

## DOCKETED

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CGS14-L-0021  
October 2, 2014

Eric Veerkamp  
California Energy Commission  
1516 Ninth Street, MS-2000  
Sacramento, CA 95814

Reference: Colusa Generating Station (06-AFC-9)

Subject: Condition of Certification AQ-7 – Source Test Protocol

Dear Eric:

Attached is a copy of the Source Test Protocol for the Colusa Generating Station. It is being submitted to you at least 45 days prior testing as required by Condition of Certification AQ-7 of the Final Commission Decision. The testing is scheduled to take place November 17-21, 2014. If you have any questions, please contact me at (530) 934-9007.

Sincerely,

Charles Price  
Senior Environmental Consultant

cc: File No. 3.6.3.1  
E. Warner, PG&E  
J. Vann, PG&E

**TEST PROTOCOL FOR  
EMISSIONS COMPLIANCE TESTING  
AND CEMS RELATIVE ACCURACY TEST AUDIT AT  
THE COLUSA GENERATING STATION**

PREPARED FOR:

**COLUSA GENERATING STATION**  
4780 DIRKS ROAD  
MAXWELL, CALIFORNIA 95955

FOR SUBMITTAL TO:

**COLUSA COUNTY AIR POLLUTION CONTROL DISTRICT**  
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COLUSA, CA 95932

PREPARED BY:

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JOHN PETERSON

SEPTEMBER 30, 2014

DOCUMENT NUMBER: **R3112096**

## CONFIDENTIALITY STATEMENT

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## 1.0 INTRODUCTION

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Delta has been contracted by Pacific Gas & Electric (PG&E) to conduct Emissions Compliance Testing and CEMS Relative Accuracy Test Audit (RATA) tests on the Continuous Emissions Monitoring System (CEMS) serving the Colusa Generating Station (Colusa) facility. Delta will conduct testing on the two GE 7FA gas turbines to comply with Colusa County Air Pollution Control District (CCAPCD) permit to operate (PTO) number 21006-259.

The test programs will include two distinct elements; 1) emissions Compliance tests, and 2) CEM RATA tests.

Emissions Compliance tests at 50% (minimum) and 75% (mid): Triplicate tests for the following emissions will be performed:

- Oxides of Nitrogen (NO<sub>x</sub>) concentration ppmv @ 15% O<sub>2</sub>, dry, lb/hr;
- Ammonia concentration ppmv @ 15% O<sub>2</sub>, dry;

Emissions Compliance tests at 100% without duct burner (Base): Triplicate tests for the following emissions will be performed:

- Oxides of Nitrogen (NO<sub>x</sub>) concentration ppmv @ 15% O<sub>2</sub>, dry, lb/hr;
- Carbon Monoxide (CO) concentration ppmv @ 15% O<sub>2</sub>, dry, lb/hr;
- Ammonia concentration ppmv @ 15% O<sub>2</sub>, dry;
- Volatile Organic Compounds (VOC) concentration ppmv @ 15% O<sub>2</sub>, lb/hr,

Emissions Compliance tests at 100% with duct burner (maximum): Triplicate tests for the following emissions will be performed:

- Oxides of Nitrogen (NO<sub>x</sub>) concentration ppmv @ 15% O<sub>2</sub>, dry, lb/hr;
- Carbon Monoxide (CO) concentration ppmv @ 15% O<sub>2</sub>, dry, lb/hr;
- Ammonia concentration ppmv @ 15% O<sub>2</sub>, dry;
- Volatile Organic Compounds (VOC) concentration ppmv @ 15% O<sub>2</sub>, lb/hr,
- Formaldehyde lb/MMscf of fuel

### CEM RATA tests:

- Oxides of Nitrogen (NO<sub>x</sub>),
  - Concentration Relative Accuracy (ppmv @ 15% O<sub>2</sub>, dry),
  - Mass Emission Rate Relative Accuracy (lb/hr)
  - Emission Factor (lb/MMBtu) Relative Accuracy,

- Oxygen (O<sub>2</sub>)
  - Concentration Relative Accuracy (% O<sub>2</sub>),
- Carbon Monoxide (CO)
  - Concentration Relative Accuracy (ppmv @ 15% O<sub>2</sub>, dry),
  - Mass Emission Rate Relative Accuracy (lb/hr)

EPA Methods 3A, 7E, 10 and SDCAPCD Method 100 will be used for the O<sub>2</sub>, NO<sub>x</sub>, and CO tests respectively. The high NO<sub>2</sub> procedures described in SDAPCD Method 100 will be used during the compliance runs to determine if the units are “High NO<sub>2</sub> Emitters.” EPA Methods 3A, 7E and 10 will be used for the RATA runs.

This protocol presents the testing procedures, description of sample locations, and a summary of quality assurance procedures.

### 1.1 TEST PROGRAM ORGANIZATION

The following persons can be contacted regarding this test program.

<b>Delta Air Quality Services Representative</b>	<b>PG&amp;E Representative</b>
John Peterson 1845 N. Case Street Orange, California 92865 Phone: (714) 279-6777 Fax: (714) 279-6781	Mr. Charles Price 4780 Dirks Road Maxwell, California 95955 Phone: (530) 934-9007
<b>Colusa County Air Pollution Control District</b>	
100 Sunrise Blvd, Suite A-3 Maxwell, California 95955	

### 1.2 TEST SCHEDULE

Table 1-1 contains a proposed daily activity schedule for the testing.

**TABLE 1-1  
COLUSA GENERATING STATION  
COMBUSTION TURBINE  
PROPOSED PROGRAM DAILY SCHEDULE**

Day	Date	Unit	Condition	Activity	Comments
Sunday	11/16/2014	1	N/A	Mobilization	
Monday	11/17/2014	1	Min Load Mid Load Base Load	NO <sub>x</sub> / Ammonia Testing NO <sub>x</sub> / Ammonia Testing NO <sub>x</sub> / CO / VOC / NH <sub>3</sub> Testing	Units at test condition from 09:00 – 18:00
Tuesday	11/18/2014	1	Max Load W/ Duct Burner On	NO <sub>x</sub> / CO / VOC / NH <sub>3</sub> Testing Formaldehyde and RATA	Units at test condition from 07:00 – 18:00
Wednesday	11/19/2014	2	Min Load Mid Load Base Load	NO <sub>x</sub> / Ammonia Testing NO <sub>x</sub> / Ammonia Testing NO <sub>x</sub> / CO / VOC / NH <sub>3</sub> Testing	Units at test condition from 07:00 – 16:00
Thursday	11/20/2014	2	Max Load W/ Duct Burner On	NO <sub>x</sub> / CO / VOC / NH <sub>3</sub> Testing Formaldehyde and RATA	Units at test condition from 07:00 – 18:00
Friday	11/21/2014	2	N/A	Contingency / Travel	

## 2.0 UNIT DESCRIPTIONS

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### 2.1 GAS TURBINE

The Colusa facility is a 664 MW combined cycle natural gas fired power generation facility located at 4780 Dirks Road, Maxwell, CA 95955. The facility consists of two 172 MW GE 7FA combustion Turbines and one 320 MW steam turbine. Each combustion turbine is equipped with a duct burner and heat recovery steam generator (HRSG).

The combustion turbines and duct burners fire only on natural gas. NO<sub>x</sub> emissions are controlled by a selective catalytic reduction (SCR) system using aqueous ammonia as the reducing agent. A non-selective catalytic reduction unit controls CO emissions.

The applicable emission limits for which compliance testing will be conducted are shown in table 2-1 below.

**TABLE 2-1  
COLUSA GENERATING STATION  
EMISSION LIMITS**

Parameter	Units	Concentration Limit	Limits without duct burner firing	Limits with duct burner firing
NO <sub>x</sub>	ppmv @ 15% O <sub>2</sub>	2.0	-	-
	lb/hr	-	15.3	20.7
CO	ppmv @ 15% O <sub>2</sub>	3.0	-	-
	lb/hr	-	14.0	18.9
VOC	ppmv @ 15% O <sub>2</sub>	-	1.38	2.0
	lb/hr	-	3.4	7.2
Ammonia	ppmv @ 15% O <sub>2</sub>	5.0	-	-
	lb/hr	-	14.2	19.2
Formaldehyde	lb/MMscf	-	0.917	0.917

The plant is equipped with a Continuous Emissions Monitoring System, (CEMS) and data acquisition and handling system, (DAHS) that provides measurements and data acquisition of O<sub>2</sub>, CO, and NO<sub>x</sub> concentrations. It is an extractive system with a heated line extending from the probe to the sample conditioning unit.

### 3.0 TEST DESCRIPTION

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#### 3.1 TEST CONDITIONS

During the emissions Compliance testing, the Combustion Turbines will be operating at four distinct loads while firing natural gas:

- Minimum (50% Load),
- Mid (75% Load),
- Base (100% Load without duct burners firing),
- Maximum (100% Load with duct burners firing)

The RATA testing will be conducted with the units at the normal load conditions. During each test, the selected process parameters shown below will be recorded and included in the final report:

- Load, Net MW
- Fuel Flow Rate
- Exhaust Temperature
- NH<sub>3</sub> Injection Rate
- Inlet SCR Temperature

#### 3.2 SAMPLE LOCATIONS

The reference method measurements will be taken from four sample ports located on the exhaust stacks. The stack inside diameters at this location is 228 inches. The sample ports are located 724 inches (3.2 diameters) downstream of the nearest flow disturbance and 372 inches (1.6 diameters) upstream of the nearest flow disturbance.

Gaseous stratification will also be investigated as part of the 1st test runs on each unit. If the NO<sub>x</sub>, CO, and O<sub>2</sub> show <10% Stratification, Runs 2-9 will be 3-point traverses (long line if >5%, short line if <5%). Sampling points for the gaseous emissions will then be selected according to EPA 40 CFR Part 75 based on the results of the stratification tests.

### 3.3 TEST PROCEDURES

The test procedures to be used are presented in Table 3-1

**TABLE 3-1  
COLUSA GENERATING STATION (OMEC)  
TEST MATRIX**

Parameter	CT-1&2 at Min Load	CT-1&2 at Mid Load	CT-1&2 at Base Load	CT-1&2 at Max Load	Method(s)	Comments
NO <sub>x</sub> Compliance	X	X	X	X	EPA 7E, SDAPCD 100	3 x 30 minute runs
CO Compliance			X	X	EPA 10	3 x 30 minute runs
VOC Compliance			X	X	EPA 18, TO-12	3 x 20 minute runs
Ammonia Compliance	X	X	X	X	BAAQMD ST-1B	3 x 30 minute runs
Formaldehyde					CARB 430,	3 x 120 minute runs
NO <sub>x</sub> RATA (ppmC, lb/MMBtu)			X	X	EPA 7E – PS2, Pt-75	3 or more additional runs at either condition
O <sub>2</sub> RATA (%dry)			X	X	EPA – PS3, Pt-75	3 or more additional runs at either condition
CO RATA (ppmC)			X	X	EPA 10 – PS4A	3 or more additional runs at either condition

### 3.4 TEST METHODOLOGY

#### 3.4.1 NO<sub>x</sub>, CO, O<sub>2</sub>, and CO<sub>2</sub>

EPA Methods 7E, 10, 3A and SDCAPCD Method 100 will be used for the NO<sub>x</sub>, CO, O<sub>2</sub>, and CO<sub>2</sub> RATA and compliance tests respectively. The high NO<sub>2</sub> procedures described in SDAPCD Method 100 will be used during the first run to determine if the units are “High NO<sub>2</sub> Emitters.” If the NO<sub>2</sub> is <5% of the total NO<sub>x</sub>, the 2<sup>nd</sup> and 3<sup>rd</sup> runs will also follow the High NO<sub>2</sub> Emitter Procedure. EPA Method 7E will be used for the remaining RATA runs. The 7E calibration and data reduction will use the NO<sub>x</sub> value from the NO<sub>x</sub> output from the instrument.

O<sub>2</sub>, CO<sub>2</sub>, NO<sub>x</sub> and CO concentrations will be measured using one of Delta’s 5 mobile emission measurement laboratories. Due to the low concentration limits for NO<sub>x</sub> and CO, Delta will employ the following special considerations:

- NO<sub>x</sub> will be measured on 0-5 ppm range and CO on 0-10 range. This will allow quantization down to 1 ppm and 2 ppm respectively.
- All sample extraction and conditioning components will be thoroughly cleaned prior to use on this project to remove contamination and eliminate sample system bias.
- Since flue gas NO<sub>x</sub> concentrations are typically comprised of up to 60% NO<sub>2</sub> following oxidation catalysts, total measurement system NO<sub>2</sub> conservation and conversion efficiency will be demonstrated prior to the commencement of sampling in addition to the analyzer only NO<sub>x</sub> converter efficiency checks required by the method.
- Zero gas used for CO system calibration check will contain approximately the same concentrations of O<sub>2</sub> and CO<sub>2</sub> as are present in the flue gas to compensate for interference effects associated with these compounds and NDIR/gas filter correlation analyzers

All quality assurance procedures required by the method will be performed on-site including: calibration error, sample system bias, analyzer drift, NO<sub>2</sub> converter efficiency checks.

#### 3.4.2 Volatile Organic Compounds

The sampling and analysis techniques of EPA Method TO-12 will be used because the emission limit for VOC is 2 ppm. This will require lower detection limits than are typical with the standard approaches to Method 18.

Stack gas samples will be collected in specially-prepared evacuated stainless-steel (SUMMA) canisters. Sample gas will be drawn through a probe and connecting line of Teflon tubing through a calibrated flow controller into each canister. The sample flow rate will be controlled so that a partial vacuum (i.e. at least 5 inches Hg) will remain in the canister to prevent condensation within the sample. Triplicate 30-minute sampling runs will be conducted on each unit.

The canisters will be transported to the laboratory for analysis within 14 days. The canisters will be prepared and analyzed by AA&C Laboratory of Ventura, California.

#### 3.4.3 Ammonia

The ammonia concentration in the stack gases will be measured using BAAQMD ST-1B using 12 point sampling traverses. The moisture will also be measured in conjunction with the ammonia analysis. BAAQMD ST-1B will also be used to perform the sample analysis. If the results indicate concentrations <1 ppm, the sample will be spiked and re-analyzed. The sampling system is described in Appendix A.

#### 3.4.4 Formaldehyde by CARB Method 430

Triplicate samples for formaldehyde will be collected from a single point near the center of the stack by CARB 430.

In this method, the exhaust gas is drawn non-isokinetically through a probe and teflon line into a series of DNPH filled midget impingers. A low-level dry gas meter fitted with a calibrated orifice that restricts the flow rate to 0.5 l/min will be used to measure the total volume of exhaust gas sampled. The line is rinsed with a portion of the first impinger catch. Each vial is analyzed for formaldehyde by HPLC.

The following QA/QC procedures will also be conducted:

- Screening of DNPH reagent;
- Three field blanks;
- One field spike;
- One trip blank;
- One trip spike;
- Laboratory blanks;
- Laboratory matrix spike

The samples will be analyzed by AAC in Ventura, CA.

### 3.5 **RELATIVE ACCURACY TEST AUDIT**

#### 3.5.1. Reference Method Tests, Relative Accuracy Test Audit

Nine to twelve sets of reference method measurements will be performed with the sample times synchronized with the CEMS. NO<sub>x</sub>, O<sub>2</sub>, and CO will be measured according to EPA reference methods 3A, 7E, and 10. The CEMS system and test methods are described in detail in Appendix A. Table 3-2 below shows the pass/fail criteria for the audit.

**TABLE 3-2  
RATA PASS/FAIL CRITERIA**

Gas	Units	Pass Criteria	Alternate Pass Criteria	Incentive Criteria
NO <sub>x</sub>	ppm@15% O <sub>2</sub>	20% (RM) <sup>1</sup>	10% (Std) <sup>2</sup>	n/a
NO <sub>x</sub>	lb/hr	20% (RM) <sup>1</sup>	10% (Std) <sup>2</sup>	n/a
NO <sub>x</sub>	lb/MMBtu	10% (RM)	0.02 lb/MMBtu <sup>3</sup>	0.015 lb/MMBtu <sup>3</sup>
CO	ppm@15% O <sub>2</sub>	10% (RM) <sup>1</sup>	5% (Std)	n/a
CO	lb/hr	10% (RM) <sup>1</sup>	5% (Std)	n/a

- 1 Using reference method average in denominator or RATA calculation  
 2 Using emission standard in denominator or RATA calculation, and only when emissions are < 50% of Standard  
 3 Where emissions are less than 0.2 lb/MMBtu.

Each set of tests consists of independent measurements of NO<sub>x</sub>, CO, and O<sub>2</sub> concentrations and calculation of the corrected concentrations and emission rates (ppmC, lb/hr, and lb/MMBtu) using EPA Method 19. The calculated lb/hr values will be generated using the stack flow rate from the CEMS. The CEMS data from the same intervals will then be compared to the reference method results and relative accuracy will be calculated according to the following equation:

$$RA = \frac{|\bar{d}| + |CC|}{\overline{RM}} \times 100\%$$

where:

RA = relative accuracy

$|\bar{d}|$  = Absolute value of the difference between RM and CEMS (RM - CEMS)

$|CC|$  = confidence coefficient of the difference between RM and CEMS

$\overline{RM}$  = mean value of the reference method

$$CC = \frac{t_{\text{value}} * \text{Std. Dev.}}{\sqrt{n}}$$

t<sub>value</sub> = statistical function of number of tests

Std. Dev. = sample standard deviation of the difference between RM and CEMS

n = number of valid tests

In addition to determining the relative accuracy of the CEMS, the test data will be used to determine the NO<sub>x</sub> Bias Adjustment Factor (BAF) which is to be applied to the CEMS data. If the mean difference (RM - CEMS) is less than the confidence coefficient, the BAF is 1.000. If the mean difference (RM - CEMS ) is greater than the confidence coefficient, then a BAF is generated using the following equation:

$$\text{BAF} = 1 + \frac{|\bar{d}|}{\text{CEMS}}$$

If the value calculated using the equation above is greater than 1.111 the default value of 1.111 will be assigned as provided for in 40 CFR 75, Appendix A, Section 7.65.

## 4.0 REPORTING

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Delta will prepare a report for the testing that will thoroughly and clearly summarize the test and analysis results including all raw lab and field data. The report will follow the format outlined in Table 4-1.

**TABLE 4-1  
TEST REPORT CHECKLIST**

- 
1. Introduction
  2. Unit Description
  3. Test Description
  4. Results
- Appendices:
- B. Quality Assurance
  - A. Field Data Sheets
    - A.1 Sample Location
    - A.2 Delta CEMS Data
  - C. Calculations and Results
  - D. Unit Operating Data
  - E. Laboratory Data
  - F. Chain of Custody
-

**APPENDIX A      MEASUREMENT PROCEDURES**

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## CONTINUOUS EMISSION MONITORING SYSTEM

Delta utilizes a mobile emission measurement laboratory for the performance of O<sub>2</sub>, CO, and NO<sub>x</sub> measurements. The laboratory is housed in a vehicle outfitted to provide a clean, quiet, environmentally controlled base for the testing operations. The laboratory has lighting, electrical distribution, air conditioning and heating to support the test instruments and provide for optimal test performance.

O<sub>2</sub>, CO, and NO<sub>x</sub> concentrations are measured using an extractive sampling system consisting of a heated probe, a heat traced Teflon sample line connected to a thermos-electrically cooled sample dryer. Following the dryer, the sample is drawn into a Teflon lined pump where it is pressurized and then filtered for delivery to the gas analysis portion of the system.

NO<sub>x</sub> concentration is determined using a chemiluminescence analyzer. The analyzer is equipped with a low temperature NO<sub>2</sub> - NO converter for the determination of total nitrogen oxides without interference from other nitrogen containing compounds.

Oxygen concentration is determined using an electro-chemical cell analyzer. The cell contains an electrolytic fluid that reacts with oxygen to generate an electrical signal proportional to the concentration.

CO is measured using a non-dispersive infrared/gas filter correlation analyzer.

The analyzers and sampling system are subjected to a variety of calibration and quality assurance procedures including leak checks, linearity and calibration error determinations before sampling, and system bias and drift determinations as part of each test run. Data are corrected for any observed bias or drift in accordance with the reference methods.

The sampling system is comprised of a glass or stainless steel probe, heated teflon sample line, two-pass thermo-electrically cooled water removal system, teflon lined sample pump and teflon sample line connected to the analyzer gas selection manifold.

## CALIBRATION SEQUENCE AND CALCULATIONS EPA METHOD 3A, 7E, 6C, 10

### DEFINITIONS:

- 1) Analyzer Calibration: Zero and span gas(es) are introduced directly to the analyzer. Adjustments are made to the analyzer zero and upscale readings, as necessary to match the certified concentrations of the calibration gas.
  
- 2) Calibration Error: Zero, mid (40-60% of calibration span), and high (100% of calibration span) calibration gases are introduced directly to the analyzer and the analyzer response to each gas is recorded (without adjustment to the analyzer). The Calibration Error (difference between the analyzer response to the calibration gas and the certified concentration of the calibration gas) must not exceed  $\pm 2\%$  of the analyzer calibration span for any of the three gases.
  
- 3) Analyzer Linearity: Analyzer linearity is defined as the difference between an analyzer response to the mid range gas and the predicted analyzer response to the mid range gas based on the analyzer response to the zero and high range gas. The Analyzer Linearity test is required on a semi-annual basis and must not exceed  $\pm 1\%$  of the calibration span.
  
- 4) Sample System Bias: The sample system bias test involves introducing zero and one upscale (mid or high) calibration gas to the entire sampling system and recording the analyzer response. The analyzer response to the calibration gas after it has passed through the entire sample system is compared to the analyzer response to same the calibration gas injected directly to the analyzer. The test is used to determine the effect which the sample system has on the species of interest and correct the measured values for any effect which the system has. The sample system bias is required to be less than  $\pm 5\%$  of the calibration span for both the zero and upscale gas.

## PROCEDURES AND CALCULATIONS:

All calibrations are documented on the strip chart recorder. The appropriate values are marked and the type of calibration performed is written on the chart.

Following assembly of the system, analyzer warm up time, and a successful leak check of the sample system, the calibration/test sequence presented in Figure 1 can begin.

An Analyzer Calibration is performed as necessary by adjusting the zero and span settings of the analyzer. These calibrations are not necessarily recorded on the chart recorder. Calibration Error is then determined at three levels for each range (which is expected to be used) of each analyzer. This check is performed, at a minimum, once at the beginning and once at the end of each test day. The calibration error must not exceed  $\pm 2\%$  of the Calibration Span as determined by the following equation:

$$\text{Calibration Error} = \frac{\text{Analyzer Response} - \text{Cal. Gas Value}}{\text{Calibration Span}} * 100\%$$

The data from the Calibration Error test can be used to determine Analyzer Linearity. The analyzer response to the mid gas is predicted using linear regression and the analyzer response to the zero and high calibration gas and the zero and high calibration gas values.

The Sample System Bias test is performed before and after each test run and must not exceed  $\pm 5\%$  of the calibration span for both the zero and upscale span gas. The system bias is calculated using the following equation:

$$\text{Sample System Bias} = \frac{\text{Response to System Bias} - \text{Response to Analyzer Cal}}{\text{Calibration Span}} * 100\%$$

Where:

Response to Analyzer Cal = The analyzer response to the last time the same calibration gas was introduced directly to the analyzer (this may be the pre-test calibration error value or a more recent analyzer calibration adjustment)

Zero and Calibration Drift are calculated for each test run based on the analyzer response during the pre- and post-test sample system bias test. Zero and upscale drift must not exceed  $\pm 3\%$  of the calibration span.

$$\text{Analyzer Drift} = \frac{\text{Post - Test System Bias Resonse} - \text{Pre - Test System Bias Response}}{\text{Calibration Span}} * 100\%$$

The pre- and post-test analyzer responses during the sample system bias test are used to correct the raw test average for any sample system bias and analyzer drift. The drift/bias corrected data are the actual reported concentrations and are used for subsequent calculations (mass emission rates, lb/MMBtu, corrections to 3% or 15% O<sub>2</sub>, etc.). The drift/bias corrections are performed using the following equation:

$$C_c = \frac{\bar{C} - C_o}{C_m - C_o} * C_{ma}$$

where:

C<sub>c</sub> = Drift/bias corrected concentration

$\bar{C}$  = Raw Test Average

C<sub>m</sub> = Average of pre- and post-test response to sample system bias span

C<sub>o</sub> = Average of pre- and post-test to sample system bias zero

C<sub>ma</sub> = Span gas value

## SDCAPCD METHOD 100 CALIBRATION SEQUENCE AND CALCULATIONS

### DEFINITIONS:

- 1) Analyzer Calibration: Zero and span gas(es) are introduced directly to the analyzer. Adjustments are made to the analyzer zero and upscale readings, as necessary to match the certified concentrations of the calibration gas.
- 2) Calibration Error: Zero, mid (40-60% of full scale), and high (80-100%) of full scale) calibration gases are introduced directly to the analyzer and the analyzer response to each gas is recorded (without adjustment to the analyzer). The Calibration Error (difference between the analyzer response to the calibration gas and the certified concentration of the calibration gas) must not exceed  $\pm 2\%$  of the analyzer full scale for any of the three gases.
- 3) Analyzer Linearity: Analyzer linearity is defined as the difference between analyzer response and the predicted analyzer response based on a linear regression of the responses to four upscale calibration gases plus a zero gas. The Analyzer Linearity test is required on a semi-annual basis and must not exceed  $\pm 2\%$  of the analyzer range.
- 4) Sample System Bias: The sample system bias test involves introducing zero and one upscale (mid or high) calibration gas to the entire sampling system and recording the analyzer response. This includes  $\text{NO}_2$  calibration gas when sampling from a "High  $\text{NO}_2$ " source ( $>5\%$  of total  $\text{NO}_x$  as  $\text{NO}_2$ ). The analyzer response to the calibration gas after it has passed through the entire sample system is compared to the analyzer response to same the calibration gas injected directly to the analyzer. The test is used to determine the effect which the sample system has on the species of interest and correct the measured values for any effect which the system has. The sample system bias is required to be less than  $\pm 5\%$  ( $\pm 15\%$  for  $\text{NO}_2$ ).

## PROCEDURES AND CALCULATIONS:

Figure 1 presents a flow chart for the SDAPCD Method 100 calibration sequence. All calibrations are documented on the Yokogawa strip chart recorder by pressing the "Manual Print" button which prints the instantaneous values for each of the active channels on the recorder. The appropriate values are marked and the type of calibration performed is written on the chart.

Following assembly of the system, analyzer warm up time, and a successful leak check of the sample system, the calibration/test sequence presented in Figure 1 can begin.

An Analyzer Calibration is performed as necessary by adjusting the zero and span settings of the analyzer. These calibrations are not necessarily recorded on the chart recorder. Calibration Error is then determined at three levels for each range (which is expected to be used) of each analyzer. This check is performed, at a minimum, once at the beginning and once at the end of each test day. The calibration error must not exceed  $\pm 2\%$  of the full range of the analyzer as determined by the following equation:

$$\text{Calibration Error} = \frac{\text{Analyzer Response} - \text{Cal. Gas Value}}{\text{Analyzer Range}} * 100\%$$

The data from the Calibration Error test can be used to determine Analyzer Linearity. The analyzer response to the mid gas is predicted using linear regression and the analyzer response to the zero and high calibration gas and the zero and high calibration gas values. The analyzer linearity must be demonstrated on a semi-annual basis using the following equation:

$$\text{Analyzer Linearity} = \frac{\text{Analyzer Response} - \text{Predicted Response}}{\text{Full Scale}} * 100\%$$

where:

$$\text{Predicted Response} = \frac{\text{Response to High Gas} - \text{Response to Zero Gas}}{\text{High Gas Value}} * \text{Mid Gas Value} + \text{Response to Zero Gas}$$

A NO<sub>2</sub> to NO converter efficiency tests is conducted at the beginning of each test day. Greater than 90% efficiency must be demonstrated for testing to proceed.

The Sample System Bias test is performed before and after each test run and must not exceed  $\pm 5\%$  (15% for NO<sub>2</sub>). The system bias is calculated using the following equation:

$$\text{Sample System Bias} = 100 - \frac{(\text{Bias} - \text{Bias Zero})}{(\text{Direct} - \text{Direct Zero})} * 100\%$$

where:

Response to Analyzer Cal = The analyzer response to the last time the same

calibration gas was introduced directly to the analyzer (this may be the pre-test calibration error value or a more recent analyzer calibration adjustment)

Analyzer response time is also determined as part of the initial system bias checks for each test series.

Zero and Calibration Drift are calculated for each test run based on the analyzer response during the pre- and post-test sample system bias test. Zero and upscale drift must not exceed  $\pm 2\%$  of the analyzer range.

$$\text{Analyzer Drift} = \frac{\text{Post - Test System Bias Resonse} - \text{Pre - Test System Bias Response}}{\text{Analyzer Range}} * 100\%$$

The pre- and post-test analyzer response during the sample system bias test are used to correct the raw test average for any sample system bias and analyzer drift. The drift/bias corrected data are the actual reported concentrations and are used for subsequent calculations (mass emission rates, lb/MMBtu, corrections to 3% or 15% O<sub>2</sub>, etc.). The drift/bias corrections is performed using the following equation:

$$C_c = \frac{\bar{C} - C_o}{C_m - C_o} * C_{ma}$$

where:

C<sub>c</sub> = Drift/bias corrected concentration

$\bar{C}$  = Raw Test Average

C<sub>m</sub> = Average of pre- and post-test response to sample system bias span

C<sub>o</sub> = Average of pre- and post-test to sample system bias zero

C<sub>ma</sub> = Span gas value

For NO<sub>x</sub> effluent gas concentrations, where the stack effluent contains more than 5 percent of the total NO<sub>x</sub> as NO<sub>2</sub>, calculate the CO, O<sub>2</sub> and CO<sub>2</sub> emissions as specified in section 7.2.2.1. Correct the averaged NO<sub>x</sub> and NO emission values, for each subtest, for NO<sub>x</sub> analyzer drift and calibration error using the following:

$$NO_{x_{avg}'} = (NO_{x_{avg}} - NO_{od}) * \frac{(NO_{ma})}{(NO_{md} - NO_{od})}$$

where:

NO<sub>xavg'</sub> = The average NO<sub>x</sub> value corrected for analyzer drift and calibration error, ppm.

NO<sub>xavg</sub> = The average NO<sub>x</sub> value in section 7.2.1, ppm

NO<sub>od</sub> = The average of the initial and final zero calibration value when introduced directly to the analyzer, ppm.

NO<sub>ma</sub> = The actual certified concentration of the mid- or high-range calibration gas, ppm.

$NO_{md}$  = The average of the initial and final analyzer calibration responses for the NO mid- or high-range calibration gas when introduced directly to the analyzer, ppm.

To correct the average NO value for analyzer drift and calibration error, make the following substitutions in the formula above:

$$NO_{xavg'} = NO_{avg'}$$

$$NO_{xavg} = NO_{avg}$$

where:

$NO_{avg'}$  = The average NO value corrected for analyzer drift and calibration error, ppm.  
 $NO_{avg}$  = The average NO value in section 7.2.1.

Calculate the average  $NO_2$  effluent gas concentrations using the following formula:

$$NO_{2avg'} = NO_{xavg'} - NO_{avg'}$$

where:

$NO_{2avg'}$  = The average  $NO_2$  value corrected for drift and analyzer calibration error.

Calculate the average effluent concentrations (per subtest) for NO and  $NO_2$  corrected for sample system bias using the following equations:

$$NO_{gas} = NO_{avg'} * \frac{(NO_{md} - NO_{od})}{(NO_m - NO_{od})}$$

$$NO_{2gas} = NO_{2avg'} * \frac{(NO_{2md} - NO_{od})}{(NO_{2m} - NO_{od})}$$

where:

$NO_{gas}$  = the stack effluent gas concentration for NO, dry basis, ppm.  
 $NO_{2gas}$  = the stack effluent gas concentration for  $NO_2$ , dry basis, ppm.  
 $NO_o$  = the average of the initial and final system calibration responses for the NO zero calibration, ppm  
 $NO_m$  = the average of the initial and final system calibration responses for the NO mid- or high-range calibration gas, ppm.  
 $NO_{2md}$  = the average of the initial and final calibration responses when the  $NO_2$  used for the system calibration is sampled directly to the analyzer.  
 $NO_{2m}$  = the average of the initial and final system calibration responses for the  $NO_2$  calibration gas, ppm.

To calculate the total  $NO_x$  gas concentration in the stack effluent use the following equation:

$\text{NO}_x \text{ gas} = \text{NO gas} + \text{NO}_2 \text{ gas}$

ADDITIONAL QUALITY ASSURANCE CHECKS:

SDAPCD Method 100 specifies allowed analyzer interferences of 2% for each analyzer type. The analyzers used by Delta are certified by the manufacturers to have interference responses which meet the requirements of Method 100.

The method for determining the efficiency of the  $\text{NO}_2$  to NO converter involves the use of a cylinder containing a certified concentration of  $\text{NO}_2$ . This test will be performed once per quarter unless an on-site demonstration is required by the site conditions ( $\text{NO}_2 > 5\%$  of total  $\text{NO}_x$ ). If the converter efficiency is found to be less than 90%, the converter will be regenerated or replaced and the converter efficiency test will be repeated

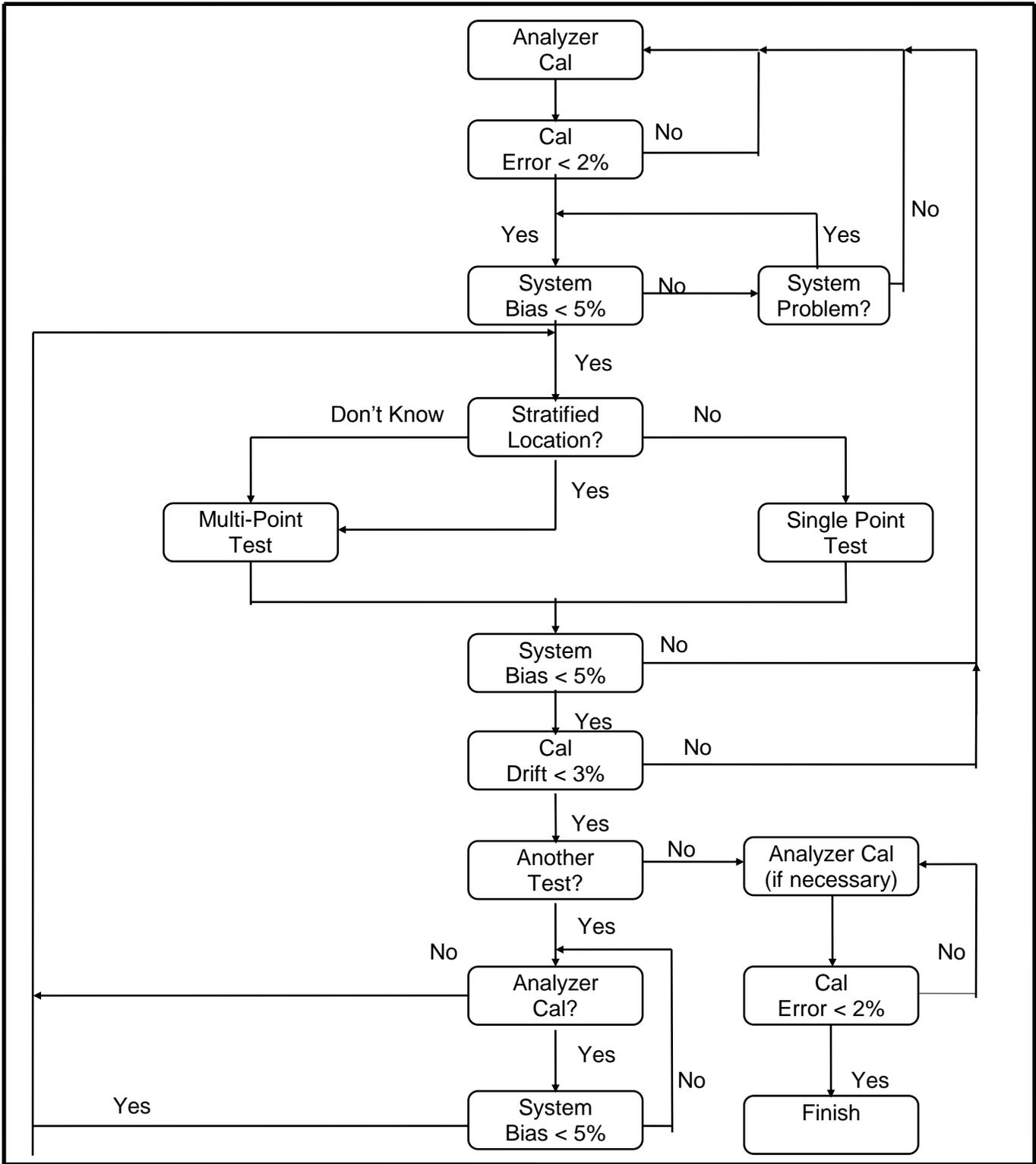


FIGURE 1: SDCAPCD METHOD 100 CALIBRATION AND TEST SEQUENCE

## AMMONIA BY ION SELECTIVE ELECTRODE - BAAQMD ST-1B and BAAQMD LAB METHOD 1A

Ammonia emissions are determined by collecting metered volume of flue gas containing ammonia vapor in dilute hydrochloric acid solution. The ammonia concentration of the sample is then determined by Ion Selective Electrode.

A sample is extracted through a glass probe fitted with a filter or quartz wool plug if necessary to remove particulate matter. The plug is located and/or heated to avoid condensation of moisture at the plug. The sample is then passed through four impingers. The first two impingers are filled with 100 ml of 0.1 N hydrochloric acid (HCl), the third is empty, and the fourth is filled with silica gel.

After each sample run, the quartz wool plug (if used) is removed and placed in a sample bottle. The impingers, glass probe, and sampling train glassware are washed with dilute HCl into a separate sample bottle. The sample bottles containing both the impinger and wash solution and the quartz wool plug are returned to the laboratory for analysis.

The ammonia samples are analyzed by Ion Selective Electrode. The sample is made basic by the addition of a pH adjusting solution to shift the ammonium/ammonia equilibrium to favor the ammonia species, which permeates a membrane and reacts with the electrode filling solution to produce an electrical signal which is detected by a dedicated analyzer determine the ammonia concentration.

The ammonia concentrations of the sample solutions are measured in units of ppm NH<sub>3</sub> by weight. By using the NH<sub>3</sub> 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<sub>3</sub> concentration in ppm by volume is calculated using the equation:

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

**APPENDIX B      QUALITY ASSURANCE**

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**Appendix B.1      Quality Assurance Program Summary**

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## QUALITY ASSURANCE PROGRAM SUMMARY

Delta Air Quality Services, Inc. is committed to providing emission related data which is complete, precise, accurate, representative, and comparable. Delta's quality assurance program and procedures are designed to ensure that the data meet or exceed the requirements of each test method for each of these items. The quality assurance program consists of the following items:

- Assignment of an Internal QA Officer
- Development and use of an internal QA Manual
- Personnel training
- Equipment maintenance and calibration
- Knowledge of current test methods
- Chain-of-custody
- QA reviews of test programs

Assignment of an Internal QA Officer: Delta has assigned an internal QA Officer who is responsible for administering all aspects of the QA program.

Internal Quality Assurance Manual: Delta has prepared a QA Manual according to the guidelines issued by EPA. The manual documents and formalizes all of Delta's QA efforts. The manual is a "living" document which is revised as Delta adds capabilities and procedures. The QA manual provides details on the items provided in this summary.

Personnel Training: Personnel training is essential to the production of high quality test results. Delta's training programs include:

- A requirement for all technical personnel to read and understand the test methods performed
- A requirement for all technical personnel to read and understand the Delta QA manual
- In-house training
- Quality Assurance meetings
- Attendance at EPA sponsored training courses
- Maintenance of training records.

Equipment Maintenance and Calibration: All laboratory and field equipment used as a part of Delta's emission measurement programs is maintained according to manufacturer's recommendations. A summary of the major equipment maintenance schedules is summarized in Table B-1. In addition to routine maintenance, calibrations are performed on all sampling equipment according to the procedures outlined in the applicable test method. The calibration intervals and techniques for major equipment components is summarized in Table B-2.

Knowledge of Current Test Methods: Delta maintains current copies of EPA, ARB, and SCAQMD Source Test Manuals and Rules and Regulations. Delta personnel coordinate, attend, and present papers at emission testing related conferences. Delta personnel maintain memberships in the Air and Waste Management Association and Source Evaluation Society. Delta personnel continually work with industry and regulatory agencies in monitoring and developing new methods and rules.

Chain-of-Custody: Delta maintains chain-of-custody documentation on all data sheets and samples. Samples are stored in a locked area accessible only to Delta source test personnel. Data sheets are kept in the custody of the originator, program manager, or in locked storage until return to Delta's office. Upon return to the office, copies are made and stored in a locking file. The original data sheets are used for report preparation and any additions are initialed and dated.

QA Reviews: Every Delta report is reviewed by someone separate from the report author. The reviewer is selected based on knowledge of the test methods used and the source tested. Periodic field, laboratory, and report reviews are performed by the QA Officer. Test plans are reviewed to ensure proper test methods are selected and reports are reviewed to ensure that the methods will be followed and any deviations from the methods are justified and documented.

**TABLE B-1  
EQUIPMENT MAINTENANCE SCHEDULE**

Equipment	Acceptance Limits	Frequency of Service	Methods of Service
Pumps	<ol style="list-style-type: none"> <li>1. Absence of leaks</li> <li>2. Ability to draw manufacturers required vacuum and flow</li> </ol>	Every 500 hours of operation or 6 months, whichever is less	<ol style="list-style-type: none"> <li>1. Visual inspection</li> <li>2. Clean</li> <li>3. Replace parts</li> <li>4. Leak check</li> </ol>
Flow Meters	<ol style="list-style-type: none"> <li>1. Free mechanical movement</li> </ol>	Every 500 hours of operation or 6 months, whichever is less	<ol style="list-style-type: none"> <li>1. Visual inspection</li> <li>2. Clean</li> <li>3. Calibrate</li> </ol>
Sampling Instruments	<ol style="list-style-type: none"> <li>1. Absence of malfunction</li> <li>2. Proper response to zero, span gas</li> </ol>	As recommended by manufacturer	As recommended by manufacturer
Integrated sampling tanks	<ol style="list-style-type: none"> <li>1. Absence of leaks</li> </ol>	Depends on nature of use	<ol style="list-style-type: none"> <li>1. Steam clean</li> <li>2. Leak check</li> </ol>
Mobile van sampling system	<ol style="list-style-type: none"> <li>1. Absence of leaks</li> </ol>	Depends on nature of use	<ol style="list-style-type: none"> <li>1. Change filters</li> <li>2. Change gas dryer</li> <li>3. Leak check</li> <li>4. Check for system contamination</li> </ol>
Sampling lines	<ol style="list-style-type: none"> <li>1. Sample degradation less than 2%</li> </ol>	After each test series	<ol style="list-style-type: none"> <li>1. Blow dry, inert gas through line until dry.</li> </ol>

**TABLE B-2  
MAJOR SAMPLING EQUIPMENT CALIBRATION REQUIREMENTS**

Sampling Equipment	Calibration Frequency	Calibration Procedure	Acceptable Calibration Criteria
Continuous Analyzers	Before and after each test day	3-point calibration error test	< 2% of analyzer range
Continuous Analyzers	Before and after each test run	2-point sample system bias check	< 5% of analyzer range
Continuous Analyzers	After each test run	2-point analyzer drift determination	< 3% of analyzer range
CEMS System	Beginning of each day	leak check	< 1 in. Hg decrease in 5 min. at > 20 in. Hg
Continuous Analyzers	Semi-annually	5-point linearity*	< 1% of analyzer range
NO <sub>x</sub> Analyzer	Daily	NO <sub>2</sub> -> NO converter efficiency	> 90%
S-type pitot tube	Prior to each project	Visual inspection	Meet dimensional criteria of Method 2
Differential Pressure Gauges (except for manometers)	Semi-annually	Correction factor based on 5-point comparison to standard	+/- 5%
Differential Pressure Gauges (except for manometers)	Bi-monthly	3-point comparison to standard, no correction factor	+/- 5%
Manometer	Semi-annually	Clean and replace fluid	
Barometer	Semi-annually	Adjusted to mercury-in-glass or National Weather Service Station	+/- 0.1 inches Hg
Dry gas meter	Semi-annually	Calibration check at 4 flow rates using a NIST traceable standard	+/- 2%
Dry gas meter	Bi-monthly	Calibration check at 2 flow rates using a NIST traceable standard	+/- 2% of semi-annual factor
Dry gas meter orifice	Annually	4-point calibration for ΔH@	--
Temperature sensors	Semi-annually	3-point calibration vs. NIST traceable standard	+/- 1.5%

\*SDCAPCD requirement

**Appendix B.2 CARB Certification/SCAQMD Laboratory Approval Program**

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State of California  
**Air Resources Board**  
Approved Independent Contractor  
**Delta Air Quality Services, Incorporated**

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, Title 17, Section 91207, until June 30, 2016, for those test methods listed below:

ARB Source Test Methods:  
1, 2, 3, 4, 5, 6, 8, 17, 20, 501  
100 (CO, CO<sub>2</sub>, NO<sub>x</sub>, O<sub>2</sub>, SO<sub>2</sub>)



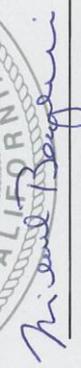
Dr. Michael T. Benjamin, Chief  
Monitoring and Laboratory Division

State of California  
**Air Resources Board**  
Approved Independent Contractor

**Delta Air Quality Services, Incorporated**

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, Title 17, Section 91207, until June 30, 2016, for those test methods listed below:

U.S. EPA Source Test Methods 201A, 202



Dr. Michael T. Benjamin, Chief  
Monitoring and Laboratory Division

State of California  
**Air Resources Board**  
Approved Independent Contractor  
**Delta Air Quality Services, Incorporated**

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, Title 17, Section 91207, until June 30, 2016, for the test method listed below:



Visible Emissions Evaluation

Dr. Michael T. Benjamin, Chief  
Monitoring and Laboratory Division



# South Coast Air Quality Management District

21865 Copley Drive, Diamond Bar, CA 91765-4178  
(909) 396-2000 • www.aqmd.gov

December 17, 2013

Mr. Robert A. Finken  
Delta Air Quality Services, Inc.  
1845 N. Case Street  
Orange, CA 92865

Subject: LAP Approval Notice  
Reference # 96LA1220

Dear Mr. Finken:

We completed our review of the renewal application you submitted for approval under the South Coast Air Quality Management District's Laboratory Approval Program (SCAQMD LAP). We are pleased to inform you that your firm is approved for the period beginning January 31, 2014, and ending January 31, 2015 for the following methods, subject to the requirements in the LAP Conditions For Approval Agreement and conditions listed in the attachment to this letter:

SCAQMD Methods 1-4  
SCAQMD Method 100.1  
SCAQMD Methods 25.1 and 25.3 (Sampling)  
SCAQMD Methods 5.1, 5.2, 5.3, and 6.1  
SCAQMD Rule 1420 – (Lead) Ambient Sampling  
USEPA CTM-030 and ASTM D6522-00

Thank you for participating in the SCAQMD LAP. Your cooperation helps us to achieve the goal of the LAP: to maintain high standards of quality in the sampling and analysis of source emissions. You may direct any questions or information to LAP Coordinator, Glenn Kasai. He may be reached by telephone at (909) 396-2271, or via e-mail at [gkasai@aqmd.gov](mailto:gkasai@aqmd.gov).

Sincerely,

Rudy Eden, Senior Manager  
Laboratory Services &  
Source Test Engineering

RE:GK/gk

cc: Mike Garibay  
Glenn Kasai

131217 LapRenewal.doc

**APPENDIX C      FACILITY PERMIT TO OPERATE**

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COLUSA COUNTY  
 AIR POLLUTION CONTROL DISTRICT  
 JOSEPH J. DAMIANO  
 DIRECTOR OF AIR QUALITY STANDARDS  
 100 SUNRISE BLVD., SUITE F, COLUSA, CALIFORNIA 95932  
 (530) 458-0590

**PACIFIC GAS AND ELECTRIC  
 COLUSA GENERATING STATION**

**PERMIT TO OPERATE CONDITIONS - 3/30/2011**

- 1) All facility operating staff shall be advised of and familiar with these permit conditions.
- 2) The "Right of Entry", as provided by the California Health and Safety Code Section 41510 of Division 26, shall apply at all times.
- 3) In the case of shut-down or re-start of air pollution control equipment for necessary scheduled maintenance, the intent to shut down such equipment shall be reported to the Colusa County Air Pollution Control District (District) Air Pollution Control Officer (APCO) at least twenty-four (24) hours prior to the planned shutdown. Such notification does not exempt the facility from complying with all permit limits and requirements.
- 4) If any upset or breakdown occurs with equipment under permit in such a manner that may cause excess emissions of air contaminants, the APCO shall be notified of such failure or breakdown within twenty-four (24) hours or by 9:00 a.m. by the following working day. The person responsible shall also submit a written statement of full disclosure of the upset/breakdown to the District within 72 hours. The report shall contain the date, time, duration, estimated emissions, cause, and remedy.
- 5) Fugitive emissions, including dust and odors shall be controlled at all times such that a nuisance is not created at any point beyond the facility's property lines.
- 6) The following equipment are permitted at the 664 MW electrical generating facility. The number, capacity and emission control systems are permit limits and requirements.

Equipment	Quantity	Make/Model	Size/Capacity	Controls
Combustion Turbine Generator (CTG)	2	General Electric 7-FA	1,790 MMbtu/hr HIV 172 MW	SCR w/ammonia Oxidation catalyst
Steam Turbine Generator	1	Condensing reheat	320 MW	
Heat Recovery Steam Generator (HRSG)	2	Nooter Eriksen w/duct burners	644 MMbtu/hr HHV	SCR w/ammonia Oxidation catalyst
Natural Gas Fuel Heater	1	Water and glycol bath	10 MMbtu/hr	Low NOx burner
Diesel Tank	1		500 Gallons	
Aqueous Ammonia Storage Tank	1	Used for NOx control	20,000 US gal	

- 7) Annual source tests are required. A source test protocol shall be submitted to the District, for approval by the Air Pollution Control Officer (APCO), at least 45 days prior to conducting the source tests. The District shall be notified at least 10 days prior to actual source testing. Both printed and electronic copies of the source tests must be provided to the District
- 8) Stack gas testing, using EPA, ARB or other APCO approved methods, shall be required on an annual basis for NO<sub>x</sub>, VOC and CO on the HRSG stacks. The HRSG stacks shall also be tested for SO<sub>x</sub> and PM<sub>10</sub> emissions during the first year and if requested by the APCO in subsequent years. The natural gas water bath heater shall be tested for NO<sub>x</sub>, SO<sub>x</sub>, VOC, CO, and PM<sub>10</sub> during the first year and thereafter only as requested by the APCO.
- 9) Annual testing of the HRSG stacks shall include quantification of formaldehyde and ammonia (NH<sub>3</sub>) emissions for compliance with permit limits. The facility owner/operator shall verify, by continuous recording, the ammonia injection rate to the system. The ammonia source test shall be conducted over the expected operating range of the turbine (including, but not limited to 50%, 75%, and 100% load) to establish the range of ammonia injection rates necessary to achieve NO<sub>x</sub> emission reductions while maintaining ammonia slip levels. The source test shall also determine the correlation between the heat input rates of each gas turbine and ammonia mass emissions.
- 10) The CTGs, duct burners, and natural gas water bath heater shall be fired exclusively on pipeline quality natural gas. The annual average sulfur content in the natural gas used at the facility shall be less than or equal to 0.3 grains per 100 scf. Monthly testing, at the site, using approved methods (i.e., EPA 19 and ASTM D-3246) is required to determine the sulfur content of the natural gas. The test results shall be provided to the District each quarter.
- 11) Permit limits on elapsed time for CTG startups and shutdown and associated emissions are presented below. Only one gas turbine may be started at a time.

Time and Emissions for One Gas Turbine During Startup and Shutdown Operations								
Pollutant	Cold Startup		Warm Startup		Hot Startup		Shutdown	
	270 Minutes		180 Minutes		90 Minutes		30 Minutes	
	Max lb/hour	Total lb/270 min	Max lb/hour	Total lb/180 min	Max lb/hour	Total lb/90 min	Max lb/hour	Total lb/30 min
NO <sub>x</sub>	333.3	779.1	249.9	456.2	152.0	259.9	115.0	115.0
CO	429.6	1,355.6	373.6	790.5	370.3	679.6	483.5	483.5
VOC	27.7	106.7	27.7	47.4	27.7	38.0	23.9	23.9
SO <sub>2</sub>	0.4	1.01	0.4	0.58	0.4	0.33	0.2	0.2
PM <sub>10</sub>	12.0	48.8	12.0	30.8	12.0	12.8	6.0	6.0

- 12) Each CTG shall meet the following maximum steady state (non startup or shutdown conditions) emission limits (concentrations are ppmvd @ 15% O<sub>2</sub>):

Pollutant	Emission	Average	W/ Duct Firing	W/O Duct Firing
NOx	Pounds	Hour	20.7	15.3
	Pounds	Day	1,497.3	1,497.3
	Concentration	Hour	2.0	2.0
VOC	Pounds	Hour	7.2	3.4
	Pounds	Day	315.3	315.3
	Concentration	Hour	2.0	1.38
CO	Pounds	Hour	18.9	14.0
	Pounds	Day	3,829.5	3,829.5
	Concentration	3Hour	3.0	3.0
PM10	Pounds	Day	324	324
NH3	Pounds	Hour	19.2	14.2
	Concentration	Hour	5.0	5.0

Toxic Air Contaminant	Emission Limit per MMscf Natural Gas
Formaldehyde	0.917 pounds

Total facility emissions of toxic air contaminants shall not exceed 10 tons per year for any single pollutant except ammonia, formaldehyde and propylene.

- 13) The natural gas water bath heater shall meet the emission limits stated below.

Pollutant	Pounds per Hour	Concentration ppmvd @ 3% O <sub>2</sub>
NO <sub>x</sub>	0.39	30.0
CO	0.79	
VOC	0.03	
PM <sub>10</sub>	0.03	
SO <sub>2</sub>	0.03	

- 14) Total emissions from the Colusa Generating Station (CGS) shall not exceed the limits established below.

Quarterly and Annual Combustion Emissions from CGS Facility					
Pollutant	1st Quarter Emissions (tons)	2nd Quarter Emissions (tons)	3rd Quarter Emissions (tons)	4th Quarter Emissions (tons)	Annual Emissions (tons)
NO <sub>x</sub>	45.56	43.58	51.30	44.27	184.7
CO	54.29	52.49	107.15	53.95	267.9
VOCs	12.30	11.63	11.84	11.76	47.5
PM <sub>10</sub>	25.54	25.78	26.02	26.02	103.4
SO <sub>2</sub>	4.07	3.85	3.89	3.89	15.7

- 15) Continuous emission monitoring (CEM) systems shall sample, analyze, and record NO<sub>x</sub>, CO and O<sub>2</sub> concentrations in the exhaust gas of both HRSG stacks. This system will

generate reports of emissions data in accordance with the permit requirements and will send alarm signals to the plant distributed control system (DCS) control room when the level of emissions approaches or exceeds pre-selected limits. Relative accuracy test audits shall be conducted annually to verify performance of the CEM system.

- 16) The Colusa County Air District shall have realtime access to the CEM data at the facility to enable District staff to monitor emissions and compliance with these permit conditions as recorded by the CEMs. The format and content of the data display shall be approved by the District.
- 17) Quarterly reports of the facility CEM and process data (including fuel use for each combustion equipment unit), including startup information, shall be submitted to the District within 30 days after the end of each quarter. Format of the data submission will be determined by the District and includes both electronic and hard copy files.
- 18) An annual report shall also be submitted for the CGS facility including: total emissions for all pollutants for each combustion unit and the entire facility, total operating hours for each combustion unit, numbers and types of startups and shutdowns for each CTG, total fuel used for each combustion unit, results of the monthly sulfur content tests, and total ammonia used. Format of the data submission will be determined by the District and includes both electronic and hard copy files.
- 19) Offsets for the Colusa Generating Station shall be in effect prior to operation of the facility and will not be less than the following amounts at any time. The offsets presented in the first table below reflect distance factor adjustments, the 1.4 to 1 VOC:NOx interpollutant ratio and the 25 tons per year emission allowance.

<b>Emission Offsets by Calendar Quarter (adjusted for distance and interpollutant ratio)</b>					
Pollutant in tons	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Tons
Oxides of nitrogen (NO <sub>2</sub> )	26.20	24.99	21.52	27.12	99.83
Volatile organic compounds	26.59	26.59	26.59	26.59	106.36
Particulate Matter PM <sub>10</sub>	21.22	19.73	15.21	22.20	78.36

<b>Emission Offsets by Calendar Quarter (not adjusted)</b>					
Pollutant in tons	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Tons
Oxides of nitrogen (NO <sub>2</sub> )	36.79	35.41	31.36	37.93	141.49
Volatile organic compounds	39.89	39.89	39.89	39.89	159.56
Particulate Matter PM <sub>10</sub>	30.43	28.33	22.15	31.75	112.66

**END OF DOCUMENT**