. Sample is pulled through the following components:

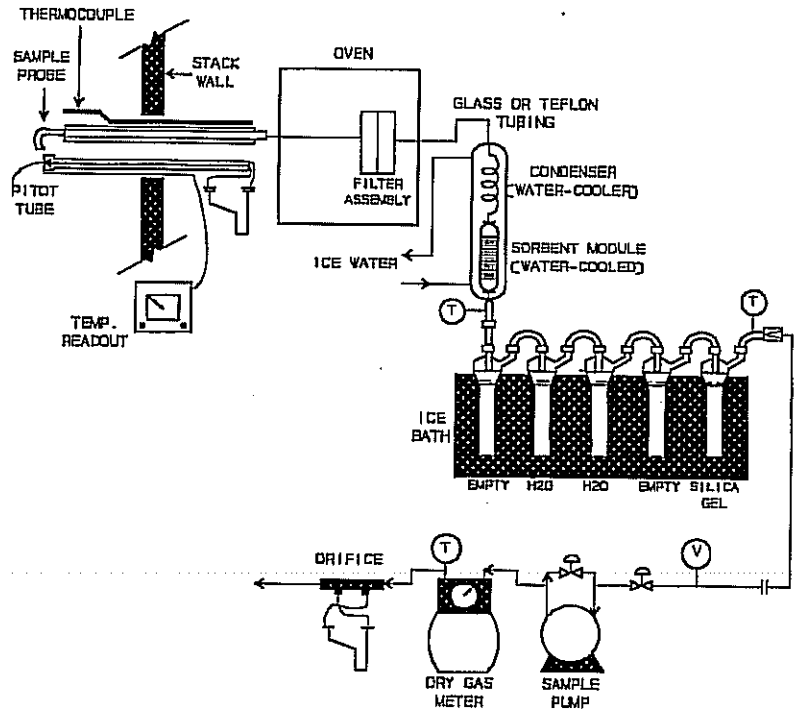
1. Glass nozzle
2. Heated glass probe (250 ± 25°F)
3. Teflon-coated glass fiber filter in heated oven (250 ± 25°F
4. Teflon tubing
5. Condenser/sorbent module cooled with circulating ice water from impinger bath
6. Dry impinger with stub stem
7. One modified Greenburg-Smith impinger with 100 ml of $NaHCO_3/Na_2CO_3$ buffer solution
8. Dry impinger as a knockout
9. Impinger containing silica gel
10. Leak-free vacuum pump
11. Calibrated dry gas meter

The pump, meter, manometers, and heater controllers are all contained in a single control box (Andersen Universal or equivalent).

During final sample train assembly and leak check procedures on the stack or duct, special precautions are taken to minimize the chance of contamination. Sample train components are open to the air for as short a time as possible; and during transport to and from the stack, all components are sealed with hexane rinsed aluminum foil.

Sample Recovery: All sample recovery is performed in Carnot's laboratory or an on-site clean room. Following sampling the resin module is sealed with glass caps and the filter impinger catch is recovered into certified, pre-cleaned amber glass jars. The sampling train glassware is then rinsed three times with methanol, three times with hexane, and three times with methylene chloride. These rinses are recovered into pre-cleaned amber glass jars. The resin module and the filter are stored on dry ice; and the impinger catch and solvent rinses are stored in a refrigerator or ice chest at 0-4°C.

Field Blank:



PAH by CARB 429

At least once during each test series, a field blank sample is collected. This consists of charging and transporting the sampling train to the sampling point; assembling and leak checking the train; and finally disassembling and recovering the train just like an actual sample is done. This field blank is analyzed exactly as the samples are.

Sample Custody: Full chain of custody is maintained on all reagents, sample trains, and samples by Carnot and by contract laboratories. In addition to formal documentation by the sample custodians, sample data sheets are initialed by the individuals who assemble and recover each sample train component.

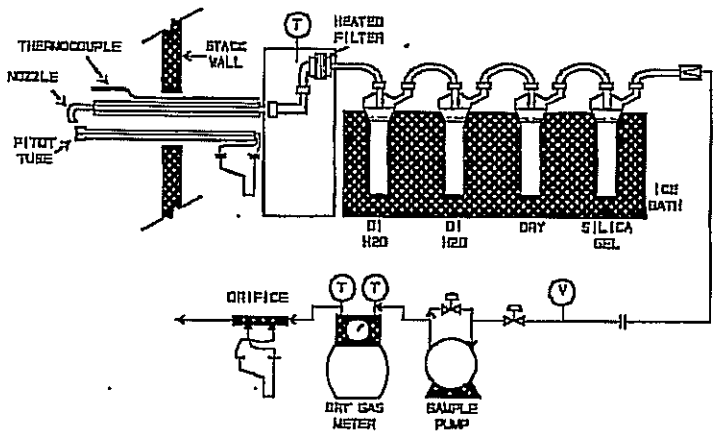
Analysis: The contract laboratory introduces surrogate (pre-test) spikes onto the XAD resin; and also introduces the appropriate alternate and internal spikes before extraction as per CARB Method 429. The nozzle, probe and filter rinses, the impinger extracts, the sample line and impinger rinses, and the filter and XAD-2 resin are combined for soxhlet extraction resulting in a single composite for analysis. The samples are analyzed by HRGC/LRMS-SIM or HRGC/HRMS following sample concentration and column clean-up.

Method: **Total Particulate by EPA Method 5 with Condensible Analysis**

Reference: EPA Method 5
SCAQMD Method 5.2

Principle: A metered flue gas sample is collected isokinetically and particulates are collected in a heated filter followed by a series of water impingers.

Sampling Procedure: The sample train used in the tests is shown in the following figure. The sample is drawn isokinetically through a nozzle, a stainless steel or glass probe, and a filter in a 250°F temperature-controlled oven. This is followed by two Greenburg-Smith impingers which contain 100 ml of distilled water, an empty impinger as a knock-out, and an impinger containing silica-gel to protect the leak-tight vacuum pump and calibrated dry gas meter from moisture. The impingers collect condensible particulate species while the filter collects any existing as particulate at 250°F.



Sample Train for Determination of Total Particulate by EPA Method 5 with Condensible Analysis

EPA Method 4 (moisture) and Methods 1 and 2 (velocity) are performed in conjunction with the test. Stack velocity is measured during the test to maintain isokinetic sampling and to measure stack flow rate. Moisture concentration is determined by weighing the impingers before and after sampling to determine the amount of moisture collected.

Sample Recovery and Analysis:

Following testing, the impingers are weighed for moisture determination and the following sample fractions are recovered:

1. Probe, nozzle and front-half glassware - H_2O or acetone wash and brushing
2. Filter
3. Impingers and connecting glassware - water wash

The probe wash is evaporated at low temperatures, baked at 105°C, desiccated and weighed; the filter is baked at 105°C, desiccated and weighed; and the aliquots of the impinger catch are baked at 105°C, desiccated and weighed.

Particulate concentration is determined by dividing the mass of particulate collected by the sample gas volume.

If the sample contains semi-volatile hydrocarbon species that might be lost by evaporating at 105°C, the sample is extracted with methylene chloride to remove those species, and the methylene chloride fraction is evaporated at ambient temperature and weighed.

If there are high concentrations of SO_2 in the gas stream, a positive interference can be caused by oxidation of SO_2 to sulfuric acid in the impingers. In this case, the impinger boildown residue is analyzed for sulfuric acid (either by titration or precipitation) and the acid is subtracted from the particulate catch as $H_2SO_4 \cdot 2H_2O$. Since this fraction includes both SO_2-related "pseudo-particulate" as well as the true particulate species SO_3, a separate test for sulfuric acid mist is run and sulfuric acid mist is added back to the particulate catch as $H_2SO_4 \cdot 2H_2O$.

If interfering species such as NH_3 or HCl are present in the gas, large quantities of pseudo-particulate sulfates and chlorides can be formed. In these cases, special procedures must be used to ensure that erroneously high particulate emission rates are not reported.

Method:	**Stack Gas Volumetric Flow Rate by Fuel "F" Factor and Heat Input**
Reference:	EPA Method 19
Principle:	The average stack gas volumetric flow rate is determined from the measurement of the heat input rate, stack concentration of O_2 or CO_2, and either an assigned F Factor or a site specific F Factor as determined from a corresponding fuel analysis.
Measurement Procedure:	The metered fuel flow is recorded over the test period and a fuel flow rate is determined in either scf/hr or lb/hr. The average stack diluent concentration of either O_2 or CO_2 is also determined for the test period using EPA Method 3 or 3A. Finally, the use of an assigned F Factor for a given fuel type as provided in Method 19 can be used with the above parameters to calculate stoichiometrically the stack gas volumetric flow rate. Otherwise, a fuel sample may be collected and analyzed for higher heating value (HHV) and composition (CHONS) and a site specific F Factor determined.
Stoichiometric Calculations:	The stack gas volumetric flow rate is determined from the following set of equations:

Input Parameters:

Qf = Fuel Flow, scfh (lb/hr)

HHV = Higher Heating Value, Btu/scf (Btu/lb)

O_2 = Exhaust Gas Concentration, %

CO_2 = Exhaust Gas Concentration, %

F_d = F Factor (O_2 Based), dscf/MMBtu

F_c = F Factor (CO_2 Based), dscf/MMBtu

Equations:

$$Q_{sd} = Q_f \, x \, HHV \, x \, F_d \left(\frac{MMBtu}{10^6 \, x \, Btu}\right)\left(\frac{20.9}{20.9 - O_2}\right)$$

or

$$Q_{sd} = Q_f \, x \, HHV \, x \, F_c \left(\frac{MMBtu}{10^6 \, x \, Btu}\right)\left(\frac{100}{CO_2}\right)$$

Method:	**Stack Gas Velocity and Volumetric Flow Rate**
Reference:	EPA Method 2, SCAQMD Method 2.1, ARB Method 2
Principle:	The average gas velocity in a stack is determined from the measurement of the gas density and from the measurement of the average velocity head using a Type-S (Stausscheibe) Pitot tube.
Sampling Procedure:	The velocity head and temperature are measured at traverse points specified by EPA Method 1 or SCAQMD Method 1.1. The velocity is measured using a Type-S Pitot tube and an inclined water manometer. The flow coefficient of the pitot tube is known. Temperature of the gas is measured using a thermocouple. The stack gas molecular weight is determined from independent measurements of O_2, CO_2, and H_2O concentrations.
Sample Analysis and Recovery:	The stack gas velocity is determined from the measured average velocity head, the measured average temperature, the measured average duct static pressure, the measured dry concentrations of O_2 and CO_2, and the measured concentration of H_2O. The velocity is determined from the following set of equations:

$$V_S = 2.90 C_p \sqrt{\Delta p T_s \left[\frac{29.92}{P_s}\right]\left[\frac{28.95}{MW_{wet}}\right]} \quad [\text{ ft/s }]$$

Δp = *Velocity/Head, inches* H_2O [in. H_2O]

T_s = *Gas Temperature, degrees R* [R]

P_s = *Absolute Static Pressure* [in Hg]

C_p = *Pitot Flow Coefficient* [unitless]

$$MW_{wet} = [(0.44)(\%CO_2)+(0.32)(\%O_2)+(0.28)(\%N_2)](1-\frac{\%H_2O}{100})+(18)(\frac{\%H_2O}{100})$$

The stack gas volumetric flow rate is determined from the measured stack gas velocity, the area of the stack at the measurement plane, and the measured gas temperature and pressure. The volumetric flow rate is determined from the following set of equations:

$$Q = (V_s)(AREA)(60) \quad [\text{ wacfm }]$$

$$Q_{ws} = Q\left[\frac{T_{ref}}{T_s}\right]\left[\frac{P_s}{29.92}\right] \quad [\text{ wscfm }]$$

$$Q_{sd} = Q_{ws}\left[1-\frac{\%H_2O}{100}\right] \quad [\text{ dscfm }]$$

Method:	**Determination of Volatile Organic Compounds (VOCs) by EPA Compendium Method TO-15**
Reference:	EPA Compendium Method TO-15
Principle:	An evacuated canister is filled with flue gas at a constant rate. The tank contents are analyzed by gas chromatography/ mass spectrometry (GC/MS) for VOCs.
Sampling Procedure:	A sample is collected at the source (usually from a stack or vent) into a canister evacuated to 0.05 mm Hg. When the canister is opened to the source containing the VOCs to be sampled, the differential pressure causes the sample to flow into the canister. The flow rate is regulated so that it is constant and the period sampled is one hour if possible. Pitot and temperature measurements of the total stack or vent flow are made.
Analytical Procedure:	The canister is shipped immediately after sampling to the laboratory for analysis. The gaseous sample from the canister is drawn through a multisorbent packing. Next, the sample is thermally desorbed from the packing and backflushed from the trap onto a gas chromatographic column to separate the compounds. Compounds of interest are determined by mass spectrometry. The Avogadro Group, LLC subcontracts TO-15 analysis to qualified local laboratories experienced in the analytical procedures. These laboratories also supply the canisters for sampling.

APPENDIX B

QUALITY ASSURANCE

Appendix B.1

Quality Assurance Program Summary

QUALITY ASSURANCE PROGRAM SUMMARY AND CARB CERTIFICATION

The Avogadro Group, LLC (Avogadro) ensures the quality and validity of its emission measurement and reporting procedures through a rigorous quality assurance (QA) program. The program is developed and administered by an internal QA Officer and encompasses seven major areas:

1. Development and use of an internal QA manual.
2. QA reviews of reports, laboratory work, and field testing.
3. Equipment calibration and maintenance.
4. Chain of custody.
5. Continuous training.
6. Knowledge of current test methods.
7. Agency certification.

Each of these areas is discussed individually below.

Quality Assurance Manual. Avogadro has prepared a QA Manual according to EPA guidelines. The manual serves to document and formalize all of Avogadro's QA efforts. The manual is constantly updated, and each employee involved in technical services for emission measurements is required to read and understand its contents. The manual includes details on the other six QA areas discussed below.

QA Reviews. Avogadro's review procedure includes review of each source test report by a project QA Officer, including reviews of laboratory and field work, data sheets, data input, calculations and averages, and report text.

The most important review is the one that takes place before a test program begins. The QA Officer works closely with testing personnel to prepare and review test protocols. Test protocol review includes selection of appropriate test procedures, evaluation of any interferences or other restrictions that might preclude use of standard test procedures, and evaluation and/or development of alternate procedures.

Equipment Calibration and Maintenance. The equipment used to conduct the emission measurements is maintained according to the manufacturer's instructions to ensure proper operation. In addition to the maintenance program, calibrations are carried out on each measurement device according to the schedule outlined by the California Air Resources Board (CARB). The schedules for maintenance and calibrations are given in Tables B-1 and B-2.

Quality control checks are also conducted in the field for each test program. A partial list of checks made as part of each CEM system test series is included below as an example of the field QA procedures.

- Sample acquisition and conditioning system leak check.
- 2-point analyzer calibrations (all analyzers)
- 3-point analyzer calibrations (analyzers with potential for linearity errors).
- Complete system calibration check ("dynamic calibration" through entire sample system).
- Periodic analyzer calibration checks (once per hour) are conducted at the start and end of each test run. Any changes between pre- and post-test readings are recorded.
- All calibrations are conducted using gases certified by the manufacturer to be + 1% of label value (NBS traceable).
- Calibration and CEM performance data are fully documented, and are included in each source test report.

Chain of Custody. Avogadro maintains full chain of custody documentation on all samples and data sheets. In addition to normal documentation of changes between field sample custodians, laboratory personnel, and field test personnel, Avogadro documents every individual who handles any test component in the field (e.g., probe wash, impinger loading and recovery, filter loading and recovery, etc.).

Samples are stored in a locked area to which only laboratory personnel have access. Neither other Avogadro employees nor cleaning crews have keys to this area.

Data sheets are copied immediately upon return from the field, and this first generation copy is placed in locked storage. Any notes made on original sheets are initialed and dated.

Training. Personnel training is essential to ensure quality testing. Avogadro has formal and informal training programs, which include:

1. Attendance at EPA-sponsored training courses.
2. Enrollment in EPA correspondence courses.
3. A requirement for all technicians to read and understand Avogadro's QA Manual.
4. In-house training and QA meetings on a regular basis.
5. Maintenance of training records.

Knowledge of Current Test Methods. With the constant updating of standard test methods and the wide variety of emerging test methods, it is essential that any qualified source tester keep abreast of new developments. Avogadro subscribes to services, which provide updates on EPA and CARB reference methods, and on EPA, CARB and local District rules and regulations. Additionally, source test personnel regularly attend and present papers at testing and emission-related seminars and conferences. Avogadro personnel maintain membership in the Air and Waste Management Association and in the Source Evaluation Society.

AGENCY CERTIFICATION

Avogadro is certified by the CARB as an independent source test contractor for gaseous and particulate measurements. Avogadro also participates in EPA QA audit programs for Methods 5, 6 and 7.
□

TABLE B-1
SAMPLING INSTRUMENTS AND EQUIPMENT CALIBRATION SCHEDULE
As Specified by the CARB

Instrument Type	Frequency of Calibration	Standard of Comparison or Method of Calibration	Acceptance Limits
Orifice Meter (large)	12 months	Calibrated dry test meter	± 2% of volume measured
Dry Gas Meter	6 months or when repaired	Calibrated dry test meter	± 2% of volume measured
S-Type Pitot (for use with EPA-type sampling train	6 months	EPA Method 2	Cp constant (+5%) over working range; difference between average Cp for each leg must be less than 2%
Vacuum Gauges Pressure Gauges	6 months	Manometer	± 3%
Field Barometer	2 weeks (or on site)	Mercury barometer	± 0.2" Hg
Temperature Measurement (thermocouples)	6 months	NBS mercury thermometer or NBS calibrated platinum RTD	± 4 F for <400 F ± 1.5% for >400 F
Temperature Readout Devices	6 months	Precision potentiometer	± 2% full scale reading
Analytical Balance	12 months (check prior to each use)	Should be performed by manufacturer or qualified laboratory	± 0.3 mg of stated weight
Probe Nozzles	Each field day	Nozzle diameter check micrometer	Range <± 0.10 mm for three measurements
Continuous Analyzers	Every field day, Depends upon use, frequency and performance	As specified by manufacturers operating manuals, EPA NBS gases and/or reference methods	Satisfy all limits specified in operating specifications

TABLE B-2
EQUIPMENT MAINTENANCE SCHEDULE
Based on Manufacturer's Specifications and Avogadro's Experience

Equipment	Performance Requirement	Maintenance Interval	Corrective Action
Pumps	1. Absence of leaks 2. Ability to draw manufacturer required vacuum and flow	Every 300 hours of operation or 6 months, whichever is less	1. Visual inspection 2. Clean 3. Replace worn parts 4. Leak check
Flow Measuring Device	1. Free mechanical movement 2. Absence of malfunction	Every 300 hours of operation or 6 months, whichever is less After each test, if used in sampling of corrosive atmospheres (e.g. H_2S)	1. Visual inspection 2. Clean 3. Calibrate
Sampling Instruments	1. Absence of malfunction 2. Proper response to zero, span gas	As required by the manufacturer	As recommended by manufacturer
Integrated Sampling Tanks	Absence of leaks	Depends on nature of use	1. Steam clean 2. Leak check
Mobile Van Sampling Systems	Absence of leaks	Depends on nature of use	1. Change filters 2. Change gas dryer 3. Leak check 4. Check for system contamination
Sampling Lines	Sample degradation less than 2%	After each test or test series	Blow filtered air through line until dry

Appendix B.2

CARB Test Method Certifications

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER I-08-004

Relating to Independent Contractor Approval Under
Section 91207, Title 17, California Code of Regulations

The Avogadro Group, LLC

WHEREAS, the Air Resources Board (ARB), pursuant to section 41512 of the California Health and Safety Code, has established the procedures contained in sections 91200-91220, title 17, California Code of Regulations, to allow the use of independent testers for compliance tests required by ARB;

WHEREAS, it has been determined that The Avogadro Group, LLC, meets the requirements of ARB for conducting ARB Test Methods 1, 2, 3, 4, 5, 8, 17, 100 (CO, CO_2, NO_x, O_2, SO_2, THC), Visible Emissions Evaluation (VEE), United States Environmental Protection Agency (U.S. EPA) Test Method 201A, determining the condensable using back-half as specified in ARB Test Method 5, and U. S. EPA Test Method 202 pursuant to sections 91200-91220, title 17, California Code of Regulations when the following conditions are met:

1. The Avogadro Group, LLC permanently marks or engraves an identification number on the body of each of its pitot tubes;

2. The Avogadro Group, LLC calibrates its differential pressure gauges after each test series in accordance with section 2.2 of ARB Test Method 2, and establishes and maintains a log of the calibrations;

3. The Avogadro Group, LLC calibrates and repairs its nozzles used in isokinetic testing as required by section 5.1 of ARB Test Method 5 and establishes and maintains a log of the calibrations which shall include notes on the repairs on each nozzle;

4. The Avogadro Group, LLC uses a filter holder, and filter support as required by section 2.1.5 of ARB Test Method 5;

5. The Avogadro Group, LLC permanently and uniquely identifies its isokinetic nozzles;

6. The Avogadro Group, LLC installs a temperature gauge to determine the temperature of the condenser outlet as required by ARB Test Method 100;

7. The person performing VEE passed ARB's Compliance Training Course #100: Fundamentals of Enforcement (FOE)/Visible Emissions Evaluation (Smoke School) and is currently certified to conduct VEE. Any subsequent recertification

must be from a certifying body recognized by ARB at the time VEE reader conducts the VEE test;

WHEREAS, ARB's Executive Officer pursuant to Health and Safety Code section 39516 issued Executive Order G-02-008 delegating to the Chief of ARB's Monitoring and Laboratory Division the authority to approve independent testers in accordance with title 17, California Code of Regulations, sections 91200-91220.

NOW, THEREFORE, I, William V. Loscutoff, Chief of ARB's Monitoring and Laboratory Division, order that The Avogadro Group, LLC is granted an approval, from the date of execution of this order, until June 30, 2009, to conduct the tests listed above, subject to compliance with sections 91200-91220, title 17, California Code of Regulations.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his authorized representative may field audit one or more tests conducted pursuant to this order for each type of testing listed above.

Executed at Sacramento, California this 15th day of April 2008.

William V. Loscutoff, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to section 91207, title 17, California Code of Regulations, until June 30, 2009, for those test methods listed below:

ARB Source Test Methods:

1, 2, 3, 4, 5, 8, 17

100 (CO, CO_2, NOx, O_2, SO_2, THC)

William V. Loscutoff, Chief
Monitoring and Laboratory Division

90 50165

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to section 91207, title 17, California Code of Regulations, until June 30, 2009 for those test methods listed below:

Visible Emissions Evaluation

United States Environmental Protection Agency Test Method 202

William V. Loscutoff, Chief
Monitoring and Laboratory Division

80 56165

State of California

Air Resources Board

Approved Independent Contractor

The Avogadro Group, LLC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to section 91207, title 17, California Code of Regulations, until June 30, 2009 for those test methods listed below:

United States Environmental Protection Agency Test Method 201A determining the condensable using back-half as specified in ARB Test Method 5

William V. Loscutoff, Chief
Monitoring and Laboratory Division

90 50105

Appendix B.3

CEM Performance and Calibrations Data – Unit 1

STRATA Configuration Page 1
04-30-2009 17:09:53
File Name: C:\Projects 2009\Panoche\Panoche.str

Operator:	Jeremy Klosinski
Plant Name:	Panoche Energy Center
Location:	Turbine # 1
Run Length:	36 minutes
Sample Rate:	30 per minute
Average Calibration Results:	0.1 minutes
Automatic Sequence, Calibration Error:	No
Automatic Sequence, System Bias:	No
Max Response Time:	Manual
Max Response Time:	1 minutes
Traverse During Run:	Yes
Number of Traverse Points:	2
Pause Each Location:	Yes

Active	Chan.	Analyte Name	Units	Span Units	Span Volts	Offset Volts
Yes	1	O2	%	19.96	7.98	0
Yes	2	CO2	%	8.48	8.48	0
Yes	3	CO	ppm	9.45	4.72	0
Yes	4	NOx	ppm	5.6	9.33	0

Measurement System Preparation Table

Gas Name	Reference Cylinder Numbers 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
O2	Z	M	H													
CO2	Z	M	H													
CO	Z			M	H											
NOx	Z			M	H											

Gas Name	Zero Reference Cylinder No.	Conc	ID Number	Low Reference Cylinder No.	Conc	ID Number
O2	1	0	CC 240878	99	0.1	0
CO2	1	0	CC 240878	99	0.1	
CO	1	0	CC 240878	99	0.1	
NOx	1	0	CC 240878	99	0.1	

Gas Name	Mid Reference Cylinder No.	Conc	ID Number	High Reference Cylinder No.	Conc	ID Number
O2	2	11.62	CC 272622	3	19.96	CC 173330
CO2	2	4.08	CC 272622	3	8.84	CC 173330
CO	4	5.07	CC 283349	5	9.45	CC 16177
NOx	4	2.5	CC 283349	5	5.6	CC 16177

Seq Num	Calibration Error Test Sequence O2	CO2	CO	NOx
1	Zero	Zero	Zero	Zero
2	High	High	High	High
3	Mid	Mid	Mid	Mid
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Seq Num	Calibration Error Valve Sequence 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X															
2			X		X											
3		X		X												
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

System Bias Check Sequence

Seq Num	O2	CO2	CO	NOx
1	Mid	Mid	Zero	Zero
2	Zero	Zero	Mid	Mid
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

System Bias Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X	X														
2	X			X												
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

STRATA Configuration End

Calibration Error Test, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-30-2009 15:19:06	0.018	-0.0004	-0.0549	0.0183
04-30-2009 15:20:07	12.281	5.4609	1.3114	3.9618
04-30-2009 15:21:06	19.922	8.8454	8.7028	5.5892
04-30-2009 15:22:06	19.922	8.8460	9.3662	5.5884
04-30-2009 15:23:07	13.250	5.0790	8.7301	3.7344
04-30-2009 15:24:06	11.592	4.1646	5.5028	2.6176

Calibration Error Test at Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 283349	CC 16177
NOx	CC 240878		CC 283349	CC 16177

Date/Time 04-30-2009 15:24:16 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Avg	0.018	-0.0004	-0.0471	0.0137
Zero Error%	0.1%	0.0%	0.5%	0.2%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	5.0700	2.5000
Mid Avg	11.591	4.1695	5.1516	2.4931
Mid Error%	0.1%	1.1%	0.9%	0.1%
High Ref Cyl	19.960	8.8400	9.4500	5.6000
High Avg	19.921	8.8478	9.4477	5.5905
High Error%	0.2%	0.1%	0.0%	0.2%

Calibration Error Test End

Initial System Bias Check, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-30-2009 15:27:59	12.638	3.1927	0.8483	0.1408
04-30-2009 15:28:59	11.529	4.1337	0.1371	0.0075
04-30-2009 15:29:58	11.062	4.0031	-0.0914	0.0792
04-30-2009 15:30:59	2.424	0.9501	1.6638	1.8400
04-30-2009 15:31:59	0.082	0.0471	4.9019	2.3734

Initial System Bias Check for Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-30-2009 15:32:39 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.018	-0.0004	-0.0471	0.0137
Zero Avg	0.037	0.0295	-0.0626	0.0064
Zero Bias%	0.1%	0.4%	0.2%	0.1%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.591	4.1695	5.1516	2.4931
Span Avg	11.518	4.1519	5.1208	2.3768
Span Bias%	0.4%	0.2%	0.3%	2.1%
Span Drift%				

System Bias Check End

AVOGADRO CEMS PERFORMANCE DATA

(circle or input applicable data)

CLIENT / LOCATION: Panoche Energy Center Unit #1 **JOB #:** 09092

OPERATOR: J. Klosinski **DATE:** 4/30/09

ANALYZERS IN SERVICE								
Analyzers:	O_2	CO_2	CO	NO_X	SO_2	THC	Other:	
FILTRATION (ON STACK)								
Filter Type:	In-Stack		Out-of-Stack		Sintered		Other:	N/A
Filter Material:	Glass	Quartz	Steel	N/A	--	--	Other:	
Filter Holder Material:	Steel	Teflon	Glass	N/A	--	--	Other:	
Oven Box (Y/N):	Yes	No	--	--	--	--	--	--
Oven Temperature:	°F	N/A	--	--	--	--	--	--
SAMPLING PROBE								
Length:	4'	6'	8'	10'	12'	14'	Other:	
Material:	Steel	Glass	Teflon	Titanium	Quartz	Inconel	Other:	
Heated (Y/N):	Yes	No	--	--	--	--	--	--
Probe Temperature:	°F	N/A	--	--	--	--	--	--
HEATED LINE								
In use (Y/N):	Yes	No	--	--	--	--	--	--
Length:	15'	25'	50'	100'	125'	150'	Other:	
Line Temperature:	268 °F	N/A	--	--	--	--	--	--
CEMS SAMPLE LINE								
Length:	25'	50'	100'	125'	150'	175'	Other:	
Material:	Teflon	Steel	Plastic	Titanium	--	--	Other:	
CONDITIONER (MOISTURE KNOCKOUT)								
In Service (Y/N):	Yes	No	--	--	--	--	--	--
Coolant:	Ice and Water		Anti-Freeze		Electric		Other:	
Trap Material:	Steel		Glass		Teflon		Other:	

LEAK CHECK

Pre-Test: <0.5 cfh @ 29.0 inches Hg vacuum

Post-Test: <0.1 cfh @ 5.0 inches Hg vacuum

System Flow Rate: 12.0 cfh

Leak Rate: $\frac{\text{Post-Test (cfh)}}{\text{System Flow Rate (cfh)}} * 100 =$ <1.0 %

SYSTEM RESPONSE	Run 1	Run 2	Run 3	Average
Upscale (seconds):	27	27	27	27
Downscale (seconds):	31	31	31	31

NO_X CONVERTER CHECK - (1) Fill Tedlar bag with NO_2 and air - (2) Run contents of bag through NO_X analyzer

$C = NO_X$ (as found): _____ ppm

$\% O_2 = O_2$ in air (as found): _____ ppm

$C_{NO2} = NO_2$ (actual): See Following Pages ppm

$C_{NO} = NO$ (actual): _____ %

NO_X Converter Efficiency: _____ %

$$C_0 = \left[\frac{20.9}{(20.9 - \% O_2)}\right] * C = ____$$

$$Eff = \left[\frac{(C_0 - C_{NO})}{C_{NO2}}\right] * 100 = ____ \%$$

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	-0.003	-0.013	0.000			

NOx Converter Check - Zero

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct.		
Name	Units	Volts	Units		Avg	Plant	Diff.
NOx	ppm	9.620	48.100	0.000			

NO_x Converter Check - High

Cylinder # = CC102102

Cylinder Concentration = 48.0

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	4.884	24.418	0.000			

NOx Converter Check - Mid

Cylinder # = CC150244

Concentration = 24.5

2 X Max Response Time		minutes	Close
Elapsed Response Time		minutes	Start Avg.
Run Length	30.00	minutes	
Elapsed Run Time		minutes	

Analyte		Current Value		Run Avg	Correct.		
Name	Units	Volts	Units		Avg	Plant	Diff.
NOx	ppm	4.794	23.970	0.000			

NOx Converter Check - NO2

Cylinder # = CC145271

Concentration = 25.2 ppm

23.970/25.2 = 95.1 % Conv. Eff.

Appendix B.4

CEM Performance and Calibrations Data – Unit 2

STRATA Configuration Page 1
04-27-2009 18:43:43
File Name: C:\Projects 2009\Panoche\Panoche.str

Operator:	Jeremy Klosinski
Plant Name:	Panoche Energy Center
Location:	Turbine # 2
Run Length:	30 minutes
Sample Rate:	30 per minute
Average Calibration Results:	0.1 minutes
Automatic Sequence, Calibration Error:	No
Automatic Sequence, System Bias:	No
Max Response Time:	Manual
Max Response Time:	1 minutes
Traverse During Run:	Yes
Number of Traverse Points:	3
Pause Each Location:	No
Traverse Valve Sequence:	None

Active	Chan.	Analyte Name	Analyte Units	Span Units	Span Volts	Offset Volts
Yes	1	O2	%	19.96	7.98	0
Yes	2	CO2	%	8.48	8.48	0
Yes	3	CO	ppm	9.45	4.72	0
Yes	4	NOx	ppm	5.6	9.33	0

Measurement System Preparation Table

Gas Name	Reference Cylinder Numbers 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
O2	Z	M	H													
CO2	Z	M	H													
CO	Z			M	H											
NOx	Z			M	H											

Gas Name	Zero Reference Cylinder No.	Conc	ID Number	Low Reference Cylinder No.	Conc	ID Number
O2	1	0	CC 240878	99	0.1	0
CO2	1	0	CC 240878	99	0.1	
CO	1	0	CC 240878	99	0.1	
NOx	1	0	CC 240878	99	0.1	

Gas Name	Mid Reference Cylinder No.	Conc	ID Number	High Reference Cylinder No.	Conc	ID Number
O2	2	11.62	CC 272622	3	19.96	CC 173330
CO2	2	4.08	CC 272622	3	8.84	CC 173330
CO	4	5.07	CC 283349	5	9.45	CC 16177
NOx	4	2.5	CC 283349	5	5.6	CC 16177

Calibration Error Test Sequence

Seq Num	O2	CO2	CO	NOx
1	Zero	Zero	Zero	Zero
2	High	High	High	High
3	Mid	Mid	Mid	Mid
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Calibration Error Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X															
2			X		X											
3		X		X												
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

System Bias Check Sequence

Seq Num	O2	CO2	CO	NOx
1	Mid	Mid	Zero	Zero
2	Zero	Zero	Mid	Mid
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

System Bias Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X	X														
2	X			X												
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

STRATA Configuration End

Calibration Error Test, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-27-2009 09:09:31	4.962	2.1398	7.3796	0.8710
04-27-2009 09:10:31	0.026	-0.0083	0.3159	-0.0012
04-27-2009 09:11:32	0.638	0.2045	0.0498	1.5576
04-27-2009 09:12:32	19.945	8.8067	6.6536	5.7675
04-27-2009 09:13:31	20.000	8.7916	9.5736	5.7719
04-27-2009 09:14:31	20.001	8.8082	9.4817	5.7772
04-27-2009 09:15:32	20.001	8.8297	9.5290	5.7689
04-27-2009 09:16:32	19.993	8.8417	9.5187	5.6468
04-27-2009 09:17:30	12.005	4.5171	7.8606	2.8784

Calibration Error Test at Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 283349	CC 16177
NOx	CC 240878		CC 283349	CC 16177

Date/Time 04-27-2009 09:18:23 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Avg	0.024	-0.0004	-0.0494	-0.0012
Zero Error%	0.1%	0.0%	0.5%	0.0%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	5.0700	2.5000
Mid Avg	11.606	4.1327	5.1506	2.5923
Mid Error%	0.1%	0.6%	0.9%	1.6%
High Ref Cyl	19.960	8.8400	9.4500	5.6000
High Avg	20.002	8.8445	9.5059	5.6047
High Error%	0.2%	0.1%	0.6%	0.1%

Calibration Error Test End

Initial System Bias Check, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-27-2009 09:19:26	17.494	1.5615	4.1212	0.6893
04-27-2009 09:20:27	15.614	2.7790	0.6334	0.0027
04-27-2009 09:21:27	11.645	4.0450	0.0144	-0.0012
04-27-2009 09:22:26	11.569	4.0697	-0.1774	-0.0012
04-27-2009 09:23:26	11.568	4.0742	-0.0678	-0.0013
04-27-2009 09:24:27	9.404	3.3192	0.0290	0.3982
04-27-2009 09:25:27	0.784	0.2208	2.9688	2.3179

Initial System Bias Check for Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

	Reference Cylinder Numbers Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-27-2009 09:26:22 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.024	-0.0004	-0.0494	-0.0012
Zero Avg	0.048	-0.0104	-0.0379	-0.0013
Zero Bias%	0.1%	0.1%	0.1%	0.0%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.606	4.1327	5.1506	2.5923
Span Avg	11.565	4.0725	5.1895	2.5032
Span Bias%	0.2%	0.7%	0.4%	1.6%
Span Drift%				

System Bias Check End

Calibration Error Test, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-28-2009 08:33:58	0.013	0.0668	-4.8	43.45
04-28-2009 08:34:58	10.798	4.6160	142.3	57.12
04-28-2009 08:35:59	20.091	8.8224	899.1	209.73
04-28-2009 08:36:59	14.825	5.8092	761.2	146.29
04-28-2009 08:37:58	11.650	4.1734	472.6	86.07

Calibration Error Test at Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2 Start-up

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 159891	CC 101529
NOx	CC 240878		SA 7855	CC 151767

Date/Time 04-28-2009 08:38:12 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Avg	0.024	0.0021	-5.0	-0.04
Zero Error%	0.1%	0.0%	0.5%	0.0%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	474.0	94.00
Mid Avg	11.650	4.1719	468.6	92.75
Mid Error%	0.1%	1.1%	0.5%	0.6%
High Ref Cyl	19.960	8.8400	946.0	210.00
High Avg	20.001	8.8454	941.0	209.81
High Error%	0.2%	0.1%	0.5%	0.1%

Calibration Error Test End

Initial System Bias Check, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-28-2009 08:39:27	20.096	0.1444	136.9	5.46
04-28-2009 08:40:27	17.362	0.9794	-3.9	4.58
04-28-2009 08:41:28	11.990	3.7671	-4.9	1.56
04-28-2009 08:42:28	11.584	4.1416	-5.2	-0.04
04-28-2009 08:43:26	6.998	2.5573	90.6	-0.05
04-28-2009 08:44:27	0.658	0.2807	399.4	-0.05
04-28-2009 08:45:27	0.060	0.0276	463.8	-0.05
04-28-2009 08:46:28	0.042	0.0192	351.1	39.65
04-28-2009 08:47:28	0.042	0.0192	27.8	88.24

Initial System Bias Check for Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2 Start-up

	Reference Cylinder Numbers	
	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-28-2009 08:47:37 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.024	0.0021	-5.0	-0.04
Zero Avg	0.062	0.0293	-5.1	-0.05
Zero Bias%	0.2%	0.3%	0.0%	0.0%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.650	4.1719	468.6	92.75
Span Avg	11.600	4.1241	463.9	89.61
Span Bias%	0.2%	0.6%	0.5%	1.5%
Span Drift%				

System Bias Check End

Calibration Error Test, Run 4 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 07:16:28	5.663	-0.3404	-5.0	-0.05
04-29-2009 07:17:28	0.026	-0.3694	-5.2	-0.05
04-29-2009 07:18:29	0.025	-0.3118	-5.2	-0.05
04-29-2009 07:19:29	0.023	-0.0005	-5.1	-0.05
04-29-2009 07:20:28	0.020	-0.0005	-5.1	-0.05
04-29-2009 07:21:28	5.786	2.5296	10.7	4.28
04-29-2009 07:22:29	20.058	9.0619	780.3	175.25
04-29-2009 07:23:29	20.061	9.0763	939.9	209.17
04-29-2009 07:24:29	20.060	9.0175	940.3	210.11
04-29-2009 07:25:28	17.860	7.4973	928.8	198.01
04-29-2009 07:26:28	11.634	4.1623	536.2	93.71

Calibration Error Test at Run 4

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 159891	CC 101529
NOx	CC 240878		SA 7855	CC 151767

Date/Time 04-29-2009 07:26:49 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Avg	0.019	-0.0005	-5.0	-0.05
Zero Error%	0.1%	0.0%	0.5%	0.0%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	474.0	94.00
Mid Avg	11.634	4.1725	468.8	93.22
Mid Error%	0.1%	1.1%	0.5%	0.4%
High Ref Cyl	19.960	8.8400	946.0	210.00
High Avg	19.995	8.8565	940.3	208.74
High Error%	0.2%	0.2%	0.6%	0.6%

Calibration Error Test End

Initial System Bias Check, Run 4 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-29-2009 07:34:16	20.322	0.2223	2.7	-0.05
04-29-2009 07:35:17	13.018	3.4274	16.5	-0.05
04-29-2009 07:36:17	11.626	4.1543	-0.8	-0.05
04-29-2009 07:37:18	11.010	3.9073	-1.2	-0.05
04-29-2009 07:38:16	1.637	0.5840	288.0	-0.05
04-29-2009 07:39:16	0.046	0.0024	463.1	-0.05
04-29-2009 07:40:17	0.037	-0.0007	339.6	43.23
04-29-2009 07:41:17	0.037	-0.0007	20.5	89.25
04-29-2009 07:42:18	0.036	-0.0007	-4.6	90.02

Initial System Bias Check for Run 4

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-29-2009 07:42:56 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.019	-0.0005	-5.0	-0.05
Zero Avg	0.054	0.0068	-4.1	-0.05
Zero Bias%	0.2%	0.1%	0.1%	0.0%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.634	4.1725	468.8	93.22
Span Avg	11.619	4.1622	459.2	90.03
Span Bias%	0.1%	0.1%	1.0%	1.5%
Span Drift%				

System Bias Check End

Calibration Error Test, Run 7 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-29-2009 18:04:01	0.151	0.0203	428.6	-0.04
04-29-2009 18:05:02	0.024	0.0095	-0.3	-0.04
04-29-2009 18:06:02	10.352	3.4357	140.0	69.48
04-29-2009 18:07:03	20.030	8.8832	896.6	201.65
04-29-2009 18:08:01	13.479	5.1941	695.3	111.76

Calibration Error Test at Run 7

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 159891	CC 101529
NOx	CC 240878		SA 7855	CC 151767

Date/Time 04-29-2009 18:08:09 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Avg	0.024	0.0095	-4.3	-0.04
Zero Error%	0.1%	0.1%	0.4%	0.0%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	474.0	94.00
Mid Avg	11.601	4.1725	480.9	92.75
Mid Error%	0.1%	1.1%	0.7%	0.6%
High Ref Cyl	19.960	8.8400	946.0	210.00
High Avg	19.916	8.8263	941.1	208.96
High Error%	0.2%	0.2%	0.5%	0.5%

Calibration Error Test End

Initial System Bias Check, Run 7 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-29-2009 18:09:28	12.863	4.5020	79.1	2.76
04-29-2009 18:10:28	12.068	3.9803	17.6	0.45
04-29-2009 18:11:29	11.013	3.9891	4.7	-0.04
04-29-2009 18:12:29	2.423	0.9844	266.1	-0.04
04-29-2009 18:13:28	0.088	0.0610	458.7	-0.04
04-29-2009 18:14:28	0.038	0.0310	404.1	26.07
04-29-2009 18:15:29	0.038	0.0296	66.9	85.39

Initial System Bias Check for Run 7

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-29-2009 18:15:29 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.024	0.0095	-4.3	-0.04
Zero Avg	0.051	0.0395	3.8	-0.04
Zero Bias%	0.1%	0.4%	0.8%	0.0%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.601	4.1725	480.9	92.75
Span Avg	11.531	4.1426	465.7	89.42
Span Bias%	0.3%	0.4%	1.5%	1.6%
Span Drift%				

System Bias Check End

AVOGADRO CEMS PERFORMANCE DATA

(circle or input applicable data)

CLIENT / LOCATION: Panoche Energy Center Unit #2 JOB #: 09092

OPERATOR: J. Klosinski DATE: 4/27/09

ANALYZERS IN SERVICE

Analyzers:	O_2	CO_2	CO	NO_x	SO_2	THC	Other:	

FILTRATION (ON STACK)

Filter Type:	In-Stack		Out-of-Stack		Sintered		Other:	N/A
Filter Material:	Glass	Quartz	Steel	N/A	--	--	Other:	
Filter Holder Material:	Steel	Teflon	Glass	N/A	--	--	Other:	
Oven Box (Y/N):	Yes	No	--	--	--	--	--	--
Oven Temperature:	°F	N/A	--	--	--	--	--	--

SAMPLING PROBE

Length:	4'	6'	8'	10'	12'	14'	Other:	
Material:	Steel	Glass	Teflon	Titanium	Quartz	Inconel	Other:	
Heated (Y/N):	Yes	No	--	--	--	--	--	--
Probe Temperature:	°F	N/A	--	--	--	--	--	--

HEATED LINE

In use (Y/N):	Yes	No	--	--	--	--	--	--
Length:	15'	25'	50'	100'	125'	150'	Other:	
Line Temperature:	267 °F	N/A	--	--	--	--	--	--

CEMS SAMPLE LINE

Length:	25'	50'	100'	125'	150'	175'	Other:	
Material:	Teflon	Steel	Plastic	Titanium	--	--	Other:	

CONDITIONER (MOISTURE KNOCKOUT)

In Service (Y/N):	Yes	No	--	--	--	--	--	--
Coolant:	Ice and Water		Anti-Freeze		Electric		Other:	
Trap Material:	Steel		Glass		Teflon		Other:	

LEAK CHECK

Pre-Test: <0.5 cfh @ 29.0 inches Hg vacuum

Post-Test: <0.1 cfh @ 5.0 inches Hg vacuum

System Flow Rate: 12.0 cfh

Leak Rate: $\frac{\text{Post-Test (cfh)}}{\text{System Flow Rate (cfh)}} * 100 =$ <1.0 %

SYSTEM RESPONSE

	Run 1	Run 2	Run 3	Average
Upscale (seconds):	26	26	26	26
Downscale (seconds):	29	29	29	29

NO_x CONVERTER CHECK - (1) Fill Tedlar bag with NO_2 and air - (2) Run contents of bag through NO_x analyzer

$C = NO_x$ (as found): _____ ppm

$\% O_2 = O_2$ in air (as found): _____ ppm

$C_{NO2} = NO_2$ (actual): _____ ppm

$C_{NO} = NO$ (actual): _____ %

NO_x Converter Efficiency: _____ %

$$C_0 = \left[\frac{20.9}{(20.9 - \% O_2)}\right] * C = ____$$

$$Eff = \left[\frac{(C_0 - C_{NO})}{C_{NO2}}\right] * 100 = ____ \%$$

See Following Pages

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

NOx Converter Check - Zero

Analyte		Current Value		Run Avg	Correct.		
Name	Units	Volts	Units		Avg	Plant	Diff.
NOx	ppm	-0.003	-0.013	0.000			

2 X Max Response Time		minutes	Close
Elapsed Response Time		minutes	Start Avg.
Run Length	30.00	minutes	
Elapsed Run Time		minutes	

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	9.589	47.946	0.000			

NOx Converter Check-High

Cylinder # = CC102102

Concentration = 48.0ppm

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	4.901	24.507	0.000			

NOx Converter Check - Mid

Cylinder # = CC150244

Concentration = 24.5 ppm

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	4.722	23.612	0.000			

NO_x converter Check - NO_2

Cylinder # = CC145271

Concentration = 25.2 ppm

23.612 / 25.2 = 93.7% conv. Eff.

Appendix B.5

CEM Performance and Calibrations Data – Unit 3

STRATA Configuration Page 1
04-23-2009 08:09:42
File Name: C:\Projects 2009\Panoche\Panoche.str

Operator:	Mark Stanfield
Plant Name:	Panoche
Location:	Turbine 3 Stack
Run Length:	30 minutes
Sample Rate:	30 per minute
Average Calibration Results:	1 minutes
Automatic Sequence, Calibration Error:	No
Automatic Sequence, System Bias:	No
Max Response Time:	Manual
Max Response Time:	1 minutes
Traverse During Run:	Yes
Number of Traverse Points:	3
Pause Each Location:	Yes

Active	Chan.	Analyte Name	Units	Span Units	Span Volts	Offset Volts
Yes	1	O2	%	19.96	7.98	0
Yes	2	CO2	%	8.48	8.48	0
Yes	3	CO	ppm	9.45	4.72	0
Yes	4	NOx	ppm	5.6	9.33	0

Measurement System Preparation Table

Gas Name	Reference Cylinder Numbers 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
O2	Z	M	H													
CO2	Z	M	H													
CO	Z			M	H											
NOx	Z			M	H											

Gas Name	Zero Reference Cylinder No.	Conc	ID Number	Low Reference Cylinder No.	Conc	ID Number
O2	1	0	CC 240878	99	0.1	0
CO2	1	0	CC 240878	99	0.1	
CO	1	0	CC 240878	99	0.1	
NOx	1	0	CC 240878	99	0.1	

Gas Name	Mid Reference Cylinder No.	Conc	ID Number	High Reference Cylinder No.	Conc	ID Number
O2	2	11.62	CC 272622	3	19.96	CC 173330
CO2	2	4.08	CC 272622	3	8.84	CC 173330
CO	4	5.07	CC 283349	5	9.45	CC 16177
NOx	4	2.5	CC 283349	5	5.6	CC 16177

Calibration Error Test Sequence

Seq Num	O2	CO2	CO	NOx
1	Zero	Zero	Zero	Zero
2	High	High	High	High
3	Mid	Mid	Mid	Mid
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Calibration Error Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X															
2			X		X											
3		X		X												
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

System Bias Check Sequence

Seq Num	O2	CO2	CO	NOx
1	Mid	Mid	Zero	Zero
2	Zero	Zero	Mid	Mid
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

System Bias Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X	X														
2	X			X												
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

STRATA Configuration End

Calibration Error Test, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 07:46:39	0.009	0.0596	4.6638	0.0063
04-23-2009 07:47:39	0.004	0.0633	0.1781	0.0001
04-23-2009 07:48:40	0.004	0.0748	0.0966	0.0028
04-23-2009 07:49:40	0.003	0.0589	0.1006	0.0048
04-23-2009 07:50:39	8.338	3.5869	0.2546	2.1580
04-23-2009 07:51:39	19.975	8.7512	7.0556	5.5845
04-23-2009 07:52:40	19.975	8.8335	9.4680	5.5829
04-23-2009 07:53:40	13.476	5.0295	8.6616	3.3350
04-23-2009 07:54:38	11.619	4.1473	5.4192	2.5991
04-23-2009 07:55:39	11.617	4.1431	5.1279	2.5976

Calibration Error Test at Run 1

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine Stack

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 283349	CC 16177
NOx	CC 240878		CC 283349	CC 16177

Date/Time 04-23-2009 07:56:00 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Avg	0.003	0.0241	0.0436	0.0052
Zero Error%	0.0%	0.3%	0.5%	0.1%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	5.0700	2.5000
Mid Avg	11.617	4.1411	5.1238	2.5946
Mid Error%	0.0%	0.7%	0.6%	1.7%
High Ref Cyl	19.960	8.8400	9.4500	5.6000
High Avg	19.976	8.8328	9.4719	5.5823
High Error%	0.1%	0.1%	0.2%	0.3%

Calibration Error Test End

Initial System Bias Check, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 09:01:58	13.227	4.5285	2.4692	1.4965
04-23-2009 09:02:58	12.532	3.9691	1.8007	0.4400
04-23-2009 09:03:59	11.602	4.1069	0.0892	0.0105
04-23-2009 09:04:59	11.566	4.1207	-0.0038	0.0020
04-23-2009 09:05:58	11.566	4.1221	0.0404	0.0010
04-23-2009 09:06:58	6.363	2.3217	0.3599	1.0010
04-23-2009 09:07:59	0.394	0.1796	3.7627	2.4173
04-23-2009 09:08:59	0.047	0.0276	5.0302	2.5099

Initial System Bias Check for Run 1

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-23-2009 09:09:20 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.003	0.0241	0.0436	0.0052
Zero Avg	0.043	0.0241	0.0112	0.0027
Zero Bias%	0.2%	0.0%	0.3%	0.0%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.617	4.1411	5.1238	2.5946
Span Avg	11.566	4.1211	5.0309	2.5107
Span Bias%	0.3%	0.2%	1.0%	1.5%
Span Drift%				

System Bias Check End

AVOGADRO CEMS PERFORMANCE DATA

(circle or enter applicable data)

CLIENT / LOCATION: PEL TURBINE #3 JOB #: 09092

OPERATOR: M. STANFIELD DATE: 4/23/09

ANALYZERS IN SERVICE								
Analyzers:	O_2	CO_2	CO	NO_X	SO_2	THC	Other:	
FILTRATION (ON STACK)								
Filter Type:	In-Stack		Out-of-Stack		Sintered		Other:	N/A
Filter Material:	Glass	Quartz	Steel	N/A	--	--	Other:	
Filter Holder Material:	Steel	Teflon	Glass	N/A	--	--	Other:	
Oven Box (Y/N):	Yes	No	--	--	--	--	--	--
Oven Temperature:	°F	N/A	--	--	--	--	--	--
SAMPLING PROBE								
Length:	4'	6'	8'	10'	12'	14'	Other:	
Material:	Steel	Glass	Teflon	Titanium	Quartz	Inconel	Other:	
Heated (Y/N):	Yes	No	--	--	--	--	--	--
Probe Temperature:	°F	N/A	--	--	--	--	--	--
HEATED LINE								
In use (Y/N):	Yes	No	--	--	--	--	--	--
Length:	15'	25'	50'	75'	100'	150'	Other:	
Line Temperature:	270 °F	N/A	--	--	--	--	--	--
CEMS SAMPLE LINE								
Length:	25'	50'	75'	100'	150'	200'	Other:	
Material:	Teflon	Plastic	Not Used	--	--	--	Other:	
CONDITIONER (MOISTURE KNOCKOUT)								
In Service (Y/N):	Yes	No	--	--	--	--	--	--
Coolant:	Ice and Water		Anti-Freeze		Electric		Other:	
Trap Material:	Steel		Glass		Teflon		Other:	

LEAK CHECK

Pre-Test: <0.1 cfh @ 27 inches Hg vacuum

Post-Test: <0.1 cfh @ 10 inches Hg vacuum

System Flow Rate: 15 cfh

Leak Rate: $\frac{\text{Post-Test (cfh)}}{\text{System Flow Rate (cfh)}} * 100 =$ <1.0 %

SYSTEM RESPONSE	Run 1	Run 2	Run 3	Average
Upscale (seconds):	30	30	30	30
Downscale (seconds):	33	34	33	33

NO_X CONVERTER CHECK (1) Fill Tedlar bag with NO_2 and air, (2) Run contents of bag through NO_X analyzer.

$C = NO_X$ (as found): _____ ppm

% O_2 = O_2 in air (as found): _____ ppm

$C_{NO2} = NO_2$ (actual): _____ ppm

C_{NO} = NO (actual): _____ %

NO_X Converter Efficiency: _____ %

$$C_0 = \left[\frac{20.9}{(20.9 - \%\,O_2)}\right] * C = ____$$

$$Eff = \left[\frac{(C_0 - C_{NO})}{C_{NO2}}\right] * 100 = ____ \%$$

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg		
Name	Units	Volts	Units			Plant	Diff.
NOx	ppm	-0.006	-0.028	0.000			

U9092 PEL

NO_x CONV. CHECK - ZERO

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	9.588	47.939	0.000			

09092 PEL

NO_x Conv. Check - High

Cylinder # CC102102

Conc. = 48.0 ppm

2 X Max Response Time		minutes	Close
Elapsed Response Time		minutes	
Run Length	30.00	minutes	Start Avg.
Elapsed Run Time		minutes	

Analyte		Current Value		Run Avg	Correct.		
Name	Units	Volts	Units		Avg	Plant	Diff.
NOx	ppm	4.834	24.169	0.000			

09092 PEC

NO_x Conv. Check - MID

Cylinder # CC150244

Conc. = 24.5 ppm

2 X Max Response Time		minutes	Close
Elapsed Response Time		minutes	
Run Length	30.00	minutes	Start Avg.
Elapsed Run Time		minutes	

Analyte		Current Value		Run Avg	Correct.		
Name	Units	Volts	Units		Avg	Plant	Diff.
NOx	ppm	4.844	24.219	0.000			

09092 TEZ

NOx CONV. CHECK - NO_2

CYLINDER # CC 145271

CONC. = 25.2 ppm

$24.219 / 25.2 = 96.1\%$

Appendix B.6

CEM Performance and Calibrations Data – Unit 4

STRATA Configuration Page 1
04-24-2009 09:56:49
File Name: C:\Projects 2009\Panoche\Panoche.str

Operator:	Mark Stanfield
Plant Name:	Panoche
Location:	Turbine 4 Stack
Run Length:	30 minutes
Sample Rate:	30 per minute
Average Calibration Results:	1 minutes
Automatic Sequence, Calibration Error:	No
Automatic Sequence, System Bias:	No
Max Response Time:	Manual
Max Response Time:	1 minutes
Traverse During Run:	Yes
Number of Traverse Points:	3
Pause Each Location:	No
Traverse Valve Sequence:	None

Active	Chan.	Analyte Name	Units	Span Units	Span Volts	Offset Volts
Yes	1	O2	%	19.96	7.98	0
Yes	2	CO2	%	8.48	8.48	0
Yes	3	CO	ppm	9.45	4.72	0
Yes	4	NOx	ppm	5.6	9.33	0

Measurement System Preparation Table

Gas Name	Reference Cylinder Numbers 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
O2	Z	M	H													
CO2	Z	M	H													
CO	Z			M	H											
NOx	Z			M	H											

Gas Name	Zero Reference Cylinder No.	Conc	ID Number	Low Reference Cylinder No.	Conc	ID Number
O2	1	0	CC 240878	99	0.1	0
CO2	1	0	CC 240878	99	0.1	
CO	1	0	CC 240878	99	0.1	
NOx	1	0	CC 240878	99	0.1	

Gas Name	Mid Reference Cylinder No.	Conc	ID Number	High Reference Cylinder No.	Conc	ID Number
O2	2	11.62	CC 272622	3	19.96	CC 173330
CO2	2	4.08	CC 272622	3	8.84	CC 173330
CO	4	5.07	CC 283349	5	9.45	CC 16177
NOx	4	2.5	CC 283349	5	5.6	CC 16177

Calibration Error Test Sequence

Seq Num	O2	CO2	CO	NOx
1	Zero	Zero	Zero	Zero
2	High	High	High	High
3	Mid	Mid	Mid	Mid
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Calibration Error Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X															
2			X		X											
3		X		X												
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

System Bias Check Sequence

Seq Num	O2	CO2	CO	NOx
1	Mid	Mid	Zero	Zero
2	Zero	Zero	Mid	Mid
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

System Bias Valve Sequence

Seq Num	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	X	X														
2	X			X												
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

STRATA Configuration End

Calibration Error Test, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 07:25:44	0.004	0.0237	2.6782	0.0097
04-24-2009 07:26:45	-0.008	0.0102	0.0141	-0.0011
04-24-2009 07:27:46	5.691	2.4774	0.0646	1.6862
04-24-2009 07:28:44	19.983	8.8660	6.2484	5.6099
04-24-2009 07:29:45	19.976	8.8517	9.3525	5.6111
04-24-2009 07:30:45	18.650	8.0810	9.3645	5.1738
04-24-2009 07:31:44	11.626	4.1837	7.0698	2.6030
04-24-2009 07:32:44	11.622	4.1901	5.1360	2.5973

Calibration Error Test at Run 1

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC 240878	0	CC 272622	CC 173330
CO2	CC 240878		CC 272622	CC 173330
CO	CC 240878		CC 283349	CC 16177
NOx	CC 240878		CC 283349	CC 16177

Date/Time 04-24-2009 07:33:12 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Avg	-0.008	0.0140	-0.0575	-0.0012
Zero Error%	0.0%	0.2%	0.6%	0.0%
Low Ref Cyl				
Low Avg				
Low Error%				
Mid Ref Cyl	11.620	4.0800	5.0700	2.5000
Mid Avg	11.621	4.1914	5.0791	2.5963
Mid Error%	0.0%	1.3%	0.1%	1.7%
High Ref Cyl	19.960	8.8400	9.4500	5.6000
High Avg	19.977	8.8474	9.3689	5.6095
High Error%	0.1%	0.1%	0.9%	0.2%

Calibration Error Test End

Initial System Bias Check, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-24-2009 07:44:04	5.442	1.8820	4.7233	2.0547
04-24-2009 07:45:05	11.413	3.9838	1.3562	0.3835
04-24-2009 07:46:03	11.537	4.0574	-0.0015	0.0189
04-24-2009 07:47:04	11.540	4.0641	-0.0845	0.0066
04-24-2009 07:48:04	10.387	3.6854	-0.0734	0.2030
04-24-2009 07:49:03	1.843	0.7212	2.0307	2.0648
04-24-2009 07:50:03	0.063	0.0344	4.8955	2.5156
04-24-2009 07:51:04	0.018	0.0116	5.0743	2.5535

Initial System Bias Check for Run 1

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-24-2009 07:51:42 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	-0.008	0.0140	-0.0575	-0.0012
Zero Avg	0.017	0.0085	-0.0780	0.0097
Zero Bias%	0.1%	0.1%	0.2%	0.2%
Zero Drift%				
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.621	4.1914	5.0791	2.5963
Span Avg	11.539	4.0640	5.0516	2.5921
Span Bias%	0.4%	1.5%	0.3%	0.1%
Span Drift%				

System Bias Check End

Test Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 08:50:52	13.208	4.5674	0.3411	3.1567
04-24-2009 08:51:51	13.187	4.5799	0.3570	3.0246
Start Averaging				
04-24-2009 08:52:51	13.172	4.5852	0.3064	2.9542
04-24-2009 08:53:52	13.171	4.5825	0.2732	3.0170
04-24-2009 08:54:53	13.167	4.5825	0.2796	3.0337
04-24-2009 08:55:51	13.165	4.5825	0.2905	3.0149
Average 111 samples	13.168	4.5825	0.2850	3.0101

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack
Test Run 1 End

PT. 1

STRAT TEST

TURBINE 4

PT. 2

STRAT TEST

TURBINE 4

Test Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 08:46:07	13.258	4.5491	0.8567	2.7343
Start Averaging				
04-24-2009 08:47:07	13.233	4.5635	0.7671	3.0227
04-24-2009 08:48:08	13.219	4.5723	0.4678	3.0658
Average 58 samples	13.217	4.5723	0.4511	3.0636
04-24-2009 08:49:06	13.213	4.5723	0.4010	3.0596

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack
Test Run 1 End

Test Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
Start Averaging				
04-24-2009 08:43:30	13.274	4.5440	0.9130	2.7942
04-24-2009 08:44:31	13.271	4.5424	0.8972	2.7925
Average 59 samples	13.272	4.5433	0.9024	2.7877

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack
Test Run 1 End

PT. 3

STRAT. TEST

TURBINE 4

AVOGADRO CEMS PERFORMANCE DATA

(circle or enter applicable data)

CLIENT / LOCATION: PEC TURBINE # 4 JOB #: 09092

OPERATOR: M. STANFIELD DATE: 4/24/09

ANALYZERS IN SERVICE								
Analyzers:	O_2	CO_2	CO	NO_X	SO_2	THC	Other:	
FILTRATION (ON STACK)								
Filter Type:	In-Stack		Out-of-Stack		Sintered		Other:	N/A
Filter Material:	Glass	Quartz	Steel	N/A	--	--	Other:	
Filter Holder Material:	Steel	Teflon	Glass	N/A	--	--	Other:	
Oven Box (Y/N):	Yes	No	--	--	--	--	--	--
Oven Temperature:	____ °F	N/A	--	--	--	--	--	--
SAMPLING PROBE								
Length:	4'	6'	8'	10'	12'	14'	Other:	
Material:	Steel	Glass	Teflon	Titanium	Quartz	Inconel	Other:	
Heated (Y/N):	Yes	No	--	--	--	--	--	--
Probe Temperature:	____ °F	N/A	--	--	--	--	--	--
HEATED LINE								
In use (Y/N):	Yes	No	--	--	--	--	--	--
Length:	15'	25'	50'	75'	100'	150'	Other:	
Line Temperature:	265 °F	N/A	--	--	--	--	--	--
CEMS SAMPLE LINE								
Length:	25'	50'	75'	100'	150'	200'	Other:	
Material:	Teflon	Plastic	Not Used	--	--	--	Other:	
CONDITIONER (MOISTURE KNOCKOUT)								
In Service (Y/N):	Yes	No	--	--	--	--	--	--
Coolant:	Ice and Water		Anti-Freeze		Electric		Other:	
Trap Material:	Steel		Glass		Teflon		Other:	

LEAK CHECK

Pre-Test: <0.1 cfh @ 29 inches Hg vacuum

Post-Test: <0.1 cfh @ 10 inches Hg vacuum

System Flow Rate: 15 cfh

Leak Rate: $\frac{\text{Post-Test (cfh)}}{\text{System Flow Rate (cfh)}} * 100 =$ <1.0 %

SYSTEM RESPONSE	Run 1	Run 2	Run 3	Average
Upscale (seconds):	31	31	32	31
Downscale (seconds):	34	34	34	34

NO_X CONVERTER CHECK (1) Fill Tedlar bag with NO_2 and air. (2) Run contents of bag through NO_X analyzer.

$C = NO_X$ (as found): ____ ppm

$\% O_2 = O_2$ in air (as found): ____ ppm

$C_{NO2} = NO_2$ (actual): ____ ppm

$C_{NO} = NO$ (actual): ____ %

NO_X Converter Efficiency: ____ %

$$C_0 = \left[\frac{20.9}{(20.9 - \% O_2)}\right] * C = ____$$

$$Eff = \left[\frac{(C_0 - C_{NO})}{C_{NO2}}\right] * 100 = ____ \%$$

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	-0.002	-0.012	0.000			

09092 PEL

NO_x CONV. CHECK - ZERO

2 X Max Response Time		minutes
Elapsed Response Time		minutes
Run Length	30.00	minutes
Elapsed Run Time		minutes

Close

Start Avg.

Analyte		Current Value		Run Avg	Correct. Avg		
Name	Units	Volts	Units			Plant	Diff.
NOx	ppm	9.650	48.252	0.000			

C9092 PEL

NO_x CONV. CHECK - HIGH

CYLINDER # CC102102

CONC. = 48.0 ppm

2 X Max Response Time		minutes	Close
Elapsed Response Time		minutes	Start Avg.
Run Length	30.00	minutes	
Elapsed Run Time		minutes	

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	4.863	24.317	0.000			

09092 PEC

NOx Conv. Check - M.D

Cylinder # CC 150244

Conc. = 24.5 ppm

2 X Max Response Time		minutes	Close
Elapsed Response Time		minutes	Start Avg.
Run Length	30.00	minutes	
Elapsed Run Time		minutes	

Analyte		Current Value		Run Avg	Correct. Avg	Plant	Diff.
Name	Units	Volts	Units				
NOx	ppm	4.773	23.867	0.000			

09092 PEC

NOx Conv. Check - NO2

Cylinder # CC 145271

Conc. = 25.2 ppm

23.867/25.2 = 94.7%

Appendix B.7

Field Equipment Calibration Data

The Avogadro Group, LLC

EPA Method 5

522 Series Meter Box Calibration

6 mo. Orifice Calibration

English Meter Box Units, English K' Factor

Average Yd:	0.972
Average dH@:	1.872
Variation of Yd's:	PASS
Variation of ΔH @:	PASS
Vacuum Criteria:	PASS

Meter #: CB 11
Calibrated by: R.Moreno
Date: 12/08/08
Barometric Pressure: 30.11 (in. Hg)
Theoretical Critical Vacuum: 14.20 (in. Hg)

!!!!!!!!
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)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!

DRY GAS METER READINGS — -CRITICAL ORIFICE READINGS-

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual – Ambient Temperature –			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.33	16.00	983.056	988.087	5.031	58.0	58.0	58.0	58.0	RG 40	0.2304	16.0	66.0	66.0	66.0
0.69	12.00	988.087	993.618	5.531	58.0	58.0	58.0	58.0	RG 48	0.3500	16.0	66.0	66.0	66.0
1.10	10.00	993.618	999.438	5.820	58.0	58.0	58.0	59.0	RG 55	0.4424	16.0	66.0	66.0	66.0
2.00	7.00	0.000	5.509	5.509	59.0	59.0	59.0	59.0	SS63	0.6036	16.0	66.0	66.0	66.0
3.40	5.00	5.509	10.703	5.194	59.0	59.0	59.0	60.0	RG 73	0.7902	16.0	66.0	66.0	66.0

RESULTS

— DRY GAS METER —

VOLUME CORRECTED Vm(std) (cu ft)
5.163
5.681
5.981
5.665
5.357

— ORIFICE —

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.008	4.959
5.513	5.460
5.808	5.752
5.547	5.493
5.187	5.137

— DRY GAS METER —

CALIBRATION FACTOR Yd

Value (number)	Variation (number)
0.970	-0.002
0.970	-0.001
0.971	-0.001
0.979	0.007
0.966	-0.004

— ORIFICE —

CALIBRATION FACTOR dH@

Value (in H2O)	Variation (in H2O)
1.944	0.071
1.886	0.014
1.880	0.007
1.834	-0.038
1.816	-0.055

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 H20 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.

SIGNED: _____ Date: 12-08-08

The Avogadro Group, LLC

EPA Method 5

522 Series Meter Box Calibration

6 mo. Orifice Calibration

English Meter Box Units, English K' Factor

Average Yd:	0.992
Average dH@:	1.789
Variation of Yd's:	PASS
Variation of ΔH @:	PASS
Vacuum Criteria:	PASS

Meter #———— CB 03
Calibrated by———— R.Moreno
Date: ———— 11/06/08
Barometric Pressure: ——— 30.37 (in. Hg)
Theoretical Critical Vacuum: 14.33 (in. Hg)

!!!!!!!!
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)^3*(deg R)*0.5/((in.Hg)*(min)).
!!!!!!!!

———— DRY GAS METER READINGS ———— -CRITICAL ORIFICE READINGS-

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual -- Ambient Temperature --			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.32	17.00	505.548	510.759	5.211	56.0	56.0	58.0	58.0	RG 40	0.2394	16.0	65.0	65.0	65.0
0.67	12.00	510.759	516.180	5.421	58.0	58.0	60.0	60.0	RG 48	0.3500	16.0	65.0	65.0	65.0
1.10	9.00	516.180	521.323	5.143	60.0	60.0	61.0	61.0	RG 55	0.4424	16.0	65.0	66.0	65.5
1.90	8.00	521.323	527.554	6.231	61.0	61.0	61.0	61.0	SS63	0.6036	16.0	66.0	66.0	66.0
3.20	6.00	527.554	533.720	6.166	61.0	61.0	62.0	62.0	RG 73	0.7902	16.0	66.0	66.0	66.0

********** RESULTS **********

— DRY GAS METER —

VOLUME CORRECTED Vm(std) (cu ft)
5.404
5.605
5.306
6.437
6.383

——— ORIFICE ———

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.372	5.264
5.566	5.455
5.275	5.174
6.394	6.278
6.278	6.164

— DRY GAS METER —

CALIBRATION FACTOR Yd Value (number)	Variation (number)
0.994	0.002
0.993	0.002
0.994	0.002
0.993	0.002
0.984	-0.008

——— ORIFICE ———

CALIBRATION FACTOR dH@ Value (in H2O)	Variation (in H2O)
1.669	0.080
1.809	0.020
1.855	0.066
1.721	-0.068
1.690	-0.099

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 H20 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.

SIGNED: _____ Date: 11/06/08

The Avogadro Group, LLC

EPA Method 5

522 Series Meter Box Calibration

6 mo. Orifice Calibration

English Meter Box Units, English K' Factor

Average Yd:	0.971
Average dH@:	1.790
Variation of Yd's:	PASS
Variation of ΔH @:	PASS
Vacuum Criteria:	PASS

Meter #: CB 05
Calibrated by: R.Moreno
Date: 11/11/08
Barometric Pressure: 30.26 (in. Hg)
Theoretical Critical Vacuum: 14.27 (in. Hg)

!!!!!!!
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)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!

DRY GAS METER READINGS — -CRITICAL ORIFICE READINGS-

		Volume			Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual — Ambient Temperature —			
dH (in H2O)	Time (min)	Initial (cu ft)	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Serial# (number)	Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.30	16.00	703.268	708.428	5.160	70.0	70.0	70.0	70.0	RG 40	0.2384	16.0	67.0	67.0	67.0
0.66	11.00	681.285	686.451	5.166	66.0	66.0	68.0	66.0	RG 46	0.3500	16.0	67.0	67.0	67.0
1.10	10.00	686.451	692.388	5.937	66.0	66.0	69.0	69.0	RG 55	0.4424	16.0	67.0	67.0	67.0
2.00	7.00	692.388	698.008	5.620	69.0	69.0	70.0	70.0	SS63	0.6038	16.0	67.0	67.0	67.0
3.50	5.00	698.008	703.268	5.260	70.0	70.0	70.0	70.0	RG 73	0.7902	16.0	67.0	67.0	67.0

RESULTS

— DRY GAS METER —

VOLUME CORRECTED Vm(std) (cu ft)
5.201
5.261
6.012
5.693
5.343

— ORIFICE —

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME NOMINAL Vcr (cu ft)
5.028	4.954
5.074	5.010
5.831	5.757
5.569	5.499
5.208	5.142

— DRY GAS METER —

CALIBRATION FACTOR Yd Value (number)	Variation (number)
0.967	-0.004
0.964	-0.006
0.970	-0.001
0.976	0.007
0.975	0.004

— ORIFICE —

CALIBRATION FACTOR dH@ Value (in H2O)	Variation (in H2O)
1.722	-0.068
1.766	-0.022
1.838	0.049
1.792	0.003
1.828	0.039

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 H20 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.

SIGNED: _____

Date: 11/11/08

Appendix B.8

Calibration Span Gas Certificates

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (323) 585-0582

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO GROUP

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON DIOXIDE GMIS	vs.SRM#1674	SA 12446	10.05 %
OXYGEN GMIS	vs.SRM#2659	CC 76878	20.98 %

ANALYZER READINGS

R=REFERENCE STANDARD Z=ZERO GAS C=GAS CANDIDATE

1. COMPONENT CARBON DIOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-730
   ANALYTICAL PRINCIPLE NDIR LAST CALIBRATION DATE 07/02/07
   FIRST ANALYSIS DATE 07/26/07 SECOND ANALYSIS DATE

Z 0.00	R 10.05	C 8.48	CONC. 8.48	Z	R	C	CONC.
R 10.05	Z 0.00	C 8.48	CONC. 8.48	R	Z	C	CONC.
Z 0.00	C 8.48	R 10.05	CONC. 8.48	Z	C	R	CONC.
U/M %		MEAN TEST ASSAY	8.48	U/M %		MEAN TEST ASSAY	

2. COMPONENT OXYGEN GMIS ANALYZER MAKE-MODEL-S/N Siemens Oxymat 5E S/N A12-839
   ANALYTICAL PRINCIPLE Paramagnetic LAST CALIBRATION DATE 07/02/07
   FIRST ANALYSIS DATE 07/26/07 SECOND ANALYSIS DATE

Z 0.00	R 20.98	C 19.96	CONC. 19.96	Z	R	C	CONC.
R 20.98	Z 0.00	C 19.96	CONC. 19.96	R	Z	C	CONC.
Z 0.00	C 19.96	R 20.98	CONC. 19.96	Z	C	R	CONC.
U/M %		MEAN TEST ASSAY	19.96	U/M %		MEAN TEST ASSAY	

Values not valid below 150 psig
O2 concentration is corrected for CO2 interference.

THIS CYLINDER NO. CC 173330
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 07/26/07
EXPIRATION DATE 07/26/10 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON DIOXIDE	8.48 %
OXYGEN	19.96 %
NITROGEN	BALANCE

ANALYZED BY PABLO REYES

CERTIFIED BY ERIC YOUNG

IMPORTANT
Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (323) 585-0582

DocNumber: 00000001026

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:
AVOGADRO

Praxair Order Number: 05519275-00
Customer P. O. Number: 01397325
Customer Reference Number: WA186

Fill Date:
Part Number: NI CD405E-AS
Lot Number: 109807702
Cylinder Style & Outlet: AS 590
Cylinder Pressure & Volume: 2000 psi 140 cu ft

PO # 1179

Certified Concentration:

Expiration Date: 3/24/2011
Cylinder Number: CC 272622

			Analytical Uncertainty:
4.08	%	CARBON DIOXIDE	± 1 %
11.62	%	OXYGEN	± 1 %
	Balance	NITROGEN	

NOx ppm = N/A NOX Values for Reference Only

Certification Information: *Certification Date:* 3/24/2008 *Term:* 36 Months *Expiration Date:* 3/24/2011
This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1
Do Not Use this Standard if Pressure is less than 150 PSIG

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON DIOXIDE

Requested Concentration: 4 %
Certified Concentration: 4.08 %
Instrument Used: Siemens Ultramat 5E S/N A12-730
Analytical Method: NDIR
Last Multipoint Calibration: 3/14/2008

First Analysis Date: Date: 3/24/2008

Z:	0	R:	5.03	C:	4.08	Conc:	4.08
R:	5.03	Z:	0	C:	4.08	Conc:	4.08
Z:	0	C:	4.08	R:	5.03	Conc:	4.08

UOM: % Mean Test Assay: 4.08 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA 17988
Ref. Std. Conc: 5.030 %
Ref. Std. Traceable to SRM # : vs. 1674b
SRM Sample # : 7-F-32
SRM Cylinder # : CAL014645

Second Analysis Date: Date: 3/26/2008

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: % Mean Test Assay: 0 %

2. Component: OXYGEN

Requested Concentration: 11.5 %
Certified Concentration: 11.62 %
Instrument Used: Siemens Oxymat 5E S/N A12-839
Analytical Method: Paramagnetic
Last Multipoint Calibration: 3/16/2008

First Analysis Date: Date: 3/24/2008

Z:	0	R:	15.02	C:	11.62	Conc:	11.62
R:	15.02	Z:	0	C:	11.62	Conc:	11.62
Z:	0	C:	11.62	R:	15.02	Conc:	11.62

UOM: % Mean Test Assay: 11.62 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC 65663
Ref. Std. Conc: 15.02 %
Ref. Std. Traceable to SRM # : vs. 2659a
SRM Sample # : 71-37-B
SRM Cylinder # : CLM-006734

Second Analysis Date: Date:

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: Mean Test Assay: 0

Analyzed by: Peter Su

Certified by: Phu Tien Nguyen

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR

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Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

DocNumber: 00000014491

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

AVOGADRO

Praxair Order Number: 08964215-00
Customer P. O. Number: 02288000
Customer Reference Number: WA191

Fill Date:
Part Number: EV NICONOE231AS
Lot Number: 109821004
Cylinder Style & Outlet: AS 660
Cylinder Pressure & Volume: 2000 psi 140 cu ft

Certified Concentration:

Expiration Date:	2/26/2011		
Cylinder Number:	CC 283349		Analytical Uncertainty:
2.48	ppm	NITRIC OXIDE	± 2 %
5.07	ppm	CARBON MONOXIDE	± 1 %
	Balance	NITROGEN	

NOx ppm = 2.50 ppm NOX Values for Reference Only

Certification Information: *Certification Date:* 2/26/2009 *Term:* 24 Months *Expiration Date:* 2/26/2011

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

LAST CERTIFIED ON 8/20/08 [NO]=2.50 ppm, [CO]=5.08 ppm (NOx 2.51 ppm).

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: NITRIC OXIDE

Requested Concentration: 2.5 ppm
Certified Concentration: 2.48 ppm
Instrument Used: Thermo Electron 42C S/N 518112457
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 2/16/2009

First Analysis Data:						Date:	2/23/2009
Z:	0	R:	9.48	C:	2.46	Conc:	2.46
R:	9.47	Z:	0	C:	2.46	Conc:	2.46
Z:	0	C:	2.47	R:	9.48	Conc:	2.47
UOM:	ppm			Mean Test Assay:			2.46 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC 240528
Ref. Std. Conc: 9.48 ppm
Ref. Std. Traceable to SRM # : vs 2626a
SRM Sample # : 49-H-106
SRM Cylinder # : CAL015552

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			0 ppm

2. Component: CARBON MONOXIDE

Requested Concentration: 5 ppm
Certified Concentration: 5.07 ppm
Instrument Used: Horiba VIA-510 S/N 576876015
Analytical Method: NDIR
Last Multipoint Calibration: 2/10/2009

First Analysis Data:						Date:	2/23/2009
Z:	0	R:	177	C:	96.8	Conc:	5.06
R:	177	Z:	0	C:	96.7	Conc:	5.06
Z:	0	C:	96.9	R:	177	Conc:	5.07
UOM:	ppm			Mean Test Assay:			5.06 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA 12719
Ref. Std. Conc: 9.26 ppm
Ref. Std. Traceable to SRM # : 1677C
SRM Sample # : 54-42
SRM Cylinder # : XF 002143B

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			0 ppm

Analyzed by: Ben McCauley

Certified by: Jack Fu

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

Making Our Planet More Productive

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Facsimile: (323) 585-0582

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs.SRM#1677	CC 135598	9.26 ppm
NITRIC OXIDE GMIS	vs.SRM#2628	CC 149891	9.88 ppm

ANALYZER READINGS

R=REFERENCE STANDARD Z=ZERO GAS C=GAS CANDIDATE

1. COMPONENT CARBON MONOXIDE GMIS ANALYZER MAKE-MODEL-S/N HORIBA, VIA-510, S/N 576876015

ANALYTICAL PRINCIPLE NDIR
FIRST ANALYSIS DATE 08/02/07
LAST CALIBRATION DATE 08/02/07
SECOND ANALYSIS DATE 08/09/07

Z 0.0	R 183.1	C 189.0	CONC. 9.56	Z 0.0	R 181.9	C 184.3	CONC. 9.38
R 182.7	Z 0.0	C 187.5	CONC. 9.50	R 181.7	Z 0.0	C 184.8	CONC. 9.42
Z 0.0	C 186.8	R 183.0	CONC. 9.45	Z 0.0	C 185.0	R 182.5	CONC. 9.39

U/M ppm MEAN TEST ASSAY 9.50 U/M ppm MEAN TEST ASSAY 9.40

2. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N Thermo Env. 42C S/N 0518112467

ANALYTICAL PRINCIPLE Chemiluminescence
FIRST ANALYSIS DATE 08/02/07
LAST CALIBRATION DATE 08/02/07
SECOND ANALYSIS DATE 08/09/07

Z 0.00	R 9.92	C 5.61	CONC. 5.59	Z 0.00	R 9.88	C 5.56	CONC. 5.56
R 9.93	Z 0.00	C 5.61	CONC. 5.58	R 9.84	Z 0.00	C 5.57	CONC. 5.59
Z 0.00	C 5.60	R 9.92	CONC. 5.58	Z 0.00	C 5.57	R 9.88	CONC. 5.57

U/M ppm MEAN TEST ASSAY 5.58 U/M ppm MEAN TEST ASSAY 5.57

Values not valid below 150 psig.
NOx value for reference use only.

THIS CYLINDER NO. CC 16177
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 2 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 08/09/07
EXPIRATION DATE 08/09/09 TERM 24 MONTHS

CERTIFIED CONCENTRATION

CARBON MONOXIDE	9.45 ppm
NITRIC OXIDE	5.58 ppm
NITROGEN	BALANCE
NOx	5.60 ppm

ANALYZED BY Henry Koung

CERTIFIED BY Phil Kim

IMPORTANT
Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE GMIS	vs.SRM#1683	CC 120399	50.7 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N THERMO ENV. 42C S/N 0518112467

ANALYTICAL PRINCIPLE CHEMILUMINESCENCE

FIRST ANALYSIS DATE 07/25/07

Z 0	R 49.7	C 46.8	CONC. 47.7	Z 0	R 50.6	C 47.8	CONC. 47.9
R 49.6	Z 0	C 46.8	CONC. 47.8	R 50.7	Z 0	C 47.8	CONC. 47.8
Z 0	C 46.8	R 49.6	CONC. 47.8	Z 0	C 47.8	R 50.7	CONC. 47.8
U/M ppm		MEAN TEST ASSAY	47.8	U/M ppm		MEAN TEST ASSAY	47.8

LAST CALIBRATION DATE 07/02/07

SECOND ANALYSIS DATE 08/01/07

VALUE NOT VALID BELOW 150 PSIG.
NOX VALUE FOR REFERENCE USE ONLY.

THIS CYLINDER NO. CC 102102
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 08/01/07
EXPIRATION DATE 08/01/09 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	47.8 ppm
NITROGEN	BALANCE
NOx	48.0 ppm

ANALYZED BY PHIL KIM

CERTIFIED BY HENRY YOUNG

IMPORTANT
Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Distribution, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

PRAXAIR

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Los Angeles, CA 90058
Telephone: (323) 585-2154
Facsimile: (714) 542-6689

DocNumber: 00000015841

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:
AVOGADRO

Praxair Order Number: 09212741-00
Customer P. O. Number: 02317694
Customer Reference Number: WA186

Fill Date:
Part Number: EV NIO24ME-AS
Lot Number: 109906302
Cylinder Style & Outlet: AS 660
Cylinder Pressure & Volume: 2000 psi 140 cu ft

Certified Concentration:

Expiration Date:	4/1/2011		Analytical Uncertainty:
Cylinder Number:	CC 150244		
24.4	ppm	NITRIC OXIDE	± 1 %
	Balance	NITROGEN	

NOx ppm = 24.5 ppm NOX Values for Reference Only

Certification Information: *Certification Date:* 4/1/2009 *Term:* 24 Months *Expiration Date:* 4/1/2011

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1

Do Not Use this Standard if Pressure is less than 150 PSIG

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: NITRIC OXIDE

Requested Concentration: 24 ppm
Certified Concentration: 24.4 ppm
Instrument Used: Thermo Electron 42C S/N 516112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 3/16/2009

First Analysis Date: Date: 3/17/2009

Z:	0	R:	24.5	C:	24.5	Conc:	24.5
R:	24.5	Z:	0	C:	24.4	Conc:	24.4
Z:	0	C:	24.4	R:	24.5	Conc:	24.4

UOM: ppm Mean Test Assay: 24.4 ppm

Analyzed by: Ben McCauley

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC 240519
Ref. Std. Conc: 24.5ppm
Ref. Std. Traceable to SRM # : vs. 2629a
SRM Sample # : 50-G-101
SRM Cylinder # : FF31652

Second Analysis Date: Date: 3/24/2009

Z:	0	R:	24.5	C:	24.3	Conc:	24.3
R:	24.5	Z:	0	C:	24.4	Conc:	24.4
Z:	0	C:	24.4	R:	24.5	Conc:	24.4

UOM: ppm Mean Test Assay: 24.4 ppm

Certified by: Henry Koung

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Facsimile: (714) 542-6689

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

PO NUMBER 2307196

REFERENCE STANDARD

COMPONENT	TYPE	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITROGEN DIOXIDE (as NOX)	GMIS	vs. SRM# 2660	CC 138323	25.17 ppm NO

ANALYZER READINGS

R = REFERENCE STANDARD *Z = ZERO GAS* *C = CANDIDATE GAS*

1. COMPONENT NITROGEN DIOXIDE (as NOx)
ANALYTICAL PRINCIPLE CHEMILUMINESCENCE

ANALYZER MAKE-MODEL-S/N Thermo Envin. 42H S/N 42-44979-273
LAST CALIBRATION DATE 2/16/2009

FIRST ANALYSIS DATE 3/6/2009

Z	0.00	R	22.58	C	22.45	CONC.	25.0
R	22.75	Z	0.00	C	22.76	CONC.	25.2
Z	0.00	C	22.63	R	22.69	CONC.	25.1
U/M	ppm				MEAN TEST ASSAY		25.1

SECOND ANALYSIS DATE

Z	0.00	R	0.00	C	0.00	CONC.	0.0
R	0.00	Z	0.00	C	0.00	CONC.	0.0
Z	0.00	C	0.00	R	0.00	CONC.	0.0
U/M						MEAN TEST ASSAY	0.0

LAST CERTIFIED ON 7/17/08 [NO2]=-25.2 ppm (NO=0.4 ppm)
VALUES NOT VALID BELOW 150 PSIG
NO VALUE FOR REFERENCE ONLY; NO = 0.4 ppm

THIS CYLINDER NO. CC 145271
HAS BEEN CERTIFIED ACCORDING TO SECTION 2.2
OF TRACEABILITY PROTOCOL NO. EPA-600/R97/121
PROCEDURE G1
CERTIFIED ACCURACY ± 2% NIST TRACEABLE
CYLINDER PRESSURE 1800 PSIG
CERTIFICATION DATE: 3/6/2009
EXPIRATION 3/6/2011 TERM 24 MONTHS

CERTIFIED CONCENTRATION

COMPONENT	CONCENTRATION
NITROGEN DIOXIDE (as NOx)	25.2 ppm
AIR	BALANCE

ANALYZED BY Benjamin McCauley

CERTIFIED BY Jack Fu

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE CMIS	vs.SRM#1660	CC 95754	499 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT CARBON MONOXIDE CMIS ANALYZER MAKE-MODEL-S/N HORIBA, VIA-510, S/N 576876015

ANALYTICAL PRINCIPLE NDIR
FIRST ANALYSIS DATE 10/24/06

Z 0.00	R 499.0	C 473.4	CONC. 473
R 499.0	Z 0.00	C 473.6	CONC. 474
Z 0.00	C 474.2	R 499.0	CONC. 474

U/M ppm MEAN TEST ASSAY 474

LAST CALIBRATION DATE 10/23/06
SECOND ANALYSIS DATE 10/31/06

Z 0.0	R 499.0	C 473.6	CONC. 474
R 499.0	Z 0.0	C 473.8	CONC. 474
Z 0.0	C 473.9	R 499.0	CONC. 474

U/M ppm MEAN TEST ASSAY 474

Values not valid below 150 psig

THIS CYLINDER NO. CC 159891
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 10/31/06
EXPIRATION DATE 10/31/09 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON MONOXIDE	474 ppm
NITROGEN	BALANCE

ANALYZED BY KING CHEUNG

CERTIFIED BY PHU TIEN NGUYEN

10X

IMPORTANT
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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE GMIS	vs.SRM#1684	CC 207088	103.3 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N BECKMAN 951A S/N#0101354

ANALYTICAL PRINCIPLE CHEMILUMINESCENCE LAST CALIBRATION DATE 07/11/07

FIRST ANALYSIS DATE 07/25/07 SECOND ANALYSIS DATE 06/01/07

Z 0	R 839	C 751	CONC. 92.5	Z 0	R 819	C 730	CONC. 92.1
R 840	Z 0	C 752	CONC. 92.5	R 818	Z 0	C 730	CONC. 92.2
Z 0	C 752	R 840	CONC. 92.5	Z 0	C 733	R 819	CONC. 92.4
U/M mV		MEAN TEST ASSAY	92.5	U/M mV		MEAN TEST ASSAY	92.2

VALUE NOT VALID BELOW 150 PSIG.
NOX VALUE FOR REFERENCE USE ONLY.

THIS CYLINDER NO. SA 7855
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 08/01/07
EXPIRATION DATE 08/01/09 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	92.4 ppm
NITROGEN	BALANCE
NOx	94.0 ppm

ANALYZED BY VICTOR DOTAN

CERTIFIED BY HASSAN GHASHAM

IMPORTANT
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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON MONOXIDE GMIS	vs.SRM#1681	CC 160128	997 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT CARBON MONOXIDE GMIS ANALYZER MAKE-MODEL-S/N Siemens Ultramat 5E S/N A12-729

ANALYTICAL PRINCIPLE NDIR
FIRST ANALYSIS DATE 04/04/07
LAST CALIBRATION DATE 04/02/07
SECOND ANALYSIS DATE 04/13/07

Z 0	R 997	C 946	CONC. 946	Z 0	R 997	C 946	CONC. 946
R 997	Z 0	C 946	CONC. 946	R 997	Z 0	C 946	CONC. 946
Z 0	C 946	R 997	CONC. 946	Z 0	C 946	R 997	CONC. 946
U/M ppm		MEAN TEST ASSAY	946	U/M ppm		MEAN TEST ASSAY	946

Values not valid below 150 psig

THIS CYLINDER NO. CC 101529
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 04/13/07
EXPIRATION DATE 04/13/10 TERM 36 MONTHS

CERTIFIED CONCENTRATION

CARBON MONOXIDE	946 ppm
NITROGEN	BALANCE

ANALYZED BY ERIC YOUNG

CERTIFIED BY KING CHEUNG

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER AVOGADRO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE GMIS	vs.SRM#1685	CC 161151	254.7 ppm

ANALYZER READINGS

R=REFERENCE STANDARD *Z=ZERO GAS* *C=GAS CANDIDATE*

1. COMPONENT NITRIC OXIDE GMIS ANALYZER MAKE-MODEL-S/N THERMO ENV, 42i, 072602432C

ANALYTICAL PRINCIPLE CHEMILUMINESCENCE

FIRST ANALYSIS DATE 12/05/07

Z 0	R 1020	C 840	CONC. 210	Z 0	R 1020	C 835	CONC. 208
R 1020	Z 0	C 841	CONC. 210	R 1017	Z 0	C 832	CONC. 208
Z 0	C 838	R 1018	CONC. 210	Z 0	C 832	R 1017	CONC. 208
U/M mV		MEAN TEST ASSAY	210	U/M mV		MEAN TEST ASSAY	208

LAST CALIBRATION DATE 11/19/07

SECOND ANALYSIS DATE 12/12/07

VALUE NOT VALID BELOW 150 PSIG.
NOX VALUE FOR REFERENCE USE ONLY.

THIS CYLINDER NO. CC 151767
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121
OF TRACEABILITY PROTOCOL NO. Rev. 9/97
PROCEDURE G1
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE
CYLINDER PRESSURE 2000 PSIG
CERTIFICATION DATE 12/12/07
EXPIRATION DATE 12/12/09 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE	209 ppm
NITROGEN	BALANCE
NOx	210 ppm

ANALYZED BY VICTOR DOTAN

CERTIFIED BY HASSAN GHASHAM

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APPENDIX C

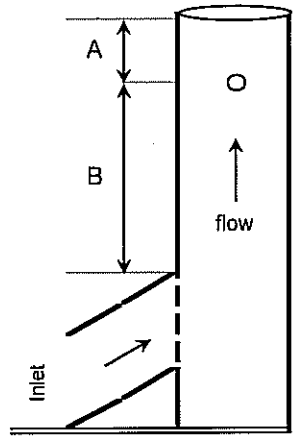
SUPPORTING DATA

Appendix C.1

Sampling Locations (all units)

Panoche Energy Center Units 1-4
TRAVERSE POINT LAYOUT (PARTICULATE)
CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	162.0	*inches*
Upstream diameter (A):	81.0	*inches*
Downstream diameter (B):	324.0	*inches*
Port length:	10.00	*inches*
Number of ports being used:	2	*see note*
Equivalent upstream diameter (A):	0.500	*Pass*
Equivalent downstream diameter (B):	2.000	*Pass*
All points at least 1.0" from stack wall:	3.402	*Pass*
Total points:	24	
Points per port:	12	

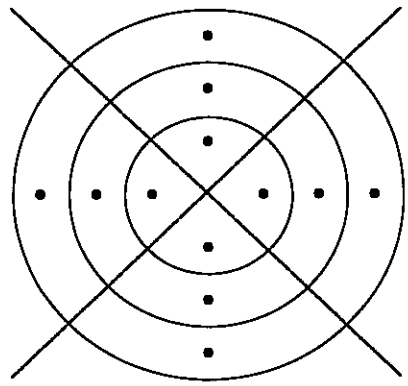


Typical vertical exhaust stack

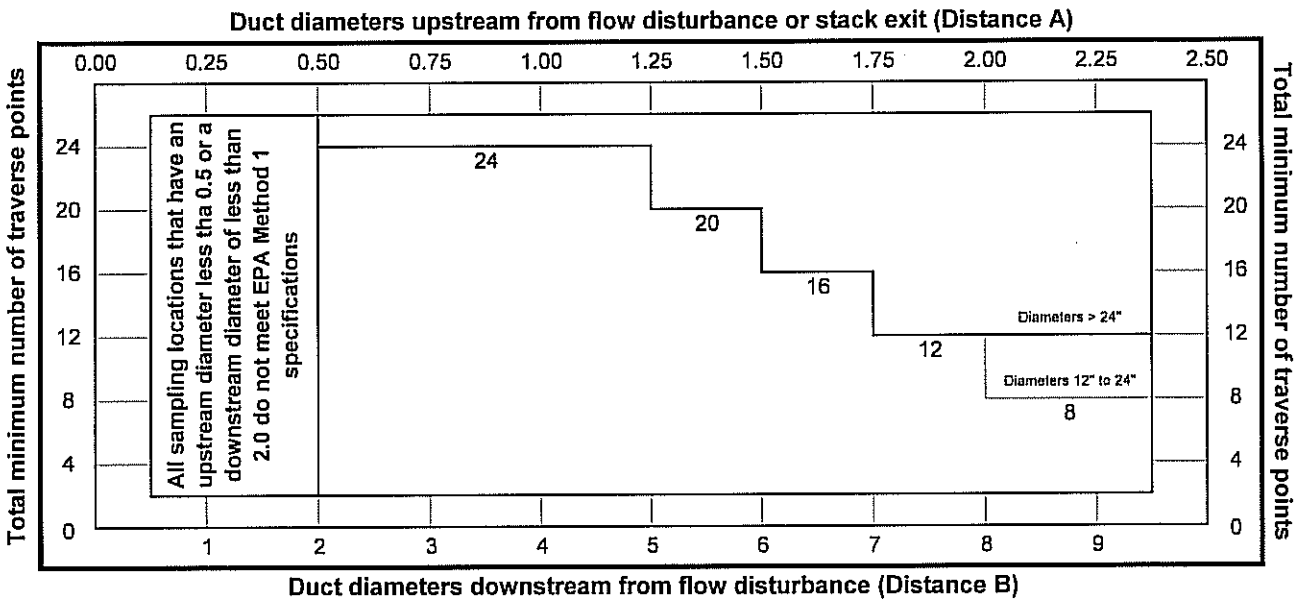
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	2.1	3.4	13.4
2	6.7	10.9	20.9
3	11.8	19.1	29.1
4	17.7	28.7	38.7
5	25.0	40.5	50.5
6	35.6	57.7	67.7
7	64.4	104.3	114.3
8	75.0	121.5	131.5
9	82.3	133.3	143.3
10	88.2	142.9	152.9
11	93.3	151.1	161.1
12	97.9	158.6	168.6

Note: No traverse point shall be within 1.0" of the stack walls (see Sections 11.3.1)

DUCT AREA = 143.139 ft^3



Example: Location of 12 points



Appendix C.2

Plant Process Data, Unit 1

#1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/30/2009 5:14 PM thru 4/30/2009 5:55 PM

Timestamp	(Turbine 1) 60-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min
4/30 17:14	2.00	1.51	0.0056	5.03	4.85	3.65
4/30 17:15	2.03	1.53	0.0056	5.14	4.92	3.71
4/30 17:16	2.06	1.55	0.0057	5.22	4.75	3.58
4/30 17:17	2.13	1.61	0.0059	5.40	4.55	3.43
4/30 17:18	2.17	1.64	0.0060	5.50	4.33	3.27
4/30 17:19	2.21	1.67	0.0061	5.59	4.29	3.24
4/30 17:20	2.24	1.69	0.0062	5.68	4.37	3.29
4/30 17:21	2.26	1.71	0.0063	5.77	4.43	3.34
4/30 17:22	2.36	1.78	0.0066	5.96	4.30	3.24
4/30 17:23	2.42	1.82	0.0067	6.14	4.14	3.12
4/30 17:24	2.42	1.83	0.0067	6.14	4.25	3.21
4/30 17:25	2.44	1.84	0.0068	6.23	4.50	3.39
4/30 17:26	2.47	1.87	0.0069	6.31	4.53	3.42
4/30 17:27	2.53	1.91	0.0070	6.40	4.36	3.29
4/30 17:28	2.63	1.98	0.0073	6.69	4.08	3.08
4/30 17:29	2.64	1.99	0.0073	6.68	4.00	3.01
4/30 17:30	2.63	1.98	0.0073	6.69	4.06	3.06
4/30 17:31	2.65	2.00	0.0074	6.69	4.03	3.04
4/30 17:32	2.65	2.00	0.0074	6.68	4.00	3.01
4/30 17:33	2.65	2.00	0.0074	6.69	4.07	3.07
4/30 17:34	2.66	2.01	0.0074	6.79	4.03	3.04
4/30 17:35	2.63	1.98	0.0073	6.68	4.01	3.03
4/30 17:36	2.60	1.96	0.0072	6.60	4.02	3.03
4/30 17:37	2.59	1.95	0.0072	6.59	4.04	3.05
4/30 17:38	2.65	2.00	0.0074	6.68	3.91	2.95
4/30 17:39	2.70	2.04	0.0075	6.87	3.81	2.87
4/30 17:40	2.66	2.01	0.0074	6.77	3.82	2.88
4/30 17:41	2.63	1.98	0.0073	6.68	3.91	2.95
4/30 17:42	2.67	2.01	0.0074	6.78	3.82	2.88
4/30 17:43	2.70	2.03	0.0075	6.88	3.65	2.75
4/30 17:44	2.70	2.04	0.0075	6.86	3.53	2.66
4/30 17:45	2.67	2.01	0.0074	6.77	3.47	2.62
4/30 17:46	2.62	1.98	0.0073	6.69	3.44	2.60
4/30 17:47	2.58	1.95	0.0072	6.59	3.47	2.62
4/30 17:48	2.61	1.97	0.0073	6.59	3.41	2.57
4/30 17:49	2.66	2.01	0.0074	6.78	3.31	2.50
4/30 17:50	2.67	2.02	0.0074	6.77	3.29	2.49
4/30 17:51	2.65	2.00	0.0074	6.78	3.34	2.52
4/30 17:52	2.64	1.99	0.0073	6.69	3.34	2.52
4/30 17:53	2.64	1.99	0.0073	6.69	3.32	2.50
4/30 17:54	2.60	1.96	0.0072	6.60	3.34	2.52
4/30 17:55	2.64	1.99	0.0073	6.69	3.27	2.47

Timestamp	(Turbine 1) 60-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min
Average (all)	2.52	1.90	0.0070	6.39	3.96	2.99
Total (all)	--	--	--	--	--	--
Minimum (all)	2.00	1.51	0.0056	5.03	3.27	2.47
Maximum (all)	2.70	2.04	0.0075	6.88	4.92	3.71
Average (valid values only)	2.52	1.90	0.0070	6.39	3.96	2.99
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	42	42	42	42	42	42

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/30/2009 5:14 PM thru 4/30/2009 5:55 PM

Timestamp	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 60-O2% 1-Min	(Turbine 1) CT Gas Flow kscf/hr 1-Min	(Turbine 1) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 1) CT Megawatts 1-Min
4/30 17:14	7.50	13.07	871.5	915.1	105.0
4/30 17:15	7.61	13.07	873.3	917.0	104.9
4/30 17:16	7.33	13.07	872.5	916.1	105.3
4/30 17:17	7.05	13.08	872.1	915.7	105.0
4/30 17:18	6.69	13.08	872.9	916.5	105.1
4/30 17:19	6.60	13.08	872.5	916.1	105.3
4/30 17:20	6.78	13.07	872.8	916.4	105.0
4/30 17:21	6.87	13.08	872.9	916.5	105.3
4/30 17:22	6.60	13.07	872.8	916.4	105.3
4/30 17:23	6.41	13.07	872.7	916.3	105.2
4/30 17:24	6.59	13.08	872.1	915.7	105.4
4/30 17:25	6.96	13.07	872.8	916.4	104.7
4/30 17:26	7.05	13.09	871.4	915.0	104.8
4/30 17:27	6.77	13.07	871.0	914.6	105.3
4/30 17:28	6.32	13.08	872.8	916.4	105.0
4/30 17:29	6.13	13.07	871.7	915.3	105.5
4/30 17:30	6.23	13.07	872.5	916.1	104.9
4/30 17:31	6.24	13.08	873.3	917.0	104.9
4/30 17:32	6.13	13.07	872.0	915.6	105.0
4/30 17:33	6.32	13.07	872.2	915.8	104.9
4/30 17:34	6.24	13.08	873.4	917.1	105.3
4/30 17:35	6.23	13.08	872.0	915.6	105.3
4/30 17:36	6.23	13.07	872.8	916.4	105.1
4/30 17:37	6.23	13.08	872.1	915.7	104.7
4/30 17:38	6.04	13.08	871.1	914.7	105.3
4/30 17:39	5.87	13.08	872.9	916.5	105.5
4/30 17:40	5.86	13.08	871.9	915.5	104.6
4/30 17:41	6.04	13.08	871.5	915.1	105.4
4/30 17:42	5.86	13.07	872.4	916.0	105.0
4/30 17:43	5.68	13.07	873.1	916.8	105.0
4/30 17:44	5.49	13.08	871.0	914.6	104.9
4/30 17:45	5.40	13.08	871.4	915.0	104.9
4/30 17:46	5.31	13.08	872.7	916.3	104.8
4/30 17:47	5.40	13.09	872.1	915.7	105.2
4/30 17:48	5.31	13.08	871.8	915.4	105.2
4/30 17:49	5.13	13.08	872.4	916.0	105.3
4/30 17:50	5.12	13.09	871.1	914.7	105.0
4/30 17:51	5.13	13.09	872.1	915.7	104.9
4/30 17:52	5.13	13.09	872.2	915.8	105.1
4/30 17:53	5.13	13.08	872.5	916.1	104.9
4/30 17:54	5.13	13.08	873.2	916.9	105.4
4/30 17:55	5.04	13.08	873.2	916.9	104.8

Timestamp	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 60-O2% 1-Min	(Turbine 1) CT Gas Flow kscf/hr 1-Min	(Turbine 1) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 1) CT Megawatts 1-Min
Average (all)	6.12	13.08	872.3	915.9	105.1
Total (all)	--	--	--	--	--
Minimum (all)	5.04	13.07	871.0	914.6	104.6
Maximum (all)	7.61	13.09	873.4	917.1	105.5
Average (valid values only)	6.12	13.08	872.3	915.9	105.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	42	42	42	42	42

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/30/2009 6:09 PM thru 4/30/2009 6:43 PM

Timestamp	(Turbine 1) 60-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min
4/30 18:09	2.67	2.01	0.0074	6.79	3.06	2.30
4/30 18:10	2.68	2.02	0.0074	6.78	3.02	2.27
4/30 18:11	2.64	1.99	0.0073	6.68	3.04	2.29
4/30 18:12	2.63	1.98	0.0073	6.70	3.04	2.29
4/30 18:13	2.64	1.99	0.0073	6.69	2.99	2.25
4/30 18:14	2.63	1.98	0.0073	6.69	3.01	2.27
4/30 18:15	2.64	1.99	0.0073	6.69	2.98	2.24
4/30 18:16	2.69	2.03	0.0075	6.87	2.83	2.13
4/30 18:17	2.68	2.02	0.0074	6.79	2.70	2.03
4/30 18:18	2.66	2.00	0.0074	6.79	2.69	2.02
4/30 18:19	2.64	1.99	0.0073	6.68	2.69	2.03
4/30 18:20	2.64	1.99	0.0073	6.69	2.73	2.06
4/30 18:21	2.61	1.97	0.0072	6.60	2.70	2.03
4/30 18:22	2.60	1.96	0.0072	6.59	2.73	2.05
4/30 18:23	2.62	1.97	0.0073	6.60	2.73	2.05
4/30 18:24	2.65	1.99	0.0073	6.70	2.72	2.05
4/30 18:25	2.67	2.01	0.0074	6.78	2.60	1.96
4/30 18:26	2.68	2.02	0.0074	6.78	2.56	1.93
4/30 18:27	2.66	2.00	0.0074	6.79	2.55	1.92
4/30 18:28	2.67	2.01	0.0074	6.78	2.50	1.88
4/30 18:29	2.67	2.01	0.0074	6.79	2.42	1.82
4/30 18:30	2.65	2.00	0.0074	6.69	2.44	1.84
4/30 18:31	2.64	1.99	0.0073	6.68	2.45	1.84
4/30 18:32	2.62	1.97	0.0073	6.60	2.42	1.82
4/30 18:33	2.63	1.98	0.0073	6.69	2.43	1.83
4/30 18:34	2.62	1.97	0.0073	6.59	2.48	1.87
4/30 18:35	2.59	1.95	0.0072	6.60	2.60	1.96
4/30 18:36	2.62	1.97	0.0073	6.60	2.53	1.90
4/30 18:37	2.70	2.03	0.0075	6.87	2.31	1.74
4/30 18:38	2.72	2.05	0.0075	6.88	2.24	1.69
4/30 18:39	2.69	2.03	0.0075	6.87	2.27	1.71
4/30 18:40	2.67	2.01	0.0074	6.78	2.31	1.74
4/30 18:41	2.65	2.00	0.0074	6.69	2.25	1.70
4/30 18:42	2.61	1.96	0.0072	6.60	2.33	1.75
4/30 18:43	2.58	1.94	0.0072	6.51	2.40	1.81
Average (all)	2.65	1.99	0.0073	6.71	2.62	1.97
Total (all)	--	--	--	--	--	--
Minimum (all)	2.58	1.94	0.0072	6.51	2.24	1.69
Maximum (all)	2.72	2.05	0.0075	6.88	3.06	2.30
Average (valid values only)	2.65	1.99	0.0073	6.71	2.62	1.97
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	35	35	35	35	35	35

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/30/2009 6:09 PM thru 4/30/2009 6:43 PM

Timestamp	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 60-O2% 1-Min	(Turbine 1) CT Gas Flow kscf/hr 1-Min	(Turbine 1) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 1) CT Megawatts 1-Min
4/30 18:09	4.77	13.06	873.7	917.4	105.0
4/30 18:10	4.67	13.06	873.0	916.7	104.9
4/30 18:11	4.67	13.07	872.0	915.6	105.5
4/30 18:12	4.68	13.06	873.5	917.2	105.4
4/30 18:13	4.58	13.06	872.5	916.1	104.9
4/30 18:14	4.67	13.06	872.5	916.1	105.2
4/30 18:15	4.58	13.06	872.8	916.4	105.0
4/30 18:16	4.39	13.07	871.8	915.4	105.3
4/30 18:17	4.13	13.06	873.3	917.0	105.3
4/30 18:18	4.13	13.06	873.4	917.1	105.0
4/30 18:19	4.12	13.07	872.0	915.6	105.2
4/30 18:20	4.22	13.07	873.0	916.7	105.1
4/30 18:21	4.22	13.07	873.1	916.8	105.1
4/30 18:22	4.21	13.06	872.3	915.9	105.4
4/30 18:23	4.22	13.06	873.4	917.1	105.3
4/30 18:24	4.22	13.06	873.8	917.5	105.5
4/30 18:25	4.03	13.07	872.0	915.6	104.9
4/30 18:26	3.94	13.06	873.0	916.7	105.2
4/30 18:27	3.94	13.07	873.4	917.1	105.0
4/30 18:28	3.85	13.07	872.3	915.9	105.2
4/30 18:29	3.76	13.06	873.5	917.2	105.4
4/30 18:30	3.76	13.07	873.0	916.7	105.1
4/30 18:31	3.75	13.06	872.0	915.6	104.9
4/30 18:32	3.76	13.06	873.6	917.3	105.1
4/30 18:33	3.76	13.06	873.4	917.1	105.0
4/30 18:34	3.85	13.06	872.0	915.6	105.3
4/30 18:35	4.03	13.06	872.4	916.0	104.9
4/30 18:36	3.94	13.06	872.8	916.4	105.2
4/30 18:37	3.57	13.06	872.5	916.1	105.0
4/30 18:38	3.49	13.06	873.6	917.3	105.0
4/30 18:39	3.48	13.07	872.5	916.1	104.9
4/30 18:40	3.57	13.07	872.4	916.0	105.2
4/30 18:41	3.48	13.07	873.1	916.8	105.5
4/30 18:42	3.58	13.06	873.4	917.1	105.3
4/30 18:43	3.67	13.06	872.9	916.5	105.0
Average (all)	4.05	13.06	872.9	916.5	105.1
Total (all)	--	--	--	--	--
Minimum (all)	3.48	13.06	871.8	915.4	104.9
Maximum (all)	4.77	13.07	873.8	917.5	105.5
Average (valid values only)	4.05	13.06	872.9	916.5	105.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	35	35	35	35	35

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/30/2009 6:52 PM thru 4/30/2009 7:26 PM

Timestamp	(Turbine 1) 60-NOx ppm 1-Min	(Turbine 1) NOx ppm @15% O2 1-Min	(Turbine 1) 75-NOx lb/mmBtu 1-Min	(Turbine 1) NOx lb/hr 1-Min Avg	(Turbine 1) CO ppm 1-Min	(Turbine 1) CO ppm @ 15% O2 1 Min
4/30 18:52	2.59	1.95	0.0072	6.60	2.27	1.71
4/30 18:53	2.59	1.95	0.0072	6.61	2.31	1.74
4/30 18:54	2.62	1.97	0.0073	6.60	2.32	1.75
4/30 18:55	2.68	2.02	0.0074	6.78	2.22	1.67
4/30 18:56	2.69	2.02	0.0075	6.78	2.11	1.59
4/30 18:57	2.66	2.00	0.0074	6.78	2.06	1.55
4/30 18:58	2.63	1.98	0.0073	6.69	2.11	1.59
4/30 18:59	2.59	1.95	0.0072	6.60	2.19	1.65
4/30 19:00	2.62	1.97	0.0073	6.60	2.17	1.63
4/30 19:01	2.66	2.00	0.0074	6.78	2.12	1.60
4/30 19:02	2.64	1.99	0.0073	6.69	2.08	1.57
4/30 19:03	2.63	1.98	0.0073	6.70	2.13	1.60
4/30 19:04	2.63	1.98	0.0073	6.69	2.16	1.63
4/30 19:05	2.64	1.99	0.0073	6.69	2.15	1.62
4/30 19:06	2.66	2.00	0.0074	6.78	2.12	1.60
4/30 19:07	2.67	2.01	0.0074	6.78	2.08	1.57
4/30 19:08	2.63	1.98	0.0073	6.69	2.12	1.60
4/30 19:09	2.59	1.95	0.0072	6.60	2.08	1.57
4/30 19:10	2.60	1.96	0.0072	6.60	2.14	1.61
4/30 19:11	2.60	1.96	0.0072	6.60	2.22	1.67
4/30 19:12	2.62	1.97	0.0073	6.60	2.36	1.78
4/30 19:13	2.63	1.98	0.0073	6.69	2.37	1.79
4/30 19:14	2.64	1.99	0.0073	6.69	2.35	1.77
4/30 19:15	2.64	1.99	0.0073	6.68	2.25	1.69
4/30 19:16	2.63	1.98	0.0073	6.69	2.28	1.72
4/30 19:17	2.65	1.99	0.0073	6.69	2.25	1.69
4/30 19:18	2.67	2.01	0.0074	6.78	2.21	1.67
4/30 19:19	2.65	2.00	0.0074	6.69	2.25	1.70
4/30 19:20	2.62	1.97	0.0073	6.69	2.21	1.67
4/30 19:21	2.65	2.00	0.0074	6.69	2.15	1.62
4/30 19:22	2.65	1.99	0.0073	6.69	2.14	1.61
4/30 19:23	2.62	1.97	0.0073	6.69	2.25	1.70
4/30 19:24	2.62	1.97	0.0073	6.60	2.23	1.68
4/30 19:25	2.65	1.99	0.0073	6.69	2.23	1.68
4/30 19:26	2.66	2.00	0.0074	6.78	2.26	1.70
Average (all)	2.63	1.98	0.0073	6.69	2.20	1.66
Total (all)	--	--	--	--	--	--
Minimum (all)	2.59	1.95	0.0072	6.60	2.06	1.55
Maximum (all)	2.69	2.02	0.0075	6.78	2.37	1.79
Average (valid values only)	2.63	1.98	0.0073	6.69	2.20	1.66
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	35	35	35	35	35	35

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/30/2009 6:52 PM thru 4/30/2009 7:26 PM

Timestamp	(Turbine 1) CO lb/hr 1-Min Avg	(Turbine 1) 60-O2% 1-Min	(Turbine 1) CT Gas Flow kscf/hr 1-Min	(Turbine 1) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 1) CT Megawatts 1-Min
4/30 18:52	3.48	13.06	873.0	916.7	105.2
4/30 18:53	3.58	13.06	873.9	917.6	105.2
4/30 18:54	3.57	13.06	872.7	916.3	104.8
4/30 18:55	3.39	13.06	872.1	915.7	105.3
4/30 18:56	3.30	13.06	873.0	916.7	105.2
4/30 18:57	3.21	13.06	873.2	916.9	104.9
4/30 18:58	3.30	13.07	873.0	916.7	105.2
4/30 18:59	3.39	13.07	872.6	916.2	105.1
4/30 19:00	3.39	13.06	873.4	917.1	105.1
4/30 19:01	3.30	13.07	873.0	916.7	105.1
4/30 19:02	3.21	13.07	873.2	916.9	105.0
4/30 19:03	3.30	13.06	873.9	917.6	105.1
4/30 19:04	3.30	13.06	873.4	917.1	105.2
4/30 19:05	3.30	13.07	873.1	916.8	104.9
4/30 19:06	3.30	13.07	873.0	916.7	105.3
4/30 19:07	3.21	13.06	873.2	916.9	105.1
4/30 19:08	3.30	13.07	872.3	915.9	105.1
4/30 19:09	3.21	13.06	873.3	917.0	105.2
4/30 19:10	3.30	13.07	872.9	916.5	105.1
4/30 19:11	3.39	13.06	872.8	916.4	105.1
4/30 19:12	3.67	13.06	873.1	916.8	105.2
4/30 19:13	3.67	13.07	873.2	916.9	105.1
4/30 19:14	3.66	13.07	872.6	916.2	105.3
4/30 19:15	3.48	13.06	872.0	915.6	105.1
4/30 19:16	3.48	13.06	873.1	916.8	105.1
4/30 19:17	3.48	13.06	873.0	916.7	105.1
4/30 19:18	3.39	13.07	872.9	916.5	105.2
4/30 19:19	3.48	13.07	872.3	915.9	105.2
4/30 19:20	3.39	13.07	872.8	916.4	105.0
4/30 19:21	3.30	13.07	872.7	916.3	105.3
4/30 19:22	3.30	13.06	873.3	917.0	105.4
4/30 19:23	3.48	13.07	872.4	916.0	105.2
4/30 19:24	3.48	13.06	872.9	916.5	105.3
4/30 19:25	3.48	13.06	872.4	916.0	105.2
4/30 19:26	3.48	13.07	872.9	916.5	105.1
Average (all)	3.40	13.06	872.9	916.6	105.1
Total (all)	--	--	--	--	--
Minimum (all)	3.21	13.06	872.0	915.6	104.8
Maximum (all)	3.67	13.07	873.9	917.6	105.4
Average (valid values only)	3.40	13.06	872.9	916.6	105.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	35	35	35	35	35

Appendix C.3

Plant Process Data, Unit 2

#1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/27/2009 10:53 AM thru 4/27/2009 11:35 AM

Timestamp	(Turbine 2) 60-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/27 10:53	2.95	2.21	0.0082	7.55	0.00	0.00
4/27 10:54	2.93	2.20	0.0081	7.53	0.00	0.00
4/27 10:55	2.87	2.15	0.0079	7.36	0.00	0.00
4/27 10:56	2.91	2.18	0.0080	7.46	0.00	0.00
4/27 10:57	2.94	2.20	0.0081	7.55	0.00	0.00
4/27 10:58	2.89	2.17	0.0080	7.46	0.00	0.00
4/27 10:59	2.83	2.12	0.0078	7.27	0.01	0.01
4/27 11:00	2.82	2.11	0.0078	7.27	0.02	0.01
4/27 11:01	2.81	2.11	0.0078	7.28	0.02	0.02
4/27 11:02	2.83	2.12	0.0078	7.27	0.02	0.01
4/27 11:03	2.87	2.15	0.0079	7.37	0.02	0.01
4/27 11:04	2.89	2.16	0.0080	7.46	0.01	0.01
4/27 11:05	2.91	2.18	0.0080	7.46	0.01	0.01
4/27 11:06	2.91	2.18	0.0080	7.44	0.00	0.00
4/27 11:07	2.94	2.20	0.0081	7.54	0.00	0.00
4/27 11:08	2.93	2.20	0.0081	7.54	0.00	0.00
4/27 11:09	2.86	2.14	0.0079	7.37	0.00	0.00
4/27 11:10	2.82	2.11	0.0078	7.27	0.00	0.00
4/27 11:11	2.85	2.14	0.0079	7.36	0.00	0.00
4/27 11:12	2.85	2.13	0.0079	7.27	0.00	0.00
4/27 11:13	2.85	2.13	0.0079	7.27	0.00	0.00
4/27 11:14	2.90	2.17	0.0080	7.46	0.00	0.00
4/27 11:15	2.96	2.22	0.0082	7.65	0.00	0.00
4/27 11:16	2.98	2.23	0.0082	7.64	0.00	0.00
4/27 11:17	2.94	2.21	0.0081	7.54	0.00	0.00
4/27 11:18	2.92	2.19	0.0081	7.45	0.00	0.00
4/27 11:19	2.87	2.15	0.0079	7.37	0.00	0.00
4/27 11:20	2.83	2.12	0.0078	7.28	0.00	0.00
4/27 11:21	2.79	2.09	0.0077	7.18	0.00	0.00
4/27 11:22	2.81	2.10	0.0077	7.18	0.00	0.00
4/27 11:23	2.89	2.16	0.0080	7.46	0.00	0.00
4/27 11:24	2.91	2.18	0.0080	7.46	0.00	0.00
4/27 11:25	2.90	2.17	0.0080	7.46	0.00	0.00
4/27 11:26	2.92	2.18	0.0080	7.46	0.00	0.00
4/27 11:27	2.92	2.18	0.0080	7.47	0.00	0.00
4/27 11:28	2.92	2.19	0.0081	7.45	0.00	0.00
4/27 11:29	2.94	2.20	0.0081	7.56	0.00	0.00
4/27 11:30	2.87	2.15	0.0079	7.37	0.00	0.00
4/27 11:31	2.82	2.11	0.0078	7.28	0.00	0.00
4/27 11:32	2.83	2.12	0.0078	7.27	0.00	0.00
4/27 11:33	2.89	2.16	0.0080	7.46	0.00	0.00
4/27 11:34	2.86	2.14	0.0079	7.36	0.00	0.00
4/27 11:35	2.81	2.11	0.0078	7.17	0.00	0.00

#1

Timestamp	(Turbine 2) 60-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
Average (all)	2.88	2.16	0.0080	7.40	0.00	0.00
Total (all)	--	--	--	--	--	--
Minimum (all)	2.79	2.09	0.0077	7.17	0.00	0.00
Maximum (all)	2.98	2.23	0.0082	7.65	0.02	0.02
Average (valid values only)	2.88	2.16	0.0080	7.40	0.00	0.00
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	43	43	43	43	43	43

1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/27/2009 10:53 AM thru 4/27/2009 11:35 AM

Timestamp	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) NH3 Injection Flow - 1-Min lb/hr	(Turbine 2) CT Megawatts 1-Min
4/27 10:53	0.00	13.04	887.4	931.8	257.141	104.8
4/27 10:54	0.00	13.03	885.5	929.8	257.141	104.9
4/27 10:55	0.00	13.03	887.7	932.1	257.141	104.8
4/27 10:56	0.00	13.04	887.7	932.1	257.141	104.8
4/27 10:57	0.00	13.03	887.4	931.8	257.141	104.8
4/27 10:58	0.00	13.03	887.6	932.0	257.141	104.9
4/27 10:59	0.00	13.03	888.0	932.4	257.141	104.9
4/27 11:00	0.00	13.03	887.7	932.1	257.141	105.0
4/27 11:01	0.00	13.04	889.1	933.6	257.138	104.9
4/27 11:02	0.00	13.03	888.1	932.5	257.130	105.1
4/27 11:03	0.00	13.02	888.4	932.8	257.128	104.8
4/27 11:04	0.00	13.02	887.5	931.9	257.125	104.9
4/27 11:05	0.00	13.02	887.9	932.3	257.125	104.9
4/27 11:06	0.00	13.03	886.2	930.5	257.125	104.8
4/27 11:07	0.00	13.03	886.1	930.4	257.125	104.8
4/27 11:08	0.00	13.04	887.1	931.5	257.125	104.9
4/27 11:09	0.00	13.03	888.7	933.1	257.125	104.9
4/27 11:10	0.00	13.03	887.4	931.8	257.130	104.8
4/27 11:11	0.00	13.04	887.6	932.0	257.130	104.9
4/27 11:12	0.00	13.02	887.7	932.1	257.125	104.9
4/27 11:13	0.00	13.02	888.1	932.5	257.130	104.9
4/27 11:14	0.00	13.01	888.1	932.5	257.130	105.0
4/27 11:15	0.00	13.04	888.1	932.5	257.133	104.9
4/27 11:16	0.00	13.03	887.4	931.8	257.138	105.0
4/27 11:17	0.00	13.04	886.6	930.9	257.141	105.0
4/27 11:18	0.00	13.03	887.0	931.4	257.130	105.0
4/27 11:19	0.00	13.03	888.5	932.9	257.125	105.0
4/27 11:20	0.00	13.03	888.5	932.9	257.125	104.8
4/27 11:21	0.00	13.02	888.5	932.9	257.125	105.0
4/27 11:22	0.00	13.01	888.4	932.8	257.125	104.8
4/27 11:23	0.00	13.02	887.9	932.3	257.125	104.9
4/27 11:24	0.00	13.02	888.5	932.9	257.125	105.0
4/27 11:25	0.00	13.02	888.2	932.6	257.125	105.0
4/27 11:26	0.00	13.01	888.3	932.7	257.125	104.9
4/27 11:27	0.00	13.01	888.9	933.3	257.125	105.1
4/27 11:28	0.00	13.02	887.3	931.7	257.125	104.9
4/27 11:29	0.00	13.02	888.8	933.2	257.125	104.9
4/27 11:30	0.00	13.02	888.4	932.8	257.125	104.8
4/27 11:31	0.00	13.02	888.3	932.7	257.125	104.9
4/27 11:32	0.00	13.03	887.9	932.3	257.130	104.9
4/27 11:33	0.00	13.02	887.6	932.0	257.130	104.8
4/27 11:34	0.00	13.03	887.1	931.5	257.128	104.9
4/27 11:35	0.00	13.03	887.2	931.6	257.125	104.9

#1 #2

Timestamp	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) NH3 Injection Flow - 1-Min lb/hr	(Turbine 2) CT Megawatts 1-Min
Average (all)	0.00	13.03	887.8	932.2	257.130	104.9
Total (all)	--	--	--	--	--	--
Minimum (all)	0.00	13.01	885.5	929.8	257.125	104.8
Maximum (all)	0.00	13.04	889.1	933.6	257.141	105.1
Average (valid values only)	0.00	13.03	887.8	932.2	257.130	104.9
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	43	43	43	43	43	43

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/27/2009 11:57 AM thru 4/27/2009 12:27 PM

Timestamp	(Turbine 2) 60-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/27 11:57	2.93	2.19	0.0081	7.47	0.00	0.00
4/27 11:58	2.87	2.14	0.0079	7.38	0.00	0.00
4/27 11:59	2.88	2.15	0.0079	7.38	0.00	0.00
4/27 12:00	2.90	2.16	0.0080	7.48	0.00	0.00
4/27 12:01	2.87	2.14	0.0079	7.38	0.00	0.00
4/27 12:02	2.89	2.16	0.0080	7.38	0.00	0.00
4/27 12:03	2.85	2.13	0.0078	7.28	0.00	0.00
4/27 12:04	2.82	2.11	0.0078	7.20	0.00	0.00
4/27 12:05	2.85	2.13	0.0078	7.29	0.00	0.00
4/27 12:06	2.86	2.14	0.0079	7.39	0.00	0.00
4/27 12:07	2.88	2.15	0.0079	7.38	0.01	0.01
4/27 12:08	2.88	2.15	0.0079	7.37	0.00	0.00
4/27 12:09	2.84	2.12	0.0078	7.28	0.01	0.01
4/27 12:10	2.86	2.14	0.0079	7.38	0.02	0.01
4/27 12:11	2.84	2.12	0.0078	7.29	0.01	0.01
4/27 12:12	2.82	2.11	0.0078	7.19	0.01	0.01
4/27 12:13	2.82	2.11	0.0078	7.19	0.01	0.01
4/27 12:14	2.80	2.09	0.0077	7.19	0.02	0.01
4/27 12:15	2.80	2.09	0.0077	7.19	0.01	0.01
4/27 12:16	2.82	2.10	0.0077	7.20	0.00	0.00
4/27 12:17	2.85	2.13	0.0078	7.29	0.00	0.00
4/27 12:18	2.86	2.14	0.0079	7.38	0.00	0.00
4/27 12:19	2.84	2.12	0.0078	7.27	0.00	0.00
4/27 12:20	2.83	2.11	0.0078	7.28	0.00	0.00
4/27 12:21	2.86	2.14	0.0079	7.38	0.00	0.00
4/27 12:22	2.87	2.14	0.0079	7.37	0.00	0.00
4/27 12:23	2.83	2.11	0.0078	7.29	0.00	0.00
4/27 12:24	2.81	2.10	0.0077	7.18	0.00	0.00
4/27 12:25	2.81	2.10	0.0078	7.19	0.00	0.00
4/27 12:26	2.93	2.19	0.0081	7.55	0.00	0.00
4/27 12:27	3.13	2.34	0.0086	8.01	0.00	0.00
Average (all)	2.86	2.14	0.0079	7.34	0.00	0.00
Total (all)	--	--	--	--	--	--
Minimum (all)	2.80	2.09	0.0077	7.18	0.00	0.00
Maximum (all)	3.13	2.34	0.0086	8.01	0.02	0.01
Average (valid values only)	2.86	2.14	0.0079	7.34	0.00	0.00
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/27/2009 11:57 AM thru 4/27/2009 12:27 PM

Timestamp	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) NH3 Injection Flow - 1-Min lb/hr	(Turbine 2) CT Megawatts 1-Min
4/27 11:57	0.00	12.99	889.4	933.9	257.128	105.0
4/27 11:58	0.00	13.00	890.0	934.5	257.125	105.0
4/27 11:59	0.00	13.00	890.2	934.7	257.125	105.0
4/27 12:00	0.00	12.99	890.5	935.0	257.125	105.0
4/27 12:01	0.00	13.00	889.6	934.1	257.125	105.0
4/27 12:02	0.00	13.00	889.2	933.7	257.125	104.9
4/27 12:03	0.00	13.00	888.7	933.1	257.125	105.0
4/27 12:04	0.00	13.00	890.1	934.6	257.125	105.0
4/27 12:05	0.00	13.00	890.5	935.0	257.125	105.1
4/27 12:06	0.00	13.00	890.6	935.1	257.125	105.2
4/27 12:07	0.00	13.01	889.4	933.9	257.125	105.0
4/27 12:08	0.00	13.00	888.3	932.7	257.125	104.9
4/27 12:09	0.00	13.00	889.0	933.5	257.125	105.1
4/27 12:10	0.00	13.00	890.0	934.5	257.125	105.0
4/27 12:11	0.00	12.99	890.2	934.7	257.125	105.0
4/27 12:12	0.00	13.00	889.3	933.8	257.125	105.0
4/27 12:13	0.00	13.00	889.1	933.6	257.125	105.0
4/27 12:14	0.00	13.00	889.1	933.6	257.125	105.0
4/27 12:15	0.00	12.99	889.2	933.7	257.125	105.1
4/27 12:16	0.00	12.99	890.3	934.8	257.125	105.0
4/27 12:17	0.00	13.00	889.5	934.0	257.125	105.0
4/27 12:18	0.00	13.00	890.2	934.7	257.125	104.9
4/27 12:19	0.00	13.00	888.0	932.4	257.125	105.0
4/27 12:20	0.00	12.99	889.0	933.5	257.125	104.9
4/27 12:21	0.00	13.00	890.2	934.7	257.125	105.0
4/27 12:22	0.00	12.99	889.0	933.5	257.125	105.0
4/27 12:23	0.00	13.00	890.4	934.9	257.125	105.0
4/27 12:24	0.00	13.00	888.5	932.9	257.125	104.9
4/27 12:25	0.00	13.02	889.4	933.9	257.125	105.0
4/27 12:26	0.00	13.02	887.5	931.9	257.125	104.9
4/27 12:27	0.00	13.01	887.5	931.9	257.125	104.9
Average (all)	0.00	13.00	889.4	933.9	257.125	105.0
Total (all)	--	--	--	--	--	--
Minimum (all)	0.00	12.99	887.5	931.9	257.125	104.9
Maximum (all)	0.00	13.02	890.6	935.1	257.128	105.2
Average (valid values only)	0.00	13.00	889.4	933.9	257.125	105.0
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/27/2009 12:36 PM thru 4/27/2009 1:06 PM

Timestamp	(Turbine 2) 60-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/27 12:36	3.15	2.36	0.0087	8.13	0.00	0.00
4/27 12:37	3.18	2.38	0.0088	8.11	0.00	0.00
4/27 12:38	3.17	2.37	0.0087	8.12	0.00	0.00
4/27 12:39	3.15	2.36	0.0087	8.11	0.00	0.00
4/27 12:40	3.15	2.36	0.0087	8.12	0.00	0.00
4/27 12:41	3.10	2.32	0.0085	7.94	0.00	0.00
4/27 12:42	3.09	2.31	0.0085	7.93	0.00	0.00
4/27 12:43	3.11	2.33	0.0086	7.92	0.00	0.00
4/27 12:44	3.05	2.28	0.0084	7.83	0.00	0.00
4/27 12:45	3.05	2.28	0.0084	7.83	0.00	0.00
4/27 12:46	3.07	2.30	0.0085	7.83	0.00	0.00
4/27 12:47	3.10	2.32	0.0085	7.92	0.00	0.00
4/27 12:48	3.12	2.33	0.0086	8.01	0.00	0.00
4/27 12:49	3.08	2.30	0.0085	7.92	0.00	0.00
4/27 12:50	3.07	2.29	0.0084	7.83	0.00	0.00
4/27 12:51	3.11	2.33	0.0086	7.93	0.00	0.00
4/27 12:52	3.13	2.34	0.0086	8.03	0.00	0.00
4/27 12:53	3.13	2.34	0.0086	8.02	0.00	0.00
4/27 12:54	3.10	2.32	0.0085	7.93	0.00	0.00
4/27 12:55	3.06	2.29	0.0084	7.84	0.00	0.00
4/27 12:56	3.06	2.29	0.0084	7.83	0.00	0.00
4/27 12:57	3.15	2.36	0.0087	8.13	0.00	0.00
4/27 12:58	3.16	2.36	0.0087	8.12	0.00	0.00
4/27 12:59	3.15	2.36	0.0087	8.12	0.00	0.00
4/27 13:00	3.14	2.35	0.0087	8.02	0.00	0.00
4/27 13:01	3.14	2.35	0.0087	8.01	0.00	0.00
4/27 13:02	3.10	2.32	0.0085	7.90	0.00	0.00
4/27 13:03	3.09	2.31	0.0085	7.90	0.00	0.00
4/27 13:04	3.13	2.34	0.0086	8.00	0.00	0.00
4/27 13:05	3.13	2.34	0.0086	8.01	0.00	0.00
4/27 13:06	3.12	2.33	0.0086	8.02	0.00	0.00
Average (all)	3.11	2.33	0.0086	7.98	0.00	0.00
Total (all)	--	--	--	--	--	--
Minimum (all)	3.05	2.28	0.0084	7.83	0.00	0.00
Maximum (all)	3.18	2.38	0.0088	8.13	0.00	0.00
Average (valid values only)	3.11	2.33	0.0086	7.98	0.00	0.00
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/27/2009 12:36 PM thru 4/27/2009 1:06 PM

Timestamp	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) NH3 Injection Flow - 1-Min lb/hr	(Turbine 2) CT Megawatts 1-Min
4/27 12:36	0.00	13.01	889.5	934.0	257.125	105.0
4/27 12:37	0.00	13.01	887.6	932.0	257.125	104.9
4/27 12:38	0.00	13.02	888.7	933.1	257.125	105.0
4/27 12:39	0.00	13.02	888.0	932.4	257.125	105.0
4/27 12:40	0.00	13.02	888.9	933.3	257.125	104.8
4/27 12:41	0.00	13.01	889.3	933.8	257.125	105.0
4/27 12:42	0.00	13.01	888.5	932.9	257.125	104.9
4/27 12:43	0.00	13.01	887.7	932.1	257.125	104.9
4/27 12:44	0.00	13.01	888.3	932.7	257.125	104.9
4/27 12:45	0.00	13.01	887.9	932.3	257.125	104.8
4/27 12:46	0.00	13.01	888.1	932.5	257.125	104.6
4/27 12:47	0.00	13.01	887.7	932.1	257.125	104.7
4/27 12:48	0.00	13.01	887.4	931.8	257.125	104.8
4/27 12:49	0.00	13.01	887.7	932.1	257.125	104.8
4/27 12:50	0.00	13.00	888.0	932.4	257.125	104.9
4/27 12:51	0.00	13.01	888.8	933.2	257.125	104.9
4/27 12:52	0.00	13.01	889.0	933.5	257.125	104.9
4/27 12:53	0.00	13.01	888.7	933.1	257.125	104.9
4/27 12:54	0.00	13.01	888.0	932.4	257.125	104.8
4/27 12:55	0.00	13.01	888.8	933.2	257.125	104.8
4/27 12:56	0.00	13.01	887.8	932.2	257.125	104.9
4/27 12:57	0.00	13.01	889.6	934.1	257.125	104.9
4/27 12:58	0.00	13.01	889.0	933.5	257.125	105.0
4/27 12:59	0.00	13.01	889.1	933.6	257.125	104.9
4/27 13:00	0.00	13.01	888.3	932.7	257.125	104.9
4/27 13:01	0.00	13.01	887.0	931.4	257.125	104.7
4/27 13:02	0.00	13.01	885.5	929.8	257.125	104.5
4/27 13:03	0.00	13.01	885.1	929.4	257.125	104.6
4/27 13:04	0.00	13.01	886.3	930.6	257.125	104.5
4/27 13:05	0.00	13.01	887.4	931.8	257.125	104.7
4/27 13:06	0.00	13.01	888.5	932.9	257.125	104.8
Average (all)	0.00	13.01	888.1	932.5	257.125	104.8
Total (all)	–	–	–	–	–	–
Minimum (all)	0.00	13.00	885.1	929.4	257.125	104.5
Maximum (all)	0.00	13.02	889.6	934.1	257.125	105.0
Average (valid values only)	0.00	13.01	888.1	932.5	257.125	104.8
Total (valid values only)	–	–	–	–	–	–
Count (valid values only)	31	31	31	31	31	31

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/28/2009 1:08 PM thru 4/28/2009 5:08 PM

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/28 13:08	8	14753.9	104.9	816.4	0.1
4/28 13:09	8	14743.8	104.9	816.4	0.1
4/28 13:10	8	14745.9	104.9	816.5	0.1
4/28 13:11	8	14744.8	104.9	816.5	0.1
4/28 13:12	8	14743.2	104.9	816.5	0.1
4/28 13:13	8	14725.3	104.9	816.5	0.1
4/28 13:14	8	14757.1	105.0	816.4	0.1
4/28 13:15	8	14755.5	105.0	816.4	0.1
4/28 13:16	8	14746.1	104.9	816.4	0.1
4/28 13:17	8	14761.2	104.9	816.4	0.1
4/28 13:18	8	14747.4	105.0	816.4	0.1
4/28 13:19	8	14750.0	104.9	816.5	0.1
4/28 13:20	8	14733.3	104.7	816.5	0.1
4/28 13:21	8	14743.5	105.0	816.5	0.1
4/28 13:22	8	14748.5	104.9	816.5	0.1
4/28 13:23	8	14761.7	105.1	816.5	0.1
4/28 13:24	8	14760.2	104.9	816.5	0.1
4/28 13:25	8	14746.4	104.8	816.5	0.1
4/28 13:26	8	14749.7	104.9	816.5	0.1
4/28 13:27	8	14751.6	104.8	816.5	0.1
4/28 13:28	8	14734.9	104.9	816.5	0.1
4/28 13:29	8	14759.9	105.0	816.5	0.1
4/28 13:30	8	14773.4	105.0	816.5	0.1
4/28 13:31	8	14764.3	105.0	816.5	0.1
4/28 13:32	8	14730.7	104.9	816.5	0.1
4/28 13:33	8	14755.2	104.9	816.5	0.1
4/28 13:34	8	14749.7	105.0	816.6	0.1
4/28 13:35	8	14759.9	105.0	816.7	0.1
4/28 13:36	8	14765.4	105.0	816.6	0.1
4/28 13:37	8	14763.8	105.0	816.5	0.1
4/28 13:38	8	14763.0	104.9	816.6	0.1
4/28 13:39	8	14761.5	104.9	816.7	0.1
4/28 13:40	8	14754.9	104.9	816.7	0.1
4/28 13:41	8	14737.8	105.0	816.7	0.1
4/28 13:42	8	14775.3	105.1	816.7	0.1
4/28 13:43	8	14757.3	105.0	816.5	0.1
4/28 13:44	8	14765.9	104.9	816.6	0.1
4/28 13:45	8	14757.8	104.9	816.7	0.1
4/28 13:46	8	14756.8	105.0	816.7	0.1
4/28 13:47	8	14768.0	105.0	816.7	0.1
4/28 13:48	8	14772.4	105.0	816.7	0.1
4/28 13:49	8	14784.9	104.9	816.8	0.1
4/28 13:50	8	14766.4	104.9	816.8	0.1
4/28 13:51	8	14751.8	104.8	816.8	0.1
4/28 13:52	8	14754.4	104.9	816.8	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/28 13:53	8	14775.6	105.1	816.8	0.1
4/28 13:54	8	14768.0	104.9	816.8	0.1
4/28 13:55	8	14771.1	104.8	816.7	0.1
4/28 13:56	8	14778.9	105.0	816.7	0.1
4/28 13:57	8	14754.4	104.8	816.7	0.1
4/28 13:58	8	14752.6	104.9	816.7	0.1
4/28 13:59	8	14767.5	104.8	816.7	0.1
4/28 14:00	8	14766.7	104.9	816.8	0.1
4/28 14:01	8	14745.6	104.8	816.8	0.1
4/28 14:02	8	14739.9	104.7	816.7	0.1
4/28 14:03	8	14751.6	104.8	816.7	0.1
4/28 14:04	8	14771.9	104.9	816.8	0.1
4/28 14:05	8	14766.9	104.9	816.9	0.1
4/28 14:06	8	14767.2	104.7	816.9	0.1
4/28 14:07	8	14775.5	104.8	816.8	0.1
4/28 14:08	8	14769.5	104.9	816.8	0.1
4/28 14:09	8	14766.4	105.0	816.8	0.1
4/28 14:10	8	14760.9	104.8	816.8	0.1
4/28 14:11	8	14793.0	104.9	817.0	0.1
4/28 14:12	8	14744.0	104.8	816.9	0.1
4/28 14:13	8	14749.2	104.8	816.8	0.1
4/28 14:14	8	14802.9	104.9	816.8	0.1
4/28 14:15	8	14774.5	105.0	816.8	0.1
4/28 14:16	8	14749.8	104.9	817.0	0.1
4/28 14:17	8	14764.9	104.8	816.8	0.1
4/28 14:18	8	14783.4	104.9	816.8	0.1
4/28 14:19	8	14749.5	104.9	816.7	0.1
4/28 14:20	8	14741.7	104.9	816.7	0.1
4/28 14:21	8	14755.5	104.8	816.7	0.1
4/28 14:22	8	14776.8	105.0	816.8	0.1
4/28 14:23	8	14776.3	104.9	816.8	0.1
4/28 14:24	8	14775.0	104.9	816.8	0.1
4/28 14:25	8	14773.2	105.0	816.9	0.1
4/28 14:26	8	14763.0	104.8	816.8	0.1
4/28 14:27	8	14759.9	104.8	816.8	0.1
4/28 14:28	8	14763.0	104.9	816.7	0.1
4/28 14:29	8	14762.8	104.8	816.8	0.1
4/28 14:30	8	14776.1	104.8	816.8	0.1
4/28 14:31	8	14796.1	105.0	816.8	0.1
4/28 14:32	8	14786.5	104.9	816.9	0.1
4/28 14:33	8	14781.5	104.8	816.9	0.1
4/28 14:34	8	14786.0	105.0	816.9	0.1
4/28 14:35	8	14812.3	105.0	817.0	0.1
4/28 14:36	8	14793.0	104.9	817.0	0.1
4/28 14:37	8	14765.6	105.0	817.1	0.1
4/28 14:38	8	14746.4	104.9	817.0	0.1
4/28 14:39	8	14795.1	104.9	817.0	0.1
4/28 14:40	8	14801.3	105.0	817.0	0.1
4/28 14:41	8	14776.8	104.9	817.0	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/28 14:42	8	14766.7	104.9	817.0	0.1
4/28 14:43	8	14768.8	104.8	816.8	0.1
4/28 14:44	8	14794.5	105.0	816.9	0.1
4/28 14:45	8	14809.4	105.1	817.0	0.1
4/28 14:46	8	14808.3	105.0	817.0	0.1
4/28 14:47	8	14785.2	105.0	817.1	0.1
4/28 14:48	8	14814.1	105.0	817.1	0.1
4/28 14:49	8	14780.2	104.9	817.1	0.1
4/28 14:50	8	14798.5	105.0	817.1	0.1
4/28 14:51	8	14803.7	105.0	817.1	0.1
4/28 14:52	8	14801.6	105.1	817.1	0.1
4/28 14:53	8	14804.7	104.9	817.1	0.1
4/28 14:54	8	14784.9	105.0	817.0	0.1
4/28 14:55	8	14787.8	104.9	817.1	0.1
4/28 14:56	8	14806.8	105.1	817.1	0.1
4/28 14:57	8	14790.9	105.0	817.1	0.1
4/28 14:58	8	14790.1	105.0	817.1	0.1
4/28 14:59	8	14789.3	104.9	817.1	0.1
4/28 15:00	8	14801.8	105.0	817.2	0.1
4/28 15:01	8	14790.6	105.0	817.2	0.1
4/28 15:02	8	14802.6	104.9	817.2	0.1
4/28 15:03	8	14804.4	105.1	817.1	0.1
4/28 15:04	8	14766.9	104.9	817.0	0.1
4/28 15:05	8	14763.0	104.8	817.0	0.1
4/28 15:06	8	14780.7	105.0	817.0	0.1
4/28 15:07	8	14787.5	105.0	817.0	0.1
4/28 15:08	8	-- <18>	-- <18>	--	-- <18>
4/28 15:09	8	14787.5	105.0	817.0	0.1
4/28 15:10	8	14815.9	105.1	817.0	0.1
4/28 15:11	8	14800.3	105.0	817.0	0.1
4/28 15:12	8	14814.6	104.9	817.1	0.1
4/28 15:13	8	14806.0	105.1	817.1	0.1
4/28 15:14	8	14799.0	105.0	817.1	0.1
4/28 15:15	8	14770.6	104.8	817.0	0.1
4/28 15:16	8	14776.3	104.8	817.0	0.1
4/28 15:17	8	14756.0	104.8	816.8	0.1
4/28 15:18	8	14781.0	105.1	816.8	0.1
4/28 15:19	8	14803.4	105.0	816.8	0.1
4/28 15:20	8	14770.6	104.9	816.8	0.1
4/28 15:21	8	14805.7	104.9	816.8	0.1
4/28 15:22	8	14806.5	105.0	817.0	0.1
4/28 15:23	8	14805.5	105.0	817.0	0.1
4/28 15:24	8	14809.1	105.0	817.0	0.1
4/28 15:25	8	14789.9	105.0	817.0	0.1
4/28 15:26	8	14799.0	105.0	817.0	0.1
4/28 15:27	8	14772.2	104.9	817.0	0.1
4/28 15:28	8	14809.4	105.0	817.1	0.1
4/28 15:29	8	14797.1	104.9	817.1	0.1
4/28 15:30	8	14801.8	105.0	817.1	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/28 15:31	8	14809.9	105.0	817.1	0.1
4/28 15:32	8	14796.1	104.9	817.1	0.1
4/28 15:33	8	14803.4	105.0	817.1	0.1
4/28 15:34	8	14799.2	104.8	817.1	0.1
4/28 15:35	8	14794.0	104.8	817.1	0.1
4/28 15:36	8	14819.5	104.9	817.2	0.1
4/28 15:37	8	14801.3	105.0	817.2	0.1
4/28 15:38	8	14801.0	105.0	817.3	0.1
4/28 15:39	8	14787.5	104.9	817.2	0.1
4/28 15:40	8	14788.6	104.8	817.3	0.1
4/28 15:41	8	14791.2	104.8	817.3	0.1
4/28 15:42	8	14802.9	104.9	817.3	0.1
4/28 15:43	8	14798.4	104.9	817.3	0.1
4/28 15:44	8	14807.3	104.9	817.3	0.1
4/28 15:45	8	14801.3	104.9	817.3	0.1
4/28 15:46	8	14809.1	105.0	817.3	0.1
4/28 15:47	8	14814.1	104.9	817.3	0.1
4/28 15:48	8	14808.3	104.8	817.3	0.1
4/28 15:49	8	14808.6	105.0	817.3	0.1
4/28 15:50	8	14801.3	105.0	817.3	0.1
4/28 15:51	8	14796.4	104.9	817.3	0.1
4/28 15:52	8	14795.8	105.0	817.3	0.1
4/28 15:53	8	14774.5	105.0	817.2	0.1
4/28 15:54	8	14804.7	104.9	817.1	0.1
4/28 15:55	8	14815.9	105.1	817.1	0.1
4/28 15:56	8	14797.2	104.9	817.1	0.1
4/28 15:57	8	14796.1	104.9	817.2	0.1
4/28 15:58	8	14808.9	104.8	817.3	0.1
4/28 15:59	8	14806.8	104.9	817.3	0.1
4/28 16:00	8	14813.8	105.0	817.3	0.1
4/28 16:01	8	14811.5	105.1	817.3	0.1
4/28 16:02	8	14810.7	104.9	817.1	0.1
4/28 16:03	8	14796.6	105.0	817.1	0.1
4/28 16:04	8	14806.5	105.0	817.1	0.1
4/28 16:05	8	14808.1	105.0	817.1	0.1
4/28 16:06	8	14830.7	105.1	817.1	0.1
4/28 16:07	8	14790.4	104.8	817.1	0.1
4/28 16:08	8	14787.8	104.8	817.1	0.1
4/28 16:09	8	14808.6	104.9	817.3	0.1
4/28 16:10	8	14804.2	104.8	817.2	0.1
4/28 16:11	8	14789.9	104.8	817.3	0.1
4/28 16:12	8	14790.6	104.7	817.3	0.1
4/28 16:13	8	14779.7	104.8	817.3	0.1
4/28 16:14	8	14810.4	105.0	817.3	0.1
4/28 16:15	8	14795.6	104.9	817.3	0.1
4/28 16:16	8	14844.3	105.1	817.1	0.1
4/28 16:17	8	14801.6	105.0	817.1	0.1
4/28 16:18	8	14809.9	105.0	817.1	0.1
4/28 16:19	8	14819.5	105.1	817.1	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/28 16:20	8	14804.2	104.8	817.1	0.1
4/28 16:21	8	14816.7	105.0	817.1	0.1
4/28 16:22	8	14808.3	104.9	817.2	0.1
4/28 16:23	8	14811.2	105.0	817.1	0.1
4/28 16:24	8	14810.4	104.9	817.1	0.1
4/28 16:25	8	14804.2	104.9	817.1	0.1
4/28 16:26	8	14784.1	104.8	817.1	0.1
4/28 16:27	8	14784.1	104.8	817.2	0.1
4/28 16:28	8	14811.7	104.9	817.3	0.1
4/28 16:29	8	14802.1	104.9	817.3	0.1
4/28 16:30	8	14812.0	104.8	817.3	0.1
4/28 16:31	8	14816.4	104.9	817.3	0.1
4/28 16:32	8	14800.0	104.9	817.3	0.1
4/28 16:33	8	14811.2	104.9	817.3	0.1
4/28 16:34	8	14795.6	104.9	817.3	0.1
4/28 16:35	8	14807.3	104.8	817.3	0.1
4/28 16:36	8	14782.8	104.8	817.3	0.1
4/28 16:37	8	14791.7	104.7	817.4	0.1
4/28 16:38	8	14801.3	104.7	817.4	0.1
4/28 16:39	8	14813.1	104.8	817.4	0.1
4/28 16:40	8	14824.0	105.0	817.3	0.1
4/28 16:41	8	14819.0	105.0	817.3	0.1
4/28 16:42	8	14791.4	104.9	817.4	0.1
4/28 16:43	8	14800.8	104.9	817.4	0.1
4/28 16:44	8	14800.5	104.7	817.4	0.1
4/28 16:45	8	14786.5	104.7	817.4	0.1
4/28 16:46	8	14797.9	104.8	817.4	0.1
4/28 16:47	8	14789.6	104.7	817.4	0.1
4/28 16:48	8	14789.3	104.8	817.4	0.1
4/28 16:49	8	14797.2	104.9	817.4	0.1
4/28 16:50	8	14806.2	104.9	817.4	0.1
4/28 16:51	8	14797.7	104.9	817.3	0.1
4/28 16:52	8	14786.2	104.9	817.3	0.1
4/28 16:53	8	14783.6	104.8	817.3	0.1
4/28 16:54	8	14805.8	105.0	817.3	0.1
4/28 16:55	8	14801.0	105.0	817.4	0.1
4/28 16:56	8	14816.9	104.9	817.3	0.1
4/28 16:57	8	14814.1	104.9	817.3	0.1
4/28 16:58	8	14779.2	104.8	817.3	0.1
4/28 16:59	8	14783.6	104.8	817.3	0.1
4/28 17:00	8	14782.6	104.7	817.4	0.1
4/28 17:01	8	14796.9	104.7	817.4	0.1
4/28 17:02	8	14811.7	105.0	817.4	0.1
4/28 17:03	8	14838.6	105.0	817.4	0.1
4/28 17:04	8	14823.7	104.9	817.4	0.1
4/28 17:05	8	14811.0	104.9	817.4	0.1
4/28 17:06	8	14805.5	104.8	817.3	0.1
4/28 17:07	8	14786.7	104.8	817.4	0.1
4/28 17:08	8	14796.9	104.9	817.4	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
Average (all)	--	14784.9	104.9	817.0	0.1
Total (all)	--	--	--	--	--
Minimum (all)	--	14725.3	104.7	816.4	0.1
Maximum (all)	--	14844.3	105.1	817.4	0.1
Average (valid values only)	--	14784.9	104.9	817.0	0.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	--	240	240	240	240

<18> = Data Handling System Malfunction

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 9:14 AM thru 4/29/2009 1:14 PM

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 9:14	8	14743.0	104.8	815.2	0.1
4/29 9:15	8	14752.9	104.9	815.2	0.1
4/29 9:16	8	14750.5	104.9	815.2	0.1
4/29 9:17	8	14749.5	104.9	815.2	0.1
4/29 9:18	8	14731.8	105.0	815.2	0.1
4/29 9:19	8	14742.2	104.9	815.3	0.1
4/29 9:20	8	14751.0	104.8	815.4	0.1
4/29 9:21	8	14747.2	105.0	815.4	0.1
4/29 9:22	8	14731.0	105.0	815.4	0.1
4/29 9:23	8	14705.0	104.8	815.4	0.1
4/29 9:24	8	14718.0	104.8	815.4	0.1
4/29 9:25	8	14751.1	104.8	815.4	0.1
4/29 9:26	8	14769.8	104.9	815.4	0.1
4/29 9:27	8	14752.6	105.0	815.4	0.1
4/29 9:28	8	14739.9	104.7	815.4	0.1
4/29 9:29	8	14735.4	104.9	815.4	0.1
4/29 9:30	8	14744.8	104.9	815.4	0.1
4/29 9:31	8	14750.0	104.9	815.4	0.1
4/29 9:32	8	14752.9	104.8	815.4	0.1
4/29 9:33	8	14745.1	104.9	815.4	0.1
4/29 9:34	8	14762.0	104.8	815.4	0.1
4/29 9:35	8	14752.6	104.9	815.4	0.1
4/29 9:36	8	14746.4	104.8	815.4	0.1
4/29 9:37	8	14758.1	104.9	815.5	0.1
4/29 9:38	8	14759.7	105.0	815.5	0.1
4/29 9:39	8	14770.6	104.9	815.7	0.1
4/29 9:40	8	14750.5	104.9	815.7	0.1
4/29 9:41	8	14752.6	104.9	815.7	0.1
4/29 9:42	8	14741.2	104.9	815.7	0.1
4/29 9:43	8	14737.3	104.9	815.7	0.1
4/29 9:44	8	14722.7	105.0	815.6	0.1
4/29 9:45	8	14778.4	105.0	815.7	0.1
4/29 9:46	8	14763.6	104.9	815.7	0.1
4/29 9:47	8	14761.2	104.8	815.7	0.1
4/29 9:48	8	14770.8	105.0	815.7	0.1
4/29 9:49	8	14760.9	104.9	815.7	0.1
4/29 9:50	8	14760.9	105.1	815.7	0.1
4/29 9:51	8	14777.3	105.0	815.7	0.1
4/29 9:52	8	14782.8	104.9	815.7	0.1
4/29 9:53	8	14787.2	104.8	815.7	0.1
4/29 9:54	8	14763.3	105.0	815.7	0.1
4/29 9:55	8	14766.7	104.9	815.7	0.1
4/29 9:56	8	14756.5	105.0	815.7	0.1
4/29 9:57	8	14764.8	105.1	815.7	0.1
4/29 9:58	8	14782.3	104.9	815.7	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 9:59	8	14753.7	104.9	815.7	0.1
4/29 10:00	8	14780.0	104.9	815.7	0.1
4/29 10:01	8	14756.5	104.8	815.7	0.1
4/29 10:02	8	14785.4	104.9	815.8	0.1
4/29 10:03	8	14805.2	104.7	815.8	0.1
4/29 10:04	8	14765.4	104.8	815.8	0.1
4/29 10:05	8	14770.3	105.0	815.8	0.1
4/29 10:06	8	14739.6	104.9	815.8	0.1
4/29 10:07	8	14779.4	104.8	815.8	0.1
4/29 10:08	8	14781.3	104.8	815.8	0.1
4/29 10:09	8	14774.0	105.0	815.8	0.1
4/29 10:10	8	14767.7	105.0	815.8	0.1
4/29 10:11	8	14763.3	104.9	815.8	0.1
4/29 10:12	8	14775.5	104.9	815.8	0.1
4/29 10:13	8	14767.5	104.8	815.8	0.1
4/29 10:14	8	14759.4	104.8	815.8	0.1
4/29 10:15	8	14772.9	104.9	815.8	0.1
4/29 10:16	8	14755.7	104.9	815.8	0.1
4/29 10:17	8	14775.3	104.9	815.8	0.1
4/29 10:18	8	14773.7	104.9	815.9	0.1
4/29 10:19	8	14776.3	104.8	815.9	0.1
4/29 10:20	8	14763.0	104.8	815.9	0.1
4/29 10:21	8	14757.8	104.8	815.8	0.1
4/29 10:22	8	14760.2	104.9	815.8	0.1
4/29 10:23	8	14776.3	104.9	815.9	0.1
4/29 10:24	8	14778.4	104.9	815.9	0.1
4/29 10:25	8	14781.8	104.9	815.9	0.1
4/29 10:26	8	14774.5	104.8	816.1	0.1
4/29 10:27	8	14783.1	104.9	816.0	0.1
4/29 10:28	8	14776.0	104.8	815.9	0.1
4/29 10:29	8	14794.5	104.7	815.9	0.1
4/29 10:30	8	14745.1	104.8	815.9	0.1
4/29 10:31	8	14772.1	104.8	815.9	0.1
4/29 10:32	8	14782.3	104.8	816.0	0.1
4/29 10:33	8	14778.4	104.7	816.1	0.1
4/29 10:34	8	14786.2	104.8	816.1	0.1
4/29 10:35	8	14792.2	105.0	816.1	0.1
4/29 10:36	8	14792.4	105.1	816.2	0.1
4/29 10:37	8	14821.9	105.0	816.2	0.1
4/29 10:38	8	14808.6	104.8	816.3	0.1
4/29 10:39	8	14802.1	104.9	816.4	0.1
4/29 10:40	8	14780.5	104.9	816.3	0.1
4/29 10:41	8	14788.6	105.0	816.2	0.1
4/29 10:42	8	14794.8	104.9	816.2	0.1
4/29 10:43	8	14797.7	104.8	816.1	0.1
4/29 10:44	8	14790.4	104.9	816.2	0.1
4/29 10:45	8	14791.7	105.0	816.3	0.1
4/29 10:46	8	14793.0	105.0	816.4	0.1
4/29 10:47	8	14813.8	105.0	816.4	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 10:48	8	14806.3	104.8	816.4	0.1
4/29 10:49	8	14806.2	105.0	816.6	0.1
4/29 10:50	8	14774.5	105.0	816.5	0.1
4/29 10:51	8	14783.1	105.0	816.4	0.1
4/29 10:52	8	14818.8	104.9	816.4	0.1
4/29 10:53	8	14803.9	104.8	816.4	0.1
4/29 10:54	8	14793.0	104.8	816.4	0.1
4/29 10:55	8	14790.4	105.0	816.4	0.1
4/29 10:56	8	14809.9	105.0	816.4	0.1
4/29 10:57	8	14807.6	104.8	816.4	0.1
4/29 10:58	8	14791.9	104.9	816.4	0.1
4/29 10:59	8	14797.7	104.8	816.4	0.1
4/29 11:00	8	14804.7	104.9	816.4	0.1
4/29 11:01	8	14797.7	105.0	816.4	0.1
4/29 11:02	8	14812.0	104.9	816.4	0.1
4/29 11:03	8	14797.9	104.9	816.4	0.1
4/29 11:04	8	14830.0	104.9	816.5	0.1
4/29 11:05	8	14794.8	105.0	816.5	0.1
4/29 11:06	8	14785.7	104.9	816.4	0.1
4/29 11:07	8	14815.6	105.0	816.4	0.1
4/29 11:08	8	14793.8	104.8	816.4	0.1
4/29 11:09	8	14821.1	104.7	816.5	0.1
4/29 11:10	8	14820.6	105.0	816.5	0.1
4/29 11:11	8	14783.3	104.9	816.5	0.1
4/29 11:12	8	14818.8	105.0	816.5	0.1
4/29 11:13	8	14809.9	104.9	816.5	0.1
4/29 11:14	8	14811.0	105.0	816.4	0.1
4/29 11:15	8	14813.8	104.9	816.4	0.1
4/29 11:16	8	14791.7	105.0	816.4	0.1
4/29 11:17	8	14813.8	104.9	816.4	0.1
4/29 11:18	8	14808.9	105.0	816.5	0.1
4/29 11:19	8	14819.8	104.8	816.5	0.1
4/29 11:20	8	14804.2	104.8	816.5	0.1
4/29 11:21	8	14808.4	104.9	816.5	0.1
4/29 11:22	8	14817.7	104.9	816.5	0.1
4/29 11:23	8	14808.3	104.9	816.5	0.1
4/29 11:24	8	14814.6	105.0	816.6	0.1
4/29 11:25	8	14820.1	104.9	816.7	0.1
4/29 11:26	8	14813.0	105.0	816.7	0.1
4/29 11:27	8	14816.7	104.8	816.7	0.1
4/29 11:28	8	14826.0	104.9	816.6	0.1
4/29 11:29	8	14806.5	104.9	816.7	0.1
4/29 11:30	8	14801.3	105.0	816.7	0.1
4/29 11:31	8	14817.7	105.0	816.7	0.1
4/29 11:32	8	14817.7	104.9	816.7	0.1
4/29 11:33	8	14827.1	104.9	816.7	0.1
4/29 11:34	8	14830.2	104.8	816.7	0.1
4/29 11:35	8	14812.0	104.9	816.7	0.1
4/29 11:36	8	14811.5	104.9	816.7	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 11:37	8	14811.0	104.9	816.7	0.1
4/29 11:38	8	14812.5	105.0	816.7	0.1
4/29 11:39	8	14814.1	104.9	816.7	0.1
4/29 11:40	8	14830.5	104.9	816.7	0.1
4/29 11:41	8	14824.5	104.9	816.7	0.1
4/29 11:42	8	14814.9	104.9	816.7	0.1
4/29 11:43	8	14819.0	104.9	816.7	0.1
4/29 11:44	8	14811.2	104.9	816.7	0.1
4/29 11:45	8	14807.6	104.8	816.8	0.1
4/29 11:46	8	14823.7	104.9	816.8	0.1
4/29 11:47	8	14816.4	104.9	816.8	0.1
4/29 11:48	8	14839.1	105.0	816.8	0.1
4/29 11:49	8	14833.9	104.9	816.8	0.1
4/29 11:50	8	14841.7	104.9	816.8	0.1
4/29 11:51	8	14822.4	105.0	816.9	0.1
4/29 11:52	8	14839.6	105.0	817.0	0.1
4/29 11:53	8	14829.2	105.0	816.9	0.1
4/29 11:54	8	14813.3	104.9	816.8	0.1
4/29 11:55	8	14829.2	104.9	816.8	0.1
4/29 11:56	8	14825.5	104.9	816.7	0.1
4/29 11:57	8	14821.4	104.9	816.7	0.1
4/29 11:58	8	14817.7	104.9	816.8	0.1
4/29 11:59	8	14846.4	105.1	816.9	0.1
4/29 12:00	8	14842.7	105.0	817.0	0.1
4/29 12:01	8	14872.7	105.0	817.1	0.1
4/29 12:02	8	14871.1	105.0	817.1	0.1
4/29 12:03	8	14816.4	104.9	817.0	0.1
4/29 12:04	8	14830.0	105.0	817.0	0.1
4/29 12:05	8	14839.8	105.0	817.1	0.1
4/29 12:06	8	14805.8	105.1	817.1	0.1
4/29 12:07	8	14857.1	104.7	817.0	0.1
4/29 12:08	8	14834.9	105.0	817.0	0.1
4/29 12:09	8	14819.0	104.8	817.0	0.1
4/29 12:10	8	14842.5	105.0	817.0	0.1
4/29 12:11	8	14863.3	105.0	817.1	0.1
4/29 12:12	8	14871.6	105.0	817.1	0.1
4/29 12:13	8	14881.3	105.2	817.1	0.1
4/29 12:14	8	14826.8	105.0	817.1	0.1
4/29 12:15	8	14820.9	105.0	817.1	0.1
4/29 12:16	8	14841.1	105.0	817.1	0.1
4/29 12:17	8	14856.5	105.0	817.1	0.1
4/29 12:18	8	14869.5	105.0	817.1	0.1
4/29 12:19	8	14868.2	105.2	817.1	0.1
4/29 12:20	8	14838.0	105.0	817.1	0.1
4/29 12:21	8	14834.9	105.0	817.1	0.1
4/29 12:22	8	14834.9	105.0	817.0	0.1
4/29 12:23	8	14863.6	105.0	817.1	0.1
4/29 12:24	8	14871.1	105.0	817.1	0.1
4/29 12:25	8	14850.8	105.0	817.1	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 12:26	8	14849.5	105.0	817.1	0.1
4/29 12:27	8	14854.4	105.0	817.1	0.1
4/29 12:28	8	14878.4	105.2	817.1	0.1
4/29 12:29	8	14879.7	105.0	817.1	0.1
4/29 12:30	8	14877.9	105.2	817.2	0.1
4/29 12:31	8	14861.0	105.1	817.2	0.1
4/29 12:32	8	14867.5	105.1	817.2	0.1
4/29 12:33	8	14845.6	105.1	817.1	0.1
4/29 12:34	8	14850.3	105.0	817.1	0.1
4/29 12:35	8	14857.8	105.0	817.1	0.1
4/29 12:36	8	14863.8	105.1	817.1	0.1
4/29 12:37	8	14840.9	105.1	817.1	0.1
4/29 12:38	8	14870.8	105.1	817.1	0.1
4/29 12:39	8	14860.7	105.1	817.2	0.1
4/29 12:40	8	14846.6	104.9	817.1	0.1
4/29 12:41	8	14859.9	104.9	817.1	0.1
4/29 12:42	8	14861.2	105.1	817.1	0.1
4/29 12:43	8	14845.1	104.9	817.3	0.1
4/29 12:44	8	14852.9	105.0	817.3	0.1
4/29 12:45	8	14861.5	105.0	817.3	0.1
4/29 12:46	8	14870.6	105.0	817.3	0.1
4/29 12:47	8	14874.0	105.0	817.3	0.1
4/29 12:48	8	14867.2	105.0	817.3	0.1
4/29 12:49	8	14855.2	105.1	817.3	0.1
4/29 12:50	8	14850.5	105.0	817.3	0.1
4/29 12:51	8	14843.5	104.8	817.2	0.1
4/29 12:52	8	14855.7	104.8	817.3	0.1
4/29 12:53	8	14866.7	104.9	817.3	0.1
4/29 12:54	8	14876.6	105.0	817.3	0.1
4/29 12:55	8	14864.3	105.1	817.3	0.1
4/29 12:56	8	14858.1	105.0	817.3	0.1
4/29 12:57	8	14842.5	104.9	817.1	0.1
4/29 12:58	8	14856.0	105.0	817.1	0.1
4/29 12:59	8	14866.4	105.0	817.2	0.1
4/29 13:00	8	14890.4	105.1	817.2	0.1
4/29 13:01	8	14880.5	105.1	817.3	0.1
4/29 13:02	8	14848.7	105.0	817.3	0.1
4/29 13:03	8	14850.3	104.9	817.3	0.1
4/29 13:04	8	14852.3	105.1	817.3	0.1
4/29 13:05	8	14873.2	104.9	817.3	0.1
4/29 13:06	8	14865.1	104.9	817.3	0.1
4/29 13:07	8	14853.9	104.9	817.3	0.1
4/29 13:08	8	14842.2	104.9	817.3	0.1
4/29 13:09	8	14836.2	104.8	817.3	0.1
4/29 13:10	8	14845.6	104.9	817.3	0.1
4/29 13:11	8	14867.5	104.8	817.3	0.1
4/29 13:12	8	14879.7	105.0	817.3	0.1
4/29 13:13	8	14864.1	104.9	817.3	0.1
4/29 13:14	8	14832.6	104.8	817.3	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
Average (all)	--	14808.0	104.9	816.4	0.1
Total (all)	--	--	--	--	--
Minimum (all)	--	14705.0	104.7	815.2	0.1
Maximum (all)	--	14890.4	105.2	817.3	0.1
Average (valid values only)	--	14808.0	104.9	816.4	0.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	--	241	241	241	241

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 2:02 PM thru 4/29/2009 6:02 PM

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 14:02	8	14785.2	104.4	817.4	0.1
4/29 14:03	8	14779.7	104.3	817.4	0.1
4/29 14:04	8	14817.4	104.5	817.4	0.1
4/29 14:05	8	14822.1	104.5	817.4	0.1
4/29 14:06	8	14857.8	104.8	817.4	0.1
4/29 14:07	8	14815.4	104.6	817.4	0.1
4/29 14:08	8	14822.9	104.4	817.4	0.1
4/29 14:09	8	14809.1	104.4	817.5	0.1
4/29 14:10	8	14799.8	104.4	817.4	0.1
4/29 14:11	8	14781.5	104.3	817.5	0.1
4/29 14:12	8	14777.9	104.3	817.6	0.1
4/29 14:13	8	14809.6	104.4	817.6	0.1
4/29 14:14	8	14810.4	104.5	817.6	0.1
4/29 14:15	8	14838.0	104.6	817.6	0.1
4/29 14:16	8	14847.4	104.7	817.4	0.1
4/29 14:17	8	14832.8	104.6	817.4	0.1
4/29 14:18	8	14814.1	104.5	817.4	0.1
4/29 14:19	8	14795.1	104.4	817.4	0.1
4/29 14:20	8	14791.1	104.3	817.5	0.1
4/29 14:21	8	14779.4	104.2	817.6	0.1
4/29 14:22	8	14774.5	104.1	817.6	0.1
4/29 14:23	8	14771.9	104.3	817.6	0.1
4/29 14:24	8	14787.5	104.3	817.6	0.1
4/29 14:25	8	14792.2	104.4	817.6	0.1
4/29 14:26	8	14788.3	104.2	817.6	0.1
4/29 14:27	8	14787.2	104.2	817.6	0.1
4/29 14:28	8	14783.6	104.1	817.6	0.1
4/29 14:29	8	14795.6	104.2	817.6	0.1
4/29 14:30	8	14774.5	104.3	817.6	0.1
4/29 14:31	8	14780.5	104.3	817.6	0.1
4/29 14:32	8	14793.0	104.4	817.6	0.1
4/29 14:33	8	14781.0	104.2	817.6	0.1
4/29 14:34	8	14784.9	104.3	817.6	0.1
4/29 14:35	8	14779.2	104.1	817.6	0.1
4/29 14:36	8	14784.1	104.2	817.6	0.1
4/29 14:37	8	14782.0	104.2	817.6	0.1
4/29 14:38	8	14780.8	104.1	817.6	0.1
4/29 14:39	8	14788.3	104.3	817.6	0.1
4/29 14:40	8	14776.1	104.2	817.6	0.1
4/29 14:41	8	14767.5	104.1	817.6	0.1
4/29 14:42	8	14790.9	104.2	817.6	0.1
4/29 14:43	8	14796.4	104.5	817.6	0.1
4/29 14:44	8	14784.6	104.5	817.4	0.1
4/29 14:45	8	14785.9	104.4	817.5	0.1
4/29 14:46	8	14761.2	104.2	817.5	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 14:47	8	14763.8	104.3	817.5	0.1
4/29 14:48	8	14744.5	104.1	817.6	0.1
4/29 14:49	8	14746.9	104.1	817.6	0.1
4/29 14:50	8	14778.1	104.2	817.6	0.1
4/29 14:51	8	14766.9	104.2	817.6	0.1
4/29 14:52	8	14782.6	104.2	817.6	0.1
4/29 14:53	8	14804.5	104.3	817.6	0.1
4/29 14:54	8	14781.3	104.3	817.5	0.1
4/29 14:55	8	14779.2	104.3	817.6	0.1
4/29 14:56	8	14765.4	104.3	817.6	0.1
4/29 14:57	8	14761.7	104.1	817.6	0.1
4/29 14:58	8	14794.5	104.4	817.6	0.1
4/29 14:59	8	14814.3	104.4	817.5	0.1
4/29 15:00	8	14815.4	104.4	817.4	0.1
4/29 15:01	8	14790.6	104.4	817.5	0.1
4/29 15:02	8	14773.2	104.4	817.5	0.1
4/29 15:03	8	14775.3	104.3	817.5	0.1
4/29 15:04	8	14780.7	104.3	817.4	0.1
4/29 15:05	8	14782.8	104.4	817.4	0.1
4/29 15:06	8	14754.7	104.4	817.4	0.1
4/29 15:07	8	14764.1	104.1	817.5	0.1
4/29 15:08	8	14767.2	104.0	817.6	0.1
4/29 15:09	8	14737.5	103.9	817.6	0.1
4/29 15:10	8	14746.1	104.2	817.6	0.1
4/29 15:11	8	14770.3	104.1	817.6	0.1
4/29 15:12	8	14766.7	104.2	817.6	0.1
4/29 15:13	8	14740.6	103.9	817.6	0.1
4/29 15:14	8	14758.3	103.9	817.6	0.1
4/29 15:15	8	14756.0	104.1	817.6	0.1
4/29 15:16	8	14751.0	104.0	817.6	0.1
4/29 15:17	8	14767.7	104.2	817.6	0.1
4/29 15:18	8	14775.2	104.4	817.6	0.1
4/29 15:19	8	14776.8	104.3	817.4	0.1
4/29 15:20	8	14770.1	104.2	817.4	0.1
4/29 15:21	8	14757.3	104.2	817.4	0.1
4/29 15:22	8	14745.3	104.2	817.4	0.1
4/29 15:23	8	14780.2	104.1	817.4	0.1
4/29 15:24	8	14769.8	104.1	817.4	0.1
4/29 15:25	8	14733.9	104.0	817.5	0.1
4/29 15:26	8	14768.2	104.1	817.5	0.1
4/29 15:27	8	14759.4	104.2	817.4	0.1
4/29 15:28	8	14757.9	104.1	817.6	0.1
4/29 15:29	8	14782.8	104.3	817.5	0.1
4/29 15:30	8	14766.2	104.1	817.5	0.1
4/29 15:31	8	14744.0	104.1	817.5	0.1
4/29 15:32	8	14745.1	103.9	817.6	0.1
4/29 15:33	8	14755.2	104.0	817.6	0.1
4/29 15:34	8	14763.3	104.1	817.6	0.1
4/29 15:35	8	14747.7	104.1	817.6	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 15:36	8	14770.6	104.3	817.5	0.1
4/29 15:37	8	14789.6	104.4	817.5	0.1
4/29 15:38	8	14762.5	104.3	817.4	0.1
4/29 15:39	8	14740.4	104.0	817.4	0.1
4/29 15:40	8	14720.9	103.9	817.4	0.1
4/29 15:41	8	14723.7	103.8	817.6	0.1
4/29 15:42	8	14729.7	103.9	817.6	0.1
4/29 15:43	8	14742.7	103.9	817.6	0.1
4/29 15:44	8	14750.5	104.1	817.6	0.1
4/29 15:45	8	14739.6	104.2	817.6	0.1
4/29 15:46	8	14725.8	103.9	817.6	0.1
4/29 15:47	8	14713.8	103.8	817.6	0.1
4/29 15:48	8	14735.7	103.9	817.6	0.1
4/29 15:49	8	14737.5	103.9	817.6	0.1
4/29 15:50	8	14739.3	103.9	817.6	0.1
4/29 15:51	8	14736.5	103.9	817.6	0.1
4/29 15:52	8	14742.5	104.0	817.6	0.1
4/29 15:53	8	14752.9	104.1	817.6	0.1
4/29 15:54	8	14765.9	104.2	817.6	0.1
4/29 15:55	8	14749.2	104.2	817.5	0.1
4/29 15:56	8	14745.3	104.1	817.5	0.1
4/29 15:57	8	14759.4	104.0	817.5	0.1
4/29 15:58	8	14767.5	104.0	817.5	0.1
4/29 15:59	8	14759.4	104.1	817.4	0.1
4/29 16:00	8	14735.4	103.9	817.6	0.1
4/29 16:01	8	14728.7	103.8	817.6	0.1
4/29 16:02	8	14734.7	103.9	817.6	0.1
4/29 16:03	8	14758.9	104.0	817.6	0.1
4/29 16:04	8	14710.4	103.8	817.6	0.1
4/29 16:05	8	14726.6	103.7	817.6	0.1
4/29 16:06	8	14711.2	103.7	817.6	0.1
4/29 16:07	8	14706.3	103.9	817.6	0.1
4/29 16:08	8	14709.1	103.7	817.6	0.1
4/29 16:09	8	14723.4	103.8	817.6	0.1
4/29 16:10	8	14735.2	104.1	817.6	0.1
4/29 16:11	8	14757.6	104.2	817.6	0.1
4/29 16:12	8	14736.7	104.0	817.4	0.1
4/29 16:13	8	14764.9	104.1	817.4	0.1
4/29 16:14	8	14775.5	104.2	817.5	0.1
4/29 16:15	8	14753.4	104.0	817.4	0.1
4/29 16:16	8	14725.5	103.9	817.4	0.1
4/29 16:17	8	14742.2	104.1	817.5	0.1
4/29 16:18	8	14727.9	103.9	817.6	0.1
4/29 16:19	8	14726.1	104.0	817.5	0.1
4/29 16:20	8	14717.5	103.9	817.6	0.1
4/29 16:21	8	14713.0	103.8	817.6	0.1
4/29 16:22	8	14712.8	103.8	817.6	0.1
4/29 16:23	8	14716.2	103.8	817.6	0.1
4/29 16:24	8	14700.0	103.8	817.6	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 16:25	8	14711.7	103.7	817.6	0.1
4/29 16:26	8	14738.0	103.9	817.6	0.1
4/29 16:27	8	14712.5	103.9	817.6	0.1
4/29 16:28	8	14729.7	103.9	817.6	0.1
4/29 16:29	8	14724.2	103.9	817.6	0.1
4/29 16:30	8	14697.4	103.8	817.6	0.1
4/29 16:31	8	14719.8	103.8	817.6	0.1
4/29 16:32	8	14730.5	104.1	817.6	0.1
4/29 16:33	8	14727.6	104.0	817.6	0.1
4/29 16:34	8	14706.3	103.8	817.6	0.1
4/29 16:35	8	14708.1	103.7	817.6	0.1
4/29 16:36	8	14727.6	103.8	817.6	0.1
4/29 16:37	8	14727.4	103.8	817.6	0.1
4/29 16:38	8	14710.4	103.6	817.6	0.1
4/29 16:39	8	14726.3	103.9	817.6	0.1
4/29 16:40	8	14743.2	103.9	817.6	0.1
4/29 16:41	8	14746.9	104.0	817.6	0.1
4/29 16:42	8	14739.6	103.9	817.6	0.1
4/29 16:43	8	14713.6	103.9	817.6	0.1
4/29 16:44	8	14714.6	103.8	817.6	0.1
4/29 16:45	8	14717.7	103.8	817.6	0.1
4/29 16:46	8	14738.8	103.9	817.6	0.1
4/29 16:47	8	14711.2	103.7	817.6	0.1
4/29 16:48	8	14683.9	103.5	817.6	0.1
4/29 16:49	8	14685.2	103.5	817.6	0.1
4/29 16:50	8	14694.8	103.6	817.6	0.1
4/29 16:51	8	14697.4	103.7	817.6	0.1
4/29 16:52	8	14708.6	103.8	817.6	0.1
4/29 16:53	8	14711.7	103.7	817.6	0.1
4/29 16:54	8	14702.6	103.6	817.6	0.1
4/29 16:55	8	14711.5	103.9	817.6	0.1
4/29 16:56	8	14699.2	103.8	817.6	0.1
4/29 16:57	8	14730.0	103.9	817.6	0.1
4/29 16:58	8	14730.0	103.9	817.6	0.1
4/29 16:59	8	14761.0	104.0	817.6	0.1
4/29 17:00	8	14732.3	104.0	817.6	0.1
4/29 17:01	8	14709.4	103.9	817.6	0.1
4/29 17:02	8	14733.1	104.0	817.6	0.1
4/29 17:03	8	14720.6	103.9	817.6	0.1
4/29 17:04	8	14748.7	104.0	817.6	0.1
4/29 17:05	8	14726.6	103.7	817.6	0.1
4/29 17:06	8	14722.4	103.7	817.6	0.1
4/29 17:07	8	14707.8	103.9	817.6	0.1
4/29 17:08	8	14718.0	103.8	817.6	0.1
4/29 17:09	8	14728.9	103.8	817.6	0.1
4/29 17:10	8	14720.1	103.9	817.6	0.1
4/29 17:11	8	14701.1	103.8	817.6	0.1
4/29 17:12	8	14732.6	104.0	817.6	0.1
4/29 17:13	8	14738.8	103.9	817.6	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 17:14	8	14736.5	103.9	817.6	0.1
4/29 17:15	8	14731.0	103.9	817.6	0.1
4/29 17:16	8	14709.1	103.9	817.6	0.1
4/29 17:17	8	14714.9	103.7	817.6	0.1
4/29 17:18	8	14706.0	103.7	817.6	0.1
4/29 17:19	8	14742.5	103.8	817.6	0.1
4/29 17:20	8	14715.4	103.7	817.6	0.1
4/29 17:21	8	14700.0	103.8	817.7	0.1
4/29 17:22	8	14713.0	103.8	817.6	0.1
4/29 17:23	8	14715.9	103.7	817.7	0.1
4/29 17:24	8	14717.5	103.7	817.7	0.1
4/29 17:25	8	14723.4	103.9	817.7	0.1
4/29 17:26	8	14713.8	103.8	817.7	0.1
4/29 17:27	8	14685.2	103.6	817.7	0.1
4/29 17:28	8	14674.8	103.6	817.7	0.1
4/29 17:29	8	14719.8	103.8	817.7	0.1
4/29 17:30	8	14740.6	103.8	817.7	0.1
4/29 17:31	8	14703.2	103.7	817.7	0.1
4/29 17:32	8	14682.6	103.7	817.7	0.1
4/29 17:33	8	14707.6	103.8	817.7	0.1
4/29 17:34	8	14723.5	103.9	817.7	0.1
4/29 17:35	8	14742.7	103.8	817.7	0.1
4/29 17:36	8	14706.0	103.7	817.7	0.1
4/29 17:37	8	14693.2	103.7	817.7	0.1
4/29 17:38	8	14697.1	103.6	817.7	0.1
4/29 17:39	8	14711.2	103.7	817.7	0.1
4/29 17:40	8	14735.2	103.8	817.7	0.1
4/29 17:41	8	14711.7	103.7	817.7	0.1
4/29 17:42	8	14701.0	103.8	817.7	0.1
4/29 17:43	8	14701.1	103.8	817.6	0.1
4/29 17:44	8	14716.7	103.8	817.7	0.1
4/29 17:45	8	14725.8	103.8	817.7	0.1
4/29 17:46	8	14737.2	103.8	817.7	0.1
4/29 17:47	8	14709.9	103.7	817.6	0.1
4/29 17:48	8	14700.3	103.7	817.7	0.1
4/29 17:49	8	14704.4	103.7	817.6	0.1
4/29 17:50	8	14720.8	103.7	817.7	0.1
4/29 17:51	8	14755.2	103.9	817.7	0.1
4/29 17:52	8	14743.2	103.8	817.7	0.1
4/29 17:53	8	14715.1	103.8	817.6	0.1
4/29 17:54	8	14678.2	103.8	817.6	0.1
4/29 17:55	8	14676.9	103.7	817.6	0.1
4/29 17:56	8	14668.8	103.8	817.6	0.1
4/29 17:57	8	14662.2	103.7	817.6	0.1
4/29 17:58	8	14684.1	103.8	817.6	0.1
4/29 17:59	8	14691.4	103.7	817.6	0.1
4/29 18:00	8	14697.9	103.8	817.6	0.1
4/29 18:01	8	14688.3	103.8	817.6	0.1
4/29 18:02	8	14678.1	103.8	817.6	0.1

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CT Gas Flow scf/min 1-Min	(Turbine 2) CT Megawatts 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
Average (all)	--	14744.8	104.0	817.6	0.1
Total (all)	--	--	--	--	--
Minimum (all)	--	14662.2	103.5	817.4	0.1
Maximum (all)	--	14857.8	104.8	817.7	0.1
Average (valid values only)	--	14744.8	104.0	817.6	0.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	--	241	241	241	241

Appendix C.4

Plant Process Data, Unit 3

#1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/23/2009 10:10 AM thru 4/23/2009 10:40 AM

Timestamp	(Turbine 3) CO lb/mmBtu 1-Min	(Turbine 3) CO lb/hr 1-Min Avg	(Turbine 3) 75-O2% 1-Min	(Turbine 3) CT Gas Flow kscf/hr 1-Min	(Turbine 3) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 3) CT Megawatts 1-Min
4/23 10:10	0.0011	1.02	12.99	881.0	925.1	105.0
4/23 10:11	0.0011	1.02	13.00	880.5	924.5	104.7
4/23 10:12	0.0011	1.02	12.98	882.7	926.8	104.9
4/23 10:13	0.0011	1.02	13.00	882.7	926.8	105.2
4/23 10:14	0.0012	1.11	13.00	882.1	926.2	105.2
4/23 10:15	0.0011	1.02	13.00	882.8	926.9	105.2
4/23 10:16	0.0011	1.02	12.99	880.0	924.0	104.9
4/23 10:17	0.0011	1.02	12.98	879.2	923.2	105.2
4/23 10:18	0.0011	1.02	12.99	879.4	923.4	105.2
4/23 10:19	0.0011	1.02	12.99	879.5	923.5	105.0
4/23 10:20	0.0011	1.02	13.00	879.8	923.8	105.3
4/23 10:21	0.0011	1.02	13.00	879.8	923.8	105.2
4/23 10:22	0.0011	1.02	13.00	879.5	923.5	105.2
4/23 10:23	0.0012	1.11	13.00	879.3	923.3	105.1
4/23 10:24	0.0012	1.11	13.00	879.4	923.4	105.3
4/23 10:25	0.0012	1.11	12.99	878.3	922.2	105.1
4/23 10:26	0.0012	1.11	12.99	879.1	923.1	105.5
4/23 10:27	0.0012	1.11	12.99	879.2	923.2	105.3
4/23 10:28	0.0012	1.11	12.99	880.6	924.6	105.0
4/23 10:29	0.0012	1.11	12.98	879.0	923.0	105.2
4/23 10:30	0.0012	1.11	12.98	880.1	924.1	105.2
4/23 10:31	0.0012	1.11	12.99	879.4	923.4	105.0
4/23 10:32	0.0012	1.11	12.99	879.6	923.6	105.0
4/23 10:33	0.0012	1.11	12.99	879.4	923.4	105.0
4/23 10:34	0.0012	1.11	12.98	880.0	924.0	105.0
4/23 10:35	0.0012	1.11	12.98	879.2	923.2	105.1
4/23 10:36	0.0011	1.02	12.97	879.9	923.9	105.0
4/23 10:37	0.0011	1.02	12.98	879.6	923.6	105.0
4/23 10:38	0.0011	1.02	12.97	880.5	924.5	105.3
4/23 10:39	0.0011	1.02	12.97	879.4	923.4	105.0
4/23 10:40	0.0011	1.02	12.98	880.0	924.0	105.3
Average (all)	0.0011	1.06	12.99	880.0	924.0	105.1
Total (all)	--	--	--	--	--	--
Minimum (all)	0.0011	1.02	12.97	878.3	922.2	104.7
Maximum (all)	0.0012	1.11	13.00	882.8	926.9	105.5
Average (valid values only)	0.0011	1.06	12.99	880.0	924.0	105.1
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/23/2009 10:10 AM thru 4/23/2009 10:40 AM

Timestamp	(Turbine 3) 75-NOx ppm 1-Min	(Turbine 3) NOx ppm @15% O2 1-Min	(Turbine 3) 60-NOx lb/mmBtu 1-Min	(Turbine 3) NOx lb/hr 1-Min Avg	(Turbine 3) CO ppm 1-Min	(Turbine 3) CO ppm @ 15% O2 1 Min
4/23 10:10	2.83	2.11	0.0078	7.22	0.68	0.51
4/23 10:11	2.83	2.11	0.0078	7.21	0.67	0.50
4/23 10:12	2.83	2.11	0.0077	7.14	0.67	0.50
4/23 10:13	2.84	2.12	0.0078	7.23	0.68	0.51
4/23 10:14	2.80	2.09	0.0077	7.13	0.69	0.52
4/23 10:15	2.75	2.05	0.0075	6.95	0.68	0.51
4/23 10:16	2.73	2.04	0.0075	6.93	0.68	0.51
4/23 10:17	2.74	2.04	0.0075	6.92	0.68	0.51
4/23 10:18	2.80	2.09	0.0077	7.11	0.68	0.51
4/23 10:19	2.84	2.12	0.0078	7.20	0.68	0.51
4/23 10:20	2.85	2.13	0.0078	7.21	0.68	0.51
4/23 10:21	2.84	2.12	0.0078	7.21	0.68	0.51
4/23 10:22	2.83	2.11	0.0078	7.20	0.68	0.51
4/23 10:23	2.82	2.11	0.0077	7.11	0.69	0.52
4/23 10:24	2.80	2.09	0.0077	7.11	0.69	0.52
4/23 10:25	2.80	2.09	0.0077	7.10	0.69	0.51
4/23 10:26	2.82	2.10	0.0077	7.11	0.70	0.52
4/23 10:27	2.81	2.10	0.0077	7.11	0.71	0.53
4/23 10:28	2.79	2.08	0.0076	7.03	0.73	0.54
4/23 10:29	2.77	2.06	0.0076	7.01	0.73	0.54
4/23 10:30	2.76	2.06	0.0076	7.02	0.74	0.55
4/23 10:31	2.77	2.07	0.0076	7.02	0.73	0.54
4/23 10:32	2.77	2.07	0.0076	7.02	0.73	0.54
4/23 10:33	2.78	2.07	0.0076	7.02	0.72	0.54
4/23 10:34	2.79	2.08	0.0076	7.02	0.71	0.53
4/23 10:35	2.80	2.09	0.0077	7.11	0.70	0.52
4/23 10:36	2.81	2.09	0.0077	7.11	0.67	0.50
4/23 10:37	2.82	2.10	0.0077	7.11	0.66	0.49
4/23 10:38	2.80	2.08	0.0077	7.12	0.66	0.49
4/23 10:39	2.80	2.08	0.0077	7.11	0.65	0.48
4/23 10:40	2.82	2.10	0.0077	7.11	0.64	0.48
Average (all)	2.80	2.09	0.0077	7.10	0.69	0.51
Total (all)	--	--	--	--	--	--
Minimum (all)	2.73	2.04	0.0075	6.92	0.64	0.48
Maximum (all)	2.85	2.13	0.0078	7.23	0.74	0.55
Average (valid values only)	2.80	2.09	0.0077	7.10	0.69	0.51
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/23/2009 11:00 AM thru 4/23/2009 11:30 AM

Timestamp	(Turbine 3) 75-NOx ppm 1-Min	(Turbine 3) NOx ppm @15% O2 1-Min	(Turbine 3) 60-NOx lb/mmBtu 1-Min	(Turbine 3) NOx lb/hr 1-Min Avg	(Turbine 3) CO ppm 1-Min	(Turbine 3) CO ppm @ 15% O2 1 Min
4/23 11:00	2.77	2.06	0.0076	7.02	0.59	0.44
4/23 11:01	2.76	2.05	0.0075	6.93	0.59	0.44
4/23 11:02	2.78	2.07	0.0076	7.03	0.59	0.44
4/23 11:03	2.79	2.08	0.0076	7.02	0.59	0.44
4/23 11:04	2.77	2.06	0.0076	7.02	0.60	0.45
4/23 11:05	2.77	2.06	0.0076	7.02	0.61	0.45
4/23 11:06	2.75	2.05	0.0075	6.93	0.61	0.45
4/23 11:07	2.73	2.03	0.0075	6.93	0.61	0.45
4/23 11:08	2.72	2.03	0.0074	6.85	0.60	0.45
4/23 11:09	2.72	2.03	0.0074	6.84	0.60	0.45
4/23 11:10	2.73	2.03	0.0075	6.93	0.60	0.45
4/23 11:11	2.72	2.02	0.0074	6.84	0.60	0.45
4/23 11:12	2.71	2.02	0.0074	6.83	0.62	0.46
4/23 11:13	2.72	2.02	0.0074	6.85	0.62	0.46
4/23 11:14	2.74	2.04	0.0075	6.93	0.61	0.45
4/23 11:15	2.75	2.05	0.0075	6.93	0.61	0.45
4/23 11:16	2.76	2.06	0.0076	7.04	0.61	0.45
4/23 11:17	2.76	2.05	0.0075	6.93	0.61	0.45
4/23 11:18	2.75	2.05	0.0075	6.93	0.62	0.46
4/23 11:19	2.74	2.04	0.0075	6.94	0.63	0.47
4/23 11:20	2.74	2.04	0.0075	6.93	0.63	0.47
4/23 11:21	2.73	2.03	0.0075	6.94	0.64	0.48
4/23 11:22	2.74	2.04	0.0075	6.94	0.64	0.48
4/23 11:23	2.74	2.04	0.0075	6.94	0.65	0.48
4/23 11:24	2.75	2.04	0.0075	6.94	0.66	0.49
4/23 11:25	2.77	2.06	0.0076	7.03	0.67	0.50
4/23 11:26	2.77	2.06	0.0076	7.03	0.68	0.51
4/23 11:27	2.74	2.04	0.0075	6.94	0.71	0.53
4/23 11:28	2.73	2.03	0.0075	6.94	0.73	0.54
4/23 11:29	2.75	2.05	0.0075	6.93	0.74	0.55
4/23 11:30	2.75	2.04	0.0075	6.94	0.72	0.54
Average (all)	2.75	2.04	0.0075	6.94	0.63	0.47
Total (all)	--	--	--	--	--	--
Minimum (all)	2.71	2.02	0.0074	6.83	0.59	0.44
Maximum (all)	2.79	2.08	0.0076	7.04	0.74	0.55
Average (valid values only)	2.75	2.04	0.0075	6.94	0.63	0.47
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/23/2009 11:00 AM thru 4/23/2009 11:30 AM

Timestamp	(Turbine 3) CO lb/mmBtu 1-Min	(Turbine 3) CO lb/hr 1-Min Avg	(Turbine 3) 75-O2% 1-Min	(Turbine 3) CT Gas Flow kscf/hr 1-Min	(Turbine 3) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 3) CT Megawatts 1-Min
4/23 11:00	0.0010	0.92	12.97	880.3	924.3	105.0
4/23 11:01	0.0010	0.92	12.97	880.2	924.2	105.2
4/23 11:02	0.0010	0.92	12.97	880.4	924.4	105.2
4/23 11:03	0.0010	0.92	12.98	879.5	923.5	104.8
4/23 11:04	0.0010	0.92	12.98	880.1	924.1	105.1
4/23 11:05	0.0010	0.92	12.97	880.0	924.0	105.1
4/23 11:06	0.0010	0.92	12.98	880.3	924.3	105.0
4/23 11:07	0.0010	0.92	12.98	879.5	923.5	105.1
4/23 11:08	0.0010	0.93	12.98	881.6	925.7	105.0
4/23 11:09	0.0010	0.92	12.98	879.9	923.9	105.2
4/23 11:10	0.0010	0.92	12.98	880.5	924.5	104.9
4/23 11:11	0.0010	0.92	12.97	880.4	924.4	105.0
4/23 11:12	0.0010	0.92	12.97	879.6	923.6	105.1
4/23 11:13	0.0010	0.93	12.97	881.5	925.6	105.0
4/23 11:14	0.0010	0.92	12.96	880.6	924.6	104.9
4/23 11:15	0.0010	0.92	12.97	880.1	924.1	105.0
4/23 11:16	0.0010	0.93	12.99	881.6	925.7	105.0
4/23 11:17	0.0010	0.92	12.97	880.4	924.4	105.5
4/23 11:18	0.0010	0.92	12.98	879.9	923.9	105.1
4/23 11:19	0.0010	0.93	12.97	881.3	925.4	105.0
4/23 11:20	0.0010	0.92	12.97	880.5	924.5	105.1
4/23 11:21	0.0011	1.02	12.97	881.6	925.7	104.9
4/23 11:22	0.0011	1.02	12.97	881.1	925.2	105.2
4/23 11:23	0.0011	1.02	12.96	881.4	925.5	104.9
4/23 11:24	0.0011	1.02	12.96	881.3	925.4	105.0
4/23 11:25	0.0011	1.02	12.96	880.6	924.6	105.0
4/23 11:26	0.0011	1.02	12.97	881.5	925.6	105.3
4/23 11:27	0.0012	1.11	12.97	880.7	924.7	105.3
4/23 11:28	0.0012	1.11	12.97	881.9	926.0	105.1
4/23 11:29	0.0012	1.11	12.97	880.6	924.6	105.0
4/23 11:30	0.0012	1.11	12.96	881.7	925.8	105.4
Average (all)	0.0010	0.97	12.97	880.7	924.7	105.1
Total (all)	--	--	--	--	--	--
Minimum (all)	0.0010	0.92	12.96	879.5	923.5	104.8
Maximum (all)	0.0012	1.11	12.99	881.9	926.0	105.5
Average (valid values only)	0.0010	0.97	12.97	880.7	924.7	105.1
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/23/2009 11:45 AM thru 4/23/2009 12:15 PM

Timestamp	(Turbine 3) CO lb/mmBtu 1-Min	(Turbine 3) CO lb/hr 1-Min Avg	(Turbine 3) 75-O2% 1-Min	(Turbine 3) CT Gas Flow kscf/hr 1-Min	(Turbine 3) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 3) CT Megawatts 1-Min
4/23 11:45	0.0010	0.93	12.95	882.0	926.1	104.8
4/23 11:46	0.0010	0.92	12.95	880.2	924.2	105.0
4/23 11:47	0.0010	0.93	12.95	882.0	926.1	105.2
4/23 11:48	0.0010	0.92	12.95	880.2	924.2	105.1
4/23 11:49	0.0010	0.92	12.95	880.8	924.8	105.1
4/23 11:50	0.0010	0.93	12.95	881.0	925.1	104.8
4/23 11:51	0.0010	0.93	12.95	882.3	926.4	105.1
4/23 11:52	0.0010	0.93	12.96	881.0	925.1	105.0
4/23 11:53	0.0010	0.93	12.95	881.1	925.2	104.9
4/23 11:54	0.0011	1.02	12.95	882.4	926.5	105.0
4/23 11:55	0.0010	0.93	12.95	883.3	927.5	105.3
4/23 11:56	0.0010	0.93	12.95	882.3	926.4	105.2
4/23 11:57	0.0010	0.93	12.95	881.5	925.6	105.3
4/23 11:58	0.0010	0.93	12.96	882.9	927.0	105.0
4/23 11:59	0.0010	0.93	12.95	881.8	925.9	105.0
4/23 12:00	0.0010	0.93	12.94	881.7	925.8	104.9
4/23 12:01	0.0011	1.02	12.95	881.0	925.1	104.9
4/23 12:02	0.0011	1.02	12.94	881.8	925.9	105.2
4/23 12:03	0.0011	1.02	12.95	880.8	924.8	105.1
4/23 12:04	0.0011	1.02	12.95	881.2	925.3	105.1
4/23 12:05	0.0011	1.02	12.95	881.5	925.6	105.2
4/23 12:06	0.0011	1.02	12.95	882.3	926.4	104.8
4/23 12:07	0.0010	0.92	12.95	880.9	924.9	105.0
4/23 12:08	0.0010	0.93	12.94	881.0	925.1	105.0
4/23 12:09	0.0010	0.93	12.94	881.0	925.1	104.8
4/23 12:10	0.0010	0.92	12.94	880.2	924.2	105.2
4/23 12:11	0.0010	0.93	12.94	881.4	925.5	105.1
4/23 12:12	0.0010	0.93	12.94	881.9	926.0	105.1
4/23 12:13	0.0010	0.93	12.94	881.0	925.1	105.0
4/23 12:14	0.0010	0.93	12.94	882.0	926.1	105.2
4/23 12:15	0.0010	0.92	12.95	880.9	924.9	105.0
Average (all)	0.0010	0.95	12.95	881.5	925.5	105.0
Total (all)	--	--	--	--	--	--
Minimum (all)	0.0010	0.92	12.94	880.2	924.2	104.8
Maximum (all)	0.0011	1.02	12.96	883.3	927.5	105.3
Average (valid values only)	0.0010	0.95	12.95	881.5	925.5	105.0
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/23/2009 11:45 AM thru 4/23/2009 12:15 PM

Timestamp	(Turbine 3) 75-NOx ppm 1-Min	(Turbine 3) NOx ppm @15% O2 1-Min	(Turbine 3) 60-NOx lb/mmBtu 1-Min	(Turbine 3) NOx lb/hr 1-Min Avg	(Turbine 3) CO ppm 1-Min	(Turbine 3) CO ppm @ 15% O2 1 Min
4/23 11:45	2.80	2.08	0.0076	7.04	0.61	0.45
4/23 11:46	2.83	2.10	0.0077	7.12	0.61	0.45
4/23 11:47	2.84	2.11	0.0077	7.13	0.61	0.45
4/23 11:48	2.83	2.10	0.0077	7.12	0.61	0.45
4/23 11:49	2.81	2.09	0.0077	7.12	0.62	0.46
4/23 11:50	2.81	2.09	0.0077	7.12	0.62	0.46
4/23 11:51	2.80	2.08	0.0076	7.04	0.61	0.45
4/23 11:52	2.79	2.07	0.0076	7.03	0.61	0.45
4/23 11:53	2.77	2.06	0.0076	7.03	0.63	0.47
4/23 11:54	2.75	2.04	0.0075	6.95	0.64	0.47
4/23 11:55	2.75	2.04	0.0075	6.96	0.63	0.47
4/23 11:56	2.78	2.06	0.0076	7.04	0.62	0.46
4/23 11:57	2.80	2.08	0.0076	7.03	0.60	0.45
4/23 11:58	2.80	2.08	0.0076	7.05	0.61	0.45
4/23 11:59	2.75	2.04	0.0075	6.94	0.62	0.46
4/23 12:00	2.69	1.99	0.0073	6.76	0.63	0.47
4/23 12:01	2.70	2.00	0.0074	6.85	0.65	0.48
4/23 12:02	2.74	2.03	0.0075	6.94	0.65	0.48
4/23 12:03	2.76	2.05	0.0075	6.94	0.65	0.48
4/23 12:04	2.78	2.06	0.0076	7.03	0.66	0.49
4/23 12:05	2.80	2.08	0.0076	7.03	0.66	0.49
4/23 12:06	2.81	2.09	0.0077	7.13	0.64	0.47
4/23 12:07	2.81	2.09	0.0077	7.12	0.62	0.46
4/23 12:08	2.80	2.08	0.0076	7.03	0.62	0.46
4/23 12:09	2.78	2.06	0.0076	7.03	0.63	0.47
4/23 12:10	2.79	2.07	0.0076	7.02	0.63	0.47
4/23 12:11	2.80	2.08	0.0076	7.03	0.62	0.46
4/23 12:12	2.83	2.10	0.0077	7.13	0.62	0.46
4/23 12:13	2.83	2.10	0.0077	7.12	0.62	0.46
4/23 12:14	2.81	2.08	0.0077	7.13	0.61	0.45
4/23 12:15	2.82	2.09	0.0077	7.12	0.62	0.46
Average (all)	2.79	2.07	0.0076	7.04	0.63	0.46
Total (all)	--	--	--	--	--	--
Minimum (all)	2.69	1.99	0.0073	6.76	0.60	0.45
Maximum (all)	2.84	2.11	0.0077	7.13	0.66	0.49
Average (valid values only)	2.79	2.07	0.0076	7.04	0.63	0.46
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

Appendix C.5

Plant Process Data, Unit 4

#1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/24/2009 9:15 AM thru 4/24/2009 9:45 AM

Timestamp	(Turbine 4) 75-NOx ppm 1-Min	(Turbine 4) NOx ppm @15% O2 1-Min	(Turbine 4) 60-NOx lb/mmBtu 1-Min	(Turbine 4) NOx lb/hr 1-Min Avg	(Turbine 4) CO ppm 1-Min	(Turbine 4) CO ppm @ 15% O2 1 Min
4/24 9:15	2.00	1.51	0.0055	5.06	0.97	0.73
4/24 9:16	2.02	1.52	0.0056	5.15	1.03	0.78
4/24 9:17	2.08	1.57	0.0058	5.34	1.01	0.76
4/24 9:18	2.16	1.63	0.0060	5.52	0.95	0.72
4/24 9:19	2.22	1.67	0.0061	5.61	0.90	0.68
4/24 9:20	2.25	1.70	0.0062	5.70	0.90	0.68
4/24 9:21	2.27	1.71	0.0063	5.79	0.94	0.71
4/24 9:22	2.28	1.72	0.0063	5.79	0.95	0.72
4/24 9:23	2.33	1.76	0.0065	5.98	0.94	0.71
4/24 9:24	2.39	1.80	0.0066	6.07	0.91	0.69
4/24 9:25	2.42	1.82	0.0067	6.17	0.89	0.67
4/24 9:26	2.46	1.86	0.0068	6.26	0.87	0.66
4/24 9:27	2.53	1.91	0.0070	6.44	0.86	0.65
4/24 9:28	2.56	1.93	0.0071	6.52	0.84	0.63
4/24 9:29	2.57	1.94	0.0071	6.53	0.86	0.65
4/24 9:30	2.57	1.94	0.0071	6.52	0.87	0.66
4/24 9:31	2.61	1.97	0.0073	6.71	0.87	0.66
4/24 9:32	2.65	2.00	0.0074	6.79	0.83	0.63
4/24 9:33	2.64	1.99	0.0073	6.72	0.82	0.62
4/24 9:34	2.61	1.97	0.0072	6.63	0.84	0.63
4/24 9:35	2.62	1.98	0.0073	6.71	0.86	0.65
4/24 9:36	2.66	2.01	0.0074	6.81	0.86	0.65
4/24 9:37	2.67	2.01	0.0074	6.82	0.86	0.65
4/24 9:38	2.69	2.03	0.0075	6.90	0.87	0.66
4/24 9:39	2.72	2.05	0.0075	6.89	0.87	0.66
4/24 9:40	2.72	2.05	0.0076	6.98	0.85	0.64
4/24 9:41	2.72	2.05	0.0076	6.99	0.84	0.63
4/24 9:42	2.73	2.06	0.0076	6.99	0.84	0.63
4/24 9:43	2.72	2.05	0.0075	6.91	0.86	0.65
4/24 9:44	2.69	2.03	0.0075	6.90	0.90	0.68
4/24 9:45	2.70	2.04	0.0075	6.89	0.94	0.71
Average (all)	2.49	1.88	0.0069	6.36	0.89	0.67
Total (all)	–	–	–	–	–	–
Minimum (all)	2.00	1.51	0.0055	5.06	0.82	0.62
Maximum (all)	2.73	2.06	0.0076	6.99	1.03	0.78
Average (valid values only)	2.49	1.88	0.0069	6.36	0.89	0.67
Total (valid values only)	–	–	–	–	–	–
Count (valid values only)	31	31	31	31	31	31

CeDAR 1-Minute Data

#1

Panoche Energy Center

Data for 4/24/2009 9:15 AM thru 4/24/2009 9:45 AM

Timestamp	(Turbine 4) CO lb/mmBtu 1-Min	(Turbine 4) CO lb/hr 1-Min Avg	(Turbine 4) 75-O2% 1-Min	(Turbine 4) CT Gas Flow kscf/hr 1-Min	(Turbine 4) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 4) CT Megawatts 1-Min
4/24 9:15	0.0016	1.47	13.06	876.4	920.2	105.0
4/24 9:16	0.0017	1.56	13.07	876.5	920.3	105.1
4/24 9:17	0.0017	1.56	13.07	876.3	920.1	105.0
4/24 9:18	0.0016	1.47	13.08	875.8	919.6	105.1
4/24 9:19	0.0015	1.38	13.07	875.8	919.6	105.0
4/24 9:20	0.0015	1.38	13.07	875.9	919.7	105.0
4/24 9:21	0.0016	1.47	13.07	875.9	919.7	105.0
4/24 9:22	0.0016	1.47	13.07	875.9	919.7	105.0
4/24 9:23	0.0016	1.47	13.08	875.7	919.5	105.0
4/24 9:24	0.0015	1.38	13.08	875.9	919.7	105.0
4/24 9:25	0.0015	1.38	13.07	876.6	920.4	105.0
4/24 9:26	0.0015	1.38	13.09	877.0	920.9	105.1
4/24 9:27	0.0015	1.38	13.08	876.3	920.1	105.1
4/24 9:28	0.0014	1.29	13.09	874.9	918.6	105.0
4/24 9:29	0.0014	1.29	13.07	875.5	919.3	105.0
4/24 9:30	0.0015	1.38	13.08	874.4	918.1	104.9
4/24 9:31	0.0015	1.38	13.10	874.9	918.6	105.1
4/24 9:32	0.0014	1.28	13.09	873.5	917.2	105.0
4/24 9:33	0.0014	1.29	13.09	876.1	919.9	105.0
4/24 9:34	0.0014	1.29	13.09	876.6	920.4	105.1
4/24 9:35	0.0015	1.38	13.08	875.3	919.1	105.1
4/24 9:36	0.0015	1.38	13.08	876.1	919.9	105.0
4/24 9:37	0.0015	1.38	13.08	877.4	921.3	105.2
4/24 9:38	0.0015	1.38	13.09	876.6	920.4	105.1
4/24 9:39	0.0015	1.38	13.08	874.7	918.4	105.0
4/24 9:40	0.0014	1.29	13.09	874.7	918.4	105.0
4/24 9:41	0.0014	1.29	13.09	876.0	919.8	105.2
4/24 9:42	0.0014	1.29	13.08	875.8	919.6	105.0
4/24 9:43	0.0015	1.38	13.08	878.0	921.9	105.2
4/24 9:44	0.0015	1.38	13.07	876.3	920.1	105.1
4/24 9:45	0.0016	1.47	13.08	874.6	918.3	105.1
Average (all)	0.0015	1.39	13.08	875.9	919.6	105.0
Total (all)	--	--	--	--	--	--
Minimum (all)	0.0014	1.28	13.06	873.5	917.2	104.9
Maximum (all)	0.0017	1.56	13.10	878.0	921.9	105.2
Average (valid values only)	0.0015	1.39	13.08	875.9	919.6	105.0
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/24/2009 10:09 AM thru 4/24/2009 10:39 AM

Timestamp	(Turbine 4) 75-NOx ppm 1-Min	(Turbine 4) NOx ppm @15% O2 1-Min	(Turbine 4) 60-NOx lb/mmBtu 1-Min	(Turbine 4) NOx lb/hr 1-Min Avg	(Turbine 4) CO ppm 1-Min	(Turbine 4) CO ppm @ 15% O2 1 Min
4/24 10:09	3.76	2.84	0.0104	9.46	0.19	0.14
4/24 10:10	3.67	2.77	0.0102	9.25	0.18	0.14
4/24 10:11	3.58	2.70	0.0099	8.99	0.17	0.13
4/24 10:12	3.46	2.61	0.0096	8.72	0.17	0.13
4/24 10:13	3.40	2.56	0.0094	8.52	0.18	0.14
4/24 10:14	3.35	2.52	0.0093	8.44	0.18	0.14
4/24 10:15	3.30	2.49	0.0091	8.27	0.17	0.13
4/24 10:16	3.31	2.49	0.0092	8.34	0.17	0.13
4/24 10:17	3.25	2.45	0.0090	8.16	0.18	0.14
4/24 10:18	3.15	2.37	0.0087	7.89	0.17	0.13
4/24 10:19	3.11	2.34	0.0086	7.79	0.16	0.12
4/24 10:20	3.15	2.38	0.0087	7.89	0.16	0.12
4/24 10:21	3.16	2.38	0.0088	7.98	0.16	0.12
4/24 10:22	3.15	2.37	0.0087	7.88	0.16	0.12
4/24 10:23	3.11	2.35	0.0086	7.79	0.17	0.13
4/24 10:24	3.06	2.31	0.0085	7.70	0.17	0.13
4/24 10:25	3.04	2.29	0.0084	7.61	0.16	0.12
4/24 10:26	3.01	2.27	0.0083	7.53	0.16	0.12
4/24 10:27	2.97	2.24	0.0082	7.43	0.16	0.12
4/24 10:28	2.96	2.23	0.0082	7.42	0.17	0.13
4/24 10:29	2.97	2.24	0.0082	7.41	0.17	0.13
4/24 10:30	2.95	2.23	0.0082	7.42	0.17	0.13
4/24 10:31	2.98	2.25	0.0083	7.51	0.16	0.12
4/24 10:32	3.03	2.29	0.0084	7.61	0.16	0.12
4/24 10:33	3.01	2.27	0.0083	7.51	0.15	0.11
4/24 10:34	2.94	2.22	0.0082	7.42	0.14	0.11
4/24 10:35	2.91	2.20	0.0081	7.33	0.15	0.11
4/24 10:36	2.88	2.17	0.0080	7.26	0.16	0.12
4/24 10:37	2.86	2.16	0.0079	7.16	0.16	0.12
4/24 10:38	2.82	2.13	0.0078	7.08	0.16	0.12
4/24 10:39	2.85	2.15	0.0079	7.17	0.15	0.11
Average (all)	3.13	2.36	0.0087	7.87	0.17	0.13
Total (all)	--	--	--	--	--	--
Minimum (all)	2.82	2.13	0.0078	7.08	0.14	0.11
Maximum (all)	3.76	2.84	0.0104	9.46	0.19	0.14
Average (valid values only)	3.13	2.36	0.0087	7.87	0.17	0.13
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/24/2009 10:09 AM thru 4/24/2009 10:39 AM

Timestamp	(Turbine 4) CO lb/mmBtu 1-Min	(Turbine 4) CO lb/hr 1-Min Avg	(Turbine 4) 75-O2% 1-Min	(Turbine 4) CT Gas Flow kscf/hr 1-Min	(Turbine 4) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 4) CT Megawatts 1-Min
4/24 10:09	0.0003	0.27	13.08	866.2	909.5	103.1
4/24 10:10	0.0003	0.27	13.08	863.7	906.9	103.1
4/24 10:11	0.0003	0.27	13.08	865.1	908.4	103.0
4/24 10:12	0.0003	0.27	13.07	864.6	907.8	103.1
4/24 10:13	0.0003	0.27	13.07	863.6	906.8	103.0
4/24 10:14	0.0003	0.27	13.07	864.3	907.5	103.0
4/24 10:15	0.0003	0.27	13.07	865.1	908.4	103.1
4/24 10:16	0.0003	0.27	13.07	863.3	906.5	103.0
4/24 10:17	0.0003	0.27	13.07	863.8	907.0	102.9
4/24 10:18	0.0003	0.27	13.07	863.2	906.4	102.9
4/24 10:19	0.0003	0.27	13.07	863.2	906.4	102.9
4/24 10:20	0.0003	0.27	13.08	863.9	907.1	102.8
4/24 10:21	0.0003	0.27	13.08	863.1	906.3	102.9
4/24 10:22	0.0003	0.27	13.07	862.8	905.9	102.8
4/24 10:23	0.0003	0.27	13.08	863.0	906.2	102.8
4/24 10:24	0.0003	0.27	13.08	863.2	906.4	102.9
4/24 10:25	0.0003	0.27	13.07	863.2	906.4	102.9
4/24 10:26	0.0003	0.27	13.08	863.9	907.1	102.9
4/24 10:27	0.0003	0.27	13.08	862.8	905.9	102.8
4/24 10:28	0.0003	0.27	13.08	861.6	904.7	102.7
4/24 10:29	0.0003	0.27	13.08	861.1	904.2	102.6
4/24 10:30	0.0003	0.27	13.08	862.1	905.2	102.7
4/24 10:31	0.0003	0.27	13.08	861.4	904.5	102.7
4/24 10:32	0.0003	0.27	13.09	862.8	905.9	102.8
4/24 10:33	0.0003	0.27	13.08	862.0	905.1	102.8
4/24 10:34	0.0002	0.18	13.08	861.4	904.5	102.7
4/24 10:35	0.0003	0.27	13.08	862.0	905.1	102.8
4/24 10:36	0.0003	0.27	13.08	864.3	907.5	103.0
4/24 10:37	0.0003	0.27	13.08	863.5	906.7	102.9
4/24 10:38	0.0003	0.27	13.08	864.2	907.4	103.1
4/24 10:39	0.0003	0.27	13.08	864.6	907.8	103.0
Average (all)	0.0003	0.27	13.08	863.3	906.5	102.9
Total (all)	--	--	--	--	--	--
Minimum (all)	0.0002	0.18	13.07	861.1	904.2	102.6
Maximum (all)	0.0003	0.27	13.09	866.2	909.5	103.1
Average (valid values only)	0.0003	0.27	13.08	863.3	906.5	102.9
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/24/2009 11:00 AM thru 4/24/2009 11:30 AM

Timestamp	(Turbine 4) CO lb/mmBtu 1-Min	(Turbine 4) CO lb/hr 1-Min Avg	(Turbine 4) 75-O2% 1-Min	(Turbine 4) CT Gas Flow kscf/hr 1-Min	(Turbine 4) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 4) CT Megawatts 1-Min
4/24 11:00	0.0003	0.27	13.08	865.0	908.3	102.9
4/24 11:01	0.0003	0.27	13.08	862.4	905.5	102.8
4/24 11:02	0.0003	0.27	13.08	861.9	905.0	102.6
4/24 11:03	0.0003	0.27	13.08	862.0	905.1	102.7
4/24 11:04	0.0002	0.18	13.08	862.8	905.9	102.8
4/24 11:05	0.0002	0.18	13.08	862.6	905.7	102.7
4/24 11:06	0.0002	0.18	13.09	862.8	905.9	102.7
4/24 11:07	0.0002	0.18	13.08	861.5	904.6	102.7
4/24 11:08	0.0002	0.18	13.08	862.7	905.8	102.7
4/24 11:09	0.0002	0.18	13.07	861.0	904.1	102.5
4/24 11:10	0.0002	0.18	13.08	861.2	904.3	102.6
4/24 11:11	0.0003	0.27	13.07	862.8	905.9	102.7
4/24 11:12	0.0003	0.27	13.07	860.8	903.8	102.5
4/24 11:13	0.0003	0.27	13.07	860.1	903.1	102.4
4/24 11:14	0.0003	0.27	13.07	862.5	905.6	102.6
4/24 11:15	0.0003	0.27	13.07	862.9	906.0	102.7
4/24 11:16	0.0002	0.18	13.08	862.2	905.3	102.7
4/24 11:17	0.0002	0.18	13.08	862.0	905.1	102.7
4/24 11:18	0.0002	0.18	13.07	861.0	904.1	102.5
4/24 11:19	0.0003	0.27	13.07	861.3	904.4	102.4
4/24 11:20	0.0003	0.27	13.07	861.5	904.6	102.5
4/24 11:21	0.0003	0.27	13.07	860.2	903.2	102.3
4/24 11:22	0.0002	0.18	13.07	858.8	901.7	102.1
4/24 11:23	0.0002	0.18	13.07	860.0	903.0	102.3
4/24 11:24	0.0002	0.18	13.08	860.3	903.3	102.4
4/24 11:25	0.0003	0.27	13.08	861.3	904.4	102.5
4/24 11:26	0.0003	0.27	13.07	861.8	904.9	102.7
4/24 11:27	0.0003	0.27	13.07	860.5	903.5	102.4
4/24 11:28	0.0003	0.27	13.07	860.2	903.2	102.4
4/24 11:29	0.0003	0.27	13.07	859.1	902.1	102.3
4/24 11:30	0.0003	0.27	13.07	860.0	903.0	102.4
Average (all)	0.0003	0.23	13.07	861.5	904.5	102.6
Total (all)	--	--	--	--	--	--
Minimum (all)	0.0002	0.18	13.07	858.8	901.7	102.1
Maximum (all)	0.0003	0.27	13.09	865.0	908.3	102.9
Average (valid values only)	0.0003	0.23	13.07	861.5	904.5	102.6
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

#3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/24/2009 11:00 AM thru 4/24/2009 11:30 AM

Timestamp	(Turbine 4) 75-NOx ppm 1-Min	(Turbine 4) NOx ppm @15% O2 1-Min	(Turbine 4) 60-NOx lb/mmBtu 1-Min	(Turbine 4) NOx lb/hr 1-Min Avg	(Turbine 4) CO ppm 1-Min	(Turbine 4) CO ppm @ 15% O2 1 Min
4/24 11:00	2.62	1.98	0.0073	6.63	0.16	0.12
4/24 11:01	2.63	1.98	0.0073	6.61	0.17	0.13
4/24 11:02	2.60	1.96	0.0072	6.52	0.16	0.12
4/24 11:03	2.58	1.95	0.0072	6.52	0.15	0.11
4/24 11:04	2.58	1.95	0.0072	6.52	0.14	0.11
4/24 11:05	2.59	1.95	0.0072	6.52	0.14	0.11
4/24 11:06	2.57	1.94	0.0071	6.43	0.14	0.11
4/24 11:07	2.59	1.95	0.0072	6.51	0.14	0.11
4/24 11:08	2.60	1.96	0.0072	6.52	0.14	0.11
4/24 11:09	2.57	1.94	0.0071	6.42	0.13	0.10
4/24 11:10	2.50	1.89	0.0069	6.24	0.14	0.11
4/24 11:11	2.48	1.87	0.0069	6.25	0.15	0.11
4/24 11:12	2.50	1.88	0.0069	6.24	0.15	0.11
4/24 11:13	2.52	1.90	0.0070	6.32	0.16	0.12
4/24 11:14	2.52	1.90	0.0070	6.34	0.16	0.12
4/24 11:15	2.57	1.94	0.0071	6.43	0.15	0.11
4/24 11:16	2.62	1.98	0.0073	6.61	0.14	0.11
4/24 11:17	2.61	1.97	0.0072	6.52	0.14	0.11
4/24 11:18	2.57	1.94	0.0071	6.42	0.14	0.11
4/24 11:19	2.52	1.90	0.0070	6.33	0.16	0.12
4/24 11:20	2.51	1.89	0.0070	6.33	0.16	0.12
4/24 11:21	2.53	1.91	0.0070	6.32	0.15	0.11
4/24 11:22	2.52	1.90	0.0070	6.31	0.14	0.11
4/24 11:23	2.48	1.87	0.0069	6.23	0.14	0.11
4/24 11:24	2.49	1.88	0.0069	6.23	0.14	0.11
4/24 11:25	2.56	1.93	0.0071	6.42	0.15	0.11
4/24 11:26	2.60	1.96	0.0072	6.52	0.15	0.11
4/24 11:27	2.61	1.97	0.0072	6.51	0.15	0.11
4/24 11:28	2.54	1.91	0.0070	6.32	0.15	0.11
4/24 11:29	2.49	1.88	0.0069	6.22	0.15	0.11
4/24 11:30	2.52	1.90	0.0070	6.32	0.15	0.11
Average (all)	2.55	1.93	0.0071	6.41	0.15	0.11
Total (all)	--	--	--	--	--	--
Minimum (all)	2.48	1.87	0.0069	6.22	0.13	0.10
Maximum (all)	2.63	1.98	0.0073	6.63	0.17	0.13
Average (valid values only)	2.55	1.93	0.0071	6.41	0.15	0.11
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	31	31	31	31	31	31

Appendix C.6

Plant Process Data, Start-up / Shutdown Unit 2

Startup #1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/28/2009 9:04 AM thru 4/28/2009 9:16 AM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/28 9:04	0.33	1.28	0.0047	0.74	83.48	324.03
4/28 9:05	12.59	17.00	0.0626	8.41	92.61	125.03
4/28 9:06	15.18	21.02	0.0775	11.61	2.70	3.74
4/28 9:07	20.58	24.68	0.0909	36.65	1.54	1.85
4/28 9:08	40.65	36.34	0.1339	104.62	1.24	1.11
4/28 9:09	36.78	28.55	0.1052	97.02	2.86	2.22
4/28 9:10	39.22	30.21	0.1113	102.77	10.80	8.32
4/28 9:11	36.39	27.85	0.1026	94.83	5.96	4.56
4/28 9:12	34.37	26.27	0.0968	89.42	0.70	0.53
4/28 9:13	34.42	26.34	0.0970	89.75	0.47	0.36
4/28 9:14	28.17	21.61	0.0796	73.62	0.41	0.31
4/28 9:15	4.99	3.83	0.0141	13.07	0.33	0.25
4/28 9:16	2.61	2.01	0.0074	6.85	0.29	0.22
Average (all)	23.56	20.54	0.0757	56.10	15.65	36.35
Total (all)	--	--	--	--	--	--
Minimum (all)	0.33	1.28	0.0047	0.74	0.29	0.22
Maximum (all)	40.65	36.34	0.1339	104.62	92.61	324.03
Average (valid values only)	23.56	20.54	0.0757	56.10	15.65	36.35
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	13	13	13	13	13	13

Startup #1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/28/2009 9:04 AM thru 4/28/2009 9:16 AM

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) Startup CO lb/hr 1-Min	(Turbine 2) Shutdown CO lb/hr 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/28 9:04	8	114.11	0.00 <60>	0.00 <60>	721.3	0.1
4/28 9:05	8	37.66	0.00 <60>	0.00 <60>	734.0	0.1
4/28 9:06	8	1.26	0.00 <60>	0.00 <60>	745.9	0.1
4/28 9:07	8	1.66	0.00 <60>	0.00 <60>	760.9	0.1
4/28 9:08	8	1.96	0.00 <60>	0.00 <60>	778.4	0.1
4/28 9:09	8	4.62	0.00 <60>	0.00 <60>	791.2	0.1
4/28 9:10	8	17.22	0.00 <60>	0.00 <60>	798.9	0.1
4/28 9:11	8	9.45	0.00 <60>	0.00 <60>	803.6	0.1
4/28 9:12	8	1.11	0.00 <60>	0.00 <60>	806.6	0.1
4/28 9:13	8	0.74	0.00 <60>	0.00 <60>	808.4	0.1
4/28 9:14	8	0.65	0.00 <60>	0.00 <60>	809.6	0.1
4/28 9:15	8	0.56	0.00 <60>	0.00 <60>	810.5	0.1
4/28 9:16	8	0.46	0.00 <60>	0.00 <60>	811.1	0.1
Average (all)	--	14.73	0.00	0.00	783.1	0.1
Total (all)	--	--	--	--	--	--
Minimum (all)	--	0.46	0.00	0.00	721.3	0.1
Maximum (all)	--	114.11	0.00	0.00	811.1	0.1
Average (valid values only)	--	14.73	--	--	783.1	0.1
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	--	13	0	0	13	13

<60> = N/A

Startup #1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/28/2009 9:04 AM thru 4/28/2009 9:16 AM

Timestamp	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) CT Megawatts 1-Min
4/28 9:04	19.38	149.9	157.4	0.0
4/28 9:05	16.53	128.2	134.6	0.0
4/28 9:06	16.64	143.1	150.3	3.0
4/28 9:07	15.98	384.8	404.0	34.8
4/28 9:08	14.30	745.8	783.1	88.1
4/28 9:09	13.30	880.0	924.0	103.3
4/28 9:10	13.24	881.8	925.9	104.3
4/28 9:11	13.19	882.0	926.1	104.9
4/28 9:12	13.18	881.6	925.7	105.0
4/28 9:13	13.19	883.0	927.2	104.9
4/28 9:14	13.21	883.0	927.2	104.9
4/28 9:15	13.21	883.0	927.2	104.8
4/28 9:16	13.22	882.2	926.3	104.8
Average (all)	14.51	662.2	695.3	74.1
Total (all)	–	–	–	–
Minimum (all)	13.18	128.2	134.6	0.0
Maximum (all)	19.38	883.0	927.2	105.0
Average (valid values only)	14.51	662.2	695.3	74.1
Total (valid values only)	–	–	–	–
Count (valid values only)	13	13	13	13

Startup #2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/28/2009 11:53 AM thru 4/28/2009 12:04 PM

Timestamp	(Turbine 2) 60-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/28 11:53	0.12	0.43	0.0016	0.25	21.27	76.52
4/28 11:54	7.38	9.76	0.0360	4.84	32.05	42.40
4/28 11:55	6.48	8.81	0.0325	4.41	1.14	1.55
4/28 11:56	10.44	13.05	0.0481	14.83	0.63	0.79
4/28 11:57	31.07	28.91	0.1065	70.22	0.48	0.45
4/28 11:58	36.93	28.74	0.1059	97.49	0.99	0.77
4/28 11:59	38.45	29.27	0.1078	99.59	8.21	6.25
4/28 12:00	37.55	28.59	0.1053	97.10	4.83	3.68
4/28 12:01	30.78	23.40	0.0862	79.56	0.19	0.14
4/28 12:02	4.97	3.78	0.0139	12.87	0.08	0.06
4/28 12:03	2.35	1.79	0.0066	6.11	0.06	0.05
4/28 12:04	2.20	1.67	0.0062	5.65	0.05	0.04
Average (all)	17.39	14.85	0.0547	41.08	5.83	11.06
Total (all)	--	--	--	--	--	--
Minimum (all)	0.12	0.43	0.0016	0.25	0.05	0.04
Maximum (all)	38.45	29.27	0.1078	99.59	32.05	76.52
Average (valid values only)	17.39	14.85	0.0547	41.08	5.83	11.06
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	12	12	12	12	12	12

Startup #2

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/28/2009 11:53 AM thru 4/28/2009 12:04 PM

Timestamp	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) CT Megawatts 1-Min
4/28 11:53	26.37	19.26	146.7	154.0	0.1
4/28 11:54	12.78	16.44	128.3	134.7	0.1
4/28 11:55	0.48	16.56	129.5	136.0	1.1
4/28 11:56	0.56	16.18	294.3	309.0	22.9
4/28 11:57	0.66	14.56	629.1	660.6	70.9
4/28 11:58	1.57	13.32	878.4	922.3	104.1
4/28 11:59	12.96	13.15	881.5	925.6	104.6
4/28 12:00	7.58	13.15	879.9	923.9	105.1
4/28 12:01	0.28	13.14	881.1	925.2	105.0
4/28 12:02	0.09	13.15	881.9	926.0	104.9
4/28 12:03	0.09	13.14	882.1	926.2	104.9
4/28 12:04	0.09	13.14	882.3	926.4	104.9
Average (all)	5.29	14.60	624.6	655.8	69.1
Total (all)	--	--	--	--	--
Minimum (all)	0.09	13.14	128.3	134.7	0.1
Maximum (all)	26.37	19.26	882.3	926.4	105.1
Average (valid values only)	5.29	14.60	624.6	655.8	69.1
Total (valid values only)	--	--	--	--	--
Count (valid values only)	12	12	12	12	12

Start-up # 3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 8:10 AM thru 4/29/2009 8:22 AM

Timestamp	(Turbine 2) 60-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/29 8:10	0.00 <13>	-- <13>	-- <13>	-- <13>	0.18 <13>	-- <13>
4/29 8:11	0.00	-- <28>	-- <28>	-- <28>	0.16	-- <28>
4/29 8:12	5.81	9.42	0.0347	5.33	166.24	269.46
4/29 8:13	19.33	27.68	0.1020	13.67	14.25	20.41
4/29 8:14	23.01	32.63	0.1202	22.73	1.70	2.41
4/29 8:15	33.04	37.06	0.1365	65.64	1.31	1.47
4/29 8:16	43.45	37.75	0.1391	118.53	0.92	0.80
4/29 8:17	34.74	27.15	0.1000	92.45	0.59	0.46
4/29 8:18	34.15	26.65	0.0982	90.73	0.87	0.68
4/29 8:19	34.49	26.85	0.0989	91.29	1.07	0.83
4/29 8:20	34.81	27.09	0.0998	92.11	0.74	0.58
4/29 8:21	35.02	27.26	0.1004	92.72	0.33	0.26
4/29 8:22	13.06	10.17	0.0374	34.65	0.21	0.16
Average (all)	23.92	26.34	0.0970	65.44	14.51	27.05
Total (all)	--	--	--	--	--	--
Minimum (all)	0.00	9.42	0.0347	5.33	0.16	0.16
Maximum (all)	43.45	37.75	0.1391	118.53	166.24	269.46
Average (valid values only)	25.91	26.34	0.0970	65.44	15.70	27.05
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	12	11	11	11	12	11

<13> = Down

<28> = Formula Input Out-Of-Range

Startup #3

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 8:10 AM thru 4/29/2009 8:22 AM

Timestamp	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) NH3 Injection Flow - 1-Min lb/hr	(Turbine 2) CT Megawatts 1-Min
4/29 8:10	-- <13>	21.05 <13>	0.0 <13>	0.0 <13>	0.219 <13>	0.0 <13>
4/29 8:11	-- <28>	21.04	66.5	69.8	0.219 <13>	0.0
4/29 8:12	92.80	17.26	146.6	153.9	0.219 <13>	0.0
4/29 8:13	6.14	16.78	127.9	134.3	0.222 <13>	0.0
4/29 8:14	1.02	16.74	180.4	189.4	0.229 <13>	7.6
4/29 8:15	1.59	15.64	459.0	482.0	0.234 <13>	45.4
4/29 8:16	1.54	14.11	813.3	854.0	0.234 <13>	96.8
4/29 8:17	0.93	13.35	882.2	926.3	0.234 <13>	105.1
4/29 8:18	1.39	13.34	881.7	925.8	0.234 <13>	104.9
4/29 8:19	1.76	13.32	880.9	924.9	0.234 <13>	105.0
4/29 8:20	1.20	13.32	880.8	924.8	11.091 <13>	104.9
4/29 8:21	0.56	13.32	881.3	925.4	241.938	104.9
4/29 8:22	0.37	13.32	882.4	926.5	257.188	104.9
Average (all)	9.94	15.58	544.8	572.1	39.423	60.0
Total (all)	--	--	--	--	--	--
Minimum (all)	0.37	13.32	0.0	0.0	0.219	0.0
Maximum (all)	92.80	21.05	882.4	926.5	257.188	105.1
Average (valid values only)	9.94	15.13	590.2	619.8	249.563	65.0
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	11	12	12	12	2	12

<13> = Down

<28> = Formula Input Out-Of-Range

Shutdown #1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 6:20 PM thru 4/29/2009 6:35 PM

Timestamp	(Turbine 2) 75-NOx ppm 1-Min	(Turbine 2) NOx ppm @15% O2 1-Min	(Turbine 2) 75-NOx lb/mmBtu 1-Min	(Turbine 2) NOx lb/hr 1-Min Avg	(Turbine 2) CO ppm 1-Min	(Turbine 2) CO ppm @ 15% O2 1 Min
4/29 18:20	2.89	2.18	0.0080	7.41	0.00	0.00
4/29 18:21	2.90	2.19	0.0081	7.41	0.00	0.00
4/29 18:22	2.88	2.18	0.0080	6.91	0.00	0.00
4/29 18:23	1.94	1.57	0.0058	3.53	0.00	0.00
4/29 18:24	1.55	1.42	0.0052	1.62	0.00	0.00
4/29 18:25	1.70	2.55	0.0094	0.71	0.00	0.00
4/29 18:26	1.75	3.73	0.0137	0.88	0.03	0.06
4/29 18:27	1.56	3.37	0.0124	0.80	0.41	0.89
4/29 18:28	1.36	2.95	0.0109	0.70	0.80	1.74
4/29 18:29	1.29	2.80	0.0103	0.67	0.94	2.04
4/29 18:30	1.26	2.74	0.0101	0.65	0.98	2.13
4/29 18:31	1.23	2.67	0.0098	0.63	1.02	2.21
4/29 18:32	1.21	2.62	0.0097	0.62	1.04	2.26
4/29 18:33	1.20	2.59	0.0096	0.61	1.06	2.29
4/29 18:34	1.19	2.57	0.0095	0.61	1.06	2.29
4/29 18:35	1.44 <13>	3.81 <13>	0.0140 <13>	0.00 <13>	1.02 <13>	2.70 <13>
Average (all)	1.71	2.62	0.0097	2.11	0.52	1.16
Total (all)	--	--	--	--	--	--
Minimum (all)	1.19	1.42	0.0052	0.00	0.00	0.00
Maximum (all)	2.90	3.81	0.0140	7.41	1.06	2.70
Average (valid values only)	1.73	2.54	0.0094	2.25	0.49	1.06
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	15	15	15	15	15	15

<13> = Down

Shutdown #1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 6:20 PM thru 4/29/2009 6:35 PM

Timestamp	(Turbine 2) Process Code 1-Min	(Turbine 2) CO lb/hr 1-Min Avg	(Turbine 2) Startup CO lb/hr 1-Min	(Turbine 2) Shutdown CO lb/hr 1-Min	(Turbine 2) SCR Temp °F - 1-Min	(Turbine 2) Combuster Inlet Pressure PSIA - 1-Min
4/29 18:20	8	0.00	0.00 <60>	0.00 <60>	817.6	0.1
4/29 18:21	8	0.00	0.00 <60>	0.00 <60>	817.6	0.1
4/29 18:22	8	0.00	0.00 <60>	0.00 <60>	817.4	0.1
4/29 18:23	8	0.00	0.00 <60>	0.00 <60>	818.0	0.1
4/29 18:24	8	0.00	0.00 <60>	0.00 <60>	819.9	0.1
4/29 18:25	8	0.00	0.00 <60>	0.00 <60>	820.8	0.1
4/29 18:26	8	0.01	0.00 <60>	0.00 <60>	820.1	0.1
4/29 18:27	8	0.13	0.00 <60>	0.00 <60>	818.9	0.1
4/29 18:28	8	0.25	0.00 <60>	0.00 <60>	817.5	0.1
4/29 18:29	8	0.30	0.00 <60>	0.00 <60>	816.2	0.1
4/29 18:30	8	0.31	0.00 <60>	0.00 <60>	814.9	0.1
4/29 18:31	8	0.32	0.00 <60>	0.00 <60>	813.8	0.1
4/29 18:32	8	0.32	0.00 <60>	0.00 <60>	812.9	0.1
4/29 18:33	8	0.33	0.00 <60>	0.00 <60>	812.0	0.1
4/29 18:34	8	0.33	0.00 <60>	0.00 <60>	811.3	0.1
4/29 18:35	13	0.00 <13>	0.00 <60>	0.00 <60>	810.6	0.1 <13>
Average (all)	--	0.14	0.00	0.00	816.2	0.1
Total (all)	--	--	--	--	--	--
Minimum (all)	--	0.00	0.00	0.00	810.6	0.1
Maximum (all)	--	0.33	0.00	0.00	820.8	0.1
Average (valid values only)	--	0.15	--	--	816.2	0.1
Total (valid values only)	--	--	--	--	--	--
Count (valid values only)	--	15	0	0	16	15

<13> = Down
<60> = N/A

Shutdown #1

CeDAR 1-Minute Data

Panoche Energy Center

Data for 4/29/2009 6:20 PM thru 4/29/2009 6:35 PM

Timestamp	(Turbine 2) 60-O2% 1-Min	(Turbine 2) CT Gas Flow kscf/hr 1-Min	(Turbine 2) CT Heat Input Rate mmBtu/hr 1-Min	(Turbine 2) CT Megawatts 1-Min
4/29 18:20	13.07	881.9	926.0	103.9
4/29 18:21	13.07	882.4	926.5	104.0
4/29 18:22	13.12	823.2	864.4	94.0
4/29 18:23	13.60	579.3	608.3	56.2
4/29 18:24	14.45	297.5	312.4	18.1
4/29 18:25	16.97	71.9	75.5	0.1
4/29 18:26	18.13	61.4	64.5	0.1
4/29 18:27	18.17	61.7	64.8	0.1
4/29 18:28	18.18	61.6	64.7	0.1
4/29 18:29	18.18	61.5	64.6	0.1
4/29 18:30	18.19	61.5	64.6	0.1
4/29 18:31	18.18	61.6	64.7	0.1
4/29 18:32	18.18	61.7	64.8	0.1
4/29 18:33	18.17	61.5	64.6	0.1
4/29 18:34	18.17	61.2	64.3	0.1
4/29 18:35	18.67 <13>	0.0 <13>	0.0 <13>	0.1 <13>
Average (all)	16.66	255.6	268.4	23.6
Total (all)	--	--	--	--
Minimum (all)	13.07	0.0	0.0	0.1
Maximum (all)	18.67	882.4	926.5	104.0
Average (valid values only)	16.52	272.7	286.3	25.1
Total (valid values only)	--	--	--	--
Count (valid values only)	15	15	15	15

<13> = Down

Appendix C.7

Avogadro Group CEMS Data, Unit 1

Test Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm	
Begin calculating run averages					
04-30-2009 17:15:04	13.024	4.6615	5.2712	2.5969	
04-30-2009 17:16:05	13.030	4.6548	4.9701	2.6310	
04-30-2009 17:17:03	13.027	4.6582	5.0310	2.6271	- 6
04-30-2009 17:18:04	13.029	4.6597	4.8919	2.6835	
04-30-2009 17:19:05	13.034	4.6565	5.1184	2.6743	
04-30-2009 17:20:04	13.035	4.6585	5.2552	2.7311	- 5
04-30-2009 17:21:04	13.033	4.6579	4.7849	2.7942	
04-30-2009 17:22:05	13.044	4.6520	4.9778	2.7675	
04-30-2009 17:23:04	13.053	4.6520	5.2172	2.7707	- 4
04-30-2009 17:24:04	13.049	4.6527	5.3612	2.7763	
04-30-2009 17:25:05	13.025	4.6686	4.9307	2.5074	
04-30-2009 17:26:04	13.018	4.6721	4.2903	2.5218	- 3
04-30-2009 17:27:04	13.013	4.6758	3.9050	2.5764	
04-30-2009 17:28:05	13.001	4.6823	4.1932	2.4062	
04-30-2009 17:29:04	13.003	4.6820	4.0061	2.4323	- 2
04-30-2009 17:30:04	12.999	4.6837	3.8709	2.4390	
04-30-2009 17:31:03	12.996	4.6877	3.9365	2.3827	
04-30-2009 17:32:04	12.995	4.6892	3.8981	2.3794	- 1
Begin Traverse					
04-30-2009 17:33:04	12.995	4.6921	3.7221	2.3826	
04-30-2009 17:34:03	15.900	3.0130	3.7034	1.5372	
04-30-2009 17:35:04	14.726	3.6503	2.6235	2.1569	
04-30-2009 17:36:03	13.021	4.6741	5.5515	3.0163	
End Traverse					
04-30-2009 17:37:04	13.016	4.6796	6.1052	3.0658	
04-30-2009 17:38:05	13.014	4.6816	5.2985	3.0206	
04-30-2009 17:39:03	13.016	4.6820	5.0852	2.9777	- 6
04-30-2009 17:40:04	13.015	4.6819	4.7425	2.9984	
04-30-2009 17:41:05	13.013	4.6820	4.4110	3.0403	
04-30-2009 17:42:03	13.018	4.6784	4.1902	2.9715	- 5
04-30-2009 17:43:04	13.027	4.6721	3.9529	2.9249	
04-30-2009 17:44:05	13.029	4.6721	3.9239	2.8662	
04-30-2009 17:45:04	13.042	4.6667	3.9261	2.8031	- 4
04-30-2009 17:46:04	13.053	4.6622	4.1119	2.7595	
04-30-2009 17:47:05	13.049	4.6628	3.9131	2.8414	
04-30-2009 17:48:04	13.055	4.6622	3.8626	2.7167	- 3
04-30-2009 17:49:04	13.072	4.6538	3.8106	2.3595	
04-30-2009 17:50:03	13.075	4.6557	3.8105	2.3122	
04-30-2009 17:51:04	13.067	4.6601	3.6012	2.2583	- 2
04-30-2009 17:52:04	13.064	4.6608	3.4749	2.2194	
04-30-2009 17:53:03	13.056	4.6643	3.5822	2.2019	
04-30-2009 17:54:04	13.099	4.6421	3.1317	2.1683	- 1
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm	
04-30-2009 17:55:03	13.037	4.6656	4.3257	2.6196	

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-30-2009 17:56:07	13.388	4.3289	2.8286	1.9014
04-30-2009 17:57:08	11.899	4.0518	2.0157	0.2127
04-30-2009 17:58:09	11.507	4.1811	0.1966	0.0012
04-30-2009 17:59:08	11.475	4.1740	0.0306	0.0042
04-30-2009 18:00:08	3.777	1.4827	1.1115	1.6616

Final System Bias Check for Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-30-2009 18:01:05 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.018	-0.0004	-0.0471	0.0137
Zero Avg	0.039	0.0798	0.0280	0.0017
Zero Bias%	0.1%	0.9%	0.8%	0.2%
Zero Drift%	0.0%	0.6%	1.0%	-0.1%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.591	4.1695	5.1516	2.4931
Span Avg	11.503	4.1818	5.3084	2.3665
Span Bias%	0.4%	0.1%	1.7%	2.3%
Span Drift%	-0.1%	0.4%	2.0%	-0.2%
Ini Zero Avg	0.037	0.0295	-0.0626	0.0064
Ini Span Avg	11.518	4.1519	5.1208	2.3768
Run Avg	13.037	4.6656	4.3257	2.6196
Co	0.038	0.0547	-0.0173	0.0040
Cm	11.510	4.1669	5.2146	2.3717
Correct Avg	13.166	4.5748	4.2086	2.7618

System Bias Check End

Test Run 2 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
Begin calculating run averages				
04-30-2009 18:10:06	12.835	4.6719	3.5190	2.8735
04-30-2009 18:11:06	12.869	4.6702	3.7547	2.9358
04-30-2009 18:12:05	13.027	4.6695	3.7833	2.9113
04-30-2009 18:13:06	13.043	4.6713	3.7856	2.9067
04-30-2009 18:14:06	13.040	4.6720	3.5861	2.9598
04-30-2009 18:15:05	13.046	4.6670	3.2659	2.6672
04-30-2009 18:16:06	13.038	4.6719	3.1063	2.3565
04-30-2009 18:17:06	13.037	4.6726	2.9739	2.3378
04-30-2009 18:18:05	13.038	4.6734	3.0070	2.3610
04-30-2009 18:19:06	13.042	4.6720	3.0268	2.3268
04-30-2009 18:20:06	13.046	4.6719	2.8962	2.2429
04-30-2009 18:21:05	13.040	4.6719	2.9765	2.2134
04-30-2009 18:22:06	13.041	4.6719	2.9625	2.2656
04-30-2009 18:23:07	13.041	4.6719	2.9178	2.2901
04-30-2009 18:24:05	13.045	4.6719	2.7726	2.3051
Begin Traverse				
04-30-2009 18:25:06	13.520	4.4262	2.7698	2.2475
04-30-2009 18:26:07	18.885	1.2078	1.8529	0.4880
04-30-2009 18:27:05	13.620	4.3207	1.8582	2.1133
End Traverse				
04-30-2009 18:28:06	13.047	4.6688	2.6522	2.2869
04-30-2009 18:29:07	13.045	4.6720	2.7634	2.2709
04-30-2009 18:30:05	13.042	4.6720	2.6726	2.2678
04-30-2009 18:31:06	13.041	4.6720	2.7162	2.2690
04-30-2009 18:32:05	13.042	4.6740	2.5972	2.2612
04-30-2009 18:33:06	13.037	4.6788	2.7710	2.2290
04-30-2009 18:34:06	13.037	4.6775	2.8920	2.2227
04-30-2009 18:35:05	13.039	4.6774	2.6045	2.3097
04-30-2009 18:36:06	13.033	4.6820	2.3694	2.3777
04-30-2009 18:37:06	13.037	4.6806	2.6084	2.3283
04-30-2009 18:38:05	13.038	4.6802	2.4287	2.3558
04-30-2009 18:39:06	13.038	4.6779	2.5811	2.2895
04-30-2009 18:40:06	13.040	4.6786	2.3615	2.2842
04-30-2009 18:41:05	13.038	4.6803	2.6868	2.2099
04-30-2009 18:42:06	13.037	4.6803	2.6229	2.2211
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-30-2009 18:43:02	13.027	4.6745	2.9257	2.4032

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1
Test Run 2 End

Final System Bias Check, Run 2 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-30-2009 18:44:30	12.991	4.2841	2.4726	1.6934
04-30-2009 18:45:31	11.611	4.1532	0.9221	0.0739
04-30-2009 18:46:32	11.421	4.1681	0.0423	0.0080
04-30-2009 18:47:30	3.313	1.3266	1.2280	1.6473
04-30-2009 18:48:31	0.075	0.1025	4.8743	2.3718

Final System Bias Check for Run 2

Operator: Jeremy Klosinski

Plant Name: Panoche Energy Center

Location: Turbine # 1

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-30-2009 18:48:33 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.018	-0.0004	-0.0471	0.0137
Zero Avg	0.037	0.0798	0.0314	0.0002
Zero Bias%	0.1%	0.9%	0.8%	0.2%
Zero Drift%	0.0%	0.0%	0.0%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.591	4.1695	5.1516	2.4931
Span Avg	11.501	4.1919	5.3076	2.3848
Span Bias%	0.5%	0.3%	1.7%	1.9%
Span Drift%	0.0%	0.1%	0.0%	0.3%
Ini Zero Avg	0.039	0.0798	0.0280	0.0017
Ini Span Avg	11.503	4.1818	5.3084	2.3665
Run Avg	13.027	4.6745	2.9257	2.4032
Co	0.038	0.0798	0.0297	0.0009
Cm	11.502	4.1869	5.3080	2.3757
Correct Avg	13.166	4.5645	2.7817	2.5290

System Bias Check End

Test Run 3 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
Begin calculating run averages				
04-30-2009 18:53:02	12.786	4.6710	2.5232	2.3328
04-30-2009 18:54:03	12.789	4.6703	2.3456	2.3786
04-30-2009 18:55:01	12.793	4.6689	2.2355	2.3525
04-30-2009 18:56:02	12.831	4.6707	2.2839	2.3198
04-30-2009 18:57:03	13.027	4.6718	2.4031	2.2573
04-30-2009 18:58:01	13.045	4.6721	2.4785	2.2251
04-30-2009 18:59:02	13.046	4.6722	2.3049	2.3233
04-30-2009 19:00:03	13.051	4.6715	2.2377	2.2916
04-30-2009 19:01:01	13.050	4.6721	2.3232	2.2704
04-30-2009 19:02:02	13.048	4.6709	2.3145	2.2823
04-30-2009 19:03:03	13.050	4.6681	2.3736	2.2668
04-30-2009 19:04:02	13.053	4.6662	2.2848	2.2892
04-30-2009 19:05:02	13.053	4.6675	2.2593	2.3096
04-30-2009 19:06:03	13.051	4.6678	2.2432	2.2988
04-30-2009 19:07:02	13.057	4.6624	2.3511	2.2265
Begin Traverse				
04-30-2009 19:08:02	13.619	4.3587	2.1527	2.2014
04-30-2009 19:09:03	20.008	0.5576	1.4370	0.1815
04-30-2009 19:10:02	14.587	3.7429	1.3210	1.8020
End Traverse				
04-30-2009 19:11:02	13.071	4.6483	2.5267	2.2692
04-30-2009 19:12:03	13.056	4.6611	2.6098	2.2785
04-30-2009 19:13:02	13.058	4.6556	2.4996	2.2857
04-30-2009 19:14:02	13.055	4.6583	2.4413	2.3043
04-30-2009 19:15:03	13.056	4.6562	2.6007	2.2771
04-30-2009 19:16:02	13.054	4.6586	2.3785	2.3125
04-30-2009 19:17:03	13.055	4.6564	2.4400	2.3198
04-30-2009 19:18:03	13.057	4.6549	2.4615	2.2858
04-30-2009 19:19:02	13.055	4.6568	2.4027	2.2755
04-30-2009 19:20:03	13.053	4.6581	2.2716	2.3411
04-30-2009 19:21:03	13.055	4.6532	2.5617	2.2812
04-30-2009 19:22:02	13.056	4.6532	2.5751	2.2709
04-30-2009 19:23:03	13.056	4.6525	2.4990	2.2813
04-30-2009 19:24:01	13.054	4.6529	2.5329	2.3193
04-30-2009 19:25:02	13.054	4.6526	2.5793	2.3156
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-30-2009 19:26:01	13.018	4.6626	2.4172	2.2958

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1
Test Run 3 End

Final System Bias Check, Run 3 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-30-2009 19:27:16	13.140	4.4160	2.5129	2.0630
04-30-2009 19:28:17	11.800	4.0933	1.3896	0.2262
04-30-2009 19:29:15	11.503	4.1692	0.1526	0.0055
04-30-2009 19:30:16	6.889	2.5690	0.4348	0.8897
04-30-2009 19:31:17	0.235	0.1484	4.0865	2.3472

Final System Bias Check for Run 3

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 1

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-30-2009 19:31:53 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.018	-0.0004	-0.0471	0.0137
Zero Avg	0.037	0.0598	0.0720	0.0014
Zero Bias%	0.1%	0.7%	1.3%	0.2%
Zero Drift%	0.0%	-0.2%	0.4%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.591	4.1695	5.1516	2.4931
Span Avg	11.500	4.1723	5.3369	2.3974
Span Bias%	0.5%	0.0%	2.0%	1.7%
Span Drift%	0.0%	-0.2%	0.3%	0.2%
Ini Zero Avg	0.037	0.0798	0.0314	0.0002
Ini Span Avg	11.501	4.1919	5.3076	2.3848
Run Avg	13.018	4.6626	2.4172	2.2958
Co	0.037	0.0698	0.0517	0.0008
Cm	11.500	4.1821	5.3222	2.3911
Correct Avg	13.159	4.5567	2.2755	2.4003

System Bias Check End

Appendix C.8

Avogadro Group CEMS Data, Unit 2

Test Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm	
04-27-2009 10:50:12	13.024	4.6892	0.2415	2.6646	
04-27-2009 10:51:13	13.003	4.7003	0.4285	2.9388	
04-27-2009 10:52:14	13.005	4.7013	1.1208	3.0249	
Begin calculating run averages					
04-27-2009 10:54:02	12.997	4.7012	0.8030	2.9736	
04-27-2009 10:55:02	12.997	4.7085	0.7302	2.9017	
04-27-2009 10:56:03	12.996	4.7416	0.6580	2.8862	- 6
04-27-2009 10:57:03	13.001	4.7747	0.6159	2.9262	
04-27-2009 10:58:02	13.008	4.7812	0.5758	3.0220	
04-27-2009 10:59:02	13.024	4.7703	0.5722	2.8921	- 5
04-27-2009 11:00:03	13.045	4.7655	0.5660	2.8626	
04-27-2009 11:01:03	13.063	4.7815	0.5655	2.9186	
04-27-2009 11:02:02	13.056	4.7816	0.5161	2.9727	- 4
04-27-2009 11:03:02	13.058	4.7817	0.4924	3.0196	
04-27-2009 11:04:03	13.041	4.7930	0.4361	2.7514	
04-27-2009 11:05:03	13.040	4.7982	0.2286	2.5682	- 3
04-27-2009 11:06:02	13.042	4.7929	0.1934	2.6491	
04-27-2009 11:07:02	13.029	4.8022	0.1860	2.5998	
04-27-2009 11:08:03	13.037	4.7968	0.1567	2.6224	- 2
04-27-2009 11:09:03	13.040	4.7956	0.1675	2.5468	
04-27-2009 11:10:02	13.032	4.7962	0.1765	2.4532	1
04-27-2009 11:11:02	13.027	4.8026	0.1625	2.4661	-
Begin Traverse					
04-27-2009 11:12:03	13.034	4.7930	0.1346	2.4995	
04-27-2009 11:13:03	16.152	2.9924	0.1568	1.5798	
04-27-2009 11:14:04	17.342	2.2731	0.4072	1.3238	
04-27-2009 11:15:02	13.309	4.6175	1.4105	3.2252	
04-27-2009 11:16:02	13.082	4.7562	2.3888	3.3306	
End Traverse					
04-27-2009 11:17:05	13.081	4.7554	2.1206	3.2813	
04-27-2009 11:18:02	13.083	4.7525	1.6007	3.2748	
04-27-2009 11:19:02	13.088	4.7526	1.2540	3.2372	- 6
04-27-2009 11:20:03	13.090	4.7527	1.1759	3.1948	
04-27-2009 11:21:03	13.086	4.7527	1.0930	3.1804	
04-27-2009 11:22:04	13.084	4.7528	0.9203	3.0962	- 5
04-27-2009 11:23:02	13.077	4.7529	0.7027	3.0762	
04-27-2009 11:24:02	13.078	4.7529	0.6007	3.1341	
04-27-2009 11:25:03	13.084	4.7509	0.5192	3.0126	- 4
04-27-2009 11:26:03	13.087	4.7474	0.4175	2.8923	
04-27-2009 11:27:02	13.089	4.7468	0.3711	2.8995	
04-27-2009 11:28:02	13.086	4.7527	0.3440	2.8883	- 3
04-27-2009 11:29:02	13.087	4.7476	0.2688	2.5163	
04-27-2009 11:30:03	13.090	4.7439	0.1616	2.3350	
04-27-2009 11:31:03	13.068	4.7579	0.1394	2.1608	- 2
04-27-2009 11:32:02	13.060	4.7628	0.1114	2.1433	
04-27-2009 11:33:02	13.062	4.7590	0.1006	2.2117	
04-27-2009 11:34:03	13.067	4.7534	0.1050	2.2800	- 1
04-27-2009 11:35:03	13.064	4.7599	0.1255	2.2019	
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm	
04-27-2009 11:35:04	13.055	4.7643	0.4948	2.7710	

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-27-2009 11:36:13	13.160	4.5876	0.0605	2.0208
04-27-2009 11:37:11	12.118	4.1456	0.2705	0.4070
04-27-2009 11:38:12	11.576	4.2383	-0.0512	0.0033
04-27-2009 11:39:12	11.454	4.2107	-0.1301	0.0077
04-27-2009 11:40:12	4.061	1.6245	0.9772	1.4820
04-27-2009 11:41:13	0.162	0.1826	4.5081	2.4311

Final System Bias Check for Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-27-2009 11:41:38 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.024	-0.0004	-0.0494	-0.0012
Zero Avg	0.017	0.1100	-0.1348	-0.0007
Zero Bias%	0.0%	1.3%	0.9%	0.0%
Zero Drift%	-0.2%	1.4%	-1.0%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.606	4.1327	5.1506	2.5923
Span Avg	11.556	4.2428	5.1494	2.4783
Span Bias%	0.2%	1.3%	0.0%	2.0%
Span Drift%	0.0%	2.0%	-0.4%	-0.4%
Ini Zero Avg	0.048	-0.0104	-0.0379	-0.0013
Ini Span Avg	11.565	4.0725	5.1895	2.5032
Run Avg	13.055	4.7643	0.4948	2.7710
Co	0.033	0.0498	-0.0863	-0.0010
Cm	11.561	4.1577	5.1695	2.4908
Correct Avg	13.126	4.6825	0.5606	2.7812

System Bias Check End

Test Run 2 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
Begin calculating run averages				
04-27-2009 11:58:01	13.053	4.7587	0.1720	2.8375
04-27-2009 11:59:02	13.058	4.7549	0.1739	2.7745
04-27-2009 12:00:03	13.062	4.7523	0.1848	2.8514
04-27-2009 12:01:01	13.055	4.7530	0.1869	2.7958
04-27-2009 12:02:01	13.059	4.7523	0.1709	2.8129
04-27-2009 12:03:02	13.062	4.7509	0.1418	2.7943
04-27-2009 12:04:03	13.060	4.7524	0.1606	2.7418
04-27-2009 12:05:01	13.062	4.7521	0.1411	2.7704
04-27-2009 12:06:02	13.065	4.7517	0.1284	2.7694
04-27-2009 12:07:02	13.060	4.7520	0.1058	2.7458
Begin Traverse				
04-27-2009 12:08:01	13.064	4.7520	0.1076	2.7883
04-27-2009 12:09:01	13.062	4.7511	0.1232	2.7395
04-27-2009 12:10:02	13.060	4.7514	0.1345	2.7502
04-27-2009 12:11:03	13.066	4.7461	0.1105	2.7780
04-27-2009 12:12:01	13.058	4.7523	0.1352	2.7318
04-27-2009 12:13:02	13.061	4.7495	0.1124	2.7607
04-27-2009 12:14:02	13.062	4.7488	0.1054	2.7211
04-27-2009 12:15:01	13.059	4.7493	0.1077	2.7260
04-27-2009 12:16:02	13.060	4.7463	0.1011	2.7241
04-27-2009 12:17:02	13.058	4.7493	0.0970	2.7454
Begin Traverse				
04-27-2009 12:18:01	13.060	4.7439	0.1139	2.7828
04-27-2009 12:19:01	13.058	4.7431	0.0958	2.7578
04-27-2009 12:20:02	13.055	4.7435	0.0974	2.7443
04-27-2009 12:21:02	13.056	4.7422	0.1065	2.7510
04-27-2009 12:22:01	13.054	4.7426	0.0968	2.7854
04-27-2009 12:23:01	13.057	4.7423	0.0921	2.7652
04-27-2009 12:24:02	13.061	4.7396	0.0806	2.7460
04-27-2009 12:25:03	13.058	4.7424	0.0975	2.7285
04-27-2009 12:26:01	13.064	4.7366	0.0894	2.7726
04-27-2009 12:27:02	13.080	4.7232	0.0724	2.9650
Run Averages	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-27-2009 12:27:02	13.060	4.7475	0.1214	2.7719

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 2 End

Final System Bias Check, Run 2 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-27-2009 12:28:07	13.200	4.5255	0.0483	2.8361
04-27-2009 12:29:05	11.889	4.1209	0.1936	0.2777
04-27-2009 12:30:06	11.564	4.2171	-0.1706	-0.0010
04-27-2009 12:31:06	8.809	3.2541	-0.1237	0.4896
04-27-2009 12:32:07	0.334	0.2202	3.0910	2.3836

Final System Bias Check for Run 2

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-27-2009 12:32:55 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.024	-0.0004	-0.0494	-0.0012
Zero Avg	0.020	0.0796	-0.2351	-0.0010
Zero Bias%	0.0%	0.9%	2.0%	0.0%
Zero Drift%	0.0%	-0.4%	-1.1%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.606	4.1327	5.1506	2.5923
Span Avg	11.563	4.2144	5.0665	2.4686
Span Bias%	0.2%	1.0%	0.9%	2.2%
Span Drift%	0.0%	-0.3%	-0.9%	-0.2%
Ini Zero Avg	0.017	0.1100	-0.1348	-0.0007
Ini Span Avg	11.556	4.2428	5.1494	2.4783
Run Avg	13.060	4.7475	0.1214	2.7719
Co	0.019	0.0948	-0.1850	-0.0009
Cm	11.560	4.2286	5.1080	2.4735
Correct Avg	13.131	4.5921	0.2935	2.8016

System Bias Check End

Test Run 3 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
Begin calculating run averages				
04-27-2009 12:37:02	12.819	4.7227	0.1621	3.0472
04-27-2009 12:38:03	12.821	4.7224	0.1977	3.0742
04-27-2009 12:39:03	12.829	4.7215	0.2183	3.0708
04-27-2009 12:40:02	12.843	4.7225	0.2331	3.0555
04-27-2009 12:41:03	13.041	4.7225	0.2490	2.9981
04-27-2009 12:42:03	13.067	4.7234	0.2240	2.9728
04-27-2009 12:43:04	13.068	4.7223	0.2091	3.0108
04-27-2009 12:44:02	13.062	4.7294	0.2137	2.9605
04-27-2009 12:45:03	13.063	4.7262	0.2310	2.9384
04-27-2009 12:46:03	13.060	4.7298	0.2424	2.9577
Begin Traverse				
04-27-2009 12:47:04	13.065	4.7247	0.2459	2.9905
04-27-2009 12:48:02	13.064	4.7223	0.2560	3.0220
04-27-2009 12:49:03	13.062	4.7261	0.2693	3.0024
04-27-2009 12:50:03	13.060	4.7278	0.2646	2.9489
04-27-2009 12:51:02	13.062	4.7224	0.2547	2.9903
04-27-2009 12:52:03	13.063	4.7232	0.2387	3.0166
04-27-2009 12:53:03	13.065	4.7226	0.2327	3.0471
04-27-2009 12:54:04	13.063	4.7226	0.2303	3.0179
04-27-2009 12:55:02	13.065	4.7225	0.2112	3.0098
04-27-2009 12:56:03	13.066	4.7224	0.1983	2.9468
Begin Traverse				
04-27-2009 12:57:03	13.069	4.7223	0.1723	3.0316
04-27-2009 12:58:04	13.066	4.7223	0.1561	3.0410
04-27-2009 12:59:02	13.068	4.7223	0.1808	3.0552
04-27-2009 13:00:03	13.069	4.7223	0.1653	3.0335
04-27-2009 13:01:03	13.069	4.7226	0.1589	3.0604
04-27-2009 13:02:04	13.064	4.7226	0.1542	2.9947
04-27-2009 13:03:02	13.063	4.7224	0.1756	2.9717
04-27-2009 13:04:03	13.065	4.7224	0.1533	3.0326
04-27-2009 13:05:03	13.066	4.7225	0.1460	3.0373
04-27-2009 13:06:02	13.065	4.7225	0.1421	3.0378
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-27-2009 13:06:02	13.032	4.7234	0.2062	3.0125

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 3 End

Final System Bias Check, Run 3 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-27-2009 13:07:40	13.194	4.4151	0.1555	2.6117
04-27-2009 13:08:40	11.764	4.1357	0.3114	0.1580
04-27-2009 13:09:41	11.564	4.2020	-0.1213	-0.0010
04-27-2009 13:10:40	5.427	2.0489	0.4172	1.1638
04-27-2009 13:11:40	0.076	0.0992	4.2738	2.4442

Final System Bias Check for Run 3

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-27-2009 13:12:39 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.024	-0.0004	-0.0494	-0.0012
Zero Avg	0.016	0.0695	-0.1031	-0.0010
Zero Bias%	0.0%	0.8%	0.6%	0.0%
Zero Drift%	0.0%	-0.1%	1.4%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.606	4.1327	5.1506	2.5923
Span Avg	11.564	4.2021	5.0453	2.4659
Span Bias%	0.2%	0.8%	1.1%	2.3%
Span Drift%	0.0%	-0.1%	-0.2%	0.0%
Ini Zero Avg	0.020	0.0796	-0.2351	-0.0010
Ini Span Avg	11.563	4.2144	5.0665	2.4686
Run Avg	13.032	4.7234	0.2062	3.0125
Co	0.018	0.0745	-0.1691	-0.0010
Cm	11.563	4.2083	5.0559	2.4673
Correct Avg	13.099	4.5885	0.3642	3.0522

System Bias Check End

Test Run 3 STRATA Version 2.01

	O2 %	CO2 %
04-28-2009 16:19:01	13.046	4.6379
04-28-2009 16:20:02	13.045	4.6400
04-28-2009 16:21:02	13.040	4.6417
04-28-2009 16:22:01	13.043	4.6416
04-28-2009 16:23:02	13.047	4.6354
04-28-2009 16:24:01	13.047	4.6313
04-28-2009 16:25:01	13.043	4.6313
04-28-2009 16:26:02	13.040	4.6333
04-28-2009 16:27:01	13.041	4.6313
04-28-2009 16:28:00	13.040	4.6313
04-28-2009 16:29:02	13.040	4.6314
04-28-2009 16:30:01	13.040	4.6314
04-28-2009 16:31:00	13.038	4.6314
04-28-2009 16:32:02	13.038	4.6313
04-28-2009 16:33:01	13.036	4.6312
04-28-2009 16:34:02	13.035	4.6356
04-28-2009 16:35:01	13.035	4.6370
04-28-2009 16:36:01	13.033	4.6423
04-28-2009 16:37:02	13.031	4.6374
04-28-2009 16:38:01	13.034	4.6315
04-28-2009 16:39:01	13.034	4.6323
04-28-2009 16:40:02	13.036	4.6336
04-28-2009 16:41:01	13.035	4.6312
04-28-2009 16:42:01	13.034	4.6313
04-28-2009 16:43:02	13.035	4.6320
Run Averages	O2 %	CO2 %
04-28-2009 16:43:37	13.070	4.6663

Toxics #1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 3 End

Final System Bias Check, Run 3 STRATA Version 2.01

	O2 %	CO2 %
04-28-2009 16:44:52	13.149	4.5768
04-28-2009 16:45:54	13.237	4.4612
04-28-2009 16:46:53	12.197	4.0941
04-28-2009 16:47:52	11.557	4.1261
04-28-2009 16:48:54	11.516	4.1320
04-28-2009 16:49:53	11.514	4.1407
04-28-2009 16:50:52	11.513	4.1413
04-28-2009 16:51:53	11.732	4.2122
04-28-2009 16:52:53	12.258	4.3987
04-28-2009 16:53:52	10.587	3.9294
04-28-2009 16:54:53	1.802	0.7910

Final System Bias Check for Run 3

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622

Date/Time 04-28-2009 16:55:44 PASSED

Analyte	O2	CO2
Units	%	%
Zero Ref Cyl	0.000	0.0000
Zero Cal	0.024	0.0021
Zero Avg	0.065	0.0592
Zero Bias%	0.2%	0.7%
Zero Drift%	0.1%	-0.1%
Span Ref Cyl	11.620	4.0800
Span Cal	11.650	4.1719
Span Avg	11.514	4.1413
Span Bias%	0.7%	0.4%
Span Drift%	-0.2%	-0.5%
Ini Zero Avg	0.044	0.0695
Ini Span Avg	11.551	4.1845
Run Avg	13.070	4.6663
Co	0.055	0.0644
Cm	11.533	4.1629
Correct Avg	13.177	4.5812

System Bias Check End

Test Run 5 STRATA Version 2.01

	O2 %	CO2 %
04-29-2009 12:27:01	13.099	4.7037
04-29-2009 12:28:02	13.099	4.7021
04-29-2009 12:29:01	13.097	4.7035
04-29-2009 12:30:00	13.097	4.7021
04-29-2009 12:31:02	13.098	4.7019
04-29-2009 12:32:01	13.101	4.7019
04-29-2009 12:33:02	13.104	4.7016
04-29-2009 12:34:01	13.113	4.6951
04-29-2009 12:35:02	13.106	4.6978
04-29-2009 12:36:01	13.100	4.7018
04-29-2009 12:37:00	13.099	4.7018
04-29-2009 12:38:02	13.098	4.7018
04-29-2009 12:39:01	13.100	4.7018
04-29-2009 12:40:02	13.114	4.6955
04-29-2009 12:41:01	13.113	4.6920
04-29-2009 12:42:02	13.096	4.7016
04-29-2009 12:43:02	13.094	4.7020
04-29-2009 12:44:01	13.096	4.7001
04-29-2009 12:45:02	13.096	4.7020
04-29-2009 12:46:01	13.095	4.7019
04-29-2009 12:47:02	13.090	4.7072
04-29-2009 12:48:01	13.090	4.7089
04-29-2009 12:49:02	13.098	4.7038
04-29-2009 12:50:02	13.103	4.7018
04-29-2009 12:51:01	13.095	4.7070
04-29-2009 12:52:02	13.089	4.7117
04-29-2009 12:53:01	13.091	4.7048
04-29-2009 12:54:00	13.095	4.7026
04-29-2009 12:55:02	13.097	4.7020
04-29-2009 12:56:01	13.110	4.6971
04-29-2009 12:57:02	13.107	4.7025
04-29-2009 12:58:01	13.092	4.7116
04-29-2009 12:59:02	13.097	4.7093
04-29-2009 13:00:01	13.096	4.7116
04-29-2009 13:01:00	13.098	4.7117
04-29-2009 13:02:02	13.096	4.7117
04-29-2009 13:03:01	13.090	4.7135
04-29-2009 13:04:02	13.090	4.7118
04-29-2009 13:05:01	13.093	4.7118
04-29-2009 13:06:00	13.092	4.7119
04-29-2009 13:07:02	13.093	4.7119

Run Averages

	O2 %	CO2 %
04-29-2009 13:07:02	13.135	4.7203

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 5 End

Toxics #2

Final System Bias Check, Run 5 STRATA Version 2.01

	O2 %	CO2 %
04-29-2009 13:11:04	13.173	4.6515
04-29-2009 13:12:05	12.408	4.0655
04-29-2009 13:13:05	11.578	4.2126
04-29-2009 13:14:04	6.669	2.5215

Final System Bias Check for Run 5

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622

Date/Time 04-29-2009 13:15:03 PASSED

Analyte	O2	CO2
Units	%	%
Zero Ref Cyl	0.000	0.0000
Zero Cal	0.019	-0.0005
Zero Avg	0.092	0.1092
Zero Bias%	0.4%	1.3%
Zero Drift%	0.2%	0.9%
Span Ref Cyl	11.620	4.0800
Span Cal	11.634	4.1725
Span Avg	11.611	4.2015
Span Bias%	0.1%	0.3%
Span Drift%	0.1%	0.3%
Ini Zero Avg	0.052	0.0344
Ini Span Avg	11.588	4.1723
Run Avg	13.135	4.7203
Co	0.072	0.0718
Cm	11.600	4.1869
Correct Avg	13.167	4.6088

System Bias Check End

Test Run 6 STRATA Version 2.01

	O2 %	CO2 %
04-29-2009 17:14:59	13.067	4.6626
04-29-2009 17:16:01	13.065	4.6626
04-29-2009 17:17:00	13.064	4.6626
04-29-2009 17:18:01	13.064	4.6626
04-29-2009 17:19:00	13.064	4.6565
04-29-2009 17:19:59	13.063	4.6526
04-29-2009 17:21:00	13.063	4.6526
04-29-2009 17:22:00	13.063	4.6527
04-29-2009 17:23:01	13.064	4.6527
04-29-2009 17:24:00	13.062	4.6524
04-29-2009 17:25:01	13.062	4.6455
04-29-2009 17:26:00	13.061	4.6488
04-29-2009 17:27:00	13.062	4.6498
04-29-2009 17:28:01	13.061	4.6525
04-29-2009 17:29:00	13.060	4.6525
04-29-2009 17:30:01	13.060	4.6525
04-29-2009 17:31:00	13.059	4.6525
04-29-2009 17:32:00	13.061	4.6443
04-29-2009 17:33:01	13.060	4.6427
04-29-2009 17:34:00	13.059	4.6427
04-29-2009 17:35:01	13.057	4.6516
04-29-2009 17:36:00	13.060	4.6445
04-29-2009 17:36:59	13.060	4.6428
04-29-2009 17:38:01	13.061	4.6429
04-29-2009 17:39:00	13.062	4.6415
04-29-2009 17:40:01	13.062	4.6399
04-29-2009 17:41:00	13.066	4.6339
04-29-2009 17:42:01	13.067	4.6349
04-29-2009 17:43:00	13.068	4.6329
04-29-2009 17:43:59	13.066	4.6329
04-29-2009 17:45:01	13.067	4.6329
04-29-2009 17:46:00	13.065	4.6329
04-29-2009 17:47:01	13.069	4.6341
04-29-2009 17:48:00	13.065	4.6425
04-29-2009 17:48:59	13.065	4.6428
04-29-2009 17:50:00	13.065	4.6428
04-29-2009 17:51:00	13.065	4.6427
04-29-2009 17:52:01	13.065	4.6428
04-29-2009 17:53:00	13.069	4.6428
04-29-2009 17:54:01	13.070	4.6428
04-29-2009 17:55:00	13.071	4.6428
Run Averages	O2 %	CO2 %
04-29-2009 17:55:00	13.072	4.6660

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 6 End

Toxics #3

Final System Bias Check, Run 6 STRATA Version 2.01

	O2 %	CO2 %
04-29-2009 17:57:45	13.122	4.6117
04-29-2009 17:58:45	12.693	3.9459
04-29-2009 17:59:46	11.589	4.1288
04-29-2009 18:00:45	11.372	4.1029
04-29-2009 18:01:46	3.535	1.3622

Final System Bias Check for Run 6

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622

Date/Time 04-29-2009 18:02:28 PASSED

Analyte	O2	CO2
Units	%	%
Zero Ref Cyl	0.000	0.0000
Zero Cal	0.019	-0.0005
Zero Avg	0.112	0.0644
Zero Bias%	0.5%	0.8%
Zero Drift%	0.1%	-0.5%
Span Ref Cyl	11.620	4.0800
Span Cal	11.634	4.1725
Span Avg	11.538	4.1499
Span Bias%	0.5%	0.3%
Span Drift%	-0.4%	-0.6%
Ini Zero Avg	0.092	0.1092
Ini Span Avg	11.611	4.2015
Run Avg	13.072	4.6660
Co	0.102	0.0868
Cm	11.574	4.1757
Correct Avg	13.138	4.5692

System Bias Check End

Appendix C.9

Avogadro Group CEMS Data, Unit 3

Test Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-23-2009 10:09:22	13.089	4.5888	1.0913	3.0251
Begin calculating run averages				
04-23-2009 10:11:02	13.087	4.5839	1.0412	2.9768
04-23-2009 10:12:03	13.083	4.5832	1.0161	2.9843
04-23-2009 10:13:03	13.081	4.5917	1.0301	2.9760
04-23-2009 10:14:04	13.081	4.5923	0.9769	2.9868
04-23-2009 10:15:02	13.082	4.5922	0.9482	2.9644
04-23-2009 10:16:02	13.086	4.5904	0.9500	2.8984
04-23-2009 10:17:03	13.087	4.5920	0.9709	2.8708
04-23-2009 10:18:04	13.090	4.5863	1.0191	2.8856
04-23-2009 10:19:04	13.085	4.5919	1.0130	2.9182
04-23-2009 10:20:02	13.083	4.5906	0.9642	2.9710
Begin Traverse				
04-23-2009 10:21:03	13.082	4.5887	0.9638	2.9856
04-23-2009 10:22:03	13.084	4.5863	0.9131	2.9852
04-23-2009 10:23:04	13.086	4.5823	0.9172	2.9645
End Traverse				
04-23-2009 10:24:02	13.087	4.5828	0.9068	2.9498
04-23-2009 10:25:03	13.087	4.5828	0.9219	2.9435
04-23-2009 10:26:03	13.087	4.5825	0.9566	2.9352
04-23-2009 10:27:04	13.083	4.5850	0.9460	2.9478
04-23-2009 10:28:02	13.084	4.5844	0.9175	2.9508
04-23-2009 10:29:02	13.086	4.5826	0.8837	2.9374
04-23-2009 10:30:03	13.087	4.5826	0.9237	2.9222
04-23-2009 10:31:03	13.084	4.5825	0.9852	2.9195
04-23-2009 10:32:04	13.086	4.5824	1.0277	2.9139
04-23-2009 10:33:02	13.084	4.5822	0.9749	2.9227
Begin Traverse				
04-23-2009 10:34:03	13.079	4.5838	0.8546	2.9245
End Traverse				
04-23-2009 10:35:03	13.078	4.5837	0.8488	2.9452
04-23-2009 10:36:04	13.077	4.5824	0.8507	2.9437
04-23-2009 10:37:04	13.073	4.5916	0.8317	2.9468
04-23-2009 10:38:02	13.068	4.5920	0.7858	2.9722
04-23-2009 10:39:03	13.072	4.5921	0.7990	2.9576
04-23-2009 10:40:03	13.072	4.5922	0.7990	2.9360
04-23-2009 10:41:04	13.066	4.5957	0.8173	2.9514
04-23-2009 10:42:02	13.067	4.5923	0.7834	2.9628
04-23-2009 10:43:02	13.069	4.5924	0.7363	2.9372
04-23-2009 10:44:03	13.067	4.5925	0.7204	2.9281
Run Averages	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-23-2009 10:44:22	13.080	4.5878	0.9093	2.9410

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 10:45:27	13.180	4.4053	0.7574	2.7274
04-23-2009 10:46:27	12.189	3.9749	0.5144	0.6286
04-23-2009 10:47:28	11.594	4.0682	-0.2015	0.0265
04-23-2009 10:48:26	11.561	4.0745	-0.3542	0.0017
04-23-2009 10:49:26	6.404	2.3164	0.2039	0.9974
04-23-2009 10:50:27	0.555	0.2241	3.6357	2.3581
04-23-2009 10:51:27	0.064	0.0152	4.9202	2.4848

Final System Bias Check for Run 1

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-23-2009 10:51:50 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.003	0.0241	0.0436	0.0052
Zero Avg	0.053	0.0110	-0.2358	0.0204
Zero Bias%	0.3%	0.2%	3.0%	0.3%
Zero Drift%	0.1%	-0.2%	-2.6%	0.3%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.617	4.1411	5.1238	2.5946
Span Avg	11.586	4.0697	4.9396	2.4895
Span Bias%	0.2%	0.8%	1.9%	1.9%
Span Drift%	0.1%	-0.6%	-1.0%	-0.4%
Ini Zero Avg	0.043	0.0241	0.0112	0.0027
Ini Span Avg	11.566	4.1211	5.0309	2.5107
Run Avg	13.080	4.5878	0.9093	2.9410
Co	0.048	0.0176	-0.1123	0.0115
Cm	11.576	4.0954	4.9852	2.5001
Correct Avg	13.136	4.5726	1.0161	2.9429

System Bias Check End

Test Run 2 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 10:58:01	12.741	4.5924	0.8151	2.9305
04-23-2009 10:59:02	12.749	4.5924	0.7953	2.9177
Begin calculating run averages				
04-23-2009 11:00:46	13.004	4.6000	0.7943	2.9251
04-23-2009 11:01:47	13.051	4.6024	0.7667	2.9151
04-23-2009 11:02:47	13.056	4.6024	0.7504	2.9047
04-23-2009 11:03:46	13.055	4.6024	0.7413	2.9114
04-23-2009 11:04:46	13.058	4.6024	0.7834	2.9190
04-23-2009 11:05:47	13.066	4.6020	0.8116	2.8961
04-23-2009 11:06:47	13.060	4.6024	0.7578	2.8890
04-23-2009 11:07:46	13.060	4.6024	0.7115	2.8661
04-23-2009 11:08:46	13.066	4.6014	0.7577	2.8701
04-23-2009 11:09:47	13.065	4.6025	0.7879	2.8476
Begin Traverse				
04-23-2009 11:10:47	13.060	4.6063	0.7155	2.8612
04-23-2009 11:11:46	13.063	4.6025	0.7508	2.8563
04-23-2009 11:12:46	13.067	4.6025	0.8007	2.8695
04-23-2009 11:13:46	13.063	4.6039	0.8339	2.8499
04-23-2009 11:14:47	13.061	4.6127	0.7871	2.8615
04-23-2009 11:15:47	13.061	4.6113	0.7622	2.8690
04-23-2009 11:16:46	13.054	4.6127	0.7183	2.8734
04-23-2009 11:17:46	13.060	4.6109	0.7200	2.8810
04-23-2009 11:18:47	13.055	4.6127	0.7050	2.8641
04-23-2009 11:19:47	13.058	4.6126	0.6942	2.8656
Begin Traverse				
04-23-2009 11:20:46	13.065	4.6124	0.8747	2.8773
04-23-2009 11:21:46	13.064	4.6123	0.8462	2.8772
04-23-2009 11:22:47	13.062	4.6127	0.7238	2.8635
04-23-2009 11:23:47	13.058	4.6162	0.7286	2.8697
04-23-2009 11:24:46	13.054	4.6206	0.7580	2.8603
04-23-2009 11:25:46	13.048	4.6225	0.7298	2.8711
04-23-2009 11:26:47	13.047	4.6299	0.7542	2.8892
04-23-2009 11:27:47	13.053	4.6275	0.7451	2.8821
04-23-2009 11:28:46	13.057	4.6224	0.7527	2.8480
04-23-2009 11:29:46	13.054	4.6245	0.7633	2.8470
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 11:29:46	13.057	4.6103	0.7609	2.8761

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack
Test Run 2 End

Final System Bias Check, Run 2 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 11:30:55	13.164	4.4750	0.6943	2.6969
04-23-2009 11:31:55	12.249	4.0096	0.5687	0.7059
04-23-2009 11:32:56	11.594	4.1063	-0.1621	0.0289
04-23-2009 11:33:54	11.516	4.1005	-0.3354	0.0019
04-23-2009 11:34:55	5.211	1.9447	0.4835	1.2485
04-23-2009 11:35:55	0.381	0.2021	3.9708	2.3809
04-23-2009 11:36:56	0.054	0.0568	4.9415	2.4627

Final System Bias Check for Run 2

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack

	Reference Cylinder Numbers Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-23-2009 11:37:02 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.003	0.0241	0.0436	0.0052
Zero Avg	0.054	0.0564	-0.1402	0.0350
Zero Bias%	0.3%	0.4%	1.9%	0.5%
Zero Drift%	0.0%	0.5%	1.0%	0.3%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.617	4.1411	5.1238	2.5946
Span Avg	11.601	4.1047	4.9402	2.4629
Span Bias%	0.1%	0.4%	1.9%	2.4%
Span Drift%	0.1%	0.4%	0.0%	-0.5%
Ini Zero Avg	0.053	0.0110	-0.2358	0.0204
Ini Span Avg	11.586	4.0697	4.9396	2.4895
Run Avg	13.057	4.6103	0.7609	2.8761
Co	0.053	0.0337	-0.1880	0.0277
Cm	11.594	4.0872	4.9399	2.4762
Correct Avg	13.093	4.6065	0.9382	2.9083

System Bias Check End

Test Run 3 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 11:44:55	12.760	4.6424	0.8043	2.9152
Begin calculating run averages				
04-23-2009 11:46:04	12.990	4.6424	0.7597	2.8947
04-23-2009 11:47:04	13.024	4.6424	0.7256	2.9092
04-23-2009 11:48:05	13.025	4.6425	0.7155	2.9384
04-23-2009 11:49:05	13.028	4.6425	0.6651	2.9121
04-23-2009 11:50:04	13.029	4.6425	0.6720	2.9090
04-23-2009 11:51:04	13.030	4.6425	0.6878	2.9032
04-23-2009 11:52:05	13.031	4.6404	0.6851	2.9210
04-23-2009 11:53:05	13.031	4.6382	0.6753	2.8969
04-23-2009 11:54:04	13.035	4.6356	0.6897	2.8998
04-23-2009 11:55:04	13.035	4.6324	0.8701	2.9065
Begin Traverse				
04-23-2009 11:56:04	13.036	4.6325	1.0399	2.8886
04-23-2009 11:57:05	13.027	4.6325	0.9478	2.9055
04-23-2009 11:58:03	13.035	4.6324	0.7382	2.9347
04-23-2009 11:59:04	13.034	4.6323	0.7184	2.9461
04-23-2009 12:00:04	13.035	4.6316	0.9262	2.9326
04-23-2009 12:01:05	13.034	4.6322	2.1939	2.8652
04-23-2009 12:02:05	13.027	4.6322	2.3216	2.8371
04-23-2009 12:03:04	13.023	4.6322	1.2288	2.8584
04-23-2009 12:04:04	13.022	4.6323	1.3267	2.8977
04-23-2009 12:05:05	13.022	4.6323	2.5334	2.9268
Begin Traverse				
04-23-2009 12:06:05	13.025	4.6276	3.3935	2.9380
04-23-2009 12:07:04	13.027	4.6225	2.8573	2.9705
04-23-2009 12:08:04	13.027	4.6225	2.4288	2.9665
04-23-2009 12:09:04	13.030	4.6225	2.6023	2.9522
04-23-2009 12:10:05	13.026	4.6225	1.8628	2.9226
04-23-2009 12:11:05	13.022	4.6225	0.8951	2.9134
04-23-2009 12:12:04	13.022	4.6226	0.7283	2.9134
04-23-2009 12:13:04	13.021	4.6226	0.7036	2.9188
04-23-2009 12:14:05	13.021	4.6188	0.7110	2.9564
04-23-2009 12:15:05	13.024	4.6127	0.7422	2.9256
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-23-2009 12:15:05	13.027	4.6314	1.2690	2.9154

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack
Test Run 3 End

Final System Bias Check, Run 3 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-23-2009 12:16:37	13.128	4.4961	0.7036	2.7995
04-23-2009 12:17:37	12.322	3.9805	0.6828	0.8098
04-23-2009 12:18:36	11.597	4.0713	-0.0675	0.0291
04-23-2009 12:19:36	11.552	4.0825	-0.2844	-0.0010
04-23-2009 12:20:37	11.158	3.9538	-0.3199	0.0522
04-23-2009 12:21:37	3.460	1.2992	1.1325	1.6181
04-23-2009 12:22:36	0.218	0.1008	4.4267	2.3951
04-23-2009 12:23:36	0.047	0.0204	4.9899	2.4492

Final System Bias Check for Run 3

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 3 Stack

	Reference Cylinder Numbers	
	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-23-2009 12:23:38 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	0.003	0.0241	0.0436	0.0052
Zero Avg	0.048	0.0210	-0.2707	-0.0010
Zero Bias%	0.2%	0.0%	3.3%	0.1%
Zero Drift%	0.0%	-0.4%	-1.4%	-0.6%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.617	4.1411	5.1238	2.5946
Span Avg	11.554	4.0824	4.9882	2.4492
Span Bias%	0.3%	0.7%	1.4%	2.6%
Span Drift%	-0.2%	-0.3%	0.5%	-0.2%
Ini Zero Avg	0.054	0.0564	-0.1402	0.0350
Ini Span Avg	11.601	4.1047	4.9402	2.4629
Run Avg	13.027	4.6314	1.2690	2.9154
Co	0.051	0.0387	-0.2054	0.0170
Cm	11.578	4.0936	4.9642	2.4560
Correct Avg	13.081	4.6211	1.4460	2.9708

System Bias Check End

Appendix C.10

Avogadro Group CEMS Data, Unit 4

Test Run 1 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-24-2009 09:14:11	13.221	4.5124	1.0625	2.3677
Begin calculating run averages				
04-24-2009 09:16:02	13.216	4.5124	1.0128	2.4272
04-24-2009 09:17:03	13.218	4.5086	1.1257	2.4095
04-24-2009 09:18:03	13.224	4.5025	1.1376	2.4200
04-24-2009 09:19:02	13.232	4.5007	1.0808	2.4994
04-24-2009 09:20:03	13.238	4.4928	1.0428	2.5650
04-24-2009 09:21:03	13.239	4.4924	0.9822	2.6274
04-24-2009 09:22:04	13.237	4.4924	0.9976	2.6493
04-24-2009 09:23:02	13.232	4.4971	1.0416	2.6483
04-24-2009 09:24:03	13.231	4.4924	1.0521	2.6913
04-24-2009 09:25:03	13.237	4.4904	1.0518	2.7309
Begin Traverse				
04-24-2009 09:26:02	13.244	4.4826	1.0049	2.7999
04-24-2009 09:27:02	13.239	4.4896	0.9947	2.8238
04-24-2009 09:28:03	13.243	4.4825	0.9625	2.8668
04-24-2009 09:29:03	13.246	4.4825	0.9369	2.9315
04-24-2009 09:30:02	13.247	4.4821	0.9271	2.9468
04-24-2009 09:31:03	13.250	4.4811	0.9403	2.9501
04-24-2009 09:32:03	13.245	4.4826	0.9621	2.9478
04-24-2009 09:33:02	13.250	4.4786	0.9657	3.0077
04-24-2009 09:34:02	13.255	4.4725	0.9047	3.0598
04-24-2009 09:35:03	13.250	4.4803	0.9136	3.0298
Begin Traverse				
04-24-2009 09:36:03	13.249	4.4825	0.9727	2.9965
04-24-2009 09:37:02	13.244	4.4825	0.9887	2.9936
04-24-2009 09:38:02	13.244	4.4826	0.9606	3.0472
04-24-2009 09:39:03	13.247	4.4826	0.9404	3.0633
04-24-2009 09:40:04	13.245	4.4864	0.9492	3.0748
04-24-2009 09:41:02	13.249	4.4869	0.9555	3.1072
04-24-2009 09:42:03	13.250	4.4826	0.9780	3.0896
04-24-2009 09:43:03	13.251	4.4890	0.9401	3.1241
04-24-2009 09:44:02	13.246	4.4925	0.9736	3.1177
04-24-2009 09:45:03	13.243	4.4957	0.9839	3.1087
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-24-2009 09:45:03	13.241	4.4886	0.9893	2.8582

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 09:46:05	12.926	4.3692	1.0830	2.9127
04-24-2009 09:47:06	11.585	3.9740	1.3284	0.7758
04-24-2009 09:48:06	11.557	4.0827	0.2156	0.0298
04-24-2009 09:49:07	11.562	4.0923	-0.1209	-0.0010
04-24-2009 09:50:06	11.516	4.0810	-0.1470	0.0038
04-24-2009 09:51:06	5.132	1.9281	0.7067	1.3460
04-24-2009 09:52:07	0.353	0.1853	4.1682	2.4819
04-24-2009 09:53:07	0.055	0.0469	5.0450	2.5549

Final System Bias Check for Run 1

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack

	Reference Cylinder Numbers	
	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-24-2009 09:53:14 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	-0.008	0.0140	-0.0575	-0.0012
Zero Avg	0.054	0.0464	-0.1146	-0.0010
Zero Bias%	0.3%	0.4%	0.6%	0.0%
Zero Drift%	0.2%	0.4%	-0.4%	-0.2%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.621	4.1914	5.0791	2.5963
Span Avg	11.562	4.0923	5.0425	2.5554
Span Bias%	0.3%	1.2%	0.4%	0.7%
Span Drift%	0.1%	0.3%	-0.1%	-0.7%
Ini Zero Avg	0.017	0.0085	-0.0780	0.0097
Ini Span Avg	11.539	4.0640	5.0516	2.5921
Run Avg	13.241	4.4886	0.9893	2.8582
Co	0.036	0.0275	-0.0963	0.0044
Cm	11.551	4.0782	5.0471	2.5738
Correct Avg	13.326	4.4934	1.0702	2.7768

System Bias Check End

Test Run 2 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 10:06:47	13.232	4.5023	0.3119	4.6357
04-24-2009 10:07:45	13.232	4.5024	0.3045	4.5106
04-24-2009 10:08:46	13.233	4.5024	0.2881	4.4044
Begin calculating run averages				
04-24-2009 10:10:05	13.236	4.5007	0.3044	4.2915
04-24-2009 10:11:06	13.238	4.4961	0.3043	4.1743
04-24-2009 10:12:06	13.238	4.4923	0.2839	4.0990
04-24-2009 10:13:05	13.237	4.4923	0.3081	3.9810
04-24-2009 10:14:06	13.236	4.4966	0.2922	3.8974
04-24-2009 10:15:05	13.234	4.4985	0.2757	3.8330
04-24-2009 10:16:05	13.233	4.4944	0.2721	3.7757
04-24-2009 10:17:06	13.235	4.4924	0.2749	3.7444
04-24-2009 10:18:06	13.237	4.4941	0.2794	3.7542
04-24-2009 10:19:05	13.232	4.4935	0.2822	3.6499
Begin Traverse				
04-24-2009 10:20:05	13.233	4.4938	0.2950	3.5725
04-24-2009 10:21:06	13.235	4.4924	0.2682	3.5522
04-24-2009 10:22:07	13.237	4.4925	0.2252	3.6039
04-24-2009 10:23:05	13.240	4.4925	0.2217	3.6029
04-24-2009 10:24:06	13.241	4.4925	0.2015	3.5833
04-24-2009 10:25:06	13.238	4.4925	0.1964	3.5436
04-24-2009 10:26:05	13.239	4.4925	0.2022	3.5048
04-24-2009 10:27:05	13.235	4.4925	0.1978	3.4866
04-24-2009 10:28:06	13.232	4.4925	0.1990	3.4384
04-24-2009 10:29:06	13.232	4.4926	0.2031	3.3998
Begin Traverse				
04-24-2009 10:30:05	13.234	4.4926	0.1970	3.4058
04-24-2009 10:31:05	13.236	4.4925	0.2077	3.4089
04-24-2009 10:32:06	13.237	4.4925	0.2259	3.3940
04-24-2009 10:33:04	13.239	4.4925	0.2052	3.4459
04-24-2009 10:34:05	13.240	4.4926	0.1964	3.4810
04-24-2009 10:35:06	13.238	4.4927	0.1897	3.4358
04-24-2009 10:36:06	13.235	4.4931	0.1934	3.3710
04-24-2009 10:37:05	13.237	4.4938	0.1807	3.3338
04-24-2009 10:38:05	13.236	4.4927	0.1843	3.3233
04-24-2009 10:39:06	13.237	4.4959	0.1859	3.2840
Run Averages	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 10:39:06	13.236	4.4936	0.2351	3.6126

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack
Test Run 2 End

Final System Bias Check, Run 2 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 10:40:42	13.074	4.4249	0.1806	3.2098
04-24-2009 10:41:43	11.640	3.9681	0.7544	1.1161
04-24-2009 10:42:43	11.554	4.0653	0.2046	0.0552
04-24-2009 10:43:44	11.564	4.0804	-0.2062	-0.0008
04-24-2009 10:44:42	11.559	4.0815	-0.2498	-0.0010
04-24-2009 10:45:43	6.061	2.2387	0.4067	1.1294
04-24-2009 10:46:43	0.452	0.2174	3.8582	2.4390
04-24-2009 10:47:44	0.056	0.0429	4.9529	2.5435

Final System Bias Check for Run 2

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack

	Reference Cylinder Numbers	
	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-24-2009 10:48:09 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	-0.008	0.0140	-0.0575	-0.0012
Zero Avg	0.047	0.0360	-0.2084	-0.0008
Zero Bias%	0.3%	0.3%	1.6%	0.0%
Zero Drift%	0.0%	-0.1%	-1.0%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.621	4.1914	5.0791	2.5963
Span Avg	11.564	4.0805	4.9465	2.5446
Span Bias%	0.3%	1.3%	1.4%	0.9%
Span Drift%	0.0%	-0.1%	-1.0%	-0.2%
Ini Zero Avg	0.054	0.0464	-0.1146	-0.0010
Ini Span Avg	11.562	4.0923	5.0425	2.5554
Run Avg	13.236	4.4936	0.2351	3.6126
Co	0.051	0.0412	-0.1615	-0.0009
Cm	11.563	4.0864	4.9945	2.5500
Correct Avg	13.309	4.4907	0.3900	3.5413

System Bias Check End

Test Run 3 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
Begin calculating run averages				
04-24-2009 11:01:13	13.234	4.5023	0.1961	3.0285
04-24-2009 11:02:14	13.235	4.5022	0.1886	3.0500
04-24-2009 11:03:14	13.235	4.5022	0.1815	3.0463
04-24-2009 11:04:13	13.234	4.5023	0.1770	3.0091
04-24-2009 11:05:13	13.228	4.5024	0.1985	3.0102
04-24-2009 11:06:14	13.234	4.5024	0.2039	3.0054
04-24-2009 11:07:13	13.233	4.5048	0.1750	3.0159
04-24-2009 11:08:13	13.230	4.5083	0.1699	3.0036
04-24-2009 11:09:14	13.236	4.5024	0.1535	3.0329
04-24-2009 11:10:14	13.236	4.5024	0.1897	3.0166
Begin Traverse				
04-24-2009 11:11:13	13.235	4.5053	0.1818	2.9861
04-24-2009 11:12:13	13.233	4.5124	0.2015	2.8937
04-24-2009 11:13:14	13.235	4.5097	0.1787	2.9201
04-24-2009 11:14:12	13.238	4.5071	0.1929	2.9573
04-24-2009 11:15:13	13.238	4.5070	0.1933	2.9426
04-24-2009 11:16:14	13.234	4.5124	0.1886	2.9618
04-24-2009 11:17:14	13.237	4.5124	0.1945	3.0269
04-24-2009 11:18:13	13.236	4.5124	0.1883	3.0539
04-24-2009 11:19:13	13.234	4.5125	0.1933	3.0243
04-24-2009 11:20:14	13.233	4.5125	0.1986	2.9810
Begin Traverse				
04-24-2009 11:21:14	13.233	4.5125	0.1782	2.9541
04-24-2009 11:22:13	13.236	4.5125	0.1909	2.9758
04-24-2009 11:23:13	13.237	4.5125	0.1792	2.9787
04-24-2009 11:24:14	13.234	4.5126	0.2002	2.9344
04-24-2009 11:25:12	13.235	4.5127	0.1757	2.9040
04-24-2009 11:26:13	13.234	4.5127	0.1765	2.9665
04-24-2009 11:27:14	13.233	4.5127	0.1749	3.0258
04-24-2009 11:28:14	13.236	4.5128	0.1816	3.0357
04-24-2009 11:29:13	13.221	4.5177	0.1945	3.0485
04-24-2009 11:30:13	13.217	4.5227	0.1757	2.9594
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-24-2009 11:30:13	13.234	4.5092	0.1858	2.9916

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack
Test Run 3 End

Final System Bias Check, Run 3 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-24-2009 11:31:20	13.073	4.4540	0.1519	2.8986
04-24-2009 11:32:21	11.604	3.9720	0.9871	0.9988
04-24-2009 11:33:22	11.551	4.0801	0.3524	0.0550
04-24-2009 11:34:20	11.562	4.0925	-0.2115	0.0012
04-24-2009 11:35:21	11.561	4.0925	-0.2493	-0.0010
04-24-2009 11:36:21	9.080	3.2790	-0.0976	0.4931
04-24-2009 11:37:20	1.298	0.5597	2.6384	2.2354
04-24-2009 11:38:20	0.093	0.0705	4.8206	2.5331

Final System Bias Check for Run 3

Operator: Mark Stanfield
Plant Name: Panoche
Location: Turbine 4 Stack

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 283349
NOx	CC 240878	CC 283349

Date/Time 04-24-2009 11:38:54 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0000	0.0000
Zero Cal	-0.008	0.0140	-0.0575	-0.0012
Zero Avg	0.053	0.0494	-0.2436	-0.0001
Zero Bias%	0.3%	0.4%	2.0%	0.0%
Zero Drift%	0.0%	0.2%	-0.4%	0.0%
Span Ref Cyl	11.620	4.0800	5.0700	2.5000
Span Cal	11.621	4.1914	5.0791	2.5963
Span Avg	11.562	4.0925	4.9269	2.5425
Span Bias%	0.3%	1.2%	1.6%	1.0%
Span Drift%	0.0%	0.1%	-0.2%	0.0%
Ini Zero Avg	0.047	0.0360	-0.2084	-0.0008
Ini Span Avg	11.564	4.0805	4.9465	2.5446
Run Avg	13.234	4.5092	0.1858	2.9916
Co	0.050	0.0427	-0.2260	-0.0004
Cm	11.563	4.0865	4.9367	2.5436
Correct Avg	13.306	4.5065	0.4044	2.9403

System Bias Check End

Appendix C.11

Avogadro Group CEMS Data, Start-up / Shutdown Unit 2

Test Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-28-2009 08:59:28	20.793	0.0805	-4.8	-0.05
04-28-2009 09:00:28	20.793	0.0796	-4.7	-0.04
04-28-2009 09:01:26	20.794	0.0856	-4.7	-0.04
04-28-2009 09:02:27	20.796	0.0896	-4.7	-0.04
Begin calculating run averages				
04-28-2009 09:03:54	20.788*	0.0896	-4.7	-0.04
04-28-2009 09:04:55	20.550*	0.2261	9.0	0.09
04-28-2009 09:05:55	17.262	2.1746	117.6	10.95
04-28-2009 09:06:56	16.486	2.6507	12.9	18.06
04-28-2009 09:07:54	16.351	2.7208	-2.0	21.60
04-28-2009 09:08:54	15.043	3.4587	-4.1	37.23
04-28-2009 09:09:55	13.574	4.2526	-4.6	36.75
04-28-2009 09:10:55	12.998	4.5631	1.1	37.89
04-28-2009 09:11:54	12.934	4.5983	7.3	36.32
04-28-2009 09:12:54	12.993	4.6126	0.6	33.99
04-28-2009 09:13:55	13.189	4.6113	-4.1	32.79
04-28-2009 09:14:55	13.217	4.6056	-4.5	31.27
04-28-2009 09:15:56	13.227	4.6025	-4.7	11.64
Run Averages	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-28-2009 09:16:42	15.167*	3.3898	8.5	22.55

Start-up #1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2 Start-up
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 2.01

	O2	CO2	CO	NOx
	%	%	ppm	ppm
04-28-2009 09:17:51	13.233	4.5966	-4.9	1.82
04-28-2009 09:18:51	12.997	4.1097	-4.7	1.63
04-28-2009 09:19:52	11.672	4.1485	-4.9	0.14
04-28-2009 09:20:50	9.594	3.5383	25.0	-0.04
04-28-2009 09:21:50	1.300	0.5846	342.7	-0.04
04-28-2009 09:22:51	0.067	0.0735	462.9	-0.04
04-28-2009 09:23:51	0.039	0.0597	434.2	16.03
04-28-2009 09:24:52	0.040	0.0597	104.0	80.83
04-28-2009 09:25:50	0.039	0.0597	1.5	89.12
04-28-2009 09:26:51	0.038	0.0597	-4.4	89.32
04-28-2009 09:27:51	0.038	0.0596	-5.0	89.31
04-28-2009 09:28:52	0.037	0.0596	-5.0	89.32

Final System Bias Check for Run 1

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2 Start-up

	Reference Cylinder Numbers	
	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-28-2009 09:29:08 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.024	0.0021	-5.0	-0.04
Zero Avg	0.058	0.0696	-4.9	0.12
Zero Bias%	0.2%	0.8%	0.0%	0.1%
Zero Drift%	0.0%	0.5%	0.0%	0.1%
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.650	4.1719	468.6	92.75
Span Avg	11.628	4.1601	464.8	89.43
Span Bias%	0.1%	0.1%	0.4%	1.6%
Span Drift%	0.1%	0.4%	0.1%	-0.1%
Ini Zero Avg	0.062	0.0293	-5.1	-0.05
Ini Span Avg	11.600	4.1241	463.9	89.61
Run Avg	15.167	3.3898	8.5	22.55
Co	0.060	0.0495	-5.0	0.04
Cm	11.614	4.1421	464.3	89.52
Correct Avg	15.193	3.3300	13.6	23.66

System Bias Check End

Test Run 2 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-28-2009 11:46:35	20.827	0.1397	-4.5	-0.04
04-28-2009 11:47:34	20.828	0.1374	-4.5	-0.04
04-28-2009 11:48:34	20.829	0.1331	-4.5	-0.04
04-28-2009 11:49:35	20.828	0.1295	-4.5	-0.04
04-28-2009 11:50:35	20.827	0.1295	-4.5	-0.04
04-28-2009 11:51:34	20.827	0.1295	-4.5	-0.04
Begin calculating run averages				
04-28-2009 11:53:01	20.821*	0.1288	-4.5	-0.04
04-28-2009 11:54:02	20.475*	0.3343	-1.4	0.06
04-28-2009 11:55:02	17.118	2.3179	28.4	8.45
04-28-2009 11:56:03	16.479	2.7111	1.2	11.16
04-28-2009 11:57:01	16.405	2.7465	-3.5	14.47
04-28-2009 11:58:02	15.339	3.3624	-4.2	28.13
04-28-2009 11:59:02	13.910	4.2002	-4.5	35.65
04-28-2009 12:00:03	13.215	4.6156	0.1	35.55
04-28-2009 12:01:01	13.142	4.6608	4.9	35.53
04-28-2009 12:02:02	13.144	4.6622	-1.1	31.69
04-28-2009 12:03:02	13.141	4.6619	-4.1	10.98
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-28-2009 12:03:48	15.581*	3.2236	0.7	18.16

Start up #2

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2 Start-up
Test Run 2 End

Final System Bias Check, Run 2 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-28-2009 12:06:06	12.033	4.0748	-4.3	0.56
04-28-2009 12:07:06	11.564	4.1806	-4.7	-0.04
04-28-2009 12:08:07	11.541	4.1872	-4.8	-0.04
04-28-2009 12:09:05	5.618	2.1475	134.7	-0.04
04-28-2009 12:10:06	0.324	0.2004	429.4	-0.04
04-28-2009 12:11:06	0.044	0.0713	467.5	-0.04
04-28-2009 12:12:07	3.074	1.1747	352.5	18.43
04-28-2009 12:13:07	0.675	0.3268	44.5	80.53
04-28-2009 12:14:06	0.052	0.0682	0.0	88.16
04-28-2009 12:15:07	0.037	0.0596	-4.5	88.39
04-28-2009 12:16:05	0.036	0.0596	-4.8	88.39
04-28-2009 12:17:06	0.035	0.0596	-4.7	88.38

Final System Bias Check for Run 2

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2 Start-up

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-28-2009 12:17:17 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.024	0.0021	-5.0	-0.04
Zero Avg	0.044	0.0695	-4.8	-0.04
Zero Bias%	0.1%	0.8%	0.0%	0.0%
Zero Drift%	-0.1%	0.0%	0.0%	-0.1%
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.650	4.1719	468.6	92.75
Span Avg	11.551	4.1845	467.4	88.37
Span Bias%	0.5%	0.1%	0.1%	2.1%
Span Drift%	-0.4%	0.3%	0.3%	-0.5%
Ini Zero Avg	0.058	0.0696	-4.9	0.12
Ini Span Avg	11.628	4.1601	464.8	89.43
Run Avg	15.581	3.2236	0.7	18.16
Co	0.051	0.0696	-4.8	0.04
Cm	11.590	4.1723	466.1	88.90
Correct Avg	15.640	3.1366	5.6	19.16

System Bias Check End

Test Run 4 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 08:06:10	20.850	0.0494	-4.8	-0.04
04-29-2009 08:07:08	20.850	0.0494	-4.8	-0.04
04-29-2009 08:08:09	20.850	0.0501	-4.8	-0.04
Begin calculating run averages				
04-29-2009 08:09:39	20.851*	0.0494	-4.8	-0.04
04-29-2009 08:10:39	20.145*	0.4710	33.4	0.84
04-29-2009 08:11:40	16.744	2.4823	90.0	15.80
04-29-2009 08:12:40	16.540	2.6119	2.6	21.29
04-29-2009 08:13:39	16.367	2.7055	-3.2	25.86
04-29-2009 08:14:40	15.015	3.4757	-4.2	39.65
04-29-2009 08:15:40	13.574	4.2725	-4.6	36.36
04-29-2009 08:16:38	13.071	4.5663	-3.4	32.81
04-29-2009 08:17:39	13.051	4.5897	-3.0	33.32
04-29-2009 08:18:39	13.215	4.5928	-4.1	32.99
04-29-2009 08:19:40	13.247	4.5983	-4.5	32.95
04-29-2009 08:20:40	13.253	4.5939	-4.5	26.30
04-29-2009 08:21:38	13.253	4.6016	-4.5	5.90
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 08:21:53	15.227*	3.3729	6.4	23.02

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 4 End

Start-up #3

Final System Bias Check, Run 4 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 08:22:56	13.342	4.5104	-4.9	2.20
04-29-2009 08:23:57	12.365	3.9767	-4.7	1.26
04-29-2009 08:24:57	11.596	4.1682	-5.0	-0.01
04-29-2009 08:25:57	8.409	3.0684	45.6	-0.05
04-29-2009 08:26:56	0.508	0.2278	390.4	-0.05
04-29-2009 08:27:56	0.042	0.0305	466.4	0.14
04-29-2009 08:28:57	1.159	0.4524	278.8	48.80
04-29-2009 08:29:57	2.460	0.9334	13.2	72.29
04-29-2009 08:30:58	2.576	0.9745	-4.1	72.13
04-29-2009 08:31:56	1.543	0.6147	-4.5	78.56
04-29-2009 08:32:56	0.088	0.0569	-4.5	89.29

Final System Bias Check for Run 4

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-29-2009 08:33:13 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.019	-0.0005	-5.0	-0.05
Zero Avg	0.052	0.0344	-5.1	-0.05
Zero Bias%	0.2%	0.4%	0.0%	0.0%
Zero Drift%	0.0%	0.3%	-0.1%	0.0%
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.634	4.1725	468.8	93.22
Span Avg	11.588	4.1723	463.9	89.84
Span Bias%	0.2%	0.0%	0.5%	1.6%
Span Drift%	-0.2%	0.1%	0.5%	-0.1%
Ini Zero Avg	0.054	0.0068	-4.1	-0.05
Ini Span Avg	11.619	4.1622	459.2	90.03
Run Avg	15.227	3.3729	6.4	23.02
Co	0.053	0.0206	-4.6	-0.05
Cm	11.604	4.1672	461.5	89.94
Correct Avg	15.265	3.2984	11.2	24.10

System Bias Check End

Test Run 7 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 18:16:30	3.287	1.1900	-2.2	64.40
04-29-2009 18:17:30	12.417	4.5085	-4.0	7.01
04-29-2009 18:18:30	12.835	4.6636	-4.2	3.73
04-29-2009 18:19:31	12.839	4.6636	-4.2	3.68
Begin calculating run averages				
04-29-2009 18:21:03	12.860	4.6615	-4.2	3.66
04-29-2009 18:22:03	13.264	4.4541	-4.2	2.67
04-29-2009 18:23:03	14.144	4.0334	-4.5	1.46
04-29-2009 18:24:04	16.163	2.8627	-4.4	1.44
04-29-2009 18:25:02	17.761	1.9205	-3.9	1.56
04-29-2009 18:26:03	17.809	1.8924	-3.3	1.36
04-29-2009 18:27:03	17.813	1.8886	-3.1	1.36
04-29-2009 18:28:03	17.809	1.8909	-3.2	1.36
04-29-2009 18:29:04	17.813	1.8909	-3.1	1.23
04-29-2009 18:30:02	17.809	1.8933	-3.2	1.15
04-29-2009 18:31:03	17.805	1.8999	-3.2	1.15
04-29-2009 18:32:03	17.801	1.9009	-3.2	1.15
04-29-2009 18:33:04	17.794	1.9067	-3.2	1.15
04-29-2009 18:34:04	18.183	1.6820	-3.2	1.55
04-29-2009 18:35:03	20.414*	0.3326	-3.3	1.21
Run Averages	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 18:35:03	17.005*	2.3474	-3.5	1.56

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2
Test Run 7 End

Shutdown # 1

Final System Bias Check, Run 7 STRATA Version 2.01

	O2 %	CO2 %	CO ppm	NOx ppm
04-29-2009 18:36:53	13.339	3.3025	-4.5	0.59
04-29-2009 18:37:51	11.556	4.1673	-4.7	-0.04
04-29-2009 18:38:52	4.274	1.5993	166.7	-0.04
04-29-2009 18:39:52	0.065	0.0488	454.8	-0.04
04-29-2009 18:40:52	0.039	0.0296	425.9	21.23
04-29-2009 18:41:53	0.039	0.0299	60.9	88.34

Final System Bias Check for Run 7

Operator: Jeremy Klosinski
Plant Name: Panoche Energy Center
Location: Turbine # 2

Reference Cylinder Numbers

	Zero	Span
O2	CC 240878	CC 272622
CO2	CC 240878	CC 272622
CO	CC 240878	CC 159891
NOx	CC 240878	SA 7855

Date/Time 04-29-2009 18:42:06 PASSED

Analyte	O2	CO2	CO	NOx
Units	%	%	ppm	ppm
Zero Ref Cyl	0.000	0.0000	0.0	0.00
Zero Cal	0.024	0.0095	-4.3	-0.04
Zero Avg	0.042	0.0395	-4.5	-0.04
Zero Bias%	0.1%	0.4%	0.0%	0.0%
Zero Drift%	0.0%	0.0%	-0.8%	0.0%
Span Ref Cyl	11.620	4.0800	474.0	94.00
Span Cal	11.601	4.1725	480.9	92.75
Span Avg	11.559	4.1627	467.2	90.90
Span Bias%	0.2%	0.1%	1.4%	0.9%
Span Drift%	0.1%	0.2%	0.1%	0.7%
Ini Zero Avg	0.051	0.0395	3.8	-0.04
Ini Span Avg	11.531	4.1426	465.7	89.42
Run Avg	17.005	2.3474	-3.5	1.56
Co	0.046	0.0395	-0.3	-0.04
Cm	11.545	4.1526	466.4	90.16
Correct Avg	17.137	2.2893	-3.2	1.67

System Bias Check End

APPENDIX D

FIELD DATA SHEETS

Appendix D.1

Ammonia Data Sheets

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Peoche Energy Center
SAMPLE LOCATION: Turbine #1 stack
OPERATOR/ASSISTANT: MC / RO
UNIT: #1
TEST NO.: 1-NH3-1
TEST CONDITION: Full Load
METER VOL. (START/END): /
METHOD: ST-1B
AMB. TEMP., °F:
PAGE 1 OF 1
PROJECT #: 09092
DATE: 04/30/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.49
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	30
Per point:	10
Total of Traverse Points:	30
ΔH =	2.0 x ~~ΔP~~

EQUIPMENT INFO:

Meter:	ID #:	CB03
	Yd value:	0.992
	ΔH@ value:	1.789
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
#1	0.1N HCl	690.1	656.5	=	33.6
#2	0.1N HCl	637.2	634.8	=	2.4
#3	Empty	564.7	563.6	=	1.1
#4	Silica Gel	841.5	838.9	=	2.6
#5				=	
#6				=	
#7				=	

POST TEST INFO: Total Weight Gain: = 39.7

Filter Appearance: N/A
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.005 to	10	—	mc
Post-Test:	0.003	5	—	MC

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
3	1714		2.0	211.383			93			60		1.0	
2	1724		↓	216.618			92			61		0.5	
1	1734			221.88			92			62		0.5	
END	1744			227.067			—			—			

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JL
Impingers Recovered: RMO
Filter Loaded: /
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by: JLC
Checked by: SAM
Sample Volume, ft^3: 15.684
Water Collected, g: 39.7
Meter Temperature, °F: 92.3
Meter Pressure (ΔH), iwg: 2.0
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: —
Stack Temperature, °F: —
O_2 / CO_2: 13.166 / 4.595
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine # ~~2~~ 1 Stack
OPERATOR/ASSISTANT: MC / RO

UNIT: #1
TEST NO.: 2-NH3-1
METHOD: ST-13B
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END): /

PAGE 1 OF 1
PROJECT #: 09092
DATE: ~~4~~ 5/30/08

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.49
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	30
Per point:	10
Total of Traverse Points:	3P
ΔH =	2.0 x ΔP

EQUIPMENT INFO:

Meter:	ID #:	LB03
	Yd value:	0.992
	ΔH@ value:	1.784
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
#1	0.1N HCl	693.3	645.8	=	47.5
#2	0.1N HCl	689.8	685.4	=	4.4
#3	Empty	548.3	547.5	=	0.8
#4	Silica Gel	816.2	811.1	=	5.1
#5				=	
#6				=	
#7				=	

POST TEST INFO: Total Weight Gain: = 57.8
Filter Appearance: N/A
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.002	10	✓	MC
Post-Test:	0.002	5	✓	MC

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP. °F	COOL °F	VAC. "Hg	STATIC PRESS
3	1809		2.0	227.282			88			62		2.5	
2	1819		↓	235.68			88			60		~~2.5~~ 2.5	
1	1829			242.98			88			59		3.0	
END	1839			249.080			—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: N/A
Impingers Recovered: RMO
Filter Loaded: —
Filter Recovered: —
Probe Wash: —

TEST SUMMARY

Calculated by: SHC
Checked by: SKM
Sample Volume, ft^3: 22.798 ✓
Water Collected, g: 57.8 ✓
Meter Temperature, °F: 88.0 ✓
Meter Pressure (ΔH), iwg: 2.0 ✓
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: —
Stack Temperature, °F: —
O_2 / CO_2: 13.166 / 4.565 ✓
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT Panoche Energy Center
SAMPLE LOCATION Turbine #1 Stack
OPERATOR/ASSISTANT MC / RB

UNIT #1
TEST CONDITION Full Load
METER VOL. (START/END) /

TEST NO. 3-NH3-1
AMB. TEMP., °F

METHOD ST-1B
PAGE 1 OF 1
PROJECT # 09097
DATE 4/30/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.49
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	30
Per point:	10
Total of Traverse Points:	SP
ΔH =	2.0 ~~ΔP~~

EQUIPMENT INFO:

Meter:	ID #:	CB03
	Yd value:	0.992
	ΔH@ value:	1.789
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
#1	0.1N HCl	702.1	654.4	=	47.7
#2	0.1N HCl	635.5	631.3	=	4.2
#3	Empty	565.2	564.7	=	0.5
#4	Silica Gel	846.4	841.5	=	4.9
#5				=	
#6				=	
#7				=	

POST TEST INFO: Total Weight Gain: = 57.3

Filter Appearance: N/A
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.002	10	✓	MC
Post-Test:	0.002	5	✓	MC

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC	STATIC PRESS
S	1852		2.0	250.382			85			64		3.0	
2	1902			258.15			85			60		3.0	
1	1912			266.18			85			61		3.0	
END	1922			274.165			—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: DK
Impingers Recovered: RBP
Filter Loaded: —
Filter Recovered: —
Probe Wash: —

TEST SUMMARY

Calculated by: DK
Checked by: SAM
Sample Volume, ft^3: 23.783 ✓
Water Collected, g: 57.3 ✓
Meter Temperature, °F: 85.0 ✓
Meter Pressure (ΔH), iwg: 2.0 ✓
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: —
Stack Temperature, °F: —
O_2 / CO_2: 13.159 / 4.557 ✓
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #2
OPERATOR/ASSISTANT: CH

UNIT: Turbine #2
TEST NO.: 1-NH3-2
METHOD: BAAQMD ST-13B
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

PAGE 1 OF 1
PROJECT # 09092.0
DATE 4/27/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.40
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	30
Per point:	10
Total of Traverse Points:	SP
ΔH =	2.0

EQUIPMENT INFO:

Meter:	ID #:	CR-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	0.1N HCl	689.4	674.2	= 15.2
#2	0.1N HCl	691.6	685.9	= 5.7
#3	Empty	554.6	553.2	= 1.4
#4	Silica Gel	805.3	799.6	= 5.7
#5				=
#6				=
#7				=

POST TEST INFO: Total Weight Gain: = 58.0
Filter Appearance: N/A
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.0002	7	OK	[illegible]
Post-Test:	0.0001	2	OK	[illegible]

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP. IN	METER TEMP. OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in. Hg	STATIC PRESS.
3	1043		2.0	430.908		64	63			55		1.25	
2	10			438.86		64	64			52		1.25	
1	20			447.73		61	66			54		1.25	
5	1113			454.534		—	—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JK
Impingers Recovered: JK
Filter Loaded: —
Filter Recovered: —
Probe Wash: —

TEST SUMMARY

Calculated by: JK
Checked by: JAM
Sample Volume, ft³: 23.626
Water Collected, g: 58.0
Meter Temperature, °F: ~~64.3~~ 68
Meter Pressure (ΔH), iwg: 2.0
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: —
Stack Temperature, °F: —
O_2 / CO_2: 13.13 / 4.683

Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #2 Stack
OPERATOR/ASSISTANT: CA

UNIT: Turbine #2
TEST NO.: #2-NH3-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: BAAQMD ST-13B
AMB. TEMP., °F:

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.40
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	30
Per point:	10
Total of Traverse Points:	SP
ΔH =	2.0 ~~ΔP~~

EQUIPMENT INFO:

Meter:	ID #:	CB-5
	Yd value:	0.571
	ΔH@ value:	1.290
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
# 1	0.1N HCl	698.9	653.4	=	45.5
# 2	0.1N HCl	638.3	632.7	=	5.6
# 3	Empty	563.4	562.3	=	1.1
# 4	Silica Gel	837.7	832.3	=	5.4
# 5				=	
# 6				=	
# 7				=	
			Total Weight Gain:	=	57.6

POST TEST INFO:

Filter Appearance: N/A
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.001	8	OK	CA
Post-Test:	0.001	6	OK	CA

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	COOL T	VAC in	STATIC PRESS
3	1157		2.0	454.675		77	71			58		2.0	
2	10			462.73		84	75			56		2.0	
1	20			470.78		99	78			55		2.0	
S	1227			478.937		—	—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: DJL
Impingers Recovered: DJL
Filter Loaded: —
Filter Recovered: —
Probe Wash: —

TEST SUMMARY

Calculated by: DJL
Checked by: SAM 24.262
Sample Volume, ft³: ~~24.626~~ SAM
Water Collected, g: 57.6 ✓
Meter Temperature, °F: 74.3 ✓
Meter Pressure (ΔH), iwg: 2.0 ✓
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: —
Stack Temperature, °F: —
O_2 / CO_2: 13.13 / 4.592 ✓
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Centre
SAMPLE LOCATION: Turbine # 2 Stack
OPERATOR/ASSISTANT: CH

UNIT: Turbine #2
TEST NO.: 3-NH3-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: BAAQMD ST18
AMB. TEMP., °F:

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.67
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	30
Per point:	10
Total of Traverse Points:	SP
ΔH =	2.0

EQUIPMENT INFO:

Meter:	ID #:	CB-5
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	0.1N HCl	686.6	643.2	= 43.4
# 2	0.1N HCl	691.9	685.5	= 6.4
# 3	Empty	555.7	554.6	= 1.1
# 4	Silica Gel	810.7	805.3	= 5.4
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 56.3
Filter Appearance: N/A
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.004	8	OK	CH
Post-Test:	0.003	9	OK	CH

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK	METER TEMP. IN	METER TEMP. OUT	PROBE	OVEN	IMP	COIL	VAC.	STATIC PRESS.
3	1236		2.0	478.948		88	81			60		1.25	
2	10		↓	487.08		102	82			52		1.20	
1	20			494.99		103	84			51		1.25	
9	1306			503.428		—	—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: 9H
Impingers Recovered:
Filter Loaded: —
Filter Recovered: —
Probe Wash: —

TEST SUMMARY

Calculated by: GMC
Checked by: SAM
Sample Volume, ft^3: 24.8480
Water Collected, g: 56.3
Meter Temperature, °F: 82.3
Meter Pressure (ΔH), iwg: 2.0
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: —
Stack Temperature, °F: —
O_2 / CO_2: 13.10/4.589

Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEL
SAMPLE LOCATION: STACK
OPERATOR/ASSISTANT: CH, MS

UNIT: 3
TEST NO.: 1-NH3-3
METHOD: ST-1B
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END): 283.789 / 306.209

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.37
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	30 min
Per point:	5
Total of Traverse Points:	
ΔH = 2.0 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	TUBING
	Material:	TITANIUM
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	0.1 N HCl	697.1	661.2	= 35.9
#2	" "	650.8	641.4	= 9.4
#3	K.O.	540.8	537.4	= 3.4
#4	S.G.	756.6	747.9	= 8.7
#5	~~RINSE~~ (M)	~~0~~	~~25.0~~	= ~~25.0~~
#6				=
#7				=
			Total Weight Gain:	= 57.4

POST TEST INFO:
Filter Appearance:
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.005	8	OK	[illegible]
Post-Test:	0.003	5	OK	[illegible]

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK	METER TEMP IN	METER TEMP OUT	PROBE	OVEN	IMP	COIL	VAC.	STATIC PRESS.
3	1010		2.0	~~287.789~~		70	67			60		2.5	-0.41
2	10			~~290.31~~		81	69			58		2.5	
1	20			298.39		84	71			55		2.5	
5	1040			306.209		—	—			—		—	
				283.789									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MSC
Impingers Recovered:	MSC
Filter Loaded:	N/A
Filter Recovered:	N/A
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MSC
Checked by:	SAM
Sample Volume, ft^3:	22.420
Water Collected, g:	57.4
Meter Temperature, °F:	73.7
Meter Pressure (ΔH), iwg:	2.0
Velocity (ΔP rms), iwg:	
Stack Pressure., iwg:	-0.41
Stack Temperature, °F:	
O_2 / CO_2:	13.136 / 4.5726
Comments:	

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEC
SAMPLE LOCATION: STACK
OPERATOR/ASSISTANT: CH, MS

UNIT: TURBINE 3
TEST NO.: 2-NH3-3
METHOD: ST-IB
TEST CONDITION: FULL LOAD
AMB. TEMP., °F:
METER VOL. (START/END): 306.400 / 330.291

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.37
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	50 min
Per point:	5 P.
Total of Traverse Points:	
ΔH =	2.0 ~~x ΔP~~

EQUIPMENT INFO:

Meter:	ID #:	CB-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	TUBING
	Material:	TITANIUM
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	0.1N HCl	698.9	662.3	= 36.6
# 2	" "	657.5	642.8	= 14.7
# 3	K.O.	550.9	547.3	= 3.6
# 4	S.G.	776.7	767.5	= 9.2
# 5	~~LINE RINSE~~	~~Ø~~	~~25.0~~	~~= -25.0~~
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 64.1
Filter Appearance:
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.003	10	OK	CH
Post-Test:	0.004	10	OK	CH

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC	STATIC PRESS
3	11:00		2.0	306.400	SAM ~~88~~	76				57		3.5	-0.41
2	10			314.28		95	78			57		3.5	
1	20			322.28		95	81			56		3.5	
5	11:30			330.291		—	—			—		—	
					82								

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MG
Impingers Recovered:	MG
Filter Loaded:	N/A
Filter Recovered:	N/A
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MS
Checked by:	SAM
Sample Volume, ft^3:	23.891 ✓
Water Collected, g:	64.1 ✓
Meter Temperature, °F:	84.5 ✓
Meter Pressure (ΔH), iwg:	2.0 ✓
Velocity (ΔP rms), iwg:	
Stack Pressure., iwg:	-0.41 ✓
Stack Temperature, °F:	
O_2 / CO_2:	13.093 / 4.61 ✓
Comments:	

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEC
SAMPLE LOCATION: STACK
OPERATOR/ASSISTANT: CH, MS

UNIT: TURBINE 3
TEST NO.: 3-NH3-3
METHOD: 5I-1B
TEST CONDITION:
AMB. TEMP., °F:
METER VOL. (START/END): 330.565 / 359.007

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.37
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	/
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	34 min #
Sample Time: Total:	~~30 min~~
Per point:	5 P.
Total of Traverse Points:	
ΔH =	2.0 ~~x ΔP~~

EQUIPMENT INFO:

Meter:	ID #:	CR-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	TURBINE
	Material:	TITANIUM
Nozzle:	Diameter:	/
	Material:	
Filter:	Number:	/
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
# 1	0.1 N HCl	664.6	612.9	=	51.7
# 2	" "	661.5	650.9	=	10.6
# 3	K.U.	542.8	539.0	=	3.8
# 4	S.G.	788.9	780.8	=	8.1
# 5	~~LINE RINSE~~	~~X~~	~~25.0~~	=	~~25.0~~
# 6				=	
# 7				=	

POST TEST INFO: Total Weight Gain: = 75.2
Filter Appearance:
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.002	10	OK	[illegible]
Post-Test:	0.001	8	OK	[illegible]

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	COIL T	VAC	STATIC PRESS
3	11:45		2.0	330.565		88	84			61		2.0	-0.41
2	20			339.36		95	84			58		2.0	
1	20			346.88		96	84			55		2.0	
5	12:15			359.007		—	—						

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MS
Impingers Recovered:	MS
Filter Loaded:	N/A
Filter Recovered:	N/A
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MS
Checked by:	JAM
Sample Volume, ft³:	28.442 ✓
Water Collected, g:	75.2 ✓
Meter Temperature, °F:	88.5 ✓
Meter Pressure (ΔH), iwg:	2.0 ✓
Velocity (ΔP rms), iwg:	
Stack Pressure., iwg:	-0.41 ✓
Stack Temperature, °F:	
O_2 / CO_2:	13.081 / 4.6211 ✓
Comments:	

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT TURBINE #4 TEST NO. 1-NH3-4 METHOD ST-1B
TEST CONDITION
AMB. TEMP., °F
METER VOL. (START/END) 359.860 / 380.704

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	30 min
Per point:	5
Total of Traverse Points:	
ΔH =	2.0 x ΔP

EQUIPMENT INFO:

Meter:	ID #:	CB-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	TUBING
	Material:	TITANIUM
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	0.1N HCl	702.8	664.4	= 38.4
#2	" "	652.5	647.9	= 4.6
#3	K.O.	542.4	540.6	= 1.8
#4	S.G.	810.3	804.3	= 6.0
#5				=
#6				=
#7				=

POST TEST INFO: Total Weight Gain: = 50.8

Filter Appearance:
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): - NO -

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.004	10	OK	CH
Post-Test:	0.002	5	OK	CH

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS	CHAIN OF CUSTODY INFORMATION
3	9:15	2.0	2.0	359.860		63	62			60		1.5	-0.55	Impingers Loaded: MS
												1.5		Impingers Recovered: MS
2	10											1.5		Filter Loaded: —
1	20			374.62		83	69			56				Filter Recovered: —
5	945			380.704		—	—			—		—		Probe Wash: CH

TEST SUMMARY

Calculated by: MS
Checked by: JAM
Sample Volume, ft³: 20.844
Water Collected, g: 50.80
Meter Temperature, °F: 69.3
Meter Pressure (ΔH), iwg: 2.0
Velocity (ΔP rms), iwg:
Stack Pressure., iwg: -0.55
Stack Temperature, °F:
O_2 / CO_2: 13.326 / 4.4934
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT TURBINE #4 TEST NO. 2-NH3-4 METHOD ST-7B
TEST CONDITION
METER VOL. (START/END) 380.872 / 406.372
AMB. TEMP., °F

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120 in.
Sample Time: Total:	30 min
Per point:	5
Total of Traverse Points:	
ΔH =	2.0 ~~x~~ ΔP

EQUIPMENT INFO:

Meter:	ID #:	CR-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	—
	Material:	Ti
Nozzle:	Diameter:	—
	Material:	—
Filter:	Number:	—
	Material:	—

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	0.1 N HCl	710.8	663.3	= 47.5
# 2	" "	650.3	646.7	= 3.6
# 3	K.O.	552.4	551.4	= 1.0
# 4	S.G.	782.3	776.7	= 5.6
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 57.7
Filter Appearance:
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.024	10	OK	#
Post-Test:	0.003	7	OK	#

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VACUUM	STATIC PRESS
3	10:07		2.0	380.872		72	69			55		3.0	-0.55
2	10			389.83		80	68			54		3.0	
1	20			398.47		82	69			57		3.0	
9	1037			406.372		—	—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MSt
Impingers Recovered:	MSt
Filter Loaded:	—
Filter Recovered:	—
Probe Wash:	—

TEST SUMMARY

Calculated by:	MSt
Checked by:	SAM
Sample Volume, ft^3:	25.500 ✓
Water Collected, g:	57.7 ✓
Meter Temperature, °F:	73.3 ✓
Meter Pressure (ΔH), iwg:	2.0 ✓
Velocity (ΔP rms), iwg:	
Stack Pressure., iwg:	-0.55 ✓
Stack Temperature, °F:	
O_2 / CO_2:	13.309 / 4.4907
Comments:	

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT TURBINE # 4
TEST NO. 3-NH3-4
METHOD ST-1B
TEST CONDITION
AMB. TEMP., °F
METER VOL. (START/END) 406.483 / 430.565

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120 IN
Sample Time: Total:	30 MIN
Per point:	5 P.
Total of Traverse Points:	
ΔH = 2.0 ~~x ΔP~~	

EQUIPMENT INFO:

Meter:	ID #:	CB-05
	Yd value:	0.971
	ΔH@ value:	1.790
Pitot:	ID #:	—
	Cp value:	—
Probe:	ID #:	TURBINE
	Material:	TITANIUM
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	0.1 N HCl	668.0	624.6	= 43.4
# 2	" "	658.1	654.2	= 3.9
# 3	K.O.	542.7	542.6	= 0.1
# 4	S.G.	793.3	788.7	= 4.6
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 52.0

Filter Appearance:
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.003	11	OK	CH
Post-Test:	0.002	9	OK	CH

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP. °F	COIL °F	VAC. in	STATIC PRESS.
3	11:00		2.0	406.483		74	70			60		2.5	-0.55
2	10			414.53		81	71			56		2.5	
1	20			422.55		86	72			60		2.5	
5	11:30			430.565		—	—			—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: MS
Impingers Recovered: MS
Filter Loaded: —
Filter Recovered: —
Probe Wash: CH

TEST SUMMARY

Calculated by: MS
Checked by: SAM
Sample Volume, ft^3: 24.082
Water Collected, g: 52.0
Meter Temperature, °F: 76.7
Meter Pressure (ΔH), iwg: 2.0
Velocity (ΔP rms), iwg: —
Stack Pressure., iwg: -0.55
Stack Temperature, °F: —
O_2 / CO_2: 13.306 / 4.5065
Comments:

Appendix D.2

Particulate Matter Data Sheets

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #1 Stack
OPERATOR/ASSISTANT: MC / RO

UNIT: #1
TEST NO.: 1-PM-1
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

PAGE 1 OF 2
PROJECT #: 09092
DATE: 4/20/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.49
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	1611
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.205
	Material:	SS
Filter:	Number:	7864
	Material:	Glass

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	DI H_2O	795.7	606.6	= 189.1
#2	DI H_2O	691.4	687.2	= 4.2
#3	DI H_2O	609.8	608.6	= 1.2
#4	Silica Gel	909.1	893.7	= 15.4
#5	Line Rinse			= -30
#6				= n/a
#7				= ~~179.9~~

POST TEST INFO: Total Weight Gain: = 179.9
Filter Appearance: Clear
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.015	10	ok	MC
Post-Test:	0.010	5	ok	MC

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter	Meter
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	COOL T	VAC in	STATIC PRESS
SE-6	1711	1.5	1.13	186.351	765		88		244	52		2.0	
5	1716	1.4	1.05	189.701	765		88		254	48		2.0	
4	1721	1.3	0.98	192.44	766		88		244	48		1.5	
3	1726	1.3	0.98	195.20	766		89		246	49		1.5	0.41
2	1731	1.1	0.82	198.05	764		90		247	50		0.5	
1	1736	~~0.5~~	~~0.37~~	200.73	766		91		247	51		0.5	
P	1741	-	-	203.085	-		-		-	-		-	
SW-6	1745	2.0	1.50	203.085	768		90		255	66		2.0	
5	1750	2.4	1.80	205.79	769		91		246	53		2.0	
4	1755	2.4	1.80	209.41	771		92		250	53		2.0	
3	1800	1.9	1.43	212.51	771		91		251	54		2.0	
2	1805	1.8	1.35	215.65	770		91		248	54		2.0	
1	1810	1.7	1.28	218.82	768		91		245	55		1.5	
P	1815			221.955									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	DJL
Impingers Recovered:	RMO
Filter Loaded:	DJL
Filter Recovered:	RMO
Probe Wash:	MC

TEST SUMMARY

Calculated by:	DJL
Checked by:	SAM
Sample Volume, ft^3:	74.445
Water Collected, g:	179.9
Meter Temperature, °F:	87.7
Meter Pressure (ΔH), iwg:	1.30
Velocity (ΔP rms), iwg:	1.7035
Stack Pressure, iwg:	-0.41
Stack Temperature, °F:	767.7
O_2 / CO_2:	13.16 / 4.560

Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT Pinoche Energy Center
SAMPLE LOCATION Turbine #1 Stack
OPERATOR/ASSISTANT RO

UNIT #1
TEST NO. 1-PM-1
TEST CONDITION Full Load
METER VOL. (START/END) /

METHOD 5/202
AMB. TEMP., °F

PAGE 2 OF 2
PROJECT # 09097
DATE 4/30/09

See Page #1

PRE-TEST DATA:

Barometric Pressure, in. Hg.: 29.49
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = 0.75 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
NW-6	1820	2.6	1.95	221.995	770		88		244	62		3.0	
5	1825	2.5	1.88	225.65	770		89		245	54		3.0	
4	1830	2.3	1.73	229.30	771		88		253	53		3.0	
3	1835	2.0	1.50	233.08	771		88		247	54		2.5	
2	1840	1.7	1.28	236.51	769		87		248	54		2.5	
1	1845	1.5	1.13	239.91	769		87		251	55		2.0	
P	1850	—	—	243.306	—		—		—	—		—	
NE-6	1853	1.6	1.20	243.306	760		85		249	60		2.0	
5	1858	1.7	1.28	246.46	769		84		248	56		2.0	
4	1903	1.8	1.35	249.45	769		83		251	55		2.0	
3	1908	1.7	1.28	252.48	768		82		249	56		2.0	
2	1913	1.4	1.05	255.49	765		82		249	55		1.5	
1	1918	1.0	0.75	258.37	765		81		247	55		1.0	
END	1923	—	—	260.796	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #1 Stack
OPERATOR/ASSISTANT: MC / RO

UNIT: # 1
TEST NO.: 2-PM-1
TEST CONDITION: Full Load
METER VOL. (START/END): /
METHOD: 5/202
AMB. TEMP., °F:

PAGE 1 OF 2
PROJECT # 09092
DATE 5/1/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.75	x ΔP

EQUIPMENT INFO:

Meter:	ID #:	CB11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	56
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.206
	Material:	SS
Filter:	Number:	7865
	Material:	Glass

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
# 1	DI H_2O	773.4	589.5	=	183.9
# 2	DI H_2O	642.8	636.6	=	6.2
# 3	DI H_2O	578.2	577.9	=	0.3
# 4	Silica Gel	803.6	783.9	=	19.7
# 5	Line Rinse			=	-30
# 6				=	
# 7				=	

POST TEST INFO:
Total Weight Gain: = 180.1
Filter Appearance: Clean
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.016	16	ok	MC
Post-Test:	0.010	5	ok	MC

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
NE-6	0803	1.7	1.28	262.557	695		54		243	43		4.5	
5	0808	1.8	1.35	265.62	707		55		246	39		4.0	
4	0813	1.9	1.43	268.77	651		56		243	41		4.0	
3	0818	1.7	1.28	271.94	683		56		244	43		4.0	-0.58
2	0823	1.4	1.05	275.05	759		57		247	45		3.0	
PAUSE	~~0826~~ 0824			275.733									
RESTART	~~0833~~ 1232	1.3	0.98	275.733	755		83		253	59		3.0	
1	1236	1.1	0.83	278.08	755		83		247	47		2.0	
PAUSE ~~1/6~~	1241	—	—	280.658	—		—			—		—	
5													
NW6	1244	2.7	2.03	280.658	763		84		250	49		6.0	
5	1249	2.5	1.88	284.34	766		86		248	45		6.0	
4	1254	2.7	2.07	288.04	768		86		249	47		6.0	
3	1259	2.0	1.56	291.88	769		87		247	49		5.0	
2	1304	1.7	1.28	295.39	769		87		247	51		4.0	
1	1309	1.6	1.20	298.57	769		87		249	53		4.0	
Pause	1314	—	—	301.673	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: MC
Impingers Recovered: MC
Filter Loaded: MC
Filter Recovered: MC
Probe Wash: MC

TEST SUMMARY

Calculated by: MC
Checked by: SAM
Sample Volume, ft^3: 75.952
Water Collected, g: 180.1
Meter Temperature, °F: 76.2
Meter Pressure (ΔH), iwg: ~~0.58~~ 1.
Velocity (ΔP rms), iwg: 1.7750
Stack Pressure., iwg: -0.58
Stack Temperature, °F: 755.3
O_2 / CO_2: 13.13/4.587
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #1 Stack
OPERATOR/ASSISTANT: CH

UNIT: #1
TEST NO.: 2-PM-1
TEST CONDITION: Full Load
METER VOL. (START/END):

METHOD: 5/202
AMB. TEMP., °F:

PAGE 2 OF 2
PROJECT # 09052
DATE 5/1/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

See Page #1

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	OIL T	VAC IN	STATIC PRESS
SW-6	1321	2.4	1.95	301.673	770		83		241	53		5.0	
5	1326	2.9	2.13	305.17	774		83		250	51		5.0	
4	1331	2.1	1.58	308.68	774		82		248	52		5.0	
3	1336	1.9	1.43	312.14	773		82		248	54		5.0	
2	1341	1.7	1.28	315.50	773		81		245	56		4.0	
1	1346	1.6	1.20	318.67	773		81		248	57		4.0	
P	1351	—		321.848	—		—		—			—	
SE-6	1353	1.5	1.13	321.848	767		79		235	58		4.0	
5	1358	1.5	1.13	324.91	773		79		242	57		3.5	
4	1403	1.3	0.98	327.92	775		78		248	57		3.0	
3	1408	1.3	0.98	330.73	775		77		261	57		3.0	
2	1413	1.1	0.83	333.54	773		76		244	55		2.0	
1	1418	1.0	0.75	336.09	773		75		251	56		2.0	
END	1423	—		338.509	—		—		—			—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #1 Stack
OPERATOR/ASSISTANT: MC

UNIT: #1
TEST NO.: 3-PM-1
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

PAGE 1 OF 2
PROJECT #: 09092
DATE: 5/1/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	5311
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.205
	Material:	SS
Filter:	Number:	7021
	Material:	Glass

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	DI H_2O	795.8	601.9	= 193.9
#2	DI H_2O	686.3	684.8	= 1.5
#3	DI H_2O	605.4	604.1	= 1.3
#4	Silica Gel	793.2	772.7	= 20.5
#5	Line Rinse			= -30
#6				=
#7				=

Total Weight Gain: = 187.2

POST TEST INFO:
Filter Appearance: Clean
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.010	10	OK	MC
Post-Test:	0.01	10	OK	MC

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in Hg	STATIC PRESS
SE 6	1455	1.5	1.17	340.780	773		68		247	65		1.0	
5	1500	1.3	0.98	343.58	775		70		241	49		1.0	
4	1505	1.4	1.05	346.38	777		68		250	51		1.5	
3	1510	1.2	0.90	349.30	777		73		247	53		1.0	
2	1515	1.1	0.83	351.93	776		75		245	55		1.0	-0.35
1	1520	1.0	0.75	354.48	774		75		249	55		0.5	
P	1525	—	—	356.805	—		—		—	—		—	
SW 6	1528	2.6	1.95	356.805	767		76		246	56		3.5	
5	1533	2.4	1.8	360.55	778		77		248	54		3.0	
4	1538	2.2	1.65	364.38	778		78		246	56		3.0	
3	1543	2.0	1.5	367.83	779		78		246	58		2.5	
2	1548	1.8	1.35	371.17	779		79		249	59		2.0	
1	1553	1.8	1.35	374.51	778		79		247	59		2.0	
P	1558	—	—	377.762	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JK
Impingers Recovered: JK
Filter Loaded: JK
Filter Recovered: JK
Probe Wash: MC

TEST SUMMARY

Calculated by: JK
Checked by: SAM
Sample Volume, ft^3: 75.048
Water Collected, g: 187.2
Meter Temperature, °F: 74.8
Meter Pressure (ΔH), iwg: 1.30
Velocity (ΔP rms), iwg: 1.6962
Stack Pressure., iwg: -0.35
Stack Temperature, °F: 776.0
O_2 / CO_2: 13.09/4.596

Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Pinoche Energy
SAMPLE LOCATION: Turbine #1 Stack
OPERATOR/ASSISTANT:

UNIT: #1
TEST NO.: 3-PM-1
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

PAGE 2 OF 2
PROJECT #: 09092
DATE: 5/1/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2:
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pilot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1				=
#2				=
#3				=
#4				=
#5				=
#6				=
#7				=

Page #1 See

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	OOI T	VAC in	STATIC PRESS
NW 6	1600	2.6	1.95	377.762	774		79		240	60		3.0	
5	1605	2.5	1.88	381.54	779		79		242	59		3.0	
4	1610	2.2	1.65	385.34	779		78		249	60		2.5	
3	1615	1.9	1.43	388.92	777		77		246	59		2.0	
2	1620	1.6	1.2	392.316	778		76		246	59		2.0	
1	1625	1.5	1.17	395.44	777		74		241	59		2.0	
P	1630	—	—	398.495	—		—		—	—		—	
NE 6	1632	1.6	1.20	398.495	774		73		259	60		2.0	
5	1637	1.7	1.28	401.53	776		73		245	58		2.0	
4	1642	1.7	1.28	404.56	775		73		245	59		2.0	
3	1647	1.6	1.20	407.58	775		72		252	59		2.0	
2	1652	1.3	0.98	410.59	774		74		245	59		1.5	
1	1657	1.0	0.75	413.38	772		72		249	60		1.0	
END!	1702	—	—	415.848	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Kiewit
SAMPLE LOCATION: Turbine #2 Stack
OPERATOR/ASSISTANT: CH

UNIT: Turbine #2
TEST NO.: 1-PM-2
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

PAGE 1 OF 2
PROJECT #: 09092
DATE: 4/27/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.43
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.215
	Material:	~~Glass~~ SS
Filter:	Number:	7990
	Material:	Glass

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	DI H_2O	785.4	587.5	197.9
#2	DI H_2O	637.1	634.5	2.6
#3	DI H_2O	577.3	578.5	-1.2
#4	Silica Gel	801.7	784.6	17.1
#5	Zone Rinse			-30
#6				
#7				

Total Weight Gain: = ~~216.4~~ 186.49

POST TEST INFO:
Filter Appearance: Clean
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.002	10	OK	
Post-Test:	0.004	10	OK	

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in	STATIC PRESS
6	1050	1.50	1.13	476.626	771		61		250	55		3.5	
5	5	1.45	1.08	482.49	773		61		245	44		3.0	-0.81
4	10	1.40	1.05	485.95	773		62		242	45		2.5	
3	15	1.30	0.98	488.75	773		63		247	47		2.5	
2	20	1.20	0.90	491.49	774		63		248	48		2.0	
1	25	1.15	0.86	493.92	774		64		250	49		2.0	
5	1120	—	—	496.784	—		—	—	—	—		—	
6	11:23	1.85	1.38	496.784	772		66		249	54		4.5	
5	5	1.90	1.43	499.96	773		66		248	46		4.5	
4	10	1.73	1.29	503.42	773		68		248	47		4.0	
3	15	1.55	1.16	506.63	772		68		252	50		3.5	
2	20	1.30	0.98	509.73	772		69		247	50		2.5	
1	25	1.10	0.83	512.62	773		71		243	51		2.0	
5	11:59	—	—	515.004	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JH
Impingers Recovered: JH
Filter Loaded: JH
Filter Recovered: JH
Probe Wash: RO

TEST SUMMARY

Calculated by: JH
Checked by: SAM
Sample Volume, ft^3: 80.747
Water Collected, g: ~~216.4~~ 186.49
Meter Temperature, °F: 71.4
Meter Pressure (ΔH), iwg: 1.30
Velocity (ΔP rms), iwg: 1.7052
Stack Pressure, iwg: -0.81
Stack Temperature, °F: 775.3
O_2 / CO_2: 13.12 / 4.621

Comments:
O_2/CO_2 = Average Runs 1-3

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT Kiewit
SAMPLE LOCATION Turbine #2 Stack
OPERATOR/ASSISTANT CH

UNIT Turbine #2 TEST NO. 1-PM-2 METHOD 5/202
TEST CONDITION Full Load AMB. TEMP., °F
METER VOL. (START/END)

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PROJECT # 09092
DATE 4/27/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2:
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = 0.75 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1			=	
# 2			=	
# 3			=	
# 4			=	
# 5			=	
# 6			=	
# 7			=	

See page

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in.	STATIC PRESS
6	1159	2.60	1.95	515.104	778		71		246	53		6.0	
5	5	2.33	1.75	518.94	777		72		246	49		6.0	
4	10	2.10	1.58	522.71	777		73		246	49		5.0	
3	15	1.95	1.46	525.99	776		75		242	50		4.75	
2	20	1.70	1.28	529.74	777		77		245	52		4.0	
1	25	1.45	1.09	532.941	777		77		244	51		3.5	
5	1229	—	—	536.182	—		—		—	—		—	
6	1233	2.50	1.88	536.182	778		79		246	58		6.0	
5	5	2.40	1.80	540.16	779		80		248	56		6.0	
4	10	2.13	1.60	543.14	778		81		244	48		5.25	
3	15	1.85	1.39	547.70	778		82		244	48		4.5	
2	20	1.60	1.20	550.95	779		82		246	49		4.0	
1	25	1.55	1.16	554.46	779		83		243	49		3.5	
5	1303	—	—	557.373	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #7 Stack
OPERATOR/ASSISTANT:

UNIT: Turbine # 7
TEST NO.: 2-PM-2
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

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PROJECT # 09092
DATE 4/27/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.40
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.25 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.215
	Material:	SS
Filter:	Number:	7851
	Material:	Glass

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	DI H_2O	790.6	605.2	= 185.4
# 2	DI H_2O	689.1	686.3	= 2.8
# 3	DI H_2O	608.6	607.6	= 1.0
# 4	Silica Gel	774.3	759.7	= 14.6
# 5	Line Rinse			= 30
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 173.8

Filter Appearance: Clean
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.005	9	OK	[illegible]
Post-Test:	0.002	7	OK	[illegible]

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP. °F	COIL °F	VAC. in. Hg	STATIC PRESS.
6	13:30	2.50	1.88	558.352	772		80		231	52		2.0	
5	5	2.38	1.79	562.18	777		82		257	40		2.0	-0.78
4	10	2.20	1.65	566.27	775		83		246	42		2.0	
3	15	2.00	1.5	569.92	778		85		244	42		1.75	
2	20	1.88	1.41	573.47	777		86		249	43		1.5	
1	25	1.70	1.28	577.31	776		86		257	43		1.25	
5	14:00	—	—	580.356	—		—		—	—		—	
6	14:04	2.60	1.95	580.396	776		85		248	47		2.5	
5	5	2.40	1.80	584.29	778		85		244	44		2.5	
4	10	2.10	1.58	588.24	779		85		249	44		2.0	
3	15	1.92	1.44	592.18	778		84		251	44		2.0	
2	20	1.65	1.24	596.68	778		84		256	44		1.5	
1	25	1.47	1.10	600.18	778		82		247	44		1.25	
5	1434	—	—	603.525	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JL
Impingers Recovered: JL
Filter Loaded: JL
Filter Recovered: JL
Probe Wash: CH

TEST SUMMARY

Calculated by: JL
Checked by: SAM
Sample Volume, ft^3: 82.093
Water Collected, g: 173.8
Meter Temperature, °F: 83.6
Meter Pressure (ΔH), iwg: 1.34
Velocity (ΔP rms), iwg: 1.7601
Stack Pressure., iwg: -0.78
Stack Temperature, °F: 778.4
O_2 / CO_2: 13.12/4.586

Comments:

O_2/CO_2 = Average Run 4-6

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT Pinoche Energy Center
SAMPLE LOCATION Turbine #2 stack
OPERATOR/ASSISTANT CH

UNIT Turbine #2 TEST NO. 2-PM-2 METHOD 5/202
TEST CONDITION Full Load AMB. TEMP., °F
METER VOL. (START/END)

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PROJECT # 09092
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PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2:
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = 0.75 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

See Page #1

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in	STATIC PRESS
6	1437	1.85	1.39	603.529	776		85		250	47		1.0	
5	5	1.90	1.43	607.03	777		88		247	48		1.0	
4	10	1.70	1.28	610.55	778		87		248	48		<1	
3	15	1.50	1.13	614.60	778		85		253	49		<1	
2	20	1.30	0.98	616.99	778		88		245	49		<1	
1	25	1.25	0.94	619.84	778		83		250	48		<1	
S	1507	—	—	622.698	—		—		—	—		—	
6	1510	1.70	1.28	622.698	779		81		236	52		1.5	
5	5	1.60	1.16	626.25	780		81		253	49		1.0	
4	10	1.45	1.09	628.25	780		80		255	48		<1	
3	15	1.30	0.98	632.9	780		80		237	48		<1	
2	20	1.30	0.98	634.84	787		79		248	49		<1	
1	25	1.15	0.86	637.79	805		78		244	45			
S	1540	—	—	640.445	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panache Energy Center
SAMPLE LOCATION: Turbine #2 Stack
OPERATOR/ASSISTANT: CH

UNIT: Turbine #2
TEST NO.: 3-PM-2
TEST CONDITION: Full Load
METER VOL. (START/END):
METHOD: 5/202
AMB. TEMP., °F:

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DATE 4/27/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.37
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-11
	Yd value:	0.972
	ΔH@ value:	1.572
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.215
	Material:	SS
Filter:	Number:	7863
	Material:	Glass

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
#1	DI H_2O	785.8	587.2	=	198.6
#2	DI H_2O	636.7	634.4	=	2.3
#3	DI H_2O	577.6	577.3	=	0.3
#4	Silica Gel	820.2	801.7	=	18.5
#5	Line Rinse			=	-30
#6				=	
#7				=	

Total Weight Gain: =

POST TEST INFO:

Filter Appearance:	clean
Condensate Appearance:	clear
Silica Gel Spent? (Y/N):	No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.006	11	OK	[illegible]
Post-Test:	0.003	8	OK	[illegible]

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
6	16:12	1.95	1.46	641.602	776		72		258	53		4.0	
5	5	2.10	1.58	645.61	776		72		249	48		4.6	-0.79
4	10	1.85	1.39	648.05	798		73		238	50		3.5	
3	15	1.67	1.25	652.28	789		72		251	56		3.25	
2	20	1.40	1.05	655.35	777		70		250	49		2.5	
1	25	1.35	1.01		777		70		243	48		2.25	
5	~~1642~~ 1656	—	—	661.209	—	—	—		—	—			
6	1700	2.0	1.50	661.209	775		69		245	56		4.25	
5	5	1.85	1.39	664.43	776		69		250	50		3.75	
4	10	1.72	1.29	667.67	775		69		245	51		3.25	
3	15	1.40	1.06	670.92	775		69		242	52		2.25	
2	20	1.36	1.02	674.14	774		69		247	51		2.25	
1	25	1.30	0.98	676.68	774		68		250	51		2.0	
5	1730	—	—	678.364	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JL
Impingers Recovered: JL
Filter Loaded: JL
Filter Recovered: JL
Probe Wash: CH

TEST SUMMARY

Calculated by: JL
Checked by: SAM
Sample Volume, ft³: 80.121
Water Collected, g: 189.7
Meter Temperature, °F: 68.6
Meter Pressure (ΔH), iwg: 1.43
Velocity (ΔP rms), iwg: 1.8928
Stack Pressure., iwg: -0.79
Stack Temperature, °F: 776.9
O_2 / CO_2: 13.16/4.564

Comments: Pause 1626
O_2/CO_2 = Average Run 7-9 ↓ 1641

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Panoche Energy Center
SAMPLE LOCATION: Turbine #2 Stack
OPERATOR/ASSISTANT: CH

UNIT: Turbine #2
TEST NO.: 3-PM-2
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

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PROJECT # 09092
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PRE-TEST DATA:

Barometric Pressure, in. Hg.: 7
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value: See
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

Page #1

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in.	STATIC PRESS
6	1735	2.70	2.09	679.364	776		67		254	52		6.0	
5	5	2.50	1.88	683.47	776		68		247	50		5.5	
4	10	2.15	1.61	687.09	776		68		251	51		5.0	
3	15	1.95	1.46	690.69	776		67		244	50		4.0	
2	20	1.95	1.46	694.16	775		67		245	51		4.0	
1	25	1.70	1.28	697.45	776		67		246	52		3.5	
S	1805	—	—	700.648	—		—		—	—		—	
6	1808	2.45	1.84	700.648	775		66		249	56		5.75	
5	5	2.27	1.70	704.77	775		67		247	53		5.0	
4	10	2.15	1.69	708.00	775		67		243	51		4.75	
3	15	2.15	1.61	711.54	775		67		245	50		4.5	
2	20	1.95	1.46	715.18	774		67		247	50		3.75	
1	25	1.90	1.43	718.47	774		66		248	49		3.5	
S	1838	—	—	721.723	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEC
SAMPLE LOCATION: Stack
OPERATOR/ASSISTANT: CH, MR

UNIT: #3
TEST NO.: 1-pm-3
TEST CONDITION: Full Load
METER VOL. (START/END): 238.543 / 317.138

METHOD: 5/202
AMB. TEMP., °F:

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PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.37
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	120
Per point:	5
Total of Traverse Points:	24
ΔH = 0.80 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.210
	Material:	SS
Filter:	Number:	7979
	Material:	Glass fiber

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	H_2O	851.5	666.0	= 185.5
#2	H_2O	631.7	624.5	= 7.2
#3	H_2O	635.4	632.8	= 2.6
#4	S.Gel	849.3	823.4	= 25.9
#5	RINSE	Ø	25.0	= -25.0
#6				=
#7				=

POST TEST INFO:
Total Weight Gain: = 196.2
Filter Appearance: LT. BROWN
Condensate Appearance: #1 LT YELLOW, #2 & 3 CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.003	9	OK	
Post-Test:	0.002	8	OK	

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
P 6	1005	1.55	1.24	238.543	766		66		268	62		1.75	
5	5	1.47	1.18	241.87	769		67		267	41		1.75	-0.41
4	10	1.49	1.19	244.55	770		69		266	42		1.75	
3	15	1.22	0.98	248.00	768		71		265	46		<1	
2	20	1.20	0.96	250.55	768		72		264	48		<1	
1	25	1.05	0.84	253.38	768		74		263	48		<1	
S	1035	—	—	255.963	—	—	—	—	—	—		—	
C 6	10:38	2.55	2.04	255.963	774		75		266	49		4.25	
5	5	2.40	1.92	260.50	775		76		266	50		4.75	
4	10	1.93	1.54	264.48	776		79		264	55		3.0	
3	15	1.61	1.29	267.235	774		79		264	57		2.5	
2	20	1.58	1.26	270.96	773		80		265	57		2.25	
1	25	1.25	1.00	274.09	774		80		267	57		2.0	
S	11:08	—	—	276.928	—		—	—	—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: CH
Impingers Recovered: MR
Filter Loaded: MR
Filter Recovered: MR
Probe Wash: CH

TEST SUMMARY

Calculated by: MR
Checked by: SAM
Sample Volume, ft³: 77.595
Water Collected, g: 196.2
Meter Temperature, °F: ~~79.75~~
Meter Pressure (ΔH), iwg: ~~1.37~~
Velocity (ΔP rms), iwg: ~~1.6218~~
Stack Pressure., iwg: -0.41
Stack Temperature, °F: 774.2
O_2 / CO_2: 13.103/4.600

Comments:
O_2/CO_2 AVG RATIO #'s 1,2 & 3 T_M=79.
ΔH=1.321 ΔP=1.6168

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT PEC
SAMPLE LOCATION Stack
OPERATOR/ASSISTANT CH, MS

UNIT 3
TEST NO. 1-Pm-3
METHOD 5/202
TEST CONDITION Full Load
AMB. TEMP., °F
METER VOL. (START/END) /

PAGE 2 OF 2
PROJECT # 09092
DATE 4/23/09

Sample

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC.	STATIC PRESS.
B 6	11:11	2.75	2.20	276.928	777		82		252	55		5.0	
5	5	2.52	2.02	281.52	778		84		224	61		4.5	
4	10	2.18	1.74	285.45	777		85		241	59		4.0	
3	15	1.95	1.56	289.55	778		86		246	55		3.0	
2	20	1.70	1.36	293.27	776		87		247	56		2.25	
1	25	1.62	1.30	297.08	777		87		248	57		2.25	
5	1141	—	—	299.931	—		—	—	—	—			
A 6	11:45	1.52	1.22	299.931	776		87		252	60		1.75	
5	5	1.50	1.20	303.58	777		87		250	57		1.75	
4	10	1.38	1.10	306.19	777		87		245	59		1.75	
3	15	1.14	0.91	309.28	776		86		254	58		1.5	
2	20	1.08	0.86	311.88	777		86		242	58		<1	
1	25	1.00	0.80	314.75	777		86		229	59		<1	
5	1215	—	—	317.138	—		—	—	—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft³:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:

Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEC
SAMPLE LOCATION: Stack
OPERATOR/ASSISTANT: CH, MS

UNIT: #3
TEST NO.: 2-Pm-3
METHOD: 5/202
TEST CONDITION:
AMB. TEMP., °F:
METER VOL. (START/END): 318.934 / 397.562

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PROJECT #: 09092
DATE: 4/23/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.31
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	120 min
Per point:	5 min
Total of Traverse Points:	24
ΔH = 0.80 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CR-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	Ti
Nozzle:	Diameter:	0.210
	Material:	SS
Filter:	Number:	7976
	Material:	Glass fiber

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	H_2O	846.1	655.1	= 191.0
#2	H_2O	637.6	632.0	= 5.6
#3	H_2O	653.7	651.8	= 1.9
#4	SiGel	873.5	855.4	= 18.1
#5	Rinse	Ø	25.0	= -25.0
#6				=
#7				=

POST TEST INFO:
Total Weight Gain: = 191.6
Filter Appearance: White - Rinses
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.003	8	OK	#
Post-Test:	0.001	7	OK	#

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
6	12:55	1.48	1.18	318.934	778		85		247	59		1.0	
5	5	1.54	1.23	322.25	778		85		243	49		1.0	-0.41
4	10	1.43	1.14	326.51	779		86		240	48		1.0	
3	15	1.32	1.05	328.40	778		86		258	49		<1	
2	20	1.25	1.00	331.23	777		87		250	50		<1	
1	25	1.01	0.81	333.89	777		87		239	51		—	
9	1325	—	—	336.565	—		—	—	—	—			
6	1327	2.25	2.20	336.565	780		87		264	55		3.75	
5	5	2.48	1.98	340.85	780		88		251	49		3.0	
4	10	2.13	1.70	344.92	780		88		251	52		2.5	
3	15	2.00	1.60	348.94	778		88		249	53		2-5	
2	20	1.77	1.42	352.31	778		89		253	54		2.0	
1	25	1.53	1.22	355.93	774		89		249	54		1.5	
9	1357	—	—	358.908	—		—	—	—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	CH
Impingers Recovered:	MSR
Filter Loaded:	MSR
Filter Recovered:	MSR
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MSR
Checked by:	JAM
Sample Volume, ft^3:	78.628 ✓
Water Collected, g:	191.6 ✓
Meter Temperature, °F:	87.6 ✓
Meter Pressure (ΔH), iwg:	1.321 ✓
Velocity (ΔP rms), iwg:	1.603 ✓
Stack Pressure., iwg:	-0.41 ✓
Stack Temperature, °F:	776.6 ✓
O_2 / CO_2:	13.08 / 4.613 ✓

Comments:
O_2/CO_2 AVG DATA #1 5 & 7

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT Turbine #3
TEST NO. 2-PM-3
TEST CONDITION Full Load
METER VOL. (START/END)

METHOD 5/202
AMB. TEMP., °F

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PROJECT # 09092
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PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = 0.80 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1			=	
# 2			=	
# 3			=	
# 4			=	
# 5			=	
# 6			=	
# 7			=	

See page

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN °F	METER TEMP OUT °F	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
6	1400	2.45	1.96	358.908	778		89		~~250~~	61		~~3.0~~	
5	5	2.22	1.78	363.07	779		90		247	53		2.5	
4	10	2.05	1.64	367.05	776		90		249	53		2.5	
3	15	1.75	1.40	370.51	777		90		246	55		2.25	
Pause 2	20	1.50	1.20	374.22	775		91		250	55		1.0	
1	25	1.31	1.05	378.12	773		91		250	55		<1	
5	~~1430~~	—	—	380.297	—		—	—	—	—		—	
	1503												
6	1507	1.50	1.20	380.297	777		86		254	59		1.0	
5	5	1.58	1.26	383.45	776		86		243	54		1.0	
4	10	1.35	1.08	386.77	776		86		247	58		<1	
3	15	1.20	0.96	389.84	774		86		247	58		<1	
2	20	1.09	0.87	391.95	769		86		248	58		<1	
1	25	0.97	0.78	394.93	769		86		240	59		<1	
5	1537	—	—	397.562	—		—	—	—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:

Comments: Pause 1422 - 1457

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEC
SAMPLE LOCATION: Stack
OPERATOR/ASSISTANT: CH, MS

UNIT: #3
TEST NO.: 3-Pm-3
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

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PROJECT #: 09092
DATE: 4/23/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.28
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120 in
Sample Time: Total:	120 min
Per point:	5 min
Total of Traverse Points:	24
ΔH = 0.80 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	56
	Material:	Ti
Nozzle:	Diameter:	0.210
	Material:	SS
Filter:	Number:	7970
	Material:	Glass fiber

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	H_2O	853.1	654.1	= 199.0
# 2	H_2O	648.8	643.3	= 5.5
# 3	H_2O	636.1	635.9	= 0.2
# 4	~~S.Gel~~		~~845.3~~	= 20.2
# 5	S.G.	804.8	784.6	=
# 6	Rinse	ø	25.0	= -25.0
# 7				=

POST TEST INFO: Total Weight Gain: = 199.9
Filter Appearance: CLEAN
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.002	10	OK	CH
Post-Test:	0.002	7	OK	CH

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VACUUM in	STATIC PRESS
6	1620	1.55	1.24	400.044	776		77		239	60		2.75	
5	5	1.67	1.34	403.45	776		78		250	51		2.75	
4	10	1.73	1.38	406.67	775		78		240	51		3.0	-0.60
3	15	1.38	1.10	409.89	773		78		248	53		2.5	
2	20	1.25	1.00	412.90	774		78		250	55		1.75	
1	25	1.08	0.86	415.81	772		78		241	55		<1	
5	1650	—	—	418.418	—		—	—	—	—			
6	1654	2.40	1.92	418.418	777		78		256	59		5.0	
5	5	2.20	1.76	422.44	776		78		241	50		4.5	
4	10	2.75	1.40	425.93	775		78		241	53		3.5	
3	15	1.50	1.20	429.85	775		79		255	54		3.0	
2	20	1.42	1.14	433.10	774		78		248	54		2.5	
1	25	1.25	1.00	436.31	774		78		255	54		2.0	
5	1724	—	—	438.763	—		—	—	—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	CH
Impingers Recovered:	MSF
Filter Loaded:	MSF
Filter Recovered:	MSF
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MSF
Checked by:	JAM
Sample Volume, ft^3:	78.227
Water Collected, g:	199.9
Meter Temperature, °F:	77.8
Meter Pressure (ΔH), iwg:	1.31
Velocity (ΔP rms), iwg:	1.6134
Stack Pressure., iwg:	~~-0.60~~ -0.
Stack Temperature, °F:	777.0
O_2 / CO_2:	~~13.00~~ 13.073/4.61

Comments:
O_2/CO_2 = Avg 9, 10, 11

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PEC
SAMPLE LOCATION: STACK
OPERATOR/ASSISTANT: MS, CH

UNIT: TURBINE #3
TEST NO.: 3-PM-3
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: 5/202
AMB. TEMP., °F:

PAGE 2 OF 2
PROJECT #:
DATE:

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.28
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120 4
Sample Time: Total:	120 min
Per point:	5 min
Total of Traverse Points:	24
ΔH = 0.80 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	
	Yd value:	
	ΔH@ value:	
Pilot:	ID #:	
	Cp value:	
Probe:	ID #:	
	Material:	
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in. Hg	STATIC PRESS
6	17:27	2.72	2.18	438.963	780		78		249	55		6.0	
5	5	2.55	2.04	443.13	781		78		240	55		6.0	
4	10	2.05	1.64	448.21	780		78		250	55		4.0	
3	15	1.93	1.54	451.09	782		78		246	57		4.0	
2	20	1.57	1.25	454.49	781		78		231	58		2.0	
1	25	1.45	1.16	457.71	280		78		251	59		2.0	
S	1802	—	—	460.892	—		—	—	—	—		—	
6	1806	1.55	1.24	460.892	778		77		255	59		3.0	
5	5	1.38	1.10	464.37	779		77		242	60		2.0	
4	10	1.42	1.13	467.01	778		77		242	59		2.5	
3	15	1.30	1.04	470.09	778		77		253	55		2.0	
2	20	1.21	0.97	472.90	778		77		251	59		2.0	
1	25	1.07	0.85	475.59	777		77		243	60		1.5	
S	1836	—	—	478.271	—		—	—	—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	
Impingers Recovered:	
Filter Loaded:	
Filter Recovered:	
Probe Wash:	
TEST SUMMARY	
Calculated by:	
Checked by:	
Sample Volume, ft^3:	
Water Collected, g:	
Meter Temperature, °F:	
Meter Pressure (ΔH), iwg:	
Velocity (ΔP rms), iwg:	
Stack Pressure., iwg:	
Stack Temperature, °F:	
O_2 / CO_2:	

Comments: Pause 17:34

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: P.E.C.
SAMPLE LOCATION: STACK
OPERATOR/ASSISTANT: CH, MS

UNIT: TURBINE # 4
TEST NO.: 1-PM-4
METHOD: 5/202
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END): 978.927 / 1055.456

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PROJECT # 09092
DATE 4/24/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120 INCH
Sample Time: Total:	120 MIN
Per point:	5 MIN
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-03
	Yd value:	0.992
	ΔH@ value:	1.789
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	TITANIUM
Nozzle:	Diameter:	0.207
	Material:	S.S.
Filter:	Number:	7977
	Material:	GLASS

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	H_2O	861.8	674.2	= 187.6
# 2	H_2O	634.4	631.4	= 3.0
# 3	H_2O	633.1	630.6	= 2.5
# 4	~~S.G.~~		~~784.6~~	=
# 5	RINSE	Ø	25.0	= ~~NA~~ -25.0
# 6	S.G.	857.5	839.0	= 18.5
# 7				=

POST TEST INFO: Total Weight Gain: = 186.6
Filter Appearance: CLEAN
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.004	10	OK	dc
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS
6	9:55	2.50	1.88	978.927	765		66		244	52		4.0	-0.55
5	5	2.50	1.88	982.61	766		66		247	53		4.0	
4	10	2.35	1.76	986.77	772		67		254	54		4.0	
3	15	2.05	1.54	990.95	775		67		251	55		4.0	
2	20	1.94	1.49	994.31	776		67		252	55		3.75	
1	25	1.65	1.24	997.49	777		67		256	56		3.0	
5	10:25	—	—	1000.613	—		—		—	—		—	
6	10:28	2.65	1.99	1000.613	776		67		252	58		4.75	
5	5	2.50	1.88	1004.60	776		68		254	56		4.75	
4	10	2.25	1.69	1008.64	776		68		255	56		4.5	
3	15	2.11	1.58	1013.00	776		68		253	56		4.0	
2	20	1.80	1.35	1016.53	776		68		245	56		3.5	
1	25	1.65	1.24	1019.08	775		68		254	55		3.23	
5	10:58	—	—	1022.324	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MSA
Impingers Recovered:	MSA
Filter Loaded:	MSA
Filter Recovered:	MSA
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MSA
Checked by:	SAM
Sample Volume, ft^3:	76.529
Water Collected, g:	186.6
Meter Temperature, °F:	67.8
Meter Pressure (ΔH), iwg:	1.298
Velocity (ΔP rms), iwg:	1.6897
Stack Pressure., iwg:	-0.55
Stack Temperature, °F:	774.3
O_2 / CO_2:	~~13.306~~ / 13.306

Comments:
O_2/CO_2 AVG. OF RATA #'S 1-4
CO_2 = 4.505

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT TURBINE #4 TEST NO. 1-PM-4 METHOD 5/202
TEST CONDITION Full Load AMB. TEMP., °F
METER VOL. (START/END)

PAGE 2 OF 2
PROJECT # 09092
DATE 4/24/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	120 min
Per point:	5 min
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	
	Yd value:	
	ΔH@ value:	
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	
	Material:	
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

SEE PAGE 1

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in	STATIC PRESS
6	11:00	1.65	1.24	1022.324	774		68		254	60		3.0	
5	5	1.60	1.20	1025.01	772		68		254	58		3.0	
4	10	1.52	1.14	1028.55	772		69		257	58		3.0	
3	15	1.45	1.09	1032.07	772		69		249	56		2.5	
2	20	1.25	0.94	1034.67	773		69		252	59		2.5	
1	25	1.03	0.77	1037.41	773		69		248	60		2.0	
5	11:30	—	—	1039.727	—		—		—	—		—	
6	11:33	1.35	1.01	1039.727	776		68		232	62		2.75	
5	5	1.25	0.94	1042.58	777		68		246	60		2.5	
4	10	1.30	0.98	1045.83	778		68		233	55		2.5	
3	15	1.10	0.82	1048.68	777		68		235	55		2.25	
2	20	1.06	0.80	1050.80	777		68		241	56		2.25	
1	25	0.94	0.71	1053.09	777		67		238	57		2.0	
5	12:03	—	—	1055.456	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: P.E.C.
SAMPLE LOCATION: STACK
OPERATOR/ASSISTANT: MS, CH

UNIT: TURBINE #4
TEST NO.: 2-PM-4
METHOD: 5/202
TEST CONDITION:
AMB. TEMP., °F:
METER VOL. (START/END): 57.177 / 130.933

PAGE 1 OF 2
PROJECT # 09092
DATE 4/24/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	120 min
Per point:	5 min
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CB-03
	Yd value:	0.992
	ΔH@ value:	1.789
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	TITANIUM
Nozzle:	Diameter:	0.207
	Material:	S.S.
Filter:	Number:	7987
	Material:	GLASS

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
#1	~~DI~~ H_2O	847.6	660.7	186.9
#2	H_2O	631.9	632.4	-0.5
#3	H_2O	662.9	661.8	1.1
#4	S.G.	821.8	806.2	15.6
#5	RINSE	Ø	25.0	-25.0
#6				
#7				

Total Weight Gain: 178.1

POST TEST INFO:

Filter Appearance: CLEAN
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.001	9	OK	[illegible]
Post-Test:	0.001	8	OK	[illegible]

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMPS °F	COOL °F	VAC IN	STATIC PRESS
6	12:25	1.25	0.94	57.177	777		65		246	55		1.75	-0.55
5	5	1.08	0.81	59.87	777		65		241	57		1.50	
4	10	1.00	0.75	62.26	778		66		240	58		1.5	
3	15	0.96	0.72	64.63	777		66		249	57		1.5	
2	20	0.90	0.68	66.95	778		66		239	58		1.5	
1	25	0.87	0.65	69.25	777		66		242	57		1.5	
9	12:55	—	—	71.435	—		—		—	—		—	
6	12:58	1.65	1.24	71.435	776		66		251	55		3.0	
5	5	1.60	1.20	75.18	774		66		242	55		2.5	
4	10	1.55	1.16	77.55	776		67		240	56		2.5	
3	15	1.31	0.98	80.73	776		67		250	56		2.0	
2	20	1.10	0.83	84.97	776		67		241	56		1.5	
1	25	1.05	0.79	86.12	774		67		237	56		1.0	
9	13:28	—	—	88.513	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MSL
Impingers Recovered:	MSL
Filter Loaded:	MSL
Filter Recovered:	MSL
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MSL
Checked by:	JAM
Sample Volume, ft^3:	73.756 ✓
Water Collected, g:	178.1 ✓
Meter Temperature, °F:	65.5 ✓
Meter Pressure (ΔH), iwg:	1.237 ✓
Velocity (ΔP rms), iwg:	1.6033 ✓
Stack Pressure., iwg:	-0.55 ✓
Stack Temperature, °F:	776.8 ✓
O_2 / CO_2:	13.264 / 4.5209 ✓

Comments:
O_2/CO_2 AVG OF RATA #'S 5-7

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT MLS, CH

UNIT TURBINE #4 TEST NO. 2-PM-4 METHOD 5/202
TEST CONDITION Full Load AMB. TEMP., °F
METER VOL. (START/END)

PAGE 2 OF 2
PROJECT # 09092
DATE 4/24/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120"
Sample Time: Total:	120 min
Per point:	5 min
Total of Traverse Points:	24
ΔH = 0.75 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	
	Yd value:	
	ΔH@ value:	
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	
	Material:	
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SEE PAGE A

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL	VACUUM	STATIC PRESS
6	13:30	2.55	1.91	98.513	778		66		244	54		4.0	
5	5	2.50	1.88	99.42	777		66		233	53		4.0	
4	10	2.20	1.65	99.87	777		66		237	54		3.75	
3	15	2.05	1.54	100.05	777		66		245	54		3.5	
2	20	1.90	1.43	104.01	777		65		237	54		3.5	
1	25	1.65	1.24	106.95	777		65		244	54		3.0	
S	1400	—	—	110.049	—		—		—	—		—	
6	1403	2.35	1.76	110.049	778		65		245	54		3.5	
5	5	2.40	1.80	113.77	778		64		241	54		3.75	
4	10	2.20	1.65	117.69	778		64		243	54		3.5	
3	15	2.05	1.54	121.09	777		64		242	54		3.25	
2	20	1.85	1.39	124.48	777		64		247	55		3.0	
1	25	1.55	1.16	127.86	776		64		244	54		2.5	
S	1433	—	—	130.933	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft³:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT TURBINE #4 TEST NO. 3-PM-4 METHOD 5/202
TEST CONDITION Full Load AMB. TEMP., °F
METER VOL. (START/END) /

PAGE 1 OF 2
PROJECT # 09092
DATE 4/24/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.46
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	120 IN
Sample Time: Total:	120 MIN
Per point:	5 MIN
Total of Traverse Points:	24
ΔH =	0.73 x ΔP

EQUIPMENT INFO:

Meter:	ID #:	CB-03
	Yd value:	0.992
	ΔH@ value:	1.789
Pitot:	ID #:	58
	Cp value:	0.8315
Probe:	ID #:	58
	Material:	TITANIUM
Nozzle:	Diameter:	0.207
	Material:	S.S.
Filter:	Number:	7993
	Material:	GLASS

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	H_2O	838.0	654.8	= 183.2
# 2	H_2O	643.8	643.0	= 0.8
# 3	H_2O	633.5	633.5	= 0.0
# 4	S.G	806.0	786.6	= 19.4
# 5	RINSE	Ø	25.0	= -25.0
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 173.4
Filter Appearance: CLEAN
Condensate Appearance: CLEAR
Silica Gel Spent? (Y/N): NO

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.004	8	OK	H
Post-Test:	0.002	7	OK	H

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK F	METER TEMP IN	METER TEMP OUT	PROBE F	OVEN F	IMPS F	COIL F	VAC in	STATIC PRESS
6	1500	2.70	2.03	134.475	777		62		236	53		5.5	-0.55
5	5	2.50	1.88	138.51	777		62		233	53		5.25	
4	10	2.27	1.70	142.34	776		62		234	53		4.75	
3	15	2.05	1.54	145.92	776		63		232	54		4.5	
2	20	1.90	1.43	149.53	777		63		246	55		4.25	
1	25	1.77	1.33	153.611	776		63		244	56		4.5	
5	1530	—	—	156.824	—		—		—	—		—	
6	1533	2.51	1.88	156.824	776		63		245	56		5.0	
5	5	2.34	1.76	161.44	776		62		246	56		5.0	
4	10	2.15	1.61	164.07	777		63		250	56		4.5	
3	15	1.75	1.31	167.56	777		64		257	57		4.0	
2	20	1.40	1.05	171.04	778		64		254	57		3.0	
1	25	1.04	0.78	173.83	777		64		247	58			
5	1603	—	—	176.263	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:	MST
Impingers Recovered:	MSL
Filter Loaded:	MST
Filter Recovered:	MSL
Probe Wash:	CH

TEST SUMMARY

Calculated by:	MSL SAM
Checked by:	SAM
Sample Volume, ft^3:	76.096 ✓
Water Collected, g:	~~173.4~~ SAM 173.8
Meter Temperature, °F:	64.0 ✓
Meter Pressure (ΔH), iwg:	1.27 ✓
Velocity (ΔP rms), iwg:	1.6523 ✓
Stack Pressure., iwg:	-0.55 ✓
Stack Temperature, °F:	775.9 ✓
O_2 / CO_2:	13.283 / 4.5083 ✓

Comments:
O_2/CO_2 = Average 8-10

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT P.E.C.
SAMPLE LOCATION STACK
OPERATOR/ASSISTANT CH, MS

UNIT TURBINE #4 TEST NO. 3-PM-4 METHOD 5/202
TEST CONDITION Full Load AMB. TEMP., °F
METER VOL. (START/END) /

PAGE 2 OF 2
PROJECT # 09092
DATE 4/24/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2:
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches: 120 IN
Sample Time: Total: 120 MIN
Per point: 5 MIN
Total of Traverse Points: 24
ΔH = 0.75 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 6				=
# 8				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SEE PAGE 1

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in	STATIC PRESS
6	1605	1.67	1.25	176.263	774		64		238	58		3.5	
5	5	1.50	1.35	180.14	774		64		236	58		3.5	
4	10	1.55	1.16	182.74	774		64		240	58		3.5	
3	15	1.35	1.04	185.79	774		65		239	59		3.0	
2	20	1.23	0.92	188.52	774		65		230	59		2.5	
1	25	1.07	0.80	191.32	774		65		258	60		2.25	
5	1635	—	—	193.754	—		—	—	—	—		—	
6	1640	1.35	1.01	193.754	776		65		248	61		3.0	
5	5	1.37	1.03	196.62	776		65		235	60		3.0	
4	10	1.32	0.99	199.71	777		66		245	58		2.75	
3	15	1.27	0.95	203.00	776		66		245	58		2.75	
2	20	1.15	0.86	205.58	777		66		249	57		2.5	
1	25	0.99	0.74	207.59	776		66		240	56		2.25	
5	1720	—	—	210.571	—		—		—	—		—	

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:

Comments:

Appendix D.3

Polycyclic Aromatic Hydrocarbons Data Sheets

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOCHE
SAMPLE LOCATION: Exhaust Stack
OPERATOR/ASSISTANT: RMO

UNIT: 2
TEST NO.: 1-PAH-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: CARB 429
AMB. TEMP., °F:

PAGE 1 OF 2
PROJECT # 09092
DATE 4/28/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.84
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	240 min
Per point:	10 min
Total of Traverse Points:	24
ΔH =	0.76 x ΔP

EQUIPMENT INFO:

Meter:	ID #:	CB-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	SB-MP-8
	Cp value:	0.8315
Probe:	ID #:	SB-MP-8
	Material:	Quartz
Nozzle:	Diameter:	0.210
	Material:	Glass
Filter:	Number:	—
	Material:	Teflon

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	CARB/KCARB	947.2	649.1	= 298.1
# 2	CARB/KCARB	665.0	652.7	= 12.3
# 3	EMPTY	498.0	495.0	= 3.0
# 4	Silica Gel	792.5	755.0	= 437.5
# 5				=
# 6				=
# 7				=

Total Weight Gain: = 350.9

POST TEST INFO:
Filter Appearance: Clean
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.018	15	OK	RMO
Post-Test:	0.008	7	OK	RMO

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	STACK ΔP	STACK ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in Hg	STATIC PRESS
NW-6	1237	2.4	1.82	724.511	767		53		248	49	26.7	3	
5	1247	2.2	~~1.80~~ 1.67	731.72	770		56		240	46	26.2	3	
4	1257	2.3	1.75	739.34	770		58		245	52	26.4	3	
3	1307	2.2	1.67	746.58	771		59		251	54	26.7	3	
2	1317	1.7	1.29	754.05	772		61		245	53	26.2	2	2mw
1	1327	1.5	1.14	760.85	772		62		244	53	26.5	1.5	~~-0.66~~
P	1337			766.592									-0.76
SW-6	1346	2.4	1.82	766.592	774		61		246	51	27.4	4	
5	1356	2.2	1.67	773.67	774		63		248	53	27.7	4	
4	1406	2.0	1.52	780.03	775		63		240	56	28.3	4	
3	1416	1.9 mw	1.44 mw	788.16	776		64		252	58	28.6	3.5	
2	1426	1.5 1.6	~~1.14~~ 1.28	795.26	773		64		244	60	30.7	3	
1	1436	1.4	1.06	802.14	775		64		238	60	32.5	2.5	
P	1446			806.798									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: RMO
Impingers Recovered: JK
Filter Loaded: RMO
Filter Recovered: JK
Probe Wash: RMO

TEST SUMMARY

Calculated by: JK
Checked by:
Sample Volume, ft^3: 154.765
Water Collected, g: 350.9
Meter Temperature, °F: 64.3
Meter Pressure (ΔH), iwg: 1.33
Velocity (ΔP rms), iwg: 1.7278
Stack Pressure., iwg: -0.76
Stack Temperature, °F: 773.8
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOLITE
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: RMO

UNIT: 2
TEST NO.: 1-RAM-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: CARB 429
AMB. TEMP., °F:

PAGE 2 OF 2
PROJECT # 09092
DATE 4/28/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = 0.76 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
#7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in	STATIC PRESS
NE-6	1452	2.0	1.52	806.798	774		64		242	57	34.2	8.4	
5	1502	1.8	1.37	814.82	774		65		247	63	34.2	2.5	
4	1512	1.7	1.29	821.00	774		66		260	63	34.4	2.5	
3	1522	1.6	1.23	827.42	773		66		248	60	31.2	3	
2	1532	1.4	1.06	833.67	772		68		253	57	32.1	2.5	
1	1542	1.2	0.91	839.12	772		68		252	58	32.0	2	
P	1552			844.227									
6	1556	1.8	1.37	844.227	775 zero 777		68		238	58	33.2	3	
5	1606	1.6	1.23	850.45	778		69		249	59	34.1	3	
4	1616	1.5	1.14	856.93	777		70		252	58	34.8	3	
3	1626	1.4	1.06	863.32	778		71		231	60	33.6	3	
2	1636	1.2	0.91	869.04	776		70		234	60	33.9	2.5	
1	1646	1.0	0.76	874.28	776		70		233	59	33.8	2	
END	1656			879.276									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOCHE
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: RMO/MC

UNIT: 2
TEST NO.: 2-PAH-2
TEST CONDITION: Full Load
METER VOL. (START/END): 879.860 /

METHOD: CARB 429
AMB. TEMP., °F:

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PROJECT # 09092
DATE 4/29/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.64
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	240 min
Per point:	10 min
Total of Traverse Points:	24

ΔH = 0.76 x ΔP

EQUIPMENT INFO:

Meter:	ID #:	CD-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pitot:	ID #:	58-MP-8
	Cp value:	0.8315
Probe:	ID #:	58-MP-8
	Material:	Quartz
Nozzle:	Diameter:	0.210 in
	Material:	Quartz Glass
Filter:	Number:	—
	Material:	Teflon

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	CARB/B: CARB	942.2	649.8	= 292.4
# 2	CARB/B: CARB	668.4	645.7	= 22.7
# 3	EMPTY	564.4	560.6	= 3.8
# 4	SILICA GEL	824.1	788.1	= 36.0
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 354.9

Filter Appearance: clean
Condensate Appearance: clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:	0.018	15	ok	RMO
Post-Test:	0.006	7	ok	RMO

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	COOL T	VAC	STATIC PRESS
SE-6	0900	1.7	1.29	879.860	758		48		252	42	27.3	3	
5	0910	1.5	1.14	886.94	762		51		241	40	25.5	3	
4	0920	1.5	1.14	892.00	763		54		248	42	25.8	3	
3	0930	1.4	1.06	898.04	763		56		247	45	25.7	2.5	
2	0940	1.2	0.91	904.32	764		57		246	46	25.8	2	
1	0950	0.95	0.72	909.40	762		59		249	47	26.4	1.5	
P	1000			913.860									
													-0.72
NE-6	1003	2.0	1.52	913.860	761		59		255	47	26.1	4	
5	1013	1.9	1.44	920.51	766		61		249	49	25.6	4	
4	1023	1.7	1.29	927.32	768		62		230	50	26.4	3	
3	1033	1.6	1.22	933.57	768		63		242	50	27.2	3	
2	1043	1.4	1.06	939.71	767		63		232	50	28.0	2.5	
1	1053	1.1	0.84	945.45	767		63		232	51	28.5	2	
P	1103			950.421									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: RMO
Impingers Recovered: JK
Filter Loaded: RMO
Filter Recovered: JK.
Probe Wash: RMO/MC

TEST SUMMARY

Calculated by: DJL
Checked by:
Sample Volume, ft^3: 152.099
Water Collected, g: 354.9
Meter Temperature, °F: 60.6
Meter Pressure (ΔH), iwg: 1.32
Velocity (ΔP rms), iwg: 1.7207
Stack Pressure., iwg: -0.72
Stack Temperature, °F: 770.3
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOCHE
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: RMO

UNIT: 2
TEST NO.: 2-PAH-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: CARB 429
AMB. TEMP., °F:

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PROJECT # 09092
DATE 4/29/05

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:

ΔH = 0.76 x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pilot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP TEMP	COOL °F	VAC in Hg	STATIC PRESS
NW-6	1105	2.4	1.82	950.421	774		63		244	51	27.9	5	
5	1115	2.3	1.75	957.44	774		63		241	52	27.6	5	
4	1125	2.2	1.67	964.85	775		63		245	55	28.9	4.5	
3	1135	2.0	1.52	971.06	775		63		245	55	29.4	4	
2	1145	1.7	1.29	978.95	776		63		241	55	29.1	3.5	
1	1155	1.6	1.22	985.21	775		63		250	55	30.1	3.5	
P	1205			991.460									
NW-6	1208	2.4	1.82	991.460	776		62		227	55	32.2	5	
5	1218	2.3	1.75	998.89	779		63		255	56	31.3	5	
4	1228	2.0	1.52	1006.27	780		64		244	57	31.9	4	
3	1238	1.8	1.37	1013.99	778		64		248	57	33.1	4	
2	1248	1.7	1.29	1019.68	779		64		253	56	33.8	4	
1	1258	1.5	1.14	1025.99	778		64		242	56	33.6	3.5	
END	1308			1031.959									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Pinoche Energy Center
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: RMO

UNIT: #2
TEST NO.: 3-PAH-2
TEST CONDITION: Full Load
METER VOL. (START/END): 32.114 /

METHOD: CARB 429
AMB. TEMP., °F:

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PROJECT # 09092
DATE 4/29/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.52
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	240 min
Per point:	10 min
Total of Traverse Points:	24
ΔH = 0.76 x ΔP	

EQUIPMENT INFO:

Meter:	ID #:	CD-11
	Yd value:	0.972
	ΔH@ value:	1.872
Pilot:	ID #:	58-MP-8
	Cp value:	~~55~~ 0.8315
Probe:	ID #:	58-MP-8
	Material:	QUARTZ
Nozzle:	Diameter:	0.210
	Material:	GLASS
Filter:	Number:	—
	Material:	TEFLON

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	CARB / B:CARB	953.3	656.3	= 297.0
# 2	CARB / R:CARB	662.3	653.3	= 9.0
# 3	empty	468.7	465.4	= 3.3
# 4	Silica Gel	689.1	654.0	= 35.1
# 5				=
# 6				=
# 7				=

POST TEST INFO:

Total Weight Gain: = 344.4
Filter Appearance: Clean
Condensate Appearance: Clear
Silica Gel Spent? (Y/N): No

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pilot	Initials
Pre-Test:	0.018	15	ok	RMO
Post-Test:	0.009	8	ok	RMO

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in	STATIC PRESS
~~NW~~ SW-6	1348	2.4	1.82	32.114	778		61		225	57	39.1	3.5	
5	1358	2.3	1.75	40.10	777		64		245	61	37.8	3.5	
4	1408	2.0	1.52	47.71	778		66		235	62	37.3	3	
3	1418	1.8	1.37	54.59	778		67		233	61	38.7	3	
2	1428	1.6	1.22	61.13	778		67		258	61	38.6	2.5	
1	1438	1.4	1.06	67.40	777		67		248	62	40.7	2	
P	1448			73.660									
													-.076
	RMO				774								
NW-6	~~1501~~ 1451	2.4	1.82	73.660	~~765~~ RMO		67		251	60	42.4	4	
5	~~1511~~ 1501	2.3	1.75	81.23	778		68		242	61	41.3	4	
4	~~1521~~ 1511	2.1	1.60	88.96	778		69		247	60	41.6	3.5	
3	~~1531~~ 1521	1.9	1.44	95.96	778		70		242	61	42.5	3	
2	~~1541~~ 1531	1.7	1.29	102.73	775		~~6~~ 71		247	62	42.0	2.5	
1	~~1551~~ 1541	1.6	1.22	109.54	774		72		250	62	41.1	2.5	
P	~~1601~~ 1551			115.668									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JK
Impingers Recovered: GJL
Filter Loaded: JK
Filter Recovered: GJL
Probe Wash: RMO

TEST SUMMARY

Calculated by: GJL
Checked by:
Sample Volume, ft^3: 153.569
Water Collected, g: 344.4
Meter Temperature, °F: 70.3
Meter Pressure (ΔH), iwg: 1.29
Velocity (ΔP rms), iwg: 1.6747
Stack Pressure., iwg: -0.76
Stack Temperature, °F: 776.3
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOCHE
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: FWW

UNIT: 2
TEST NO.: 3-PAH-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: CARB 429
AMB. TEMP., °F:

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PROJECT # 09092
DATE 4/29/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:
Assumed Stack Pressure:
Assumed Moisture Content:
Assumed O_2 / CO_2::
Assumed ΔP:
Assumed ΔH:
Stack Diameter, Inches:
Sample Time: Total:
Per point:
Total of Traverse Points:
ΔH = x ΔP

EQUIPMENT INFO:

Meter: ID #:
Yd value:
ΔH@ value:
Pitot: ID #:
Cp value:
Probe: ID #:
Material:
Nozzle: Diameter:
Material:
Filter: Number:
Material:

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1				=
# 2				=
# 3				=
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: =
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COOL °F	VAC in. Hg	STATIC PRESS
NS-6	1555	1.9	1.44	115.668	778		72		250	55	39.8	2.5	
5	1605	1.9	1.44	121.87	777		72		245	56	37.9	3	
4	1615	1.7	1.29	128.51	776		73		247	55	38.5	2.5	
3	1625	1.5	1.14	135.20	777		73		247	56	40.3	2.5	
2	1635	1.3	0.99	141.09	775		73		248	55	41.9	2	
1	1645	1.1	0.84	146.84	772		73		251	55	42.4	1.5	
P	1655			151.870									
SE 6	1659	1.7	1.29	151.870	773		73		239	54	44.6	3	
5	1709	1.5	1.14	158.32	778		74		235	56	43.7	2.5	
4	1719	1.4	1.06	164.56	778		74		240	56	44.0	2.5	
3	1729	1.3	0.99	170.29	778		74		248	56	44.6	2	
2	1739	1.0	0.76	176.14	776		73		250	57	44.0	1.5	
1	1749	1.0	0.76	180.79	775		73		247	56	43.9	1.5	
(FM)	1759			185.683									

CHAIN OF CUSTODY INFORMATION

Impingers Loaded:
Impingers Recovered:
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

Appendix D.4

Aldehyde Data Sheets

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOCHE
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: RMO

UNIT: 2
TEST NO.: F 1-Form-2
METHOD: CARB 430
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END): /

PAGE 1 OF 1
PROJECT # 09092
DATE 4/28/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.58
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	
Per point:	
Total of Traverse Points:	
ΔH =	x ΔP

EQUIPMENT INFO:

Meter:	ID #:	
	Yd value:	
	ΔH@ value:	
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	
	Material:	
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)		Wt.(g)
# 1	DNPH	102.0	98.3	=	3.7
# 2	DNPH	103.0	103.6	=	-0.6
# 3	Silica Gel	108.5	104.6	=	3.9
# 4				=	
# 5				=	
# 6				=	
# 7				=	
			Total Weight Gain:	=	7.0

POST TEST INFO:
Filter Appearance:
Condensate Appearance:
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP °F	COIL °F	VAC in	STATIC PRESS	CHAIN OF CUSTODY INFORMATION
	1308	~~Dry~~ Wet A	~~Dry~~ Wet B	DIFF										Impingers Loaded:
START	1308	Ø"	~~22.5~~ 23.5"	23.5"										Impingers Recovered:
	1328	Ø"	~~22.5~~ 23.5"	23.5"										Filter Loaded:
	1348	Ø	~~22.5~~ 23.5"	23.5"										Filter Recovered:
1	1408	0.75"	~~22.75~~ 23.75"	23.0"										Probe Wash:
	1428	0.75"	~~22.75~~ 23.5"	22.75"										TEST SUMMARY
	1448	3.0"	24.0	21.0"										Calculated by:
2	1508	3.5	24.0	20.5"										Checked by:
	1528	3.5	24.5	21.0"										Sample Volume, ft^3:
	1548	3.5	24.5	21.0"										Water Collected, g:
3	1608	3.5	24.5	21.0										Meter Temperature, °F:
	1628	3.5	24.5	21.0"										Meter Pressure (ΔH), iwg:
	1648	3.5	24.5	21.0"										Velocity (ΔP rms), iwg:
END 4	1708													Stack Pressure., iwg:
														Stack Temperature, °F:
		in Hg		in Hg										O_2 / CO_2:
														Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: Pinoche Energy Center
SAMPLE LOCATION: Turbine #2 Stack
OPERATOR/ASSISTANT: RMO

UNIT: #2
TEST NO.: 2-Form-2
METHOD: CARB 430
TEST CONDITION: Full Load
AMB. TEMP., °F:
METER VOL. (START/END):

PAGE 1 OF 1
PROJECT #: 09092
DATE: 4/29/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.64
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2::	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	
Per point:	
Total of Traverse Points:	

ΔH = _____ x ΔP

EQUIPMENT INFO:

Meter:	ID #:	
	Yd value:	
	ΔH@ value:	
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	
	Material:	
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	DNPH	107.7	103.9	= 3.8
# 2	~~DNH~~ DNPH	107.0	103.4	= -0.4
# 3	Silica Gel	108.4	102.0	= 4.4
# 4				=
# 5				=
# 6				=
# 7				=
			Total Weight Gain:	= 7.8

POST TEST INFO:

Filter Appearance: —
Condensate Appearance: —
Silica Gel Spent? (Y/N):

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	ΔP	ΔH	METER READING	STACK °F	METER TEMP IN	METER TEMP OUT	PROBE °F	OVEN °F	IMP. °F	COOL °F	VAC in Hg	STATIC PRESS
	~~0914~~	GUAGE A	GUAGE B	DIFF									
START 0	0914	220.5	22.5	22.0"									
	0934	1.0	23.0	22.0"									
	0954	2.0	23.5	21.5"									
1	1014	1.0	23.5	22.5"									
	1034	0.5	23.0	22.5"									
	1054	0.5	22.5	22.0"									
2	1114	0.5	22.5	22.0"									
	1134	0.75	22.5	21.75"									
	1154	1.0	23.0	22.0"									
3	1214	1.0	23.0	22.0"									
	1234	1.25	22.75	21.5"									
	1254	1.25	22.75	21.5"									
END 4	1314												

in Hg

Small moisture clog in sample line; resolved itself

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JK
Impingers Recovered: JK
Filter Loaded:
Filter Recovered:
Probe Wash:

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

The Avogadro Group, LLC

SAMPLE TRAIN TEST DATA

CLIENT: PANOCHE
SAMPLE LOCATION: EXHAUST STACK
OPERATOR/ASSISTANT: RMO

UNIT: 2
TEST NO.: 3-FORM-2
TEST CONDITION: Full Load
METER VOL. (START/END): /

METHOD: CARB 430
AMB. TEMP., °F:

PAGE 1 OF 1
PROJECT #: 09092
DATE: 4/25/09

PRE-TEST DATA:

Barometric Pressure, in. Hg.:	29.64
Assumed Stack Pressure:	
Assumed Moisture Content:	
Assumed O_2 / CO_2:	
Assumed ΔP:	
Assumed ΔH:	
Stack Diameter, Inches:	
Sample Time: Total:	
Per point:	
Total of Traverse Points:	

ΔH = _____ x ΔP

EQUIPMENT INFO:

Meter:	ID #:	
	Yd value:	
	ΔH@ value:	
Pitot:	ID #:	
	Cp value:	
Probe:	ID #:	
	Material:	
Nozzle:	Diameter:	
	Material:	
Filter:	Number:	
	Material:	

Imp.	Reagent	Wt.(End)	Wt.(Start)	Wt.(g)
# 1	DNPH	106.6	103.3	= 3.3
# 2	DNPH	98.5	98.8	= -0.3
# 3	Silica Gel	108.5	105.6	= 2.9
# 4				=
# 5				=
# 6				=
# 7				=

POST TEST INFO: Total Weight Gain: = 5.9

Filter Appearance: —
Condensate Appearance: —
Silica Gel Spent? (Y/N): —

SAMPLE TRAIN LEAK CHECK:

	CFM	Vac.	Pitot	Initials
Pre-Test:				
Post-Test:				

PRE-TEST CALIBRATION CHECK:

	Time	ΔH	Meter Vol.	Meter In	Meter Out
Initial:					
Final:					

SAMPLE POINT	TIME	GAUGE A	GAUGE B	METER READING	STACK T	METER TEMP IN	METER TEMP OUT	PROBE T	OVEN T	IMP T	COIL T	VAC	STATIC PRESS
	M	GAUGE A	GAUGE B	DIFF									
START 0	1402	1.75	23.25	21.50"									
	1422	1.75	23.25	21.50"									
	1442	3.5	24.0	20.50"									
1	1502	4.0	24.25	20.25"									
	1522	4.5	24.75	20.25"									
	1542	4.0	25.0	21.0"									
2	1602	4.0	24.5	20.5"									
	1622	4.0	24.75	20.75"									
	1642	4.25	24.75	20.5"									
3	1702	4.0	24.5	20.5"									
	1722	4.0	24.5	20.5"									
	1742	4.0	24.5	20.5"									
END 4	1802												
			in Hg										

CHAIN OF CUSTODY INFORMATION

Impingers Loaded: JK
Impingers Recovered: JK
Filter Loaded: JF
Filter Recovered: —
Probe Wash: —

TEST SUMMARY

Calculated by:
Checked by:
Sample Volume, ft^3:
Water Collected, g:
Meter Temperature, °F:
Meter Pressure (ΔH), iwg:
Velocity (ΔP rms), iwg:
Stack Pressure., iwg:
Stack Temperature, °F:
O_2 / CO_2:
Comments:

APPENDIX E

LABORATORY REPORTS

Appendix E.1

Ammonia Lab Data

The Avogadro Group, LLC

2825 Verne Roberts Circle; Antioch CA, 94509 (925)680-4300 Main (925) 680-4416 Fax

PROJECT # 09092

CLIENT/LOCATION Pinoche Energy Center

SAMPLE LOCATION Turbines 2, 3, and 4

SAMPLE DATE 4/23, 4/24, 4/27

DATE ANALYZED 4/29/09

ANALYST INITIALS JSK

AMMONIA BY ION SELECTIVE ELECTRODE (BAAQMD ST-1B)

TEST NUMBER	SAMPLE DESCRIPTION	TOTAL VOL (mL) (TV)	ppm NH_3 ORION	$\overline{X}$ - BLANK (ppm)	COMMENTS
BLANK (V_{bl}): 0.1 N HCl			0.00	—	
CALIBRATION STANDARDS NH_3 = 1.216, 12.16, 121.6 ppm NH_3			—	—	SLOPE = -58.4
AUDIT SAMPLE: 10.00 ppm NH_3			10.3	10.3	103 % Recovery
FB-NH_3	0.1 N HCl	205.3	0.00	0.00	
1-NH_3-2		266.9	5.77	5.77	
2-NH_3-2		268.4	5.82	5.82	
3-NH_3-2		267.1	6.50	6.50	
1-NH_3-3		267.4	4.72	4.72	
2-NH_3-3		274.0	4.78	4.78	
3-NH_3-3		282.6	5.36	5.36	
1-NH_3-4		259.7	4.65	4.65	
2-NH_3-4		268.1	4.78	4.78	
3-NH_3-4		261.3	6.12	6.12	

METHOD OF SAMPLE PREP/NOTES
1) ADD pH/IONIC STRENGTH ADJUSTING SOLUTION
2) CHECK THAT pH IS ≥ 11
3) USE 30 mL ALIQUOTS

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

AVOGADRO AMMONIA RESULTS

Client: Panoche Energy Center

Project: 09092.0

NH3 Calibration:
Standards: 1216 ppm, 12.16 ppm, 121.6 ppm NH3
Slope: -57.90
pH Calibration Check (pH = 5.00): 4.98

NH3 Audit (Ricca Chemical):
Lot No. 1904181
Recovery: 103%

Test Number	Reagent	Sample Volume (mL)	pH	Dilution Factor	Meter Reading (ppm NH3)	Blank Corrected (ppm NH3)	Average
Lab Blank (0.1 N HCl)		--	--	1	0.00	--	0.00
					0.00	--	
NH3 Audit (10.00 ppm)		--	--	1	10.4	10.4	10.3
					10.2	10.2	
FB-NH3	0.1 N HCl	203.9	0.97	1	0.00	--	< 0.5
					0.00	--	
1-NH3-1	0.1 N HCl	251.3	1.00	1	1.82	1.82	1.81
					1.80	1.80	
1-NH3-2	0.1 N HCl	257.7	1.03	1	2.72	2.72	2.74
					2.76	2.76	
2-NH3-3	0.1 N HCl	252.3	1.04	1	2.92	2.92	2.92
					2.92	2.92	

NOTES: Reporting Limits: 0.5 ppm (mg/L) ammonia
Units: ppm = mg/L

Meter: Orion 4-Star, S/N 009797
Ammonia Probe: Orion MY6007

Analyzed by: Navdeep Bola — Date: 05/11/09
Navdeep Bola
Laboratory Analyst I

Reviewed by: Michele Hoffmann — Date: 05/11/09
Michele Hoffmann
Laboratory Manager

2825 VERNE ROBERTS CIRCLE; ANTIOCH, CA 94509 (925) 680-4300 Main (925) 680-4416 Fax

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE
BAAQMD METHOD ST-1B
Client: Panoche Energy Center
Project: 09092.0

Custody

Four samples collected in 0.1 N HCl were received on May 5, 2009. According to the Chain of Custody, these samples were collected on April 30, 2009. All samples were received in good condition with no signs of loss.

Sample Analysis Notes

Samples were analyzed for ammonia based on the analytical procedures in BAAQMD ST-1A (Determination of Ammonia Effluents Collected in Acid Media using the Specific Ion Electrode). These samples were analyzed on May 11, 2009 (within 6 days of sample receipt). All samples had a pH measurement below 1.05. Immediately before ammonia analysis, the pH of the each sample was raised above 11 using a pH/ionic strength adjusting solution.

Calibration Notes

Prior to analysis, the calibration was checked with a 10.00 ppm audit sample. The measured value was within 5% of the certified concentration.

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Appendix E.2

Particulate Matter Lab Data

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

PARTICULATE MATTER RESULTS

Client: Panoche Energy Center

Project: # 09092.0

Test No.:	1-PM-1	2-PM-1	3-PM-1
Front-Half Particulate Catch			
Filter catch, net mg	0.00	0.00	0.00
Probe / nozzle rinse (acetone), net mg	0.14	0.66	0.13
Total filterable particulate matter catch, net mg	*0.14*	*0.66*	*0.13*
Back-Half Particulate Catch			
Aqueous rinse (ASTM Type II water), net mg	1.36	2.14	4.67
Organic rinse (methylene chloride), net mg	0.92	0.51	0.52
Total condensible particulate matter catch, net mg	*2.28*	*2.65*	*5.19*
Total Particulate Matter Catch, net mg	**2.42**	**3.31**	**5.32**

Note: The results were blank -corrected according to the test methods.

Prepared by: _____ Date: 05/18/09

Navdeep Bola
Laboratory Analyst

Reviewed by: _____ Date: 05/18/09

Michele Hoffmann
Laboratory Manager

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The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

PARTICULATE MATTER RESULTS

Client: Panoche Energy Center

Project: # 09092.0

Test No.:	1-PM-2	2-PM-2	3-PM-2
Front-Half Particulate Catch			
Filter catch, net mg	0.00	0.00	0.00
Probe / nozzle rinse (acetone), net mg	0.07	0.07	0.20
Total filterable particulate matter catch, net mg	*0.07*	*0.07*	*0.20*
Back-Half Particulate Catch			
Aqueous rinse (ASTM Type II water), net mg	6.64	4.24	1.24
Organic rinse (methylene chloride), net mg	0.01	0.10	0.03
Total condensible particulate matter catch, net mg	*6.65*	*4.34*	*1.27*
Total Particulate Matter Catch, net mg	**6.72**	**4.41**	**1.47**

Note: The results were blank -corrected according to the test methods.

Prepared by: _____ Date: 05/18/09

Navdeep Bola
Laboratory Analyst

Reviewed by: _____ Date: 05/18/09

Michele Hoffmann
Laboratory Manager

2825 VERNE ROBERTS CIRCLE; ANTIOCH, CA 94509 (925) 680-4300 Main (925) 680-4416 Fax

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-2	Filter	N/A	7980	Tare 1	0.41910	0.41880	--	-0.30	--	--	--	--
	(F½)			Tare 2	0.41905	0.41879	0.01	-0.26	--	--	--	--
				Tare 3	0.41906	0.41875	0.04	-0.31	--	--	--	--
				Average	**0.41907**	**0.41878**	--	**-0.29**	N/A	N/A	N/A	N/A
1-PM-1	Filter	N/A	7864	Tare 1	0.4137	0.4123	--	-1.40	--	--	--	--
	(F½)			Tare 2	0.4138	0.4121	0.20	-1.70	--	--	--	--
				Tare 3	0.4137	0.4121	0.00	-1.60	--	--	--	--
				Average	**0.4137**	**0.4122**	--	**-1.57**	N/A	N/A	N/A	**0.00**
2-PM-1	Filter	N/A	7865	Tare 1	0.4123	0.4120	--	-0.30	--	--	--	--
	(F½)			Tare 2	0.4121	0.4119	0.10	-0.20	--	--	--	--
				Tare 3	0.4121	0.4120	0.10	-0.10	--	--	--	--
				Average	**0.4122**	**0.4120**	--	**-0.20**	N/A	N/A	N/A	**0.00**
3-PM-1	Filter	N/A	7021	Tare 1	0.4166	0.4163	--	-0.30	--	--	--	--
	(F½)			Tare 2	0.4165	0.4161	0.20	-0.40	--	--	--	--
				Tare 3	0.4166	0.4163	0.20	-0.30	--	--	--	--
				Average	**0.4166**	**0.4162**	--	**-0.33**	N/A	N/A	N/A	**0.00**

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

FB-PM-2	Probe/Nozzle	78.9	A774	Tare 1	2.26005	2.26020	--	0.15	--	--	--	--
	Acetone			Tare 2	2.26001	2.26023	0.03	0.22	--	--	--	--
	(F½)			Tare 3	2.26003	2.26021	0.02	0.18	--	--	--	--
				Average	**2.26003**	**2.26021**	--	**0.18**	0.0002%	N/A	N/A	N/A
1-PM-1	Probe/Nozzle	73.2	A775	Tare 1	2.25979	2.26013	--	0.34	--	--	--	--
	Acetone			Tare 2	2.25981	2.26014	0.01	0.33	--	--	--	--
	(F½)			Tare 3	2.25984	2.26009	0.05	0.25	--	--	--	--
				Average	**2.25981**	**2.26012**	--	**0.31**	0.0002%	0.17	0.73	**0.14**
2-PM-1	Probe/Nozzle	64.1	A776	Tare 1	2.27012	2.27094	--	0.82	--	--	--	--
	Acetone			Tare 2	2.27016	2.27098	0.04	0.82	--	--	--	--
	(F½)			Tare 3	2.27017	2.27096	0.02	0.79	--	--	--	--
				Average	**2.27015**	**2.27096**	--	**0.81**	0.0002%	0.15	0.64	**0.66**
3-PM-1	Probe/Nozzle	83.9	A777	Tare 1	2.26894	2.26926	--	0.32	--	--	--	--
	Acetone			Tare 2	2.26899	2.26931	0.05	0.32	--	--	--	--
	(F½)			Tare 3	2.26895	2.26927	0.04	0.32	--	--	--	--
				Average	**2.26896**	**2.26928**	--	**0.32**	0.0002%	0.19	0.84	**0.13**

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-2	Organic	250	A778	Tare 1	2.26559	2.26566	--	0.07	--	--	--	--
	$MeCl_2$			Tare 2	2.26558	2.26567	0.01	0.09	--	--	--	--
	(B½)			Tare 3	2.26553	2.26568	0.01	0.15	--	--	--	--
				Average	**2.26557**	**2.26567**	--	**0.10**	0.0000%	N/A	N/A	N/A
1-PM-1	Organic	250	A779	Tare 1	2.24721	2.24823	--	1.02	--	--	--	--
	$MeCl_2$			Tare 2	2.24726	2.24827	0.04	1.01	--	--	--	--
	(B½)			Tare 3	2.24724	2.24827	0.00	1.03	--	--	--	--
				Average	**2.24724**	**2.24826**	--	**1.02**	0.0000%	0.10	3.32	**0.92**
2-PM-1	Organic	250	A750	Tare 1	2.27145	2.27206	--	0.61	--	--	--	--
	$MeCl_2$			Tare 2	2.27147	2.27211	0.05	0.64	--	--	--	--
	(B½)			Tare 3	2.27148	2.27206	0.05	0.58	--	--	--	--
				Average	**2.27147**	**2.27208**	--	**0.61**	0.0000%	0.10	3.32	**0.51**
3-PM-1	Organic	250	A751	Tare 1	2.24768	2.24824	--	0.56	--	--	--	--
	$MeCl_2$			Tare 2	2.24763	2.24829	0.05	0.66	--	--	--	--
	(B½)			Tare 3	2.24763	2.24829	0.00	0.66	--	--	--	--
				Average	**2.24765**	**2.24827**	--	**0.63**	0.0000%	0.10	3.32	**0.52**

Note: The organic fractions were blank-corrected according to EPA Method 202. Blank values of greater than 0.001 percent of the weight of $MeCl_2$ used cannot be subtracted from the sample weight.

FB-PM-2	Aqueous	202	A755	Tare 1	2.27355	2.27367	--	0.12	--	--	--	--
	Water			Tare 2	2.27355	2.27370	0.03	0.15	--	--	--	--
	(B½)			Tare 3	2.27350	2.27366	0.04	0.16	--	--	--	--
				Average	**2.27353**	**2.27368**	--	**0.14**	0.0001%	N/A	N/A	N/A
1-PM-1	Aqueous	403	A757	Tare 1	2.28718	2.28865	--	1.47	--	--	--	--
	Water			Tare 2	2.28717	2.28869	0.04	1.52	--	--	--	--
	(B½)			Tare 3	2.28717	2.28869	0.00	1.52	--	--	--	--
				Average	**2.28717**	**2.28868**	--	**1.50**	0.0001%	0.14	2.02	**1.36**
2-PM-1	Aqueous	403	A759	Tare 1	2.23896	2.24124	--	2.28	--	--	--	--
	Water			Tare 2	2.23898	2.24122	0.02	2.24	--	--	--	--
	(B½)			Tare 3	2.23895	2.24127	0.05	2.32	--	--	--	--
				Average	**2.23896**	**2.24124**	--	**2.28**	0.0001%	0.14	2.02	**2.14**
3-PM-1	Aqueous	402	A756	Tare 1	2.26927	2.27406	--	4.79	--	--	--	--
	Water			Tare 2	2.26924	2.27407	0.01	4.83	--	--	--	--
	(B½)			Tare 3	2.26929	2.27410	0.03	4.81	--	--	--	--
				Average	**2.26927**	**2.27408**	--	**4.81**	0.0001%	0.14	2.02	**4.67**

Note: The aqueous fractions were blank-corrected according to EPA Method 202. ASTM Type II water was used for the reagent and rinses.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-2	**Filter**	N/A	7980	Tare 1	0.41910	0.41880	--	-0.30	--	--	--	--
	(F½)			Tare 2	0.41905	0.41879	0.01	-0.26	--	--	--	--
				Tare 3	0.41906	0.41875	0.04	-0.31	--	--	--	--
				Average	**0.41907**	**0.41878**	--	**-0.29**	N/A	N/A	N/A	N/A
1-PM-2	**Filter**	N/A	7990	Tare 1	0.42196	0.41984	--	-2.12	--	--	--	--
	(F½)			Tare 2	0.42191	0.41982	0.02	-2.09	--	--	--	--
				Tare 3	0.42195	0.41980	0.02	-2.15	--	--	--	--
				Average	**0.42194**	**0.41982**	--	**-2.12**	N/A	N/A	N/A	**0.00**
2-PM-2	**Filter**	N/A	7851	Tare 1	0.4179	0.4167	--	-1.20	--	--	--	--
	(F½)			Tare 2	0.4178	0.4169	0.20	-0.90	--	--	--	--
				Tare 3	0.4179	0.4169	0.00	-1.00	--	--	--	--
				Average	**0.4179**	**0.4168**	--	**-1.03**	N/A	N/A	N/A	**0.00**
3-PM-2	**Filter**	N/A	7863	Tare 1	0.4127	0.4124	--	-0.30	--	--	--	--
	(F½)			Tare 2	0.4126	0.4122	0.20	-0.40	--	--	--	--
				Tare 3	0.4127	0.4122	0.00	-0.50	--	--	--	--
				Average	**0.4127**	**0.4123**	--	**-0.40**	N/A	N/A	N/A	**0.00**

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

FB-PM-2	**Probe/Nozzle**	78.9	A774	Tare 1	2.26005	2.26020	--	0.15	--	--	--	--
	Acetone			Tare 2	2.26001	2.26023	0.03	0.22	--	--	--	--
	(F½)			Tare 3	2.26003	2.26021	0.02	0.18	--	--	--	--
				Average	**2.26003**	**2.26021**	--	**0.18**	0.0002%	N/A	N/A	N/A
1-PM-2	**Probe/Nozzle**	55.7	A771	Tare 1	2.26155	2.26172	--	0.17	--	--	--	--
	Acetone			Tare 2	2.26156	2.26177	0.05	0.21	--	--	--	--
	(F½)			Tare 3	2.26155	2.26177	0.00	0.22	--	--	--	--
				Average	**2.26155**	**2.26175**	--	**0.20**	0.0002%	0.13	0.56	**0.07**
2-PM-2	**Probe/Nozzle**	57.9	A772	Tare 1	2.27350	2.27369	--	0.19	--	--	--	--
	Acetone			Tare 2	2.27352	2.27372	0.03	0.20	--	--	--	--
	(F½)			Tare 3	2.27349	2.27372	0.00	0.23	--	--	--	--
				Average	**2.27350**	**2.27371**	--	**0.21**	0.0002%	0.13	0.58	**0.07**
3-PM-2	**Probe/Nozzle**	78.5	A773	Tare 1	2.26437	2.26474	--	0.37	--	--	--	--
	Acetone			Tare 2	2.26442	2.26479	0.05	0.37	--	--	--	--
	(F½)			Tare 3	2.26437	2.26478	0.01	0.41	--	--	--	--
				Average	**2.26439**	**2.26477**	--	**0.38**	0.0002%	0.18	0.79	**0.20**

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-2	**Organic**	250	A778	Tare 1	2.26559	2.26566	--	0.07	--	--	--	--
	$MeCl_2$			Tare 2	2.26558	2.26567	0.01	0.09	--	--	--	--
	(B½)			Tare 3	2.26553	2.26568	0.01	0.15	--	--	--	--
				Average	**2.26557**	**2.26567**	--	**0.10**	0.0000%	N/A	N/A	N/A
1-PM-2	**Organic**	250	A752	Tare 1	2.25570	2.25577	--	0.07	--	--	--	--
	$MeCl_2$			Tare 2	2.25567	2.25582	0.05	0.15	--	--	--	--
	(B½)			Tare 3	2.25570	2.25582	0.00	0.12	--	--	--	--
				Average	**2.25569**	**2.25580**	--	**0.11**	0.0000%	0.10	3.32	**0.01**
2-PM-2	**Organic**	250	A753	Tare 1	2.25749	2.25767	--	0.18	--	--	--	--
	$MeCl_2$			Tare 2	2.25751	2.25772	0.05	0.21	--	--	--	--
	(B½)			Tare 3	2.25751	2.25772	0.00	0.21	--	--	--	--
				Average	**2.25750**	**2.25770**	--	**0.20**	0.0000%	0.10	3.32	**0.10**
3-PM-2	**Organic**	250	A754	Tare 1	2.26365	2.26383	--	0.18	--	--	--	--
	$MeCl_2$			Tare 2	2.26370	2.26379	0.04	0.09	--	--	--	--
	(B½)			Tare 3	2.26370	2.26384	0.05	0.14	--	--	--	--
				Average	**2.26368**	**2.26382**	--	**0.14**	0.0000%	0.10	3.32	**0.03**

Note: The organic fractions were blank-corrected according to EPA Method 202. Blank values of greater than 0.001 percent of the weight of $MeCl_2$ used cannot be subtracted from the sample weight.

FB-PM-2	**Aqueous**	202	A755	Tare 1	2.27355	2.27367	--	0.12	--	--	--	--
	Water			Tare 2	2.27355	2.27370	0.03	0.15	--	--	--	--
	(B½)			Tare 3	2.27350	2.27366	0.04	0.16	--	--	--	--
				Average	**2.27353**	**2.27368**	--	**0.14**	0.0001%	N/A	N/A	N/A
1-PM-2	**Aqueous**	424	A791	Tare 1	2.27012	2.27688	--	6.76	--	--	--	--
	Water			Tare 2	2.27011	2.27690	0.02	6.79	--	--	--	--
	(B½)			Tare 3	2.27012	2.27691	0.01	6.79	--	--	--	--
				Average	**2.27012**	**2.27690**	--	**6.78**	0.0001%	0.14	2.02	**6.64**
2-PM-2	**Aqueous**	389	A758	Tare 1	2.26205	2.26640	--	4.35	--	--	--	--
	Water			Tare 2	2.26203	2.26642	0.02	4.39	--	--	--	--
	(B½)			Tare 3	2.26203	2.26644	0.02	4.41	--	--	--	--
				Average	**2.26204**	**2.26642**	--	**4.38**	0.0001%	0.14	2.02	**4.24**
3-PM-2	**Aqueous**	402	A799	Tare 1	2.28388	2.28524	--	1.36	--	--	--	--
	Water			Tare 2	2.28390	2.28529	0.05	1.39	--	--	--	--
	(B½)			Tare 3	2.28389	2.28529	0.00	1.40	--	--	--	--
				Average	**2.28389**	**2.28527**	--	**1.38**	0.0001%	0.14	2.02	**1.24**

Note: The aqueous fractions were blank-corrected according to EPA Method 202. ASTM Type II water was used for the reagent and rinses.

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE
EPA METHOD 5/202
Client: Panoche Energy Center
Project: 09092.0

Custody

Seven sets of samples were received on May 5, 2009. Each set included a filter, probe/nozzle rinse, impinger rinse, and impinger water. Acetone, dichloromethane, and water reagent blanks were also received. According to the Chain of Custody, these samples were collected on April 27 - May 1, 2009. The filters for 1-PM-1, 2-PM-1, 1-PM-2, and 3-PM-2 each had a small tear on the edge of the filter. The remaining samples were received in good condition with no signs of loss.

Analysis

Samples were analyzed for particulate matter using the analytical procedures in EPA Methods 5 (Determination of Particulate Matter Emissions from Stationary Sources) and 202 (Determination of Condensable Particulate Matter Emissions from Stationary Sources). Reagent blanks were not analyzed at this time as requested on the Chain of Custody. Samples were analyzed on May 12-18, 2009 after desiccating for at least 24 hours. The results were blank corrected according to the test methods.

Front-Half Analysis

The particulate matter on the filters for both units was white in color except for 2-PM-1, which had a sandy brown discoloration. The probe/nozzle rinses for both units appeared as a white residue except for 1-PM-1 which had a clear residue.

Back-Half Analysis

The condensable particulate matter for both was primarily found in the aqueous fractions. Unit 1 aqueous fractions appeared as a white residue except for 3-PM-1 which had a brown and white residue while the aqueous fractions for Unit 2 appeared as a brown and white residue except for 3-PM-2 which was white in color. The organic fractions for Unit 1 appeared as a white residue while Unit 2 organic fractions appeared as a clear residue.

QC Notes

Prior to analysis, the accuracy of the balance was checked using 500 mg and 100 g ASTM E617-97 Class 1 Stainless Steel weights.

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

PARTICULATE MATTER RESULTS

Client: Panoche Energy Center

Project: # 09092.0

Test No.:	1-PM-3	2-PM-3	3-PM-3
Front-Half Particulate Catch			
Filter catch, net mg	9.46	0.00	0.00
Probe / nozzle rinse (acetone), net mg	4.82	1.60	1.00
Total filterable particulate matter catch, net mg	*14.28*	*1.60*	*1.00*
Back-Half Particulate Catch			
Aqueous rinse (ASTM Type II water), net mg	3.16	1.75	1.29
Organic rinse (methylene chloride), net mg	0.11	0.12	0.09
Total condensible particulate matter catch, net mg	*3.27*	*1.87*	*1.38*
Total Particulate Matter Catch, net mg	**17.55**	**3.47**	**2.38**

Note: The results were blank -corrected according to the test methods.

Prepared by: _____ Date: 05/05/09

Navdeep Bola
Laboratory Analyst

Reviewed by: _____ Date: 05/05/09

Michele Hoffmann
Laboratory Manager

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The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

PARTICULATE MATTER RESULTS

Client: Panoche Energy Center

Project: # 09092.0

Test No.:	1-PM-4	2-PM-4	3-PM-4
Front-Half Particulate Catch			
Filter catch, net mg	0.00	0.00	0.00
Probe / nozzle rinse (acetone), net mg	1.15	0.58	0.58
Total filterable particulate matter catch, net mg	*1.15*	*0.58*	*0.58*
Back-Half Particulate Catch			
Aqueous rinse (ASTM Type II water), net mg	1.34	9.11	7.53
Organic rinse (methylene chloride), net mg	0.00	0.65	0.67
Total condensible particulate matter catch, net mg	*1.34*	*9.76*	*8.20*
Total Particulate Matter Catch, net mg	**2.49**	**10.34**	**8.78**

Note: The results were blank -corrected according to the test methods.

Prepared by: _____ Date: 05/28/09
Navdeep Bola
Laboratory Analyst

Reviewed by: _____ Date: 05/28/09
Michele Hoffmann
Laboratory Manager

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AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-3	Filter (F½)	N/A	7994	Tare 1	0.42023	0.42004	--	-0.19	--	--	--	--
				Tare 2	0.42025	0.42001	0.03	-0.24	--	--	--	--
				Tare 3	0.42027	0.42000	0.01	-0.27	--	--	--	--
				Average	**0.42025**	**0.42002**	--	**-0.23**	N/A	N/A	N/A	N/A
1-PM-3	Filter (F½)	N/A	7979	Tare 1	0.42137	0.43084	--	9.47	--	--	--	--
				Tare 2	0.42136	0.43084	0.00	9.48	--	--	--	--
				Tare 3	0.42137	0.43080	0.04	9.43	--	--	--	--
				Average	**0.42137**	**0.43083**	--	**9.46**	N/A	N/A	N/A	**9.46**
2-PM-3	Filter (F½)	N/A	7976	Tare 1	0.41906	0.41752	--	-1.54	--	--	--	--
				Tare 2	0.41907	0.41755	0.03	-1.52	--	--	--	--
				Tare 3	0.41905	0.41750	0.05	-1.55	--	--	--	--
				Average	**0.41906**	**0.41752**	--	**-1.54**	N/A	N/A	N/A	**0.00**
3-PM-3	Filter (F½)	N/A	7970	Tare 1	0.41543	0.41312	--	-2.31	--	--	--	--
				Tare 2	0.41539	0.41312	0.00	-2.27	--	--	--	--
				Tare 3	0.41538	0.41308	0.04	-2.30	--	--	--	--
				Average	**0.41540**	**0.41311**	--	**-2.29**	N/A	N/A	N/A	**0.00**

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

FB-PM-3	Probe/Nozzle Acetone (F½)	99.2	A735	Tare 1	2.26418	2.26444	--	0.26	--	--	--	--
				Tare 2	2.26416	2.26446	0.02	0.30	--	--	--	--
				Tare 3	2.26416	2.26443	0.03	0.27	--	--	--	--
				Average	**2.26417**	**2.26444**	--	**0.28**	0.0003%	N/A	N/A	N/A
1-PM-3	Probe/Nozzle Acetone (F½)	101.0	A720	Tare 1	2.26547	2.27054	--	5.07	--	--	--	--
				Tare 2	2.26544	2.27059	0.05	5.15	--	--	--	--
				Tare 3	2.26547	2.27055	0.04	5.08	--	--	--	--
				Average	**2.26546**	**2.27056**	--	**5.10**	0.0003%	0.28	1.01	**4.82**
2-PM-3	Probe/Nozzle Acetone (F½)	106.4	A721	Tare 1	2.25593	2.25781	--	1.88	--	--	--	--
				Tare 2	2.25596	2.25783	0.02	1.87	--	--	--	--
				Tare 3	2.25591	2.25786	0.03	1.95	--	--	--	--
				Average	**2.25593**	**2.25783**	--	**1.90**	0.0003%	0.30	1.06	**1.60**
3-PM-3	Probe/Nozzle Acetone (F½)	91.5	A722	Tare 1	2.26453	2.26580	--	1.27	--	--	--	--
				Tare 2	2.26458	2.26580	0.00	1.22	--	--	--	--
				Tare 3	2.26455	2.26583	0.03	1.28	--	--	--	--
				Average	**2.26455**	**2.26581**	--	**1.26**	0.0003%	0.26	0.92	**1.00**

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-3	Organic	250	A719	Tare 1	2.25193	2.25207	--	0.14	--	--	--	--
	$MeCl_2$			Tare 2	2.25190	2.25209	0.02	0.19	--	--	--	--
	(B½)			Tare 3	2.25191	2.25204	0.05	0.13	--	--	--	--
				Average	**2.25191**	**2.25207**	--	**0.15**	0.0000%	N/A	N/A	N/A
1-PM-3	Organic	250	A710	Tare 1	2.24926	2.24950	--	0.24	--	--	--	--
	$MeCl_2$			Tare 2	2.24929	2.24953	0.03	0.24	--	--	--	--
	(B½)			Tare 3	2.24925	2.24955	0.02	0.30	--	--	--	--
				Average	**2.24927**	**2.24953**	--	**0.26**	0.0000%	0.15	3.32	**0.11**
2-PM-3	Organic	250	A712	Tare 1	2.27869	2.27895	--	0.26	--	--	--	--
	$MeCl_2$			Tare 2	2.27871	2.27900	0.05	0.29	--	--	--	--
	(B½)			Tare 3	2.27873	2.27900	0.00	0.27	--	--	--	--
				Average	**2.27871**	**2.27898**	--	**0.27**	0.0000%	0.15	3.32	**0.12**
3-PM-3	Organic	250	A713	Tare 1	2.24507	2.24530	--	0.23	--	--	--	--
	$MeCl_2$			Tare 2	2.24506	2.24529	0.01	0.23	--	--	--	--
	(B½)			Tare 3	2.24502	2.24529	0.00	0.27	--	--	--	--
				Average	**2.24505**	**2.24529**	--	**0.24**	0.0000%	0.15	3.32	**0.09**

Note: The organic fractions were blank-corrected according to EPA Method 202. Blank values of greater than 0.001 percent of the weight of $MeCl_2$ used cannot be subtracted from the sample weight.

FB-PM-3	Aqueous	390	A740	Tare 1	2.25970	2.25983	--	0.13	--	--	--	--
	Water			Tare 2	2.25975	2.25988	0.05	0.13	--	--	--	--
	(B½)			Tare 3	2.25975	2.25986	0.02	0.11	--	--	--	--
				Average	**2.25973**	**2.25986**	--	**0.12**	0.0000%	N/A	N/A	N/A
1-PM-3	Aqueous	615	A708	Tare 1	2.25305	2.25628	--	3.23	--	--	--	--
	Water			Tare 2	2.25300	2.25632	0.04	3.32	--	--	--	--
	(B½)			Tare 3	2.25301	2.25632	0.00	3.31	--	--	--	--
				Average	**2.25302**	**2.25631**	--	**3.29**	0.0000%	0.12	3.90	**3.16**
2-PM-3	Aqueous	604	A743	Tare 1	2.27644	2.27832	--	1.88	--	--	--	--
	Water			Tare 2	2.27648	2.27836	0.04	1.88	--	--	--	--
	(B½)			Tare 3	2.27649	2.27836	0.00	1.87	--	--	--	--
				Average	**2.27647**	**2.27835**	--	**1.88**	0.0000%	0.12	3.90	**1.75**
3-PM-3	Aqueous	633	A741	Tare 1	2.25024	2.25159	--	1.35	--	--	--	--
	Water			Tare 2	2.25019	2.25164	0.05	1.45	--	--	--	--
	(B½)			Tare 3	2.25021	2.25164	0.00	1.43	--	--	--	--
				Average	**2.25021**	**2.25162**	--	**1.41**	0.0000%	0.12	3.90	**1.29**

Note: The aqueous fractions were blank-corrected according to EPA Method 202. ASTM Type II water was used for the reagent and rinses.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Sample Amount (g)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-4	Filter	N/A	7986	Tare 1	0.42068	0.42041	--	-0.27	--	--	--	--
	(F½)			Tare 2	0.42063	0.42039	0.02	-0.24	--	--	--	--
				Tare 3	0.42063	0.42042	0.03	-0.21	--	--	--	--
				Average	**0.42065**	**0.42041**	--	**-0.24**	N/A	N/A	N/A	N/A
1-PM-4	Filter	N/A	7977	Tare 1	0.41977	0.41883	--	-0.94	--	--	--	--
	(F½)			Tare 2	0.41978	0.41887	0.04	-0.91	--	--	--	--
				Tare 3	0.41974	0.41888	0.01	-0.86	--	--	--	--
				Average	**0.41976**	**0.41886**	--	**-0.90**	N/A	N/A	N/A	**0.00**
2-PM-4	Filter	N/A	7987	Tare 1	0.41775	0.41617	--	-1.58	--	--	--	--
	(F½)			Tare 2	0.41770	0.41616	0.01	-1.54	--	--	--	--
				Tare 3	0.41770	0.41615	0.01	-1.55	--	--	--	--
				Average	**0.41772**	**0.41616**	--	**-1.56**	N/A	N/A	N/A	**0.00**
3-PM-4	Filter	N/A	7993	Tare 1	0.41941	0.41624	--	-3.17	--	--	--	--
	(F½)			Tare 2	0.41936	0.41622	0.02	-3.14	--	--	--	--
				Tare 3	0.41938	0.41620	0.02	-3.18	--	--	--	--
				Average	**0.41938**	**0.41622**	--	**-3.16**	N/A	N/A	N/A	**0.00**

Note: The filters were not blank-corrected according to EPA Methods 5 / 17.

FB-PM-4	Probe/Nozzle	97.9	A723	Tare 1	2.27546	2.27566	--	0.20	--	--	--	--
	Acetone			Tare 2	2.27549	2.27562	0.04	0.13	--	--	--	--
	(F½)			Tare 3	2.27544	2.27564	0.02	0.20	--	--	--	--
				Average	**2.27546**	**2.27564**	--	**0.18**	0.0002%	N/A	N/A	N/A
1-PM-4	Probe/Nozzle	97.6	A724	Tare 1	2.25290	2.25419	--	1.29	--	--	--	--
	Acetone			Tare 2	2.25290	2.25424	0.05	1.34	--	--	--	--
	(F½)			Tare 3	2.25290	2.25424	0.00	1.34	--	--	--	--
				Average	**2.25290**	**2.25422**	--	**1.32**	0.0002%	0.18	0.98	**1.15**
2-PM-4	Probe/Nozzle	97.0	A715	Tare 1	2.26755	2.26832	--	0.77	--	--	--	--
	Acetone			Tare 2	2.26758	2.26832	0.00	0.74	--	--	--	--
	(F½)			Tare 3	2.26758	2.26834	0.02	0.76	--	--	--	--
				Average	**2.26757**	**2.26833**	--	**0.76**	0.0002%	0.18	0.97	**0.58**
3-PM-4	Probe/Nozzle	90.7	A716	Tare 1	2.25483	2.25556	--	0.73	--	--	--	--
	Acetone			Tare 2	2.25486	2.25552	0.04	0.66	--	--	--	--
	(F½)			Tare 3	2.25487	2.25570	0.18	0.83	--	--	--	--
				Average	**2.25485**	**2.25559**	--	**0.74**	0.0002%	0.16	0.91	**0.58**

Note: The acetone fractions were blank-corrected according to EPA Methods 5 / 17. Blank values of greater than 0.001 percent of the weight of acetone used cannot be subtracted from the sample weight.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
FB-PM-4	Organic	250	A714	Tare 1	2.26280	2.26300	--	0.20	--	--	--	--
	$MeCl_2$			Tare 2	2.26275	2.26303	0.03	0.28	--	--	--	--
	(B½)			Tare 3	2.26277	2.26302	0.01	0.25	--	--	--	--
				Average	**2.26277**	**2.26302**	--	**0.24**	0.0001%	N/A	N/A	N/A
1-PM-4	Organic	250	A705	Tare 1	2.27226	2.27247	--	0.21	--	--	--	--
	$MeCl_2$			Tare 2	2.27226	2.27252	0.05	0.26	--	--	--	--
	(B½)			Tare 3	2.27224	2.27248	0.04	0.24	--	--	--	--
				Average	**2.27225**	**2.27249**	--	**0.24**	0.0001%	0.24	3.32	**0.00**
2-PM-4	Organic	250	A706	Tare 1	2.27006	2.27099	--	0.93	--	--	--	--
	$MeCl_2$			Tare 2	2.27011	2.27099	0.00	0.88	--	--	--	--
	(B½)			Tare 3	2.27008	2.27096	0.03	0.88	--	--	--	--
				Average	**2.27008**	**2.27098**	--	**0.90**	0.0001%	0.24	3.32	**0.65**
3-PM-4	Organic	250	A707	Tare 1	2.26096	2.26186	--	0.90	--	--	--	--
	$MeCl_2$			Tare 2	2.26098	2.26189	0.03	0.91	--	--	--	--
	(B½)			Tare 3	2.26098	2.26191	0.02	0.93	--	--	--	--
				Average	**2.26097**	**2.26189**	--	**0.91**	0.0001%	0.24	3.32	**0.67**

Note: The organic fractions were blank-corrected according to EPA Method 202. Blank values of greater than 0.001 percent of the weight of $MeCl_2$ used cannot be subtracted from the sample weight.

FB-PM-4	Aqueous	394	A742	Tare 1	2.28832	2.28869	--	0.37	--	--	--	--
	Water			Tare 2	2.28833	2.28870	0.01	0.37	--	--	--	--
	(B½)			Tare 3	2.28833	2.28840	0.30	0.07	--	--	--	--
				Average	**2.28833**	**2.28860**	--	**0.27**	0.0001%	N/A	N/A	N/A
1-PM-4	Aqueous	609	A744	Tare 1	2.26412	2.26572	--	1.60	--	--	--	--
	Water			Tare 2	2.26415	2.26576	0.04	1.61	--	--	--	--
	(B½)			Tare 3	2.26414	2.26577	0.01	1.63	--	--	--	--
				Average	**2.26414**	**2.26575**	--	**1.61**	0.0001%	0.27	3.94	**1.34**
2-PM-4	Aqueous	636	A746	Tare 1	2.26151	2.27085	--	9.34	--	--	--	--
	Water			Tare 2	2.26152	2.27090	0.05	9.38	--	--	--	--
	(B½)			Tare 3	2.26149	2.27090	0.00	9.41	--	--	--	--
				Average	**2.26151**	**2.27088**	--	**9.38**	0.0001%	0.27	3.94	**9.11**
3-PM-4	Aqueous	587	A745	Tare 1	2.24083	2.24860	--	7.77	--	--	--	--
	Water			Tare 2	2.24081	2.24865	0.05	7.84	--	--	--	--
	(B½)			Tare 3	2.24080	2.24860	0.05	7.80	--	--	--	--
				Average	**2.24081**	**2.24862**	--	**7.80**	0.0001%	0.27	3.94	**7.53**

Note: The aqueous fractions were blank-corrected according to EPA Method 202. ASTM Type II water was used for the reagent and rinses.

AVOGADRO PARTICULATE MATTER RESULTS
Client: Panoche Energy Center
Project: # 09092.0

Test Number	Sample Fraction	Total Volume (ml)	Lab Number (ID)	Tare Sequence (#)	Tare Weight (g)	Final Weight (g)	Difference from prev. weight (mg)	Raw Gain Weight (mg)	Blank Residue (%)	Blank Correction (mg)	Maximum Correction (mg)	Final Results (mg)
RB	**Acetone**	139.6	A717	Tare 1	2.27337	2.27348	--	0.11	--	--	--	--
				Tare 2	2.27338	2.27350	0.02	0.12	--	--	--	--
				Tare 3	2.27336	2.27350	0.00	0.14	--	--	--	--
				Average	**2.27337**	**2.27349**	--	**0.12**	0.0001%	N/A	N/A	N/A
RB	**$MeCl_2$**	188.8	A718	Tare 1	2.24669	2.24671	--	0.02	--	--	--	--
				Tare 2	2.24666	2.24673	0.02	0.07	--	--	--	--
				Tare 3	2.24665	2.24672	0.01	0.07	--	--	--	--
				Average	**2.24667**	**2.24672**	--	**0.05**	0.0000%	N/A	N/A	**N/A**
RB	**Water**	317.8	A709	Tare 1	2.28300	2.28319	--	0.19	--	--	--	--
				Tare 2	2.28300	2.28324	0.05	0.24	--	--	--	--
				Tare 3	2.28295	2.28322	0.02	0.27	--	--	--	--
				Average	**2.28298**	**2.28322**	--	**0.23**	0.0001%	N/A	N/A	**N/A**

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE
EPA METHOD 5/202
Client: Panoche Energy Center
Project: 09092.0

Custody

Eight sets of samples were received on April 27, 2009. Each set included a filter, probe/nozzle rinse, impinger rinse, and impinger water. Acetone, dichloromethane, and water reagent blanks were also received. According to the Chain of Custody, these samples were collected on April 23-24, 2009. All samples were received in good condition with no signs of loss.

Analysis

Samples were analyzed for particulate matter using the analytical procedures in EPA Methods 5 (Determination of Particulate Matter Emissions from Stationary Sources) and 202 (Determination of Condensable Particulate Matter Emissions from Stationary Sources). Samples were analyzed on April 29 – May 5, 2009 after desiccating for at least 24 hours. The results were blank corrected according to the test methods.

Front-Half Analysis

The particulate matter on the filters for both units was white in color except for 1-PM-3, which was brown in color, and 2-PM-3 which had a light gray discoloration. The probe/nozzle rinses for both units appeared as a white residue except for 1-PM-3 which had a reddish brown residue.

Back-Half Analysis

The condensable particulate matter for both was primarily found in the aqueous fractions. Unit 3 aqueous fractions appeared as a white residue except for 1-PM-3 which had a yellow residue while the aqueous fractions for Unit 4 appeared as a brown residue except for 1-PM-4 which was white in color. The organic fractions for both units appeared as a white residue.

QC Notes

Prior to analysis, the accuracy of the balance was checked using 500 mg and 100 g ASTM E617-97 Class 1 Stainless Steel weights.

Appendix E.3

Polycyclic Aromatic Hydrocarbons Lab Data

Vista
Analytical Laboratory

RECEIVED
MAY 15 2009
BY:_____

May 14, 2009

Vista Project I.D.: 31639

Mr. Jeremy Klosinski
The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509

Dear Mr. Klosinski,

Enclosed are the results for the four MM5 samples received at Vista Analytical Laboratory on May 05, 2009 under your Project Name "PANOCHE". These samples were extracted and analyzed using CARB Method 429 for PAHs. A rush turnaround time was provided for this work.

The following report consists of a Sample Inventory (Section I), Analytical Results (Section II) and the Appendix, which contains the chain-of-custody, a list of data qualifiers and abbreviations, Vista's current certifications, and copies of the raw data (if requested).

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com. Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha M. Maier
Laboratory Director

ACCREDITED IN ACCORDANCE WITH nelac

Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAC for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista Analytical Laboratory.

Vista

Section I: Sample Inventory Report

Date Received: 5/5/2009
Project No.: 31639
Project Name: PANOCHE

Lab. Sample ID	Client Sample ID	Component ID
001	PAH-1	B 1/2
		F 1/2
		Filter
		Imp Contents
		Imp Rinses
		XAD Trap
002	PAH-2	B 1/2
		F 1/2
		Filter
		Imp Contents
		Imp Rinses
		XAD Trap
003	PAH-3	B 1/2
		F 1/2
		Filter
		Imp Contents
		Imp Rinses
		XAD Trap
004	PAH-FB	B 1/2
		F 1/2
		Filter
		Imp Contents
		Imp Rinses
		XAD Trap

Smpinvgnmm5.rpt

SECTION II

Vista

Method Blank | **CARB Method 429**

Matrix:	MM5	QC Batch No.:	2081	Lab Sample:	0-MB001
Sample Size:	Sample	Date Extracted:	7-May-09	Date Analyzed DB-5:	12-May-09

Analyte	Conc. (ng/Sample)	RL[a]	Qualifiers
Naphthalene	197	25.0	
2-Methylnaphthalene	45.1	10.0	
Acenaphthylene	ND	10.0	
Acenaphthene	ND	10.0	
Fluorene	ND	10.0	
Phenanthrene	ND	25.0	
Anthracene	ND	10.0	
Fluoranthene	ND	10.0	
Pyrene	ND	10.0	
Benz(a)anthracene	ND	10.0	
Chrysene	ND	10.0	
Benzo(b)fluoranthene	ND	10.0	
Benzo(k)fluoranthene	ND	10.0	
Benzo(e)pyrene	ND	10.0	
Benzo(a)pyrene	ND	10.0	
Perylene	ND	10.0	
Indeno(1,2,3-c,d)pyrene	ND	10.0	
Dibenz(a,h)anthracene	ND	10.0	
Benzo(g,h,i)perylene	ND	10.0	

	Labeled Standard[c]	%R	LCL-UCL[d]	Qualifiers
IS	d8-Naphthalene	80.6	50 - 150	
	d8-Acenaphthylene	85.3	50 - 150	
	d10-Acenaphthene	80.0	50 - 150	
	d10-Fluorene	83.2	50 - 150	
	d10-Phenanthrene	80.2	50 - 150	
	d10-Fluoranthene	100	50 - 150	
	d12-Benz(a)anthracene	101	50 - 150	
	d12-Chrysene	96.1	50 - 150	
	d12-Benzo(b)fluoranthene	107	50 - 150	
	d12-Benzo(k)fluoranthene	98.0	50 - 150	
	d12-Benzo(a)pyrene	100	50 - 150	
	d12-Indeno(1,2,3-c,d)pyrene	115	50 - 150	
	d14-Dibenz(a,h)anthracene	113	50 - 150	
	d12-Benzo(g,h,i)perylene	110	50 - 150	
PS	d14-Terphenyl	96.1	50 - 150	
	d12-Benzo(e)pyrene	103	50 - 150	
AS	d10-Anthracene	100	50 - 150	

a. Reporting limit.
b. Method detection limit.
c. IS; Internal Standards
d. Lower control limit - upper control limit.

Analyst: MAS

Approved By: William J. Luksemburg 14-May-2009 10:15

Vista

LCS Results — CARB Method 429

Matrix:	MM5	QC Batch No.:	2081
Sample Size:	Sample	Date Extracted:	7-May-09

Lab Sample: 0-001LCS1/LCS2 Date Analyzed DB-5:12-May-09

Analyte	LCS1-%R	LCS2-%R	RPD
Naphthalene	135	136	0.738
2-Methylnaphthalene	104	124	17.5
Acenaphthylene	103	99.5	3.46
Acenaphthene	95.5	104	8.52
Fluorene	114	96.0	17.1
Phenanthrene	91.6	105	13.6
Anthracene	84.5	89.0	5.19
Fluoranthene	90.0	88.0	2.25
Pyrene	88.5	87.5	1.14
Benz(a)anthracene	93.5	94.5	1.06
Chrysene	103	100	2.96
Benzo(b)fluoranthene	92.0	94.5	2.68
Benzo(k)fluoranthene	93.0	93.0	0
Benzo(e)pyrene	94.0	97.0	3.14
Benzo(a)pyrene	96.5	97.5	1.03
Perylene	93.0	94.5	1.60
Indeno(1,2,3-c,d)pyrene	92.0	94.5	2.68
Dibenz(a,h)anthracene	96.0	94.5	1.57
Benzo(g,h,i)perylene	91.0	96.5	5.87

IS Type	Internal Standard	LCS1-%R	LCS2-%R
IS	d8-Naphthalene	74.6	78.8
	d8-Acenaphthylene	82.5	86.8
	d10-Acenaphthene	93.1	83.7
	d10-Fluorene	81.1	84.7
	d10-Phenanthrene	99.0	88.3
	d10-Fluoranthene	101	103
	d12-Benz(a)anthracene	102	101
	d12-Chrysene	92.1	94.5
	d12-Benzo(b)fluoranthene	109	113
	d12-Benzo(k)fluoranthene	101	100
	d12-Benzo(a)pyrene	96.9	99.4
	d12-Indeno(1,2,3-c,d)pyrene	119	120
	d14-Dibenz(a,h)anthracene	118	120
	d12-Benzo(g,h,i)perylene	117	117
PS	d14-Terphenyl	NA	NA
	d12-Benzo(e)pyrene	NA	NA
AS	d10-Anthracene	111	104

Chemist: MAS

Approved By William J. Luksemburg 14-May-2009 10:15

Vista

Sample ID: PAH-1 **CARB Method 429**

Client Data		Sample Data		Laboratory Data			
Name:	The Avogadro Group, LLC	Matrix:	MM5	Lab Sample:	31639-001	Date Received:	5-May-09
Project:	PANOCHE	Sample Size:	Sample	QC Batch No.:	2081	Date Extracted:	7-May-09
Date Collected:	28-Apr-09			Date Analyzed DB-5:	12-May-09		
Time Collected:	NA						

Analyte	Conc. (ng/Sample)	RL [a]	Qualifiers
Naphthalene	ND	985	
2-Methylnaphthalene	ND	226	
Acenaphthylene	ND	10.0	
Acenaphthene	ND	10.0	
Fluorene	ND	10.0	
Phenanthrene	62.4	25.0	
Anthracene	ND	10.0	
Fluoranthene	164	10.0	
Pyrene	364	10.0	
Benz(a)anthracene	ND	10.0	
Chrysene	ND	10.0	
Benzo(b)fluoranthene	17.8	10.0	
Benzo(k)fluoranthene	ND	10.0	
Benzo(e)pyrene	91.8	10.0	
Benzo(a)pyrene	ND	10.0	
Perylene	ND	10.0	
Indeno(1,2,3-c,d)pyrene	50.0	10.0	
Dibenz(a,h)anthracene	ND	10.0	
Benzo(g,h,i)perylene	301	10.0	

	Labeled Standard [c]	%R	LCL-UCL [d]	Qualifiers
IS	d8-Naphthalene	85.1	50 - 150	
	d8-Acenaphthylene	88.1	50 - 150	
	d10-Acenaphthene	82.6	50 - 150	
	d10-Fluorene	83.6	50 - 150	
	d10-Phenanthrene	87.7	50 - 150	
	d10-Fluoranthene	102	50 - 150	
	d12-Benz(a)anthracene	112	50 - 150	
	d12-Chrysene	148	50 - 150	
	d12-Benzo(b)fluoranthene	132	50 - 150	
	d12-Benzo(k)fluoranthene	107	50 - 150	
	d12-Benzo(a)pyrene	99.3	50 - 150	
	d12-Indeno(1,2,3-c,d)pyrene	104	50 - 150	
	d14-Dibenz(a,h)anthracene	108	50 - 150	
	d12-Benzo(g,h,i)perylene	105	50 - 150	
PS	d14-Terphenyl	98.6	50 - 150	
	d12-Benzo(e)pyrene	99.5	50 - 150	
AS	d10-Anthracene	108	50 - 150	

a. Reporting limit.
b. Method detection limit.
c. IS; Internal Standards, PS; Pre-Spike Surrogates.
d. Lower control limit - upper control limit.

Analyst: MAS

Approved By: William J. Luksemburg 14-May-2009 10:15

Vista

Sample ID: PAH-2 **CARB Method 429**

Client Data		Sample Data		Laboratory Data			
Name:	The Avogadro Group, LLC	Matrix:	MM5	Lab Sample:	31639-002	Date Received:	5-May-09
Project:	PANOCHE	Sample Size:	Sample	QC Batch No.:	2081	Date Extracted:	7-May-09
Date Collected:	29-Apr-09			Date Analyzed DB-5:	12-May-09		
Time Collected:	NA						

Analyte	Conc. (ng/Sample)	RL [a]	Qualifiers
Naphthalene	ND	985	
2-Methylnaphthalene	ND	226	
Acenaphthylene	ND	10.0	
Acenaphthene	ND	10.0	
Fluorene	11.7	10.0	
Phenanthrene	28.7	25.0	
Anthracene	ND	10.0	
Fluoranthene	ND	10.0	
Pyrene	ND	10.0	
Benz(a)anthracene	ND	10.0	
Chrysene	ND	10.0	
Benzo(b)fluoranthene	ND	10.0	
Benzo(k)fluoranthene	ND	10.0	
Benzo(e)pyrene	ND	10.0	
Benzo(a)pyrene	ND	10.0	
Perylene	ND	10.0	
Indeno(1,2,3-c,d)pyrene	ND	10.0	
Dibenz(a,h)anthracene	ND	10.0	
Benzo(g,h,i)perylene	ND	10.0	

	Labeled Standard [c]	%R	LCL-UCL [d]	Qualifiers
IS	d8-Naphthalene	83.1	50 - 150	
	d8-Acenaphthylene	80.9	50 - 150	
	d10-Acenaphthene	85.9	50 - 150	
	d10-Fluorene	83.5	50 - 150	
	d10-Phenanthrene	89.6	50 - 150	
	d10-Fluoranthene	101	50 - 150	
	d12-Benz(a)anthracene	118	50 - 150	
	d12-Chrysene	117	50 - 150	
	d12-Benzo(b)fluoranthene	117	50 - 150	
	d12-Benzo(k)fluoranthene	97.4	50 - 150	
	d12-Benzo(a)pyrene	95.6	50 - 150	
	d12-Indeno(1,2,3-c,d)pyrene	107	50 - 150	
	d14-Dibenz(a,h)anthracene	107	50 - 150	
	d12-Benzo(g,h,i)perylene	106	50 - 150	
PS	d14-Terphenyl	104	50 - 150	
	d12-Benzo(e)pyrene	108	50 - 150	
AS	d10-Anthracene	113	50 - 150	

a. Reporting limit.
b. Method detection limit.
c. IS; Internal Standards, PS; Pre-Spike Surrogates.
d. Lower control limit - upper control limit.

Analyst: MAS

Approved By: William J. Luksemburg 14-May-2009 10:15

Vista

Sample ID: **PAH-3** **CARB Method 429**

Client Data		Sample Data		Laboratory Data			
Name:	The Avogadro Group, LLC	Matrix:	MM5	Lab Sample:	31639-003	Date Received:	5-May-09
Project:	PANOCHE	Sample Size:	Sample	QC Batch No.:	2081	Date Extracted:	7-May-09
Date Collected:	29-Apr-09			Date Analyzed DB-5:	12-May-09		
Time Collected:	NA						

Analyte	Conc. (ng/Sample)	RL [a]	Qualifiers
Naphthalene	ND	985	
2-Methylnaphthalene	ND	226	
Acenaphthylene	ND	10.0	
Acenaphthene	ND	10.0	
Fluorene	ND	10.0	
Phenanthrene	ND	25.0	
Anthracene	ND	10.0	
Fluoranthene	11.6	10.0	
Pyrene	26.0	10.0	
Benz(a)anthracene	ND	10.0	
Chrysene	ND	100	D
Benzo(b)fluoranthene	ND	100	D
Benzo(k)fluoranthene	ND	10.0	
Benzo(e)pyrene	ND	10.0	
Benzo(a)pyrene	ND	10.0	
Perylene	ND	10.0	
Indeno(1,2,3-c,d)pyrene	ND	10.0	
Dibenz(a,h)anthracene	ND	10.0	
Benzo(g,h,i)perylene	ND	10.0	

	Labeled Standard [c]	%R	LCL-UCL [d]	Qualifiers
IS	d8-Naphthalene	79.8	50 - 150	
	d8-Acenaphthylene	83.2	50 - 150	
	d10-Acenaphthene	80.3	50 - 150	
	d10-Fluorene	88.1	50 - 150	
	d10-Phenanthrene	80.3	50 - 150	
	d10-Fluoranthene	102	50 - 150	
	d12-Benz(a)anthracene	122	50 - 150	
	d12-Chrysene	100	50 - 150	D
	d12-Benzo(b)fluoranthene	94.2	50 - 150	D
	d12-Benzo(k)fluoranthene	105	50 - 150	
	d12-Benzo(a)pyrene	99.8	50 - 150	
	d12-Indeno(1,2,3-c,d)pyrene	106	50 - 150	
	d14-Dibenz(a,h)anthracene	108	50 - 150	
	d12-Benzo(g,h,i)perylene	100	50 - 150	
PS	d14-Terphenyl	104	50 - 150	
	d12-Benzo(e)pyrene	102	50 - 150	
AS	d10-Anthracene	108	50 - 150	

a. Reporting limit.
b. Method detection limit.
c. IS; Internal Standards, PS; Pre-Spike Surrogates.
d. Lower control limit - upper control limit.

Analyst: MAS

Approved By: William J. Luksemburg 14-May-2009 10:15

Vista

Sample ID: **PAH-FB** **CARB Method 429**

Client Data		Sample Data		Laboratory Data			
Name:	The Avogadro Group, LLC	Matrix:	MM5	Lab Sample:	31639-004	Date Received:	5-May-09
Project:	PANOCHE	Sample Size:	Sample	QC Batch No.:	2081	Date Extracted:	7-May-09
Date Collected:	28-Apr-09			Date Analyzed DB-5:	12-May-09		
Time Collected:	NA						

Analyte	Conc. (ng/Sample)	RL [a]	Qualifiers
Naphthalene	ND	985	
2-Methylnaphthalene	ND	226	
Acenaphthylene	ND	10.0	
Acenaphthene	ND	10.0	
Fluorene	ND	10.0	
Phenanthrene	ND	25.0	
Anthracene	ND	10.0	
Fluoranthene	ND	10.0	
Pyrene	ND	10.0	
Benz(a)anthracene	ND	10.0	
Chrysene	ND	10.0	
Benzo(b)fluoranthene	ND	10.0	
Benzo(k)fluoranthene	ND	10.0	
Benzo(e)pyrene	ND	10.0	
Benzo(a)pyrene	ND	10.0	
Perylene	ND	10.0	
Indeno(1,2,3-c,d)pyrene	ND	10.0	
Dibenz(a,h)anthracene	ND	10.0	
Benzo(g,h,i)perylene	ND	10.0	

	Labeled Standard [c]	%R	LCL-UCL [d]	Qualifiers
IS	d8-Naphthalene	87.4	50 - 150	
	d8-Acenaphthylene	91.8	50 - 150	
	d10-Acenaphthene	90.8	50 - 150	
	d10-Fluorene	90.1	50 - 150	
	d10-Phenanthrene	99.1	50 - 150	
	d10-Fluoranthene	102	50 - 150	
	d12-Benz(a)anthracene	113	50 - 150	
	d12-Chrysene	101	50 - 150	
	d12-Benzo(b)fluoranthene	116	50 - 150	
	d12-Benzo(k)fluoranthene	100	50 - 150	
	d12-Benzo(a)pyrene	105	50 - 150	
	d12-Indeno(1,2,3-c,d)pyrene	122	50 - 150	
	d14-Dibenz(a,h)anthracene	120	50 - 150	
	d12-Benzo(g,h,i)perylene	112	50 - 150	
PS	d14-Terphenyl	109	50 - 150	
	d12-Benzo(e)pyrene	112	50 - 150	
AS	d10-Anthracene	108	50 - 150	

a. Reporting limit.
b. Method detection limit.
c. IS; Internal Standards, PS; Pre-Spike Surrogates.
d. Lower control limit - upper control limit.

Analyst: MAS

Approved By: William J. Luksemburg 14-May-2009 10:15

APPENDIX

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank.
D	Dilution
E	The amount detected is above the High Calibration Limit.
P	The amount reported is the maximum possible concentration due to possible chlorinated diphenylether interference.
H	The signal-to-noise ratio is greater than 10:1.
I	Chemical Interference
J	The amount detected is below the Low Calibration Limit.
*	See Cover Letter
Conc.	Concentration
DL	Sample-specific estimated detection limit
MDL	The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero in the matrix tested.
EMPC	Estimated Maximum Possible Concentration
NA	Not applicable
RL	Reporting Limit – concentrations that correspond to low calibration point
ND	Not Detected
TEQ	Toxic Equivalency

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
State of Alaska, DEC	CA413-2008
State of Arizona	AZ0639
State of Arkansas, DEQ	08-043-0
State of Arkansas, DOH	Reciprocity through CA
State of California – NELAP Primary AA	02102CA
State of Colorado	N/A
State of Connecticut	PH-0182
State of Florida, DEP	E87777
State of Indiana Department of Health	C-CA-02
Commonwealth of Kentucky	90063
State of Louisiana, Health and Hospitals	LA08000
State of Louisiana, DEQ	01977
State of Maine	2008024
State of Michigan	9932
State of Mississippi	Reciprocity through CA
Naval Facilities Engineering Service Center	NFESC413
State of Nevada	CA004132007A
State of New Jersey	CA003
State of New Mexico	Reciprocity through CA
State of New York, DOH	11411
State of North Carolina	06700
State of North Dakota, DOH	R-078
State of Oklahoma	D9919
State of Oregon	CA200001-006
State of Pennsylvania	68-00490
State of South Carolina	87002001
State of Tennessee	TN02996
State of Texas	T104704189-08-TX
U.S. Army Corps of Engineers	N/A
State of Utah	CA16400
Commonwealth of Virginia	00013
State of Washington	C1285
State of Wisconsin	998036160
State of Wyoming	8TMS-Q

CHAIN OF CUSTODY

(VISTA) 31639 5.2°/11.6°C

Client/Project Name	Project Location/Sample Location	ANALYSES
PANOCHE	UNIT #2 STACK	
Project No. 09092.2 ☑ Lump-sum ☐ T&M ☐ California ☐ Medford ☐ Portland	BAAQMD: ☐ Yes ☒ No / P.O. No.	
Sampler: (Signature)	Send Analytical Report To: JEREMY KOSINSKI	Full 202? ☐ Yes ☐ No N/A

Sample No./ Identification	Date	# of Containers	Lab Sample Number	Type of Sample	CARB 429			Remarks
1-PAH-FB	4/29/09	1		#1 Nozzle, Probe, F½ Filter	X			#1, 3, & 5 used
2-PAH-FB		1		#2 Filter	X			Acetone, Hexane
3-PAH-FB		1		#3 B½ Filter, Sampleline, Coil	X			and $MeCl_2$
4-PAH-FB		1		#4 imp contents	X			#2 Teflon backed
5-PAH-FB		1		#5 imp rinses	X			Filter
PAH-FB		1		#6 XAD-TRAP	X			#4 Carb/BiCarb
(1,2,3,4,5)-PAH-1	4/29/09	6		#1,#2,#3,#4,#5,#6	X			
(1,2,3,4,5)-PAH-2	4/29/09	6			X			
(1,2,3,4,5)-PAH-3	4/29/09	6			X			
		24						

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	5/5/09	1400		05/05/09	1400
Relinquished by: (Signature)	Date 05/05/09	Time 1615	Received by: (Signature)	Date 5/5/09	Time 1700
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Sample Collected By:

The Avogadro Group, LLC

2825 Verne Roberts Circle
Antioch, CA 94509

(925) 680-4300 * (925) 680-4416 FAX

Analytical report due date: _____

White: Project Mgr.

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 31639 TAT Unspecified

Samples Arrival:	Date/Time 5/5/09 1607	Initials: CV	Location: LR-2 Shelf/Rack: N/A
Logged In:	Date/Time 5/6/09 0816	Initials: CV	Location: R-1 Shelf/Rack: N/A

Delivered By:	FedEx	UPS	Cal	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Dry Ice	None		
Temp °C 5.2°	Time: 1610	Thermometer ID: IR-1				

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Shipping Documentation Present?			✓
Airbill / Trk #			✓
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?	✓		
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

$Na_2S_2O_3$ Preservation Documented?	COC	Sample Container	None		
Shipping Container	Vista	Client	Retain	Return	Dispose

Comments:

traps + solvent rinses

SAMPLE LOG-IN CHECKLIST

Vista Analytical Laboratory

Vista Project #: 31639 TAT Unspecified

Samples Arrival:	Date/Time 5/5/09 1607	Initials: CV	Location: URJR Shelf/Rack: N/A
Logged In:	Date/Time 5/6/09 0816	Initials: CV	Location: R-1 Shelf/Rack: N/A

Delivered By:	FedEx	UPS	Cal	DHL	Hand Delivered	Other
Preservation:	Ice	Blue Ice	Dry Ice	None		
Temp °C 11.6°	Time: 1608	Thermometer ID: IR-1				

	YES	NO	NA
Adequate Sample Volume Received?	✓		
Holding Time Acceptable?	✓		
Shipping Container(s) Intact?	✓		
Shipping Custody Seals Intact?			✓
Shipping Documentation Present?			✓
Airbill / Trk #			✓
Sample Container Intact?	✓		
Sample Custody Seals Intact?			✓
Chain of Custody / Sample Documentation Present?	✓		
COC Anomaly/Sample Acceptance Form completed?	✓		
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			✓

$Na_2S_2O_3$ Preservation Documented?	COC	Sample Container	None		
Shipping Container	Vista	Client	Retain	Return	Dispose

Comments:

impingers + filters

Chain of Custody Anomaly/Sample Acceptance Form

Client: The Avogadro Group, LLC
Contact: Jeremy Klosinski
Fax Number: 925-6804416

Project Number 31639
Date Received: May 5 2009
Documented by/date: CW 5/6/09

Please review the following information and complete the Client Authorization section. To comply with NELAC regulations, we must receive authorization before proceeding with sample analysis.
Thank You. (Fax # 916-673-0106)

The following information or item is needed to proceed with analysis:

- ☐ Complete Chain-of-Custody
- ☐ Test Method Requested
- ☐ Analyte List Requested
- ☐ Preservative
- ☐ Sample Identification
- ☐ Sample Collection Date / Time
- ☐ Collector's Name
- ☐ Sample Type
- ☐ Sample Location

The following anomalies were noted. Authorization is needed to proceed with the analysis.

(Temperature outside ±2°C range) Samples Affected: impinger contents and filters for all samples
Temperature outside 11.6 °C Ice present? Yes (No)

Sample ID Discrepancy	Samples Affected	
Sample holding time missed	Samples Affected	
Custody seals broken	Samples Affected	
Insufficient Sample Size	Samples Affected	
Sample Container(s) Broken	Samples Affected	
Incorrect Container Type	Samples Affected	

Other

Client Authorization

Proceed With Analysis: (YES) NO Signature and Date RMH 5/7/09

Client Comments/Instructions: per Jeremy by phone

Vista Analytical Laboratory
El Dorado Hills, CA 95762
Phone: (916) 673-1520 Fax:(916) 673-0106

Appendix E.4

Aldehyde Lab Data

Air Toxics LTD.
Laboratory Services Since 1989

5/26/2009
Mr. Jeremy Klosinski
The Avogadro Group
2825 Verne Roberts Circle

Antioch CA 94509

Project Name: Panoche
Project #: 09092.2
Workorder #: 0905110R1

Dear Mr. Jeremy Klosinski

The following report includes the data for the above referenced project for sample(s) received on 5/5/2009 at Air Toxics Ltd.

The data and associated QC analyzed by Modified CARB 430 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 6:30 A.M to 5:30 PST

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 0905110R1

Work Order Summary

CLIENT:	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509	**BILL TO:**	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509
PHONE:	925-680-4300	**P.O. #**	
FAX:	925-680-4416	**PROJECT #**	09092.2 Panoche
DATE RECEIVED:	05/05/2009	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/19/2009		
DATE REISSUED:	05/26/2009		

FRACTION #	NAME	TEST
01A	TRIP SPIKE	Modified CARB 430
02A	TRIP BLANK	Modified CARB 430
03A	FB-FORM-1	Modified CARB 430
04A	1-FORM-1	Modified CARB 430
05A	2-FORM-1	Modified CARB 430
06A	FB-FORM-2	Modified CARB 430
07A	1-FORM-2	Modified CARB 430
08A	2-FORM-2	Modified CARB 430
09A	FB-FORM-3	Modified CARB 430
10A	1-FORM-3	Modified CARB 430
11A	2-FORM-3	Modified CARB 430
12A	Lab Blank	Modified CARB 430
13A	LCS	Modified CARB 430

CERTIFIED BY: Linda L. Freeman DATE: 05/26/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Air Toxics Ltd.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified CARB 430
The Avogadro Group
Workorder# 0905110R1

Two Vial and nine DNPH Screw Cap Vial samples were received on May 05, 2009. The laboratory performed analysis via modified Method CARB 430 using reverse phase High Pressure Liquid Chromatography (HPLC) with an Ultraviolet (UV) Detector. The method involves extracting the derivatized aldehydes and ketones from the impinger solution. See the data sheets for the reporting limits for each compound.

Requirement	*CARB 430*	*ATL Modifications*
Extraction	Serially extracted three times.	Single extraction is sufficient and minimizes further addition of background contamination.
Reagent Certification/Field Blank	4 Reagent Blanks will be prepared and flushed through the same length sample line and same type of impinger as will be used in the field. Field Blank criteria: < 10 % of sample values on a total sampling train.	Criteria are < RL for all analytes. 4 Reagent Blanks are prepared by taking four 10 mL aliquots and extracting them using the same procedure as is used to extract samples.
DNPH Certification	New crystals should be analyzed by acidifying with 1mL of 2N Hydrochloric Acid per 100mL DNPH	DNPH reagent is certified at the time of shipment to verify the purity of the crystals.
Sample Quantitation	Use daily RF.	Use ICAL RF.
Retention Time (RT) Precision	%RPD < 2 % for daily calibration standards	RT widths determined by bracketing standards analyzed before and after the sample.
Limit of Detection	The "limit of detection" is defined as the upper bound of the 95% confidence interval for the analysis of at least 4 Reagent Blanks.	Detection Limit is based on the current MDL study which is calculated from a minimum of 7 extracted spikes following 40 CFR Part 136 App. B.
Field Blank Subtraction	Subtract the average of the Field Blanks from the sample result.	Blank subtraction is not performed on sample results.
LCS	If the LCS is out it must be re-extracted until it is in or re-calibrate.	The LCS is only extracted once with out-of-control recoveries flagged.

Requirement	*CARB 430*	*ATL Modifications*
Weight Measurements	Measure the weight of each vial before and after sampling to establish no loss of contents.	Weight measurements are not taken.
Calibration Standard Precision	%RSD +- 10%.	Not measured; recovery of all Continuing Calibration standards must be 90 - 110%.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Extraction solvent was added to all samples in the field, therefore the date of extraction is also the date of collection. The QCs were extracted at the laboratory on 05/08/2009.

The concentration of Formaldehyde in sample 2-FORM-3 (second impinger) (0.56ug) was greater than in sample 1-FORM-3 (first impinger) (<0.50ug). Re-analysis confirmed the results.

THE WORK ORDER WAS RE-ISSUED ON 05/26/09 TO REPORT ACETALDEHYDE PER CLIENT'S REQUEST. AS ACETALDEHYDE WAS NOT ORIGINALLY REQUESTED, IT WAS NOT ADDED TO THE LABORATORY CONTROL SPIKE SAMPLE AT THE TIME OF SAMPLE EXTRACTION.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B- Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
CARB METHOD 430 HPLC

Client Sample ID: TRIP BLANK

Lab ID#: 0905110R1-02A
No Detections Were Found.

Client Sample ID: FB-FORM-1

Lab ID#: 0905110R1-03A
No Detections Were Found.

Client Sample ID: 1-FORM-1

Lab ID#: 0905110R1-04A

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.79

Client Sample ID: 2-FORM-1

Lab ID#: 0905110R1-05A

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.57

Client Sample ID: FB-FORM-2

Lab ID#: 0905110R1-06A
No Detections Were Found.

Client Sample ID: 1-FORM-2

Lab ID#: 0905110R1-07A

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.77

Client Sample ID: 2-FORM-2

Lab ID#: 0905110R1-08A
No Detections Were Found.

Client Sample ID: FB-FORM-3

Lab ID#: 0905110R1-09A

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
CARB METHOD 430 HPLC

Client Sample ID: FB-FORM-3

Lab ID#: 0905110R1-09A
No Detections Were Found.

Client Sample ID: 1-FORM-3

Lab ID#: 0905110R1-10A
No Detections Were Found.

Client Sample ID: 2-FORM-3

Lab ID#: 0905110R1-11A

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.56

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRIP SPIKE

Lab ID#: 0905110R1-01A

CARB METHOD 430 HPLC

File Name:	f0508024r1	Date of Collection: 4/27/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 04:22 PM
		Date of Extraction: 4/27/09

Compound	%Recovery
Formaldehyde	91
Acetaldehyde	101
Acrolein	95

Total Volume=10mL

Container Type: Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRIP BLANK

Lab ID#: 0905110R1-02A

CARB METHOD 430 HPLC

File Name:	f0508025r1	Date of Collection: 4/27/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 04:43 PM
		Date of Extraction: 4/27/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=10mL

Container Type: Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: FB-FORM-1

Lab ID#: 0905110R1-03A

CARB METHOD 430 HPLC

File Name:	f0508026r1	Date of Collection: 4/28/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 05:04 PM
		Date of Extraction: 4/28/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=9.0mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-FORM-1

Lab ID#: 0905110R1-04A

CARB METHOD 430 HPLC

File Name:	f0512003r1	Date of Collection: 4/28/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/12/09 08:31 AM
		Date of Extraction: 4/28/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.79
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=15mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-FORM-1

Lab ID#: 0905110R1-05A

CARB METHOD 430 HPLC

File Name:	f0508029r1	Date of Collection: 4/28/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 06:07 PM
		Date of Extraction: 4/28/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.57
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=10mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: FB-FORM-2

Lab ID#: 0905110R1-06A

CARB METHOD 430 HPLC

File Name:	f0508027r1	Date of Collection: 4/29/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 05:25 PM
		Date of Extraction: 4/29/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=9.0mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-FORM-2

Lab ID#: 0905110R1-07A

CARB METHOD 430 HPLC

File Name:	f0512004r1	Date of Collection: 4/29/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/12/09 08:51 AM
		Date of Extraction: 4/29/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.77
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=16mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-FORM-2

Lab ID#: 0905110R1-08A

CARB METHOD 430 HPLC

File Name:	f0508030r1	Date of Collection: 4/29/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 06:28 PM
		Date of Extraction: 4/29/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=9.0mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: FB-FORM-3

Lab ID#: 0905110R1-09A

CARB METHOD 430 HPLC

File Name:	f0508028r1	Date of Collection: 4/29/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 05:46 PM
		Date of Extraction: 4/29/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=9.0mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-FORM-3

Lab ID#: 0905110R1-10A

CARB METHOD 430 HPLC

File Name:	f0512005r1	Date of Collection: 4/29/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/12/09 09:12 AM
		Date of Extraction: 4/29/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=16mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-FORM-3

Lab ID#: 0905110R1-11A

CARB METHOD 430 HPLC

File Name:	f0508031r1	Date of Collection: 4/29/09 1/1/1990
Dil. Factor:	1.00	Date of Analysis: 5/8/09 06:49 PM
		Date of Extraction: 4/29/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	0.56
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=10mL

Container Type: DNPH Screw Cap Vial

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0905110R1-12A

CARB METHOD 430 HPLC

File Name:	f0508022r1	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/8/09 03:41 PM
		Date of Extraction: 5/8/09

Compound	Rpt. Limit (ug)	Amount (ug)
Formaldehyde	0.50	Not Detected
Acetaldehyde	0.50	Not Detected
Acrolein	0.50	Not Detected

Total Volume=10mL

Container Type: NA - Not Applicable

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0905110R1-13A

CARB METHOD 430 HPLC

File Name:	f0508023r1	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/8/09 04:02 PM
		Date of Extraction: 5/8/09

Compound	%Recovery
Formaldehyde	84
Acetaldehyde	Not Spiked
Acrolein	91

Total Volume=10mL

Container Type: NA - Not Applicable

Appendix E.5

Volatile Organic Compounds Lab Data

Air Toxics LTD.
Laboratory Services Since 1989

5/13/2009
Mr. Jeremy Klosinski
The Avogadro Group
2825 Verne Roberts Circle

Antioch CA 94509

Project Name: Panoche Energy Center
Project #: 09092
Workorder #: 0905111

Dear Mr. Jeremy Klosinski

The following report includes the data for the above referenced project for sample(s) received on 5/5/2009 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-12 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner
Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 0905111

Work Order Summary

CLIENT:	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509	**BILL TO:**	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509
PHONE:	925-680-4300	**P.O. #**	
FAX:	925-680-4416	**PROJECT #**	09092 Panoche Energy Center
DATE RECEIVED:	05/05/2009	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/13/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	1-VOC-1	Modified TO-12	8.0 "Hg	5 psi
02A	2-VOC-1	Modified TO-12	7.0 "Hg	5 psi
03A	3-VOC-1	Modified TO-12	7.5 "Hg	5 psi
04A	1-VOC-2	Modified TO-12	7.5 "Hg	5 psi
05A	2-VOC-2	Modified TO-12	9.0 "Hg	5 psi
06A	3-VOC-2	Modified TO-12	9.0 "Hg	5 psi
07A	1-VOC-3	Modified TO-12	10.0 "Hg	5 psi
08A	2-VOC-3	Modified TO-12	9.5 "Hg	5 psi
08B	2-VOC-3	Modified TO-12	9.5 "Hg	5 psi
08C	2-VOC-3	Modified TO-12	9.5 "Hg	5 psi
09A	3-VOC-3	Modified TO-12	9.5 "Hg	5 psi
10A	1-VOC-4	Modified TO-12	9.5 "Hg	5 psi
11A	2-VOC-4	Modified TO-12	9.5 "Hg	5 psi
12A	3-VOC-4	Modified TO-12	9.0 "Hg	5 psi
13A	Lab Blank	Modified TO-12	NA	NA
14A	LCS	Modified TO-12	NA	NA

CERTIFIED BY: Linda D. Truman DATE: 05/13/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-12
The Avogadro Group
Workorder# 0905111

Twelve 6 Liter Summa Canister (100% Certified) samples were received on May 05, 2009. The laboratory performed analysis via modified EPA Method TO-12 for Total Non-Methane Organic Compounds (TNMOC). TNMOC was analyzed via GC/FID. The TNMOC results are calculated using the response of Heptane. The method involves concentrating up to 200 mL of air samples. The concentrated aliquot is then dry purged to remove water vapor prior to entering the chromatographic system. Method TO-12 is intended to be applied to ambient air samples only, therefore, matrices that are highly contaminated with Methane may produce biased results. See the data sheets for the reporting limit for TNMOC.

Requirement	*Method TO-12*	*ATL Modifications*
Reporting Limit	0.02 ppmc	0.010 ppmv
Calibration Standard	Propane	Heptane
Reported Units	Ppmc	Ppmv
Initial Calibration	Five levels - each level three runs with % RSD < 3 %; Linearity criterion not specified.	Minimum of three levels; % RSD <= 30 %.
Sample Analysis Frequency	Duplicate analysis with RPD <5 %, report average results of two analyses.	Single analysis. Duplicate 10 % of samples with RPD <= 25% for detections > 5 X's the RL.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

The duplicate analysis of sample 2-VOC-3 did not pass precision acceptance criteria for TNMOC ref. to Heptane (MW=100). The sample was analyzed a third time and still did not duplicate. All three analyses are reported.

Definition of Data Qualifying Flags

Six qualifiers may have been used on the Analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated Peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

File extensions may have been used on the data analysis sheets and indicates

as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-12 GC/FID

Client Sample ID: 1-VOC-1

Lab ID#: 0905111-01A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.037

Client Sample ID: 2-VOC-1

Lab ID#: 0905111-02A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.075

Client Sample ID: 3-VOC-1

Lab ID#: 0905111-03A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.038

Client Sample ID: 1-VOC-2

Lab ID#: 0905111-04A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.028

Client Sample ID: 2-VOC-2

Lab ID#: 0905111-05A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.019	0.034

Client Sample ID: 3-VOC-2

Lab ID#: 0905111-06A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.019	0.027

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-12 GC/FID

Client Sample ID: 1-VOC-3

Lab ID#: 0905111-07A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.042

Client Sample ID: 2-VOC-3

Lab ID#: 0905111-08A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.40

Client Sample ID: 2-VOC-3

Lab ID#: 0905111-08B

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.23

Client Sample ID: 2-VOC-3

Lab ID#: 0905111-08C

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.15

Client Sample ID: 3-VOC-3

Lab ID#: 0905111-09A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.027

Client Sample ID: 1-VOC-4

Lab ID#: 0905111-10A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.047

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-12 GC/FID

Client Sample ID: 2-VOC-4

Lab ID#: 0905111-11A

No Detections Were Found.

Client Sample ID: 3-VOC-4

Lab ID#: 0905111-12A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.019	0.031

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-VOC-1

Lab ID#: 0905111-01A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050707	Date of Collection:	4/30/09 1/1/1990
Dil. Factor:	1.83	Date of Analysis:	5/7/09 12:03 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.037

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-VOC-1

Lab ID#: 0905111-02A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050706	Date of Collection:	5/1/09 1/1/1990
Dil. Factor:	1.75	Date of Analysis:	5/7/09 11:28 AM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.075

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-VOC-1

Lab ID#: 0905111-03A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050708	Date of Collection:	5/1/09 1/1/1990
Dil. Factor:	1.79	Date of Analysis:	5/7/09 12:38 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.038

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-VOC-2

Lab ID#: 0905111-04A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050709	Date of Collection:	4/27/09 1/1/1990
Dil. Factor:	1.79	Date of Analysis:	5/7/09 01:11 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.018	0.028

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-VOC-2

Lab ID#: 0905111-05A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050710	Date of Collection:	4/27/09 1/1/1990
Dil. Factor:	1.91	Date of Analysis:	5/7/09 01:54 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.019	0.034

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-VOC-2

Lab ID#: 0905111-06A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050711	Date of Collection:	4/27/09 1/1/1990
Dil. Factor:	1.91	Date of Analysis:	5/7/09 02:48 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.019	0.027

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-VOC-3

Lab ID#: 0905111-07A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050712	Date of Collection:	4/23/09 1/1/1990
Dil. Factor:	2.01	Date of Analysis:	5/7/09 03:21 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.042

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-VOC-3

Lab ID#: 0905111-08A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050713	Date of Collection:	4/23/09 1/1/1990
Dil. Factor:	1.96	Date of Analysis:	5/7/09 03:54 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.40

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-VOC-3

Lab ID#: 0905111-08B

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050718	Date of Collection:	4/23/09 1/1/1990
Dil. Factor:	1.96	Date of Analysis:	5/7/09 06:38 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.23

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-VOC-3

Lab ID#: 0905111-08C

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050722	Date of Collection:	4/23/09 1/1/1990
Dil. Factor:	1.96	Date of Analysis:	5/7/09 08:49 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.15

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-VOC-3

Lab ID#: 0905111-09A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050714	Date of Collection:	4/23/09 1/1/1990
Dil. Factor:	1.96	Date of Analysis:	5/7/09 04:27 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.027

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-VOC-4

Lab ID#: 0905111-10A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050715	Date of Collection:	4/24/09 1/1/1990
Dil. Factor:	1.96	Date of Analysis:	5/7/09 04:59 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	0.047

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-VOC-4

Lab ID#: 0905111-11A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050716	Date of Collection:	4/24/09 1/1/1990
Dil. Factor:	1.96	Date of Analysis:	5/7/09 05:32 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.020	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-VOC-4

Lab ID#: 0905111-12A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050717	Date of Collection:	4/24/09 1/1/1990
Dil. Factor:	1.91	Date of Analysis:	5/7/09 06:05 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.019	0.031

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0905111-13A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050704	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/7/09 10:14 AM	

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.010	Not Detected

Container Type: NA - Not Applicable

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0905111-14A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d050702	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/7/09 08:49 AM

Compound	%Recovery
Heptane	82

Container Type: NA - Not Applicable

The Avogadro Group, LLC

Air Quality Consulting and Source Emissions Testing

HYDROCARBON ANALYSIS RESULTS

Client: Panoche Energy Center
Project: 09092.0
Date Collected: April 28-29, 2009
Date Analyzed: April 30, 2009

Test No:		Startup #1	Startup #2A	Startup #2B	Startup #3
Methane, ppmv		4.12	Flat Bag	1.13	6.71
Non-methane hydrocarbons, ppmv					
ethane	Concentration in ppmv of component	< 0.07		< 0.07	0.07
ethene		< 0.07		< 0.07	< 0.07
C3		< 0.04		< 0.04	< 0.04
C4		< 0.03		< 0.03	< 0.03
C5		< 0.03		< 0.03	0.06
C6		< 0.02		< 0.02	0.03
> C6 (ppmv units of methane)		< 0.13		< 0.13	< 0.13
Total hydrocarbons (THC)		**4.12**	--	**1.13**	**7.33**
Total non-methane hydrocarbons (TNMHC)		**< 0.78**	--	**< 0.78**	**< 1.02**
Total non-methane non-ethane hydrocarbons (TNMNE)		**< 0.65**	--	**< 0.65**	**< 0.87**

NOTES: THC, TNMNE and TNMHC expressed as ppmv units of methane

When TNMHC and/or TNMNE fell below the reporting limit (< 0.78 ppmv and < 0.65 ppmv, respectively), values were calculated by taking the sum of the methane equivalent concentrations of the detected species and of the detection limits of the remaining species that were not detected.

Reporting Limits: methane 0.13 ppmv, ethane 0.07 ppmv, C3 0.04 ppmv, C4 0.03 ppmv, C5 0.03 ppmv, C6 0.02 ppmv, > C6 0.13 ppmv methane, THC 0.91 ppmv methane, TNMHC 0.78 ppmv methane, TNMNE 0.65 ppmv methane

Prepared by: _____ Date: 05/01/09
Navdeep Bola
Laboratory Analyst I

Reviewed by: _____ Date: 05/01/09
Michele Hoffmann
Laboratory Manager

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The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE
EPA METHOD 18
Client: Panoche Energy Center
Project: 09092.0

Custody

Four samples collected in Tedlar bags were received on April 30, 2009. According to the Chain of Custody, these samples were collected on April 28-29, 2009. The first bag for Startup #2 was flat and could not be analyzed. The remaining samples were received in good condition with no signs of loss.

Sample Analysis Notes

Samples were analyzed for hydrocarbons using the analytical procedures in EPA Method 18 (Measurement of Gaseous Organic Compound Emissions by Gas Chromatography). Samples were analyzed on April 30, 2009 (within 72 hours of sample collection). VOC results were corrected to dry concentrations as described in method 18.

Calibration Notes

All calibration standards were within 5% of their mean values. Pre- and post-test analyses of a mid level standard differed by no more than 5%. Therefore, only the pre-test calibration was used for analysis. Audits were within 10% of the certified cylinder value.

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The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

HYDROCARBON ANALYSIS RESULTS

Client: Panoche Energy Center
Project: 09092.2
Date Collected: April 29, 2009
Date Analyzed: May 5, 2009

Test No:		**Shutdown**
Methane, ppmv		15.20
Non-methane hydrocarbons, ppmv		
ethane	Concentration in ppmv of component	0.14
ethene		< 0.07
C3		< 0.04
C4		< 0.03
C5		< 0.03
C6		0.03
> C6 (ppmv units of methane)		< 0.13
Total hydrocarbons (THC)		**15.67**
Total non-methane hydrocarbons (TNMHC)		**< 0.99**
Total non-methane non-ethane hydrocarbons (TNMNE)		**< 0.71**

NOTES: THC, TNMNE and TNMHC expressed as ppmv units of methane

When TNMHC and TNMNE fell below the reporting limit (< 0.78 ppmv and < 0.65 ppmv, respectively), values were calculated by taking the sum of the methane equivalent concentrations of the detected species and of the detection limits of the remaining species that were not detected.

Reporting Limits: methane 0.13 ppmv, ethane 0.07 ppmv, C3 0.04 ppmv, C4 0.03 ppmv, C5 0.03 ppmv, C6 0.02 ppmv, > C6 0.13 ppmv methane, THC 0.91 ppmv methane, TNMHC 0.78 ppmv methane, TNMNE 0.65 ppmv methane

Michele Hoffmann
Laboratory Manager

Date: 05/05/09

2825 VERNE ROBERTS CIRCLE; ANTIOCH, CA 94509 (925) 680-4300 Main (925) 680-4416 Fax

The Avogadro Group, LLC
Air Quality Consulting and Source Emissions Testing

LABORATORY NARRATIVE
EPA METHOD 18
Client: Panoche Energy Center
Project: 09092.2

Custody

One sample collected in a Tedlar bag was received on May 4, 2009. According to the Chain of Custody, this sample was collected on April 29, 2009. This sample was received in good condition with no signs of loss.

Sample Analysis Notes

This sample was analyzed for hydrocarbons using the analytical procedures in EPA Method 18 (Measurement of Gaseous Organic Compound Emissions by Gas Chromatography). The sample was analyzed on May 4, 2009 (beyond 72 hours of sample collection). VOC results were corrected to dry concentrations as described in method 18.

Calibration Notes

All calibration standards were within 5% of their mean values. Pre- and post-test analyses of a mid level standard differed by no more than 5%. Therefore, only the pre-test calibration was used for analysis. Audits were within 10% of the certified cylinder value.

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CHAIN OF CUSTODY

Client/Project Name	Project Location/Sample Location	ANALYSES			
PANOCHE	Unit #2				
Project No. 09092.2 ☒ Lump-sum ☐ T&M ☐ California ☐ Medford ☐ Portland	BAAQMD: ☐ Yes ☒ No / P.O. No.				Full 202? ☐ Yes ☐ No
Sampler: (Signature)	Send Analytical Report To: JEREMY KLUSINSKI				

Sample No./ Identification	Date	# of Containers	Lab Sample Number	Type of Sample	EPA 18			Remarks
Shutdown	4/29/09	1		TEDLAR BAG	X			

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	4/5/1/09	2145		05/04/09	1030
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Sample Collected By:

The Avogadro Group, LLC
2825 Verne Roberts Circle
Antioch, CA 94509
(925) 680-4300 * (925) 680-4416 FAX

Analytical report due date: _____

White: Project Mgr. **Yellow**: Originator **Pink**: Laboratory

Appendix E.6

Volatile Hazardous Air Pollutants Lab Data

Air Toxics LTD.
Laboratory Services Since 1989

5/19/2009
Mr. Jeremy Klosinski
The Avogadro Group
2825 Verne Roberts Circle

Antioch CA 94509

Project Name: Panoche Energy Center
Project #: 09092
Workorder #: 0905112A

Dear Mr. Jeremy Klosinski

The following report includes the data for the above referenced project for sample(s) received on 5/5/2009 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner
Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 0905112A

Work Order Summary

CLIENT:	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509	**BILL TO:**	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509
PHONE:	925-680-4300	**P.O. #**	
FAX:	925-680-4416	**PROJECT #**	09092 Panoche Energy Center
DATE RECEIVED:	05/05/2009	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/11/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	1-HAP	Modified TO-15	6.8 "Hg	5 psi
02A	2-HAP	Modified TO-15	6.0 "Hg	5 psi
03A	3-HAP	Modified TO-15	6.6 "Hg	5 psi
03AA	3-HAP Lab Duplicate	Modified TO-15	6.6 "Hg	5 psi
04A	Lab Blank	Modified TO-15	NA	NA
05A	CCV	Modified TO-15	NA	NA
06A	LCS	Modified TO-15	NA	NA

CERTIFIED BY: Linda S. Truman

Laboratory Director

DATE: 05/19/09

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
The Avogadro Group
Workorder# 0905112A

Three 6 Liter Summa Canister (100% Certified) samples were received on May 05, 2009. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	</= 30% Difference	</= 30% Difference; Compounds exceeding this criterion and associated data are flagged and narrated.
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction no performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 1-HAP

Lab ID#: 0905112A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Methylene Chloride	0.86	1.8	3.0	6.3

Client Sample ID: 2-HAP

Lab ID#: 0905112A-02A

No Detections Were Found.

Client Sample ID: 3-HAP

Lab ID#: 0905112A-03A

No Detections Were Found.

Client Sample ID: 3-HAP Lab Duplicate

Lab ID#: 0905112A-03AA

No Detections Were Found.

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-HAP

Lab ID#: 0905112A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050906	Date of Collection:	4/28/09 1/1/1990
Dil. Factor:	1.73	Date of Analysis:	5/9/09 01:04 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.86	Not Detected	4.3	Not Detected
Freon 114	0.86	Not Detected	6.0	Not Detected
Chloromethane	3.5	Not Detected	7.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Bromomethane	0.86	Not Detected	3.4	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.9	Not Detected
Ethanol	3.5	Not Detected	6.5	Not Detected
Freon 113	0.86	Not Detected	6.6	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Acetone	3.5	Not Detected	8.2	Not Detected
2-Propanol	3.5	Not Detected	8.5	Not Detected
Carbon Disulfide	0.86	Not Detected	2.7	Not Detected
3-Chloropropene	3.5	Not Detected	11	Not Detected
Methylene Chloride	0.86	1.8	3.0	6.3
Methyl tert-butyl ether	0.86	Not Detected	3.1	Not Detected
trans-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Hexane	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.86	Not Detected	2.6	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Tetrahydrofuran	0.86	Not Detected	2.6	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.4	Not Detected
2,2,4-Trimethylpentane	0.86	Not Detected	4.0	Not Detected
Benzene	0.86	Not Detected	2.8	Not Detected
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Heptane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.6	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
1,4-Dioxane	3.5	Not Detected	12	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
4-Methyl-2-pentanone	0.86	Not Detected	3.5	Not Detected
Toluene	0.86	Not Detected	3.2	Not Detected
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-HAP

Lab ID#: 0905112A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050906	Date of Collection:	4/28/09 1/1/1990
Dil. Factor:	1.73	Date of Analysis:	5/9/09 01:04 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected
2-Hexanone	3.5	Not Detected	14	Not Detected
Dibromochloromethane	0.86	Not Detected	7.4	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.6	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	Not Detected	3.8	Not Detected
m,p-Xylene	0.86	Not Detected	3.8	Not Detected
o-Xylene	0.86	Not Detected	3.8	Not Detected
Styrene	0.86	Not Detected	3.7	Not Detected
Bromoform	0.86	Not Detected	8.9	Not Detected
Cumene	0.86	Not Detected	4.2	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	5.9	Not Detected
Propylbenzene	0.86	Not Detected	4.2	Not Detected
4-Ethyltoluene	0.86	Not Detected	4.2	Not Detected
1,3,5-Trimethylbenzene	0.86	Not Detected	4.2	Not Detected
1,2,4-Trimethylbenzene	0.86	Not Detected	4.2	Not Detected
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.5	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,2,4-Trichlorobenzene	3.5	Not Detected	26	Not Detected
Hexachlorobutadiene	3.5	Not Detected	37	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	96	70-130
4-Bromofluorobenzene	102	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-HAP

Lab ID#: 0905112A-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050907	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.68	Date of Analysis:	5/9/09 01:46 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.84	Not Detected	4.2	Not Detected
Freon 114	0.84	Not Detected	5.9	Not Detected
Chloromethane	3.4	Not Detected	6.9	Not Detected
Vinyl Chloride	0.84	Not Detected	2.1	Not Detected
1,3-Butadiene	0.84	Not Detected	1.8	Not Detected
Bromomethane	0.84	Not Detected	3.3	Not Detected
Chloroethane	0.84	Not Detected	2.2	Not Detected
Freon 11	0.84	Not Detected	4.7	Not Detected
Ethanol	3.4	Not Detected	6.3	Not Detected
Freon 113	0.84	Not Detected	6.4	Not Detected
1,1-Dichloroethene	0.84	Not Detected	3.3	Not Detected
Acetone	3.4	Not Detected	8.0	Not Detected
2-Propanol	3.4	Not Detected	8.2	Not Detected
Carbon Disulfide	0.84	Not Detected	2.6	Not Detected
3-Chloropropene	3.4	Not Detected	10	Not Detected
Methylene Chloride	0.84	Not Detected	2.9	Not Detected
Methyl tert-butyl ether	0.84	Not Detected	3.0	Not Detected
trans-1,2-Dichloroethene	0.84	Not Detected	3.3	Not Detected
Hexane	0.84	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.84	Not Detected	3.4	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.84	Not Detected	2.5	Not Detected
cis-1,2-Dichloroethene	0.84	Not Detected	3.3	Not Detected
Tetrahydrofuran	0.84	Not Detected	2.5	Not Detected
Chloroform	0.84	Not Detected	4.1	Not Detected
1,1,1-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Cyclohexane	0.84	Not Detected	2.9	Not Detected
Carbon Tetrachloride	0.84	Not Detected	5.3	Not Detected
2,2,4-Trimethylpentane	0.84	Not Detected	3.9	Not Detected
Benzene	0.84	Not Detected	2.7	Not Detected
1,2-Dichloroethane	0.84	Not Detected	3.4	Not Detected
Heptane	0.84	Not Detected	3.4	Not Detected
Trichloroethene	0.84	Not Detected	4.5	Not Detected
1,2-Dichloropropane	0.84	Not Detected	3.9	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
Bromodichloromethane	0.84	Not Detected	5.6	Not Detected
cis-1,3-Dichloropropene	0.84	Not Detected	3.8	Not Detected
4-Methyl-2-pentanone	0.84	Not Detected	3.4	Not Detected
Toluene	0.84	Not Detected	3.2	Not Detected
trans-1,3-Dichloropropene	0.84	Not Detected	3.8	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-HAP

Lab ID#: 0905112A-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050907	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.68	Date of Analysis:	5/9/09 01:46 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	0.84	Not Detected	4.6	Not Detected
Tetrachloroethene	0.84	Not Detected	5.7	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Dibromochloromethane	0.84	Not Detected	7.2	Not Detected
1,2-Dibromoethane (EDB)	0.84	Not Detected	6.4	Not Detected
Chlorobenzene	0.84	Not Detected	3.9	Not Detected
Ethyl Benzene	0.84	Not Detected	3.6	Not Detected
m,p-Xylene	0.84	Not Detected	3.6	Not Detected
o-Xylene	0.84	Not Detected	3.6	Not Detected
Styrene	0.84	Not Detected	3.6	Not Detected
Bromoform	0.84	Not Detected	8.7	Not Detected
Cumene	0.84	Not Detected	4.1	Not Detected
1,1,2,2-Tetrachloroethane	0.84	Not Detected	5.8	Not Detected
Propylbenzene	0.84	Not Detected	4.1	Not Detected
4-Ethyltoluene	0.84	Not Detected	4.1	Not Detected
1,3,5-Trimethylbenzene	0.84	Not Detected	4.1	Not Detected
1,2,4-Trimethylbenzene	0.84	Not Detected	4.1	Not Detected
1,3-Dichlorobenzene	0.84	Not Detected	5.0	Not Detected
1,4-Dichlorobenzene	0.84	Not Detected	5.0	Not Detected
alpha-Chlorotoluene	0.84	Not Detected	4.3	Not Detected
1,2-Dichlorobenzene	0.84	Not Detected	5.0	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	25	Not Detected
Hexachlorobutadiene	3.4	Not Detected	36	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	100	70-130
4-Bromofluorobenzene	105	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-HAP

Lab ID#: 0905112A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050908	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.72	Date of Analysis:	5/9/09 03:14 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.86	Not Detected	4.2	Not Detected
Freon 114	0.86	Not Detected	6.0	Not Detected
Chloromethane	3.4	Not Detected	7.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Bromomethane	0.86	Not Detected	3.3	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.8	Not Detected
Ethanol	3.4	Not Detected	6.5	Not Detected
Freon 113	0.86	Not Detected	6.6	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Acetone	3.4	Not Detected	8.2	Not Detected
2-Propanol	3.4	Not Detected	8.4	Not Detected
Carbon Disulfide	0.86	Not Detected	2.7	Not Detected
3-Chloropropene	3.4	Not Detected	11	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
Methyl tert-butyl ether	0.86	Not Detected	3.1	Not Detected
trans-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Hexane	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.86	Not Detected	2.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Tetrahydrofuran	0.86	Not Detected	2.5	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.4	Not Detected
2,2,4-Trimethylpentane	0.86	Not Detected	4.0	Not Detected
Benzene	0.86	Not Detected	2.7	Not Detected
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Heptane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.6	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
4-Methyl-2-pentanone	0.86	Not Detected	3.5	Not Detected
Toluene	0.86	Not Detected	3.2	Not Detected
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-HAP

Lab ID#: 0905112A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050908	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.72	Date of Analysis:	5/9/09 03:14 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.8	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Dibromochloromethane	0.86	Not Detected	7.3	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.6	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	Not Detected	3.7	Not Detected
m,p-Xylene	0.86	Not Detected	3.7	Not Detected
o-Xylene	0.86	Not Detected	3.7	Not Detected
Styrene	0.86	Not Detected	3.7	Not Detected
Bromoform	0.86	Not Detected	8.9	Not Detected
Cumene	0.86	Not Detected	4.2	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	5.9	Not Detected
Propylbenzene	0.86	Not Detected	4.2	Not Detected
4-Ethyltoluene	0.86	Not Detected	4.2	Not Detected
1,3,5-Trimethylbenzene	0.86	Not Detected	4.2	Not Detected
1,2,4-Trimethylbenzene	0.86	Not Detected	4.2	Not Detected
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.4	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	99	70-130
1,2-Dichloroethane-d4	105	70-130
4-Bromofluorobenzene	102	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-HAP Lab Duplicate

Lab ID#: 0905112A-03AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050909	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.72	Date of Analysis:	5/9/09 04:22 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.86	Not Detected	4.2	Not Detected
Freon 114	0.86	Not Detected	6.0	Not Detected
Chloromethane	3.4	Not Detected	7.1	Not Detected
Vinyl Chloride	0.86	Not Detected	2.2	Not Detected
1,3-Butadiene	0.86	Not Detected	1.9	Not Detected
Bromomethane	0.86	Not Detected	3.3	Not Detected
Chloroethane	0.86	Not Detected	2.3	Not Detected
Freon 11	0.86	Not Detected	4.8	Not Detected
Ethanol	3.4	Not Detected	6.5	Not Detected
Freon 113	0.86	Not Detected	6.6	Not Detected
1,1-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Acetone	3.4	Not Detected	8.2	Not Detected
2-Propanol	3.4	Not Detected	8.4	Not Detected
Carbon Disulfide	0.86	Not Detected	2.7	Not Detected
3-Chloropropene	3.4	Not Detected	11	Not Detected
Methylene Chloride	0.86	Not Detected	3.0	Not Detected
Methyl tert-butyl ether	0.86	Not Detected	3.1	Not Detected
trans-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Hexane	0.86	Not Detected	3.0	Not Detected
1,1-Dichloroethane	0.86	Not Detected	3.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.86	Not Detected	2.5	Not Detected
cis-1,2-Dichloroethene	0.86	Not Detected	3.4	Not Detected
Tetrahydrofuran	0.86	Not Detected	2.5	Not Detected
Chloroform	0.86	Not Detected	4.2	Not Detected
1,1,1-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Cyclohexane	0.86	Not Detected	3.0	Not Detected
Carbon Tetrachloride	0.86	Not Detected	5.4	Not Detected
2,2,4-Trimethylpentane	0.86	Not Detected	4.0	Not Detected
Benzene	0.86	Not Detected	2.7	Not Detected
1,2-Dichloroethane	0.86	Not Detected	3.5	Not Detected
Heptane	0.86	Not Detected	3.5	Not Detected
Trichloroethene	0.86	Not Detected	4.6	Not Detected
1,2-Dichloropropane	0.86	Not Detected	4.0	Not Detected
1,4-Dioxane	3.4	Not Detected	12	Not Detected
Bromodichloromethane	0.86	Not Detected	5.8	Not Detected
cis-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected
4-Methyl-2-pentanone	0.86	Not Detected	3.5	Not Detected
Toluene	0.86	Not Detected	3.2	Not Detected
trans-1,3-Dichloropropene	0.86	Not Detected	3.9	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-HAP Lab Duplicate

Lab ID#: 0905112A-03AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050909	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.72	Date of Analysis:	5/9/09 04:22 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	0.86	Not Detected	4.7	Not Detected
Tetrachloroethene	0.86	Not Detected	5.8	Not Detected
2-Hexanone	3.4	Not Detected	14	Not Detected
Dibromochloromethane	0.86	Not Detected	7.3	Not Detected
1,2-Dibromoethane (EDB)	0.86	Not Detected	6.6	Not Detected
Chlorobenzene	0.86	Not Detected	4.0	Not Detected
Ethyl Benzene	0.86	Not Detected	3.7	Not Detected
m,p-Xylene	0.86	Not Detected	3.7	Not Detected
o-Xylene	0.86	Not Detected	3.7	Not Detected
Styrene	0.86	Not Detected	3.7	Not Detected
Bromoform	0.86	Not Detected	8.9	Not Detected
Cumene	0.86	Not Detected	4.2	Not Detected
1,1,2,2-Tetrachloroethane	0.86	Not Detected	5.9	Not Detected
Propylbenzene	0.86	Not Detected	4.2	Not Detected
4-Ethyltoluene	0.86	Not Detected	4.2	Not Detected
1,3,5-Trimethylbenzene	0.86	Not Detected	4.2	Not Detected
1,2,4-Trimethylbenzene	0.86	Not Detected	4.2	Not Detected
1,3-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,4-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
alpha-Chlorotoluene	0.86	Not Detected	4.4	Not Detected
1,2-Dichlorobenzene	0.86	Not Detected	5.2	Not Detected
1,2,4-Trichlorobenzene	3.4	Not Detected	26	Not Detected
Hexachlorobutadiene	3.4	Not Detected	37	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	103	70-130
4-Bromofluorobenzene	104	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0905112A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050905	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/9/09 12:01 PM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	2.0	Not Detected	4.1	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.50	Not Detected	1.9	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0905112A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050905	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/9/09 12:01 PM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	92	70-130
4-Bromofluorobenzene	101	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 0905112A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050902	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/9/09 09:00 AM

Compound	%Recovery
Freon 12	105
Freon 114	97
Chloromethane	100
Vinyl Chloride	102
1,3-Butadiene	95
Bromomethane	112
Chloroethane	104
Freon 11	97
Ethanol	93
Freon 113	99
1,1-Dichloroethene	101
Acetone	94
2-Propanol	97
Carbon Disulfide	95
3-Chloropropene	102
Methylene Chloride	92
Methyl tert-butyl ether	112
trans-1,2-Dichloroethene	101
Hexane	106
1,1-Dichloroethane	101
2-Butanone (Methyl Ethyl Ketone)	109
cis-1,2-Dichloroethene	104
Tetrahydrofuran	104
Chloroform	103
1,1,1-Trichloroethane	104
Cyclohexane	105
Carbon Tetrachloride	107
2,2,4-Trimethylpentane	106
Benzene	98
1,2-Dichloroethane	102
Heptane	105
Trichloroethene	101
1,2-Dichloropropane	100
1,4-Dioxane	100
Bromodichloromethane	104
cis-1,3-Dichloropropene	108
4-Methyl-2-pentanone	110
Toluene	102
trans-1,3-Dichloropropene	107

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 0905112A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050902	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/9/09 09:00 AM	

Compound	%Recovery
1,1,2-Trichloroethane	100
Tetrachloroethene	104
2-Hexanone	101
Dibromochloromethane	103
1,2-Dibromoethane (EDB)	103
Chlorobenzene	100
Ethyl Benzene	104
m,p-Xylene	105
o-Xylene	106
Styrene	108
Bromoform	108
Cumene	104
1,1,2,2-Tetrachloroethane	100
Propylbenzene	102
4-Ethyltoluene	103
1,3,5-Trimethylbenzene	102
1,2,4-Trimethylbenzene	100
1,3-Dichlorobenzene	101
1,4-Dichlorobenzene	100
alpha-Chlorotoluene	108
1,2-Dichlorobenzene	98
1,2,4-Trichlorobenzene	97
Hexachlorobutadiene	102

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	101	70-130
1,2-Dichloroethane-d4	103	70-130
4-Bromofluorobenzene	102	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0905112A-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050903	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/9/09 09:54 AM

Compound	%Recovery
Freon 12	82
Freon 114	93
Chloromethane	81
Vinyl Chloride	83
1,3-Butadiene	95
Bromomethane	92
Chloroethane	86
Freon 11	94
Ethanol	67
Freon 113	119
1,1-Dichloroethene	117
Acetone	103
2-Propanol	105
Carbon Disulfide	95
3-Chloropropene	112
Methylene Chloride	100
Methyl tert-butyl ether	114
trans-1,2-Dichloroethene	109
Hexane	108
1,1-Dichloroethane	108
2-Butanone (Methyl Ethyl Ketone)	112
cis-1,2-Dichloroethene	109
Tetrahydrofuran	105
Chloroform	105
1,1,1-Trichloroethane	98
Cyclohexane	103
Carbon Tetrachloride	97
2,2,4-Trimethylpentane	101
Benzene	100
1,2-Dichloroethane	100
Heptane	105
Trichloroethene	101
1,2-Dichloropropane	100
1,4-Dioxane	96
Bromodichloromethane	101
cis-1,3-Dichloropropene	106
4-Methyl-2-pentanone	108
Toluene	106
trans-1,3-Dichloropropene	108

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0905112A-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	x050903	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/9/09 09:54 AM

Compound	%Recovery
1,1,2-Trichloroethane	103
Tetrachloroethene	105
2-Hexanone	99
Dibromochloromethane	103
1,2-Dibromoethane (EDB)	100
Chlorobenzene	100
Ethyl Benzene	102
m,p-Xylene	103
o-Xylene	103
Styrene	105
Bromoform	104
Cumene	102
1,1,2,2-Tetrachloroethane	94
Propylbenzene	99
4-Ethyltoluene	99
1,3,5-Trimethylbenzene	97
1,2,4-Trimethylbenzene	92
1,3-Dichlorobenzene	94
1,4-Dichlorobenzene	92
alpha-Chlorotoluene	101
1,2-Dichlorobenzene	87
1,2,4-Trichlorobenzene	87
Hexachlorobutadiene	85

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	98	70-130

Air Toxics LTD.
Laboratory Services Since 1989

5/13/2009
Mr. Jeremy Klosinski
The Avogadro Group
2825 Verne Roberts Circle

Antioch CA 94509

Project Name: Panoche Energy Center
Project #: 09092
Workorder #: 0905112B

Dear Mr. Jeremy Klosinski

The following report includes the data for the above referenced project for sample(s) received on 5/5/2009 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-12 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner
Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 0905112B

Work Order Summary

CLIENT:	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509	**BILL TO:**	Mr. Jeremy Klosinski The Avogadro Group 2825 Verne Roberts Circle Antioch, CA 94509
PHONE:	925-680-4300	**P.O. #**	
FAX:	925-680-4416	**PROJECT #**	09092 Panoche Energy Center
DATE RECEIVED:	05/05/2009	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/13/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	1-HAP	Modified TO-12	6.8 "Hg	5 psi
02A	2-HAP	Modified TO-12	6.0 "Hg	5 psi
03A	3-HAP	Modified TO-12	6.6 "Hg	5 psi
04A	Lab Blank	Modified TO-12	NA	NA
05A	LCS	Modified TO-12	NA	NA

CERTIFIED BY: Linda L. Truman

DATE: 05/13/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Air Toxics Ltd.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-12
The Avogadro Group
Workorder# 0905112B

Three 6 Liter Summa Canister (100% Certified) samples were received on May 05, 2009. The laboratory performed analysis via modified EPA Method TO-12 for Total Non-Methane Organic Compounds (TNMOC). TNMOC was analyzed via GC/FID. The TNMOC results are calculated using the response of Heptane. The method involves concentrating up to 200 mL of air samples. The concentrated aliquot is then dry purged to remove water vapor prior to entering the chromatographic system. Method TO-12 is intended to be applied to ambient air samples only, therefore, matrices that are highly contaminated with Methane may produce biased results. See the data sheets for the reporting limit for TNMOC.

Requirement	*Method TO-12*	*ATL Modifications*
Reporting Limit	0.02 ppmc	0.010 ppmv
Calibration Standard	Propane	Heptane
Reported Units	Ppmc	Ppmv
Initial Calibration	Five levels - each level three runs with % RSD < 3 %; Linearity criterion not specified.	Minimum of three levels; % RSD </= 30 %.
Sample Analysis Frequency	Duplicate analysis with RPD <5 %, report average results of two analyses.	Single analysis. Duplicate 10 % of samples with RPD </= 25% for detections > 5 X's the RL.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Six qualifiers may have been used on the Analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated Peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-12 GC/FID

Client Sample ID: 1-HAP

Lab ID#: 0905112B-01A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.017	0.020

Client Sample ID: 2-HAP

Lab ID#: 0905112B-02A

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.017	0.028

Client Sample ID: 3-HAP

Lab ID#: 0905112B-03A

No Detections Were Found.

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 1-HAP

Lab ID#: 0905112B-01A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d051114	Date of Collection:	4/28/09 1/1/1990
Dil. Factor:	1.73	Date of Analysis:	5/11/09 06:04 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.017	0.020

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 2-HAP

Lab ID#: 0905112B-02A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d051115	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.68	Date of Analysis:	5/11/09 06:48 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.017	0.028

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: 3-HAP

Lab ID#: 0905112B-03A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d051116	Date of Collection:	4/29/09 1/1/1990
Dil. Factor:	1.72	Date of Analysis:	5/11/09 07:23 PM

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.017	Not Detected

Container Type: 6 Liter Summa Canister (100% Certified)

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0905112B-04A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d051103	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/11/09 09:35 AM	

Compound	Rpt. Limit (ppmv)	Amount (ppmv)
TNMOC ref. to Heptane (MW=100)	0.010	Not Detected

Container Type: NA - Not Applicable

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0905112B-05A

MODIFIED EPA METHOD TO-12 GC/FID

File Name:	d051120	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/11/09 10:10 PM

Compound	%Recovery
Heptane	103

Container Type: NA - Not Applicable

Appendix E.7

Fuel and Sulfur Dioxide Lab Data

FUEL F-FACTOR CALCULATIONS

Panoche Energy Center Unit #3

5/1/09

SPECIES	MW	MOLE %	MW*%	HHV	BTU/SCF	C	H	O	N
C_1	16	96.263	1544.3	1012.00	974.18	11.55	3.85	0.00	0.00
C_2	30	1.570	47.21	1773.00	27.84	0.38	0.09	0.00	0.00
C_3	44	0.320	14.11	2524.00	8.08	0.12	0.03	0.00	0.00
ISO C_4	58	0.057	3.31	3271.00	1.86	0.03	0.01	0.00	0.00
N-C_4	58	0.056	3.25	3271.00	1.83	0.03	0.01	0.00	0.00
ISO C_5	72	0.018	1.30	3998.00	0.72	0.01	0.00	0.00	0.00
N-C_5	72	0.012	0.86	3998.00	0.48	0.01	0.00	0.00	0.00
C_{6+}	86	0.012	1.03	4743.00	0.57	0.01	0.00	0.00	0.00
CO	28	0.000	0.00	321.00	0.00	0.00	0.00	0.00	0.00
CO_2	44	1.391	61.22	--	--	0.17	0.00	0.45	0.00
H_2O	18	0.000	0.00	--	--	0.00	0.00	0.00	0.00
N_2	28	0.301	8.43	--	--	0.00	0.00	0.00	0.08
O_2	32	0.000	0.00	--	--	0.00	0.00	0.00	0.00
Ave. / Total		100.00	1685.04		1015.56	12.29	3.99	0.45	0.08
Weight, %		99.75		=		72.94	23.66	2.64	0.50

Gas MW	16.85	
Btu/scf=	1015.56	@ 60 F
Btu/lb.=	22,872	
lb./scf=	0.0444	
Fd"(60)=	8,464.7	(O_2 Based)
Fd"(68)=	8,594.9	
Fc"(60)=	1,008.2	(CO_2 Based)
Fc"(68)=	1,023.7	

Calculations:

Fd"(68) = 10^6 * [3.64 * (H%) + 1.53 * (C%) + 0.14 * (N%) - 0.46 * (O%)] / HHV, Btu/lb

Fd"(60) = Fd"(68) * 520 R / 528 R

Fc"(68) = 10^6 * [0.321 * (C%)] / HHV, Btu/lb

Fc"(60) = Fc"(68) * 520 R / 528 R

FUEL F-FACTOR CALCULATIONS

Panoche Energy Center Unit #4

5/1/09

SPECIES	MW	MOLE %	MW*%	HHV	BTU/SCF	C	H	O	N
C_1	16	96.303	1545.0	1012.00	974.59	11.56	3.85	0.00	0.00
C_2	30	1.557	46.82	1773.00	27.61	0.37	0.09	0.00	0.00
C_3	44	0.312	13.76	2524.00	7.87	0.11	0.02	0.00	0.00
ISO C_4	58	0.055	3.19	3271.00	1.80	0.03	0.01	0.00	0.00
N-C_4	58	0.054	3.13	3271.00	1.77	0.03	0.01	0.00	0.00
ISO C_5	72	0.018	1.30	3998.00	0.72	0.01	0.00	0.00	0.00
N-C_5	72	0.012	0.86	3998.00	0.48	0.01	0.00	0.00	0.00
C_{6+}	86	0.012	1.03	4743.00	0.57	0.01	0.00	0.00	0.00
CO	28	0.000	0.00	321.00	0.00	0.00	0.00	0.00	0.00
CO_2	44	1.343	59.11	--	--	0.16	0.00	0.43	0.00
H_2O	18	0.000	0.00	--	--	0.00	0.00	0.00	0.00
N_2	28	0.334	9.36	--	--	0.00	0.00	0.00	0.09
O_2	32	0.000	0.00	--	--	0.00	0.00	0.00	0.00
Ave. / Total		100.00	1683.52		1015.40	12.28	3.99	0.43	0.09
Weight, %		99.75		=		72.96	23.68	2.55	0.56

Gas MW	16.84	
Btu/scf=	1015.40	@ 60 F
Btu/lb.=	22,889	
lb./scf=	0.0444	
Fd"(60)=	8,464.5	(O_2 Based)
Fd"(68)=	8,594.7	
Fc"(60)=	1,007.7	(CO_2 Based)
Fc"(68)=	1,023.2	

Calculations:

Fd"(68) = 10^6 * [3.64 * (H%) + 1.53 * (C%) + 0.14 * (N%) - 0.46 * (O%)] / HHV, Btu/lb

Fd"(60) = Fd"(68) * 520 R / 528 R

Fc"(68) = 10^6 * [0.321 * (C%)] / HHV, Btu/lb

Fc"(60) = Fc"(68) * 520 R / 528 R

Certificate of Analysis

SINCE 1985

Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kiewit Industrial Co.	REQUESTED BY:	Mr. John Martin
SAMPLE:	Gas Sample Test # 2 CTG # 4 Sample # 1 Cylinder # 3064 04/30/09 12:40 (Firebaugh, CA)	REPORT DATE:	May 1, 2009
LABORATORY NO:	55022-02	PURCHASE ORDER NO:	Pending

TEST RESULTS

Composition of Natural Gas by Gas Chromatography, ASTM D 1945:

TEST	*Mol %*
Nitrogen	0.368
Hydrogen	0.000
Oxygen / Argon	0.000
Carbon monoxide	0.000
Carbon dioxide	1.349
Methane	96.263
Ethane	1.562
Propane	0.308
Iso-butane	0.055
N-butane	0.054
Iso-Pentane	0.018
N-pentane	0.011
Hexanes Plus	0.012
TOTAL	100.000

Caloric Value and Specific Gravity of Gases, ASTM D 3588:

Specific Gravity at 60°F (air=1)	0.5815

Calculated B.T.U./cu.ft. @ 14.696 psia and 60°F

NET (Dry basis)	912.3
Gross (Dry basis)	1,012.9

Calculated B.T.U./lb.

NET (Dry basis)	20,558.6
Gross (Dry basis)	22,826.9

Respectfully submitted
FOR TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

These analyses, opinions or interpretations are based on material supplied by the client to whom, and for whose exclusive and confidential use this report is made. Texas Oiltech Laboratories, Inc. and its officers assume no responsibility and make no warranty for proper operations of any petroleum, oil, gas or any other material in connection with which this report is used or relied on.

Cert. No. 5085

Certificate of Analysis

SINCE 1985

Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kiewit Industrial Co.	REQUESTED BY:	Mr. John Martin
SAMPLE:	Gas Sample Test # 3 CTG # 3 Sample # 1 Cylinder # 3071 04/29/09 05:31 (Firebaugh, CA)	REPORT DATE:	May 1, 2009
LABORATORY NO:	55022-04	PURCHASE ORDER NO:	Pending

TEST — RESULTS

Composition of Natural Gas by Gas Chromatography, ASTM D 1945:

TEST	*Mol %*
Nitrogen	0.377
Hydrogen	0.000
Oxygen / Argon	0.000
Carbon monoxide	0.000
Carbon dioxide	1.366
Methane	96.217
Ethane	1.565
Propane	0.321
Iso-butane	0.056
N-butane	0.056
Iso-Pentane	0.018
N-pentane	0.012
Hexanes Plus	0.012
TOTAL	100.000

Caloric Value and Specific Gravity of Gases, ASTM D 3588:

Specific Gravity at 60°F (air=1)	0.5819

Calculated B.T.U./cu.ft. @ 14.696 psia and 60°F

NET (Dry basis)	912.4
Gross (Dry basis)	1,013.0

Calculated B.T.U./lb.

NET (Dry basis)	20,545.6
Gross (Dry basis)	22,812.2

Respectfully submitted
FOR TEXAS OILTECH LABORATORIES, L.P.

A. Phil Soru Bakhsh
Director of Laboratory Operations

ASTM INTERNATIONAL

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Certificate of Analysis

SINCE 1985

Quality Controlled Through Analysis

10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kiewit Industrial Co.	REQUESTED BY:	Mr. John Martin
SAMPLE:	Gas Sample Test # 1 CTG # 4 Sample # 1 Cylinder # 2537 04/30/09 11:15 (Firebaugh, CA)	REPORT DATE:	May 1, 2009
LABORATORY NO:	55022-01	PURCHASE ORDER NO:	Pending

TEST RESULTS

Composition of Natural Gas by Gas Chromatography, ASTM D 1945:

TEST	*Mol %*
Nitrogen	0.334
Hydrogen	0.000
Oxygen / Argon	0.000
Carbon monoxide	0.000
Carbon dioxide	1.343
Methane	96.303
Ethane	1.557
Propane	0.312
Iso-butane	0.055
N-butane	0.054
Iso-Pentane	0.018
N-pentane	0.012
Hexanes Plus	0.012
TOTAL	100.000

Caloric Value and Specific Gravity of Gases, ASTM D 3588:

Specific Gravity at 60°F (air=1)	0.5814

Calculated B.T.U./cu.ft. @ 14.696 psia and 60°F

NET (Dry basis)	912.7
Gross (Dry basis)	1,013.4

Calculated B.T.U./lb.

NET (Dry basis)	20,573.5
Gross (Dry basis)	22,843.4

Total Sulfur by Microcoulometer, ASTM D 3246, ppm	<1.0

Respectfully submitted
FOR TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

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P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kiewit Industrial Co.	REQUESTED BY:	Mr. John Martin
SAMPLE:	Gas Sample Test # 3 CTG # 3 Sample # 1 Cylinder # 2195 04/29/09 03:50 (Firebaugh, CA)	REPORT DATE:	May 1, 2009
LABORATORY NO:	55022-03	PURCHASE ORDER NO:	Pending

TEST — RESULTS

Composition of Natural Gas by Gas Chromatography, ASTM D 1945:

TEST	*Mol %*
Nitrogen	0.301
Hydrogen	0.000
Oxygen / Argon	0.000
Carbon monoxide	0.000
Carbon dioxide	1.391
Methane	96.263
Ethane	1.570
Propane	0.320
Iso-butane	0.057
N-butane	0.056
Iso-Pentane	0.018
N-pentane	0.012
Hexanes Plus	0.012
TOTAL	100.000

Caloric Value and Specific Gravity of Gases, ASTM D 3588:

Specific Gravity at 60°F (air=1)	0.5819

Calculated B.T.U./cu.ft. @ 14.696 psia and 60°F

NET (Dry basis)	912.8
Gross (Dry basis)	1,013.5

Calculated B.T.U./lb.

NET (Dry basis)	20,558.1
Gross (Dry basis)	22,826.1

Total Sulfur by Microcoulometer, ASTM D 3246, ppm	<1.0

Respectfully submitted
FOR TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

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P.O. BOX 741905, HOUSTON, TEXAS 77274

TEL: (281) 495-2400
FAX: (281) 495-2410

CLIENT:	Kiewit Industrial Co.	REQUESTED BY:	Mr. John Martin
SAMPLE:	Multiple Samples	REPORT DATE:	June 8, 2009
LABORATORY NO:	55425	PURCHASE ORDER NO:	Pending

TEST RESULTS

Lab No.	Sample ID.	Total Sulfur Content by Microcoulometer, ASTM D 3246, ppm
55425-01	CTG # 1 Test 4 Sample #3 Cylinder # 1314 05/02/09 05:00	<1.0
55425-02	CTG # 2 Test 4 Sample #3 Cylinder # 3065 05/02/09 01:50	<1.0

Respectfully submitted
FOR TEXAS OILTECH LABORATORIES, L.P.

A. Phil Sorurbakhsh
Director of Laboratory Operations

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APPENDIX F

EMMISION CALCULATIONS

Appendix F.1

General Emission Calculations

EMISSION CALCULATIONS

1. Volumetric Flow and Isokinetics

a. Standard sample gas volume, dscf

$$V_{m\,std} = (0.03342)(V_m)\left[P_{bar} + \left(\frac{\Delta H}{13.6}\right)\right]\left(\frac{T_{ref}}{T_m}\right)(Y)$$

b. Water vapor volume, scf

$$V_{w\,std} = (0.0472)(V_{lc})\left(\frac{T_{ref}}{528\ ^{\circ}R}\right)$$

c. Moisture content, nondimensional

$$B_{ws} = \left(\frac{V_{w\,std}}{(V_{m\,std} + V_{w\,std})}\right)$$

d. Stack gas molecular weight, lb/lb mole (dry)

$$MW_{dry} = [0.44\,(\%\ CO_2)] + [0.32\,(\%\ O_2)] + [0.28\,(\%\ N_2)]$$

e. Stack gas molecular weight, lb/lb mole (wet)

$$MW_{wet} = [MW_{dry}\,(1 - B_{ws})] + [18\,(B_{ws})]$$

f. Absolute stack pressure, in Hg

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

g. Stack velocity, ft/sec

$$V_s = (2.90)(C_p)\sqrt{(\Delta P)(T_s)}\ \sqrt{\left(\frac{29.92}{P_s}\right)\left(\frac{28.95}{MW_{wet}}\right)}$$

h. Actual stack flow rate, acfm

$$Q = (V_s)(A_s)(60\ min/hr)$$

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (Q)\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (Q)(1 - B_{ws})\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

k. Percent isokinetic

$$I = \left(\frac{(17.32)(T_s)(V_{m\,std})}{(1 - B_{ws})(\Theta)(V_s)(P_s)(D_n^2)}\right)\left(\frac{528\ ^{\circ}R}{T_{ref}}\right)$$

2. Gaseous Emissions

a. Concentration, ppm volume wet (i.e. to calculate wet ppm from dry ppm)

$$C_w = (C)(1 - B_{ws})$$

b. Concentration, ppm @ 3% O_2 dry

$$C_3 = (C)\left[\frac{(20.9 - 3.0)}{(20.9 - \%\ O_2)}\right]$$

c. Concentration, ppm @ 12% CO_2 dry

$$C_{12} = (C)\left(\frac{12.0}{\%\ CO_2}\right)$$

d. Concentration, ppm volume dry (i.e. to calculate dry ppm from wet ppm)

$$C = \left[\frac{C_w}{(1 - B_{ws})}\right]$$

e. Mass emission rate, lb/hr

$$M = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})\,(60\ min/hr)$$

where,

SV = specific molar volume of an ideal gas:

$SV = 379.5\ ft^3/lb\ mole\ for\ T_{ref} = 520\ °R$ (60 °F)

$SV = 383.1\ ft^3/lb\ mole\ for\ T_{ref} = 525\ °R$ (65 °F)

$SV = 385.3\ ft^3/lb\ mole\ for\ T_{ref} = 528\ °R$ (68 °F)

$SV = 386.8\ ft^3/lb\ mole\ for\ T_{ref} = 530\ °R$ (70 °F)

$$SV = (379.5)\left[\frac{(460 + (T_{ref}\ °F))}{520}\right]$$ at different reference temperatures

$°R = °F + 460$ (to convert reference temperature in $°F$ to $°R$, add 460)

f. Emission rate, lb/MMBtu

$$E = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(F_d)\left(\frac{20.9}{20.9 - \%\ O_2}\right)$$

g. Mass emission rate, grams/bhp-hr

$$M_j = (M)\left(\frac{453.59\ g/lb}{J}\right)$$

3. Particulate Emissions

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

b. Grain loading corrected to 12% CO_2, gr/dscf @ 12% CO_2

$$G_{12} = (G)\left(\frac{12.0}{\%\,CO_2}\right)$$

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\,O_2}\right)$$

4. <u>Fuel Factor "F"</u>

a. Choice #1 – use the values for Fd provided in Method 19, Table 19-1
Choice #2 – if you have fuel ultimate and proximate analysis, calculate Fd
(need fuel weight %CHONS, HHV)
Stoichiometric fuel factor at 68 °F, dscf/MMBtu at 0% O_2:

$$F_d = \frac{(10^6)\left[3.64\,(\%H) + 1.53\,(\%C) + 0.14\,(\%N) + 0.57\,(\%S) - 0.46\,(\%\,O)\right]}{HHV,\ Btu/lb}$$

b. Fuel factor at 60 °F (use if all your volumes and flows are at 60 °F)

$$F_{d60} = F_d\left(\frac{520^\circ R}{528^\circ R}\right)$$

5. Miscellaneous Equations

a. Standard stack gas flow rate, calculated from fuel flow and F factor, dscfm

Note: Q_f and HHV need to be in units of either lb/hr and Btu/lb, or scf/hr and *Btu/scf. Do not mix units!*

(calculation based on stack $\%O_2$)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_d)\left(\frac{20.9}{(20.9 - O_2)}\right) / (60\ min/hr)$$

or (calculation based on stack $\%CO_2$ – see EPA Method 19 for values of F_c)

$$Q_{ds} = (Q_f)(HHV)(10^{-6})(F_c)\left(\frac{100}{CO_2}\right) / (60\ min/hr)$$

b. Destruction efficiency of emission control device, %

$$EFF = \left(\frac{C_{in} - C_{out}}{C_{in}}\right)(100)$$ based on concentrations

or

$$EFF = \left(\frac{M_{in} - M_{out}}{M_{in}}\right)(100)$$ based on mass emission rates

c. Cylinder gas audit, % accuracy

$$A_c = \left(\frac{(C_m - C_a)}{C_a}\right)(100)$$

Nomenclature:

A_c	=	accuracy of CEMS during cylinder gas audit (CGA), % difference
A_s	=	stack area, ft^2 (πr^2), where $\pi = 3.1416$ and r = radius (½ diameter) in feet
B_{ws}	=	flue gas moisture content (multiply by 100 for % by volume)
C	=	concentration of gaseous species, ppm volume dry
C_a	=	concentration of audit gas, ppm (for CGA, equation 5c)
C_m	=	concentration measured by CEMS, ppm (for CGA, equation 5c)
C_p	=	calibration factor for pitot tube, dimensionless
C_w	=	concentration of gaseous species, ppm volume wet
C_3	=	corrected concentration of gaseous species, ppm @ 3% O_2 dry
C_{12}	=	corrected concentration of gaseous species, ppm @ 12% CO_2 dry
CO_2	=	carbon dioxide content of stack gas, % volume dry
D_n	=	nozzle diameter, inches (inches = millimeters / 2.54 / 10)
E	=	mass emission rate, lb/MMBtu
EFF	=	destruction or removal efficiency of emission control device, % efficiency
F_c	=	stoichiometric "F" factor of fuel based on CO_2, dscf/MMBtu @ 100% CO_2
F_d	=	stoichiometric "F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2
G	=	particulate matter grain loading, grains/dscf
G_{12}	=	corrected particulate matter grain loading, grains/dscf @ 12% CO_2
G_m	=	mass of collected particulate matter, mg
ΔH	=	meter orifice pressure differential, inches of water, gauge (iwg)
HHV	=	higher heating value of fuel, Btu/lb or Btu/scf
I	=	% isokinetic sampling rate, %
J	=	brake horsepower, bhp
M_j	=	mass emission rate of measured species (s), g/hp-hr
M	=	mass emission rate, lb/hr
MW_{dry}	=	molecular weight of stack gas, dry basis
MW_{wet}	=	molecular weight of stack gas, wet basis

MW_s = molecular weight of gaseous species (s), lb/lb mole:

CO	:	28.01	(can use 28)
NO_x as NO_2	:	46.01	(can use 46)
SO_x as SO_2	:	64.06	(can use 64)
Hydrocarbons as C	:	12.01	(can use 12)
Hydrocarbons as CH_4	:	16.04	(can use 16)
Hydrocarbons as C_3H_8	:	44.10	(can use 44)
NH_3	:	17.03	(can use 17)

N_2 = nitrogen content of stack gas, % volume dry
(usually determined by difference, N_2 = 100 - % O_2 - % CO_2)

Θ = sampling time, minutes

O_2 = oxygen content of stack gas, % volume dry

ΔP = average pitot tube differential pressure, root mean square (RMS), iwg
(average the square roots of the delta p's, then square the result = $\left(\overline{\sqrt{\Delta P}}\right)^2$)

P_{bar} = barometric pressure, in. Hg

P_s = stack absolute pressure, in. Hg

P_{sg} = stack static pressure, inches of water, gauge (iwg)

Q = wet stack gas flow rate at actual conditions, acfm

Q_f = fuel flow rate, scfh or lb/hr (be careful of units)

Q_{ds} = dry stack gas flow rate at standard conditions, dscfm

Q_{ws} = wet stack gas flow rate at standard conditions, wscfm

$°R$ = absolute temperature in Rankin degrees (°F plus 460)

SV = specific molar volume of an ideal gas at standard conditions, ft^3/lb mole

T_m = meter temperature, °R

T_{ref} = reference temperature, °R

T_s = stack gas temperature, °R

V_s = stack gas velocity, ft/sec

V_{lc} = volume of liquid collected in impingers, ml

V_m = dry meter volume uncorrected, acf

$V_{m\,std}$ = dry meter volume corrected to standard conditions, dscf

$V_{w\,std}$ = volume of water vapor at standard conditions, scf

Y = meter calibration coefficient, dimensionless

Appendix F.2

Nitrogen Oxide and Carbon Monoxide Spreadsheets

PANOCHE ENERGY CENTER
TURBINE 1
EMISSION COMPLIANCE TESTS

Test No.	Run 1	Run 2	Run 3	AVERAGE
Date	4/30/09	4/30/09	4/30/09	--
Time	1714-1755	1809-1843	1852-1926	--
Standard Temperature (Tref °F)	60	60	60	60
Barometric Press. (in. Hg)	29.49	29.49	29.49	29.49
Unit Fuel Flow (scfh) @ 60 °F	872,300	872,900	872,900	872,700
"F_d" factor (dscf/MMBtu) @ 68 °F	8,595	8,595	8,595	8,595
"F_d" factor (dscf/MMBtu) @ Tref °F	8,465	8,465	8,465	8,465
HHV (btu/scf) @ 60 °F	1,015	1,015	1,015	1,015
Stack Flow - based on F_d (dscfm)	337,800	338,033	337,596	337,810
O_2, % volume dry	13.17	13.17	13.16	13.17
CO_2, % volume dry	4.58	4.57	4.56	4.57
CO, ppm volume dry	4.2	2.8	2.3	3.1
CO, ppm @ 15% O_2	3.2	2.1	1.7	2.4
CO, lb/hr	6.30	4.16	3.40	4.62
CO, lb/MMBtu	0.007	0.005	0.004	0.005
NO_X, ppm volume dry	2.8	2.5	2.4	2.6
NO_X, ppm @ 15% O_2	2.1	1.9	1.8	2.0
NO_X, lb/hr as NO_2	6.79	6.22	5.89	6.30
NO_X, lb/MMBtu as NO_2	0.008	0.007	0.007	0.007
SO_X, gr/100scf (from fuel)	0.059	0.059	0.059	0.059
SO_X, ppm volume dry	0.0	0.0	0.0	0.0
SO_X, ppm @ 15% O_2	0.0	0.0	0.0	0.0
SO_X, lb/hr as SO_2	0.15	0.15	0.15	0.15
SO_X, lb/MMBtu as SO_2	0.000	0.000	0.000	0.000

PANOCHE ENERGY CENTER
TURBINE 2
EMISSION COMPLIANCE TESTS

Test No.	Run 1	Run 2	Run 3	AVERAGE
Date	4/27/09	4/27/09	4/27/09	--
Time	1053-1135	1157-1227	1236-1306	--
Standard Temperature (Tref °F)	60	60	60	60
Barometric Press. (in. Hg)	29.40	29.40	29.40	29.40
Unit Fuel Flow (scfh) @ 60 °F	887,800	889,400	888,100	888,433
"F_d" factor (dscf/MMBtu) @ 68 °F	8,595	8,595	8,595	8,595
"F_d" factor (dscf/MMBtu) @ Tref °F	8,465	8,465	8,465	8,465
HHV (btu/scf) @ 60 °F	1,015	1,015	1,015	1,015
Stack Flow - based on F_d (dscfm)	341,857	342,649	340,833	341,780
O_2, % volume dry	13.13	13.13	13.10	13.12
CO_2, % volume dry	4.68	4.59	4.59	4.62
CO, ppm volume dry	0.6	0.3	0.4	0.4
CO, ppm @ 15% O_2	0.4	0.2	0.3	0.3
CO, lb/hr	0.85	0.45	0.55	0.61
CO, lb/MMBtu	0.001	0.000	0.001	0.001
NO_X, ppm volume dry	2.8	2.8	3.1	2.9
NO_X, ppm @ 15% O_2	2.1	2.1	2.3	2.2
NO_X, lb/hr as NO_2	6.92	6.98	7.57	7.16
NO_X, lb/MMBtu as NO_2	0.008	0.008	0.008	0.008
SO_X, gr/100scf (from fuel)	0.0591	0.0591	0.0591	0.0591
SO_X, ppm volume dry	0.0	0.0	0.0	0.0
SO_X, ppm @ 15% O_2	0.0	0.0	0.0	0.0
SO_X, lb/hr as SO_2	0.15	0.15	0.15	0.15
SO_X, lb/MMBtu as SO_2	0.000	0.000	0.000	0.000

PANOCHE ENERGY CENTER
TURBINE 3
EMISSION COMPLIANCE TESTS

Test No.	Run 1	Run 2	Run 3	AVERAGE
Date	4/23/09	4/23/09	4/23/09	--
Time	1010-1040	1100-1130	1145-1215	--
Standard Temperature (Tref °F)	60	60	60	60
Barometric Press. (in. Hg)	29.31	29.31	29.31	29.31
Unit Fuel Flow (scfh) @ 60 °F	880,000	880,700	881,500	880,733
"F_d" factor (dscf/MMBtu) @ 68 °F	8,595	8,595	8,595	8,595
"F_d" factor (dscf/MMBtu) @ Tref °F	8,465	8,465	8,465	8,465
HHV (btu/scf) @ 60 °F	1,015	1,015	1,015	1,015
Stack Flow - based on F_d (dscfm)	339,465	337,560	337,434	338,153
O_2, % volume dry	13.14	13.09	13.08	13.10
CO_2, % volume dry	4.57	4.61	4.62	4.60
CO, ppm volume dry	1.0	0.9	1.4	1.1
CO, ppm @ 15% O_2	0.8	0.7	1.1	0.9
CO, lb/hr	1.53	1.40	2.16	1.70
CO, lb/MMBtu	0.002	0.002	0.002	0.002
NO_X, ppm volume dry	2.9	2.9	3.0	2.9
NO_X, ppm @ 15% O_2	2.2	2.2	2.2	2.2
NO_X, lb/hr as NO_2	7.27	7.14	7.29	7.23
NO_X, lb/MMBtu as NO_2	0.008	0.008	0.008	0.008
SO_X, gr/100scf (from fuel)	0.0591	0.0591	0.0591	0.0591
SO_X, ppm volume dry	0.0	0.0	0.0	0.0
SO_X, ppm @ 15% O_2	0.0	0.0	0.0	0.0
SO_X, lb/hr as SO_2	0.15	0.15	0.15	0.15
SO_X, lb/MMBtu as SO_2	0.000	0.000	0.000	0.000

PANOCHE ENERGY CENTER
TURBINE 4
EMISSION COMPLIANCE TESTS

Test No.	Run 1	Run 2	Run 3	AVERAGE
Date	4/24/09	4/24/09	4/24/09	--
Time	0915-0945	1009-1039	1100-1130	--
Standard Temperature (Tref °F)	60	60	60	60
Barometric Press. (in. Hg)	29.46	29.46	29.46	29.46
Unit Fuel Flow (scfh) @ 60 °F	875,900	863,300	861,500	866,900
"F_d" factor (dscf/MMBtu) @ 68 °F	8,595	8,595	8,595	8,595
"F_d" factor (dscf/MMBtu) @ Tref °F	8,465	8,465	8,465	8,465
HHV (btu/scf) @ 60 °F	1,015	1,015	1,015	1,015
Stack Flow - based on F_d (dscfm)	346,364	340,482	339,772	342,206
O_2, % volume dry	13.33	13.31	13.31	13.32
CO_2, % volume dry	4.49	4.49	4.51	4.50
CO, ppm volume dry	1.1	0.4	0.4	0.6
CO, ppm @ 15% O_2	0.8	0.3	0.3	0.5
CO, lb/hr	1.64	0.59	0.61	0.95
CO, lb/MMBtu	0.002	0.001	0.001	0.001
NO_X, ppm volume dry	2.8	3.5	2.9	3.1
NO_X, ppm @ 15% O_2	2.2	2.8	2.3	2.4
NO_X, lb/hr as NO_2	6.98	8.77	7.27	7.67
NO_X, lb/MMBtu as NO_2	0.008	0.010	0.008	0.009
SO_X, gr/100scf (from fuel)	0.0591	0.0591	0.0591	0.0591
SO_X, ppm volume dry	0.0	0.0	0.0	0.0
SO_X, ppm @ 15% O_2	0.0	0.0	0.0	0.0
SO_X, lb/hr as SO_2	0.15	0.15	0.15	0.15
SO_X, lb/MMBtu as SO_2	0.000	0.000	0.000	0.000

Appendix F.3

Start-up / Shutdown Spreadsheets

Panoche Unit 2
Startup 1
4-28-09

Fuel Fd 8465 dscf/MMBTU @ 0% O2
Fuel HHV 1015 BTU/scf

CEM Data Corrected for Calibrations

Time	O2 %	CO2 %	CO ppm	NOx ppm	THC ppm	NMNEHC fraction	CO ppmc 15%	NOx ppmc 15%	Raw Fuel Flow kscfh	Stack Flow dscfm		Total lb emitted each minute: CO	NOx as NO2	THC as CH4	NMNEHC as CH4
												Begin Startup			
9:03:54	20.83	0.09	0.30	0.00	0.65	1.0000	25.64	0.00	0.0	*50,000*		0.001	0.000	0.001	0.001
9:04:55	20.59	0.22	13.85	0.13	0.65	1.0000	266.16	2.50	149.9	*100,000*		0.101	0.002	0.003	0.003
9:05:55	17.29	2.17	121.31	10.98	0.65	1.0000	198.50	17.96	128.2	106,408		0.938	0.139	0.003	0.003
9:06:56	16.52	2.65	17.71	18.08	0.65	1.0000	23.83	24.33	143.1	97,684		0.126	0.211	0.003	0.003
9:07:54	16.38	2.72	2.97	21.62	0.65	1.0000	3.87	28.22	384.8	254,804		0.055	0.658	0.007	0.007
9:08:54	15.07	3.46	0.89	37.23	0.65	1.0000	0.90	37.66	745.8	382,728		0.025	1.701	0.010	0.010
9:09:55	13.59	4.25	0.40	36.75	0.65	1.0000	0.32	29.68	880.0	360,497		0.010	1.582	0.010	0.010
9:10:55	13.02	4.56	6.04	37.89	0.65	1.0000	4.52	28.35	881.8	334,756		0.147	1.514	0.009	0.009
9:11:54	12.95	4.60	12.17	36.32	0.65	1.0000	9.03	26.96	882.0	332,127		0.294	1.440	0.009	0.009
9:12:54	13.01	4.61	5.54	33.99	0.65	1.0000	4.14	25.42	881.6	334,467		0.135	1.357	0.009	0.009
9:13:55	13.21	4.61	0.89	32.79	0.65	1.0000	0.68	25.15	883.0	343,562		0.022	1.345	0.009	0.009
9:14:55	13.24	4.61	0.49	31.28	0.65	1.0000	0.38	24.08	883.0	344,821		0.012	1.288	0.009	0.009
9:15:56	13.25	4.60	0.30	11.67	0.65	1.0000	0.23	8.99	883.0	345,273		0.007	0.481	0.009	0.009
9:16:56	13.25	4.60	0.20	2.67	0.65	1.0000	0.15	2.06	882.2	345,096		0.005	0.110	0.009	0.009
9:17:51	13.25	4.60	0.10	1.86	0.65	1.0000	0.08	1.43	882.2	345,232		0.002	0.077	0.009	0.009
									632.7			**Startup Complete**			
				Startup Complete		*15* min		**Avg. Flow dscfm**		271,830					
											Total lb emitted:	**1.88**	**11.90**	**0.11**	**0.11**
											lb/hr emission rate:	**7.522**	**47.62**	**0.440**	**0.440**

Panoche Unit 2
Startup 6
4-28-09

Fuel Fd 8710 dscf/MMBTU @ 0% O2
Fuel HHV 1015 BTU/scf

CEM Data Corrected for Calibrations

Time	O2 %	CO2 %	CO ppm	NOx ppm	THC ppm	NMNEHC fraction	CO ppmc	NOx ppmc	Raw Fuel Flow kscfh	Stack Flow dscfm		Total lb emitted each minute: CO	NOx as NO2	THC as CH4	NMNEHC as CH4
											Begin Startup				
11:53:01	20.86	0.13	0.49	0.00	0.65	1.0000	82.94	0.00	*73.4*	*50,000*		0.002	0.000	0.001	0.001
11:54:02	20.52	0.33	3.56	0.10	0.65	1.0000	54.97	1.54	146.7	*100,000*		0.026	0.001	0.003	0.003
11:55:02	17.15	2.32	33.05	8.48	0.65	1.0000	51.99	13.34	128.3	105,352		0.253	0.107	0.003	0.003
11:56:03	16.51	2.71	6.13	11.19	0.65	1.0000	8.24	15.03	129.5	90,814		0.040	0.121	0.002	0.002
11:57:01	16.43	2.75	1.48	14.49	0.65	1.0000	1.96	19.15	294.3	202,951		0.022	0.351	0.005	0.005
11:58:02	15.36	3.36	0.79	28.14	0.65	1.0000	0.84	29.99	629.1	350,006		0.020	1.176	0.009	0.009
11:59:02	13.93	4.20	0.49	35.65	0.65	1.0000	0.42	30.18	878.4	388,167		0.014	1.652	0.010	0.010
12:00:03	13.23	4.62	5.05	35.55	0.65	1.0000	3.88	27.36	881.5	354,106		0.130	1.503	0.010	0.010
12:01:01	13.16	4.66	9.80	35.53	0.65	1.0000	7.47	27.09	879.9	350,118		0.249	1.485	0.009	0.009
12:02:02	13.16	4.66	3.86	31.70	0.65	1.0000	2.94	24.17	881.1	350,687		0.098	1.327	0.009	0.009
12:03:02	13.16	4.66	0.89	11.01	0.65	1.0000	0.68	8.39	881.9	350,869		0.023	0.461	0.009	0.009
12:04:02	13.16	4.66	0.89	2.61	0.65	1.0000	0.68	1.99	882.1	350,948		0.023	0.109	0.009	0.009
12:05:02	13.16	4.66	0.89	1.87	0.65	1.0000	0.68	1.42	882.1	350,948		0.023	0.078	0.009	0.009
									582.2		**Startup Complete**				
						13 min		**Stack Flow dscfm**		**261,151**					
											Total lb emitted:	**0.92**	**8.37**	**0.09**	**0.09**
											lb/hr emission rate:	**4.26**	**38.64**	**0.42**	**0.42**
Averages:	**15.77**	**3.13**	**5.96**	**19.26**	**0.65**	**1.00**	**19.67**	**17.84**							

Gateway Unit A
Startup 3
4-29-09

Fuel Fd 8710 dscf/MMBTU @ 0% O2
Fuel HHV 1015 BTU/scf

CEM Data Corrected for Calibrations

Time	O2 %	CO2 %	CO ppm	NOx ppm	THC ppm	NMNEHC fraction	CO ppmc	NOx ppmc	Raw Fuel Flow kscfh	Stack Flow dscfm		Total lb emitted each minute: CO	NOx as NO2	THC as CH4	NMNEHC as CH4
												Begin Startup			
8:09:39	20.89	0.05	0.20	0.01	0.87	1.0000	100.69	5.06	0.00	0		0.000	0.000	0.000	0.000
8:10:39	20.18	0.47	37.97	0.88	0.87	1.0000	311.34	7.25	66.50	*100,000*		0.276	0.011	0.004	0.004
8:11:40	16.77	2.49	93.93	15.75	0.87	1.0000	134.20	22.50	146.60	109,319		0.746	0.206	0.004	0.004
8:12:40	16.57	2.62	7.51	21.21	0.87	1.0000	10.23	28.87	127.90	90,873		0.050	0.230	0.003	0.003
8:13:39	16.39	2.71	1.78	25.75	0.87	1.0000	2.33	33.70	180.40	123,242		0.016	0.379	0.004	0.004
8:14:40	15.04	3.48	0.79	39.45	0.87	1.0000	0.80	39.70	459.00	241,070		0.014	1.135	0.009	0.009
8:15:40	13.59	4.28	0.40	36.18	0.87	1.0000	0.32	29.21	813.30	342,700		0.010	1.480	0.012	0.012
8:16:38	13.09	4.58	1.58	32.66	0.87	1.0000	1.19	24.66	882.20	347,734		0.040	1.356	0.013	0.013
8:17:39	13.07	4.60	1.98	33.16	0.87	1.0000	1.49	24.98	881.70	346,647		0.050	1.372	0.013	0.013
8:18:39	13.23	4.60	0.89	32.83	0.87	1.0000	0.68	25.26	880.90	353,760		0.023	1.387	0.013	0.013
8:19:40	13.26	4.61	0.49	32.79	0.87	1.0000	0.38	25.34	880.80	355,206		0.013	1.391	0.013	0.013
8:20:40	13.27	4.60	0.49	26.19	0.87	1.0000	0.38	20.25	881.30	355,688		0.013	1.112	0.013	0.013
8:21:38	13.27	4.61	0.49	5.91	0.87	1.0000	0.38	4.57	882.40	356,132		0.013	0.251	0.013	0.013
8:22:38	13.27	4.61	0.49	2.91	0.87	1.0000	0.38	2.25	882.40	356,132		0.013	0.124	0.013	0.013
8:22:56	13.36	4.52	0.10	2.24	0.87	1.0000	0.08	1.75	882.40	360,347		0.003	0.096	0.013	0.013
									589.85			**Startup Complete**			
						15 min		**Avg. Flow dscfm**		255,923					
											Total lb emitted:	**1.28**	**10.53**	**0.14**	**0.14**
											lb/hr emission rate:	**5.11**	**42.12**	**0.55**	**0.55**
Average:	17.19	2.36	7.29	13.43	1.23	0.66	24.56	12.84							

Panoche Unit 2
Shutdown 7
4-29-09
CEM Data Corrected for Calibrations

Fuel Fd 8710 dscf/MMBTU @ 0% O2
Fuel HHV 1015 BTU/scf

Time	O2 %	CO2 %	CO ppm	NOx ppm	THC ppm	NMNEHC fraction	CO ppmc	NOx ppmc	Raw Fuel Flow kscfh	Stack Flow dscfm		Total lb emitted each minute: CO	NOx as NO2	THC as CH4	NMNEHC as CH4
												Begin Shutdown			
18:21:03	12.88	4.67	0.79	3.69	0.71	1.0000	0.58	2.71	882.4	338,643		0.019	0.149	0.010	0.010
18:22:03	13.28	4.46	0.79	2.70	0.71	1.0000	0.61	2.09	823.2	332,720		0.019	0.107	0.010	0.010
18:23:03	14.16	4.04	0.49	1.50	0.71	1.0000	0.43	1.31	579.3	264,809		0.010	0.047	0.008	0.008
18:24:04	16.19	2.87	0.59	1.48	0.71	1.0000	0.74	1.85	297.5	194,417		0.008	0.034	0.006	0.006
18:25:02	17.79	1.92	1.09	1.60	0.71	1.0000	2.06	3.04	71.9	71,196		0.006	0.014	0.002	0.002
18:26:03	17.84	1.90	1.68	1.40	0.71	1.0000	3.24	2.70	61.4	61,754		0.008	0.010	0.002	0.002
18:27:03	17.84	1.89	1.88	1.40	0.71	1.0000	3.62	2.70	61.7	62,137		0.008	0.010	0.002	0.002
18:28:03	17.84	1.89	1.78	1.40	0.71	1.0000	3.43	2.70	61.6	61,955		0.008	0.010	0.002	0.002
18:29:04	17.84	1.89	1.88	1.27	0.71	1.0000	3.62	2.45	61.5	61,936		0.008	0.009	0.002	0.002
18:30:02	17.84	1.90	1.78	1.19	0.71	1.0000	3.43	2.30	61.5	61,855		0.008	0.009	0.002	0.002
18:31:03	17.83	1.90	1.78	1.19	0.71	1.0000	3.43	2.29	61.6	61,874		0.008	0.009	0.002	0.002
18:32:03	17.83	1.90	1.78	1.19	0.71	1.0000	3.42	2.29	61.7	61,894		0.008	0.009	0.002	0.002
18:33:04	17.82	1.91	1.78	1.19	0.71	1.0000	3.41	2.29	61.5	61,553		0.008	0.009	0.002	0.002
18:34:04	18.21	1.69	1.78	1.59	0.71	1.0000	3.91	3.49	61.2	70,144		0.009	0.013	0.002	0.002
18:35:03	20.45	0.33	1.68	1.25	0.71	1.0000	22.05	16.43	0.0	0		**Shutdown Complete**			
									213.9						
						14 min			**Avg. Flow dscfm**	117,793					
											Total lb emitted:	**0.14**	**0.44**	**0.05**	**0.05**
											lb/hr emission rate:	**0.58**	**1.89**	**0.22**	**0.22**
Average:	17.04	2.35	1.44	1.60	0.71	1.00	3.87	3.38							

Avogadro Group Emission Data

Start-up and Shutdown of Gas Turbine Unit A
Gateway Generating Station
Antioch, CA

Start-up			**CO**	**NOx as NO2**	**NMNEHC as CH4**
4-28-09					
Run 1	Duration	15 min.			
		Total lb emitted:	**1.880**	**11.90**	**0.110**
		lb/hr emission rate:	7.522	47.62	0.440
4-28-09					
Run 2	Duration	13 min.			
		Total lb emitted:	**0.923**	**8.372**	**0.092**
		lb/hr emission rate:	4.259	38.64	0.423
4-29-09					
Run 3	Duration	15 min.			
		Total lb emitted:	**1.278**	**10.53**	**0.139**
		lb/hr emission rate:	5.111	42.12	0.555
		Average lb/start:	**1.360**	**10.27**	**0.113**
		Permit Limits, lb/start:	*106.6*	*44.4*	*7.6*
		Average test duration, min:	14		
		Average lb/hr:	**5.694**	**42.99**	**0.475**

Shutdown			**CO**	**NOx as NO2**	**NMNEHC as CH4**
4-29-09					
Run 1	Duration	14 min.			
		Total lb emitted:	**0.14**	**0.44**	**0.05**
		lb/hr emission rate:	0.581	1.889	0.221
		Average lb/shutdown:	**0.14**	**0.44**	**0.05**
		Permit Limits, lb/shutdown:	*268.57*	*34.29*	*17.14*
		Average test duration, min:	14		
		Average lb/hr:	**0.58**	**1.89**	**0.22**

RELATIVE ACCURACY DETERMINATION
PANOCHE ENERGY CENTER - UNIT 2

O_2, % volume dry

Run #	Date	Time	RM	CEMS	Difference	n	t(0,975)
Run 1	4/28/09	0903-0915	15.16	14.51	0.650	1	100.00
Run 2	4/28/09	1152-1203	15.77	14.60	1.170	2	12.706
Run 3	4/29/09	0808-0821	~~17.19~~	~~15.58~~	~~1.610~~	3	4.303
Run 4	4/29/09	1820-1835	17.04	16.66	0.380	4	3.182
AVERAGES:			15.99	15.26	0.733		
RELATIVE ACCURACY, %:							**-4.59%**

RELATIVE ACCURACY DETERMINATION
PANOCHE ENERGY CENTER - UNIT 2

CO, ppm @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	t(0,975)
Run 1	4/28/09	0903-0915	41.400	36.350	5.050	1	100.00
Run 2	4/28/09	1152-1203	~~19.670~~	~~11.060~~	~~8.610~~	2	12.706
Run 3	4/29/09	0808-0821	26.880	27.050	-0.170	3	4.303
Run 4	4/29/09	1820-1835	3.870	1.160	2.710	4	3.182
AVERAGES:			24.050	21.520	2.530		*> 50% of limit*
EMISSION LIMIT:							*use RM criteria*
RELATIVE ACCURACY, %:							**-10.52%**

RELATIVE ACCURACY DETERMINATION
PANOCHE ENERGY CENTER - UNIT 2

CO, lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	t(0,975)
Run 1	4/28/09	0903-0915	~~7.520~~	~~14.730~~	~~-7.210~~	1	100.00
Run 2	4/28/09	1152-1203	4.250	5.290	-1.040	2	12.706
Run 3	4/29/09	0808-0821	5.110	9.940	-4.830	3	4.303
Run 4	4/29/09	1820-1835	0.580	0.140	0.440	4	3.182
AVERAGES:			1.310	1.816	-0.506		*< 50% of limit*
EMISSION LIMIT:					106.6		*use AS criteria*
RELATIVE ACCURACY, %:							**-0.47%**

RELATIVE ACCURACY DETERMINATION
PANOCHE ENERGY CENTER - UNIT 2

NO_X, ppm @ 15% O_2

Run #	Date	Time	RM	CEMS	Difference	n	t(0,975)
Run 1	4/28/09	0903-0915	20.100	20.540	-0.440	1	100.00
Run 2	4/28/09	1152-1203	17.800	14.850	2.950	2	12.706
Run 3	4/29/09	0808-0821	~~12.800~~	~~26.340~~	~~-13.540~~	3	4.303
Run 4	4/29/09	1820-1835	3.400	2.620	0.780	4	3.182
AVERAGES:			13.767	12.670	1.097		*> 50% of limit*
EMISSION LIMIT:							*use RM criteria*
RELATIVE ACCURACY, %:							**-7.97%**

RELATIVE ACCURACY DETERMINATION
PANOCHE ENERGY CENTER - UNIT 2

NO_X, lb/hr

Run #	Date	Time	RM	CEMS	Difference	n	t(0,975)
Run 1	4/28/09	0903-0915	47.620	56.100	-8.480	1	100.00
Run 2	4/28/09	1152-1203	38.640	41.080	-2.440	2	12.706
Run 3	4/29/09	0808-0821	~~42.120~~	~~65.440~~	~~-23.320~~	3	4.303
Run 4	4/29/09	1820-1835	1.890	2.110	-0.220	4	3.182
AVERAGES:			29.383	33.097	-3.713		*> 50% of limit*
EMISSION LIMIT:							*use RM criteria*
RELATIVE ACCURACY, %:							**12.64%**

PANOCHE ENERGY CENTER - UNIT 2
STARTUP/SHUTDOWN

Test No.	(Startup) Run 1	(Startup) Run 2	(Startup) Run 3	(Shutdown) Run 4
Date	4/28/09	4/28/09	4/29/09	4/29/09
Start Time	0903-0915	1152-1203	0808-0821	1820-1835
Reference Temp. (F)	60	60	60	60
Barometric Press. (in. Hg)	29.84	29.84	29.64	29.52
Unit Power Output (MW)	74.1	69.1	60.0	23.6
Unit Fuel Flow (scfh) @ 60 °F	632,700	582,200	589,900	213,900
"Fd" factor (dscf/MMBtu) @ 68 °F	8,595	8,595	8,595	8,595
"Fd" factor (dscf/MMBtu) @ Tref	8,465	8,465	8,465	8,465
HHV (btu/scf) @ 60 °F	1,015	1,015	1,015	1,015
Stack Flow - based on Fd (dscfm)	271,830	261,151	255,923	262,968
O_2, % volume dry	15.16	15.77	17.19	17.04
CO_2, % volume dry	3.410	3.130	2.360	2.350
CO, ppm volume dry	13.10	6.000	7.30	1.400
CO, ppm dry @ 15% O_2	38.50	19.700	24.60	3.900
CO, lb/hr (based on O_2)	7.52	4.250	5.11	0.580
CO, lb/MMBtu	0.030	0.015	0.026	0.005
NO_X, ppm volume dry	22.20	19.70	13.40	1.600
NO_X, ppm dry @ 15% O_2	20.10	17.80	12.80	3.400
NO_X, lb/hr (based on O_2) as NO_2	47.62	38.64	42.12	1.890
NO_X, lb/MMBtu as NO_2	0.051	0.050	0.048	0.006
VOC, ppm volume dry	0.700	0.700	1.200	0.700
VOC, ppm @ 15% O_2	0.700	0.700	2.000	1.100
VOC, lb/hr as CH_4	0.440	0.420	0.560	0.220
VOC, lb/MMBtu as CH_4	0.002	0.002	0.004	0.002

Appendix F.4

Ammonia Spreadsheets

Ammonia Test Result Average
PEC
Turbine #1

Test No:	1-NH3-1	2-NH3-2	3-NH3-1	AVERAGES
Date:	4/30/09	4/30/09	4/30/09	--
Time:	1714-1744	1809-1839	1852-1922	--
O_2, % volume dry:	13.166	13.166	13.159	13.164
CO_2, % volume dry:	4.58	4.57	4.56	4.57
Moisture Content, % by volume:	11.284	11.222	10.672	11.059
NH3 audit sample, % recovery.....	103.0	103.0	103.0	103.0
NH3 concentrations, ppm volume dry.....	1.5	1.6	1.6	1.6
NH3 concentrations, ppm @ 15% O2 dry.....	1.2	1.2	1.2	1.2
NH3 mass emissions, lb/hr.....	1.40	1.48	1.47	1.45
NH3 mass emissions, lb/MMBtu.....	0.002	0.002	0.002	0.002

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-NH3-1
Unit / Location	Turbine #1	*	Date	4/30/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1714-1744

Meter box number	CB-03	*	Barometric pressure, in Hg	29.49
Meter calibration, Yd	0.9920	*	Meter box volume, acf	15.684
Stack area, square feet	143.139	*	Impinger liquid volume, ml	39.7
Reference temperature, °F	60	*	Meter temperature, °F	92.3
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.17
CO_2, % volume dry	4.575

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	251.3
Sample concentration (measured), ppm	1.81

1a	Standard sample volume, dscf	14.509
1b	Water vapor volume, scf	1.8454
1c	Moisture fraction, nondimensional	0.1128
1d	Stack gas molecular weight, dry	29.259
1e	Stack gas molecular weight, wet	27.988
1f	Absolute stack pressure, in Hg	29.490
1j	Stack flow rate, dscfm (from fuel flow)	337,800

2a	O_2, % volume wet	11.680
2a	CO_2, % volume wet	4.06
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	1.54
2b	NH_3 concentrations, ppm @ 15% O_2 dry	1.17
2e	NH_3 mass emissions, lb/hr	1.397
2f	NH_3 mass emissions, lb/MMBtu	0.0016

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-NH3-2
Unit / Location	Turbine #1	*	Date	4/30/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1809-1839

Meter box number	CB-03	*	Barometric pressure, in Hg	29.49
Meter calibration, Yd	0.9920	*	Meter box volume, acf	22.798
Stack area, square feet	143.139	*	Impinger liquid volume, ml	57.8
Reference temperature, °F	60	*	Meter temperature, °F	88.0
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.17
CO_2, % volume dry	4.565

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	257.7
Sample concentration (measured), ppm	2.74

1a	Standard sample volume, dscf	21.256
1b	Water vapor volume, scf	2.6868
1c	Moisture fraction, nondimensional	0.1122
1d	Stack gas molecular weight, dry	29.257
1e	Stack gas molecular weight, wet	27.994
1f	Absolute stack pressure, in Hg	29.490
1j	Stack flow rate, dscfm (from fuel flow)	338,033

2a	O_2, % volume wet	11.689
2a	CO_2, % volume wet	4.05
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	1.63
2b	NH_3 concentrations, ppm @ 15% O_2 dry	1.24
2e	NH_3 mass emissions, lb/hr	1.481
2f	NH_3 mass emissions, lb/MMBtu	0.0017

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-NH3-1
Unit / Location	Turbine #1	*	Date	4/30/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1852-1922

Meter box number	CB-03	*	Barometric pressure, in Hg	29.49
Meter calibration, Yd	0.9920	*	Meter box volume, acf	23.783
Stack area, square feet	143.139	*	Impinger liquid volume, ml	57.3
Reference temperature, °F	60	*	Meter temperature, °F	85.0
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.16
CO_2, % volume dry	4.557

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	252.3
Sample concentration (measured), ppm	2.92

1a	Standard sample volume, dscf	22.296
1b	Water vapor volume, scf	2.6636
1c	Moisture fraction, nondimensional	0.1067
1d	Stack gas molecular weight, dry	29.255
1e	Stack gas molecular weight, wet	28.054
1f	Absolute stack pressure, in Hg	29.490
1j	Stack flow rate, dscfm (from fuel flow)	337,596

2a	O_2, % volume wet	11.755
2a	CO_2, % volume wet	4.07
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	1.62
2b	NH_3 concentrations, ppm @ 15% O_2 dry	1.23
2e	NH_3 mass emissions, lb/hr	1.472
2f	NH_3 mass emissions, lb/MMBtu	0.0017

Ammonia Test Result Average
PEC
Turbine #2

Test No:	1-NH3-2	2-NH3-2	3-NH3-2	AVERAGES
Date:	4/27/09	4/27/09	4/27/09	--
Time:	1043-1113	1157-1227	1236-1306	--
O_2, % volume dry:	13.130	13.130	13.100	13.120
CO_2, % volume dry:	4.68	4.59	4.59	4.62
Moisture Content, % by volume:	10.795	10.576	10.332	10.567
NH3 audit sample, % recovery.....	103.0	103.0	103.0	103.0
NH3 concentrations, ppm volume dry.....	3.8	3.4	3.3	3.5
NH3 concentrations, ppm @ 15% O2 dry.....	2.9	2.6	2.5	2.7
NH3 mass emissions, lb/hr.....	3.51	3.12	3.05	3.23
NH3 mass emissions, lb/MMBtu.....	0.004	0.004	0.003	0.004

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-NH3-2
Unit / Location	Turbine #2	*	Date	4/27/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1043-1113

Meter box number	CB-05	*	Barometric pressure, in Hg	29.40
Meter calibration, Yd	0.9710	*	Meter box volume, acf	23.626
Stack area, square feet	143.139	*	Impinger liquid volume, ml	58.0
Reference temperature, °F	60	*	Meter temperature, °F	68.7
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.13
CO_2, % volume dry	4.683

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	267.1
Sample concentration (measured), ppm	6.50

1a	Standard sample volume, dscf	22.280
1b	Water vapor volume, scf	2.6961
1c	Moisture fraction, nondimensional	0.1079
1d	Stack gas molecular weight, dry	29.274
1e	Stack gas molecular weight, wet	28.057
1f	Absolute stack pressure, in Hg	29.400
1j	Stack flow rate, dscfm (from fuel flow)	341,857

2a	O_2, % volume wet	11.713
2a	CO_2, % volume wet	4.18
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	3.82
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.90
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	9.78
2e	NH_3 mass emissions, lb/hr	3.514
2f	NH_3 mass emissions, lb/MMBtu	0.0040

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-NH3-2
Unit / Location	Turbine #2	*	Date	4/27/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1157-1227

Meter box number	CB-05	*	Barometric pressure, in Hg	29.40
Meter calibration, Yd	0.9710	*	Meter box volume, acf	24.262
Stack area, square feet	143.139	*	Impinger liquid volume, ml	57.6
Reference temperature, °F	60	*	Meter temperature, °F	74.3
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.13
CO_2, % volume dry	4.592

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	268.4
Sample concentration (measured), ppm	5.82

1a	Standard sample volume, dscf	22.640
1b	Water vapor volume, scf	2.6775
1c	Moisture fraction, nondimensional	0.1058
1d	Stack gas molecular weight, dry	29.260
1e	Stack gas molecular weight, wet	28.069
1f	Absolute stack pressure, in Hg	29.400
1j	Stack flow rate, dscfm (from fuel flow)	342,649

2a	O_2, % volume wet	11.741
2a	CO_2, % volume wet	4.11
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	3.38
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.57
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	8.83
2e	NH_3 mass emissions, lb/hr	3.119
2f	NH_3 mass emissions, lb/MMBtu	0.0035

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-NH3-2
Unit / Location	Turbine #2	*	Date	4/27/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1236-1306

Meter box number	CB-05	*	Barometric pressure, in Hg	29.67
Meter calibration, Yd	0.9710	*	Meter box volume, acf	24.480
Stack area, square feet	143.139	*	Impinger liquid volume, ml	56.3
Reference temperature, °F	60	*	Meter temperature, °F	82.3
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.10
CO_2, % volume dry	4.589

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	266.9
Sample concentration (measured), ppm	5.77

1a	Standard sample volume, dscf	22.713
1b	Water vapor volume, scf	2.6171
1c	Moisture fraction, nondimensional	0.1033
1d	Stack gas molecular weight, dry	29.258
1e	Stack gas molecular weight, wet	28.095
1f	Absolute stack pressure, in Hg	29.670
1j	Stack flow rate, dscfm (from fuel flow)	340,833

2a	O_2, % volume wet	11.746
2a	CO_2, % volume wet	4.11
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	3.32
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.51
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	8.69
2e	NH_3 mass emissions, lb/hr	3.049
2f	NH_3 mass emissions, lb/MMBtu	0.0034

Ammonia Test Result Average
PEC
Turbine #3

Test No:	1-NH3-3	2-NH3-3	3-NH3-3	AVERAGES
Date:	4/23/09	4/23/09	4/23/09	--
Time:	1010-1040	1100-1130	1145-1215	--
O_2, % volume dry:	13.136	13.093	13.081	13.103
CO_2, % volume dry:	4.57	4.61	4.62	4.60
Moisture Content, % by volume:	11.310	11.998	11.921	11.743
NH3 audit sample, % recovery.....	103.0	103.0	103.0	103.0
NH3 concentrations, ppm volume dry.....	3.0	2.9	2.9	2.9
NH3 concentrations, ppm @ 15% O2 dry.....	2.2	2.2	2.2	2.2
NH3 mass emissions, lb/hr.....	2.70	2.67	2.61	2.66
NH3 mass emissions, lb/MMBtu.....	0.003	0.003	0.003	0.003

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-NH3-3
Unit / Location	Turbine #3	*	Date	4/23/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1010-1040

Meter box number	CB-05	*	Barometric pressure, in Hg	29.37
Meter calibration, Yd	0.9710	*	Meter box volume, acf	22.420
Stack area, square feet	143.139	*	Impinger liquid volume, ml	57.4
Reference temperature, °F	60	*	Meter temperature, °F	73.7
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.136
CO_2, % volume dry	4.57

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	267.4
Sample concentration (measured), ppm	4.72

1a	Standard sample volume, dscf	20.924
1b	Water vapor volume, scf	2.6682
1c	Moisture fraction, nondimensional	0.1131
1d	Stack gas molecular weight, dry	29.257
1e	Stack gas molecular weight, wet	27.984
1f	Absolute stack pressure, in Hg	29.370
1j	Stack flow rate, dscfm (from fuel flow)	339,465

2a	O_2, % volume wet	11.650
2a	CO_2, % volume wet	4.06
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	2.96
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.25
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	7.76
2e	NH_3 mass emissions, lb/hr	2.702
2f	NH_3 mass emissions, lb/MMBtu	0.0031

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-NH3-3
Unit / Location	Turbine #3	*	Date	4/23/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1100-1130

Meter box number	CB-05	*	Barometric pressure, in Hg	29.37
Meter calibration, Yd	0.9710	*	Meter box volume, acf	23.891
Stack area, square feet	143.139	*	Impinger liquid volume, ml	64.1
Reference temperature, °F	60	*	Meter temperature, °F	84.5
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.093
CO_2, % volume dry	4.61

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	274.0
Sample concentration (measured), ppm	4.78

1a	Standard sample volume, dscf	21.854
1b	Water vapor volume, scf	2.9797
1c	Moisture fraction, nondimensional	0.1200
1d	Stack gas molecular weight, dry	29.261
1e	Stack gas molecular weight, wet	27.910
1f	Absolute stack pressure, in Hg	29.370
1j	Stack flow rate, dscfm (from fuel flow)	337,560

2a	O_2, % volume wet	11.522
2a	CO_2, % volume wet	4.05
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	2.94
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.22
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	7.65
2e	NH_3 mass emissions, lb/hr	2.669
2f	NH_3 mass emissions, lb/MMBtu	0.0030

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-NH3-3
Unit / Location	Turbine #3	*	Date	4/23/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1145-1215

Meter box number	CB-05	*	Barometric pressure, in Hg	29.37
Meter calibration, Yd	0.9710	*	Meter box volume, acf	28.442
Stack area, square feet	143.139	*	Impinger liquid volume, ml	75.2
Reference temperature, °F	60	*	Meter temperature, °F	88.5
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.081
CO_2, % volume dry	4.62

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	282.6
Sample concentration (measured), ppm	5.36

1a	Standard sample volume, dscf	25.828
1b	Water vapor volume, scf	3.4957
1c	Moisture fraction, nondimensional	0.1192
1d	Stack gas molecular weight, dry	29.263
1e	Stack gas molecular weight, wet	27.920
1f	Absolute stack pressure, in Hg	29.370
1j	Stack flow rate, dscfm (from fuel flow)	337,434

2a	O_2, % volume wet	11.522
2a	CO_2, % volume wet	4.07
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	2.87
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.17
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	7.46
2e	NH_3 mass emissions, lb/hr	2.611
2f	NH_3 mass emissions, lb/MMBtu	0.0030

Ammonia Test Result Average
PEC
Turbine # 4

Test No:	1-NH3-4	2-NH3-4	3-NH3-4	AVERAGES
Date:	4/24/09	4/24/09	4/24/09	--
Time:	0915-0945	1007-1037	1100-1130	--
O_2, % volume dry:	13.326	13.309	13.306	13.314
CO_2, % volume dry:	4.49	4.49	4.51	4.50
Moisture Content, % by volume:	10.716	10.094	9.733	10.181
NH3 audit sample, % recovery.....	103.0	103.0	103.0	103.0
NH3 concentrations, ppm volume dry.....	3.0	2.6	3.5	3.0
NH3 concentrations, ppm @ 15% O2 dry.....	2.3	2.0	2.7	2.4
NH3 mass emissions, lb/hr.....	2.80	2.41	3.20	2.80
NH3 mass emissions, lb/MMBtu.....	0.003	0.003	0.004	0.003

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-NH3-4
Unit / Location	Turbine # 4	*	Date	4/24/09
Test method	BAAQMD ST-1B	*	Start / Stop time	0915-0945

Meter box number	CB-05	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9710	*	Meter box volume, acf	20.844
Stack area, square feet	143.139	*	Impinger liquid volume, ml	50.8
Reference temperature, °F	60	*	Meter temperature, °F	69.3
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.326
CO_2, % volume dry	4.49

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	259.7
Sample concentration (measured), ppm	4.65

1a	Standard sample volume, dscf	19.674
1b	Water vapor volume, scf	2.3614
1c	Moisture fraction, nondimensional	0.1072
1d	Stack gas molecular weight, dry	29.252
1e	Stack gas molecular weight, wet	28.046
1f	Absolute stack pressure, in Hg	29.460
1j	Stack flow rate, dscfm (from fuel flow)	346,364

2a	O_2, % volume wet	11.898
2a	CO_2, % volume wet	4.01
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	3.01
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.34
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	8.03
2e	NH_3 mass emissions, lb/hr	2.805
2f	NH_3 mass emissions, lb/MMBtu	0.0032

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-NH3-4
Unit / Location	Turbine # 4	*	Date	4/24/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1007-1037

Meter box number	CB-05	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9710	*	Meter box volume, acf	25.500
Stack area, square feet	143.139	*	Impinger liquid volume, ml	57.7
Reference temperature, °F	60	*	Meter temperature, °F	73.3
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.309
CO_2, % volume dry	4.49

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	268.1
Sample concentration (measured), ppm	4.78

1a	Standard sample volume, dscf	23.889
1b	Water vapor volume, scf	2.6822
1c	Moisture fraction, nondimensional	0.1009
1d	Stack gas molecular weight, dry	29.251
1e	Stack gas molecular weight, wet	28.115
1f	Absolute stack pressure, in Hg	29.460
1j	Stack flow rate, dscfm (from fuel flow)	340,482

2a	O_2, % volume wet	11.966
2a	CO_2, % volume wet	4.04
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	2.63
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.04
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	7.02
2e	NH_3 mass emissions, lb/hr	2.410
2f	NH_3 mass emissions, lb/MMBtu	0.0028

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-NH3-4
Unit / Location	Turbine # 4	*	Date	4/24/09
Test method	BAAQMD ST-1B	*	Start / Stop time	1100-1130

Meter box number	CB-05	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9710	*	Meter box volume, acf	24.082
Stack area, square feet	143.139	*	Impinger liquid volume, ml	52.0
Reference temperature, °F	60	*	Meter temperature, °F	76.7
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	2.000
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.306
CO_2, % volume dry	4.51

Audit sample concentration (measured), ppm	10.30
Audit sample concentration (actual), ppm	10.00
Sample volume (total), ml	261.3
Sample concentration (measured), ppm	6.12

1a	Standard sample volume, dscf	22.417
1b	Water vapor volume, scf	2.4172
1c	Moisture fraction, nondimensional	0.0973
1d	Stack gas molecular weight, dry	29.253
1e	Stack gas molecular weight, wet	28.158
1f	Absolute stack pressure, in Hg	29.460
1j	Stack flow rate, dscfm (from fuel flow)	339,772

2a	O_2, % volume wet	12.011
2a	CO_2, % volume wet	4.07
-	NH_3 audit sample, % recovery	103.0

-	NH_3 concentrations, ppm volume dry	3.50
2b	NH_3 concentrations, ppm @ 15% O_2 dry	2.72
2c	NH_3 concentrations, ppm @ 12% CO_2 dry	9.31
2e	NH_3 mass emissions, lb/hr	3.198
2f	NH_3 mass emissions, lb/MMBtu	0.0037

Appendix F.5

Particulate Matter Spreadsheets

Particulate Matter Result Average
PEC
Turbine #1

Test No:	1-PM-1	2-PM-1	3-PM-1	AVERAGES
Date:	4/30/09	5/1/09	5/1/09	--
Time:	1711-1923	0803-1423	1455-1702	--
O_2, % volume dry:	13.16	13.13	13.09	13.13
CO_2, % volume dry:	4.56	4.59	4.60	4.58
Stack Temperature, °F:	767.7	755.3	776.0	766.3
Moisture Content, % by volume:	10.96	10.58	11.05	10.86
Flow Rate, dscfm:	360,233	370,586	357,800	362,873
F½ grain loading, gr/dscf.....	0.0000	0.0001	0.0000	0.0001
F½ mass emissions, lb/hr.....	0.10	0.46	0.09	0.21
F½ mass emissions, lb/MMBtu.....	0.000	0.000	0.000	0.000
B½ grain loading, gr/dscf.....	0.0005	0.0006	0.0011	0.0007
B½ mass emissions, lb/hr.....	1.60	1.84	3.50	2.31
B½ mass emissions, lb/MMBtu.....	0.002	0.002	0.004	0.002
Total grain loading, gr/dscf.....	0.0005	0.0007	0.0012	0.0008
Total mass emissions, lb/hr.....	1.70	2.29	3.59	2.53
Total mass emissions, lb/MMBtu.....	0.002	0.002	0.004	0.003

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-PM-1
Unit / Location	Turbine #1	*	Date	4/30/09
Test method	EPA 5/202	*	Start / Stop time	1711-1923

Meter box number	CB-11	*	Barometric pressure, in Hg	29.49
Meter calibration, Yd	0.972	*	Meter box volume, acf	74.445
Stack area, square feet	143.139	*	Impinger liquid volume, ml	179.9
Reference temperature, °F	60	*	Meter temperature, °F	87.7
Sample time, minutes	120.0	*	Meter pressure, (Delta H) iwg	1.300
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.7035
Nozzle diameter, in	0.205	*	Static pressure, iwg	-0.41
Fuel type	Gas	*	Stack temperature, °F	767.7
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.160
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.56

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.14
B½ particulate matter catch (water), mg	1.36
B½ particulate matter catch ($MeCL_2$), mg	0.92
Total particulate matter catch, mg	2.42

1a	Standard sample volume, dscf	67.928
1b	Water vapor volume, scf	8.3626
1c	Moisture fraction, nondimensional	0.1096
1d	Stack gas molecular weight, dry	29.256
1e	Stack gas molecular weight, wet	28.022
1f	Absolute stack pressure, in Hg	29.460
1g	Stack gas velocity, ft/sec	112.958
1h	Stack flow rate, acfm	970,120
1i	Stack flow rate, wscfm	404,581
1j	Stack flow rate, dscfm	360,233
1k	Isokinetic ratio, %	98.2

3a	F½ grain loading, gr/dscf	0.0000
3b	F½ grain loading @ 15% O_2	0.0000
3c	F½ mass emissions, lb/hr	0.0982
	F½ mass emissions, lb/MMBtu	0.0001
3a	B½ grain loading, gr/dscf	0.0005
3b	B½ grain loading @ 15% O_2	0.0004
3c	B½ mass emissions, lb/hr	1.5991
	B½ mass emissions, lb/MMBtu	0.0017
3a	Total grain loading, gr/dscf	0.0005
3b	Total grain loading @ 15% O_2	0.0004
3c	Total mass emissions, lb/hr	1.6973
	Total mass emissions, lb/MMBtu	0.0018

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-PM-1
Unit / Location	Turbine #1	*	Date	5/1/09
Test method	EPA 5/202	*	Start / Stop time	0803-1423

Meter box number	CB-11	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9720	*	Meter box volume, acf	75.952
Stack area, square feet	143.139	*	Impinger liquid volume, ml	180.1
Reference temperature, °F	60	*	Meter temperature, °F	76.2
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.360
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.7750
Nozzle diameter, in	0.205	*	Static pressure, iwg	-0.58
Fuel type	Gas	*	Stack temperature, °F	755.3
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.130
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.59

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.66
B½ particulate matter catch (water), mg	2.14
B½ particulate matter catch ($MeCL_2$), mg	0.51
Total particulate matter catch, mg	3.31

1a	Standard sample volume, dscf	70.728
1b	Water vapor volume, scf	8.3719
1c	Moisture fraction, nondimensional	0.1058
1d	Stack gas molecular weight, dry	29.259
1e	Stack gas molecular weight, wet	28.067
1f	Absolute stack pressure, in Hg	29.417
1g	Stack gas velocity, ft/sec	114.710
1h	Stack flow rate, acfm	985,172
1i	Stack flow rate, wscfm	414,452
1j	Stack flow rate, dscfm	370,586
1k	Isokinetic ratio, %	99.3

3a	F½ grain loading, gr/dscf	0.0001
3b	F½ grain loading @ 15% O_2	0.0001
3c	F½ mass emissions, lb/hr	0.4574
	F½ mass emissions, lb/MMBtu	0.0005
3a	B½ grain loading, gr/dscf	0.0006
3b	B½ grain loading @ 15% O_2	0.0004
3c	B½ mass emissions, lb/hr	1.8364
	B½ mass emissions, lb/MMBtu	0.0019
3a	Total grain loading, gr/dscf	0.0007
3b	Total grain loading @ 15% O_2	0.0005
3c	Total mass emissions, lb/hr	2.2937
	Total mass emissions, lb/MMBtu	0.0024

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-PM-1
Unit / Location	Turbine #1	*	Date	5/1/09
Test method	EPA 5/202	*	Start / Stop time	1455-1702

Meter box number	CB-11	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9720	*	Meter box volume, acf	75.068
Stack area, square feet	143.139	*	Impinger liquid volume, ml	187.2
Reference temperature, °F	60	*	Meter temperature, °F	74.8
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.300
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6962
Nozzle diameter, in	0.205	*	Static pressure, iwg	-0.35
Fuel type	Gas	*	Stack temperature, °F	776.0
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.090
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.60

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.13
B½ particulate matter catch (water), mg	4.67
B½ particulate matter catch ($MeCL_2$), mg	0.52
Total particulate matter catch, mg	5.32

1a	Standard sample volume, dscf	70.078
1b	Water vapor volume, scf	8.7020
1c	Moisture fraction, nondimensional	0.1105
1d	Stack gas molecular weight, dry	29.259
1e	Stack gas molecular weight, wet	28.015
1f	Absolute stack pressure, in Hg	29.434
1g	Stack gas velocity, ft/sec	113.159
1h	Stack flow rate, acfm	971,847
1i	Stack flow rate, wscfm	402,230
1j	Stack flow rate, dscfm	357,800
1k	Isokinetic ratio, %	101.9

3a	F½ grain loading, gr/dscf	0.0000
3b	F½ grain loading @ 15% O_2	0.0000
3c	F½ mass emissions, lb/hr	0.0878
	F½ mass emissions, lb/MMBtu	0.0001
3a	B½ grain loading, gr/dscf	0.0011
3b	B½ grain loading @ 15% O_2	0.0009
3c	B½ mass emissions, lb/hr	3.5047
	B½ mass emissions, lb/MMBtu	0.0038
3a	Total grain loading, gr/dscf	0.0012
3b	Total grain loading @ 15% O_2	0.0009
3c	Total mass emissions, lb/hr	3.5925
	Total mass emissions, lb/MMBtu	0.0038

Particulate Matter Result Average
PEC
Turbine #2

Test No:	1-PM-2	2-PM-2	3-PM-2	AVERAGES
Date:	4/27/09	4/27/09	4/27/09	--
Time:	1050-1303	1330-1540	1612-1838	--
O_2, % volume dry:	13.12	13.12	13.16	13.13
CO_2, % volume dry:	4.62	4.59	4.56	4.59
Stack Temperature, °F:	775.3	778.4	776.9	776.9
Moisture Content, % by volume:	10.26	9.70	10.46	10.14
Flow Rate, dscfm:	361,027	368,081	379,087	369,398
F½ grain loading, gr/dscf.....	0.0000	0.0000	0.0000	0.0000
F½ mass emissions, lb/hr.....	0.04	0.05	0.13	0.07
F½ mass emissions, lb/MMBtu.....	0.000	0.000	0.000	0.000
B½ grain loading, gr/dscf.....	0.0014	0.0009	0.0003	0.0008
B½ mass emissions, lb/hr.....	4.19	2.81	0.84	2.61
B½ mass emissions, lb/MMBtu.....	0.004	0.003	0.001	0.003
Total grain loading, gr/dscf.....	0.0014	0.0009	0.0003	0.0009
Total mass emissions, lb/hr.....	4.23	2.85	0.98	2.69
Total mass emissions, lb/MMBtu.....	0.005	0.003	0.001	0.003

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-PM-2
Unit / Location	Turbine #2	*	Date	4/27/09
Test method	EPA 5/202	*	Start / Stop time	1050-1303

Meter box number	CB-11	*	Barometric pressure, in Hg	29.43
Meter calibration, Yd	0.972	*	Meter box volume, acf	80.747
Stack area, square feet	143.139	*	Impinger liquid volume, ml	186.4
Reference temperature, °F	60	*	Meter temperature, °F	71.4
Sample time, minutes	120.0	*	Meter pressure, (Delta H) iwg	1.300
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.7052
Nozzle diameter, in	0.215	*	Static pressure, iwg	-0.81
Fuel type	Gas	*	Stack temperature, °F	775.3
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.120
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.62

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.07
B½ particulate matter catch (water), mg	6.64
B½ particulate matter catch ($MeCL_2$), mg	0.01
Total particulate matter catch, mg	6.72

1a	Standard sample volume, dscf	75.784
1b	Water vapor volume, scf	8.6648
1c	Moisture fraction, nondimensional	0.1026
1d	Stack gas molecular weight, dry	29.264
1e	Stack gas molecular weight, wet	28.108
1f	Absolute stack pressure, in Hg	29.370
1g	Stack gas velocity, ft/sec	113.362
1h	Stack flow rate, acfm	973,588
1i	Stack flow rate, wscfm	402,304
1j	Stack flow rate, dscfm	361,027
1k	Isokinetic ratio, %	99.3

3a	F½ grain loading, gr/dscf	0.0000
3b	F½ grain loading @ 15% O_2	0.0000
3c	F½ mass emissions, lb/hr	0.0441
	F½ mass emissions, lb/MMBtu	0.0000
3a	B½ grain loading, gr/dscf	0.0014
3b	B½ grain loading @ 15% O_2	0.0010
3c	B½ mass emissions, lb/hr	4.1899
	B½ mass emissions, lb/MMBtu	0.0045
3a	Total grain loading, gr/dscf	0.0014
3b	Total grain loading @ 15% O_2	0.0010
3c	Total mass emissions, lb/hr	4.2340
	Total mass emissions, lb/MMBtu	0.0045

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-PM-2
Unit / Location	Turbine #2	*	Date	4/27/09
Test method	EPA 5/202	*	Start / Stop time	1330-1540

Meter box number	CB-11	*	Barometric pressure, in Hg	29.40
Meter calibration, Yd	0.9720	*	Meter box volume, acf	82.093
Stack area, square feet	143.139	*	Impinger liquid volume, ml	173.8
Reference temperature, °F	60	*	Meter temperature, °F	83.6
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.340
Pitot coefficient	0.832	*	Velocity head, (Delta P) iwg	1.7601
Nozzle diameter, in	0.215	*	Static pressure, iwg	-0.78
Fuel type	Gas	*	Stack temperature, °F	778.4
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.120
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.59

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.07
B½ particulate matter catch (water), mg	4.24
B½ particulate matter catch ($MeCL_2$), mg	0.10
Total particulate matter catch, mg	4.41

1a	Standard sample volume, dscf	75.249
1b	Water vapor volume, scf	8.0791
1c	Moisture fraction, nondimensional	0.0970
1d	Stack gas molecular weight, dry	29.259
1e	Stack gas molecular weight, wet	28.167
1f	Absolute stack pressure, in Hg	29.343
1g	Stack gas velocity, ft/sec	115.251
1h	Stack flow rate, acfm	989,815
1i	Stack flow rate, wscfm	407,600
1j	Stack flow rate, dscfm	368,081
1k	Isokinetic ratio, %	96.7

3a	F½ grain loading, gr/dscf	0.0000
3b	F½ grain loading @ 15% O_2	0.0000
3c	F½ mass emissions, lb/hr	0.0453
	F½ mass emissions, lb/MMBtu	0.0000
3a	B½ grain loading, gr/dscf	0.0009
3b	B½ grain loading @ 15% O_2	0.0007
3c	B½ mass emissions, lb/hr	2.8077
	B½ mass emissions, lb/MMBtu	0.0029
3a	Total grain loading, gr/dscf	0.0009
3b	Total grain loading @ 15% O_2	0.0007
3c	Total mass emissions, lb/hr	2.8530
	Total mass emissions, lb/MMBtu	0.0030

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-PM-2
Unit / Location	Turbine #2	*	Date	4/27/09
Test method	EPA 5/202	*	Start / Stop time	1612-1838

Meter box number	CB-11	*	Barometric pressure, in Hg	29.37
Meter calibration, Yd	0.9720	*	Meter box volume, acf	80.121
Stack area, square feet	143.139	*	Impinger liquid volume, ml	189.7
Reference temperature, °F	60	*	Meter temperature, °F	68.6
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.430
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.8928
Nozzle diameter, in	0.215	*	Static pressure, iwg	-0.79
Fuel type	Gas	*	Stack temperature, °F	776.9
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.160
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.56

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.20
B½ particulate matter catch (water), mg	1.24
B½ particulate matter catch ($MeCL_2$), mg	0.03
Total particulate matter catch, mg	1.47

1a	Standard sample volume, dscf	75.466
1b	Water vapor volume, scf	8.8182
1c	Moisture fraction, nondimensional	0.1046
1d	Stack gas molecular weight, dry	29.257
1e	Stack gas molecular weight, wet	28.079
1f	Absolute stack pressure, in Hg	29.312
1g	Stack gas velocity, ft/sec	119.694
1h	Stack flow rate, acfm	1,027,974
1i	Stack flow rate, wscfm	423,383
1j	Stack flow rate, dscfm	379,087
1k	Isokinetic ratio, %	94.2

3a	F½ grain loading, gr/dscf	0.0000
3b	F½ grain loading @ 15% O_2	0.0000
3c	F½ mass emissions, lb/hr	0.1329
	F½ mass emissions, lb/MMBtu	0.0001
3a	B½ grain loading, gr/dscf	0.0003
3b	B½ grain loading @ 15% O_2	0.0002
3c	B½ mass emissions, lb/hr	0.8437
	B½ mass emissions, lb/MMBtu	0.0009
3a	Total grain loading, gr/dscf	0.0003
3b	Total grain loading @ 15% O_2	0.0002
3c	Total mass emissions, lb/hr	0.9766
	Total mass emissions, lb/MMBtu	0.0010

Particulate Matter Result Average
PEC
Turbine #3

Test No:	1-PM-3	2-PM-3	3-PM-3	AVERAGES
Date:	4/23/09	4/23/09	4/23/09	--
Time:	1005-1215	1255-	1620-1836	--
O_2, % volume dry:	13.10	13.08	13.07	13.09
CO_2, % volume dry:	4.60	4.61	4.61	4.61
Stack Temperature, °F:	774.2	776.6	777.0	775.9
Moisture Content, % by volume:	11.18	11.10	11.76	11.35
Flow Rate, dscfm:	348,593	346,644	339,374	344,871
F½ grain loading, gr/dscf.....	0.0030	0.0003	0.0002	0.0012
F½ mass emissions, lb/hr.....	9.08	1.03	0.64	3.58
F½ mass emissions, lb/MMBtu.....	0.010	0.001	0.001	0.004
B½ grain loading, gr/dscf.....	0.0007	0.0004	0.0003	0.0005
B½ mass emissions, lb/hr.....	2.08	1.20	0.89	1.39
B½ mass emissions, lb/MMBtu.....	0.002	0.001	0.001	0.002
Total grain loading, gr/dscf.....	0.0037	0.0008	0.0005	0.0017
Total mass emissions, lb/hr.....	11.16	2.23	1.53	4.98
Total mass emissions, lb/MMBtu.....	0.012	0.002	0.002	0.005

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-PM-3
Unit / Location	Turbine #3	*	Date	4/23/09
Test method	EPA 5/202	*	Start / Stop time	1005-1215

Meter box number	CB-11	*	Barometric pressure, in Hg	29.37
Meter calibration, Yd	0.9720	*	Meter box volume, acf	78.595
Stack area, square feet	143.139	*	Impinger liquid volume, ml	196.2
Reference temperature, °F	60	*	Meter temperature, °F	79.7
Sample time, minutes	120.0	*	Meter pressure, (Delta H) iwg	1.321
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6168
Nozzle diameter, in	0.210	*	Static pressure, iwg	-0.41
Fuel type	Gas	*	Stack temperature, °F	774.2
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.103
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.60

F½ particulate matter catch (filter), mg	9.46
F½ particulate matter catch (acetone), mg	4.82
B½ particulate matter catch (water), mg	3.16
B½ particulate matter catch ($MeCL_2$), mg	0.11
Total particulate matter catch, mg	17.55

1a	Standard sample volume, dscf	72.486
1b	Water vapor volume, scf	9.1203
1c	Moisture fraction, nondimensional	0.1118
1d	Stack gas molecular weight, dry	29.260
1e	Stack gas molecular weight, wet	28.002
1f	Absolute stack pressure, in Hg	29.340
1g	Stack gas velocity, ft/sec	110.603
1h	Stack flow rate, acfm	949,892
1i	Stack flow rate, wscfm	392,454
1j	Stack flow rate, dscfm	348,593
1k	Isokinetic ratio, %	103.1

3a	F½ grain loading, gr/dscf	0.0030
3b	F½ grain loading @ 15% O_2	0.0023
3c	F½ mass emissions, lb/hr	9.0826
	F½ mass emissions, lb/MMBtu	0.0100
3a	B½ grain loading, gr/dscf	0.0007
3b	B½ grain loading @ 15% O_2	0.0005
3c	B½ mass emissions, lb/hr	2.0798
	B½ mass emissions, lb/MMBtu	0.0023
3a	Total grain loading, gr/dscf	0.0037
3b	Total grain loading @ 15% O_2	0.0028
3c	Total mass emissions, lb/hr	11.1624
	Total mass emissions, lb/MMBtu	0.0123

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-PM-3
Unit / Location	Turbine #3	*	Date	4/23/09
Test method	EPA 5/202	*	Start / Stop time	1255-

Meter box number	CB-11	*	Barometric pressure, in Hg	29.31
Meter calibration, Yd	0.9720	*	Meter box volume, acf	78.628
Stack area, square feet	143.139	*	Impinger liquid volume, ml	191.6
Reference temperature, °F	60	*	Meter temperature, °F	87.6
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.321
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6030
Nozzle diameter, in	0.210	*	Static pressure, iwg	-0.41
Fuel type	Gas	*	Stack temperature, °F	776.6
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.080
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.61

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	1.60
B½ particulate matter catch (water), mg	1.75
B½ particulate matter catch ($MeCL_2$), mg	0.12
Total particulate matter catch, mg	3.47

1a	Standard sample volume, dscf	71.325
1b	Water vapor volume, scf	8.9065
1c	Moisture fraction, nondimensional	0.1110
1d	Stack gas molecular weight, dry	29.261
1e	Stack gas molecular weight, wet	28.011
1f	Absolute stack pressure, in Hg	29.280
1g	Stack gas velocity, ft/sec	110.331
1h	Stack flow rate, acfm	947,558
1i	Stack flow rate, wscfm	389,931
1j	Stack flow rate, dscfm	346,644
1k	Isokinetic ratio, %	102.1

3a	F½ grain loading, gr/dscf	0.0003
3b	F½ grain loading @ 15% O_2	0.0003
3c	F½ mass emissions, lb/hr	1.0284
	F½ mass emissions, lb/MMBtu	0.0011
3a	B½ grain loading, gr/dscf	0.0004
3b	B½ grain loading @ 15% O_2	0.0003
3c	B½ mass emissions, lb/hr	1.2020
	B½ mass emissions, lb/MMBtu	0.0013
3a	Total grain loading, gr/dscf	0.0008
3b	Total grain loading @ 15% O_2	0.0006
3c	Total mass emissions, lb/hr	2.2304
	Total mass emissions, lb/MMBtu	0.0025

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-PM-3
Unit / Location	Turbine #3	*	Date	4/23/09
Test method	EPA 5/202	*	Start / Stop time	1620-1836

Meter box number	CB-11	*	Barometric pressure, in Hg	28.28
Meter calibration, Yd	0.9720	*	Meter box volume, acf	78.227
Stack area, square feet	143.139	*	Impinger liquid volume, ml	199.9
Reference temperature, °F	60	*	Meter temperature, °F	77.8
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.312
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6134
Nozzle diameter, in	0.210	*	Static pressure, iwg	-0.60
Fuel type	Gas	*	Stack temperature, °F	777.0
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.073
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.61

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	1.00
B½ particulate matter catch (water), mg	1.29
B½ particulate matter catch ($MeCL_2$), mg	0.09
Total particulate matter catch, mg	2.38

1a	Standard sample volume, dscf	69.722
1b	Water vapor volume, scf	9.2923
1c	Moisture fraction, nondimensional	0.1176
1d	Stack gas molecular weight, dry	29.261
1e	Stack gas molecular weight, wet	27.937
1f	Absolute stack pressure, in Hg	28.236
1g	Stack gas velocity, ft/sec	112.884
1h	Stack flow rate, acfm	969,486
1i	Stack flow rate, wscfm	384,605
1j	Stack flow rate, dscfm	339,374
1k	Isokinetic ratio, %	101.9

3a	F½ grain loading, gr/dscf	0.0002
3b	F½ grain loading @ 15% O_2	0.0002
3c	F½ mass emissions, lb/hr	0.6438
	F½ mass emissions, lb/MMBtu	0.0007
3a	B½ grain loading, gr/dscf	0.0003
3b	B½ grain loading @ 15% O_2	0.0002
3c	B½ mass emissions, lb/hr	0.8884
	B½ mass emissions, lb/MMBtu	0.0010
3a	Total grain loading, gr/dscf	0.0005
3b	Total grain loading @ 15% O_2	0.0004
3c	Total mass emissions, lb/hr	1.5322
	Total mass emissions, lb/MMBtu	0.0017

Particulate Matter Result Average
PEC
Turbine # 4

Test No:	1-PM-4	2-PM-4	3-PM-4	AVERAGES
Date:	4/24/09	4/24/09	4/24/09	--
Time:	0955-1203	1225-1433	1500-1720	--
O_2, % volume dry:	13.31	13.26	13.28	13.28
CO_2, % volume dry:	4.51	4.52	4.51	4.51
Stack Temperature, °F:	774.3	776.8	775.9	775.7
Moisture Content, % by volume:	10.51	10.38	10.08	10.32
Flow Rate, dscfm:	359,079	349,837	356,248	355,055
F½ grain loading, gr/dscf.....	0.0002	0.0001	0.0001	0.0002
F½ mass emissions, lb/hr.....	0.74	0.38	0.37	0.49
F½ mass emissions, lb/MMBtu.....	0.001	0.000	0.000	0.001
B½ grain loading, gr/dscf.....	0.0003	0.0021	0.0017	0.0014
B½ mass emissions, lb/hr.....	0.86	6.32	5.22	4.13
B½ mass emissions, lb/MMBtu.....	0.001	0.007	0.006	0.005
Total grain loading, gr/dscf.....	0.0005	0.0022	0.0018	0.0015
Total mass emissions, lb/hr.....	1.60	6.69	5.59	4.63
Total mass emissions, lb/MMBtu.....	0.002	0.007	0.006	0.005

(1) Species was detected in every sample and sample fraction.

(2) The results were blank-corrected.

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	1-PM-4
Unit / Location	Turbine # 4	*	Date	4/24/09
Test method	EPA 5/202	*	Start / Stop time	0955-1203

Meter box number	CB-03	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9920	*	Meter box volume, acf	76.529
Stack area, square feet	143.139	*	Impinger liquid volume, ml	186.6
Reference temperature, °F	60	*	Meter temperature, °F	67.8
Sample time, minutes	120.0	*	Meter pressure, (Delta H) iwg	1.298
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6897
Nozzle diameter, in	0.207	*	Static pressure, iwg	-0.55
Fuel type	Gas	*	Stack temperature, °F	774.3
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.306
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.51

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	1.15
B½ particulate matter catch (water), mg	1.34
B½ particulate matter catch ($MeCL_2$), mg	0.00
Total particulate matter catch, mg	2.49

1a	Standard sample volume, dscf	73.878
1b	Water vapor volume, scf	8.6741
1c	Moisture fraction, nondimensional	0.1051
1d	Stack gas molecular weight, dry	29.253
1e	Stack gas molecular weight, wet	28.071
1f	Absolute stack pressure, in Hg	29.420
1g	Stack gas velocity, ft/sec	112.781
1h	Stack flow rate, acfm	968,602
1i	Stack flow rate, wscfm	401,239
1j	Stack flow rate, dscfm	359,079
1k	Isokinetic ratio, %	105.0

3a	F½ grain loading, gr/dscf	0.0002
3b	F½ grain loading @ 15% O_2	0.0002
3c	F½ mass emissions, lb/hr	0.7392
	F½ mass emissions, lb/MMBtu	0.0008
3a	B½ grain loading, gr/dscf	0.0003
3b	B½ grain loading @ 15% O_2	0.0002
3c	B½ mass emissions, lb/hr	0.8614
	B½ mass emissions, lb/MMBtu	0.0009
3a	Total grain loading, gr/dscf	0.0005
3b	Total grain loading @ 15% O_2	0.0004
3c	Total mass emissions, lb/hr	1.6006
	Total mass emissions, lb/MMBtu	0.0018

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	2-PM-4
Unit / Location	Turbine # 4	*	Date	4/24/09
Test method	EPA 5/202	*	Start / Stop time	1225-1433

Meter box number	CB-03	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9920	*	Meter box volume, acf	73.756
Stack area, square feet	143.139	*	Impinger liquid volume, ml	178.1
Reference temperature, °F	60	*	Meter temperature, °F	65.5
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.237
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6033
Nozzle diameter, in	0.207	*	Static pressure, iwg	-0.55
Fuel type	Gas	*	Stack temperature, °F	776.8
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.264
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.52

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.58
B½ particulate matter catch (water), mg	9.11
B½ particulate matter catch ($MeCL_2$), mg	0.65
Total particulate matter catch, mg	10.34

1a	Standard sample volume, dscf	71.502
1b	Water vapor volume, scf	8.2790
1c	Moisture fraction, nondimensional	0.1038
1d	Stack gas molecular weight, dry	29.254
1e	Stack gas molecular weight, wet	28.086
1f	Absolute stack pressure, in Hg	29.420
1g	Stack gas velocity, ft/sec	109.941
1h	Stack flow rate, acfm	944,209
1i	Stack flow rate, wscfm	390,343
1j	Stack flow rate, dscfm	349,837
1k	Isokinetic ratio, %	104.3

3a	F½ grain loading, gr/dscf	0.0001
3b	F½ grain loading @ 15% O_2	0.0001
3c	F½ mass emissions, lb/hr	0.3753
	F½ mass emissions, lb/MMBtu	0.0004
3a	B½ grain loading, gr/dscf	0.0021
3b	B½ grain loading @ 15% O_2	0.0016
3c	B½ mass emissions, lb/hr	6.3156
	B½ mass emissions, lb/MMBtu	0.0071
3a	Total grain loading, gr/dscf	0.0022
3b	Total grain loading @ 15% O_2	0.0017
3c	Total mass emissions, lb/hr	6.6909
	Total mass emissions, lb/MMBtu	0.0075

SOURCE TEST DATA SUMMARY

Client	PEC	*	Test number	3-PM-4
Unit / Location	Turbine # 4	*	Date	4/24/09
Test method	EPA 5/202	*	Start / Stop time	1500-1720

Meter box number	CB-03	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	0.9920	*	Meter box volume, acf	76.096
Stack area, square feet	143.139	*	Impinger liquid volume, ml	178.4
Reference temperature, °F	60	*	Meter temperature, °F	64.0
Sample time, minutes	120	*	Meter pressure, (Delta H) iwg	1.270
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.6523
Nozzle diameter, in	0.207	*	Static pressure, iwg	-0.55
Fuel type	Gas	*	Stack temperature, °F	775.9
Fuel "HHV", Btu/scf	1,015	*	Stack O_2, % volume dry	13.283
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack CO_2, % volume dry	4.51

F½ particulate matter catch (filter), mg	0.00
F½ particulate matter catch (acetone), mg	0.58
B½ particulate matter catch (water), mg	7.53
B½ particulate matter catch ($MeCL_2$), mg	0.67
Total particulate matter catch, mg	8.78

1a	Standard sample volume, dscf	73.988
1b	Water vapor volume, scf	8.2929
1c	Moisture fraction, nondimensional	0.1008
1d	Stack gas molecular weight, dry	29.253
1e	Stack gas molecular weight, wet	28.119
1f	Absolute stack pressure, in Hg	29.420
1g	Stack gas velocity, ft/sec	111.503
1h	Stack flow rate, acfm	957,627
1i	Stack flow rate, wscfm	396,179
1j	Stack flow rate, dscfm	356,248
1k	Isokinetic ratio, %	106.0

3a	F½ grain loading, gr/dscf	0.0001
3b	F½ grain loading @ 15% O_2	0.0001
3c	F½ mass emissions, lb/hr	0.3694
	F½ mass emissions, lb/MMBtu	0.0004
3a	B½ grain loading, gr/dscf	0.0017
3b	B½ grain loading @ 15% O_2	0.0013
3c	B½ mass emissions, lb/hr	5.2219
	B½ mass emissions, lb/MMBtu	0.0058
3a	Total grain loading, gr/dscf	0.0018
3b	Total grain loading @ 15% O_2	0.0014
3c	Total mass emissions, lb/hr	5.5912
	Total mass emissions, lb/MMBtu	0.0062

Appendix F.6

Polycyclic Aromatic Hydrocarbon Spreadsheets

POLYCYCLIC AROMATIC HYDROCARBON TEST RESULTS
PANOCHE ENERGY CENTER
UNIT 2 STACK

Test No:	1-PAH-2	2-PAH-2	3-PAH-2				FB-PAH-Out-2
Date:	4/28/09	4/29/09	4/29/09				4/29/09
Time:	1237-1656	0900-1308	1348-1759				--
Flow Rate, dscfm:	368,267	365,254	359,263				364,261
Sample Volume, dscf:	149.28	146.76	144.87		AVERAGES		146.97
Temperature, °F	773.8	770.3	776.3				773.5
O_2, % volume dry:	13.18	13.17	13.14				13.16
CO_2, % volume dry:	4.58	4.61	4.57				4.59
H_2O, % by volume:	9.85	10.11	9.95				9.97
Species	**ng/m^3**	**ng/m^3**	**ng/m^3**	**ng/m^3**	**@12% CO2**	**g/s**	**ng/m^3**
Naphthalene	ND< 232.99	ND< 236.99	ND< 240.1	ND< 236.7	ND< 619.3	ND< 4.07E-05	ND< 236.7
Benz(a)anthracene	ND< 2.365	ND< 2.406	ND< 2.925	ND< 2.565	ND< 6.712	ND< 4.40E-07	ND< 2.403
Chrysene	ND< 2.365	ND< 2.406	ND< 24.37	ND< 9.715	ND< 25.42	ND< 1.65E-06	ND< 2.403
Benzo(b)fluoranthene	4.210	ND< 2.406	ND< 24.37	< 10.33	< 27.03	< 1.76E-06	ND< 2.403
Benzo(k)fluoranthene	ND< 2.365	ND< 2.406	ND< 2.437	ND< 2.403	ND< 6.287	ND< 4.13E-07	ND< 2.403
Benzo(a)pyrene	ND< 2.365	ND< 2.406	ND< 2.437	ND< 2.403	ND< 6.287	ND< 4.13E-07	ND< 2.403
Indeno(1,2,3-cd)pyrene	11.827	ND< 2.406	ND< 2.437	< 5.557	< 14.54	< 9.60E-07	ND< 2.403
Dibenzo(a,h)anthracene	ND< 2.365	ND< 2.406	ND< 2.437	ND< 2.403	ND< 6.287	ND< 4.13E-07	ND< 2.403
Total PAH	< 260.9	< 253.8	< 301.5	< 272.1	< 711.8	< 4.67E-05	< 253.5
Total w/o Naphthalene	< 27.86	< 16.84	< 61.42	< 35.38	< 92.56	< 6.05E-06	< 16.82

ND< - species was not detected in the sample.

< - species was detected in at least one sample or sample fraction, but not in all samples or sample fractions.

(1) No blank corrections of any kind were made to sample values.

(2) The field blank values presented were calculated using the average sample volume from these tests.

(3) Non-detected values are reported at the detection limit.

POLYCYCLIC AROMATIC HYDROCARBONS LABORATORY SUMMARY
PANOCHE ENERGY CENTER
UNIT 2 STACK

Client:	Panoche	**Initials:**	JSK
Location:	Turbine #2	**Sample Vol., dscf**	149.276
Test Date:	4/28/09	**Flow Rate. dscfm:**	368,267
Test Number:	1-PAH-2	**O_2, % vol. dry:**	13.18
T Ref (F)	60	**CO_2, % vol. dry:**	4.581
Fd @ 68F	#N/A		

SPECIES	ng/train	ng/dscm	ng/m^3	ng/m^3 @ 12% CO	lb/hr
Naphthalene	ND< 985.0	ND< 232.99	ND< 233.0	ND< 610.3	ND< 3.21E-04
Benz(a)anthracene	ND< 10.00	ND< 2.365	ND< 2.365	ND< 6.196	ND< 3.26E-06
Chrysene	ND< 10.00	ND< 2.365	ND< 2.365	ND< 6.196	ND< 3.26E-06
Benzo(b)fluoranthene	17.80	4.210	4.210	11.029	5.80E-06
Benzo(k)fluoranthene	ND< 10.00	ND< 2.365	ND< 2.365	ND< 6.196	ND< 3.26E-06
Benzo(a)pyrene	ND< 10.00	ND< 2.365	ND< 2.365	ND< 6.196	ND< 3.26E-06
Indeno(1,2,3-cd)pyrene	50.00	11.827	11.83	30.980	1.63E-05
Dibenzo(a,h)anthracene	ND< 10.00	ND< 2.365	ND< 2.365	ND< 6.196	ND< 3.26E-06

Note: No blank corrections of any kind were made to sample values.

POLYCYCLIC AROMATIC HYDROCARBONS LABORATORY SUMMARY
PANOCHE ENERGY CENTER
UNIT 2 STACK

Client:	Panoche	**Initials:**	JSK
Location:	Turbine #2	**Sample Vol., dscf**	146.756
Test Date:	4/29/09	**Flow Rate. dscfm:**	365,254
Test Number:	2-PAH-2	**O_2, % vol. dry:**	13.17
T Ref (F)	60	**CO_2, % vol. dry:**	4.609
Fd @ 68F	#N/A		

SPECIES	ng/train	ng/dscm	ng/m^3	ng/m^3 @ 12% CO	lb/hr
Naphthalene	ND< 985.0	ND< 236.99	ND< 237.0	ND< 617.1	ND< 3.24E-04
Benz(a)anthracene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06
Chrysene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06
Benzo(b)fluoranthene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06
Benzo(k)fluoranthene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06
Benzo(a)pyrene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06
Indeno(1,2,3-cd)pyrene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06
Dibenzo(a,h)anthracene	ND< 10.00	ND< 2.406	ND< 2.406	ND< 6.265	ND< 3.29E-06

Note: No blank corrections of any kind were made to sample values.

POLYCYCLIC AROMATIC HYDROCARBONS LABORATORY SUMMARY
PANOCHE ENERGY CENTER
UNIT 2 STACK

Client:	Panoche	**Initials:**	JSK
Location:	Turbine #2	**Sample Vol., dscf:**	144.866
Test Date:	4/29/09	**Flow Rate. dscfm:**	359,263
Test Number:	3-PAH-2	**O_2, % vol. dry:**	13.14
T Ref (F)	60	**CO_2, % vol. dry:**	4.569
Fd @ 68F	#N/A		

SPECIES	ng/train	ng/dscm	ng/m^3	ng/m^3 @ 12% CO	lb/hr
Naphthalene	ND< 985.0	ND< 240.09	ND< 240.1	ND< 630.5	ND< 3.23E-04
Benz(a)anthracene	ND< 12.00	ND< 2.925	ND< 2.925	ND< 7.682	ND< 3.93E-06
Chrysene	ND< 100.00	ND< 24.374	ND< 24.37	ND< 64.013	ND< 3.28E-05
Benzo(b)fluoranthene	ND< 100.00	ND< 24.374	ND< 24.37	ND< 64.013	ND< 3.28E-05
Benzo(k)fluoranthene	ND< 10.00	ND< 2.437	ND< 2.437	ND< 6.401	ND< 3.28E-06
Benzo(a)pyrene	ND< 10.00	ND< 2.437	ND< 2.437	ND< 6.401	ND< 3.28E-06
Indeno(1,2,3-cd)pyrene	ND< 10.00	ND< 2.437	ND< 2.437	ND< 6.401	ND< 3.28E-06
Dibenzo(a,h)anthracene	ND< 10.00	ND< 2.437	ND< 2.437	ND< 6.401	ND< 3.28E-06

Note: No blank corrections of any kind were made to sample values.

SOURCE TEST DATA SUMMARY

Client	Panoche	*	Test Number	1-PAH-2
Unit / Location	Turbine #2	*	Date	4/28/09
Test Method	CARB 429	*	Start / Stop Time	1237-1656

Meter Box Number	CB-11	*	Barometric Press (in Hg)	29.84
Meter Calibration (Yd)	0.9720	*	Meter Volume (acf)	154.765
Stack Area (square feet)	143.139	*	Liquid Volume (ml)	350.9
Reference Temperature (°F)	60	*	Meter Temperature (°F)	64.3
Sample Time (Minutes)	240	*	Meter Pressure (iwg)	1.330
Pitot Coefficient	0.8315	*	Velocity Head (iwg)	1.7278
Nozzle Diameter (in)	0.210	*	Static Pressure (iwg)	0.76
Fuel Type	Nat. Gas	*	Stack Temperature (°F)	773.8
Fuel "HHV" (Btu/scf)	#N/A	*	Stack O_2 (%)	13.18
Fuel "F" Factor (dscf/MMBtu)	#N/A	*	Stack CO_2 (%)	4.581

a	Standard Sample Volume (dscf)	149.28
b	Water Vapor Volume (scf)	16.312
c	Moisture Fraction (nondimensional)	0.0985
d_1	Stack Gas Molecular Weight (dry)	29.260
d_2	Stack Gas Molecular Weight (wet)	28.151
e	Absolute Stack Pressure (in Hg)	29.896
f	Stack Gas Velocity (ft/sec)	112.949
g	Stack Flow Rate (acfm)	970,045
h_1	Stack Flow Rate (dscfm)	368,267
h_2	Stack Flow Rate (wscfm)	408,508
i	Isokinetic Ratio (%)	100.5

SOURCE TEST DATA SUMMARY

Client	Panoche	*	Test Number	2-PAH-2
Unit / Location	Turbine #2	*	Date	4/29/09
Test Method	CARB 429	*	Start / Stop Time	0900-1308

Meter Box Number	CB-11	*	Barometric Press (in Hg)	29.64
Meter Calibration (Yd)	0.9720	*	Meter Volume (acf)	152.099
Stack Area (square feet)	143.139	*	Liquid Volume (ml)	354.9
Reference Temperature (°F)	60	*	Meter Temperature (°F)	60.6
Sample Time (Minutes)	240	*	Meter Pressure (iwg)	1.320
Pitot Coefficient	0.8315	*	Velocity Head (iwg)	1.7207
Nozzle Diameter (in)	0.210	*	Static Pressure (iwg)	-0.72
Fuel Type	Nat. Gas	*	Stack Temperature (°F)	770.3
Fuel "HHV" (Btu/scf)	#N/A	*	Stack O_2 (%)	13.17
Fuel "F" Factor (dscf/MMBtu)	#N/A	*	Stack CO_2 (%)	4.609

a	Standard Sample Volume (dscf)	146.76
b	Water Vapor Volume (scf)	16.497
c	Moisture Fraction (nondimensional)	0.1011
d_1	Stack Gas Molecular Weight (dry)	29.264
d_2	Stack Gas Molecular Weight (wet)	28.126
e	Absolute Stack Pressure (Hg)	29.587
f	Stack Gas Velocity (ft/sec)	113.193
g	Stack Flow Rate (acfm)	972,141
h_1	Stack Flow Rate (dscfm)	365,254
h_2	Stack Flow Rate (wscfm)	406,314
i	Isokinetic Ratio (%)	99.7

SOURCE TEST DATA SUMMARY

Client	Panoche	*	Test Number	3-PAH-2
Unit / Location	Turbine #2	*	Date	4/29/09
Test Method	CARB 429	*	Start / Stop Time	1348-1759

Meter Box Number	CB-11	*	Barometric Press (in Hg)	29.52
Meter Calibration (Yd)	0.9720	*	Meter Volume (acf)	153.569
Stack Area (square feet)	143.139	*	Liquid Volume (ml)	344.4
Reference Temperature (°F)	60	*	Meter Temperature (°F)	70.3
Sample Time (Minutes)	240	*	Meter Pressure (iwg)	1.290
Pitot Coefficient	0.8315	*	Velocity Head (iwg)	1.6747
Nozzle Diameter (in)	0.210	*	Static Pressure (iwg)	-0.76
Fuel Type	Nat. Gas	*	Stack Temperature (°F)	776.3
Fuel "HHV" (Btu/scf)	#N/A	*	Stack O_2 (%)	13.14
Fuel "F" Factor (dscf/MMBtu)	#N/A	*	Stack CO_2 (%)	4.569

a	Standard Sample Volume (dscf)	144.87
b	Water Vapor Volume (scf)	16.009
c	Moisture Fraction (nondimensional)	0.0995
d_1	Stack Gas Molecular Weight (dry)	29.257
d_2	Stack Gas Molecular Weight (wet)	28.136
e	Absolute Stack Pressure (Hg)	29.464
f	Stack Gas Velocity (ft/sec)	112.154
g	Stack Flow Rate (acfm)	963,217
h_1	Stack Flow Rate (dscfm)	359,263
h_2	Stack Flow Rate (wscfm)	398,965
i	Isokinetic Ratio (%)	100.0

Appendix F.7

Aldehyde Spreadsheets

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Unit	Turbine #2
Test method	CARB 430	*	Date	4/28/09 - 4/29/09

Stack area, square feet	78.540	*	Compound	Formaldehyde
Orifice ID	22	*	Compound molecular weight	30.0
Reference temperature, °F	60	*	Barometric pressure, in Hg	29.58
Stack gas molecular weight	29.260	*	Fuel "F" factor, dscf/MMBtu	N/A

Field Blanks		*µg/sample*	*sample vol, ml*
Test number	FB-Form-1	*0.50*	9.0
Test number	FB-Form-2	*0.50*	9.0
Test number	FB-Form-3	*0.50*	9.0
Total		1.50	27.0

Samples		*µg/sample*	*sample vol, ml*
Test number	Form-1		
Vial number	1-Form-1	0.79	15.0
Vial number	2-Form-1	0.57	10.0
Total		1.36	25.0
Test number	Form-2		
Vial number	1-Form-2	0.77	16.0
Vial number	2-Form-2	*0.50*	9.0
Total		*1.27*	25.0
Test number	Form-3		
Vial number	1-Form-3	*0.50*	16.0
Vial number	2-Form-3	0.56	10.0
Total		*1.06*	26.0

Sampling Data

Run 1	
Time	1308-1708
Flow Rate, dscf	368,267
O_2, % volume dry	13.177
Sample run time, minutes	240
Sample volume, liters	93.02
Sample volume, dscm	0.089
Run 2	
Time	0914-1314
Flow Rate, dscf	365,254
O_2, % volume dry	13.167
Sample run time, minutes	240
Sample Volume, liters	93.02
Sample Volume, dscm	0.089
Run 3	
Time	1402-1802
Flow Rate, dscf	359,263
O_2, % volume dry	13.138
Sample run time, minutes	240
Sample Volume, liters	93.02
Sample Volume, dscm	0.089

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Unit	Turbine #2
Test method	CARB 430	*	Date	4/28/09 - 4/29/09

Stack area, square feet	78.540	*	Compound	Acetaldehyde
Orifice ID	22	*	Compound molecular weight	44.1
Reference temperature, °F	60	*	Barometric pressure, in Hg	29.58
Stack gas molecular weight	29.260	*	Fuel "F" factor, dscf/MMBtu	N/A

Field Blanks		*µg/sample*	*sample vol, ml*
Test number	FB-Form-1	*0.50*	9.0
Test number	FB-Form-2	*0.50*	9.0
Test number	FB-Form-3	*0.50*	9.0
Total		*1.50*	27.0

Samples		*µg/sample*	*sample vol, ml*
Test number	Form-1		
Vial number	1-Form-1	*0.50*	15.0
Vial number	2-Form-1	*0.50*	10.0
Total		*1.00*	25.0
Test number	Form-2		
Vial number	1-Form-2	*0.50*	16.0
Vial number	2-Form-2	*0.50*	9.0
Total		*1.00*	25.0
Test number	Form-3		
Vial number	1-Form-3	*0.50*	16.0
Vial number	2-Form-3	*0.50*	10.0
Total		*1.00*	26.0

Sampling Data

Run 1	
Time	1308-1708
Flow Rate, dscf	368,267
O_2, % volume dry	13.177
Sample run time, minutes	240
Sample volume, liters	93.02
Sample volume, dscm	0.09023
Run 2	
Time	0914-1314
Flow Rate, dscf	365,254
O_2, % volume dry	13.167
Sample run time, minutes	240
Sample Volume, liters	93.02
Sample Volume, dscm	0.09023
Run 3	
Time	1402-1802
Flow Rate, dscf	359,263
O_2, % volume dry	13.138
Sample run time, minutes	240
Sample Volume, liters	93.02
Sample Volume, dscm	0.09023

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Unit	Turbine #2
Test method	CARB 430	*	Date	4/28/09 - 4/29/09

Stack area, square feet	78.540	*	Compound	Acrolein
Orifice ID	22	*	Compound molecular weight	56.1
Reference temperature, °F	60	*	Barometric pressure, in Hg	29.58
Stack gas molecular weight	29.260	*	Fuel "F" factor, dscf/MMBtu	N/A

Field Blanks		*µg/sample*	*sample vol, ml*
Test number	FB-Form-1	*0.50*	9.0
Test number	FB-Form-2	*0.50*	9.0
Test number	FB-Form-3	*0.50*	9.0
Total		*1.50*	27.0

Samples		*µg/sample*	*sample vol, ml*
Test number	Form-1		
Vial number	1-Form-1	*0.50*	15.0
Vial number	2-Form-1	*0.50*	10.0
Total		*1.00*	25.0
Test number	Form-2		
Vial number	1-Form-2	*0.50*	16.0
Vial number	2-Form-2	*0.50*	9.0
Total		*1.00*	25.0
Test number	Form-3		
Vial number	1-Form-3	*0.50*	16.0
Vial number	2-Form-3	*0.50*	10.0
Total		*1.00*	26.0

Sampling Data

Run 1	
Time	1308-1708
Flow Rate, dscf	368,267
O_2, % volume dry	13.177
Sample run time, minutes	240
Sample volume, liters	93.02
Sample volume, dscm	0.09023
Run 2	
Time	0914-1314
Flow Rate, dscf	365,254
O_2, % volume dry	13.167
Sample run time, minutes	240
Sample Volume, liters	93.02
Sample Volume, dscm	0.09023
Run 3	
Time	1402-1802
Flow Rate, dscf	359,263
O_2, % volume dry	13.138
Sample run time, minutes	240
Sample Volume, liters	93.02
Sample Volume, dscm	0.09023

Formaldehyde Test Results
Panoche Energy Center
Turbine #2

Test No.:	Form-1	Form-2	Form-3	Averages
Date:	4/28/09 - 4/29/09	4/28/09 - 4/29/09	4/28/09 - 4/29/09	--
Time:	1308-1708	0914-1314	1402-1802	--
Kiln Feed Rate, tons/hour:	179.9	179.9	179.9	179.9
Flow Rate, dscf:	368,267	365,254	359,263	364,261
O_2, % volume dry:	13.18	13.17	13.14	13.16
CO_2, % volume dry:	18.59	18.59	18.50	18.56
Stack temperature, °F:	191.5	191.5	188.2	190.4
H_20, % by volume:	10.58	10.58	10.87	10.68
Sample Volume, dscm:	0.089	0.089	0.089	0.089
Calculations		*Non-blank Corrected Values*		
Formaldehyde concentration, ug/dscm	15.24	*14.23*	*11.88*	*13.78*
Formaldehyde concentration, lb/hr	2.10E-02	*1.95E-02*	*1.60E-02*	*1.88E-02*
Calculations		*Reporting Limit Values*		
Formaldehyde concentration, ug/dscm	77.81	*77.81*	*80.92*	*78.84*
Formaldehyde concentration, lb/hr	1.07E-01	*1.06E-01*	*1.09E-01*	*1.07E-01*

Sample to Blank Ratio
Form-1
-0.02
Form-2
-0.09
Form-3
-0.27

Acetaldehyde Test Results
Panoche Energy Center
Turbine #2

Test No.:	Form-1	Form-2	Form-3	Averages
Date:	4/28/09 - 4/29/09	4/28/09 - 4/29/09	4/28/09 - 4/29/09	--
Time:	1308-1708	0914-1314	1402-1802	--
Kiln Feed Rate, tons/hour:	179.9	179.9	179.9	179.9
Flow Rate, dscf:	368,267	365,254	359,263	364,261
O_2, % volume dry:	13.18	13.17	13.14	13.16
CO_2, % volume dry:	18.59	18.59	18.50	18.56
Stack temperature, °F:	191.5	191.5	188.2	190.4
H_20, % by volume:	10.58	10.58	10.87	10.68
Sample Volume, dscm:	0.090	0.090	0.090	0.090
Calculations		*Non-blank Corrected Values*		
Formaldehyde concentration, ug/dscm	*11.08*	*11.08*	*11.08*	*11.08*
Acetaldehyde concentration, lb/hr	*1.53E-02*	*1.52E-02*	*1.49E-02*	*1.51E-02*
Calculations		*Reporting Limit Values*		
Formaldehyde concentration, ug/dscm	*76.97*	*76.97*	*80.04*	*77.99*
Acetaldehyde concentration, lb/hr	*1.06E-01*	*1.05E-01*	*1.08E-01*	*1.06E-01*

Sample to Blank Ratio
Form-1
-0.28
Form-2
-0.28
Form-3
-0.31

Acrolein Test Results
Panoche Energy Center
Turbine #2

Test No.:	Form-1	Form-2	Form-3	Averages
Date:	4/28/09 - 4/29/09	4/28/09 - 4/29/09	4/28/09 - 4/29/09	--
Time:	1308-1708	0914-1314	1402-1802	--
Kiln Feed Rate, tons/hour:	179.9	179.9	179.9	179.9
Flow Rate, dscf:	368,267	365,254	359,263	364,261
O_2, % volume dry:	13.18	13.17	13.14	13.16
CO_2, % volume dry:	18.59	18.59	18.50	18.56
Stack temperature, °F:	191.5	191.5	188.2	190.4
H_20, % by volume:	10.58	10.58	10.87	10.68
Sample Volume, dscm:	0.090	0.090	0.090	0.090
Calculations		*Non-blank Corrected Values*		
Formaldehyde concentration, ug/dscm	*11.08*	*11.08*	*11.08*	*11.08*
Acrolein concentration, lb/hr	*1.53E-02*	*1.52E-02*	*1.49E-02*	*1.51E-02*
Calculations		*Reporting Limit Values*		
Formaldehyde concentration, ug/dscm	*76.97*	*76.97*	*80.04*	*77.99*
Acrolein concentration, lb/hr	*1.06E-01*	*1.05E-01*	*1.08E-01*	*1.06E-01*

Sample to Blank Ratio
Form-1
-0.28
Form-2
-0.28
Form-3
-0.31

Appendix F.8

Volatile Organic Compounds Spreadsheets

TNMEOC Average Test Results
Panoche Energy Center
Unit 1

Test number	1-VOC-1	2-VOC-1	3-VOC-1	Average
Date	4/30/09	4/30/09	4/30/09	--
Start / Stop time	1714-1744	1809-1839	1852-1922	--
O2, % volume dry	13.17	13.17	13.16	**13.17**
CO2, % volume dry	4.575	4.565	4.557	**4.566**
Stack Flow Rate based on fuel flow (dscfm)	337,702	337,934	337,628	**337,755**
TNMEOC concentrations, ppm volume dry as CH4	0.259	0.525	0.266	**0.350**
TNMEOC concentrations, ppm @ 15% O2 dry as CH4	0.198	0.401	0.203	**0.267**
TNMEOC mass emissions, lb/hr as CH4	0.222	0.450	0.228	**0.300**
TNMEOC mass emissions, lb/MMBtu as CH4	0.0003	0.0005	0.0003	**0.0003**
TNMEOC mass emissions, lb/hr as C	0.166	0.337	0.171	**0.224**
TNMEOC mass emissions, lb/MMBtu as C	0.0002	0.0004	0.0002	**0.0003**

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	1-VOC-1
Unit / Location	Unit 1	*	Date	4/30/09
Test method	EPA TO-12	*	Start / Stop time	1714-1744

Meter box number	N/A	*	Barometric pressure, in Hg	29.49
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.170
CO_2, % volume dry	4.58

Stack Flow Rate based on fuel flow (dscfm)	337,702

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.037
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.26
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.20
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.222
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0003
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.166
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0002

SOURCE TEST DATA SUMMARY

	Client	Panoche Energy Center	*	Test number	2-VOC-1
	Unit / Location	Unit 1	*	Date	4/30/09
	Test method	EPA TO-12	*	Start / Stop time	1809-1839
	Meter box number	N/A	*	Barometric pressure, in Hg	29.49
	Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
	Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
	Reference temperature, °F	60	*	Meter temperature, °F	N/A
	Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
	Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
	Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
	Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A
	O_2, % volume dry				13.170
	CO_2, % volume dry				4.565
	Stack Flow Rate based on fuel flow (dscfm)				337,934
	Concentrations				
	TNMEOC emissions, ppm volume dry as C_7H_{16}				0.075
2d	TNMEOC concentrations, ppm volume dry as CH_4				0.53
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4				0.40
	Mass Emissions as Methane				
2e	TNMEOC mass emissions, lb/hr as CH_4				0.450
2f	TNMEOC mass emissions, lb/MMBtu as CH_4				0.0005
	Mass Emissions as Carbon				
2e	TNMEOC mass emissions, lb/hr as C				0.337
2f	TNMEOC mass emissions, lb/MMBtu as C				0.0004

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	3-VOC-1
Unit / Location	Unit 1	*	Date	4/30/09
Test method	EPA TO-12	*	Start / Stop time	1852-1922

Meter box number	N/A	*	Barometric pressure, in Hg	29.49
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,710	*	Stack temperature, °F	N/A

O_2, % volume dry	13.160
CO_2, % volume dry	4.557

Stack Flow Rate based on fuel flow (dscfm)	337,628

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.038
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.27
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.20
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.228
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0003
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.171
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0002

TNMEOC Average Test Results
Panoche Energy Center
Unit 2

	1-VOC-2	2-VOC-2	3-VOC-2	Average
Test number	1-VOC-2	2-VOC-2	3-VOC-2	Average
Date	4/29/09	4/29/09	4/29/09	--
Start / Stop time	1053-1123	1157-1227	1236-1306	--
O2, % volume dry	13.13	13.13	13.10	**13.12**
CO2, % volume dry	4.683	4.592	4.589	**4.621**
TNMEOC concentrations, ppm volume dry as CH4	0.196	0.238	0.189	**0.208**
TNMEOC concentrations, ppm @ 15% O2 dry as CH4	0.149	0.181	0.143	**0.158**
TNMEOC mass emissions, lb/hr as CH4	0.170	0.207	0.163	**0.180**
TNMEOC mass emissions, lb/MMBtu as CH4	0.0002	0.0002	0.0002	**0.0002**
TNMEOC mass emissions, lb/hr as C	0.127	0.155	0.122	**0.135**
TNMEOC mass emissions, lb/MMBtu as C	0.0001	0.0002	0.0001	**0.0002**

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	1-VOC-2
Unit / Location	Unit 2	*	Date	4/29/09
Test method	EPA TO-12	*	Start / Stop time	1053-1123

Meter box number	N/A	*	Barometric pressure, in Hg	29.40
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.130
CO_2, % volume dry	4.683

Stack Flow Rate based on fuel flow (dscfm)	341,934

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.028
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.20
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.15
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.170
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0002
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.127
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0001

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number		2-VOC-2
Unit / Location	Unit 2	*	Date		4/29/09
Test method	EPA TO-12	*	Start / Stop time		1157-1227
Meter box number	N/A	*	Barometric pressure, in Hg		29.40
Meter calibration, Yd	N/A	*	Meter box volume, acf		N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml		N/A
Reference temperature, °F	60	*	Meter temperature, °F		N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg		N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg		N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg		N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F		N/A

	O_2, % volume dry	13.130
	CO_2, % volume dry	4.592
	Stack Flow Rate based on fuel flow (dscfm)	342,771
	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.034
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.24
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.18
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.207
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0002
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.155
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0002

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	3-VOC-2
Unit / Location	Unit 2	*	Date	4/29/09
Test method	EPA TO-12	*	Start / Stop time	1236-1306

Meter box number	N/A	*	Barometric pressure, in Hg	29.40
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.100
CO_2, % volume dry	4.589

Stack Flow Rate based on fuel flow (dscfm)	340,866

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.027
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.19
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.14
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.163
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0002
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.122
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0001

TNMEOC Average Test Results
Panoche Energy Center
Unit 3

Test number	**1-VOC-3**	**2-VOC-3**	**3-VOC-3**	**Average**
Date	4/23/09	4/23/09	4/23/09	--
Start / Stop time	1010-1040	1100-1130	1145-1215	--
O2, % volume dry	13.14	13.09	13.08	**13.10**
CO2, % volume dry	4.573	4.607	4.621	**4.600**
Stack Flow Rate based on fuel flow (dscfm)	339,366	337,766	337,554	**338,229**
TNMEOC concentrations, ppm volume dry as CH4	0.294	1.050	0.189	**0.511**
TNMEOC concentrations, ppm @ 15% O2 dry as CH4	0.224	0.793	0.143	**0.386**
TNMEOC mass emissions, lb/hr as CH4	0.253	0.899	0.162	**0.438**
TNMEOC mass emissions, lb/MMBtu as CH4	0.0003	0.0010	0.0002	**0.0005**
TNMEOC mass emissions, lb/hr as C	0.189	0.673	0.121	**0.328**
TNMEOC mass emissions, lb/MMBtu as C	0.0002	0.0008	0.0001	**0.0004**

Note: Data in italics have values less than the detection limit and are reported at the detection limit.

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	1-VOC-3
Unit / Location	Unit 3	*	Date	4/23/09
Test method	EPA TO-12	*	Start / Stop time	1010-1040

Meter box number	N/A	*	Barometric pressure, in Hg	29.31
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.140
CO_2, % volume dry	4.57

Stack Flow Rate based on fuel flow (dscfm)	339,366

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.042
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.29
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.22
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.253
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0003
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.189
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0002

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number		2-VOC-3
Unit / Location	Unit 3	*	Date		4/23/09
Test method	EPA TO-12	*	Start / Stop time		1100-1130
Meter box number	N/A	*	Barometric pressure, in Hg		29.37
Meter calibration, Yd	N/A	*	Meter box volume, acf		N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml		N/A
Reference temperature, °F	60	*	Meter temperature, °F		N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg		N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg		N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg		N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F		N/A

	O_2, % volume dry	13.090
	CO_2, % volume dry	4.607
	Stack Flow Rate based on fuel flow (dscfm)	337,766
	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.150
2d	TNMEOC concentrations, ppm volume dry as CH_4	1.05
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.79
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.899
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0010
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.673
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0008

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	3-VOC-3
Unit / Location	Unit 3	*	Date	4/23/09
Test method	EPA TO-12	*	Start / Stop time	1145-1215

Meter box number	N/A	*	Barometric pressure, in Hg	29.37
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,710	*	Stack temperature, °F	N/A

O_2, % volume dry	13.080
CO_2, % volume dry	4.621

Stack Flow Rate based on fuel flow (dscfm)	337,554

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.027
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.19
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.14
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.162
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0002
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.121
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0001

TNMEOC Average Test Results
Panoche Energy Center
Unit 4

Test number	1-VOC-4	2-VOC-4	3-VOC-4	Average
Date	4/24/09	4/24/09	4/24/09	--
Start / Stop time	0915-0945	1009-1039	1100-1130	--
O2, % volume dry	13.33	13.31	13.31	**13.32**
CO2, % volume dry	4.493	4.491	4.507	**4.497**
TNMEOC concentrations, ppm volume dry as CH4	0.329	0.140	0.217	**0.229**
TNMEOC concentrations, ppm @ 15% O2 dry as CH4	0.256	0.109	0.169	**0.178**
TNMEOC mass emissions, lb/hr as CH4	0.289	0.121	0.187	**0.199**
TNMEOC mass emissions, lb/MMBtu as CH4	0.0003	0.0001	0.0002	**0.0002**
TNMEOC mass emissions, lb/hr as C	0.216	0.091	0.140	**0.149**
TNMEOC mass emissions, lb/MMBtu as C	0.0002	0.0001	0.0002	**0.0002**

Note: Data in italics have values less than the detection limit and are reported at the detection limit.

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	1-VOC-4
Unit / Location	Unit 4	*	Date	4/24/09
Test method	EPA TO-12	*	Start / Stop time	0915-0945

Meter box number	N/A	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.330
CO_2, % volume dry	4.493

Stack Flow Rate based on fuel flow (dscfm)	346,259

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.047
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.33
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.26
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.289
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0003
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.216
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0002

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	2-VOC-4
Unit / Location	Unit 4	*	Date	4/24/09
Test method	EPA TO-12	*	Start / Stop time	1009-1039

Meter box number	N/A	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.310
CO_2, % volume dry	4.491

Stack Flow Rate based on fuel flow (dscfm)	340,514

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.020
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.14
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.11
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.121
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0001
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.091
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0001

SOURCE TEST DATA SUMMARY

Client	Panoche Energy Center	*	Test number	3-VOC-4
Unit / Location	Unit 4	*	Date	4/24/09
Test method	EPA TO-12	*	Start / Stop time	1100-1130

Meter box number	N/A	*	Barometric pressure, in Hg	29.46
Meter calibration, Yd	N/A	*	Meter box volume, acf	N/A
Stack area, square feet	N/A	*	Impinger liquid volume, ml	N/A
Reference temperature, °F	60	*	Meter temperature, °F	N/A
Sample time, minutes	30	*	Meter pressure, (Delta H) iwg	N/A
Pitot coefficient	N/A	*	Velocity head, (Delta P) iwg	N/A
Fuel "HHV", Btu/scf	1,015	*	Static pressure, iwg	N/A
Fuel "F" factor, dscf/MMBtu	8,595	*	Stack temperature, °F	N/A

O_2, % volume dry	13.310
CO_2, % volume dry	4.507

Stack Flow Rate based on fuel flow (dscfm)	339,669

	Concentrations	
	TNMEOC emissions, ppm volume dry as C_7H_{16}	0.031
2d	TNMEOC concentrations, ppm volume dry as CH_4	0.22
2b	TNMEOC concentrations, ppm @ 15% O_2 dry as CH_4	0.17
	Mass Emissions as Methane	
2e	TNMEOC mass emissions, lb/hr as CH_4	0.187
2f	TNMEOC mass emissions, lb/MMBtu as CH_4	0.0002
	Mass Emissions as Carbon	
2e	TNMEOC mass emissions, lb/hr as C	0.140
2f	TNMEOC mass emissions, lb/MMBtu as C	0.0002

Appendix F.9

Volatile Hazardous Air Pollutant Spreadsheets

HAP RESULTS SUMMARY
Panoche
Turbine #2

Test No:	1-HAP	2-HAP	3-HAP	AVERAGES
Date:	4/28/09	4/29/09	4/29/09	--
Time:	1237-1337	0900-1000	1348-1448	--
O_2, % volume dry:	13.18	13.17	13.14	13.16
CO_2, % volume dry:	4.58	4.61	4.57	4.59
Stack Temperature, °F:	773.8	770.3	776.3	773.5
Moisture Content, % by volume:	9.85	10.11	9.95	9.97
Flow Rate, dscfm:	368,267	365,254	359,263	364,261
Standard sample volume, dscf:	149.28	146.76	144.87	146.97
1,3-Butadiene, ug/m3	ND< 1.90	ND< 1.80	ND< 1.90	ND< 1.87
1,3-Butadiene, ug/m3 @ 15% O2	ND< 1.45	ND< 1.37	ND< 1.44	ND< 1.42
1,3-Butadiene, lb/hr	ND< 0.003	ND< 0.002	ND< 0.003	ND< 0.003
Benzene, ug/m3	ND< 2.80	ND< 2.70	ND< 2.70	ND< 2.73
Benzene, ug/m3 @ 15% O2	ND< 2.14	ND< 2.06	ND< 2.05	ND< 2.08
Benzene, lb/hr	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
Ethyl Benzene, ug/m3	ND< 3.80	ND< 3.60	ND< 3.70	ND< 3.70
Ethyl Benzene, ug/m3 @ 15% O2	ND< 2.90	ND< 2.75	ND< 2.81	ND< 2.82
Ethyl Benzene, lb/hr	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
Hexane, ug/m3	ND< 3.00	ND< 3.00	ND< 3.00	ND< 3.00
Hexane, ug/m3 @ 15% O2	ND< 2.29	ND< 2.29	ND< 2.28	ND< 2.29
Hexane, lb/hr	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
Propylene, ug/m3	ND< 6.04	ND< 6.04	ND< 6.04	ND< 6.04
Propylene, ug/m3 @ 15% O2	ND< 4.61	ND< 4.61	ND< 4.59	ND< 4.60
Propylene, lb/hr	ND< 0.008	ND< 0.008	ND< 0.008	ND< 0.008
Propylene Oxide, ug/m3	ND< 8.34	ND< 8.34	ND< 8.34	ND< 8.34
Propylene Oxide, ug/m3 @ 15% O2	ND< 6.37	ND< 6.36	ND< 6.34	ND< 6.36
Propylene Oxide, lb/hr	ND< 0.011	ND< 0.011	ND< 0.011	ND< 0.011
Toluene, ug/m3	ND< 3.20	ND< 3.20	ND< 3.20	ND< 3.20
Toluene, ug/m3 @ 15% O2	ND< 2.44	ND< 2.44	ND< 2.43	ND< 2.44
Toluene, lb/hr	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
m,p-Xylene, ug/m3	ND< 3.80	ND< 3.60	ND< 3.70	ND< 3.70
m,p-Xylene, ug/m3 @ 15% O2	ND< 2.90	ND< 2.75	ND< 2.81	ND< 2.82
m,p-Xylene, lb/hr	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
o-Xylene, ug/m3	ND< 3.80	ND< 3.60	ND< 3.70	ND< 3.70
o-Xylene, ug/m3 @ 15% O2	ND< 2.90	ND< 2.75	ND< 2.81	ND< 2.82
o-Xylene, lb/hr	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005

Note: Stack flow data is from corresponding PAH runs.
Note: Sample values were not blank corrected.
Note: Non-detect values are reported at the detection limit.

SOURCE TEST DATA SUMMARY

Client	Panoche	*	Test number	1-HAP
Unit / Location	Turbine #2	*	Date	4/28/09
Test method	EPA TO-15	*	Start / Stop time	1237-1337

Meter box number	CB-11	*	Barometric pressure, in Hg	29.84
Meter calibration, Yd	0.9720	*	Meter box volume, acf	154.765
Stack area, square feet	143.139	*	Impinger liquid volume, ml	350.9
Reference temperature, °F	60	*	Meter temperature, °F	64.3
Sample time, minutes	60	*	Meter pressure, (Delta H) iwg	1.330
Pitot coefficient	0.8315	*	Velocity head, (Delta P) iwg	1.7278
Nozzle diameter, in	0.210	*	Static pressure, iwg	0.76
Fuel type	Natural Gas	*	Stack temperature, °F	773.8
Fuel "HHV", Btu/scf	N/A	*	Stack O_2, % volume dry	13.177
Fuel "F" factor, dscf/MMBtu	N/A	*	Stack CO_2, % volume dry	4.58

Volatile Organic Compounds		ug/m³
1,3-Butadiene	ND<	1.90
Benzene	ND<	2.80
Ethyl Benzene	ND<	3.80
Hexane	ND<	3.00
Propylene	ND<	6.04
Propylene Oxide	ND<	8.34
Toluene	ND<	3.20
m,p-Xylene	ND<	3.80
o-Xylene	ND<	3.80

1a	Standard sample volume, dscf	149.276
1b	Water vapor volume, scf	16.3115
1c	Moisture fraction, nondimensional	0.0985
1d	Stack gas molecular weight, dry	29.260
1e	Stack gas molecular weight, wet	28.151
1f	Absolute stack pressure, in Hg	29.896
1g	Stack gas velocity, ft/sec	112.949
1h	Stack flow rate, acfm	970,045
1i	Stack flow rate, wscfm	408,508
1j	Stack flow rate, dscfm	368,267

1,3-Butadiene, ug/m³	ND<	1.900
1,3-Butadiene, ug/m³ @ 15% O_2	ND<	1.452
1,3-Butadiene, lb/hr	ND<	0.003
Benzene, ug/m³	ND<	2.800
Benzene, ug/m³ @ 15% O2	ND<	2.139
Benzene, lb/hr	ND<	0.004
Ethyl Benzene, ug/m³	ND<	3.800
Ethyl Benzene, ug/m³ @ 15% O2	ND<	2.903
Ethyl Benzene, lb/hr	ND<	0.005
Hexane, ug/m³	ND<	3.000
Hexane, ug/m³ @ 15% O2	ND<	2.292
Hexane, lb/hr	ND<	0.004
Propylene, ug/m³	ND<	6.040
Propylene, ug/m³ @ 15% O2	ND<	4.614
Propylene, lb/hr	ND<	0.008
Propylene Oxide, ug/m³	ND<	8.340
Propylene Oxide, ug/m³ @ 15% O2	ND<	6.371
Propylene Oxide, lb/hr	ND<	0.011
Toluene, ug/m³	ND<	3.200
Toluene, ug/m³ @ 15% O2	ND<	2.445
Toluene, lb/hr	ND<	0.004
m,p-Xylene, ug/m³	ND<	3.800
m,p-Xylene, ug/m³ @ 15% O2	ND<	2.903
m,p-Xylene, lb/hr	ND<	0.005
o-Xylene, ug/m³	ND<	3.800
o-Xylene, ug/m³ @ 15% O2	ND<	2.903
o-Xylene, lb/hr	ND<	0.005

Note: Stack flow data is from corresponding PAH runs.
Note: Sample values were not blank corrected.
Note: Non-detect values are reported at the detection limit.

SOURCE TEST DATA SUMMARY

Client	Panoche	•	Test number	2-HAP
Unit / Location	Turbine #2	•	Date	4/29/09
Test method	EPA TO-15	•	Start / Stop time	0900-1000

Meter box number	CB-11	•	Barometric pressure, in Hg	29.64
Meter calibration, Yd	0.9720	•	Meter box volume, acf	152.099
Stack area, square feet	143.139	•	Impinger liquid volume, ml	354.9
Reference temperature, °F	60	•	Meter temperature, °F	60.6
Sample time, minutes	60	•	Meter pressure, (Delta H) iwg	1.320
Pitot coefficient	0.8315	•	Velocity head, (Delta P) iwg	1.7207
Nozzle diameter, in	0.210	•	Static pressure, iwg	-0.72
Fuel type	Natural Gas	•	Stack temperature, °F	770.3
Fuel "HHV", Btu/scf	N/A	•	Stack O_2, % volume dry	13.167
Fuel "F" factor, dscf/MMBtu	N/A	•	Stack CO_2, % volume dry	4.61

Volatile Organic Compounds		ug/m³
1,3-Butadiene	ND<	1.80
Benzene	ND<	2.70
Ethyl Benzene	ND<	3.60
Hexane	ND<	3.00
Propylene	ND<	6.04
Propylene Oxide	ND<	8.34
Toluene	ND<	3.20
m,p-Xylene	ND<	3.60
o-Xylene	ND<	3.60

1a	Standard sample volume, dscf	146.756
1b	Water vapor volume, scf	16.4975
1c	Moisture fraction, nondimensional	0.1011
1d	Stack gas molecular weight, dry	29.264
1e	Stack gas molecular weight, wet	28.126
1f	Absolute stack pressure, in Hg	29.587
1g	Stack gas velocity, ft/sec	113.193
1h	Stack flow rate, acfm	972,141
1i	Stack flow rate, wscfm	406,314
1j	Stack flow rate, dscfm	365,254

1,3-Butadiene, ug/m3	ND<	1.800
1,3-Butadiene, ug/m3 @ 15% O2	ND<	1.373
1,3-Butadiene, lb/hr	ND<	0.002
Benzene, ug/m3	ND<	2.700
Benzene, ug/m3 @ 15% O2	ND<	2.060
Benzene, lb/hr	ND<	0.004
Ethyl Benzene, ug/m3	ND<	3.600
Ethyl Benzene, ug/m3 @ 15% O2	ND<	2.747
Ethyl Benzene, lb/hr	ND<	0.005
Hexane, ug/m3	ND<	3.000
Hexane, ug/m3 @ 15% O2	ND<	2.289
Hexane, lb/hr	ND<	0.004
Propylene, ug/m3	ND<	6.040
Propylene, ug/m3 @ 15% O2	ND<	4.608
Propylene, lb/hr	ND<	0.008
Propylene Oxide, ug/m3	ND<	8.340
Propylene Oxide, ug/m3 @ 15% O2	ND<	6.363
Propylene Oxide, lb/hr	ND<	0.011
Toluene, ug/m3	ND<	3.200
Toluene, ug/m3 @ 15% O2	ND<	2.441
Toluene, lb/hr	ND<	0.004
m,p-Xylene, ug/m3	ND<	3.600
m,p-Xylene, ug/m3 @ 15% O2	ND<	2.747
m,p-Xylene, lb/hr	ND<	0.005
o-Xylene, ug/m3	ND<	3.600
o-Xylene, ug/m3 @ 15% O2	ND<	2.747
o-Xylene, lb/hr	ND<	0.005

Note: Stack flow data is from corresponding PAH runs.
Note: Sample values were not blank corrected.
Note: Non-detect values are reported at the detection limit.

SOURCE TEST DATA SUMMARY

Client	Panoche	•	Test number	3-HAP
Unit / Location	Turbine #2	•	Date	4/29/09
Test method	EPA TO-15	•	Start / Stop time	1348-1448

Meter box number	CB-11	•	Barometric pressure, in Hg	29.52
Meter calibration, Yd	0.9720	•	Meter box volume, acf	153.569
Stack area, square feet	143.139	•	Impinger liquid volume, ml	344.4
Reference temperature, °F	60	•	Meter temperature, °F	70.3
Sample time, minutes	60	•	Meter pressure, (Delta H) iwg	1.290
Pitot coefficient	0.8315	•	Velocity head, (Delta P) iwg	1.6747
Nozzle diameter, in	0.210	•	Static pressure, iwg	-0.76
Fuel type	Natural Gas	•	Stack temperature, °F	776.3
Fuel "HHV", Btu/scf	N/A	•	Stack O_2, % volume dry	13.138
Fuel "F" factor, dscf/MMBtu	N/A	•	Stack CO_2, % volume dry	4.57

Volatile Organic Compounds		ug/m³
1,3-Butadiene	ND<	1.90
Benzene	ND<	2.70
Ethyl Benzene	ND<	3.70
Hexane	ND<	3.00
Propylene	ND<	6.04
Propylene Oxide	ND<	8.34
Toluene	ND<	3.20
m,p-Xylene	ND<	3.70
o-Xylene	ND<	3.70

1a	Standard sample volume, dscf	144.866
1b	Water vapor volume, scf	16.0094
1c	Moisture fraction, nondimensional	0.0995
1d	Stack gas molecular weight, dry	29.257
1e	Stack gas molecular weight, wet	28.136
1f	Absolute stack pressure, in Hg	29.464
1g	Stack gas velocity, ft/sec	112.154
1h	Stack flow rate, acfm	963,217
1i	Stack flow rate, wscfm	398,965
1j	Stack flow rate, dscfm	359,263

1,3-Butadiene, ug/m3	ND<	1.900
1,3-Butadiene, ug/m3 @ 15% O2	ND<	1.444
1,3-Butadiene, lb/hr	ND<	0.003
Benzene, ug/m3	ND<	2.700
Benzene, ug/m3 @ 15% O2	ND<	2.052
Benzene, lb/hr	ND<	0.004
Ethyl Benzene, ug/m3	ND<	3.700
Ethyl Benzene, ug/m3 @ 15% O2	ND<	2.812
Ethyl Benzene, lb/hr	ND<	0.005
Hexane, ug/m3	ND<	3.000
Hexane, ug/m3 @ 15% O2	ND<	2.280
Hexane, lb/hr	ND<	0.004
Propylene, ug/m3	ND<	6.040
Propylene, ug/m3 @ 15% O2	ND<	4.591
Propylene, lb/hr	ND<	0.008
Propylene Oxide, ug/m3	ND<	8.340
Propylene Oxide, ug/m3 @ 15% O2	ND<	6.339
Propylene Oxide, lb/hr	ND<	0.011
Toluene, ug/m3	ND<	3.200
Toluene, ug/m3 @ 15% O2	ND<	2.432
Toluene, lb/hr	ND<	0.004
m,p-Xylene, ug/m3	ND<	3.700
m,p-Xylene, ug/m3 @ 15% O2	ND<	2.812
m,p-Xylene, lb/hr	ND<	0.005
o-Xylene, ug/m3	ND<	3.700
o-Xylene, ug/m3 @ 15% O2	ND<	2.812
o-Xylene, lb/hr	ND<	0.005

Note: Stack flow data is from corresponding PAH runs.
Note: Sample values were not blank corrected.
Note: Non-detect values are reported at the detection limit.

Appendix F.10

Example Calculations

EXAMPLE CALCULATIONS
GASEOUS EMISSIONS

Project name: Panoche Energy Center **Project number:** 09092

Computed by: J. Klosinski **Calculation date:** 6/3/09

Run number: Unit #1 Run #1 **Gaseous species:** NO_x

EMISSIONS DATA

Reference temperature, °R	520	T_{ref} = (°F plus 460)
Concentration of gaseous species, ppmvd	2.762	C
Flue gas moisture content, non-dimensional	—	B_{ws}
Dry stack gas flow rate at standard conditions, dscfm	337,800	Q_{ds}
Stack O_2, % volume dry	13.17	O_2
Stack CO_2, % volume dry	4.58	CO_2
"F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2	8465	F_d
Brake horsepower, bhp	—	J
Molecular weight of gaseous species, lb/lb mole	46.01	MW_s where,

MW_s = 28.01 for CO; 46.01 for NO_X as NO_2; 64.06 for SO_X as SO_2; 17.03 for NH_3; 12.01 for carbon, C; 16.04 for methane (CH_4)

Specific molar volume of an ideal gas at standard conditions, ft^3/lb mole: 379.5 SV where,

SV = 379.5 ft^3/lb mole for T_{ref} at 520 °R (60 °F)

SV = 385.3 ft^3/lb mole for T_{ref} at 528 °R (68 °F)

SV = 386.8 ft^3/lb mole for T_{ref} at530 °R (70 °F)

$$SV = (379.5)\left[\frac{((T_{ref}\ ^\circ R))}{520}\right]$$ at different reference temperatures

Note: The results calculated in the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.

2. GASEOUS EMISSIONS

a. Concentration, ppm volume wet (i.e. to calculate wet ppm from dry ppm)

$$C_w = (C)(1 - B_{ws})$$

$$C_w = (\qquad)(1 - \qquad)$$

C_w = _____ ppmvw

b. Concentration, ppm @ ~~3%~~ 15% O_2 dry

$$C_3 = (C)\left[\frac{(20.9 - \cancel{3.0}\ 15.0)}{(20.9 - \%\ O_2)}\right]$$

$$C_3 = (2.762)\left[\frac{(20.9 - \cancel{3.0}\ 15.0)}{(20.9 - 13.17)}\right]$$

C_3 = 2.108 ppm @ ~~3%~~ 15% O_2

c. Concentration, ppm @ 12% CO_2 dry

$$C_{12} = (C)\left(\frac{12.0}{\%\ CO_2}\right)$$

$$C_{12} = (\qquad)\left(\frac{12.0}{\qquad}\right)$$

C_{12} = _____ ppm @ 12% CO_2

e. Mass emissions, lb/hr

$$M = (C)\,(10^{-6})\left(\frac{MW_s}{SV}\right)(Q_{ds})(60\ min/hr)$$

$$M = (2.762)\,(10^{-6})\left(\frac{46.01}{379.5}\right)(337{,}809)(60)$$

M = 6.786 lb/hr

EXAMPLE CALCULATIONS
PARTICULATE MATTER EMISSIONS

Project name: Panoche Energy Center **Project number:** 09092

Computed by: J. Klosinski **Calculation date:** 6/3/09

Run number: Unit # 1 Run # 1

EMISSIONS DATA

Mass of collected particulate matter, mg	2.42	G_m
Dry stack gas flow rate at standard conditions, dscfm	360,233	Q_{ds}
Dry meter volume at standard conditions, dscf	67.928	$V_{m\,std}$
Stack O_2, % volume dry	13.160	O_2
Stack CO_2, % volume dry	4.56	CO_2
"F" factor of fuel based on O_2, dscf/MMBtu @ 0% O_2	8595	F_d

3. PARTICULATE MATTER EMISSIONS

a. Grain loading, gr/dscf

$$G = (0.01543)\left(\frac{G_m}{V_{m\,std}}\right)$$

$$G = (0.01543)\left(\frac{2.42}{67.928}\right)$$

G = 0.00055 gr/dscf

***Note:** The results calculated on this page and the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing computer spreadsheets results with those derived from using a calculator.*

b. Grain loading corrected to 12% CO_2, gr/dscf @ 12% CO_2

$$G_{12} = (G)\left(\frac{12.0}{\%\,CO_2}\right)$$

$$G_{12} = (0.0005)\left(\frac{12.0}{\quad}\right)$$

G_{12} = _____ gr/dscf @ 12% CO_2

c. Mass emission rate, lb/hr

$$M = (G)(Q_{ds})\left(\frac{60\ min/hr}{7000\ gr/lb}\right)$$

$$M = (0.00055)(360{,}233)\left(\frac{60}{7000}\right)$$

M = 1.698 lb/hr

d. Emission rate, lb/MMBtu

$$E = (G)\left(\frac{1\ lb}{7000\ gr}\right)(F_d)\left(\frac{20.9}{20.9 - \%\,O_2}\right)$$

$$E = (0.00055)\left(\frac{1\ lb}{7000\ gr}\right)(8595)\left(\frac{20.9}{20.9 - 13.16}\right)$$

E = 0.0018 lb/MMBtu

EXAMPLE CALCULATIONS
STACK GAS VOLUMETRIC FLOW RATE

Project name: Pinoche Energy Center **Project number:** 09092

Computed by: J. Klosinski **Calculation date:** 6/3/09

Run number: Unit #1 Run #1

SAMPLE TRAIN DATA

Meter calibration factor, Yd	0.972	Y
Stack area, square feet	143.139	A_s
Reference temperature, °R	520	T_{ref} = (°F plus 460)
Pitot Coefficient	0.8315	C_p
Barometric pressure, in Hg	29.49	P_{bar}
Meter box volume, acf	74.445	V_m
Impinger liquid volume, ml	179.9	V_{lc}
Meter temperature, °R	547.7	T_m = (°F plus 460)
Meter pressure, (Delta H) iwg	1.300	ΔH
Velocity head, (Delta P) iwg	1.7035	ΔP
Static pressure, iwg	-0.41	P_{sg}
Stack temperature, °R	1227.7	T_s = (°F plus 460)
Stack O_2, % volume dry	13.160	O_2
Stack CO_2, % volume dry	4.56	CO_2
Stack N_2, % volume dry	82.28	N_2 = (100- % O_2 - % CO_2)
Nozzle Diameter, inches	0.205	D_n
PM sampling time, minutes	120	Θ

Note: The results calculated in the pages that follow may differ slightly from the results presented in the final report. This difference can be attributed to "significant digit round-off errors" common when comparing spreadsheets results with those derived from using a calculator.

1. VOLUMETRIC FLOW RATE

a. Standard sample gas volume, dscf

$$V_{m\,std} = (0.03342)(V_m)\left[P_{bar} + \left(\frac{\Delta H}{13.6}\right)\right]\left(\frac{T_{ref}}{T_m}\right)(Y)$$

$$V_{m\,std} = (0.03342)(74.445)\left[29.49 + \left(\frac{1.300}{13.6}\right)\right]\left(\frac{520}{547.7}\right)(0.972)$$

$V_{m\,std}$ = 67.928 dscf

b. Water vapor volume, scf

$$V_{w\,std} = (0.0472)(V_{lc})\left(\frac{T_{ref}}{528\ ^{o}R}\right)$$

$$V_{w\,std} = (0.0472)(179.9)\left(\frac{520}{528}\right)$$

$V_{w\,std}$ = 8.3626 scf

c. Moisture content, non-dimensional

$$B_{ws} = \left(\frac{V_{w\,std}}{(V_{m\,std} + V_{w\,std})}\right)$$

$$B_{ws} = \left(\frac{8.3626}{(67.928 + 8.3626)}\right)$$

B_{ws} = 0.096 moisture content (multiply by 100 for % by volume)

d. Stack gas molecular weight, lb/lb mole (dry)

$$MW_{dry} = [0.44\,(\%\ CO_2)] + [0.32\,(\%\ O_2)] + [0.28\,(\%\ N_2)]$$

$$MW_{dry} = [0.44\,(\ 4.56\ )] + [0.32\,(\ 13.16\ )] + [0.28\,(\ 82.28\ )]$$

MW_{dry} = 29.256 lb/lb mole

e. Stack gas molecular weight, lb/lb mole (wet)

$$MW_{wet} = [MW_{dry}\,(1 - B_{ws})] + [18\,(B_{ws})]$$

$$MW_{wet} = [\ 29.256\,(1 - 0.1096\ )] + [18\,(\ 0.1096\ )]$$

MW_{wet} = 28.022 lb/lb mole

f. Absolute stack pressure, in Hg

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

$$P_s = 29.49 + \left(\frac{-0.41}{13.6}\right)$$

P_s = 29.460 in. Hg

g. Stack velocity, ft/sec

$$V_s = (2.90)(C_p)\sqrt{(\Delta P)(T_s)}\ \sqrt{\left(\frac{29.92}{P_s}\right)\left(\frac{28.95}{MW_{wet}}\right)}$$

$$V_s = (2.90)(\ 0.8315)\sqrt{(\ 1.7035)(\ 1227.7\ )}\ \sqrt{\left(\frac{29.92}{29.460}\right)\left(\frac{28.95}{28.022}\right)}$$

V_s = 112.958 ft/sec

h. Actual stack flow rate, acfm

$$Q = (V_s)\,(A_s)\,(60\ min/hr)$$

$$Q = (112.958)\,(143.139)\,(60)$$

Q = 970,120 acfm

i. Standard stack gas flow rate, wscfm

$$Q_{ws} = (Q)\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

$$Q_{ws} = (970{,}120)\left(\frac{520}{1227.7}\right)\left(\frac{29.460}{29.92}\right)$$

Q_{ws} = 404,581 wscfm

j. Standard stack gas flow rate, dscfm

$$Q_{ds} = (Q)\,(1 - B_{ws})\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right) = (1 - B_{ws})\,Q_{ws}$$

$$Q_{ds} = (1 - 0.1096)(404{,}581)$$

Q_{ds} = 360,238 dscfm

k. Percent Isokinetic, %

$$I = \left(\frac{(17.32)(T_s)(V_{m\,std})}{(1 - B_{ws})(\Theta)(V_s)(P_s)(D_n^{\,2})}\right)\left(\frac{528\ ^\circ R}{T_{ref}}\right)$$

$$I = \left(\frac{(17.32)(1227.7)(67.928)}{(1 - 0.1096)(120)(112.958)(29.460)(0.205^2)}\right)\left(\frac{528\ ^\circ R}{520}\right)$$

I = 98.2 %

APPENDIX G

COM 2030

SJVAPCD - Appendix G

DRAFT COPY - San Joaquin Valley Air Pollution Control District - Testing Contractor's CARB Method 100 Quality Assurance Worksheet

**** All supporting data for this worksheet must also be clearly indicated and labeled on the emission trace chart ****

**** A copy of a this completed worksheet is required for every unit tested and must be included in the Summary Section of the Source Test Report ****

Company Name:	Panoche	Permit Number:	C-7220-1-0			Test Date:	5/1/2009
Unit Name:	Turbine #1	Average Fuel Rate MSCFD:	20945			Was multipoint sampling required by the District policy?	Yes
Select Test Type:	RATA	Fuel BTU/CF, dry, gross(% wt):	1015			Highest point for all pollutants above the Run 1 Cavg.%:	41.1%
Permitted MMBtu/hr:	0	Fuel Ffactor @ 68:	8595			Lowest point for all pollutants below the Run 1 Cavg %:	27.6%
Testing Company:	Avogadro	Estimated Qsd DSCFM:	344414			From above does subsequent runs require multipoint?, >10%, M100 4.5:	Yes
Name of Tester:	J. Klosinski	Estimated MMBtu/hr, firing percent :	885.79	—	X	Is a PM or EPA Method 6 test included in this test report?	Yes

2.2 Gas Analyzers	O2				NOx				CO				SO2			
Limit equivalent (LE)as uncorrected ppm:					3				6							
Range, Limit equivalent %:	20				6	45%			9	63%				—		
Non RATA; R1 Cavg (0-95%) of r:		N/A	N/A			N/A	N/A			N/A	N/A			—	—	
RATA; Run 1 Cavg (10%-95%) of r, M100 1.5.1:		65%	OK			47%	OK			46%	OK			—	—	

3 Calibration Gases																
Was EPA Method 205 gas dilution used?, Then identify gas with division symbol M100 3.2:																
If 'Yes' above, select the mid-level cal. gas ppm or %, +/-2%, EPA 205:				÷				÷				÷				÷
High-range: (80-100%) of r, Chcal, M100 3.1.1; select if divider used:	19.960	100.0%	OK		5.600	100.0%	OK		9.450	100.0%	OK			—	—	
High-range cylinder #, M100 3.1.1:	CC 173330		OK		CC 16177		OK		CC 16177		OK				—	
High-range expiration date:	07/26/10		OK		08/09/09		OK		08/09/09		OK				—	
Mid-range: (40-60%) of r, Cmcal, M100 3.1.2; indicate if divider used:	11.620	58.2%	OK		2.500	44.6%	OK		5.070	53.7%	OK			—	—	
Mid-range cylinder #, M100 3.1.2:	CC 272622		OK		CC 283349		OK		CC 283349		OK				—	
Mid-range expiration date:	03/24/11		OK		02/26/11		OK		02/26/11		OK				—	
Zero cylinder #, M100 3.1.3:	CC 179360		OK													

SJVAPCD - Appendix G

Pollutant	O2			NOx			CO			SO2		
4.2 Calibration of Continuous Analyzers												
NO2 converter efficiency, Eff%, >90%, M100 2.2.5:				95.10		OK		D3, <1ppm:	-0.50			
High-range response (+/-2%) of r, Cauh, M100 4.2:	19.92	-0.20%	OK	5.59	-0.17%	OK	9.45	-0.02%	OK		—	—
Mid-range response (+/-2%) of r, Caum, M100 4.2:	11.59	-0.15%	OK	2.49	-0.12%	OK	5.15	0.86%	OK		—	—
Zero gas response (+/- 2%) of r, Caz, M100 4.2:	0.02	0.09%	OK	0.01	0.24%	OK	-0.05	-0.50%	OK		—	—
4.3 Pre-Test Leak Check												
Time of leak check, M100 4.3:	12:00		OK									
4.4 Pre-Test System Bias Check (Suggest using both mid and high gases if unsure of emission concentration)												
Initial high-gas (+/-5%) Cibu,M100 6.2,Eq100-2:		—	N/A		—	N/A		—	N/A		—	—
Initial mid-gas (+/-5%) Cibu, M100 6.2,Eq100-2:	11.52	0.37%	OK	2.38	2.08%	OK	5.12	0.33%	OK		—	—
Initial zero gas (+/-5%) Cibz, M100 6.2,Eq100-2:	0.04	-0.10%	OK	0.01	0.13%	OK	-0.06	0.16%	OK		—	—
Run 1												
Run 1 start time:	17:14		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.04	13.04		2.62	2.62		4.33	4.33			—	
Raw highest, ppm or %, Cmax:	13.10	0.48%		3.04	16.06%		6.11	41.14%			—	
Raw lowest, ppm or %, Cmin:	13.00	0.32%		2.17	17.23%		3.13	27.60%			—	
Run1 Cavg as a % of r, M100 4.4:		65.32%			46.78%			45.77%			—	
Select Chcal or Cmcal to become Ccal M100 4.4:	11.620	11.62	OK	2.500	2.50	OK	5.070	5.07	OK		—	—
Cau, M100 6.2:		11.59			2.49			5.15			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.50	0.08%	OK	2.37	0.18%	OK	5.31	-1.99%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.04	-0.01%	OK	0.00	0.08%	OK	0.03	-0.96%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.44%	OK		2.26%	OK		-1.66%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.11%	OK		0.21%	OK		-0.79%	OK		—	—
7.1 Pollutant Concentration												
1.5.1 Range (10%-95%):		65.32%	OK		46.78%	OK		45.77%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.51			2.37			5.21			—	
Avg. of Cibz and Cfbz, Co:		0.04			0.00			-0.02			—	
Cgas, ppm or %:		13.17			2.76			4.21			—	
Eq 100-5 Cgas@3%:					6.39			9.75			—	
Cgas@15%:					2.11			3.21			—	

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Pollutant	O2			NOx			CO			SO2		
Run 2												
Run 2 start time:	18:09		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.03	13.03		2.40	2.40		2.93	2.93			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.50	0.09%	OK	2.38	-0.14%	OK	5.31	-1.98%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.04	0.00%	OK	0.00	0.11%	OK	0.03	-0.99%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.45%	OK		1.93%	OK		-1.65%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.10%	OK		0.24%	OK		-0.83%	OK		—	—
7.1 Pollutant Concentration												
1.5.1 Range (10%-95%):		65.27%	OK		42.91%	OK		30.96%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.50			2.38			5.31			—	
Avg. of Cibz and Cfbz, Co:		0.04			0.00			0.03			—	
Cgas, ppm or %:		13.17			2.53			2.78			—	
Eq 100-5 Cgas@3%:					5.86			6.44			—	
Cgas@15%:					1.93			2.12			—	

Run 3												
Run 3 start time:	6:54:00 PM		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.02	13.02		2.30	2.30		2.42	2.42			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.50	0.09%	OK	2.40	-0.37%	OK	5.34	-2.29%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.04	0.00%	OK	0.00	0.09%	OK	0.07	-1.42%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.46%	OK		1.71%	OK		-1.96%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.10%	OK		0.22%	OK		-1.26%	OK		—	—
7.1 Pollutant Concentration												
1.5.1 Range (10%-95%):		65.22%	OK		41.00%	OK		25.58%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.50			2.39			5.32			—	
Avg. of Cibz and Cfbz, Co:		0.04			0.00			0.05			—	
Cgas, ppm or %:		13.16			2.40			2.28			—	
Eq 100-5 Cgas@3%:					5.55			5.27			—	
Cgas@15%:					1.83			1.74			—	

O2% Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

NOx Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

CO Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SO2 Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

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Pollutant	O2	NOx	CO	SO2
Est. avg. from 3 runs (not to be used for compliance determination)				
Cgas, ppm or %:	13.2	2.6	3.1	----
Eq 100-5 Cgas@3%:		5.9	7.2	----
Cgas@15%:		2.0	2.4	----
Eq 100-4 lbs/hr:		6.42	4.66	----
EPA Eq 19-1 lbs/MMBtu:		0.007	0.005	----
g/Bhp-hr:		0.028	0.020	----

If permit conditions require source to maintain daily, monthly, quarterly or annual fuel, production or sulfur records then enter the data below. Include copies or a printout of these records in the Operating Data section of the test report.

		Units			Units
Fuel or production rate nearest to the day of the test.			Fuel sulfur concentration rate nearest to the day of the test.		
Fuel or production rate nearest to 3-months prior to the day of test.		ton/day	Fuel sulfur concentration rate nearest to 3-months prior to the day of the test.		
Fuel or production rate nearest to 6-months prior to the day of test.			Fuel sulfur concentration rate nearest to 6-months prior to the day of the test.		
Fuel or production rate nearest to 9-months prior to the day of test.			Fuel sulfur concentration rate nearest to 9-months prior to the day of the test.		

Tester's comment area, explain each "X" mark and what actions will be taken to prevent reoccurrence.

District Review Code:	3	/

SJVAPCD - Appendix G

DRAFT COPY - San Joaquin Valley Air Pollution Control District - Testing Contractor's CARB Method 100 Quality Assurance Worksheet

**** All supporting data for this worksheet must also be clearly indicated and labeled on the emission trace chart ****

**** A copy of a this completed worksheet is required for every unit tested and must be included in the Summary Section of the Source Test Report ****

Company Name:	Panoche	Permit Number:	C-4220-2-0			Test Date:	4/27/2009
Unit Name:	Turbine #2	Average Fuel Rate MSCFD:	21322			Was multipoint sampling required by the District policy?	Yes
Select Test Type:	Non RATA	Fuel BTU/CF, dry, gross(% wt):	1015			Highest point for all pollutants above the Run 1 Cavg.%:	79.7%
Permitted MMBtu/hr:	0	Fuel Ffactor @ 68:	8595			Lowest point for all pollutants below the Run 1 Cavg %:	22.7%
Testing Company:	Avogadro	Estimated Qsd DSCFM:	346128			From above does subsequent runs require multipoint?, >10%, M100 4.5:	Yes
Name of Tester:	J. Klosinski	Estimated MMBtu/hr, firing percent :	901.76	----	X	Is a PM or EPA Method 6 test included in this test report?	Yes

2.2 Gas Analyzers	O2				NOx				CO				SO2			
Limit equivalent (LE)as uncorrected ppm:					3				6							
Range, Limit equivalent %:	20				6	45%			9	63%				-----		
Non RATA; R1 Cavg (0-95%) of r:		65%	OK			49%	OK			5%	OK			-----	-----	
RATA; Run 1 Cavg (10%-95%) of r, M100 1.5.1:		N/A	N/A			N/A	N/A			N/A	N/A			-----	-----	

3 Calibration Gases																
Was EPA Method 205 gas dilution used?, Then identify gas with division symbol M100 3.2:																
If 'Yes' above, select the mid-level cal. gas ppm or %, +/-2%, EPA 205:				÷				÷				÷				÷
High-range: (80-100%) of r, Chcal, M100 3.1.1; select if divider used:	19.960	100.0%	OK		5.600	100.0%	OK		9.450	100.0%	OK			—	—	
High-range cylinder #, M100 3.1.1:	CC 173330		OK		CC 16177		OK		CC 16177		OK				—	
High-range expiration date:	07/26/10		OK		08/09/09		OK		08/09/09		OK				—	
Mid-range: (40-60%) of r, Cmcal, M100 3.1.2; indicate if divider used:	11.620	58.2%	OK		2.500	44.6%	OK		5.070	53.7%	OK			—	—	
Mid-range cylinder #, M100 3.1.2:	CC 272622		OK		CC 283349		OK		CC 283349		OK				—	
Mid-range expiration date:	03/24/11		OK		02/26/11		OK		02/26/11		OK				—	
Zero cylinder #, M100 3.1.3:	CC 179360		OK													

SJVAPCD - Appendix G

Pollutant	O2			NOx			CO			SO2		
4.2 Calibration of Continuous Analyzers												
NO2 converter efficiency, Eff%, >90%, M100 2.2.5:				93.70		OK		D3, <1 ppm:	-0.50			
High-range response (+/-2%) of r, Cauh, M100 4.2:	20.00	0.21%	OK	5.60	0.08%	OK	9.51	0.59%	OK		—	—
Mid-range response (+/-2%) of r, Caum, M100 4.2:	11.61	-0.07%	OK	2.59	1.65%	OK	5.15	0.85%	OK		—	—
Zero gas response (+/- 2%) of r, Caz, M100 4.2:	0.02	0.12%	OK	0.00	-0.02%	OK	-0.05	-0.52%	OK		—	—
4.3 Pre-Test Leak Check												
Time of leak check, M100 4.3:	10:02		OK									
4.4 Pre-Test System Bias Check (Suggest using both mid and high gases if unsure of emission concentration)												
Initial high-gas (+/-5%) Cibu,M100 6.2,Eq100-2:		—	N/A		—	N/A		—	N/A		—	—
Initial mid-gas (+/-5%) Cibu, M100 6.2,Eq100-2:	11.57	0.21%	OK	2.50	1.59%	OK	5.19	-0.41%	OK		—	—
Initial zero gas (+/-5%) Cibz, M100 6.2,Eq100-2:	0.05	-0.12%	OK	0.00	0.00%	OK	-0.04	-0.12%	OK		—	—
Run 1												
Run 1 start time:	10:51		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.06	13.06		2.77	2.77		0.49	0.49			—	
Raw highest, ppm or %, Cmax:	13.09	0.27%		3.28	18.42%		0.10	79.67%			—	
Raw lowest, ppm or %, Cmin:	13.00	0.45%		2.14	22.65%		1.25	-153.44%			—	
Run1 Cavg as a % of r, M100 4.4:		65.41%			49.48%			5.24%			—	
Select Chcal or Cmcal to become Ccal M100 4.4:	11.620	11.62	OK	2.500	2.50	OK	5.070	5.07	OK		—	—
Cau, M100 6.2:		11.61			2.59			5.15			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.56	0.05%	OK	2.48	0.44%	OK	5.15	0.42%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.02	0.16%	OK	0.00	-0.01%	OK	-0.13	1.03%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.25%	OK		2.04%	OK		0.01%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		0.04%	OK		-0.01%	OK		0.90%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		65.41%	OK		49.48%	OK		5.24%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.56			2.49			5.17			—	
Avg. of Cibz and Cfbz, Co:		0.03			0.00			-0.09			—	
Cgas, ppm or %:		13.13			2.78			0.56			—	
Eq 100-5 Cgas@3%:					6.40			1.29			—	
Cgas@15%:					2.11			0.43			—	

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2			NOx			CO			SO2		
Run 2												
Run 2 start time:	11:57		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.06	13.06		2.77	2.77		0.12	0.12			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.56	0.01%	OK	2.47	0.62%	OK	5.07	1.30%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.02	0.14%	OK	0.00	-0.01%	OK	-0.24	2.09%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.22%	OK		2.21%	OK		0.89%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		0.02%	OK		0.00%	OK		1.97%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		65.43%	OK		49.50%	OK		1.28%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.56			2.47			5.11			—	
Avg. of Cibz and Cfbz, Co:		0.02			0.00			-0.18			—	
Cgas, ppm or %:		13.13			2.80			0.29			—	
Eq 100-5 Cgas@3%:					6.45			0.67			—	
Cgas@15%:					2.13			0.22			—	

Pollutant	O2			NOx			CO			SO2		
Run 3												
Run 3 start time:	12:36:00 PM		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.03	13.03		3.01	3.01		0.21	0.21			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.56	0.01%	OK	2.47	0.67%	OK	5.05	1.53%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.02	0.16%	OK	0.00	-0.01%	OK	-0.10	0.69%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.21%	OK		2.26%	OK		1.11%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		0.04%	OK		0.00%	OK		0.57%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		65.29%	OK		53.79%	OK		2.18%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.56			2.47			5.06			—	
Avg. of Cibz and Cfbz, Co:		0.02			0.00			-0.17			—	
Cgas, ppm or %:		13.10			3.05			0.36			—	
Eq 100-5 Cgas@3%:					7.00			0.83			—	
Cgas@15%:					2.31			0.27			—	

O2% Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

NOx Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

CO Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SO2 Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2	NOx	CO	SO2
Est. avg. from 3 runs (not to be used for compliance determination)				
Cgas, ppm or %:	13.1	2.9	0.4	—
Eq 100-5 Cgas@3%:		6.6	0.9	—
Cgas@15%:		2.2	0.3	—
Eq 100-4 lbs/hr:		7.20	0.60	—
EPA Eq 19-1 lbs/MMBtu:		0.008	0.001	—
g/Bhp-hr:		0.031	0.003	—

If permit conditions require source to maintain daily, monthly, quarterly or annual fuel, production or sulfur records then enter the data below. Include copies or a printout of these records in the Operating Data section of the test report.

		Units			Units
Fuel or production rate nearest to the day of the test.		Units	Fuel sulfur concentration rate nearest to the day of the test.		Units
Fuel or production rate nearest to 3-months prior to the day of test.		ton/day	Fuel sulfur concentration rate nearest to 3-months prior to the day of the test.		
Fuel or production rate nearest to 6-months prior to the day of test.			Fuel sulfur concentration rate nearest to 6-months prior to the day of the test.		
Fuel or production rate nearest to 9-months prior to the day of test.			Fuel sulfur concentration rate nearest to 9-months prior to the day of the test.		

Tester's comment area, explain each "X" mark and what actions will be taken to prevent reoccurrence.

District Review Code:	3	/

SJVAPCD - Appendix G

DRAFT COPY - San Joaquin Valley Air Pollution Control District - Testing Contractor's CARB Method 100 Quality Assurance Worksheet

**** All supporting data for this worksheet must also be clearly indicated and labeled on the emission trace chart ****

**** A copy of a this completed worksheet is required for every unit tested and must be included in the Summary Section of the Source Test Report ****

Company Name:	Panoche	Permit Number:	C-7220-3-0			Test Date:	4/23/2009
Unit Name:	Turbine #3	Average Fuel Rate MSCFD:	21138		Was multipoint sampling required by the District policy?		Yes
Select Test Type:	Non RATA	Fuel BTU/CF, dry, gross(% wt):	1015		Highest point for all pollutants above the Run 1 Cavg.%:		13.3%
Permitted MMBtu/hr:	0	Fuel Ffactor @ 68:	8595		Lowest point for all pollutants below the Run 1 Cavg %:		20.8%
Testing Company:	Avogadro	Estimated Qsd DSCFM:	343128		From above does subsequent runs require multipoint?, >10%, M100 4.5:		Yes
Name of Tester:	M. Stanfield	Estimated MMBtu/hr, firing percent :	893.94	----- X	Is a PM or EPA Method 6 test included in this test report?		Yes

2.2 Gas Analyzers	O2			NOX			CO			SO2		
Limit equivalent (LE)as uncorrected ppm:				3			6					
Range, Limit equivalent %:	20			6	45%		9	63%			—	
Non RATA; R1 Cavg (0-95%) of r:		66%	OK		53%	OK		10%	OK		—	—
RATA; Run 1 Cavg (10%-95%) of r, M100 1.5.1:		N/A	N/A		N/A	N/A		N/A	N/A		—	—

3 Calibration Gases																
Was EPA Method 205 gas dilution used?, Then identify gas with division symbol M100 3.2:																
If 'Yes' above, select the mid-level cal. gas ppm or %, +/-2%, EPA 205:				÷				÷				÷				÷
High-range: (80-100%) of r, Chcal, M100 3.1.1; select if divider used:	19.960	100.0%	OK		5.600	100.0%	OK		9.450	100.0%	OK			—	—	
High-range cylinder #, M100 3.1.1:	CC 173330		OK		CC 16177		OK		CC 16177		OK				—	
High-range expiration date:	07/26/10		OK		08/09/09		OK		08/09/09		OK				—	
Mid-range: (40-60%) of r, Cmcal, M100 3.1.2; indicate if divider used:	11.620	58.2%	OK		2.500	44.6%	OK		5.070	53.7%	OK			—	—	
Mid-range cylinder #, M100 3.1.2:	CC 272622		OK		CC 283349		OK		CC 283349		OK				—	
Mid-range expiration date:	03/24/11		OK		02/26/11		OK		02/26/11		OK				—	
Zero cylinder #, M100 3.1.3:	CC 179360		OK													

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2			NOx			CO			SO2		
4.2 Calibration of Continuous Analyzers												
NO2 converter efficiency, Eff%, >90%, M100 2.2.5:				96.10		OK		D3, <1 ppm:	-0.50			
High-range response (+/-2%) of r, Cauh, M100 4.2:	19.98	0.08%	OK	5.58	-0.32%	OK	9.47	0.23%	OK		—	—
Mid-range response (+/-2%) of r, Caum, M100 4.2:	11.62	-0.02%	OK	2.59	1.69%	OK	5.12	0.57%	OK		—	—
Zero gas response (+/- 2%) of r, Caz, M100 4.2:	0.00	0.02%	OK	0.01	0.09%	OK	0.04	0.46%	OK		—	—
4.3 Pre-Test Leak Check												
Time of leak check, M100 4.3:	9:26		OK									
4.4 Pre-Test System Bias Check (Suggest using both mid and high gases if unsure of emission concentration)												
Initial high-gas (+/-5%) Cibu,M100 6.2,Eq100-2:		—	N/A		—	N/A		—	N/A		—	—
Initial mid-gas (+/-5%) Cibu, M100 6.2,Eq100-2:	11.57	0.26%	OK	2.51	1.50%	OK	5.03	0.98%	OK		—	—
Initial zero gas (+/-5%) Cibz, M100 6.2,Eq100-2:	0.04	-0.20%	OK	0.00	0.04%	OK	0.01	0.34%	OK		—	—
Run 1												
Run 1 start time:	10:10		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.08	13.08		2.94	2.94		0.91	0.91			—	
Raw highest, ppm or %, Cmax:	13.09	0.08%		2.99	1.56%		1.03	13.28%			—	
Raw lowest, ppm or %, Cmin:	13.07	0.11%		2.87	2.39%		0.72	20.77%			—	
Run1 Cavg as a % of r, M100 4.4:		65.53%			52.52%			9.62%			—	
Select Chcal or Cmcal to become Ccal M100 4.4:	11.620	11.62	OK	2.500	2.50	OK	5.070	5.07	OK		—	—
Cau, M100 6.2:		11.62			2.59			5.12			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.59	-0.10%	OK	2.49	0.38%	OK	4.94	0.97%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.05	-0.05%	OK	0.02	-0.32%	OK	-0.24	2.61%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.16%	OK		1.88%	OK		1.95%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.25%	OK		-0.27%	OK		2.96%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		65.53%	OK		52.52%	OK		9.62%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.58			2.50			4.99			—	
Avg. of Cibz and Cfbz, Co:		0.05			0.01			-0.11			—	
Cgas, ppm or %:		13.14			2.94			1.02			—	
Eq 100-5 Cgas@3%:					6.78			2.35			—	
Cgas@15%:					2.24			0.78			—	

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2			NOx			CO			SO2		
Run 2												
Run 2 start time:	11:00		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.06	13.06		2.88	2.88		0.76	0.76			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.60	-0.18%	OK	2.46	0.85%	OK	4.94	0.96%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.05	-0.06%	OK	0.04	-0.58%	OK	-0.14	1.60%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.08%	OK		2.35%	OK		1.94%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.26%	OK		-0.53%	OK		1.94%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		65.42%	OK		51.36%	OK		8.05%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.59			2.48			4.94			—	
Avg. of Cibz and Cfbz, Co:		0.05			0.03			-0.19			—	
Cgas, ppm or %:		13.09			2.91			0.94			—	
Eq 100-5 Cgas@3%:					6.67			2.15			—	
Cgas@15%:					2.20			0.71			—	

Run 3												
Run 3 start time:	11:45:00 AM		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.03	13.03		2.92	2.92		1.27	1.27			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.55	0.06%	OK	2.45	1.10%	OK	4.99	0.45%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.05	-0.03%	OK	0.00	0.07%	OK	-0.27	2.98%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.32%	OK		2.60%	OK		1.43%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.23%	OK		0.11%	OK		3.33%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		65.27%	OK		52.06%	OK		13.43%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.58			2.46			4.96			—	
Avg. of Cibz and Cfbz, Co:		0.05			0.02			-0.21			—	
Cgas, ppm or %:		13.08			2.97			1.45			—	
Eq 100-5 Cgas@3%:					6.80			3.32			—	
Cgas@15%:					2.24			1.09			—	

O2% Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

NOx Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

CO Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SO2 Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SJVAPCD - Appendix G

Pollutant	O2	NOx	CO	SO2
Est. avg. from 3 runs (not to be used for compliance determination)				
Cgas, ppm or %:	13.1	2.9	1.1	—
Eq 100-5 Cgas@3%:		6.7	2.6	—
Cgas@15%:		2.2	0.9	—
Eq 100-4 lbs/hr:		7.13	1.65	—
EPA Eq 19-1 lbs/MMBtu:		0.008	0.002	—
g/Bhp-hr:		0.031	0.007	—

If permit conditions require source to maintain daily, monthly, quarterly or annual fuel, production or sulfur records then enter the data below. Include copies or a printout of these records in the Operating Data section of the test report.

		Units			Units
Fuel or production rate nearest to the day of the test.			Fuel sulfur concentration rate nearest to the day of the test.		
Fuel or production rate nearest to 3-months prior to the day of test.		ton/day	Fuel sulfur concentration rate nearest to 3-months prior to the day of the test.		
Fuel or production rate nearest to 6-months prior to the day of test.			Fuel sulfur concentration rate nearest to 6-months prior to the day of the test.		
Fuel or production rate nearest to 9-months prior to the day of test.			Fuel sulfur concentration rate nearest to 9-months prior to the day of the test.		

Tester's comment area, explain each "X" mark and what actions will be taken to prevent reoccurrence.

District Review Code:	3	/

SJVAPCD - Appendix G

DRAFT COPY - San Joaquin Valley Air Pollution Control District - Testing Contractor's CARB Method 100 Quality Assurance Worksheet

**** All supporting data for this worksheet must also be clearly indicated and labeled on the emission trace chart ****

**** A copy of a this completed worksheet is required for every unit tested and must be included in the Summary Section of the Source Test Report ****

Company Name:	Panoche	Permit Number:	C-7220-4-0			Test Date:	4/24/2009
Unit Name:	Turbine #4	Average Fuel Rate MSCFD:	20806			Was multipoint sampling required by the District policy?	Yes
Select Test Type:	Non RATA	Fuel BTU/CF, dry, gross(% wt):	1015			Highest point for all pollutants above the Run 1 Cavg.%:	15.0%
Permitted MMBtu/hr:	0	Fuel Ffactor @ 68:	8595			Lowest point for all pollutants below the Run 1 Cavg %:	15.7%
Testing Company:	Avogadro	Estimated Qsd DSCFM:	346627			From above does subsequent runs require multipoint?, >10%, M100 4.5:	Yes
Name of Tester:	M. Stanfield	Estimated MMBtu/hr, firing percent :	879.90	----	X	Is a PM or EPA Method 6 test included in this test report?	Yes

2.2 Gas Analyzers	O2				NOx				CO				SO2			
Limit equivalent (LE)as uncorrected ppm:					3				6							
Range, Limit equivalent %:	20				6	45%			9	63%				----		
Non RATA; R1 Cavg (0-95%) of r:		66%	OK			51%	OK			10%	OK			----	—	
RATA; Run 1 Cavg (10%-95%) of r, M100 1.5.1:		N/A	N/A			N/A	N/A			N/A	N/A			—	—	

3 Calibration Gases																
Was EPA Method 205 gas dilution used?, Then identify gas with division symbol M100 3.2:																
If 'Yes' above, select the mid-level cal. gas ppm or %, +/-2%, EPA 205:				÷				÷				÷				÷
High-range: (80-100%) of r, Chcal, M100 3.1.1; select if divider used:	19.960	100.0%	OK		5.600	100.0%	OK		9.450	100.0%	OK			----	----	
High-range cylinder #, M100 3.1.1:	CC 173330		OK		CC 16177		OK		CC 16177		OK				—	
High-range expiration date:	07/26/10		OK		08/09/09		OK		08/09/09		OK				—	
Mid-range: (40-60%) of r, Cmcal, M100 3.1.2; indicate if divider used:	11.620	58.2%	OK		2.500	44.6%	OK		5.070	53.7%	OK			—	—	
Mid-range cylinder #, M100 3.1.2:	CC 272622		OK		CC 283349		OK		CC 283349		OK				—	
Mid-range expiration date:	03/24/11		OK		02/26/11		OK		02/26/11		OK				—	
Zero cylinder #, M100 3.1.3:	CC 179360		OK													

SJVAPCD - Appendix G

Pollutant	O2			NOx			CO			SO2		
4.2 Calibration of Continuous Analyzers												
NO2 converter efficiency, Eff%, >90%, M100 2.2.5:				94.70		OK		D3, <1 ppm:	-0.50			
High-range response (+/-2%) of r, Cauh, M100 4.2:	19.98	0.09%	OK	5.61	0.17%	OK	9.37	-0.86%	OK		—	—
Mid-range response (+/-2%) of r, Caum, M100 4.2:	11.62	0.01%	OK	2.60	1.72%	OK	5.08	0.10%	OK		—	—
Zero gas response (+/- 2%) of r, Caz, M100 4.2:	-0.01	-0.04%	OK	0.00	-0.02%	OK	-0.06	-0.61%	OK		—	—
4.3 Pre-Test Leak Check												
Time of leak check, M100 4.3:	8:02		OK									
4.4 Pre-Test System Bias Check (Suggest using both mid and high gases if unsure of emission concentration)												
Initial high-gas (+/-5%) Cibu,M100 6.2,Eq100-2:		—	N/A		—	N/A		—	N/A		—	—
Initial mid-gas (+/-5%) Cibu, M100 6.2,Eq100-2:	11.54	0.41%	OK	2.59	0.07%	OK	5.05	0.29%	OK		—	—
Initial zero gas (+/-5%) Cibz, M100 6.2,Eq100-2:	0.02	-0.13%	OK	0.01	-0.19%	OK	-0.08	0.22%	OK		—	—
Run 1												
Run 1 start time:	9:15		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.24	13.24		2.86	2.86		0.99	0.99			—	
Raw highest, ppm or %, Cmax:	13.26	0.11%		3.12	9.30%		1.14	14.99%			—	
Raw lowest, ppm or %, Cmin:	13.22	0.19%		2.41	15.70%		0.90	8.55%			—	
Run1 Cavg as a % of r, M100 4.4:		66.34%			51.04%			10.47%			—	
Select Chcal or Cmcal to become Ccal M100 4.4:	11.620	11.62	OK	2.500	2.50	OK	5.070	5.07	OK		—	—
Cau, M100 6.2:		11.62			2.60			5.08			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.56	-0.12%	OK	2.56	0.66%	OK	5.04	0.10%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.05	-0.19%	OK	0.00	0.19%	OK	-0.11	0.39%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.30%	OK		0.73%	OK		0.39%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.31%	OK		0.00%	OK		0.60%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		66.34%	OK		51.04%	OK		10.47%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.55			2.57			5.05			—	
Avg. of Cibz and Cfbz, Co:		0.04			0.00			-0.10			—	
Cgas, ppm or %:		13.33			2.78			1.07			—	
Eq 100-5 Cgas@3%:					6.57			2.53			—	
Cgas@15%:					2.17			0.83			—	

SJVAPCD - Appendix G

Pollutant	O2			NOx			CO			SO2		
Run 2												
Run 2 start time:	10:09		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.24	13.24		3.61	3.61		0.24	0.24			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.56	-0.13%	OK	2.54	0.85%	OK	4.95	1.11%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.05	-0.15%	OK	0.00	0.19%	OK	-0.21	1.38%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.29%	OK		0.92%	OK		1.40%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.28%	OK		-0.01%	OK		1.60%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		66.31%	OK		64.51%	OK		2.49%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.56			2.55			4.99			—	
Avg. of Cibz and Cfbz, Co:		0.05			0.00			-0.16			—	
Cgas, ppm or %:		13.31			3.54			0.39			—	
Eq 100-5 Cgas@3%:					8.35			0.92			—	
Cgas@15%:					2.75			0.30			—	

Pollutant	O2			NOx			CO			SO2		
Run 3												
Run 3 start time:	11:00:00 AM		OK									
Van's voltage, VAC RMS, per policy:	118.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	13.23	13.23		2.99	2.99		0.19	0.19			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	11.56	-0.12%	OK	2.54	0.89%	OK	4.93	1.32%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	0.05	-0.18%	OK	0.00	0.18%	OK	-0.24	1.75%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		0.30%	OK		0.96%	OK		1.61%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		-0.31%	OK		-0.02%	OK		1.97%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		66.30%	OK		53.42%	OK		1.97%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		11.56			2.54			4.94			—	
Avg. of Cibz and Cfbz, Co:		0.05			0.00			-0.23			—	
Cgas, ppm or %:		13.31			2.94			0.40			—	
Eq 100-5 Cgas@3%:					6.93			0.94			—	
Cgas@15%:					2.29			0.31			—	

O2% Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

NOx Avg.

- (●) No Range Changes Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

CO Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SO2 Avg.

- (●) No Range Change Occurred. Average From Three Run Review.
- ( ) Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ( ) Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2	NOx	CO	SO2
Est. avg. from 3 runs (not to be used for compliance determination)				
Cgas, ppm or %:	13.3	3.1	0.6	—
Eq 100-5 Cgas@3%:		7.3	1.5	—
Cgas@15%:		2.4	0.5	—
Eq 100-4 lbs/hr:		7.70	0.91	—
EPA Eq 19-1 lbs/MMBtu:		0.009	0.001	—
g/Bhp-hr:		0.034	0.004	—

If permit conditions require source to maintain daily, monthly, quarterly or annual fuel, production or sulfur records then enter the data below. Include copies or a printout of these records in the Operating Data section of the test report.

		Units			Units
Fuel or production rate nearest to the day of the test.			Fuel sulfur concentration rate nearest to the day of the test.		
Fuel or production rate nearest to 3-months prior to the day of test.		ton/day	Fuel sulfur concentration rate nearest to 3-months prior to the day of the test.		
Fuel or production rate nearest to 6-months prior to the day of test.			Fuel sulfur concentration rate nearest to 6-months prior to the day of the test.		
Fuel or production rate nearest to 9-months prior to the day of test.			Fuel sulfur concentration rate nearest to 9-months prior to the day of the test.		

Tester's comment area, explain each "X" mark and what actions will be taken to prevent reoccurrence.

District Review Code:	3	/

APPENDIX H

STRIPCHART RECORDINGS

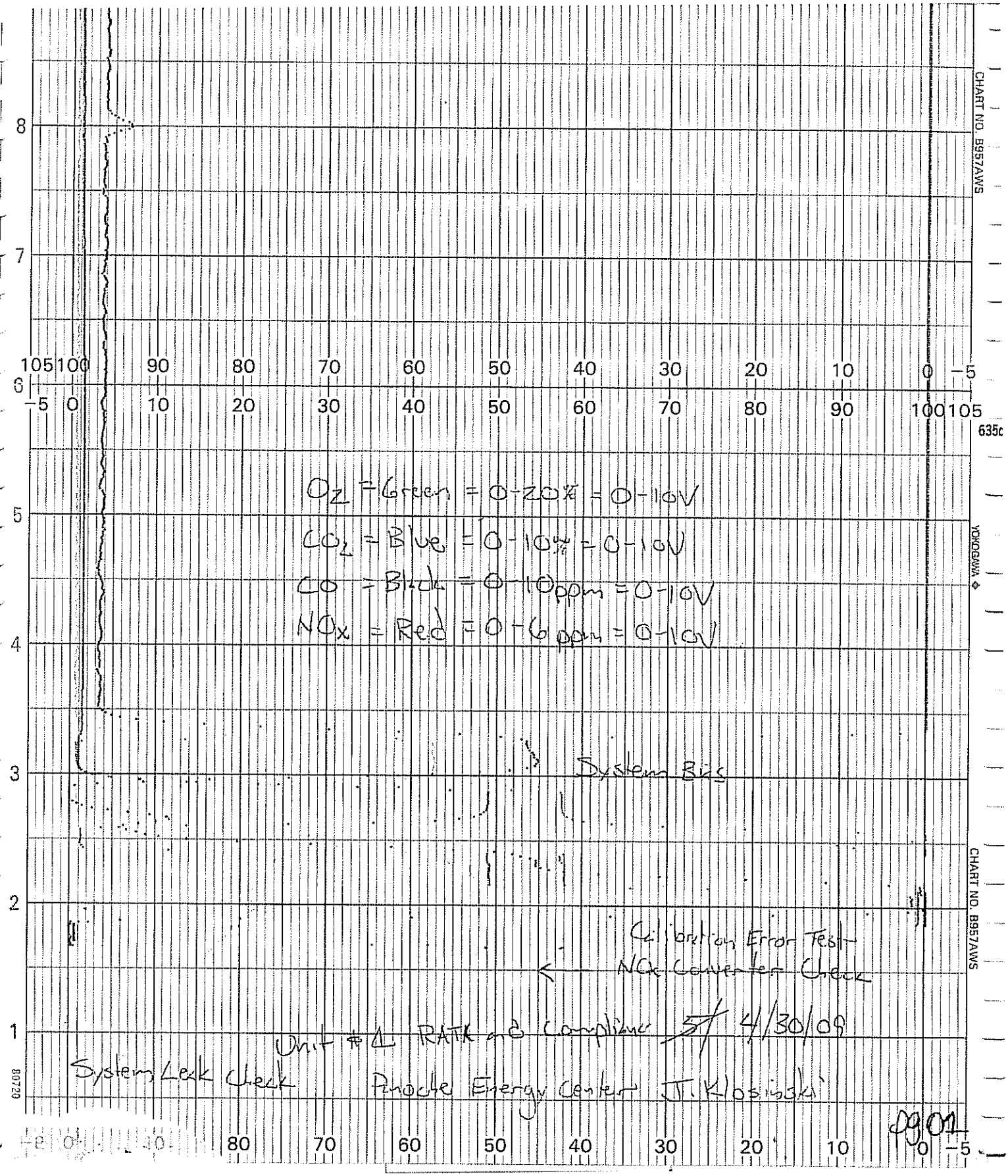
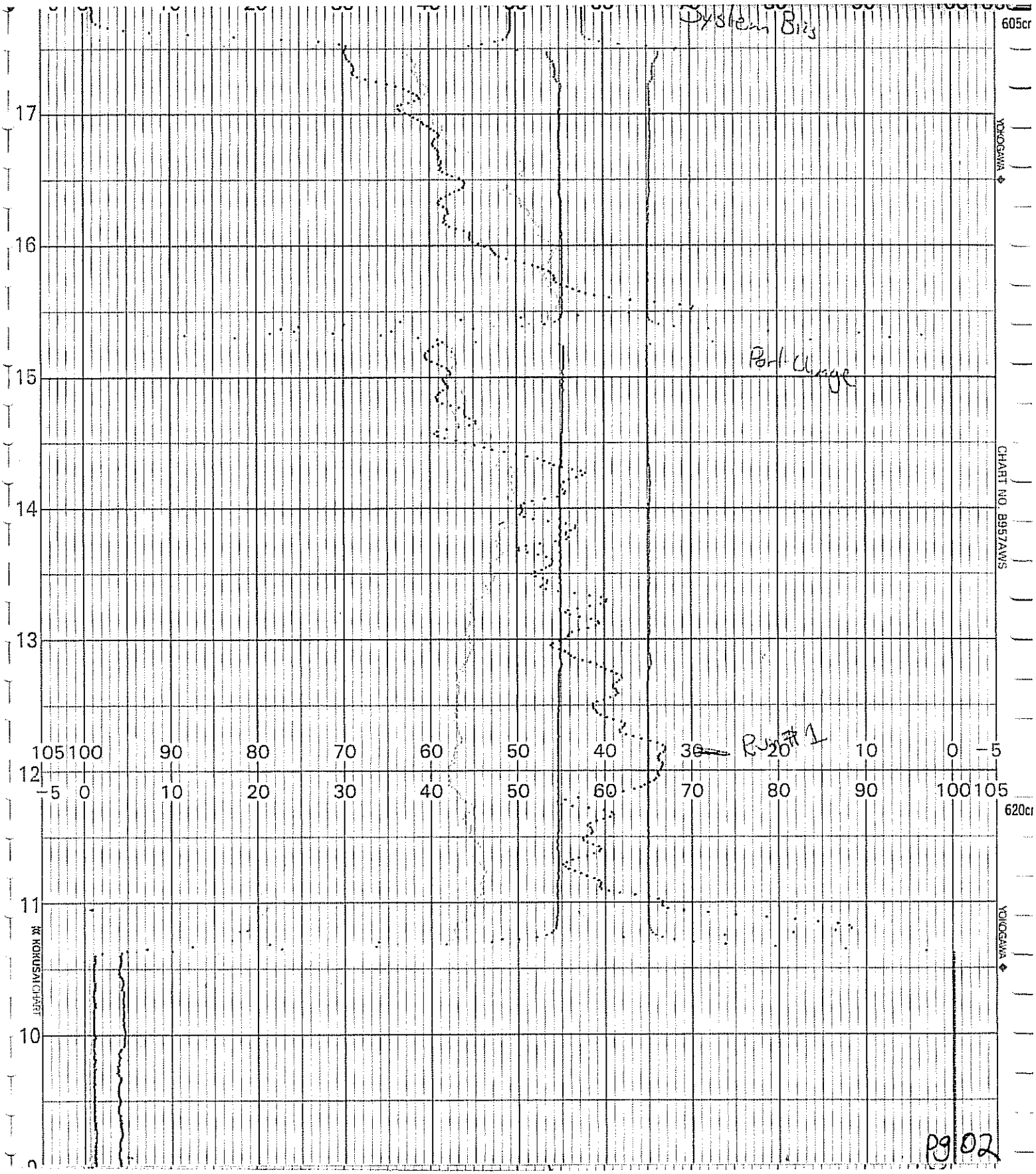
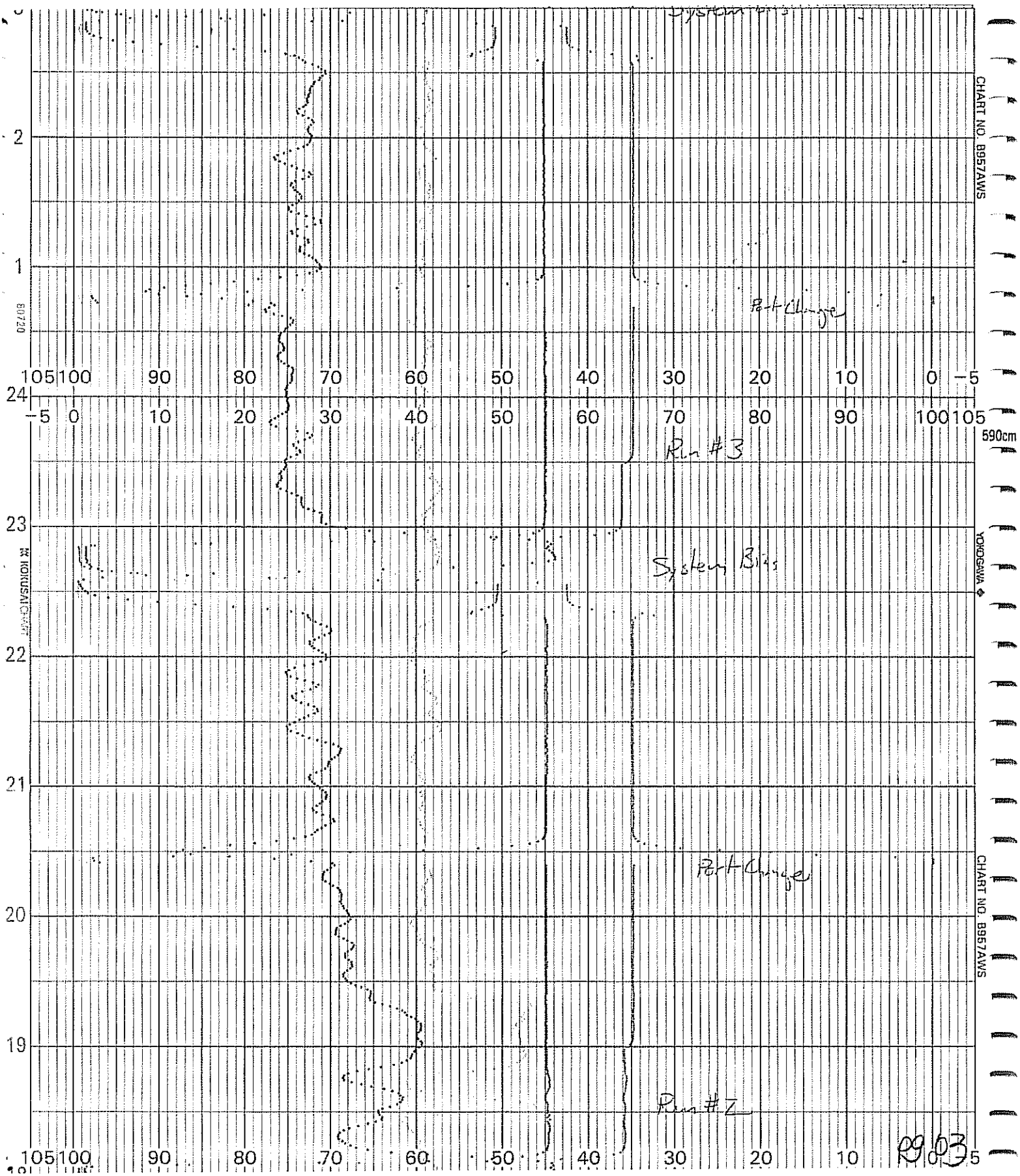
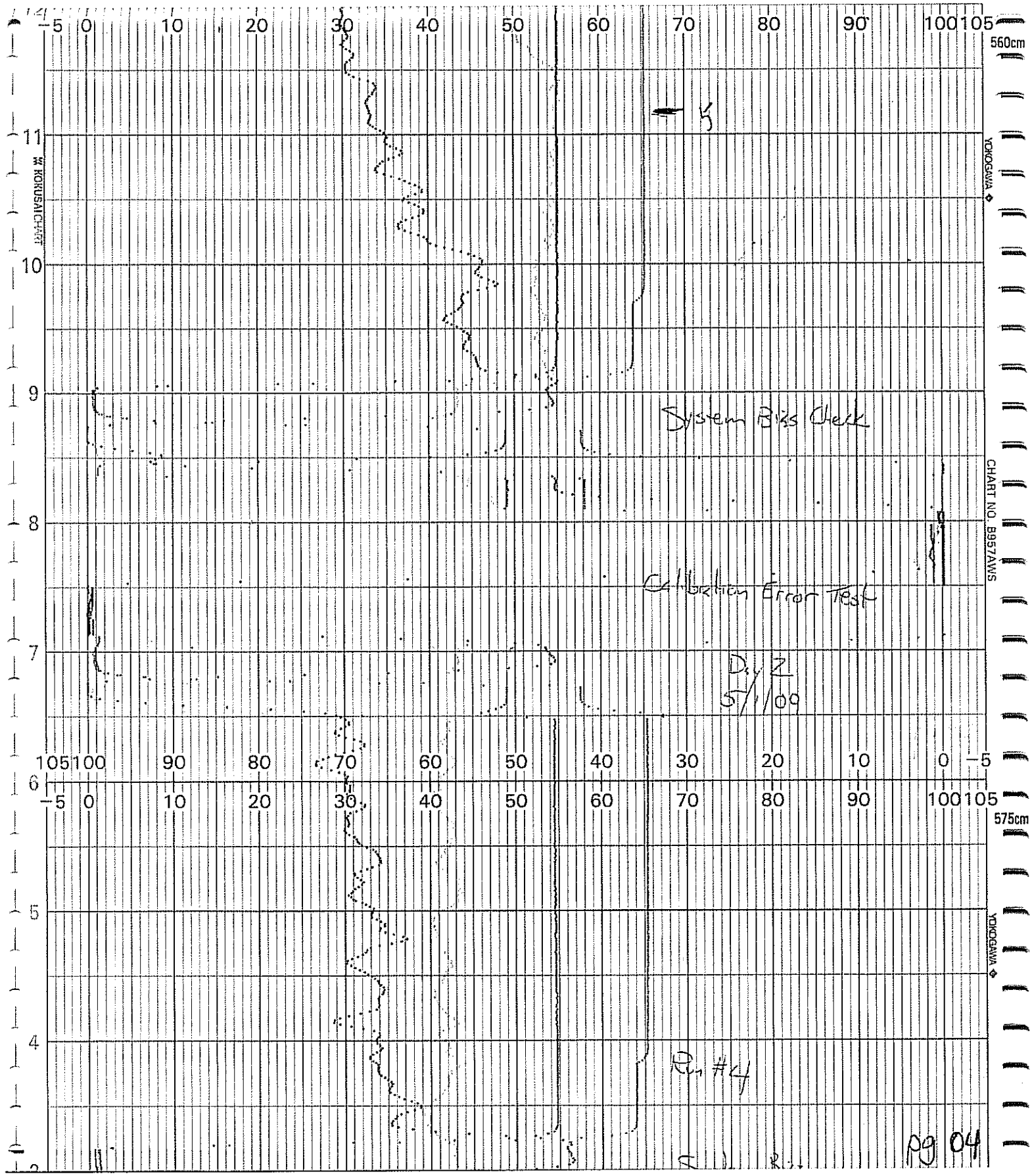


CHART NO. B957AWS
YOKOGAWA
CHART NO. B957AWS
O2 = Green = 0-20% = 0-10V
CO2 = Blue = 0-10% = 0-10V
CO = Black = 0-100ppm = 0-10V
NOx = Red = 0-6 ppm = 0-10V
System Bias
Calibration Error Test
NOx Converter Check
Unit #1 RATA and Compliance 4/30/09
System Leak Check
Pinnacle Energy Center J. Klosinski
0901


605cr
YOKOGAWA
CHART NO. B957AWS
620cr
YOKOGAWA
KOKUSAI CHART
17
16
15
14
13
12
11
10
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
Run #1
Pg 02


System Bias
Port Change
Run #3
System Bias
Port Change
Run #2
CHART NO. B957AWS
CHART NO. B957AWS
YOKOGAWA
590cm
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
24
23
22
21
20
19
2
1
B9 03


560cm
575cm
YOKOGAWA
CHART NO. B957AWS
W KOKUSAI CHART
System Bias Check
Calibration Error Test
Day 2
5/1/09
Run #4
Pg 04

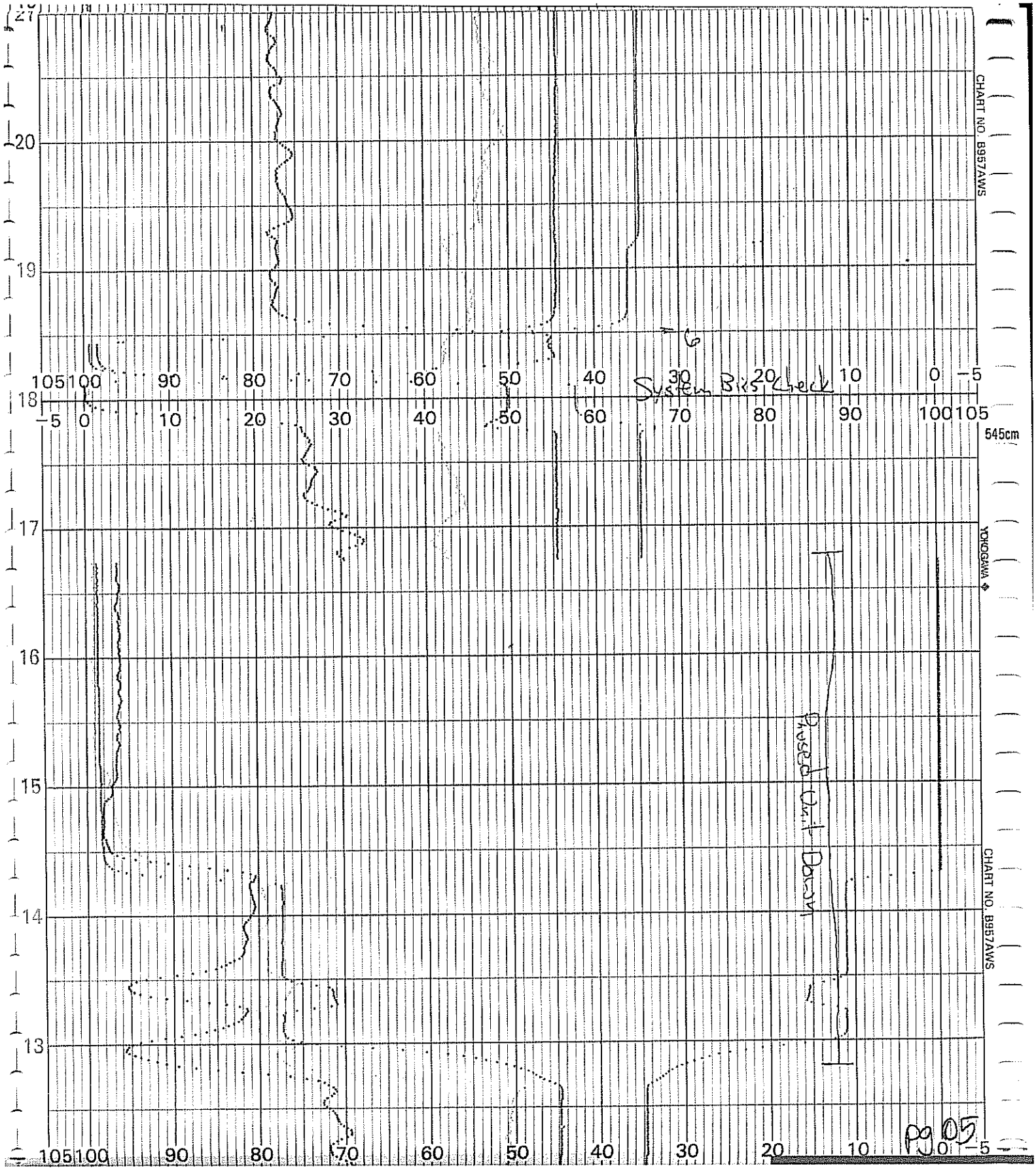
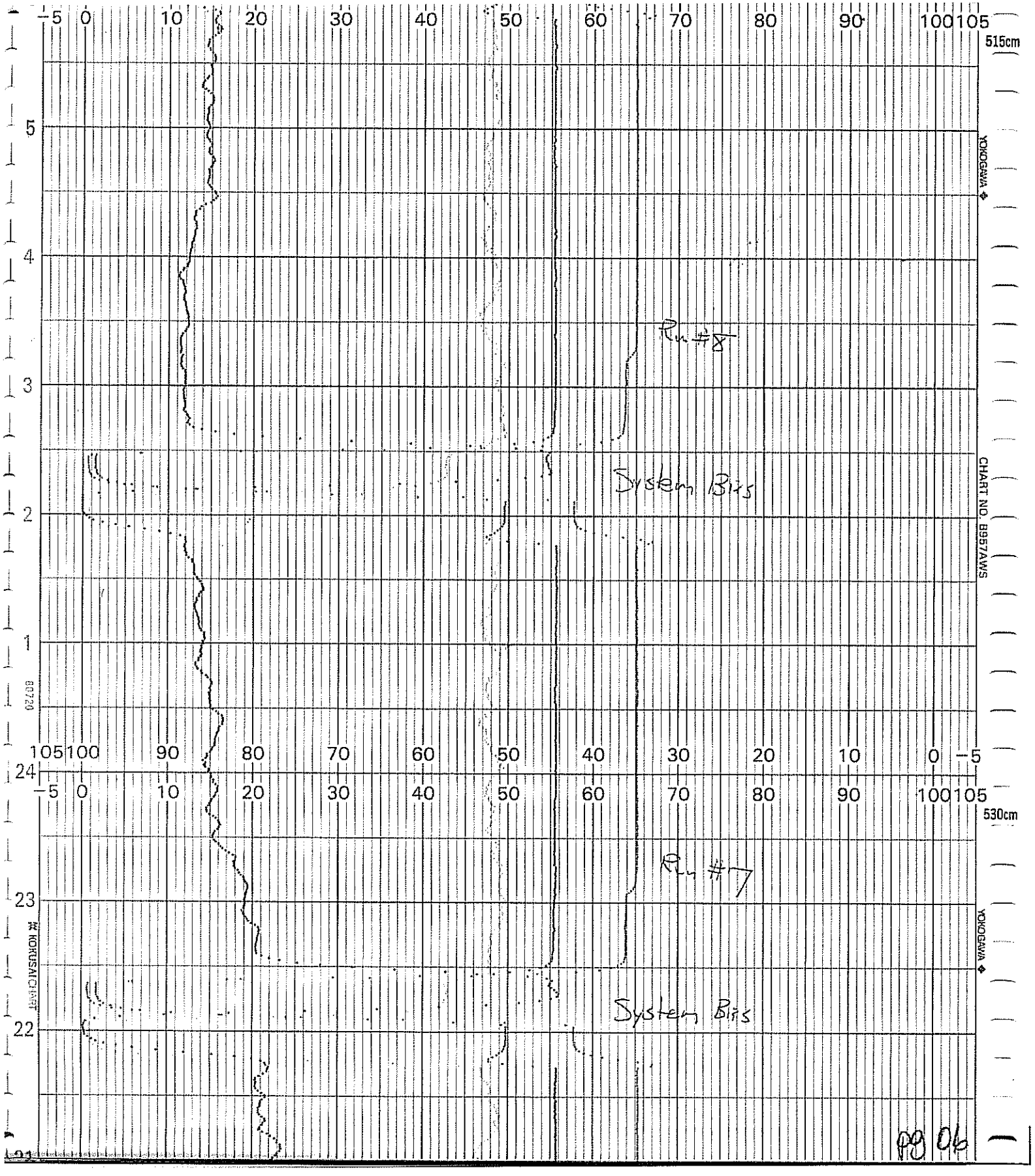
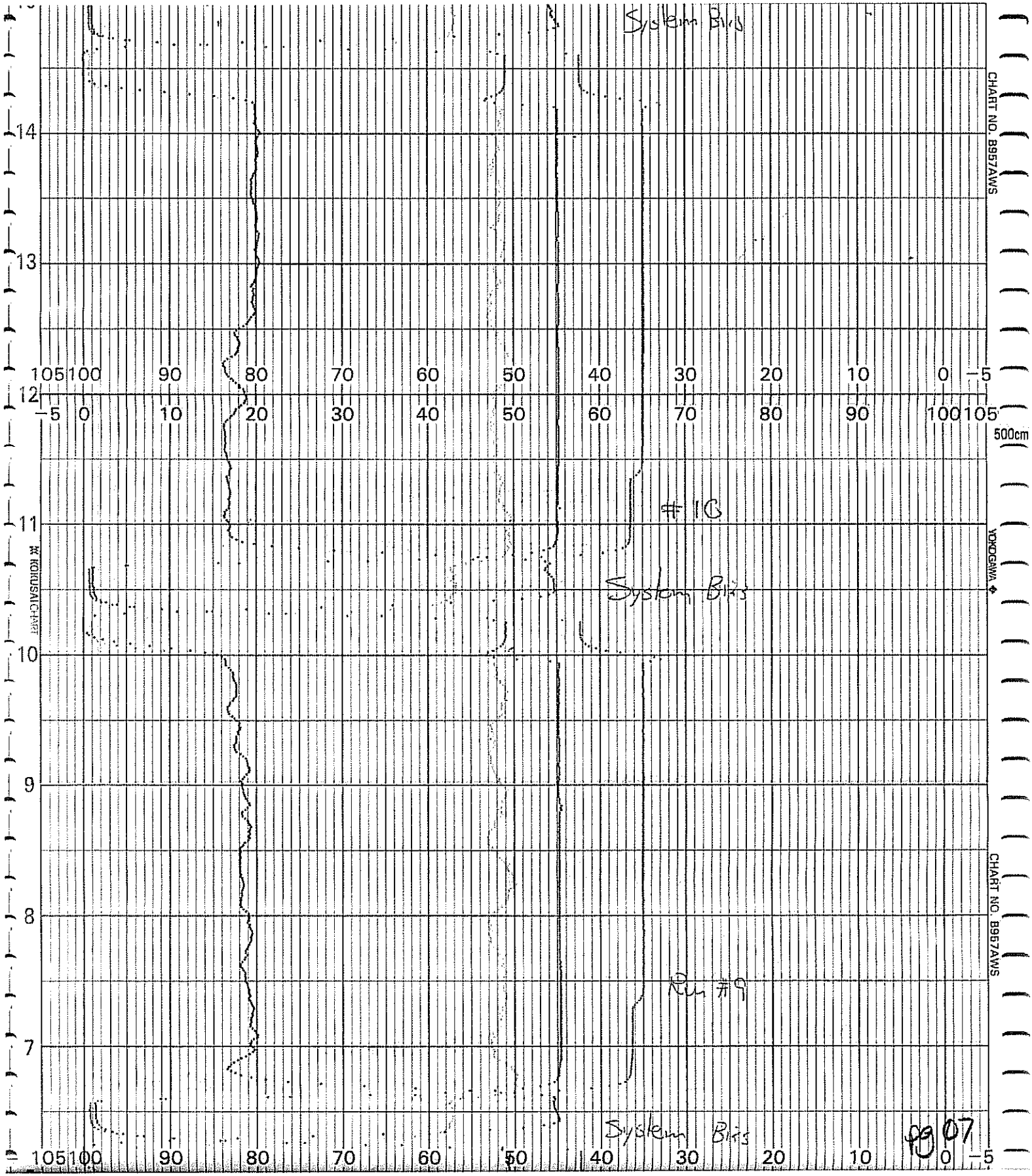
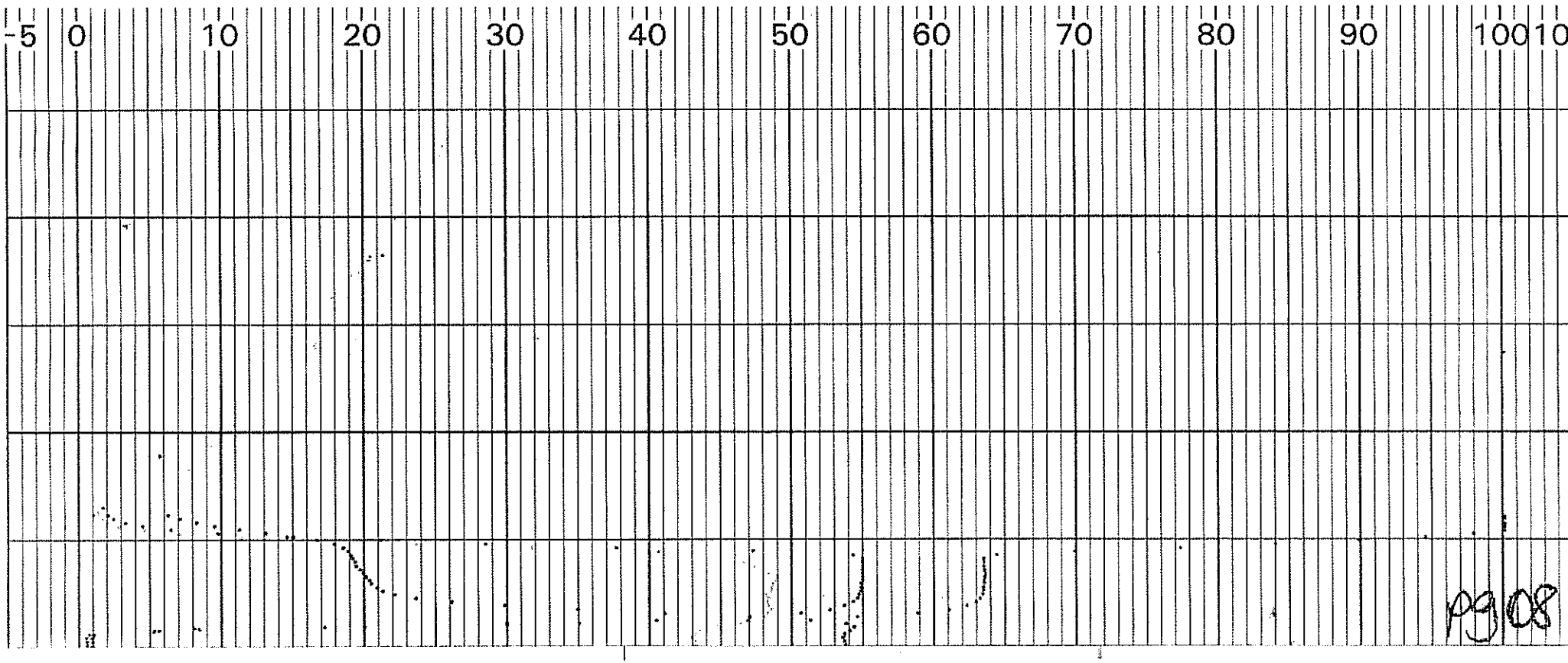
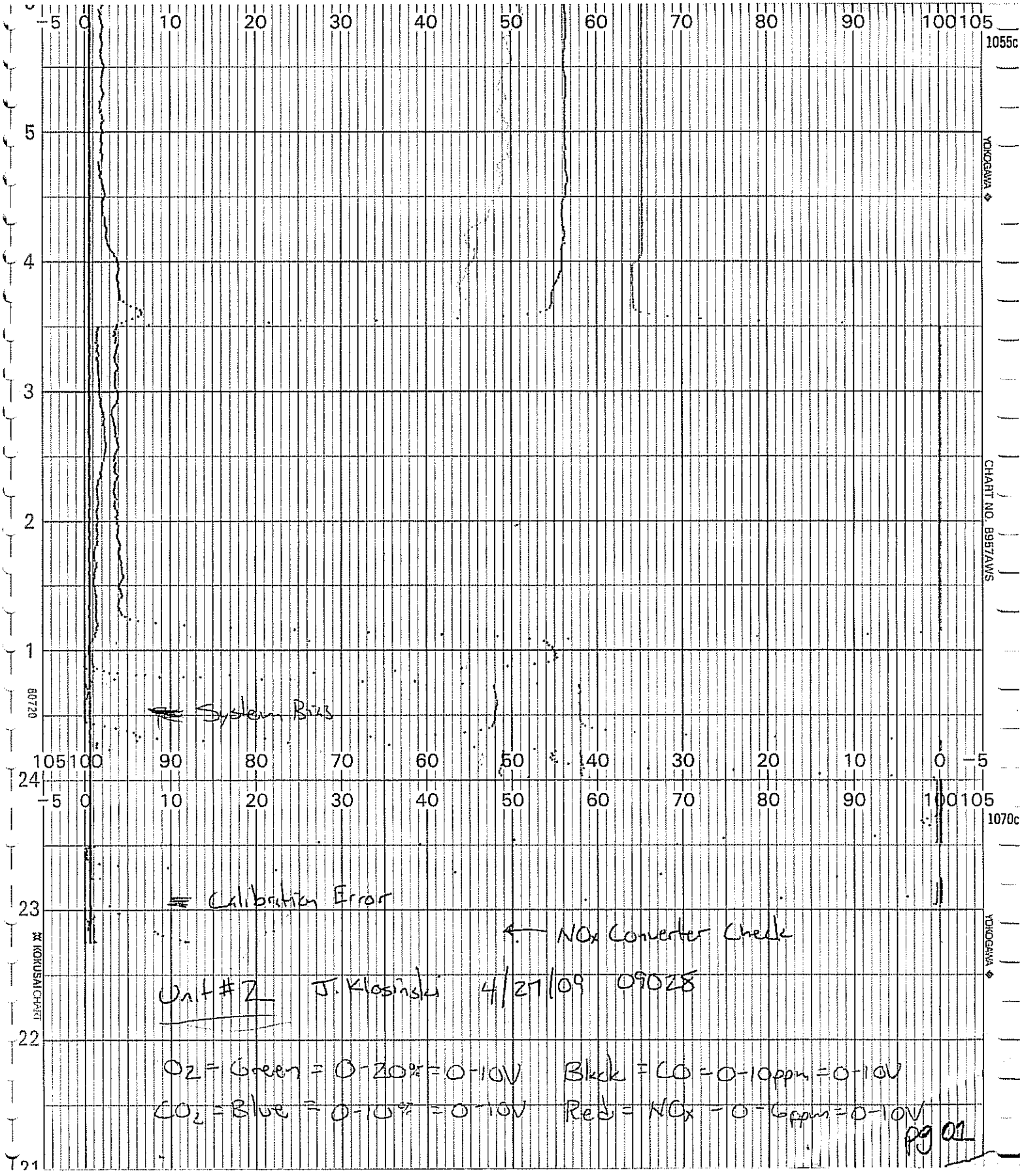


CHART NO. B957AWS
YOKOGAWA
545cm
System Bias Check
Based Out Bias
P9 05


-5 0 10 20 30 40 50 60 70 80 90 100 105
515cm
Run #8
System Bias
105 100 90 80 70 60 50 40 30 20 10 0 -5
530cm
Run #7
System Bias
YOKOGAWA
CHART NO. B957AWS
KOKUSAI CHART
88 06


System Bias
CHART NO. B957AWS
14
13
105 100 90 80 70 60 50 40 30 20 10 0 −5
12
−5 0 10 20 30 40 50 60 70 80 90 100 105
500cm
#1C
11
System Bias
YOKOGAWA
10
9
8
Run #9
CHART NO. B957AWS
7
System Bias
105 100 90 80 70 60 50 40 30 20 10 0 −5
0007


-5
0
10
20
30
40
50
60
70
80
90
100
10
P9108


System Bias
Calibration Error
NOx Converter Check
Unit #2 J. Klosinski 4/27/09 09028
O2 = Green = 0-20% = 0-10V Black = CO = 0-10ppm = 0-10V
CO2 = Blue = 0-10% = 0-10V Red = NOx = 0-6ppm = 0-10V
pg 01
YOKOGAWA
CHART NO. B997AWS
KOKUSAI CHART

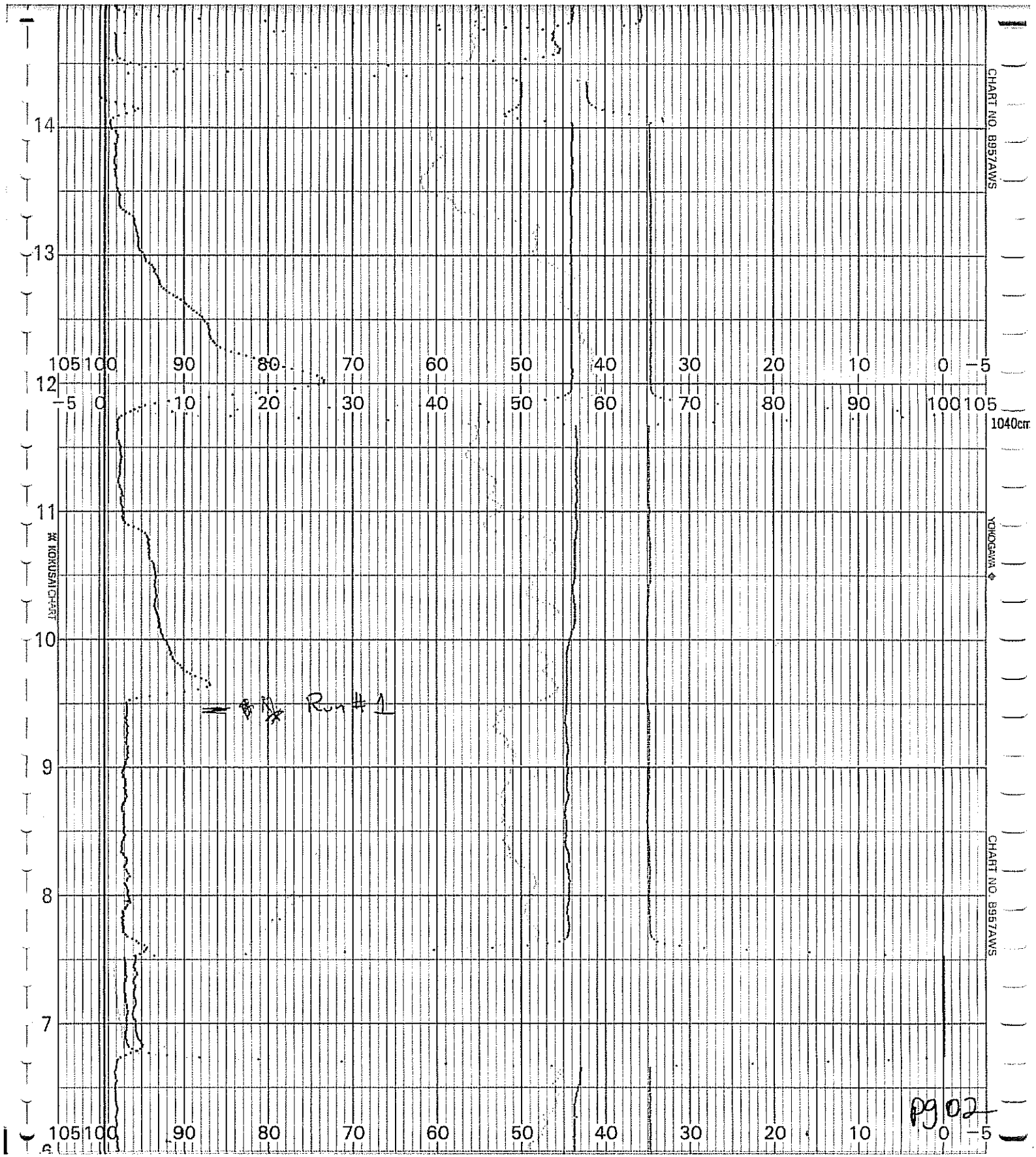
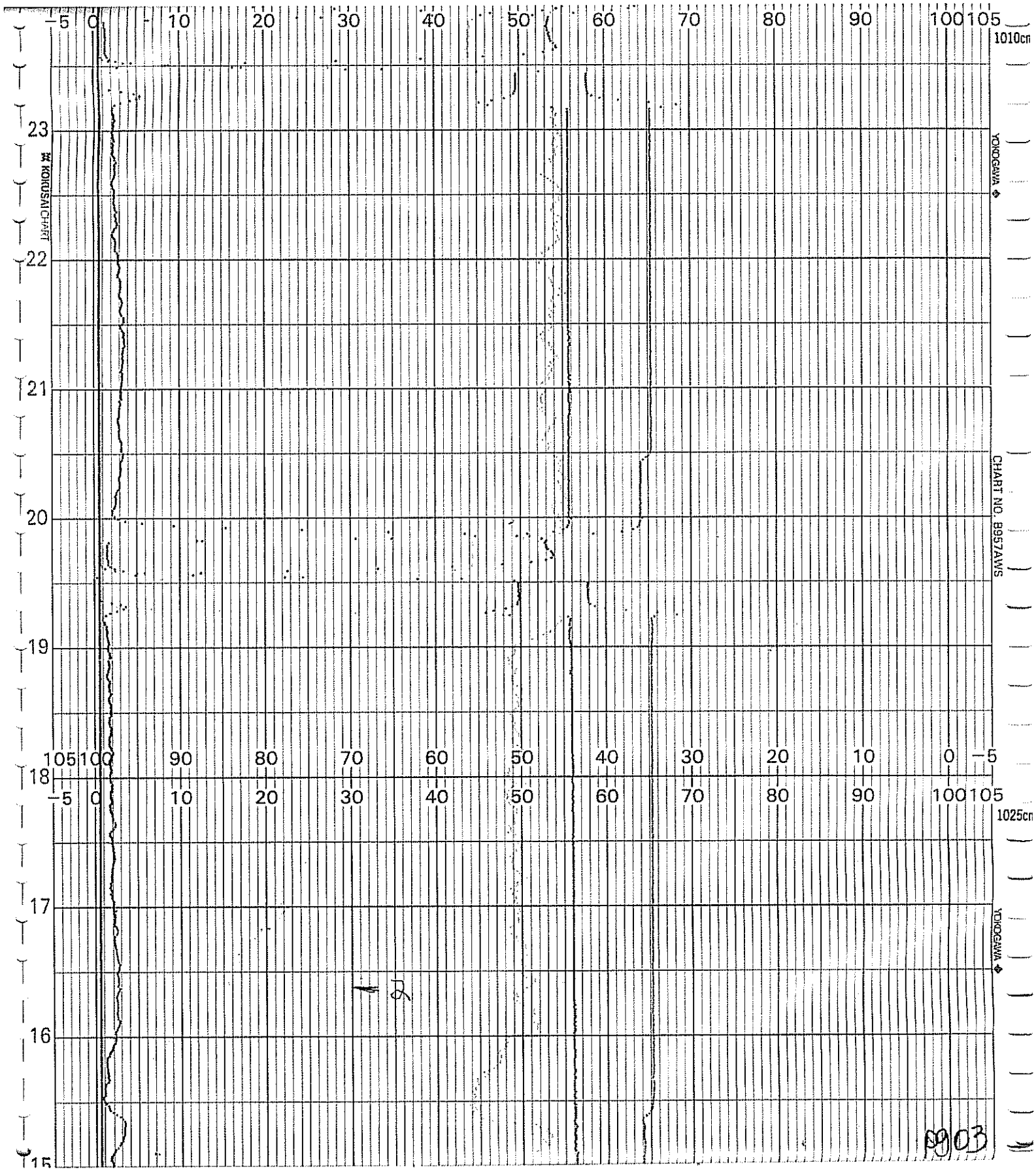


CHART NO. 8957AWS
YOKOGAWA
KOKUSAI CHART
1040cm
Run #1
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
14
13
12
11
10
9
8
7
6
pg 02


-5 0 10 20 30 40 50 60 70 80 90 100 105
1010cm
23
22
21
20
19
18
17
16
15
KOKUSAI CHART
YOKOGAWA
CHART NO. 8957AWS
105 100 90 80 70 60 50 40 30 20 10 0 -5
1025cm
8903

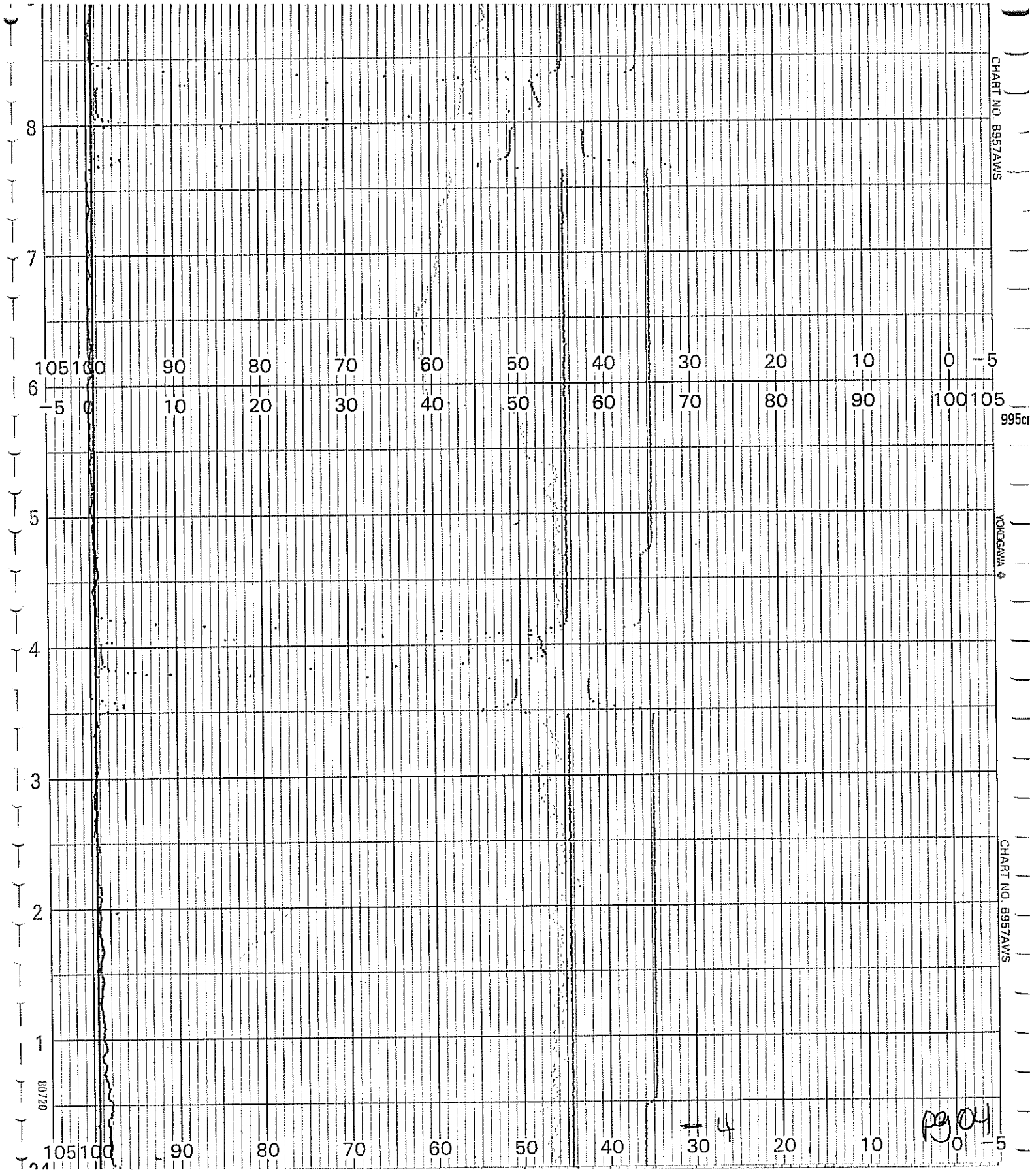
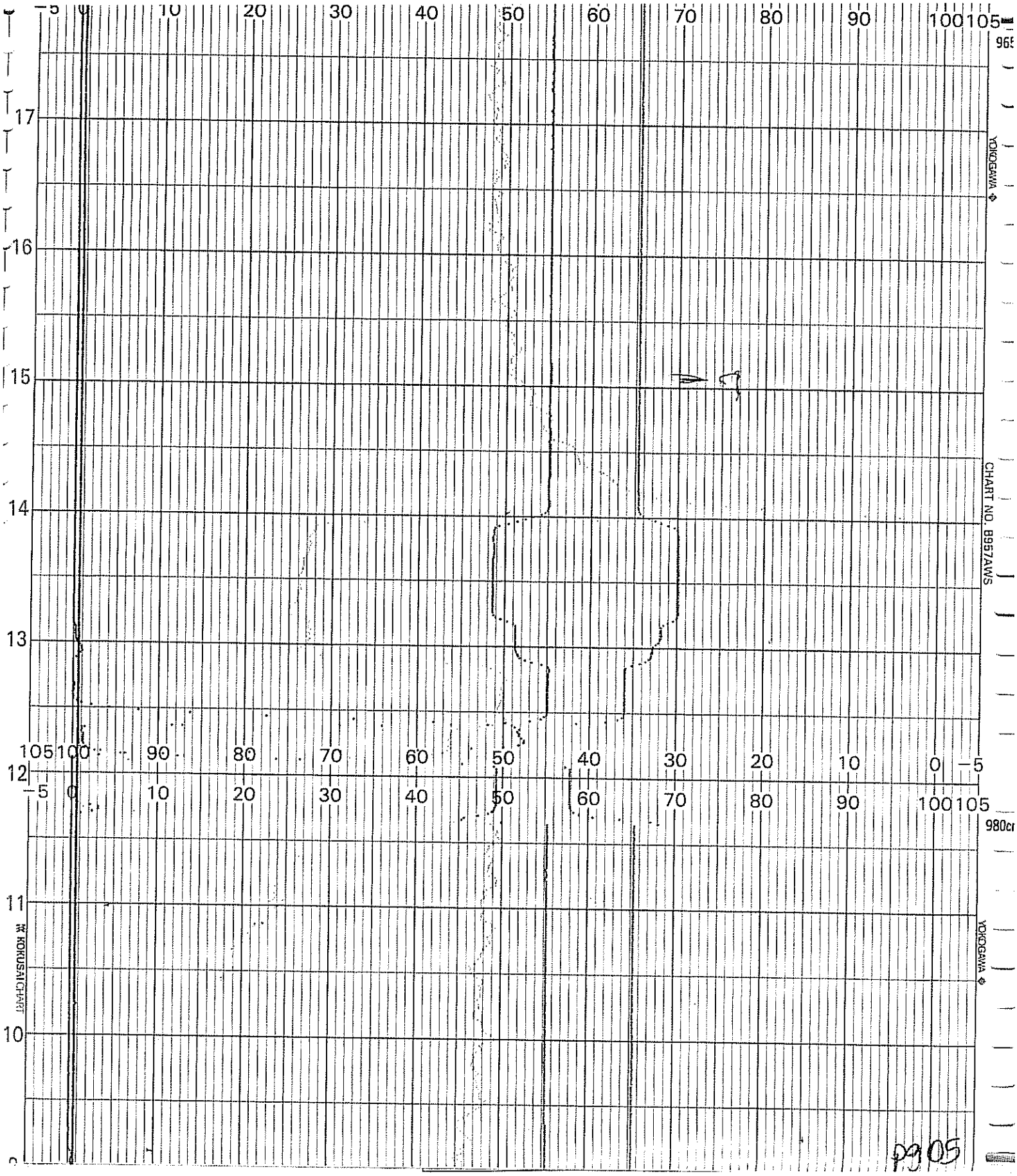


CHART NO. 8957AWS
YOKOGAWA
CHART NO. 8957AWS
8
7
6
5
4
3
2
1
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
105 100 90 80 70 60 50 40 30 20 10 0 −5
pg 04


YOKOGAWA
CHART NO. B957AWS
KOKUSAI CHART
P905

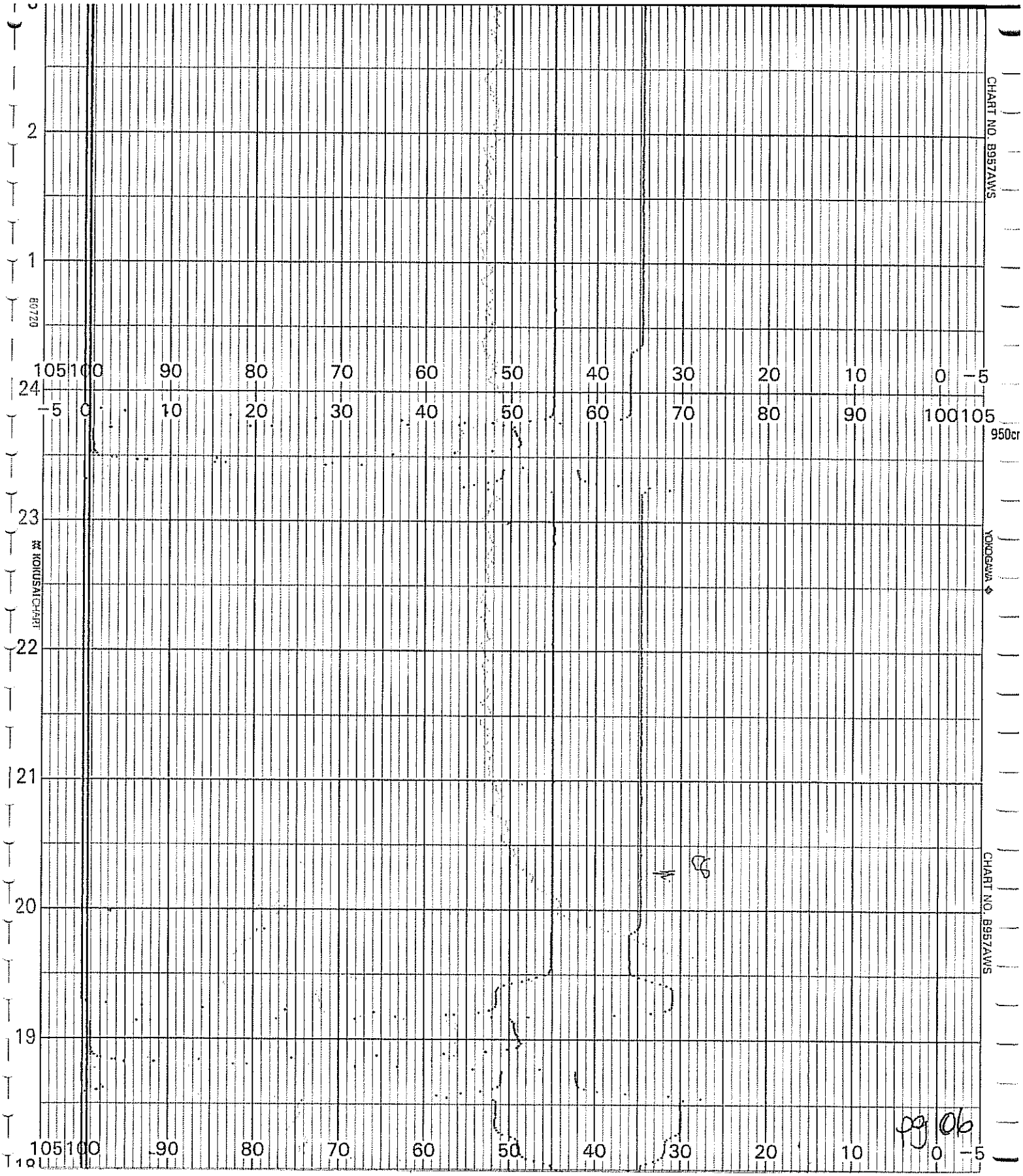


CHART NO. B957AWS
YOKOGAWA
CHART NO. B957AWS
950cr
KOKUSAI CHART
86720
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
24
23
22
21
20
19
18
09 06

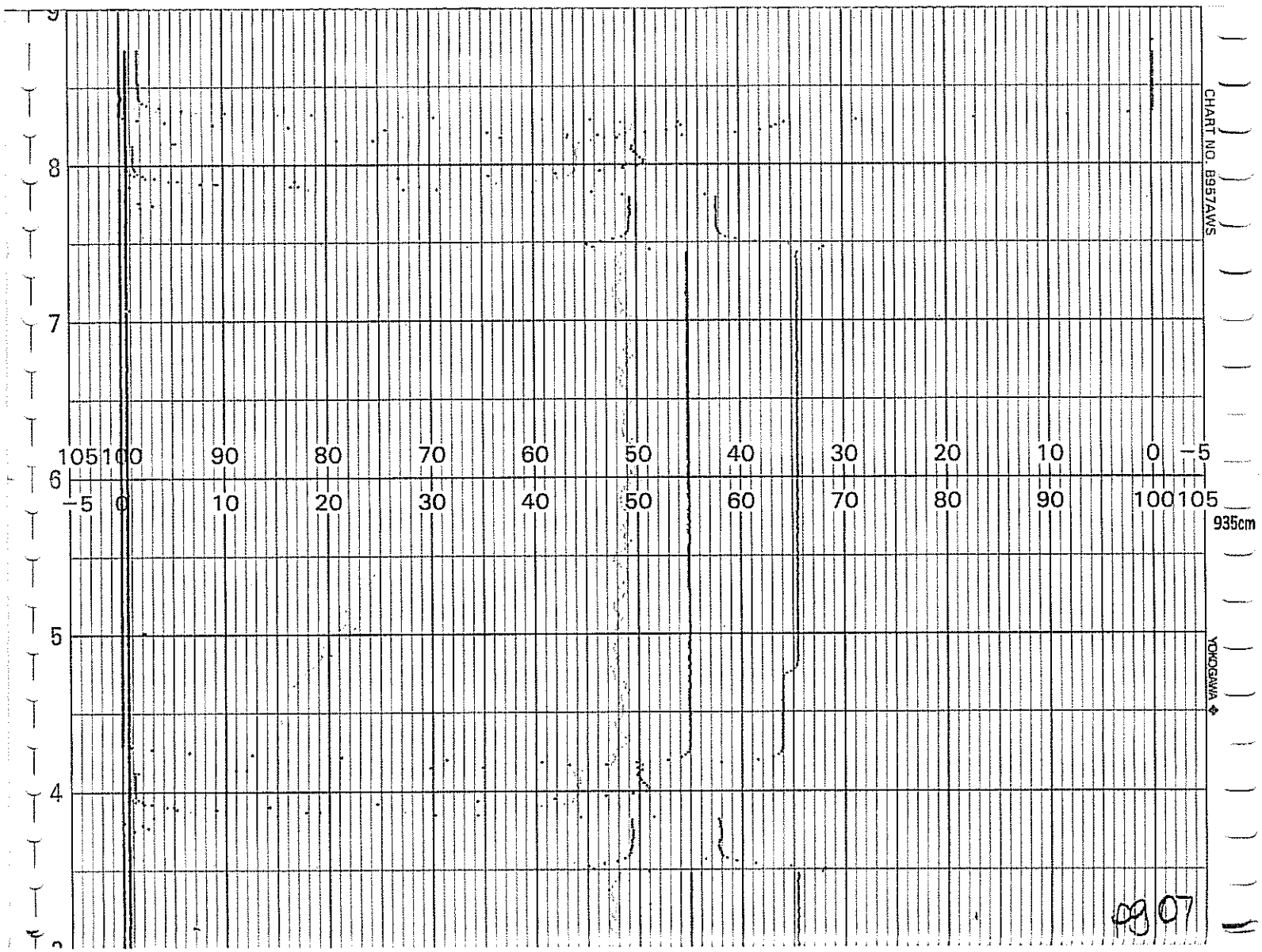
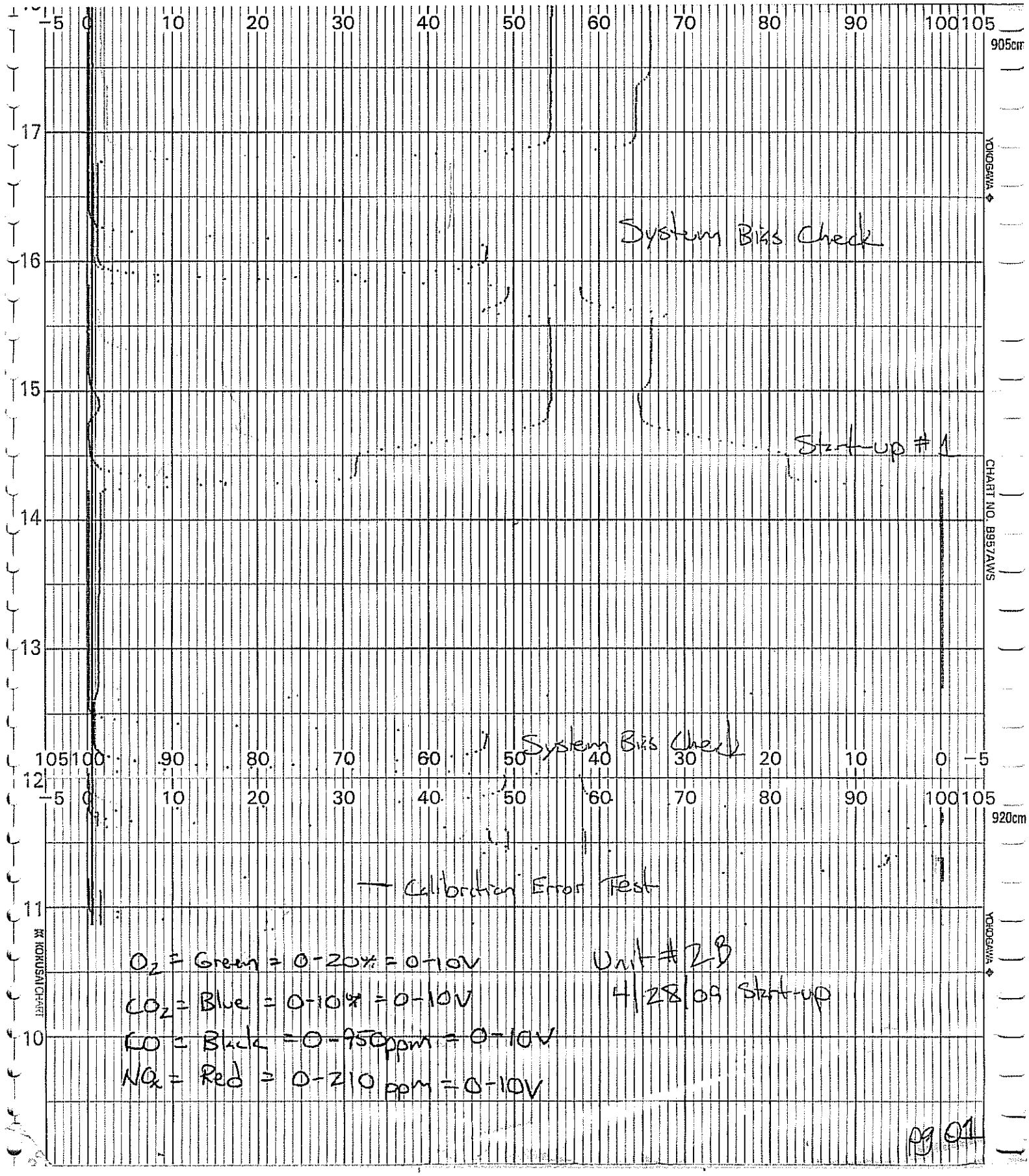


CHART NO. B957AWS
935cm
YOKOGAWA
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
9
8
7
6
5
4
3
0907


System Bias Check
Start-up #1
System Bias Check
Calibration Error Test
O2 = Green = 0-20% = 0-10V
CO2 = Blue = 0-10% = 0-10V
CO = Black = 0-950ppm = 0-10V
NOx = Red = 0-210 ppm = 0-10V
Unit #28
4/28/09 Start-up
905cm
920cm
YOKOGAWA
CHART NO. B957AWS
KOKUSAI CHART

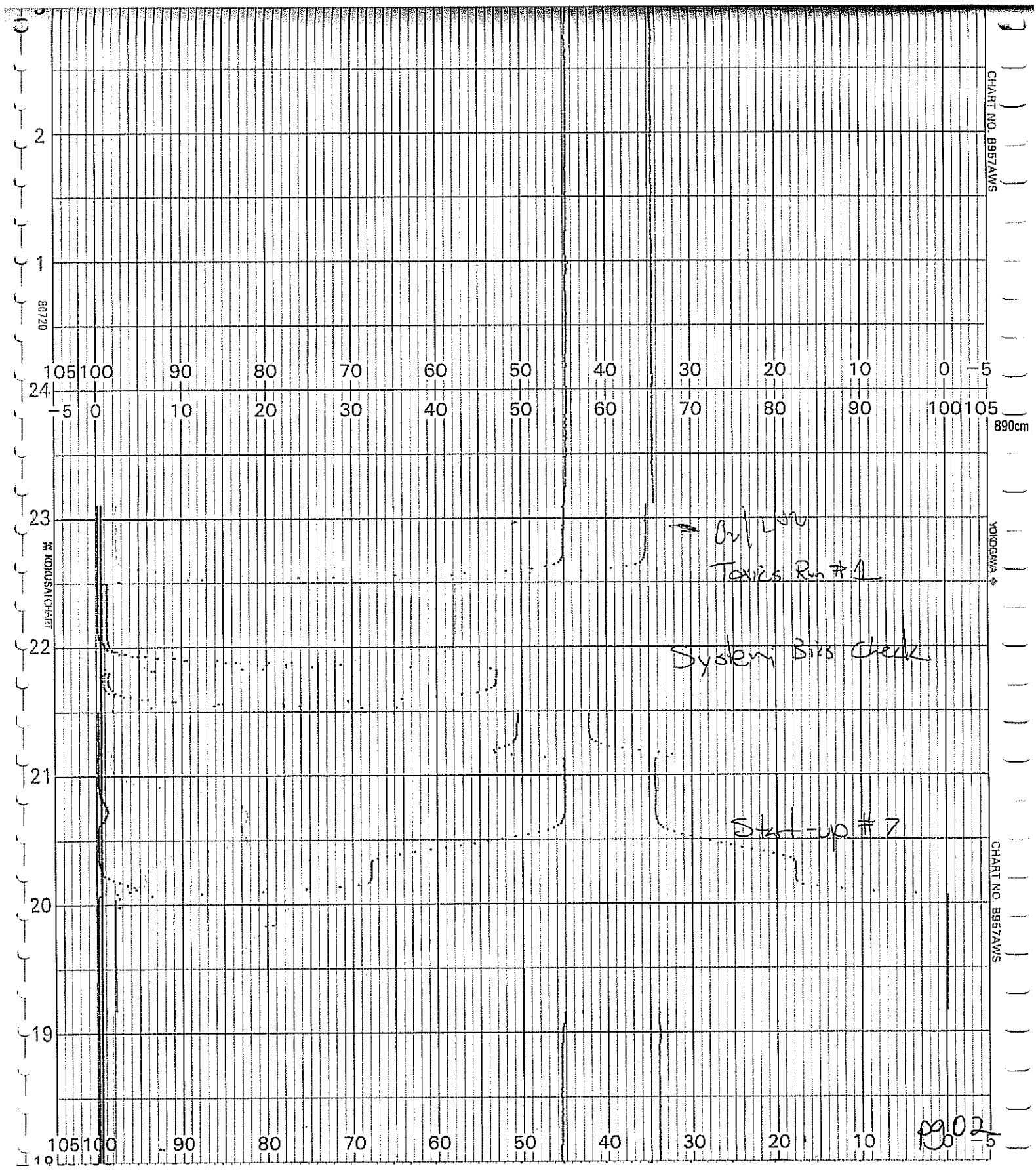
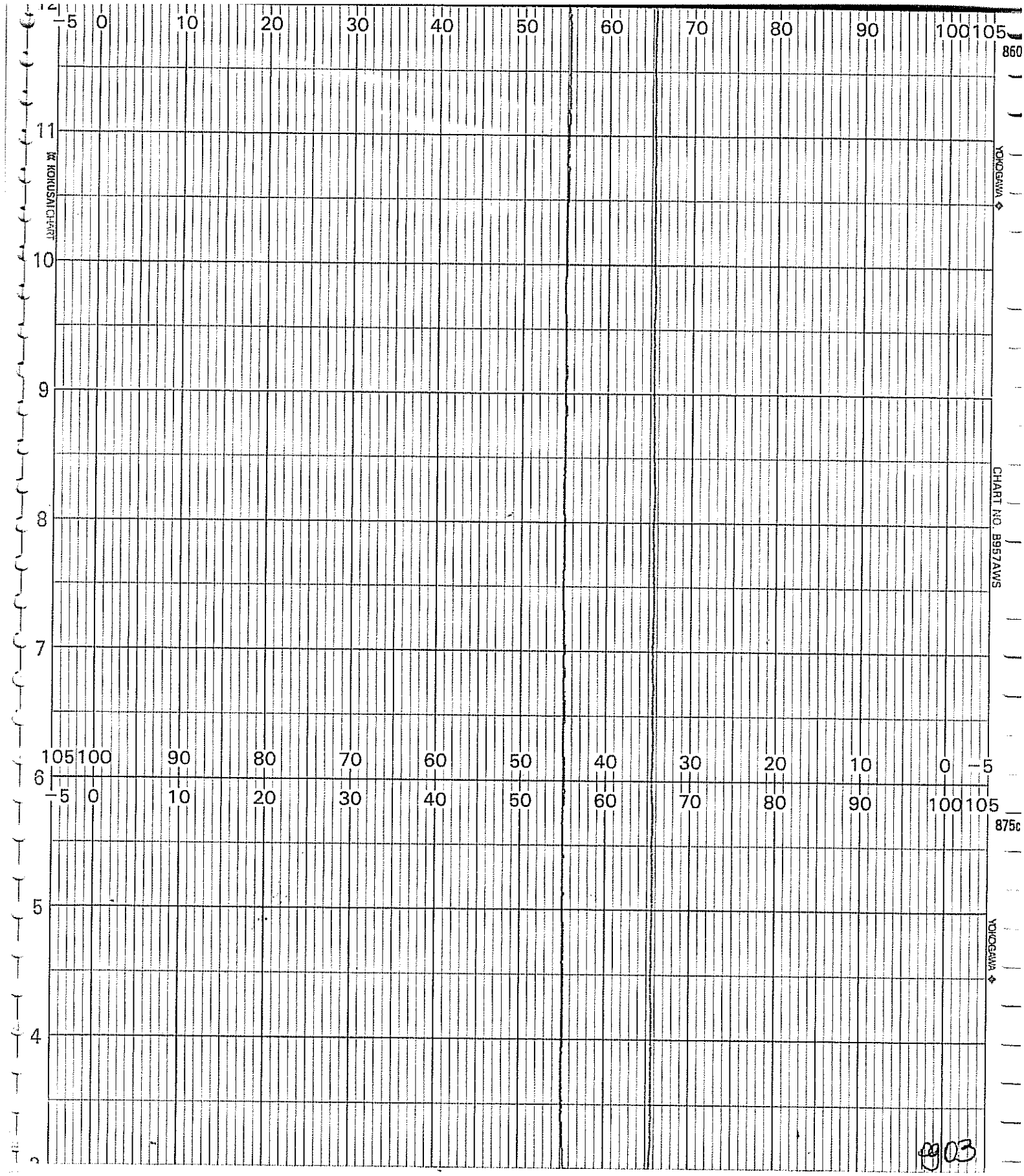


CHART NO. B957AWS
YOKOGAWA
890cm
Oil Low
Toxics Run #1
System Bias Check
Start-up #2
CHART NO. B957AWS
KOKUSAI CHART
80720
P902


-5 0 10 20 30 40 50 60 70 80 90 100 105
860
11
10
9
8
7
6
5
4
KIKUSAI CHART
YOKOGAWA
CHART NO. B957AWS
105 100 90 80 70 60 50 40 30 20 10 0 -5
875c
YOKOGAWA
03

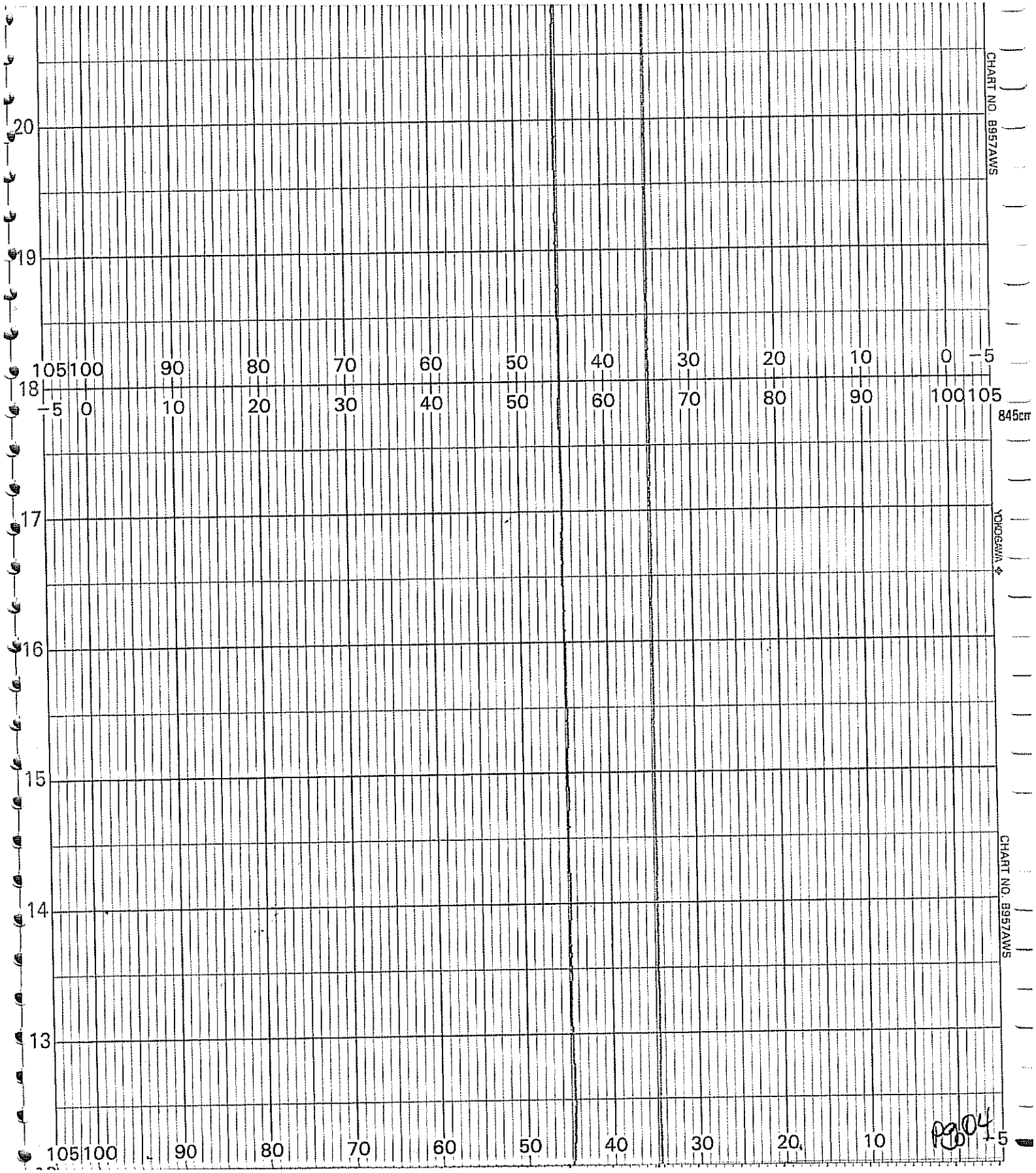
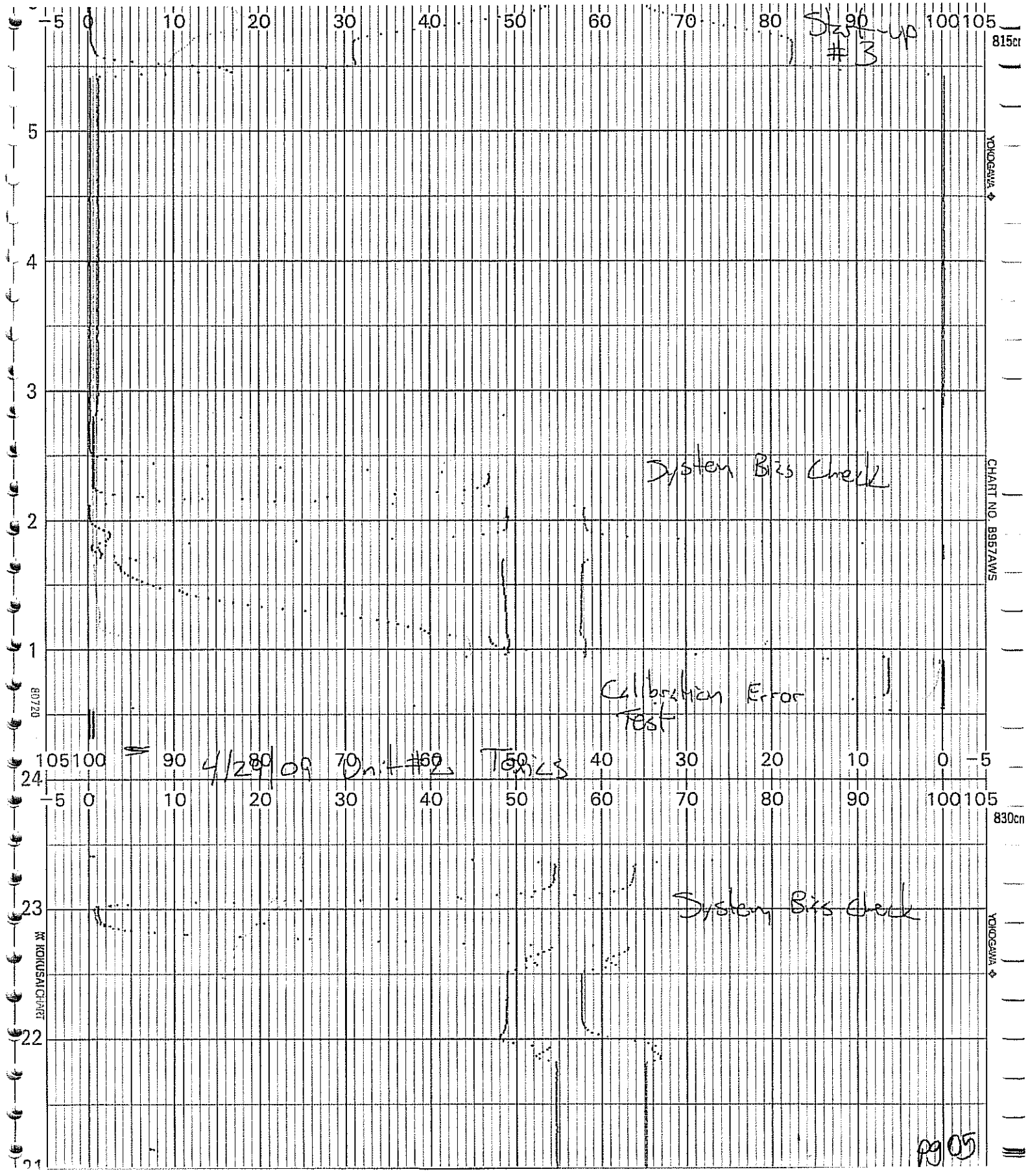


CHART NO. B957AWS
YOKOGAWA
845cm
20
19
18
17
16
15
14
13
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
105 100 90 80 70 60 50 40 30 20 10 −5
P604


Start-up #3
System Bias Check
Calibration Error Test
4/29/09 Unit #2 Tones
System Bias Check
YOKOGAWA
CHART NO. B957AWS
KOKUSAI CHART
P905

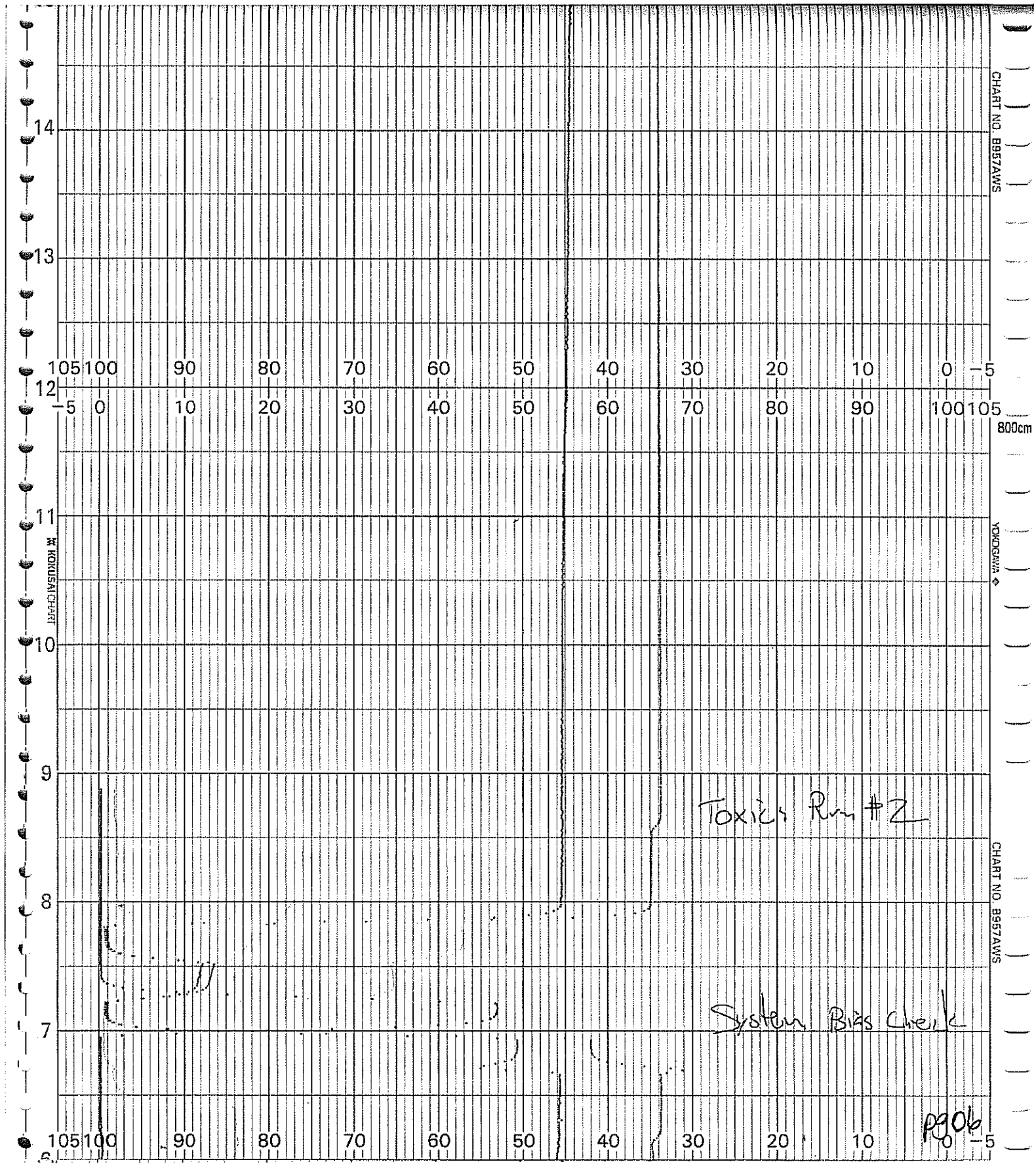
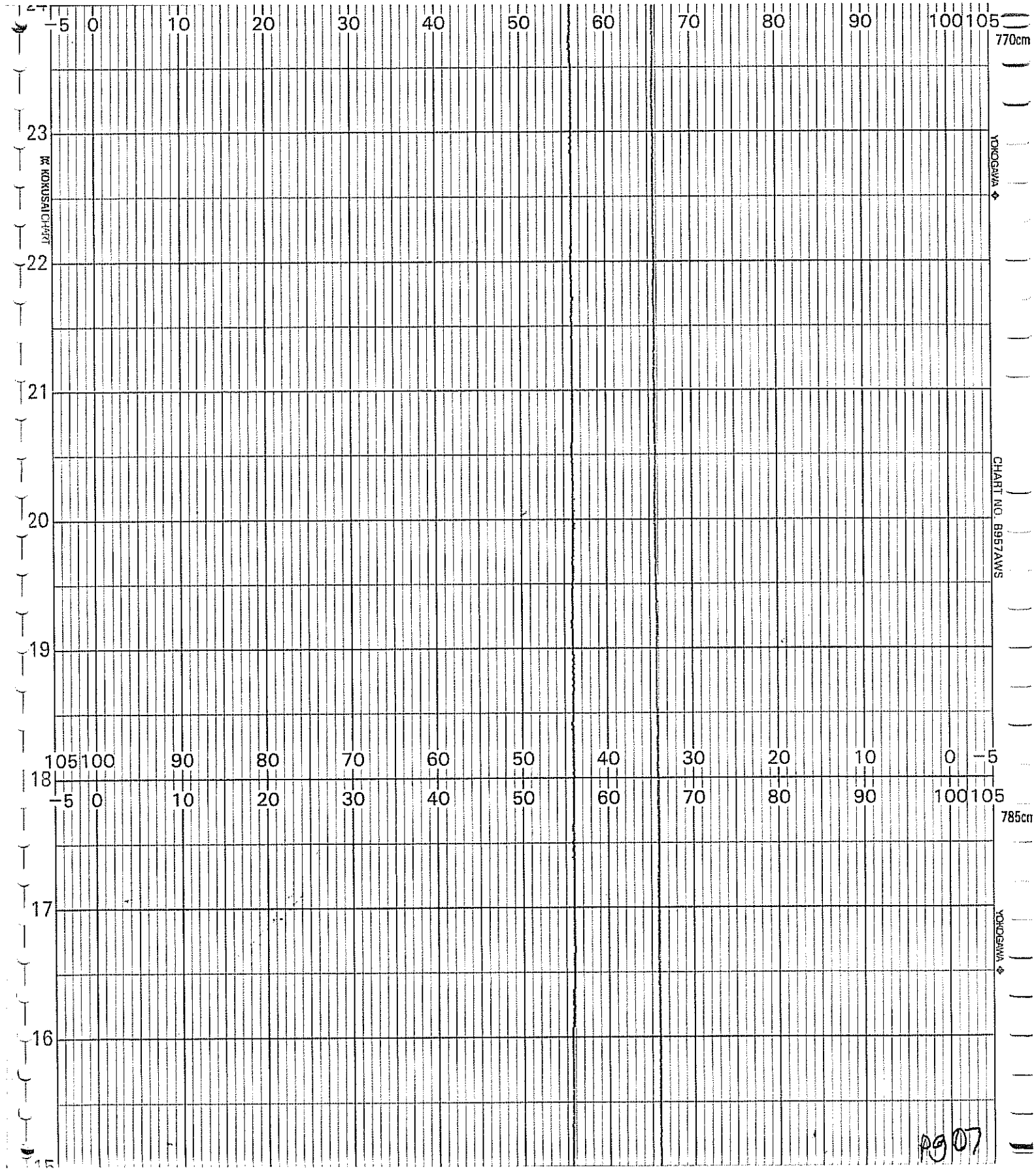


CHART NO. B957AWS
800cm
YOKOGAWA
KOKUSAI CHART
Toxicity Run #2
System Bias Check
P906


−5 0 10 20 30 40 50 60 70 80 90 100 105
770cm
23
22
21
20
19
18
17
16
15
KOKUSAI CHART
YOKOGAWA
CHART NO. 8957AWS
105 100 90 80 70 60 50 40 30 20 10 0 −5
785cm
A907

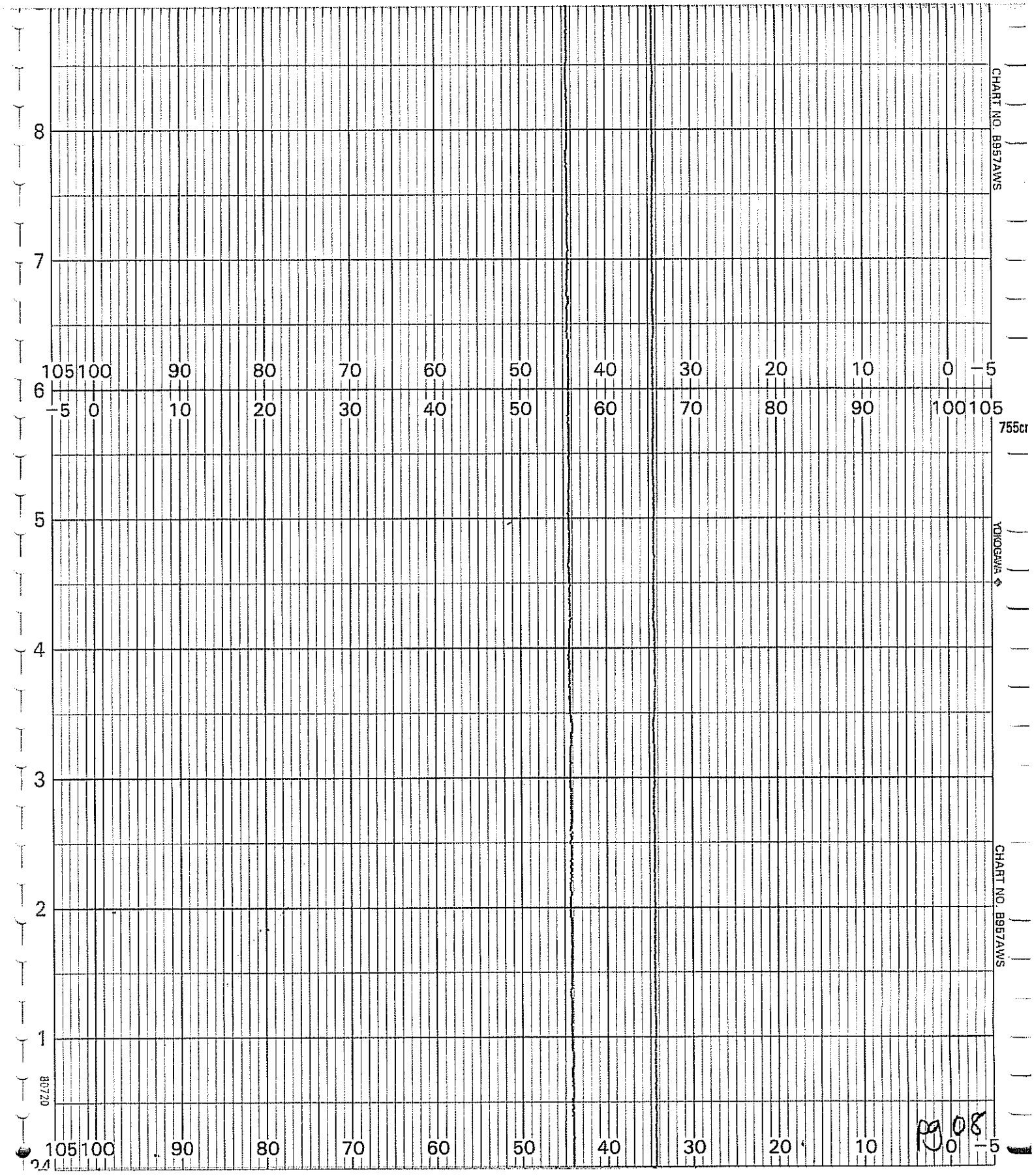
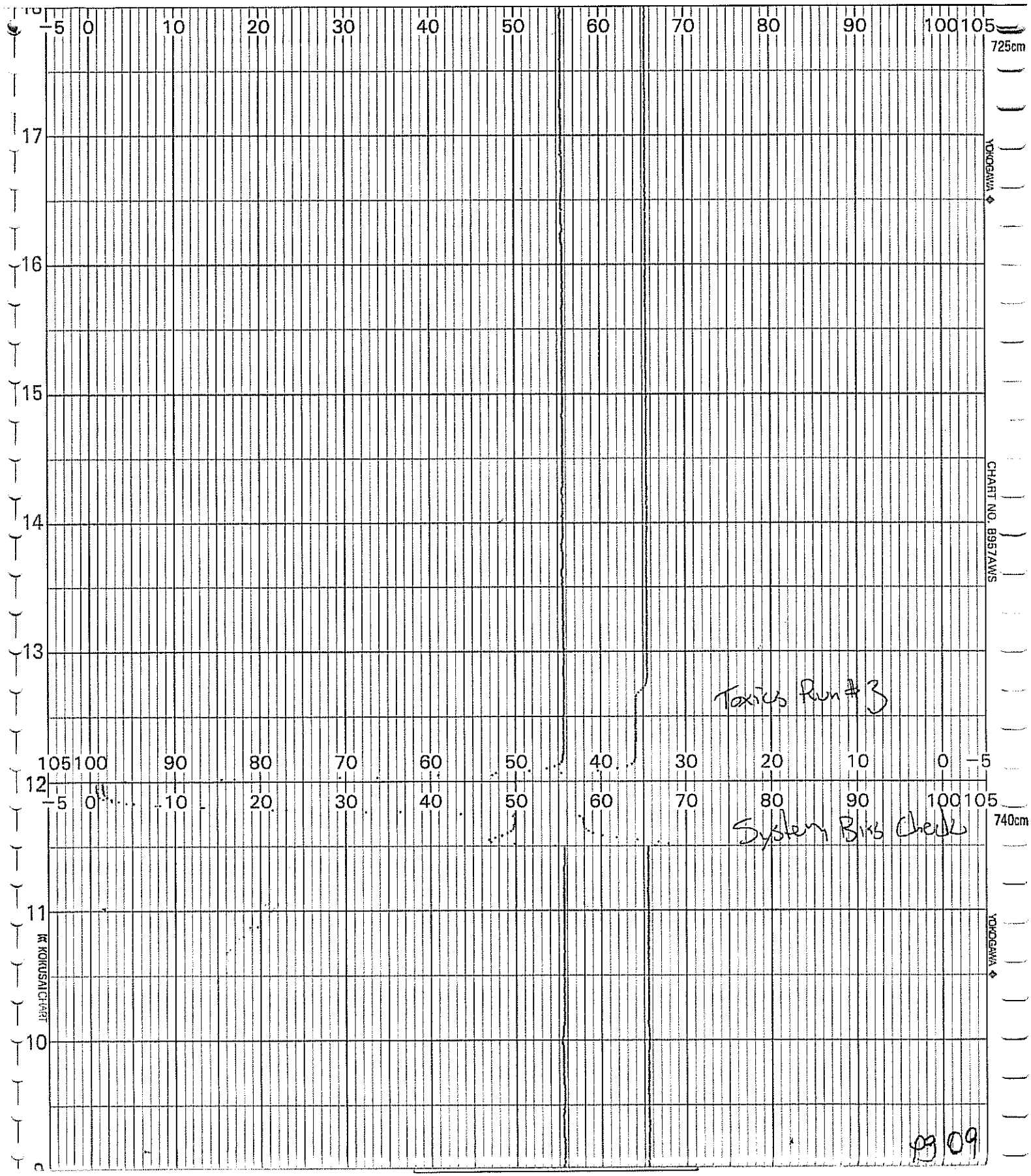


CHART NO. B957AWS
8
7
105 100 90 80 70 60 50 40 30 20 10 0 −5
6
−5 0 10 20 30 40 50 60 70 80 90 100 105
755cr
5
YOKOGAWA
4
3
CHART NO. B957AWS
2
1
80720
105 100 90 80 70 60 50 40 30 20 10 0 −5
24
Pg 08


725cm
740cm
YOKOGAWA
CHART NO. B957AWS
KOKUSAI CHART
Toxics Run #3
System Bias Check
09 09

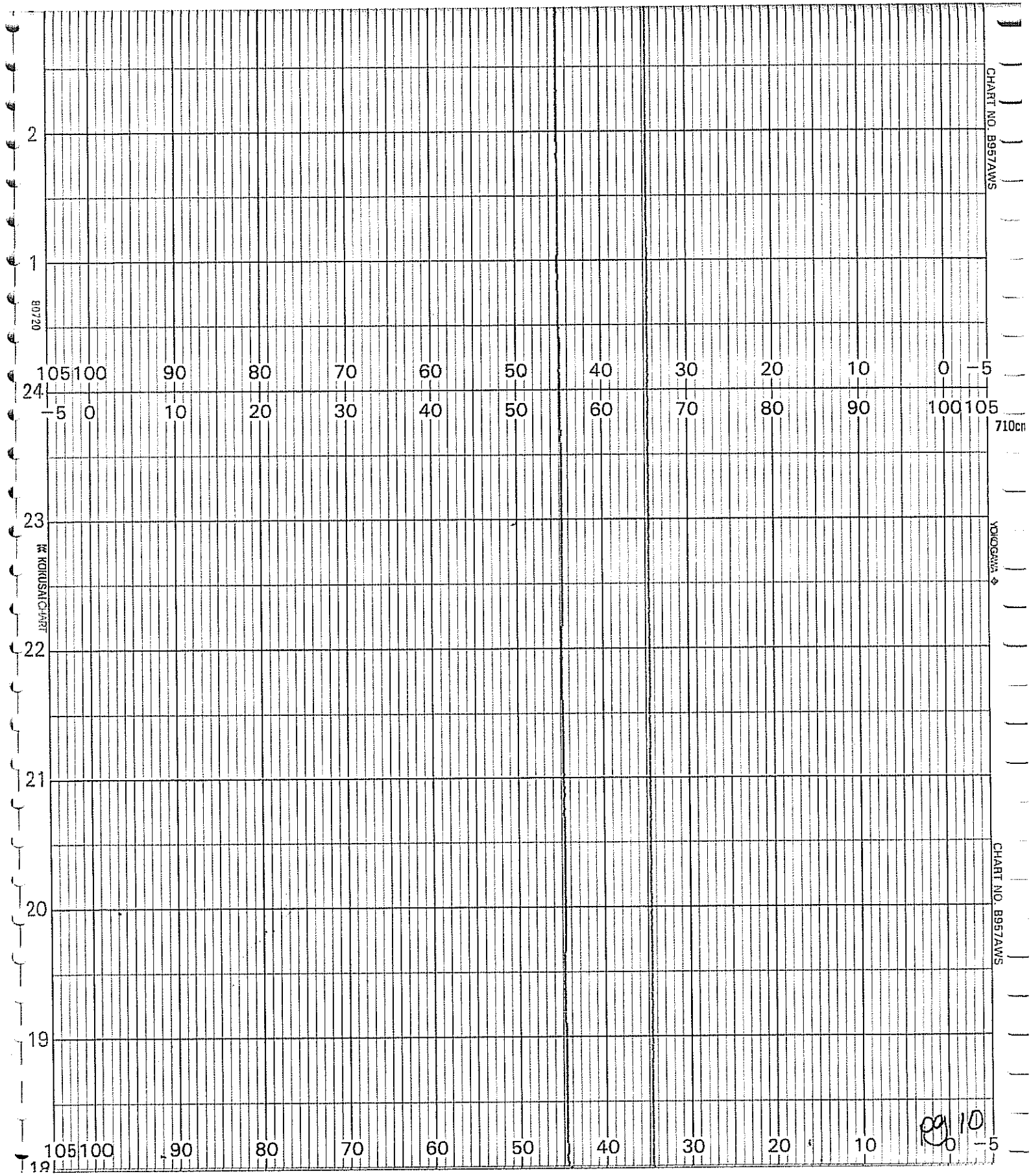
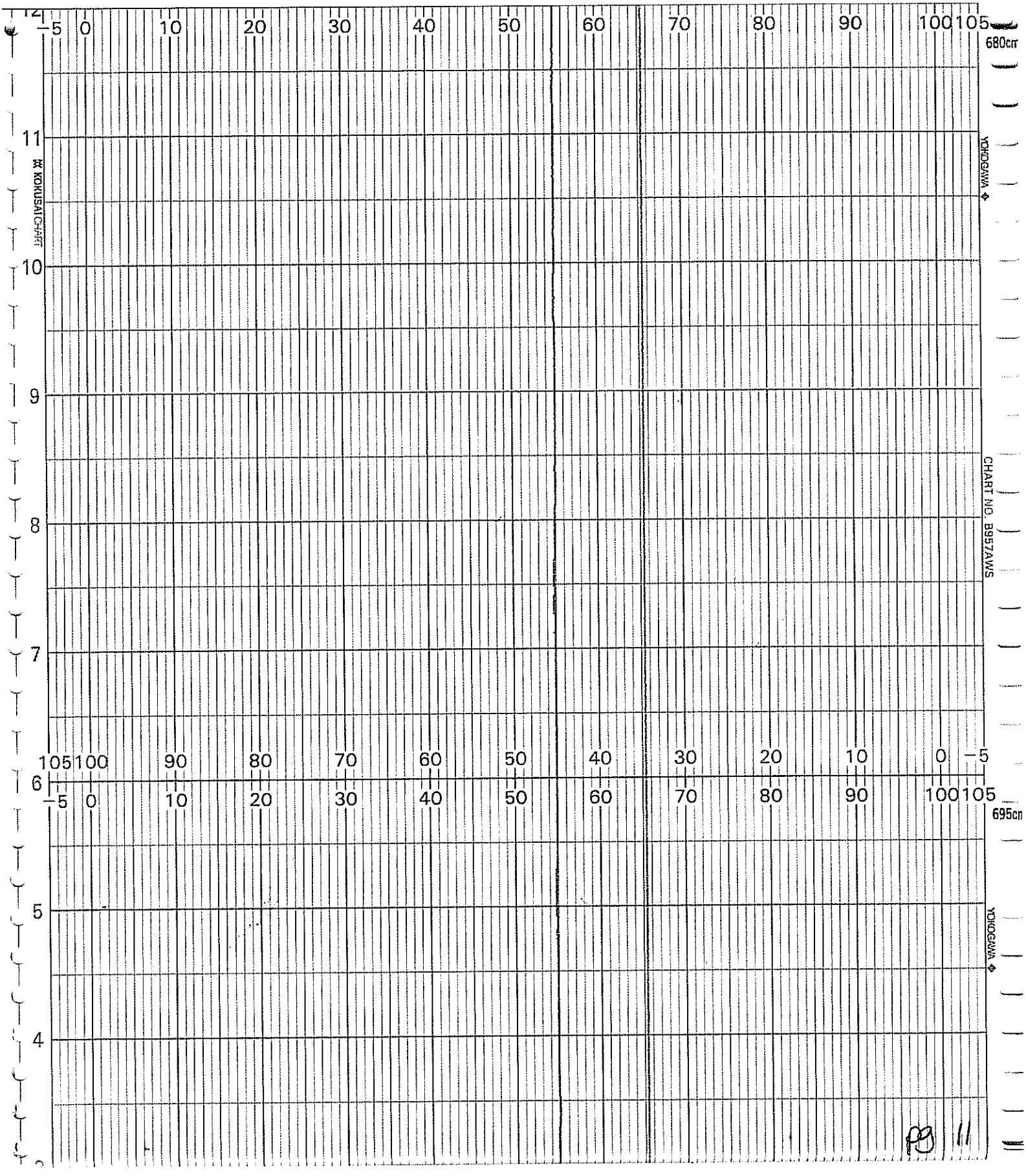
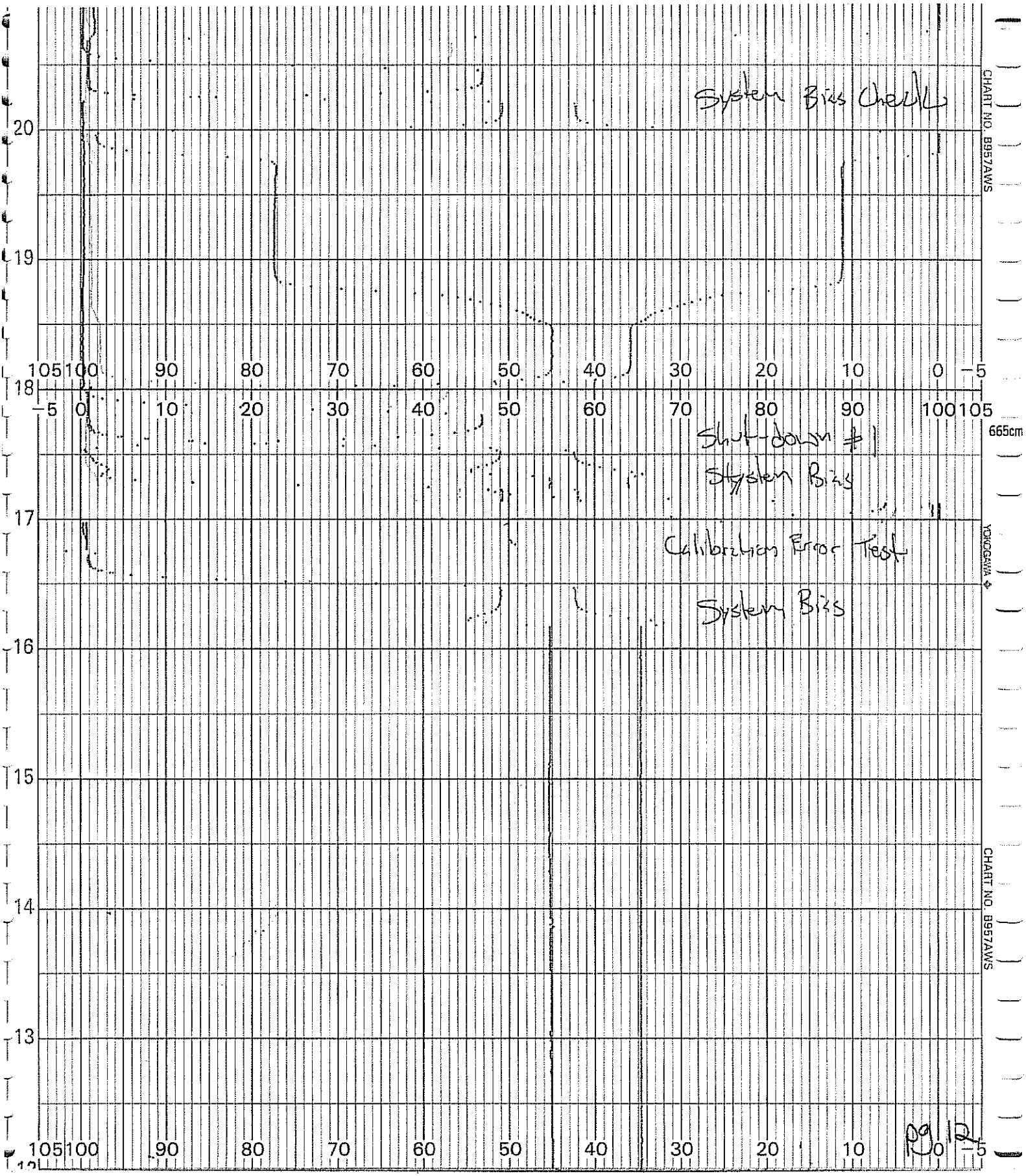
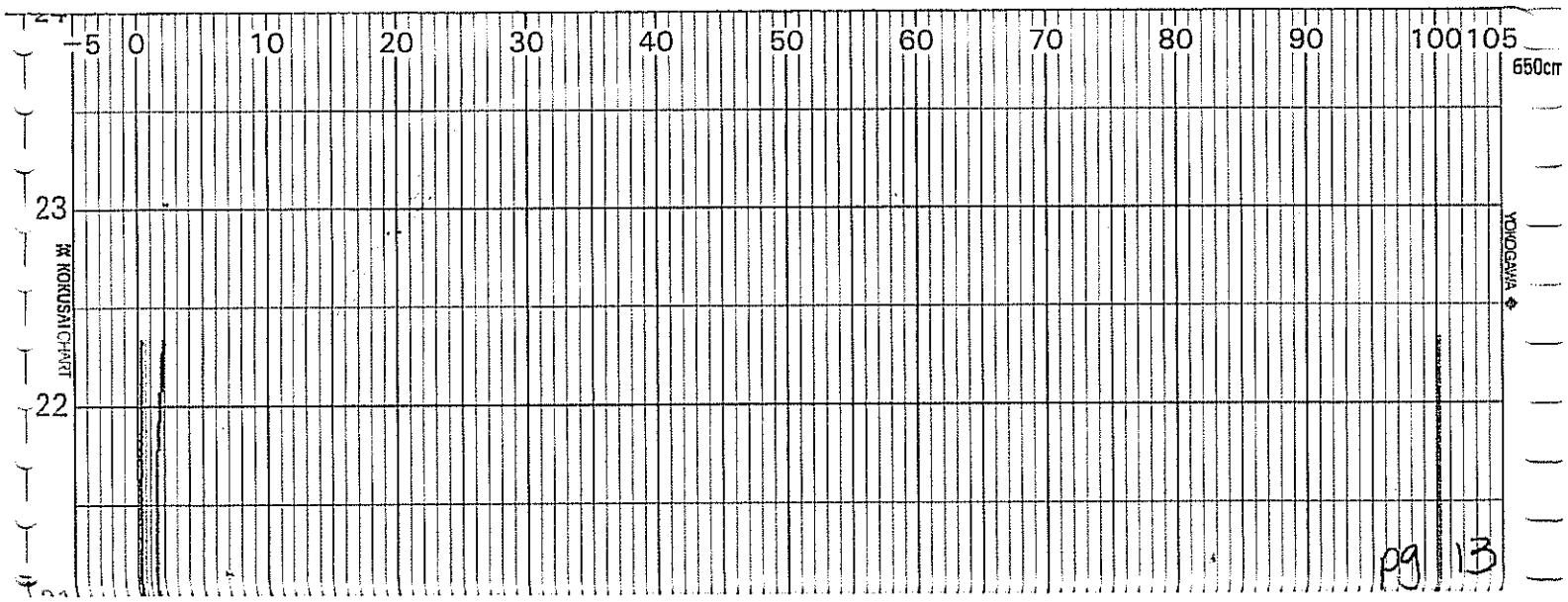
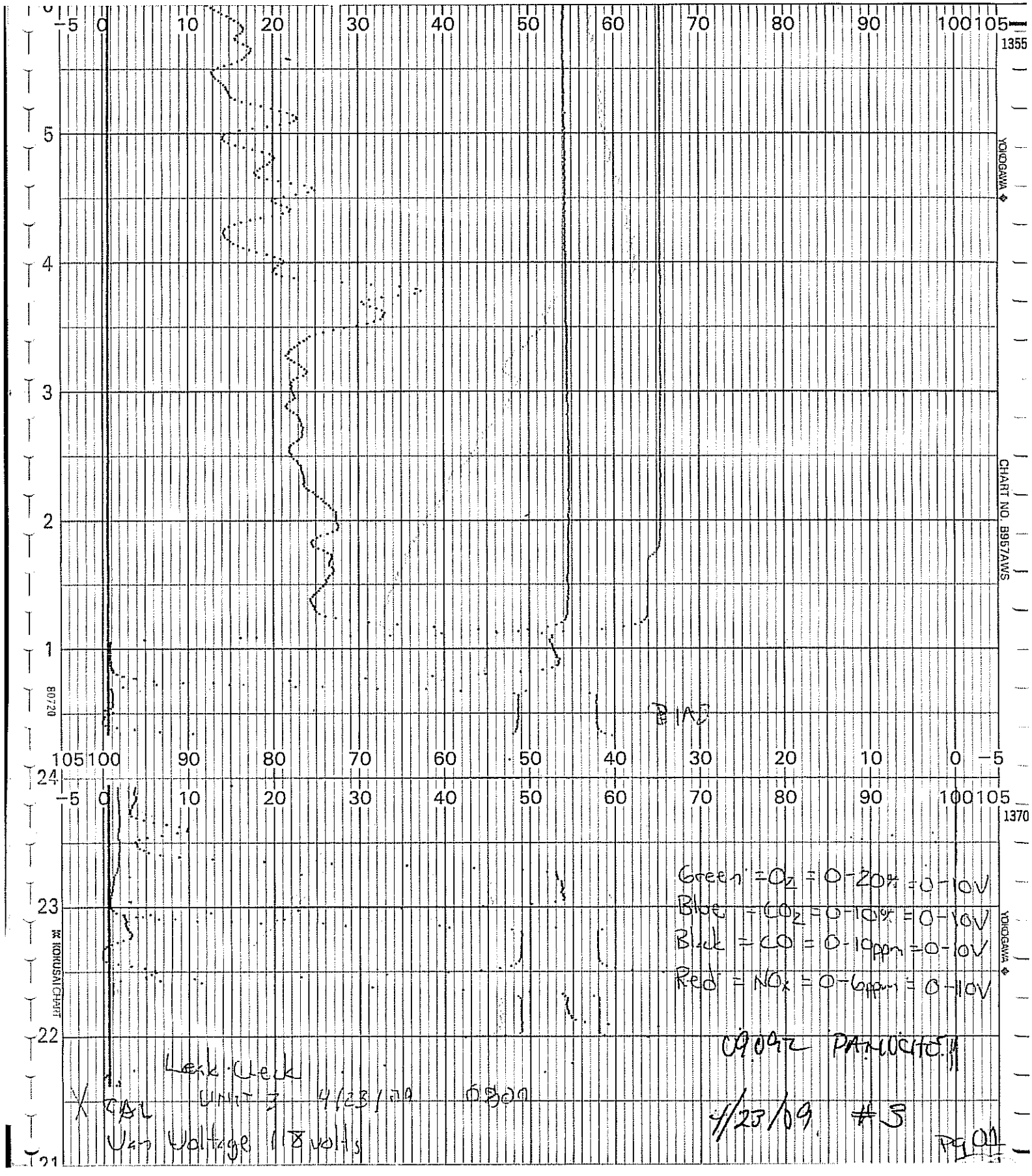


CHART NO. B957AWS
2
1
80720
105 100 90 80 70 60 50 40 30 20 10 0 −5
24
−5 0 10 20 30 40 50 60 70 80 90 100 105
710cm
23
KOKUSAI CHART
YOKOGAWA
22
21
20
CHART NO. B957AWS
19
105 100 90 80 70 60 50 40 30 20 10 0 −5
18


-5 0 10 20 30 40 50 60 70 80 90 100 105
680cm
YOKOGAWA
CHART NO. B957AWS
105 100 90 80 70 60 50 40 30 20 10 0 -5
-5 0 10 20 30 40 50 60 70 80 90 100 105
695cm
YOKOGAWA
KOKUSAI CHART
12
11
10
9
8
7
6
5
4
P9 11


System Bias Check
Shut-down #1
System Bias
Calibration Error Test
System Bias
CHART NO. B957AWS
YOKOGAWA
665cm
20
19
18
17
16
15
14
13
105 100 90 80 70 60 50 40 30 20 10 0 −5
−5 0 10 20 30 40 50 60 70 80 90 100 105
105 100 90 80 70 60 50 40 30 20 10 0 −5
PG 12


-5
0
10
20
30
40
50
60
70
80
90
100
105
650cm
23
22
KOKUSAI CHART
YOKOGAWA
p9 13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Black = CO = 0-10ppm = 0-10V
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Leak Check
UNIT 2 4/23/09 0800
CAL
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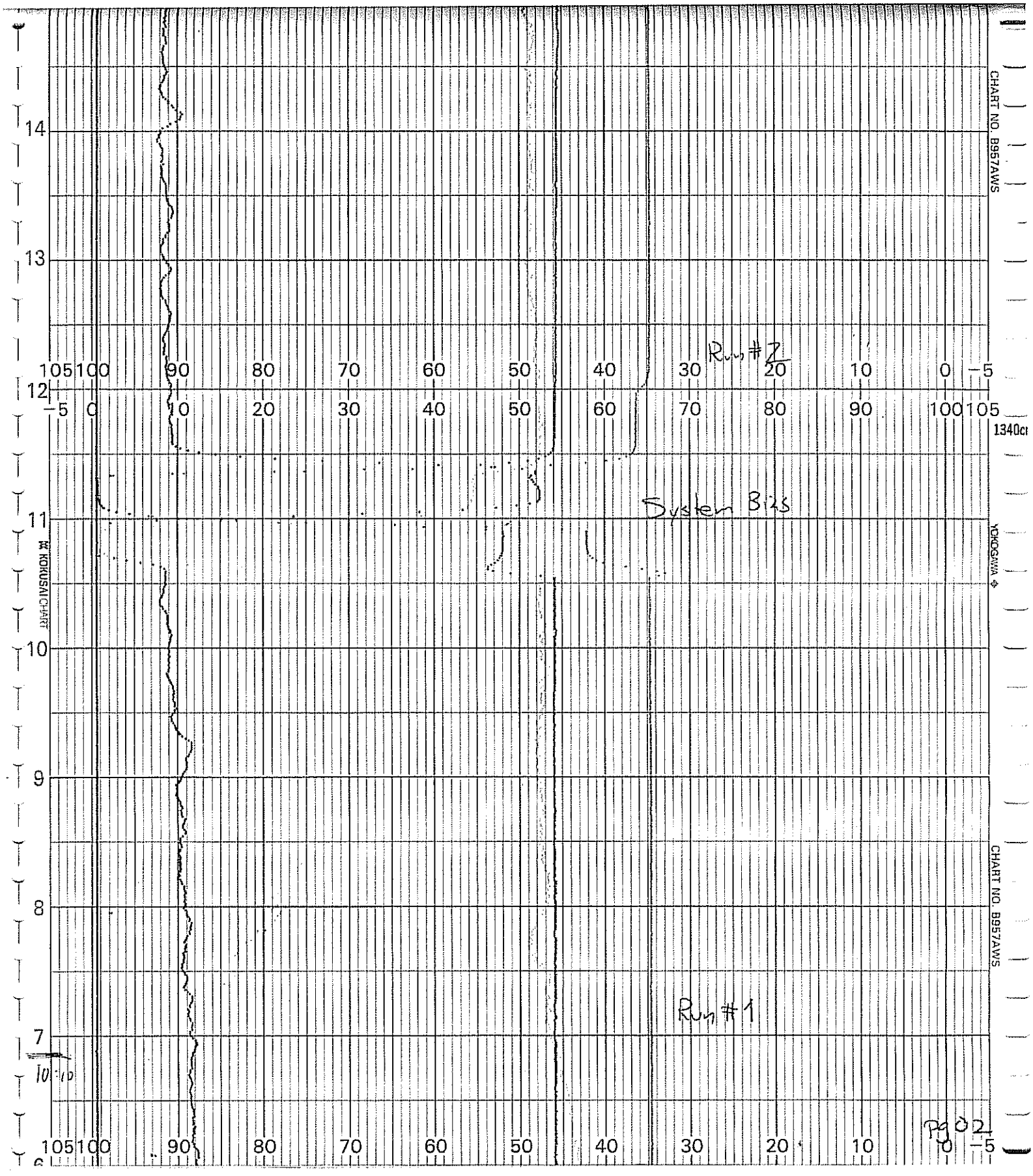
4/23/09 #3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KOKUSAI CHART
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Run #1
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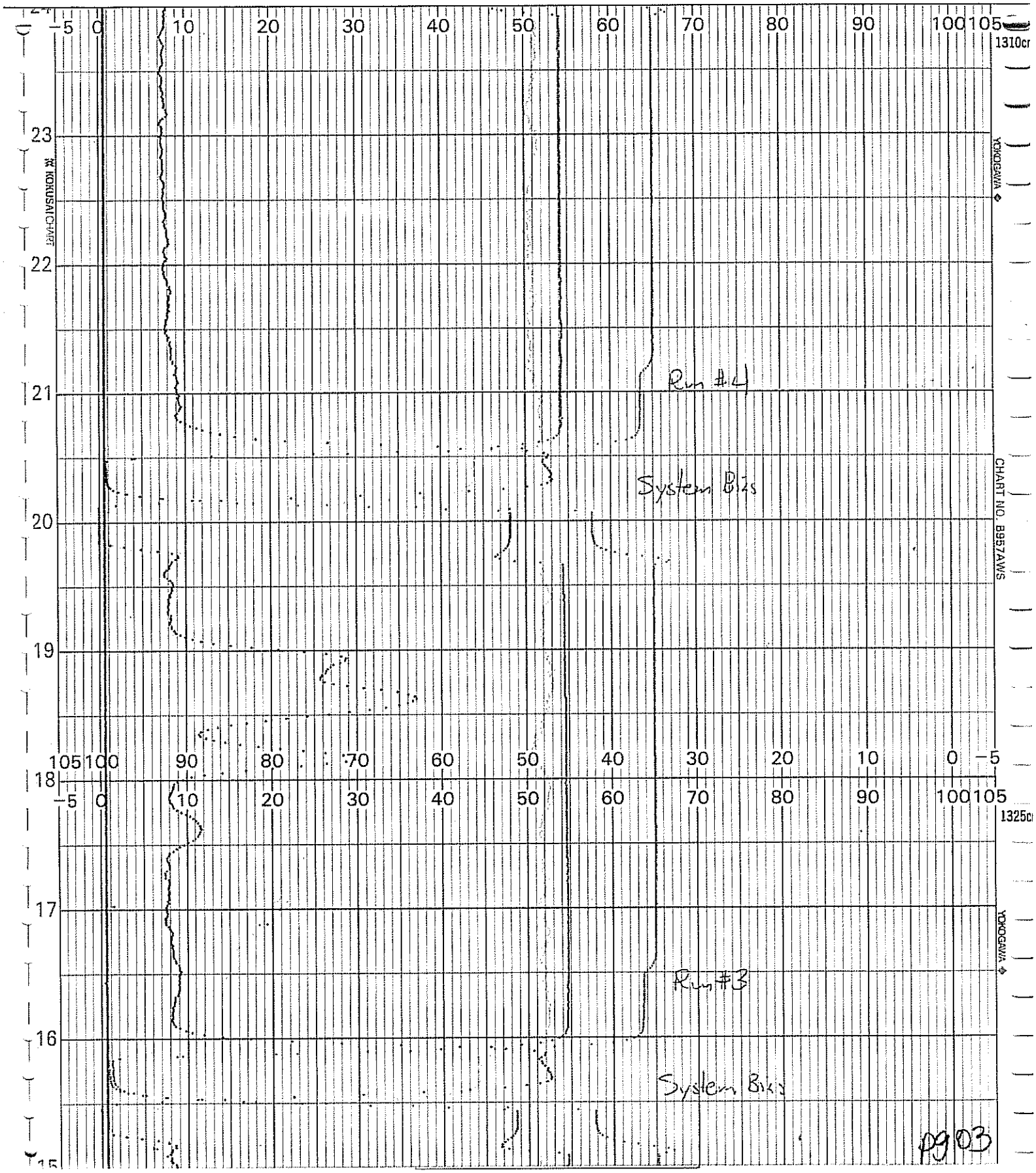
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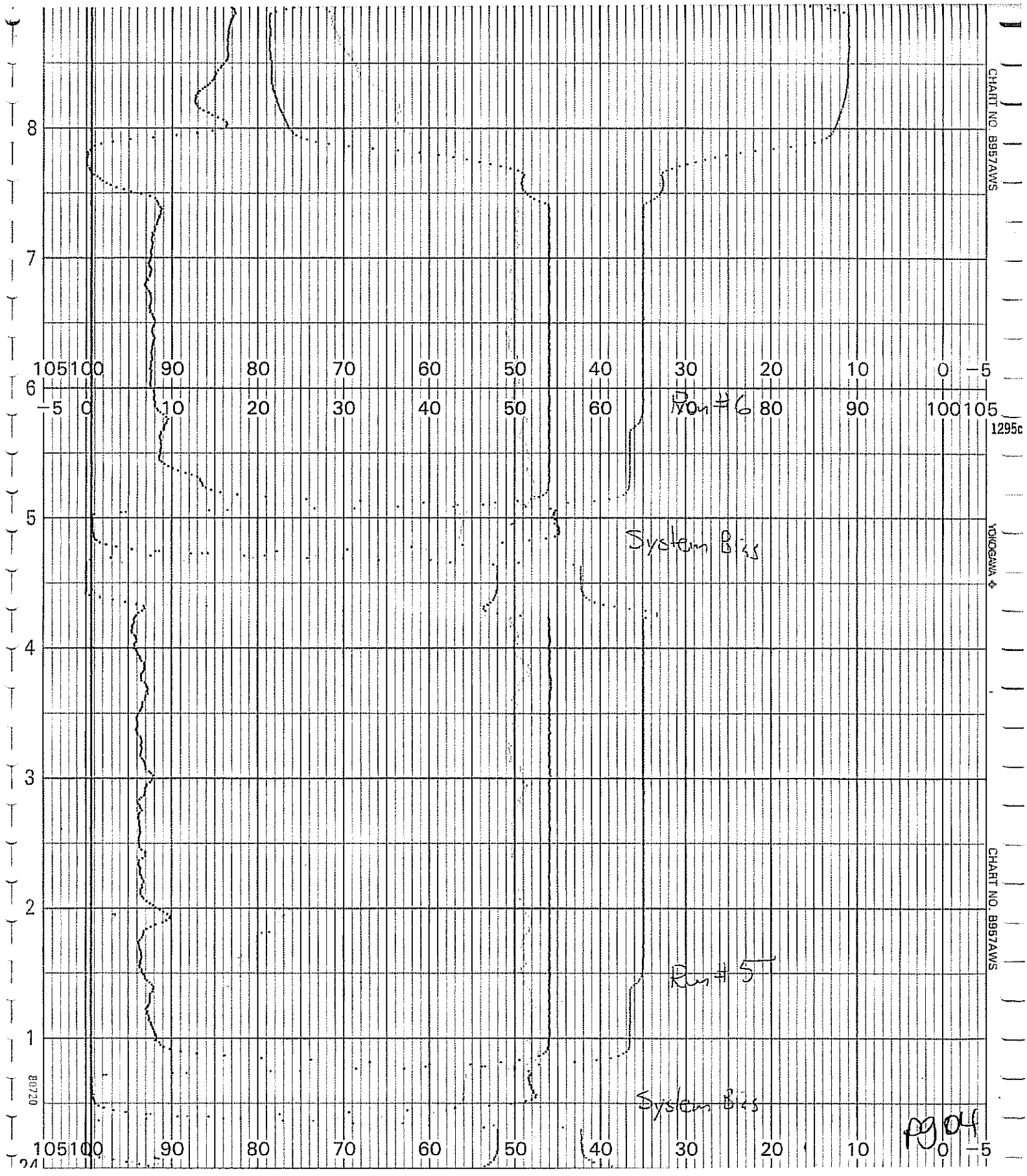
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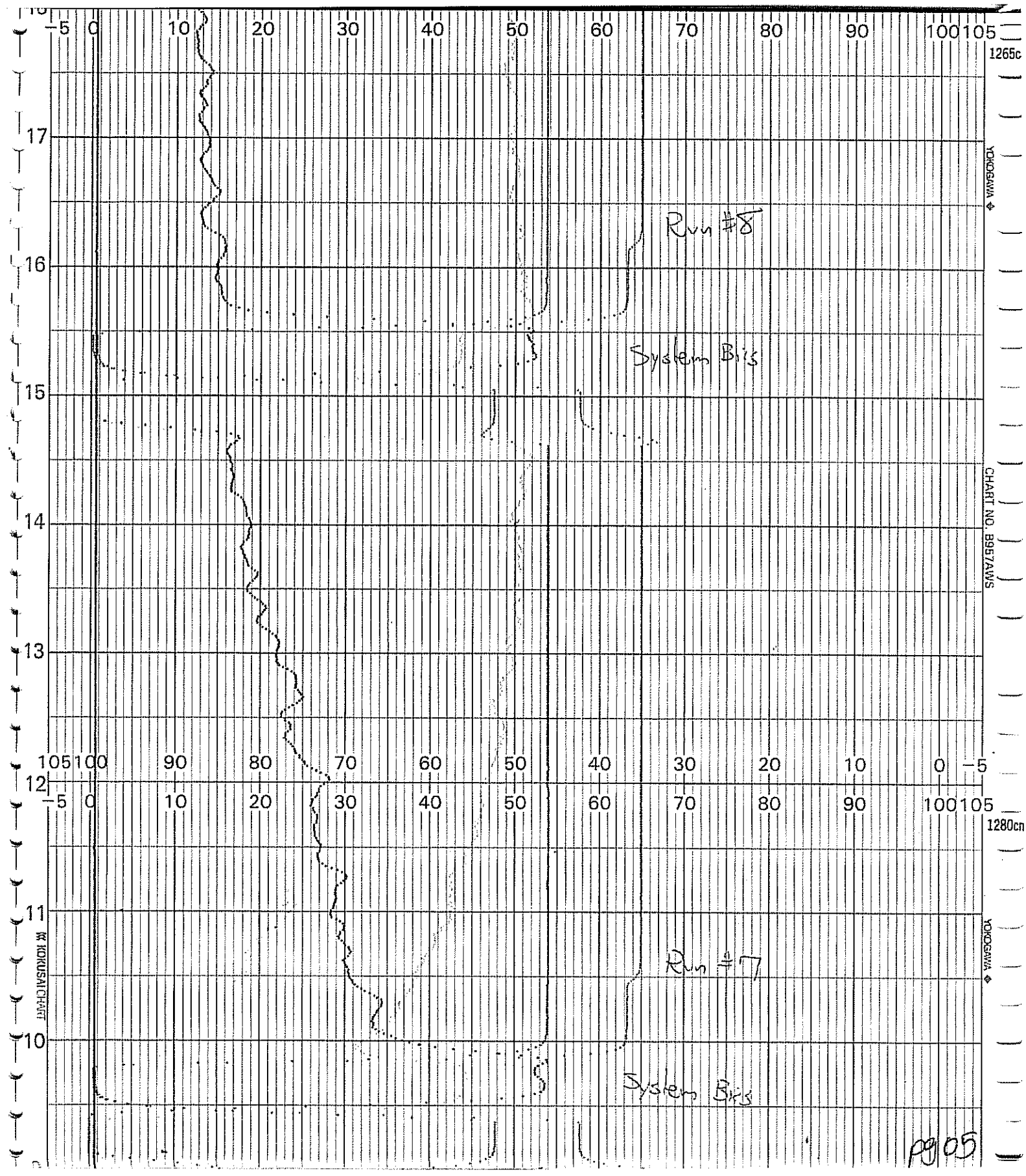
Run #5
System Bias
pg 04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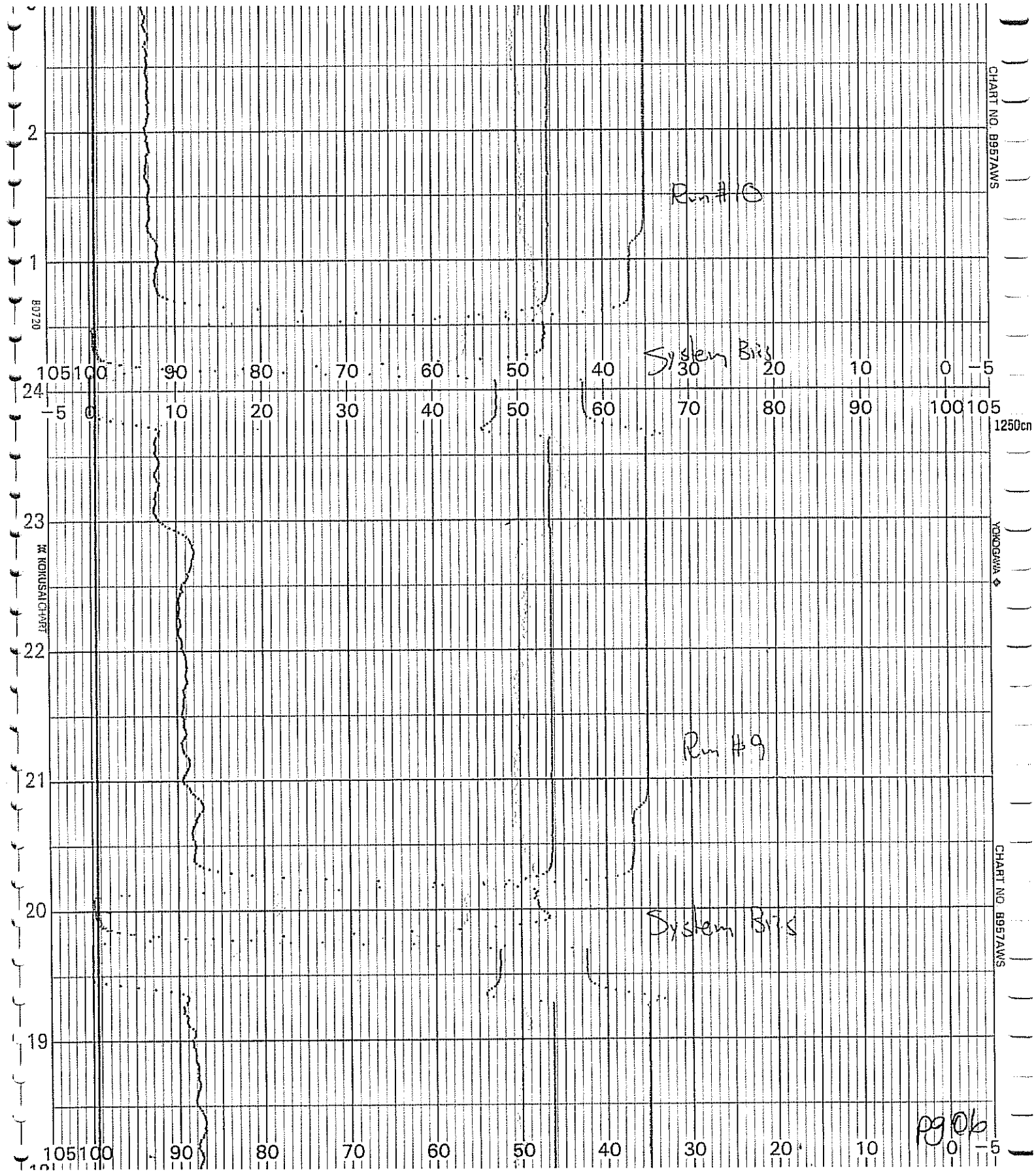
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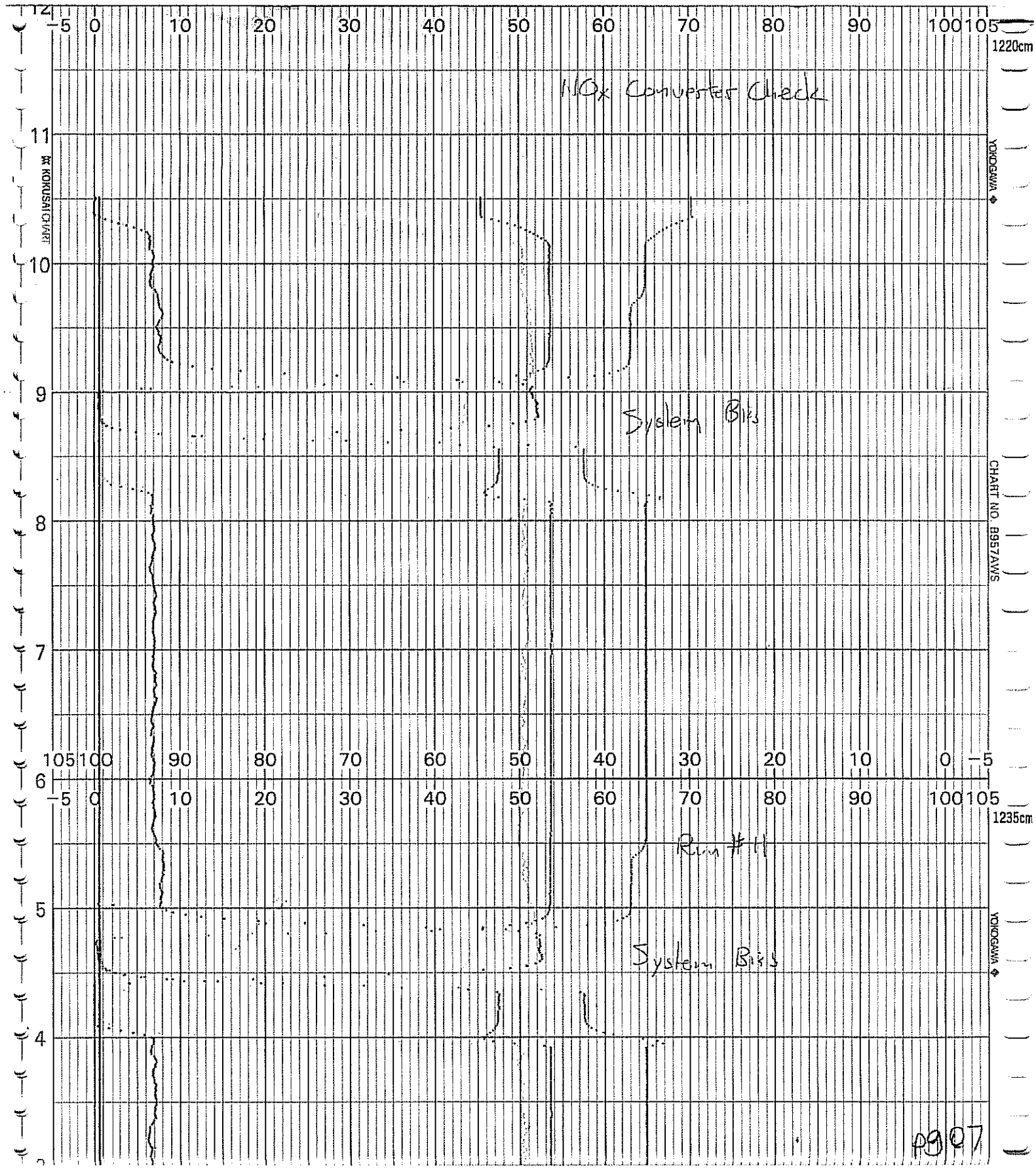
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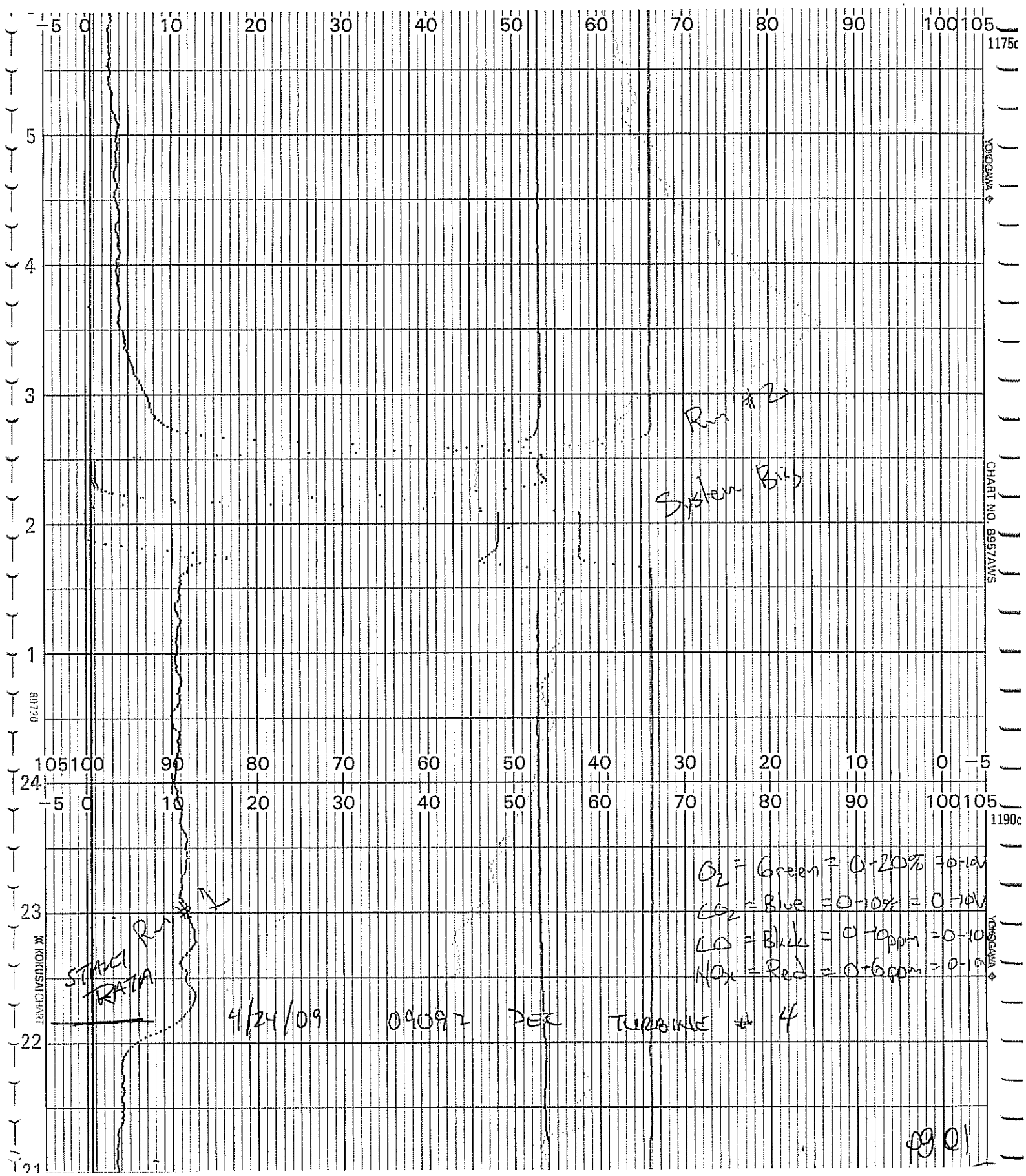
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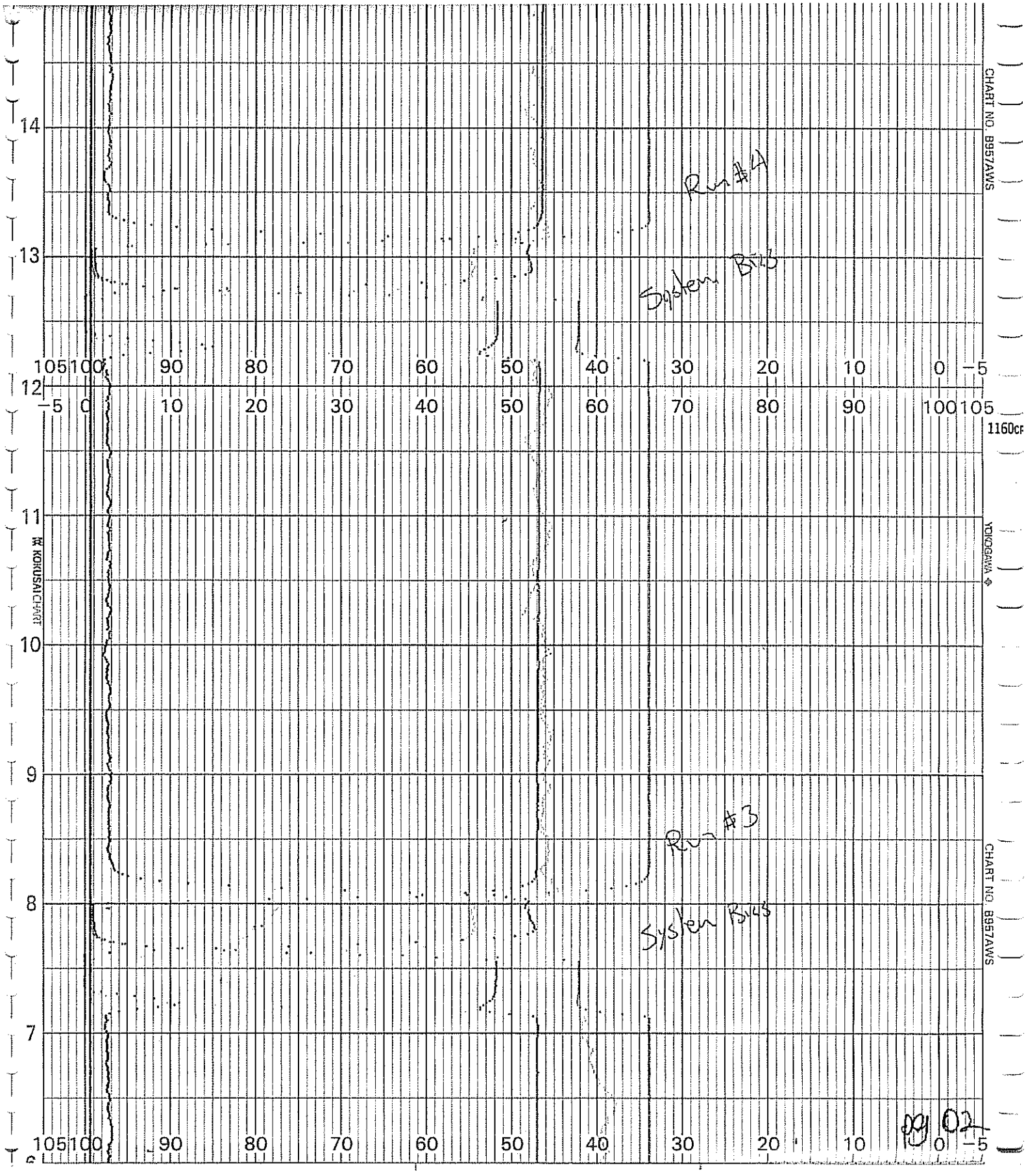
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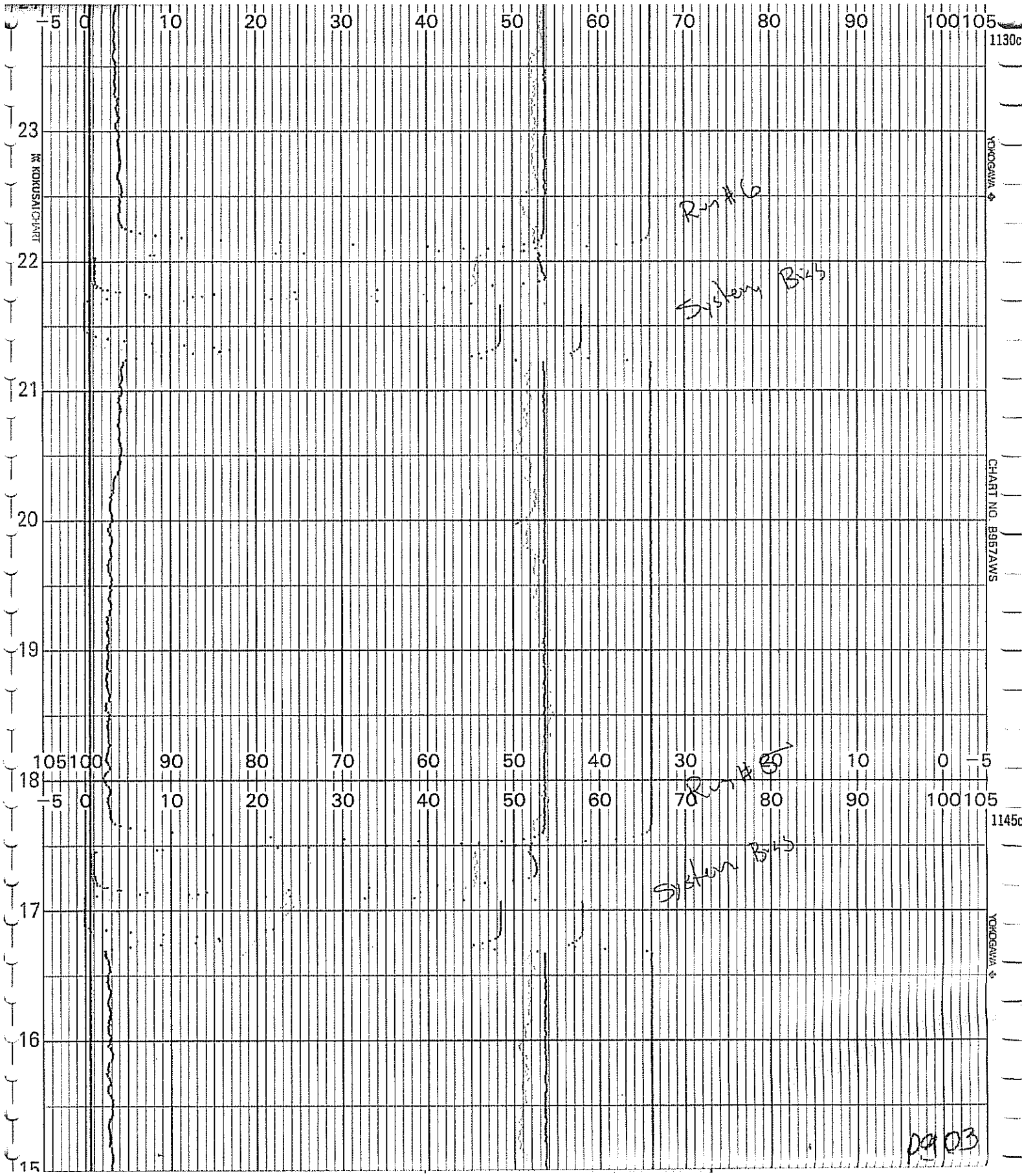
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System B-45
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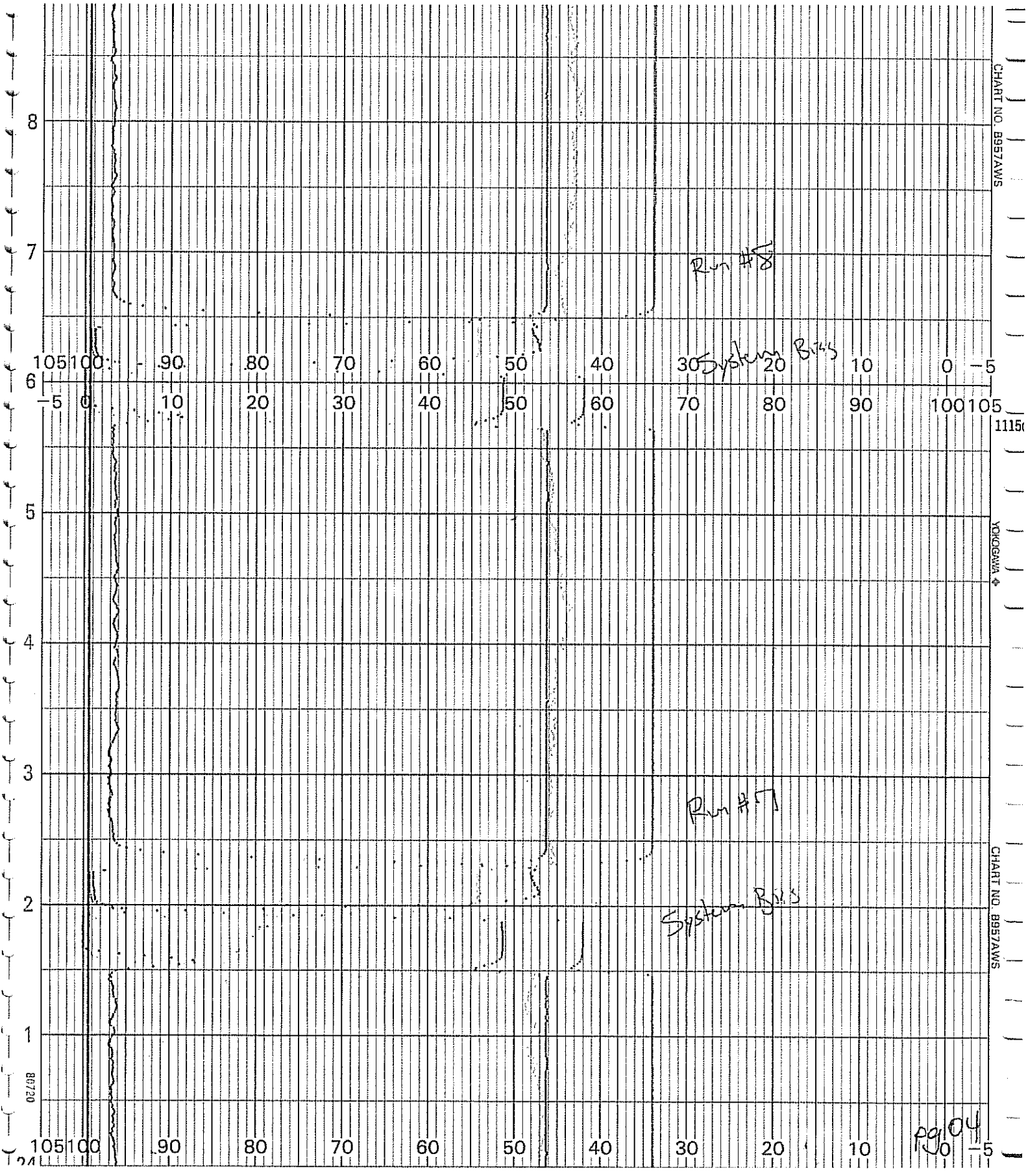
P903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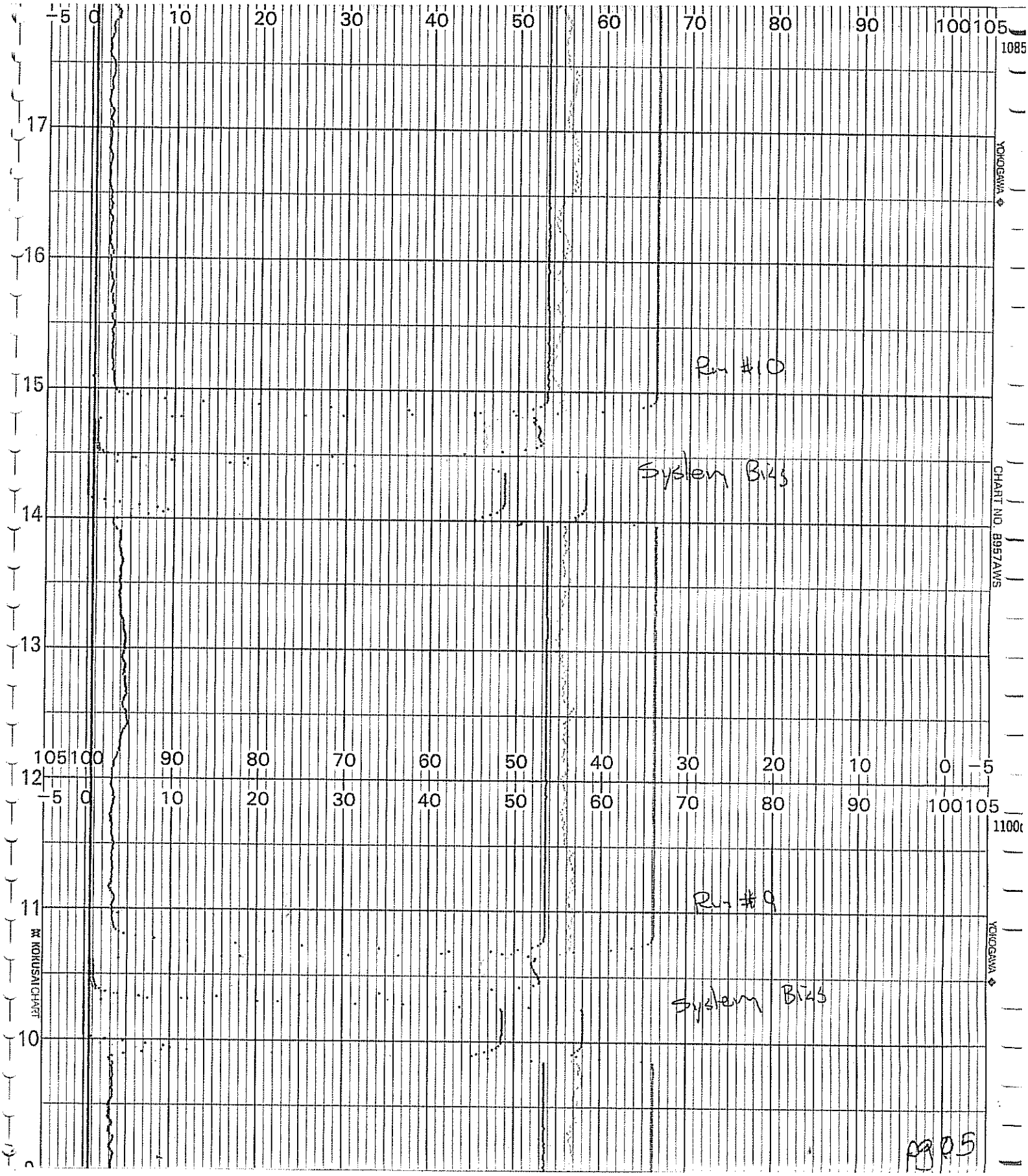
Pg 04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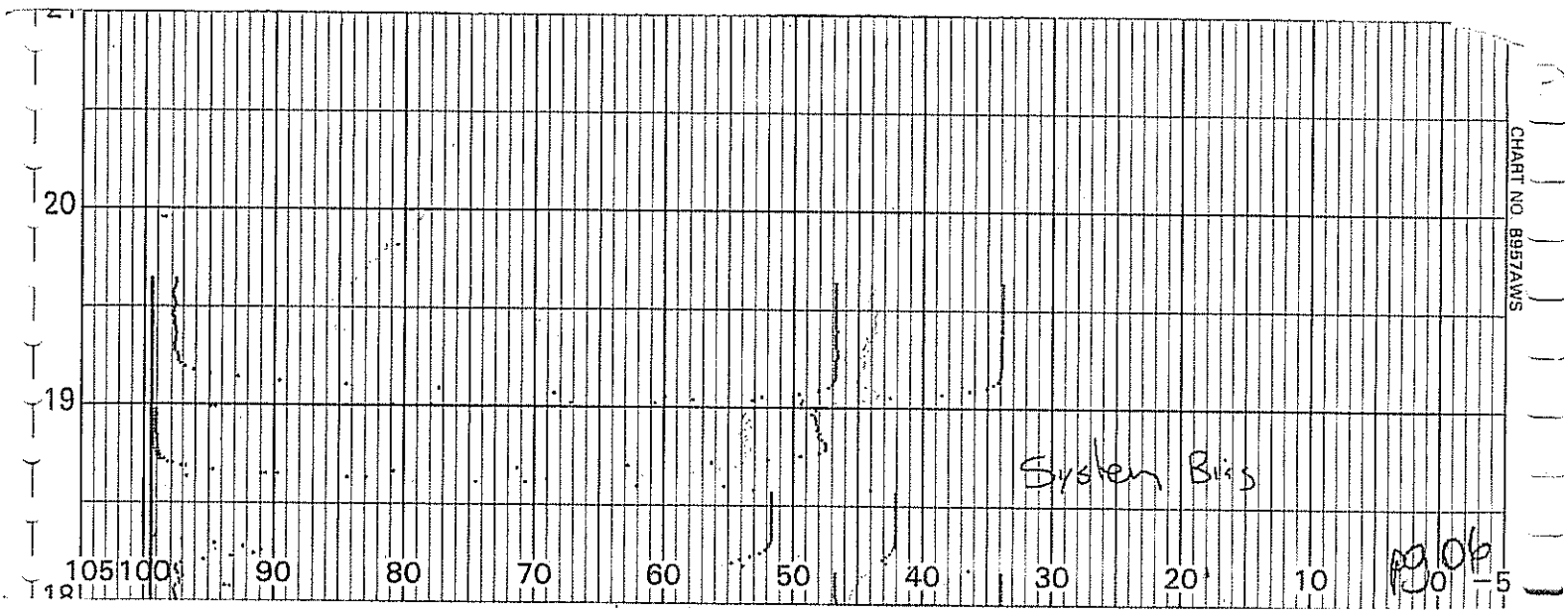
20
19
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System Bias
CHART NO. B957AWS

APPENDIX I

EXCERPTS FROM AUTHORITY TO CONSTRUCT

17. The continuous emissions monitors specified in these permit conditions shall be installed, calibrated and operational prior to the first firing of the unit. After first firing, the detection range of the CEMS shall be adjusted as necessary to accurately measure the resulting range of NOx and CO emissions concentrations. [District Rule 2201]

18. The total number of firing hours of this unit without abatement of emissions by the SCR system and the oxidation catalyst of units C-7220-1, '2, '3, and '4 shall not exceed 800 hours total during the commissioning period. Such operation of this unit without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system and the oxidation catalyst in place. Upon completion of these activities, the permittee shall provide written notice to the District and the unused balance of the 800 firing hours without abatement shall expire. Records of the commissioning hours of operation for units C-7220-1, '2, '3, and '4 shall be maintained. [District Rule 2201]

19. The total mass emissions of NOx, SOx, PM10, CO, and VOC that are emitted during the commissioning period shall accrue towards the consecutive twelve month emission limits specified in condition #38. NOx and CO total mass emissions will be determined from CEMs data and SOx, PM10, and VOC total mass emissions will be calculated. [District Rule 2201]

20. A selective catalytic reduction (SCR) system and an oxidation catalyst shall serve the gas turbine engine. Exhaust ducting may be equipped (if required) with a fresh air inlet blower to be used to lower the exhaust temperature prior to inlet of the SCR system catalyst. The permittee shall submit SCR and oxidation catalyst design details to the District at least 30 days prior to commencement of construction. [District Rule 2201]

21. Permittee shall submit continuous emission monitor design, installation, and operational details to the District at least 30 days prior to commencement of construction. [District Rule 2201]

22. The owner or operator shall submit to the District, before issuance of the Permit to Operate, information correlating the NOx control system operating parameters to the associated measured NOx output. The information must be sufficient to allow the District to determine compliance with the NOx emission limits of this permit when no continuous emission monitoring data for NOx is available or when the continuous emission monitoring system is not operating properly. [District Rule 4703]

23. All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]

24. No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

25. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]

26. Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

27. Combustion turbine generator (CTG) and electrical generator lube oil vents shall be equipped with mist eliminators. Visible emissions from lube oil vents shall not exhibit opacity of 5% or greater, except for a period or periods not exceeding three minutes in any one hour. [District Rules 2201 and 4101]

28. The CTG shall be fired exclusively on PUC-regulated natural gas with a sulfur content of no greater than 1.0 grain of sulfur compounds (as S) per 100 dry scf of natural gas. [District Rule 2201 and 40 CFR 60.4330(a)(2)]

29. Emission rates from the CTG, except during startup or shutdown periods, shall not exceed any of the following limits: NOx (as NO2) – 8.03 lb/hr and 2.5 ppmvd @ 15% O2; SOx (as SO2) – 2.51 lb/hr; PM10 – 6.00 lb/hr; CO – 11.81 lb/hr and 6.0 ppmvd @ 15% O2; or VOC (as methane) – 2.67 lb/hr and 2.0 ppmvd @ 15% O2. NO_X (as NO_2) emission limits are one hour rolling averages. All other pollutant emission concentration limits are based on three hour rolling averages. [District Rules 2201 and 4703 and 40 CFR 60.4320(a) & (b)]

30. Ammonia (NH3) emissions shall not exceed either of the following limits: 11.90 lb/hr or 10 ppmvd @ 15% O2 (based on a 24 hour rolling average). [District Rules 2201 and 4102]

31. During periods of startup, CTG exhaust emission rates shall not exceed any of the following limits: NOx (as NO2) – 44.40 lb/hr, SOx – 2.51 lb/hr, PM10 6.00 lb/hr, CO - 106.60 lb/hr, or VOC - 7.60 lb/hr, based on one hour averages. [District Rules 2201]

32. During periods of shutdown, CTG exhaust emission rates shall not exceed any of the following limits: NOx (as NO2) – 34.29 lb/hr, SOx – 2.51 lb/hr, PM10 6.00 lb/hr, CO – 268.57 lb/hr, or VOC - 17.14 lb/hr, based on one hour averages. [District Rules 2201]

33. Startup shall be defined as the period of time during which a unit is brought from a shutdown status to its SCR operating temperature and pressure, including the time required by the unit's emission control system to reach full operations. Shutdown shall be defined as the period of time during which a unit is taken from an operational to a non-operational status as the fuel supply to the unit is completely turned off. [District Rules 2201 and 4703]

34. The duration of each startup or shutdown shall not exceed two hours. Startup and shutdown emissions shall be counted toward all applicable emission limits. [District Rules 2201 and 4703]

35. The emission control systems shall be in operation and emissions shall be minimized insofar as technologically feasible during startup and shutdown. [District Rule 4703]

36. Daily emissions from the CTG shall not exceed any of the following limits: NOx (as NO2) – 261.1 lb/day; VOC – 79.1 lb/day; CO – 560.4 lb/day; PM10 – 144.0 lb/day; or SOx (as SO2) - 60.2 lb/day. [District Rule 2201]

37. Quarterly hours of operation shall not exceed any of the following: 1st Quarter - 1,100 hours, 2nd Quarter - 1,100 hours, 3rd Quarter - 1,600 hours, or 4th Quarter - 1,200 hours. [District Rule 2201]

38. Annual emissions from the CTG, calculated on a twelve consecutive month rolling basis, shall not exceed any of the following: NOx (as NO2) - 48,465 lb/year; SOx (as SO2) - 12,550 lb/year; PM10 - 30,000 lb/year; CO - 92,750 lb/year; or VOC - 15,174 lb/year. [District Rule 2201]

39. Each one hour period shall commence on the hour. Each one hour period in a three hour rolling average will commence on the hour. The three hour average will be compiled from the three most recent one hour periods. Each one hour period in a twenty-four hour average for ammonia slip will commence on the hour. [District Rule 2201]

40. Daily emissions will be compiled for a twenty-four hour period starting and ending at twelve-midnight. Each month in the twelve consecutive month rolling average emissions shall commence at the beginning of the first day of the month. The twelve consecutive month rolling average emissions to determine compliance with annual emissions limitations shall be compiled from the twelve most recent calendar months. [District Rule 2201]

41. Compliance with the ammonia emission limits shall be demonstrated utilizing one of the following procedures: 1) calculate the daily ammonia emissions using the following equation: (ppmvd @ 15% O2) = ((a - (b x c/1,000,000)) x (1,000,000 / b)) x d, where a = average ammonia injection rate (lb/hr) / (17 lb/lb mol), b = dry exhaust flow rate (lb/hr) / (29 lb/lb mol), c = change in measured NOx concentration ppmvd @ 15% O2 across the catalyst, and d = correction factor. The correction factor shall be derived annually during compliance testing by comparing the measured and calculated ammonia slip; 2.) Utilize another District-approved calculation method using measured surrogate parameters to determine the daily ammonia emissions in ppmvd @ 15% O2. If this option is chosen, the permittee shall submit a detailed calculation protocol for District approval at least 60 days prior to commencement of operation; 3.) Alternatively, the permittee may utilize a continuous in-stack ammonia monitor to verify compliance with the ammonia emissions limit. If this option is chosen, the permittee shall submit a monitoring plan for District approval at least 60 days prior to commencement of operation. [District Rule 2201]

42. Source testing to measure startup and shutdown NOx, CO, and VOC mass emission rates shall be conducted for one of the gas turbines (C-7220-1, C-7220-2, C-7220-3, or C-7220-4) prior to the end of the commissioning period and at least once every seven years thereafter. CEM relative accuracy shall be determined during startup source testing in accordance with 40 CFR 60, Appendix B. If CEM data is not certifiable to determine compliance with NOx and CO startup emission limits, then source testing to measure startup NOx and CO mass emission rates shall be conducted at least once every 12 months. [District Rule 1081]

43. Hazardous Air Pollutant (HAP) emissions shall not exceed 25 tpy all HAPS or 10 tpy any single HAP. [District Rule 4002]

44. Permittee shall conduct an initial speciated HAPS and total VOC source test for one of the GTEs (C-7220-1, '2, '3 or '4), by District witnessed in situ sampling of exhaust gases by a qualified independent source test firm. PEC shall correlate the total HAPS emissions rate and the single highest HAP emission rate to the VOC mass emission determined during the speciated HAPs source test. Initial and annual compliance with the HAPS emissions limit (25 tpy all HAPs

or 10 tpy any single HAP) shall be demonstrated by the combined VOC emissions rates for the GTEs (C-7220-1, '2, '3, and '4) determined during initial and annual compliance source testing and the correlation between VOC emissions and HAP(s). [District Rule 4002]

45. Source testing to measure the NOx, CO, VOC, and NH3 emission rates (lb/hr and ppmvd @ 15% O2) and PM10 emission rate (lb/hr) shall be conducted within 120 days after initial operation and at least once every twelve months thereafter. [District Rules 1081 and 4703 and 40 CFR 60.4400(a)]

46. The sulfur content of each fuel source shall be: (i) documented in a valid purchase contract, a supplier certification, a tariff sheet or transportation contract or (ii) shall be demonstrated within 60 days after the end of the commissioning period and monitored weekly thereafter. If the sulfur content is demonstrated to be less than 1.0 gr/100 scf for eight consecutive weeks, then the monitoring frequency shall be every six months. If the result of any six month monitoring demonstrates that the fuel does not meet the fuel sulfur content limit, weekly monitoring shall resume. [40 CFR 60.4360, 60.4365(a) and 60.4370(c)]

47. The following test methods shall be used: NOx - EPA Method 7E or 20, PM10 - EPA Method 5/202 (front half and back half), CO - EPA Method 10 or 10B, O2 - EPA Method 3, 3A, or 20, VOC - EPA Method 18 or 25, and ammonia – EPA Method 206. EPA approved alternative test methods as approved by the District may also be used to address the source testing requirements of this permit. The request to utilize EPA approved alternative source testing methods must be submitted in writing and written approval received from the District prior to the submission of the source test plan. [District Rules 1081 and 4703 and 40 CFR 60.4400(1)(i)]

48. HHV and LHV of the fuel shall be determined using ASTM D3588, ASTM 1826, or ASTM 1945. [40 CFR 60.332(a),(b) and District Rule 4703, 6.4.5]

49. Fuel sulfur content shall be monitored using one of the following methods: ASTM Methods D1072, D3246, D4084, D4468, D4810, D6228, D6667 or Gas Processors Association Standard 2377. [40 CFR 60.4415(a)(1)(i)]

50. The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing. [District Rule 1081]

51. Compliance demonstration (source testing) shall be District witnessed or authorized and samples shall be collected by a certified testing laboratory. Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified 30 days prior to any compliance source test, and a source test plan must be submitted for approval 15 days prior to testing. The results of each source test shall be submitted to the District within 60 days thereafter. [District Rule 1081]

52. The turbine shall be equipped with a continuous monitoring system to measure and record fuel consumption. [District Rules 2201 and 4703 and 40 CFR 60.4335(b)(1)]

53. The owner or operator shall install, certify, maintain, operate and quality-assure a Continuous Emission Monitoring System (CEMS) which continuously measures and records the exhaust gas NO_X, CO and O_2 concentrations. Continuous emissions monitor(s) shall be capable of monitoring emissions during normal operating conditions, and during startups and shutdowns provided the CEMS pass the relative accuracy requirement for startups and shutdowns specified herein. If relative accuracy of CEMS cannot be demonstrated during startup conditions, CEMS results during startup and shutdown events shall be replaced with startup emission rates obtained from source testing to determine compliance with emission limits contained in this document. [District Rules 1080, 2201 and 4703 and 40 CFR 60.4335(b)(1)]

54. The CEMS shall complete a minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period or shall meet equivalent specifications established by mutual agreement of the District, the ARB and the EPA. [District Rule 1080 and 40 CFR 60.4345(b)]

55. The NO_X, CO and O_2 CEMS shall meet the requirements in 40 CFR 60, Appendix F Procedure 1 and Part 60, Appendix B Performance Specification 2 (PS 2), or shall meet equivalent specifications established by mutual agreement of the District, the ARB, and the EPA. [District Rule 1080 and 40 CFR 60.4345(a)]

56. Audits of continuous emission monitors shall be conducted quarterly, except during quarters in which relative accuracy and total accuracy testing is performed, in accordance with EPA guidelines. The District shall be notified prior to completion of the audits. Audit reports shall be submitted along with quarterly compliance reports to the District. [District Rule 1080]

57. The owner/operator shall perform a relative accuracy test audit (RATA) for the NOx, CO, and O2 CEMs as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rule 1080]

58. Results of the CEM system shall be averaged over a one hour period for NOx emissions and a three hour period for CO emissions using consecutive 15-minute sampling periods in accordance with all applicable requirements of CFR 60.13. [District Rule 4703 and 40 CFR 60.13]

59. Excess emissions shall be defined as any operating hour in which the 4-hour or 30-day rolling average NO_X concentration exceeds applicable emissions limit and a period of monitor downtime shall be any unit operating hour in which sufficient data are not obtained to validate the hour for either NO_X or O2 (or both). [40 CFR 60.4380(b)(1)]

60. Results of continuous emissions monitoring shall be reduced according to the procedure established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other

January 5, 2012

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Mr. Gerardo Rios
Chief, Permits Office
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

Subject: Pio Pico Energy Center PSD Permit Application
Modeling Questions

Dear Mr. Rios:

As requested by EPA in the December 9, 2011 meeting between representatives of EPA and Pio Pico Energy Center, LLC (Applicant), we are herein submitting additional information on behalf of Applicant. Specifically, EPA requested additional analysis and information to support the modeling performed for the Pio Pico PSD Permit Application.

It should be noted that Applicant submitted the proposed modeling protocol for the Pio Pico Energy Center (Project) to EPA on December 1, 2010, with a request for review and comment, consistent with EPA's policy encouraging early consultation on modeling issues.[1] EPA did not respond to Applicant's request. In the absence of any questions or concern expressed by EPA regarding the protocol, the Applicant proceeded with modeling and analysis consistent with the protocol, and has expended considerable time and effort in reliance on EPA's tacit approval.

Data Substitution

Comment: *Provide tables showing the measured data (prior to data substitution).*

Response: The requested information has been prepared by the San Diego Air Pollution Control District (District), and is included on the enclosed disk.

Meteorological Data

Comment: *Justify the use of Otay Mesa meteorological data to characterize conditions in the project area.*

[1] Appendix W, Section 10.2.1: "[e]very effort should be made by the Regional Office to meet with all parties involved in a SIP revision or a PSD permit application prior to the start of any work on such a project. During this meeting, a protocol should be established between the preparing and reviewing parties to define the procedures to be followed, the data to be collected, the model to be used, and the analysis of the source and concentration data."

Response: The following discussion is based on criteria described in Section 3.1 (Representativeness) in EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications (February 2000).

The guidance states that "Representativeness has been defined as 'the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application.'" The guidance indicates that "a quantitative method does not exist for determining representativeness absolutely." There are no generally accepted analytical or statistical techniques to determine representativeness of meteorological data or monitoring sites.

In general, for use in air quality modeling applications, meteorological data should be representative of conditions affecting the transport and dispersion of pollutants in the "area of interest" as determined by the locations of the sources and receptors being modeled. For this project, the "area of interest" includes the project site and the significant impact area (the area where screening modeling predicts project impact of any pollutant above Significant Impact Levels).

In steady-state modeling applications, one typically focuses on the meteorological conditions at the release height of the source or sources, or the plume height in the case of buoyant sources. Representativeness for steady-state modeling applications must necessarily be assessed in concert with the steady-state assumption that meteorological conditions are constant within the space-time domain of the application; as typically applied, measurements for a single location, somewhere near the source, are assumed to apply, without change, at all points in the modeling domain.

As can be seen in Figure 1, the Project site, the Otay Mesa monitoring site, and Brown Airfield, from whose meteorological monitoring station the few substituted meteorological data were obtained, are all situated on the same flat mesa within three miles of each other. The Otay Mesa monitoring site is less than two miles from the project site. Air flow over all three locations is sufficiently identical to consider meteorological data monitored at the International Border Crossing to represent the meteorological conditions at the project site (see wind roses for Otay Mesa and Brown Airfield monitoring data in Figures 2 and 3, respectively). Wind speeds at the Otay Mesa monitoring site are somewhat slower than those at Brown Airfield, leading to more conservative air quality concentrations computed by AERMOD from Project emissions.

Consistency would call for site selection criteria consistent with the steady-state assumption; i.e., to the extent possible, sites should perhaps be selected such that factors that cause spatial variations in meteorological conditions are invariant over the spatial domain of the application, whatever that might be. Such factors would include surface characteristics such as ground cover, surface roughness, the presence or absence of water bodies, etc. Similarly, the representativeness of existing third-party databases should be judged, in part, by comparing the surface characteristics in the vicinity of the meteorological monitoring site with the surface characteristics that generally describe the analysis domain.

Figure 1
PPEC Project Site and Vicinity

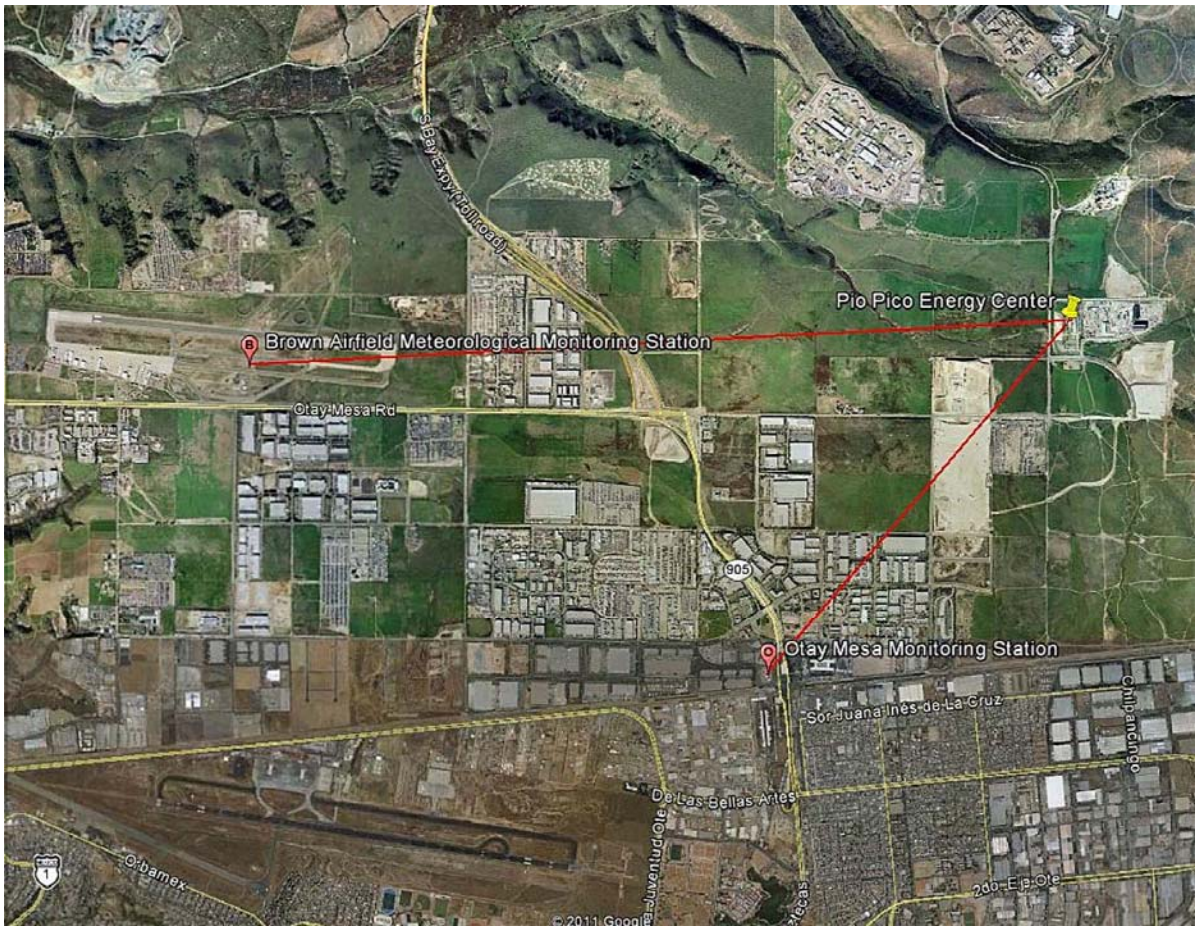


Figure 2
Wind Rose, Otay Mesa International Border Crossing Meteorological Monitoring Station, 2006-2008

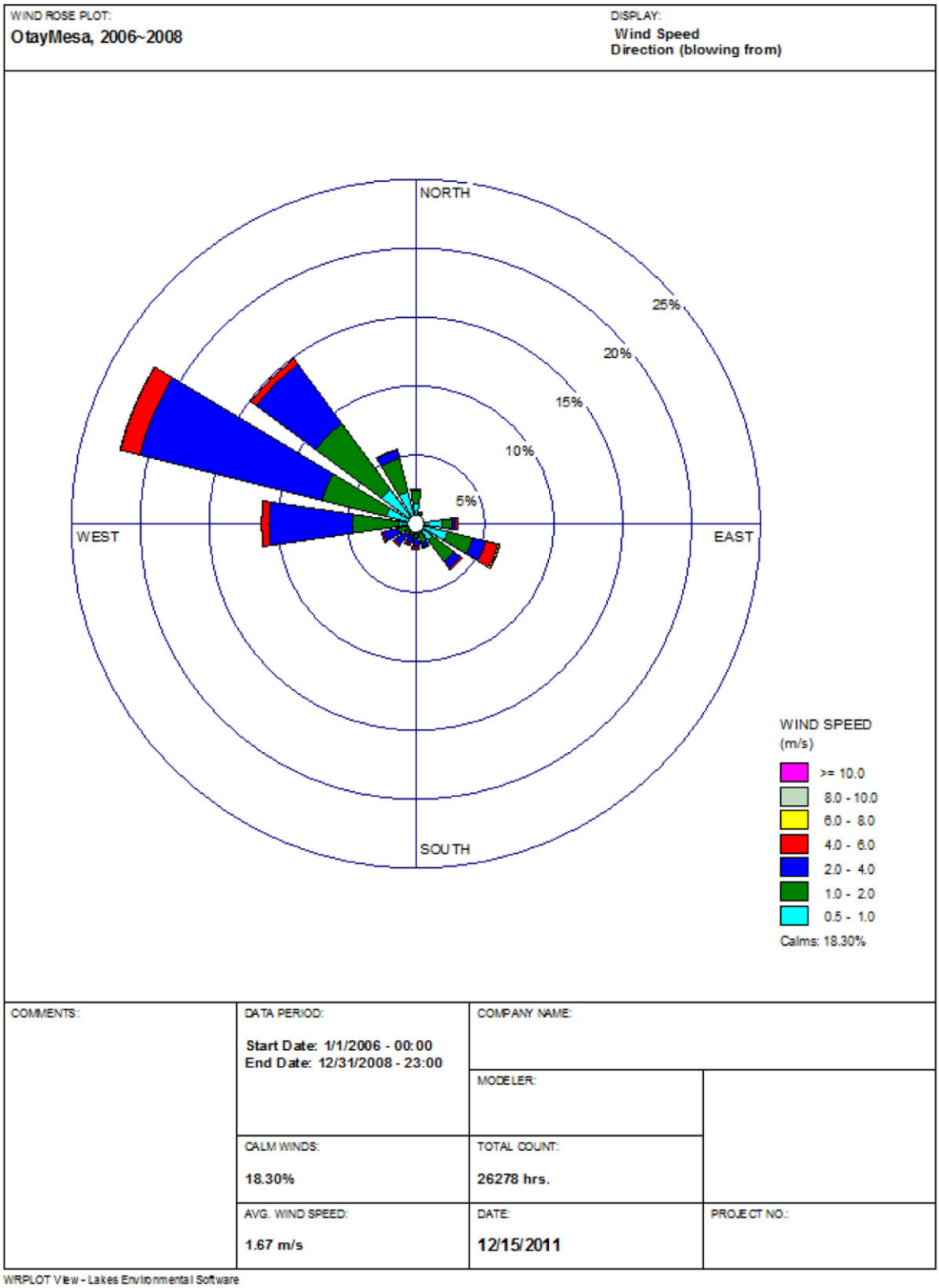
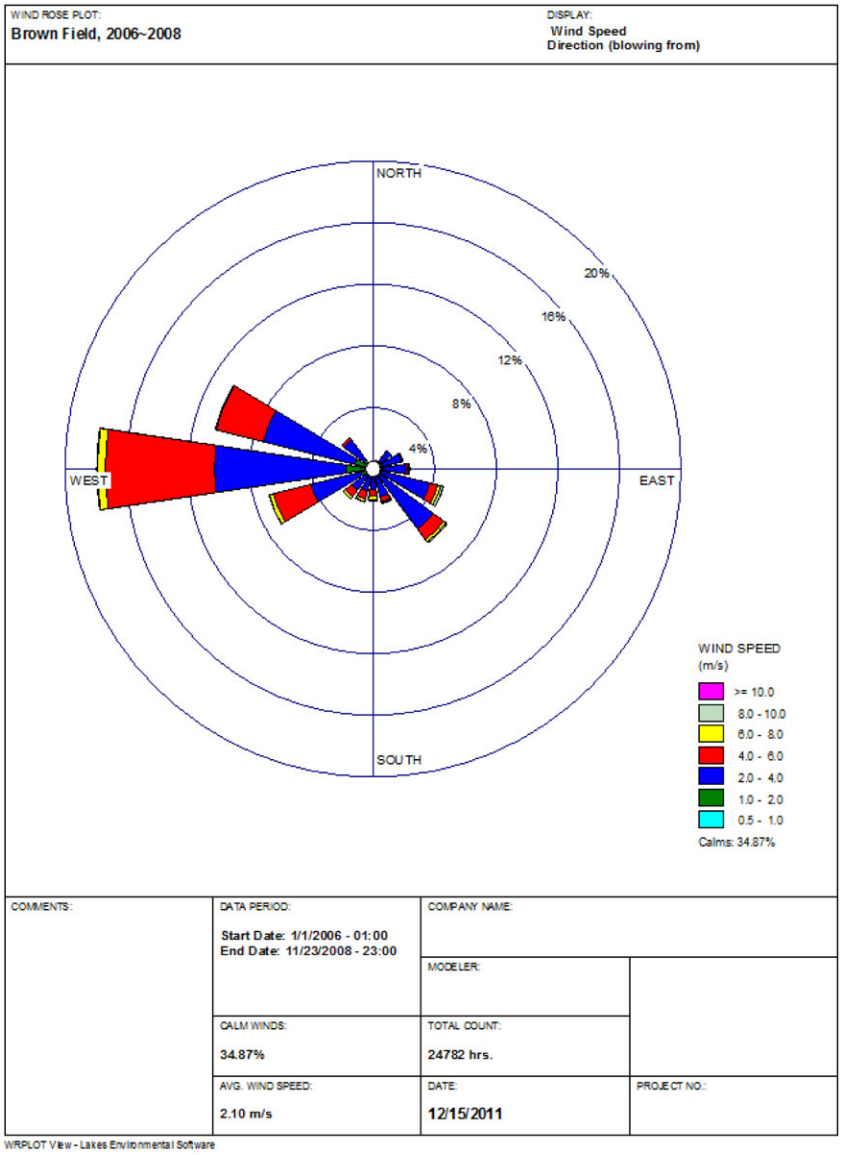


Figure 3
Wind Rose, Brown Field Meteorological Monitoring Station, 2006-2008



The surface characteristics around the Otay Mesa meteorological station at the International Border Crossing and the project site are shown in Table 1.

Table 1: Otay Mesa Meteorological Station Surface Characteristics[a]

Month	Sector	Alb	Bo	Zo[b]
1	1	0.18	1.09	0.7
2	1	0.18	1.09	0.7
3	1	0.16	0.65	0.7
4	1	0.16	0.65	0.7
5	1	0.18	0.70	0.7
6	1	0.18	0.70	0.7
7	1	0.18	0.70	0.7
8	1	0.18	0.70	0.7
9	1	0.18	0.70	0.7
10	1	0.18	1.09	0.7
11	1	0.18	1.09	0.7
12	1	0.18	1.09	0.7

Sector = 360 degrees, Alb = Albedo, Bo = Bowen Ratio, and Zo = surface roughness.

[a] Used in AERMET for AERMOD Air Dispersion Modeling.
[b] Values adjusted by SDAPCD from the AERSURFACE values of 0.2.

Table 2: "Area of Interest" Surface Characteristics[a]

Month	Sector	Alb	Bo	Zo
1	1	0.17	1.26	0.5
2	1	0.17	1.26	0.5
3	1	0.17	0.85	0.5
4	1	0.17	0.85	0.5
5	1	0.17	0.76	0.5
6	1	0.17	0.76	0.5
7	1	0.17	0.76	0.5
8	1	0.17	0.76	0.5
9	1	0.17	0.76	0.5
10	1	0.17	1.26	0.5
11	1	0.17	1.26	0.5
12	1	0.17	1.26	0.5

Sector = 360 degrees, Alb = Albedo, Bo = Bowen Ratio, and Zo = surface roughness.

[a] Area immediately east of project site. Values generated using AERSURFACE.

.

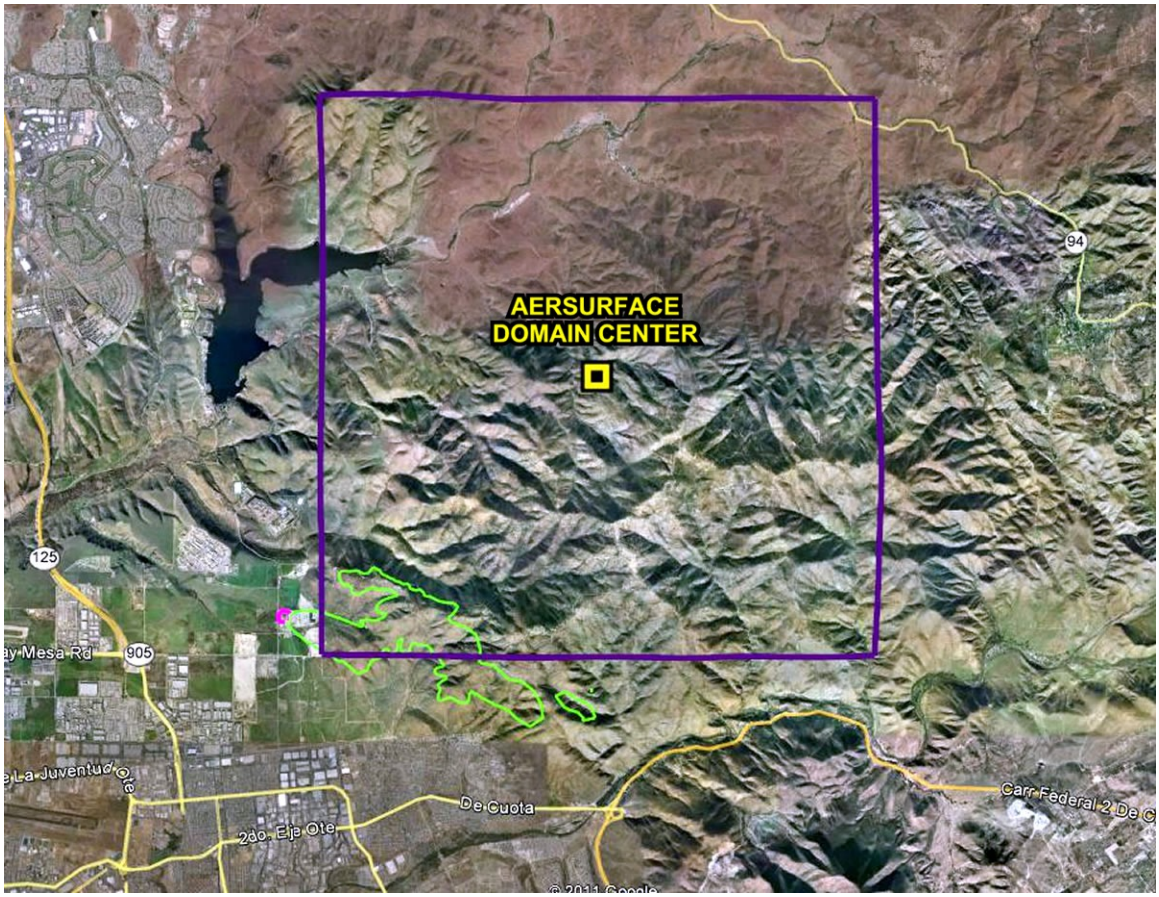
The data in Table 1 were developed by the District with guidance methodology described in its February 3, 2011 email (see Attachment D), as follows:

> *The recommended approach for processing digitized land cover data to determine the effective Bowen ratio and Albedo for input to AERMET is to average the surface characteristics across a representative domain without any direction or distance dependency. The recommended default domain is a 10km by 10km region centered on the measurement site. A domain representative of the application site may be more appropriate for some applications, particularly if the majority of sources are elevated releases.*
>
> *For this project we chose to use the proposed Pio Pico facility location as the center of the domain used in determination of the Bowen Ratios and Albedos on a monthly basis since the proposed facility is comprised of elevated sources. AERSURFACE was used for this purpose. We modify the seasonal categories for San Diego County for input to the AERSURFACE program as follows:*
>
> - *Transitional Spring: March and April*
> - *Midsummer: May, June, July, August, September*
> - *Autumn with unharvested cropland: October, November, December, January, February*
>
> *Since AERSUFACE currently uses a Land Use data base from 1992, and does not take buildings in to account, we then modified the Surface Roughness value determined for the actual Meteorological tower location (SDAPCD Otay monitoring station), which is located approximately 1.8 miles SW of the proposed facility site. The value obtained using AERSURFACE was approximately 0.2. We replaced this with a Surface Roughness value of 0.7 based on a review of aerial photos for the area. We feel that this better represents the vicinity of the Meteorological tower as a light industrial and residential area that includes northern Mexico and the U.S border area.*[2]

For comparison, average surface characteristics were developed using AERSURFACE for the 10 km by 10 km analysis domain with its western border near the project site, and its southeast corner close to the U.S.-Mexico border (see Figure 4). This domain covers most of the significant impact area, including the areas with the highest impacts. It therefore best represents the "area of interest" for the project. The results are shown in Table 2.

[2] Email from Ralph DeSiena (District) to Eric Walther (Sierra Research), February 3, 2011.

Figure 4
Location of Domain Representing Area of Interest
for Surface Characteristic Analysis



Surface characteristics affect modeling results.[3] As shown in Tables 1 and 2, the albedos for the two domains are very similar (0.16 - 0.18 for the Otay Mesa meteorological station, and 0.17 for the area of interest). The Bowen Ratios in Table 2 are consistently slightly higher than the Bowen Ratios in Table 1, reflecting a small difference between surface moisture present in the light industrial and residential area surrounding the Otay Mesa Station and in the relatively uniform sparse desert ground cover/vegetation that characterizes the area of interest. The higher the Bowen Ratio, the dryer the ground surface, and the less latent heat transfer contributes to overall heat flux from convective turbulence (i.e., the more sensible heat transfer contributes to overall heat flux from convective turbulence). Increasing this surface characteristic causes a small increase in the calculated ground-level concentration.[4] The surface roughness difference between 0.7 and 0.5 meters in the two tables, respectively, is similar, with both values determined to be in the same Category 2 (medium roughness) according to the Texas Commission on Environmental Quality.[5] For 35 meter stacks, the higher the surface roughness, the higher the concentration.

In summary, the albedo for the meteorological station is essentially the same for the area of interest; the Bowen Ratios at the meteorological station are consistently lower than for the area of interest, which would tend to lower maximum modeled concentrations; and the surface roughness is higher at the meteorological station than for the area of interest, which would tend to increase modeled concentrations. **Overall, comparison of the surface characteristics at the meteorological monitoring site with the surface characteristics in the area of interest supports the use of the Otay Mesa border station meteorological data as representative.**

Using EPA guidance as a basis, the factors listed below were considered in the determination of representativeness:

- *In general, the representativeness of the meteorological data used in an air quality modeling analysis is dependent on the proximity of the meteorological monitoring site to the "area-of-interest."* As previously indicated, the source of the meteorological data used in this analysis is two miles from the project site away with no intervening structures, hills, or water bodies that might significantly affect meteorological conditions. **Factor weighs in favor of considering the data representative.**

- *Spatial representativeness of the data will almost always be adversely affected (degraded) by increasing the distance between the sources and receptors (increasing the size of the area-of-interest).* This is inevitable in a steady-state

[3] The qualitative description of the effects of surface characteristics on modeling results are from T.G. Grosch and R.F. Lee, "Sensitivity of the AERMOD Air Quality Model to the Selection of Land Use Parameters," http://www.environmental-expert.com/Files%5C20658%5Carticles%5C4842%5Ctp_wessex99.pdf
[4] Grosch and Lee. Ibid.
[5] Texas Commission on Environmental Quality, "AERMOD Training," *http://www.cabq.gov/airquality/pdf/tceqsfcroughnessguidance.pdf*, accessed December 22, 2011.

model, and provides no basis for distinguishing between one set of data and another. **Factor is neutral with regard to considering the data representative.**

- *Although proximity of the meteorological monitoring site is an important factor, representativeness is not simply a function of distance. In some instances, even though meteorological data are acquired at the location of the pollutant source, they may not correctly characterize the important atmospheric dispersion conditions; e.g., dispersion conditions affecting sources located on the coast are strongly affected by off-shore air/sea boundary conditions - data collected at the source would not always reflect these conditions.* The source of meteorological data, the project site, and the area-of-interest are all located well inland, in close proximity to each other, and have surface characteristics that are similar to each other. **Factor weighs in favor of considering the data representative.**

- *Representativeness is a function of the height of the measurement. For example, one can expect more site-to-site variability in measurements taken close to the surface compared to measurements taken aloft. As a consequence, upper-air measurements are generally representative of much larger spatial domains then are surface measurements.* The meteorological sensors at the Otay Mesa monitoring station are located at the 10 meter (32.8 feet) standard height. The sensors therefore provide wind speed, wind direction, and temperatures that appropriately characterize a realistic boundary layer near the monitoring station and throughout the analysis domain that includes the Project site. **Factor weighs in favor of considering the data representative.**

- *Factors that should be considered in selecting a monitoring site in complex terrain include: the aspect ratio and slope of the terrain, the ratios of terrain height to stack height and plume height, the distance of the source from the terrain feature, and the effects of terrain features on meteorological conditions, especially wind speed and wind direction.* The Project site is somewhat closer to the San Ysidro Mountains to the east than is the Otay Mesa monitoring station. The San Ysidro Mountains have maximum elevations around 2,000 feet. The wind roses in Figures 2 and 3 and the wind roses for Chula Vista and El Cajon contained included as Figures 1 and 2, respectively, in our December 1, 2011 letter all show the dominance of the westerly sea breezes throughout this region west of the mountains. The fact that the mountains are downwind of both the Project site and the monitoring station almost all of the time assures that effects of the elevated terrain in the mountains on the monitored values of wind speed and direction are likely to be similarly minimal for both sites. **Factor weighs in favor of considering the data representative.**

In summary, consideration of the factors listed in EPA guidance on determination of the representativeness of meteorological data results in the conclusion that the Otay Mesa data are adequately representative of the area of interest for this Project. Furthermore, any objections that might be raised concerning the Otay Mesa data would be equally applicable to data that might be collected onsite. Therefore, there is no basis for requiring collection of onsite meteorological data.

In-Stack NO_2/NOx Ratio

Comment: *Provide the documents that were used to derive the in-stack NO_2NOx ratios for the NO_2 modeling analysis.*

Response: At the direction of the District, the NO_2/NOx ratios used for PPEC in the dispersion modeling were revised to 13% during normal operations and 24% during startup and commissioning. The District justified those levels in an email[6] to the applicant as follows:

> *The tentative recommendation for normal operations is based on source tests of four natural-gas-fired LM6000PC SPRINT turbines equipped with water injection, SCR, and oxidation catalysts. Preliminarily, these appear to be the closest analogue to the LMS100 as proposed for Pio Pico (i.e., aeroderivative, simple cycle, diffusion flame combustors, same NOx controls, oxidation catalysts, and interstage cooling—albeit with water injection for the SPRINTs). The value is an average over the four turbines (rounded up) of the average NO2/NOx ratio for each turbine. The average NO2/NOx ratios for the four turbines were .0393 (2 tests), .0603 (2 tests), 0.185 (1 test), and 0.205 (1 test), respectively.*
>
> *For situations when the SCR is not operating, the tentative ratio is based on source tests of 11 natural-gas-fired GE Frame 5 turbines. These turbines all have water injection but no other NOx controls and no oxidation catalyst. The NO2/NOx ratio for these turbines ranges from about 0.18 to 0.285 (averaged over 7-10 source tests of each turbine).*
>
> *The source tests were all at greater than 80% load.*

The Pacific Recovery NO_2/NOx ratio of 75% was taken from source test data for the facility. The data were provided by the District to be used for this analysis (see Attachment B). Over four test runs, average NO_2/NOx ratios ranged from 55% to 75%. For the cumulative impact analysis, the applicant selected the most conservative average value to characterize this source.

The Otay Mesa NO_2/NOx ratio of 5% was taken from source test data for the Otay Mesa facility. The data were provided by the District to be used for this analysis (see Attachment C). The NO_2/NOx ratio ranged from 4% to 6% with the duct burners, and 4% to 7% without duct burners. For the cumulative impact analysis, the applicant selected a round number within the range.

The NO_2/NOx ratios for the small Calpeak Boarder and Larkspur units (all 10%) were based on a conservative interpretation of data provided by the District (see Attachment C).

---

[6] See the December 23, 2010 email from Steve Moore to Steve Hill provided in Attachment A.

PM BACT for Turbines

Comment: *Provide the data from the Panoche Energy Center project used to develop the proposed turbine PM BACT emission level of 5.5 lb/hr.*

Response: The Panoche Energy Center source test data are summarized in Table 3. Please note that these few source tests are not sufficient to demonstrate that the measured emission rates are achievable under all conditions and for the lifetime of the turbines. Furthermore, the test method used to measure PM is not very accurate at the low levels being measured; there is considerable variability in the results. For these reasons, the applicant has proposed a compliance level that takes into account (a) the vendor guarantee; (b) the emission levels demonstrated in the source tests; (c) reasonable variability in performance that can be expected over the lifetime of a well-maintained unit; and (d) the variability inherent in the source test methodology.

Taking all of the above into account, test results provide sufficient support for the Applicant to determine that it can comply with a 5.5 lb/hr emission limit, which is equivalent to 0.0065 lb/MMBtu measured at or near peak turbine load.

Source test reports and/or summaries are included on the enclosed CD.

Table 3. Panoche Energy Center
PM Emission Tests Results (lb/MMBtu)
4 x 100 MW GE Model LMS100 combustion turbines

Date	**5/13/2011**	**5/12/2011**	**5/11/2011**	**5/10/2011**	**5/11/2010**	**5/12/2010**	**5/18/2010**	**5/19/2010**	**4/30/09 - 5/1/09**	**4/27/2009**	**4/23/2009**	**4/24/2009**
Unit	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Unit Load									100%	100%	100%	100%
Run 1	0.00298	0.00402	0.00314	0.00184	0.00279	0.00141	0.00168	0.00249	0.002	0.005	0.012	0.002
Run 2	0.00261	0.00192	0.00420	0.00182	0.00213	0.00107	0.00176	0.00198	0.002	0.003	0.002	0.007
Run 3	0.00167	0.00169	0.00605	0.00185	0.00169	0.00155	0.00149	0.00310	0.004	0.001	0.002	0.006
Average	0.00242	0.00254	0.00446	0.00184	0.00220	0.00134	0.00164	0.00252	0.003	0.003	0.005	0.005

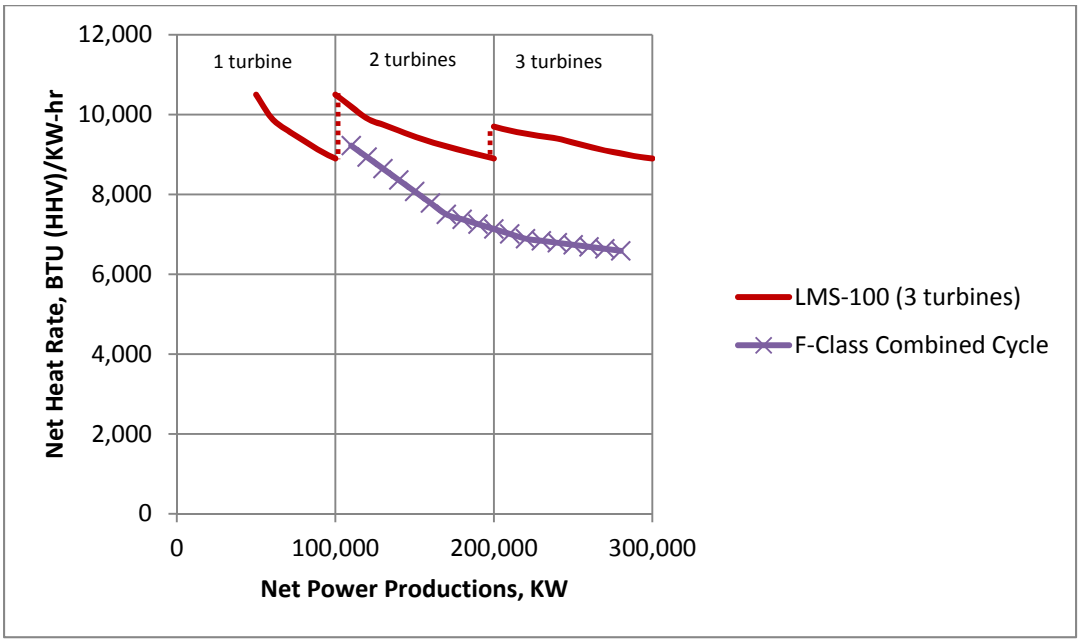
	2011	**2010**	**2009**	**Overall**
Average	0.00282	0.00193	0.004	0.003
Std Deviation	0.00136	0.00060	0.003	0.002
Relative Std Deviation	48%	31%	78%	73%
Mean plus 2 S.D	0.0055	0.0031	0.0103	0.0072

GHG BACT for Turbines

Comment: *In Step 4 of the BACT analysis, Applicant made the following statement: "A larger-capacity unit would be operated at less than optimum (full) output more frequently than a smaller-capacity turbine, and since gas turbine efficiency drops rapidly at less than full load, this mode of operation would likely reduce the overall efficiency of the combined-cycle units to below that of the proposed simple-cycle gas turbines." Please provide the basis for this claim.*

Response: As shown in Figure 5, turbine efficiency drops rapidly at less than full load. A single, high-efficiency combined-cycle unit (such as an F-class unit in a 1x1 configuration) cannot effectively operate through the broad range of loads that multiple simple-cycle units can.[7] Figure 5 compares the efficiency curves for the proposed LMS100 configuration with an F-class combined cycle unit (GE S107FB). It is important to note that while the LMS100 configuration provides the flexibility to operate across the full range of loads between approximately 50 MW and 300 MW, it will most likely be dispatched to operate at the more efficient loads of 100 MW, 200 MW or 300 MW.

Figure 5
Turbine Efficiency Curves



[7] As designed, PPEC is capable of providing load-following capability from a minimum of 50 MW up to its full capacity of 300 MW. The GE S107FB is limited to a range of approximately 110-280 MW. The broader range of response is an important feature of PPEC's proposal to SDG&E.

If you have any questions regarding this information, please contact the Applicant's representative David Jenkins at (317) 431-1004, or Gary Rubenstein or me at (916) 444-6666.

Sincerely,

Steve Hill

cc: John McKinsey, Stoel Rives LLP
David Jenkins, Apex Power Group
Steve Moore, San Diego Air Pollution Control District

Attachments
Enclosure: CD

ATTACHMENT A

December 23, 2010 Email from Steve Moore to Steve Hill

Steve Hill

From: Moore, Steve <Steve.Moore@sdcounty.ca.gov>
Sent: Thursday, December 23, 2010 2:36 PM
To: Steve Hill
Cc: Eric Walther
Subject: RE: Pio Pico NO2/NOx

Follow Up Flag: Follow up
Flag Status: Completed
Expires: Sunday, December 20, 2020 12:00 AM

Steve,

The tentative recommendation for normal operations is based on source tests of four natural-gas-fired LM6000PC SPRINT turbines equipped with water injection, SCR, and oxidation catalysts. Preliminarily, these appear to be the closest analogue to the LMS100 as proposed for Pio Pico (i.e., aeroderivative, simple cycle, diffusion flame combustors, same NOx controls, oxidation catalysts, and interstage cooling—albeit with water injection for the SPRINTs). The value is an average over the four turbines (rounded up) of the average NO2/NOx ratio for each turbine. The average NO2/NOx ratios for the four turbines were .0393 (2 tests), .0603 (2 tests), 0.185 (1 test), and 0.205 (1 test), respectively.

For situations when the SCR is not operating, the tentative ratio is based on source tests of 11 natural-gas-fired GE Frame 5 turbines. These turbines all have water injection but no other NOx controls and no oxidation catalyst. The NO2/NOx ratio for these turbines ranges from about 0.18 to 0.285 (averaged over 7-10 source tests of each turbine).

The source tests were all at greater than 80% load.

Thanks.

Steven Moore
Senior Air Pollution Control Engineer
San Diego County Air Pollution Control District
10124 Old Grove Road, San Diego, CA 92131

858-586-2750

Celebrating 50 years of air quality progress!

From: Steve Hill [mailto:SHill@sierraresearch.com]
Sent: Thursday, December 23, 2010 1:48 PM
To: Moore, Steve; Eric Walther
Cc: Gary Rubenstein
Subject: RE: Pio Pico NO2/NOx

Thank you for the guidance.

Can you please provide the justification for using those values? We need to be able to explain to EPA the basis for any value that we use. We can refer to San Joaquin's published guidance for a ratio of 0.10, but have been unable to find source test data to support a different value.

--Steve

From: Moore, Steve [mailto:Steve.Moore@sdcounty.ca.gov]
Sent: Thursday, December 23, 2010 1:16 PM
To: Steve Hill; Eric Walther
Subject: Pio Pico NO2/NOx

Steve & Eric,

For purposes of the AQIA in a submittal of a new or revised application for the Pio Pico Energy Center, the District tentatively recommends the following in-stack NO2/NOx ratios for the LMS100 turbine proposed for the project:

Normal Operations: 0.13
Commissioning, Startup, or any other situation when the SCR is not fully operational: 0.24

Please be aware that the District is continuing to investigate this issue and reserves the right to change these tentative recommendations based on reevaluation of existing information or new information.

Thanks.

Steven Moore
Senior Air Pollution Control Engineer
San Diego County Air Pollution Control District
10124 Old Grove Road, San Diego, CA 92131

858-586-2750

Celebrating 50 years of air quality progress!

ATTACHMENT B

Pacific Recovery Test Data

NO2 Priority	PO_NUM	ID_NUM	DBA	EQUIP_DESC	Mfg	Model
1	40247-1	6068	Pacific Recovery, Otay Landfill, Eng @1	One Cooper Superior model 16SGTA pre-chamber lean burn piston engine, rated at 2650 bhp at 900 rpm. Fueled with landfill gas from a landfill gas collection system consisting of 62 wells and associated landfill gas venting system which also supplies fuel to engine #2.	Cooper	16SGTA
1	40247-2	6068	Pacific Recovery, Otay Landfill, Eng #2	One Cooper Superior model 16SGTA pre-chamber lean burn piston engine, rated at 2650 bhp at 900 rpm. Fueled with landfill gas from a landfill gas collection system consisting of 62 wells and associated landfill gas venting system which also supplies fuel to engine #1.	Cooper	16SGTA
1	979979-3	6068	Pacific Recovery, Engine #3, Otay Landfill	One Cooper Superior model 16SGTA pre-chamber lean burn piston engine, rated at 2650 bhp at 900 rpm. Fueled with landfill gas from a landfill gas collection system consisting of 62 wells and associated landfill gas venting system which also supplies fuel to engine #1	Cooper	16SGTA
1	979979-4	6068	Pacific Recovery, Engine #4, Otay Landfill	One Cooper Superior model 16SGTA pre-chamber lean burn piston engine, rated at 2650 bhp at 900 rpm. Fueled with landfill gas from a landfill gas collection system consisting of 62 wells and associated landfill gas venting system which also supplies fuel to engine #1	Cooper	16SGTA

TC = Turbocharged
AC = Aftercooled
4DR = Timing retarded by 4 degrees
DPF Diesel Particulate Filter
SCR = Selective Catalytic Reduction
OxCat = Oxidation Catalyst
LB = Lean Burn
LFG = Landfill Gas

BHP	Spark Ignited Engine Type	Turbocharged	Aftercooled	Timing	Diesel Particulate Filter	Add-on NOx Control	In-Combutor NOx Control	CO/VOC Control	Fuel	No. Tests	Average NOx, ppmv @ 15% O2	Average NO2/NOx
2650	LB	—	—	—	—	—	—	—	LFG	10	56.93	54.98
2650	LB	—	—	—	—	—	—	—	LFG	8	59.31	55.51
2650	LB	—	—	—	—	—	—	—	LFG	2	23.70	74.85
2650	LB	—	—	—	—	—	—	—	LFG	3	30.30	56.37

Maximum NO2/NOx	Minimum NO2/Nox	NO2/NOx Standard Deviation	Average Load, %
67.9	5.1	18.13075	97.5%
71.2	6.6	20.77605	97.5%
78.2	71.5	4.737615	97.4%
72.3	33.8	20.08889	95.5%

ATTACHMENT C

Turbine Test Data

NO2 Priority	D_NUM	M_DBA	PO_NUM	EQUIP_DESC
1	7630	WILDFLOWER ENERGY LP/LARKSPUR	976094	ONE (1) GENERAL ELECTRIC 45 MW NOMINALLY RATED MODEL LM 6000 PC SPRINT SIMPLE CYCLE GAS TURBINE WITH A HEAT INPUT RATING OF 395 MM BTU/HR (LHV) WHEN OPERATED ON NATURAL GAS AND 398 MM BTU/HR (LHV) WHEN OPERATED ON LIQUID FUEL, EQUIPPED WITH A WATER INJECTION SYSTEM AND CORMETECH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM INCLUDING AUTOMATIC AMMONIA INJECTION CONTROL SYSTEM FOR CONTROL OF NOX, CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS), DATA ACQUISITION AND RECORDING SYSTEMS AND AND THE OPTION OF AN OXIDATION CATALYST SYSTEM: UNIT 100 (WEST UNIT) THE COMBINED TOTAL ELECTRICAL NOMINAL POWER OUTPUT FROM THE LARKSPUR POWER PLANT, INCLUDES POWER FROM UNIT 100 AND UNIT 200 IS 90 MW. 976094 EAD 01/06/03 (982160 11/04) 976138 AND 976094 04/20/05 (981537 04/05) 983806 12/29/05 EAD
1	7630	WILDFLOWER ENERGY LP/LARKSPUR	976138	ONE (1) GENERAL ELECTRIC 45 MW NOMINALLY RATED MODEL LM 6000 PC SPRINT SIMPLE CYCLE GAS TURBINE WITH A HEAT INPUT RATING OF 395 MM BTU/HR (LHV) WHEN OPERATED ON NATURAL GAS AND 398 MM BTU/HR (LHV) WHEN OPERATED ON LIQUID FUEL, EQUIPPED WITH A WATER INJECTION SYSTEM AND CORMETECH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM INCLUDING AUTOMATIC AMMONIA INJECTION CONTROL SYSTEM FOR CONTROL OF NOX, CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS), DATA ACQUISITION AND RECORDING SYSTEMS AND THE OPTION OF AN OXIDATION CATALYST SYSTEM: UNIT 200 (EAST UNIT). THE COMBINED TOTAL ELECTRICAL NOMINAL POWER OUTPUT FROM THE LARKSPUR POWER PLANT, INCLUDING THE POWER FROM UNIT 100 AND UNIT 200 IS 90 MW 976094 AND 976136 EAD 1/6/03 (982160 11/04) 979094 AND 976136 EAD 4/20/05 (981537 04/20/05) 983806 EAD 12/29/05
1	7835	CALPEAK POWER LLC	976502	GAS TURBINE (49.5 MW): PRATT & WHITNEY, MODEL FT-8 (DLN), TWIN-PAC (TWO SIMPLE CYCLE GAS TURBINES WITH COMMON GENERATOR AND EXHAUST), 500 MMBTU/HR TOTAL HEAT INPUT, NATURAL GAS FIRED, WITH EXHAUST AIR COOLING, A PEERLESS MANUFACTURING COMPANY SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM WITH A HALDOR CATALYST, AN ENGELHARD OXIDATION CATALYST SYSTEM, A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), AND CONTINUOUS PARAMETRIC MONITORS. (976502AFS11JUL2002)(978638 ALC 09/04)(983962 & 984416 EAD 6/07/07)
1A	86017	CA ST OF DEPT (	860159	ONE(1) SOLAR CENTAUR GSC 4500 COMBUSTION TURBINE MODEL GS1-CB-KA, SERIAL NUMBER CG86N28; ELECTRICL GENRATOR RATED AT 2.93 MW; WASTE HEAT RECOVERY; ONE (1) COEN MODEL GDB-300 DUCT BURNER MODIFIED FOR MAXIMUM HEAT INPUT OF 16 MM BTU/HR WITH A BYPASS VALVE AND SECONDARY EXHAUST, WHICH ALLOWS THE EXHAUST TO BYPASS THE DUCTBURNER/HEAT RECOVERY BOILER. APP.#910523 RLB 5/25/93 (9/24/02 COMPLIANCE REQUESTED EQ. DESC. CHANGE-AFS)
1A		OTAY MESA ENE	978379	Power Station #1 consisting of: one Gas Turbine (171.7 MW nominal): General Electric, Model 7FA, with DLN 2.6 low-NOx burners, natural gas fired, 1607.1 MMBtu/hr nominal heat input (LHV), S/N TBD, with a heat recovery steam generator (HRSG) with a 388.1 MMBtu/hr duct burner, Nooter-Eriksen, vented to a selective catalytic reduction (SCR) system, equipped with a continuous emission monitoring system (CEMS); common to both power stations are a steam turbine generator (277 MW nominal), Siemans-Westinghouse, Model KN, S/N TBD; two air-cooled condensers, GEA, 295'L x 123'W x 76'H; a wet surface air cooler, Niagara Blower Co., Model RWC 48240-2F16, or equivalent; and an auxiliary boiler, 87 MMBtu/hr, with low-NOx burners.
1A		OTAY MESA ENE	978380	Power Station #2 consisting of: one Gas Turbine (171.7 MW nominal): General Electric, Model 7FA, with DLN 2.6 low-NOx burners, natural gas fired, 1607.1 MMBtu/hr nominal heat input (LHV), S/N TBD, with a heat recovery steam generator (HRSG) with a 388.1 MMBtu/hr duct burner, Nooter-Eriksen, vented to a selective catalytic reduction (SCR) system, equipped with a continuous emission monitoring system (CEMS); common to both power stations are a steam turbine generator (277 MW nominal), Siemans-Westinghouse, Model KN, S/N TBD; two air-cooled condensers, GEA, 295'L x 123'W x 76'H; a wet surface air cooler, Niagara Blower Co., Model RWC 48240-2F16, or equivalent; and an auxiliary boiler, 87 MMBtu/hr, with low-NOx burners.

DB = Duct Burner
Comb = Combined cycle including combined heat and power (i.e., cogeneration)
Simple = simple cycle
DF = Diffusion Flame
LPM = Lean Premixed
Aero = Aeroderivative
Ind = Industrial
SCR = Selective Catalytic Reduction
WI = Water Injection
OxCat = Oxidation Catalyst

M_DBA	PO_NUM	EQUIP_DESC	Mfg	Model	Type	Turbine Rated Power Output, MW	Turbine Rated Heat Input (HHV), MMBtu/hr	Combustor	Duct Burner	Duct Burner Rated Heat Input, MMBtu	DB Combustor	Rated DB Heat Input (HHV), MMBTu/hr	Cycle	Add-on NOx Control	In-Combutor NOx Control	CO/VOC Control	No. Tests Fired on Natural Gas with DB On	NG DB On Average NOx, ppmv @ 15% O2	Natural Gas DB On Average NO2/NOx	Natural Gas DB On Maximum NO2/NOx	Natural Gas DB On Minimum NO2/NOx	Natural Gas DB On NO2/NOx Standard Deviation	Natural Gas DB On Average Load, %	No. Tests Fired on Natural Gas with DB Off	NG DB Off Average NOx, ppmv @ 15% O2	Natural Gas DB Off Average NO2/NOx	Natural Gas DB Off Maximum NO2/NOx	Natural Gas DB Off Minimum NO2/NOx
WILDFLOWER ENERGY LP/LARKSPUR	976094	ONE (1) GENERAL ELECTRIC 45 MW NOMINALLY RATED MODEL LM 6000 PC SPRINT SIMPLE CYCLE GAS TURBINE WITH A HEAT INPUT RATING OF 395 MM BTU/HR (LHV) WHEN OPERATED ON NATURAL GAS AND 398 MM BTU/HR (LHV) WHEN OPERATED ON LIQUID FUEL, EQUIPPED WITH A WATER INJECTION SYSTEM AND CORMETECH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM INCLUDING AUTOMATIC AMMONIA INJECTION CONTROL SYSTEM FOR CONTROL OF NOX, CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS), DATA ACQUISITION AND RECORDING SYSTEMS AND AND THE OPTION OF AN OXIDATION CATALYST SYSTEM: UNIT 100 (WEST UNIT) THE COMBINED TOTAL ELECTRICAL NOMINAL POWER OUTPUT FROM THE LARKSPUR POWER PLANT, INCLUDES POWER FROM UNIT 100 AND UNIT 200 IS 90 MW. 976094 EAD 01/06/03 (982160 11/04) 976138 AND 976094 04/20/05 (981537 04/05) 983806 12/29/05 EAD	GE	LM6000PC SPRINT	Aero	45	395	DF	—	—	—	—	Simple	SCR.	WI	—	0	N/A	N/A	N/A	N/A	N/A	N/A	3	5.16	14.07	17.00	9.30
WILDFLOWER ENERGY LP/LARKSPUR	976138	ONE (1) GENERAL ELECTRIC 45 MW NOMINALLY RATED MODEL LM 6000 PC SPRINT SIMPLE CYCLE GAS TURBINE WITH A HEAT INPUT RATING OF 395 MM BTU/HR (LHV) WHEN OPERATED ON NATURAL GAS AND 398 MM BTU/HR (LHV) WHEN OPERATED ON LIQUID FUEL, EQUIPPED WITH A WATER INJECTION SYSTEM AND CORMETECH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM INCLUDING AUTOMATIC AMMONIA INJECTION CONTROL SYSTEM FOR CONTROL OF NOX, CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS), DATA ACQUISITION AND RECORDING SYSTEMS AND THE OPTION OF AN OXIDATION CATALYST SYSTEM: UNIT 200 (EAST UNIT). THE COMBINED TOTAL ELECTRICAL NOMINAL POWER OUTPUT FROM THE LARKSPUR POWER PLANT, INCLUDING THE POWER FROM UNIT 100 AND UNIT 200 IS 90 MW 976094 AND 976136 EAD 1/6/03 (982160 11/04) 979094 AND 976136 EAD 4/20/05 (981537 04/20/05) 983806 EAD 12/29/05	GE	LM6000PC SPRINT	Aero	45	395	DF	—	—	—	—	Simple	SCR.	WI	—	0	N/A	N/A	N/A	N/A	N/A	N/A	2	4.74	9.60	16.30	2.90
CALPEAK POWER LLC	976502	GAS TURBINE (49.5 MW): PRATT & WHITNEY, MODEL FT-8 (DLN), TWIN-PAC (TWO SIMPLE CYCLE GAS TURBINES WITH COMMON GENERATOR AND EXHAUST), 500 MMBTU/HR TOTAL HEAT INPUT, NATURAL GAS FIRED, WITH EXHAUST AIR COOLING, A PEERLESS MANUFACTURING COMPANY SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM WITH A HALDOR CATALYST, AN ENGELHARD OXIDATION CATALYST SYSTEM, A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), AND CONTINUOUS PARAMETRIC MONITORS. (976502AFS11JUL2002)(978638 ALC 09/04)(983962 & 984416 EAD 6/07/07)	PW	FT-8	Aero	49.5	500	LPM	—	—	—	—	Simple	SCR.	—	OxCat	0	N/A	N/A	N/A	N/A	N/A	N/A	2	2.93	10.52	14.60	6.43
CA ST OF DEPT (	860159	ONE(1) SOLAR CENTAUR GSC 4500 COMBUSTION TURBINE MODEL GS1-CB-KA, SERIAL NUMBER CG86N28; ELECTRICL GENRATOR RATED AT 2.93 MW; WASTE HEAT RECOVERY; ONE (1) COEN MODEL GDB-300 DUCT BURNER MODIFIED FOR MAXIMUM HEAT INPUT OF 16 MM BTU/HR WITH A BYPASS VALVE AND SECONDARY EXHAUST, WHICH ALLOWS THE EXHAUST TO BYPASS THE DUCTBURNER/HEAT RECOVERY BOILER. APP.#910523 RLB 5/25/93 (9/24/02 COMPLIANCE REQUESTED EQ. DESC. CHANGE-AFS)	SOLAR	GSI-CB-KA	Ind	2.93		DF	DB	16		16	Comb	—	WI	—	5	21.50	49.64	69.60	34.10	14.85	85.35	0	N/A	N/A	N/A	N/A
OTAY MESA ENE	978379	Power Station #1 consisting of: one Gas Turbine (171.7 MW nominal): General Electric, Model 7FA, with DLN 2.6 low-NOx burners, natural gas fired, 1607.1 MMBtu/hr nominal heat input (LHV), S/N TBD, with a heat recovery steam generator (HRSG) with a 388.1 MMBtu/hr duct burner, Nooter-Eriksen, vented to a selective catalytic reduction (SCR) system, equipped with a continuous emission monitoring system (CEMS); common to both power stations are a steam turbine generator (277 MW nominal), Siemans-Westinghouse, Model KN, S/N TBD; two air-cooled condensers, GEA, 295'L x 123'W x 76'H; a wet surface air cooler, Niagara Blower Co., Model RWC 48240-2F16, or equivalent; and an auxiliary boiler, 87 MMBtu/hr, with low-NOx burners.	GE	7FA	Ind	171.7	1607.1	LPM	DB	388.1		388.1	Comb	SCR	—	—	2	1.51	5.33	6.13	4.53	1.13	130.46	2	1.55	6.97	7.33	6.60
OTAY MESA ENE	978380	Power Station #2 consisting of: one Gas Turbine (171.7 MW nominal): General Electric, Model 7FA, with DLN 2.6 low-NOx burners, natural gas fired, 1607.1 MMBtu/hr nominal heat input (LHV), S/N TBD, with a heat recovery steam generator (HRSG) with a 388.1 MMBtu/hr duct burner, Nooter-Eriksen, vented to a selective catalytic reduction (SCR) system, equipped with a continuous emission monitoring system (CEMS); common to both power stations are a steam turbine generator (277 MW nominal), Siemans-Westinghouse, Model KN, S/N TBD; two air-cooled condensers, GEA, 295'L x 123'W x 76'H; a wet surface air cooler, Niagara Blower Co., Model RWC 48240-2F16, or equivalent; and an auxiliary boiler, 87 MMBtu/hr, with low-NOx burners.	GE	7FA	Ind	171.7	1607.1	LPM	DB	388.1		388.1	Comb	SCR	—	—	2	1.48	4.06	4.26	3.87	0.28	128.70	1	1.46	3.87	3.87	3.87

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M_DBA	PO_NUM	EQUIP_DESC	Natural Gas DB Off NO2/NOx Standard Deviation	Natural Gas DB Off Average Load, %	No. Tests Fired on Diesel Oil	Oil Average NOx, ppmv @ 15% O2	Oil Average NO2/Nox	Oil Maximum NO2/NOx	Oil Minimum NO2/NOx	Oil NO2/NOx Standard Deviation	Oil Average Load, %	Notes
WILDFLOWER ENERGY LP/LARKSPUR	976094	ONE (1) GENERAL ELECTRIC 45 MW NOMINALLY RATED MODEL LM 6000 PC SPRINT SIMPLE CYCLE GAS TURBINE WITH A HEAT INPUT RATING OF 395 MM BTU/HR (LHV) WHEN OPERATED ON NATURAL GAS AND 398 MM BTU/HR (LHV) WHEN OPERATED ON LIQUID FUEL, EQUIPPED WITH A WATER INJECTION SYSTEM AND CORMETECH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM INCLUDING AUTOMATIC AMMONIA INJECTION CONTROL SYSTEM FOR CONTROL OF NOX, CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS), DATA ACQUISITION AND RECORDING SYSTEMS AND AND THE OPTION OF AN OXIDATION CATALYST SYSTEM: UNIT 100 (WEST UNIT) THE COMBINED TOTAL ELECTRICAL NOMINAL POWER OUTPUT FROM THE LARKSPUR POWER PLANT, INCLUDES POWER FROM UNIT 100 AND UNIT 200 IS 90 MW. 976094 EAD 01/06/03 (982160 11/04) 976138 AND 976094 04/20/05 (981537 04/05) 983806 12/29/05 EAD	4.16	101.41	1	11.10	5.70	5.70	5.70	#DIV/0!	98.22	
WILDFLOWER ENERGY LP/LARKSPUR	976138	ONE (1) GENERAL ELECTRIC 45 MW NOMINALLY RATED MODEL LM 6000 PC SPRINT SIMPLE CYCLE GAS TURBINE WITH A HEAT INPUT RATING OF 395 MM BTU/HR (LHV) WHEN OPERATED ON NATURAL GAS AND 398 MM BTU/HR (LHV) WHEN OPERATED ON LIQUID FUEL, EQUIPPED WITH A WATER INJECTION SYSTEM AND CORMETECH SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM INCLUDING AUTOMATIC AMMONIA INJECTION CONTROL SYSTEM FOR CONTROL OF NOX, CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS), DATA ACQUISITION AND RECORDING SYSTEMS AND THE OPTION OF AN OXIDATION CATALYST SYSTEM: UNIT 200 (EAST UNIT). THE COMBINED TOTAL ELECTRICAL NOMINAL POWER OUTPUT FROM THE LARKSPUR POWER PLANT, INCLUDING THE POWER FROM UNIT 100 AND UNIT 200 IS 90 MW 976094 AND 976136 EAD 1/6/03 (982160 11/04) 979094 AND 976136 EAD 4/20/05 (981537 04/20/05) 983806 EAD 12/29/05	9.48	103.11	1	12.10	2.80	2.80	2.80	#DIV/0!	100.00	
CALPEAK POWER LLC	976502	GAS TURBINE (49.5 MW): PRATT & WHITNEY, MODEL FT-8 (DLN), TWIN-PAC (TWO SIMPLE CYCLE GAS TURBINES WITH COMMON GENERATOR AND EXHAUST), 500 MMBTU/HR TOTAL HEAT INPUT, NATURAL GAS FIRED, WITH EXHAUST AIR COOLING, A PEERLESS MANUFACTURING COMPANY SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM WITH A HALDOR CATALYST, AN ENGELHARD OXIDATION CATALYST SYSTEM, A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), AND CONTINUOUS PARAMETRIC MONITORS. (976502AFS11JUL2002)(978638 ALC 09/04)(983962 & 984416 EAD 6/07/07)	5.77	95.96	0	N/A	N/A	N/A	N/A	N/A	N/A	
CA ST OF DEPT (	860159	ONE(1) SOLAR CENTAUR GSC 4500 COMBUSTION TURBINE MODEL GS1-CB-KA, SERIAL NUMBER CG86N28; ELECTRICL GENRATOR RATED AT 2.93 MW; WASTE HEAT RECOVERY; ONE (1) COEN MODEL GDB-300 DUCT BURNER MODIFIED FOR MAXIMUM HEAT INPUT OF 16 MM BTU/HR WITH A BYPASS VALVE AND SECONDARY EXHAUST, WHICH ALLOWS THE EXHAUST TO BYPASS THE DUCTBURNER/HEAT RECOVERY BOILER. APP.#910523 RLB 5/25/93 (9/24/02 COMPLIANCE REQUESTED EQ. DESC. CHANGE-AFS)	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	
OTAY MESA ENE	978379	Power Station #1 consisting of: one Gas Turbine (171.7 MW nominal): General Electric, Model 7FA, with DLN 2.6 low-NOx burners, natural gas fired, 1607.1 MMBtu/hr nominal heat input (LHV), S/N TBD, with a heat recovery steam generator (HRSG) with a 388.1 MMBtu/hr duct burner, Nooter-Eriksen, vented to a selective catalytic reduction (SCR) system, equipped with a continuous emission monitoring system (CEMS); common to both power stations are a steam turbine generator (277 MW nominal), Siemans-Westinghouse, Model KN, S/N TBD; two air-cooled condensers, GEA, 295'L x 123'W x 76'H; a wet surface air cooler, Niagara Blower Co., Model RWC 48240-2F16, or equivalent; and an auxiliary boiler, 87 MMBtu/hr, with low-NOx burners.	0.52	133.37	0	N/A	N/A	N/A	N/A	N/A	N/A	
OTAY MESA ENE	978380	Power Station #2 consisting of: one Gas Turbine (171.7 MW nominal): General Electric, Model 7FA, with DLN 2.6 low-NOx burners, natural gas fired, 1607.1 MMBtu/hr nominal heat input (LHV), S/N TBD, with a heat recovery steam generator (HRSG) with a 388.1 MMBtu/hr duct burner, Nooter-Eriksen, vented to a selective catalytic reduction (SCR) system, equipped with a continuous emission monitoring system (CEMS); common to both power stations are a steam turbine generator (277 MW nominal), Siemans-Westinghouse, Model KN, S/N TBD; two air-cooled condensers, GEA, 295'L x 123'W x 76'H; a wet surface air cooler, Niagara Blower Co., Model RWC 48240-2F16, or equivalent; and an auxiliary boiler, 87 MMBtu/hr, with low-NOx burners.	#DIV/0!	99.59	0	N/A	N/A	N/A	N/A	N/A	N/A	

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ATTACHMENT D

February 3, 2011 Email from Ralph DeSiena to Eric Walther

From: Desiena, Ralph [mailto:Ralph.Desiena@sdcounty.ca.gov]
Sent: Thursday, February 03, 2011 11:39 AM
To: Eric Walther
Cc: Moore, Steve; Reeve, Bill; Desiena, Ralph
Subject: RE: CEC request for met data on the Pio Pico Energy Center Project

Eric,

I'm attaching the Aermet data you requested for 2004 and 2005.
Also attached is the revised 2008 data, which now includes the missing end period, a little over one month, of that data.

In response to your request from CEC is the following:

The recommended approach for processing digitized land cover data to determine the effective Bowen ratio and Albedo for input to AERMET is to average the surface characteristics across a representative domain without any direction or distance dependency. The recommended default domain is a 10km by 10km region centered on the measurement site. A domain representative of the application site may be more appropriate for some applications, particularly
if the majority of sources are elevated releases.

For this project we chose to use the proposed Pio Pico facility location as the center of the domain used in determination of the Bowen Ratios and Albedos on a monthly basis since the proposed facility is comprised of elevated sources. AERSURFACE was used for this purpose. We modify the seasonal categories for San Diego County for input to the AERSURFACE program as follows:

Transitional Spring: March and April
Midsummer: May, June, July, August, September
Autumn with unharvested cropland: October, November, December, January, February

Since AERSUFACE currently uses a Land Use data base from 1992, and does not take buildings in to account, we then modified the Surface Roughness value determined for the actual Meteorological tower location (SDAPCD Otay monitoring station), which is located approximately 1.8 miles SW of the proposed facility site. The value obtained using AERSURFACE was approximately 0.2. We replaced this with a Surface Roughness value of 0.7 based on a review of aerial photos for the area. We feel that this better represents the vicinity of the Meteorological tower as a light industrial and residential area that includes northern Mexico and the U.S border area.

If you have any questions please let me know.

Regards,

Ralph

Ralph DeSiena
Air Pollution Meteorologist
San Diego County Air Pollution Control

10124 Old Grove Rd.
San Diego, CA 92131
858-586-2772 fax 858-586-2759
www.sdapcd.org

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE *PIO PICO ENERGY CENTER, LLC*	**Docket No. 11-AFC-1** **PROOF OF SERVICE** **(Revised 12/16/11)**

Pio Pico Energy Center, LLC
Letter to Eric Solorio dated January 17, 2012 re Comments on San Diego Air Pollution Control District's Preliminary Determination of Compliance

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DECLARATION OF SERVICE

I, Judith M. Warmuth, declare that on January 17, 2012, I deposited copies of the aforementioned document and, if applicable, a disc containing the aforementioned document in the United States mail at 500 Capitol Mall, Suite 1600, Sacramento, California 95814, with first-class postage thereon fully prepaid and addressed to those identified on the Proof of Service list above.

AND/OR

Transmission via electronic mail, personal delivery and first class U.S. mail were consistent with the requirements of California Code of Regulations, Title 20, sections 1209, 1209.5, and 1210. All electronic copies were sent to all those identified on the Proof of Service list above.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Judith M. Warmuth