UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

October 27, 2016

Mr. David O'Neill
President
LandGas Technology LLC
5487 N. Milwaukee Avenue
Chicago, IL 60630

RE: Approval of Revised Blue Lake Power Source Test Protocol

Dear Mr. O'Neill:

Pursuant to Paragraph 33.a of the Proposed Consent Decree lodged in *United States et al. v. Blue Lake Power LLC*, Blue Lake Power, LLC ("BLP") submitted a revised Source Test Protocol to EPA and the North Coast Unified Air Quality Management District (the "District") on October 24, 2016.[1] EPA has reviewed the Source Test Protocol and consulted with the District regarding approval of the Protocol. Pursuant to Paragraph 34 of the Proposed Consent Decree, EPA hereby approves the revised Source Test Protocol with the following modifications:

- The reference to a stack test date of October 25, 2016 is deleted.
- BLP shall provide both EPA and the District with at least 24-hour advance notice of the date and time of the actual stack test.

Please contact me at 415-972-3965 if you have any questions.

Sincerely,

Mark A. Sims
Environmental Engineer
Air & TRI Enforcement Office (ENF-2-1)
U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

cc: Mr. Glenn Zane, Blue Lake Power LLC
Ms. Jane Luckhardt, Day Carter & Murphy LLC
Mr. Brian Wilson, North Coast Unified Air Quality Management District
Ms. Nancy Diamond, Law Offices of Nancy Diamond
Ms. Sheila McAnaney, U.S. Department of Justice
Mr. Brian Riedel, U.S. Environmental Protection Agency

[1] BLP had submitted previous versions of the Protocol to EPA and the District on September 21, 2016, and October 10, 2016, and EPA had provided comments.

The Avogadro Group, LLC

SOURCE TEST PROTOCOL
2016 EMISSIONS COMPLIANCE TESTS AND RELATIVE ACCURACY TEST AUDIT
BLUE LAKE POWER, LLC
BLUE LAKE, CALIFORNIA

Prepared For:

BLUE LAKE POWER, LLC
200 Taylor Way
Blue Lake, California 95525

For Submittal To:

NORTH COAST UNIFIED AQMD
2300 Myrtle Avenue
Eureka, California 95501

Prepared By:

MAQS Antioch
2825 Verne Roberts Circle
Antioch, California 94509
(925) 680-4300

October 24, 2016

REVIEW AND CERTIFICATION

I certify that to the best of my knowledge the information in this test protocol is complete and accurate and conforms to the requirements of the MAQS Quality Manual.

Name: Mark Stanfield Title: Project Manager

Sign: Date 10/24/2016

I have reviewed, technically and editorially, details, and other appropriate written materials contained herein, and hereby certify that to the best of my knowledge the presented material is authentic and accurate and conforms to the requirements of the MAQS Quality Manual.

Name: Dan Duncan Title: QA/QC Manager

Sign: Date: 10/24/2016

SUMMARY INFORMATION

Source Information

Source Location:	Blue Lake Power, LLC 200 Taylor Way Blue Lake, CA 95525
Contact:	Mr. Mike Dedmore
Telephone:	(707) 844-3508
Regulatory Agency:	North Coast Unified Air Quality Management District
Unit:	One Zurn Industries wood-fired boiler
Purpose:	Determination of compliance and relative accuracy
Procedures:	EPA Methods 1, 2, 3A, 4, 7E, 9, 10, 19, 201a/202 BAAQMD Method ST-1B ASTM Methods E711-87 or E870-82
Permit to Operate:	No. NS-071

Testing Company Information

Testing Firm:	MAQS Antioch 2825 Verne Roberts Circle Antioch, CA 94509
Contacts:	Mr. Mark Stanfield Project Manager
Telephone:	(541) 665-0802
Facsimile:	(503) 922-4676
Certifications:	CARB Independent Tester, CARB VEE
Test Date:	October 25, 2016

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APPENDICES

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SECTION 1.0

INTRODUCTION

MAQS Antioch (MAQS) has been contracted by Blue Lake Power, LLC (BLP) to perform a series of emission tests at their facility in Blue Lake, California. The testing is scheduled for October 25, 2016 with a start time of approximately 9:00 A.M.

The tests will be conducted on the wood-fired boiler using 100% wood fuel with no propane at 95% production capacity in order to determine the compliance status of the unit with respect to the applicable emission limits outlined in the permit to operate (No. NS-071) issued by the North Coast Unified Air Quality Management District (NCUAQMD). In addition, a relative accuracy test audit (RATA) will be conducted on the continuous emission monitoring system (CEMS) in accordance with EPA 40 CFR Part 60, Appendices B and F. Tests will be performed on the boiler to determine the following emission parameters:

- Emission Compliance:
  - Nitrogen oxides (NO_X) – lb/MMBtu
  - Carbon monoxide (CO) – lb/MMBtu
  - Particulate matter (PM_{10}) – gr/dscf, lb/MMBtu
  - Ammonia (NH_3) – ppmvd, lb/MMBtu
  - Visible emissions (VE) - % opacity
- O_2 and CO_2 (% volume dry) - for molecular weight and dilution calculations
- Stack gas volumetric flow rate (dscfm) and moisture content (% by volume)
- Fuel analysis (CHONS, HHV and F_d)
- Relative accuracy test audit (RATA):
  - O_2 analyzer - % volume dry
  - NO_X analyzer - ppmvd, lb/MMBtu
  - CO analyzer - ppmvd, lb/MMBtu

MAQS Antioch will provide the test personnel and all necessary equipment to measure emissions as required by the regulations and permit conditions. BLP personnel will provide the plant process data to be included in the final report. The results of the tests will be presented in a report and delivered to BLP within 45 days after completion of the field tests. This test protocol provides descriptions of the facility and test location, descriptions of the testing program, the test methods and procedures, the program schedule, and a summary of our quality assurance program.

SECTION 2.0

TESTING CONTRACTOR

The test program will be conducted by MAQS Antioch. Analysis of the particulate matter and ammonia emission samples will be conducted in MAQS Antioch's analytical laboratory. MAQS Antioch contacts for the project will be:

- Project Manager: Mark Stanfield (541) 261-6426
- District Manager: Shane Mascitelli (925) 437-1561
- Laboratory Manager: Dan Duncan (925) 680-4300

MAQS is a recognized independent contractor that has been 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. MAQS Antioch operates as an Air Emission Testing Body (AETB) as defined in 40 CFR 72.2, conforming to ASTM D7036-04 as it pertains to 40 CFR Part 75. Certificates are provided in Appendix B of this test plan. MAQS Antioch is a full service source testing and combustion engineering consulting firm with extensive experience in air quality management and pollution control.

MAQS Antioch will provide a professional source test team to conduct the testing as described in this test plan. The test team members assigned to this project are familiar with the testing of this industry and have been selected based on specific experience and proficiency with the methods to be used. All RATA and performance tests will be overseen and supervised onsite by at least one Qualified Individual, as defined in 40 CFR 72.2.

SECTION 3.0

SOURCE LOCATION INFORMATION

3.1 FACILITY DESCRIPTION

The BLP facility, located in Blue Lake, California, operates a hogged wood-fired Zurn Industries boiler, rated at 118,000 lb/hour-steam (185 MMBtu/hr). The unit is also equipped with an 80 MMBtu/hr propane burner for use during startups, shutdowns and periods of poor wood combustion. For control of particulate matter emissions, the unit is equipped with a multiclone and an electrostatic precipitator (EP).

To monitor gaseous emissions, the unit is equipped with a continuous emissions monitoring system (CEMS) consisting of O_2, NO_X and CO analyzers.

The CEMS is an extractive type, with the sampling probe located within the exhaust stream of the EP.

3.2 SAMPLING LOCATION

Emissions from the boiler exhaust through the EP to a vertical, cylindrical exhaust stack, 60 inches in diameter. There are two sampling ports, set apart 90 degrees from each other on the same horizontal plane, that provide access to the sample traverse points. The sampling ports are located greater than or equal to 0.5 diameters upstream and greater than or equal to 2.0 diameters downstream from the nearest flow disturbance. Access to the ports is via stairs to the top of the EP and a short ladder to the testing platform approximately 60 feet above ground level. A diagram of the sampling location and traverse point locations will be included in the final report.

SECTION 4.0

TEST DESCRIPTION

4.1 PROGRAM OBJECTIVES

The test program will be conducted to determine compliance with the source testing limitations of the NCUAQMD permit to operate. Additional tests will be performed to determine the relative accuracy of the CEMS in accordance with 40 CFR, Part 60, Appendices B and F. The final report will present the results of the emission tests and will compare them to the permit limits and performance specifications. The results will be presented in units consistent with the permit and with those reported by the CEMS. Table 4-1 presents the permitted emission limitations for the facility.

4.2 TEST CONDITIONS

The emission compliance tests will be conducted with the boiler operating at full load (maximum capacity) conditions. All additional CEMS relative accuracy test runs will be conducted with the boiler operating at a minimum of 50% capacity. Process conditions will be determined by steam flow measurements using the plant instrumentation which will be coordinated by BLP personnel.

The unit operating data (steam production and gross power production) and CEMS data will be collected by BLP personnel, and will be provided to MAQS Antioch for documentation of the process conditions and relative accuracy. Printouts from the digital control system will be provided to MAQS Antioch. MAQS Antioch will monitor the collection of process and CEMS data, and will provide additional data collection as necessary to document the operation. Table 4-2 outlines the RATA limitations according to 40 CFR Part 60, Appendices B and F.

TABLE 4-1
EMISSION LIMITATIONS
ZURN BOILER
BLUE LAKE POWER

Pollutant	Permit Condition	Emission Limits
Oxides of Nitrogen (NO_X)		
lb/MMBtu as NO_2	Condition III.C	0.15
Carbon Monoxide (CO)		
lb/MMBtu	Condition III.B	1.00
Particulate Matter (PM)		
lb/MMBtu	Condition III.A.1	0.04
Visible Emissions		
% opacity	Condition III.A.2	20

TABLE 4-2
CEMS PERFORMANCE SPECIFICATIONS
ZURN BOILER
BLUE LAKE POWER

CEMS Output	40 CFR Part 60 Appendix B Reference	Specification Limit %
Oxygen (O_2):		
% volume dry	PS 3, Section 13.2	1.0
Nitrogen Oxides (NO_X):		
lb/MMBtu as NO_2	PS 6, Section 13.2	10 or 20
Carbon Monoxide (CO):		
lb/MMBtu	PS 6, Section 13.2	10 or 20

Note: Performance Specification 6 criteria specifies a relative accuracy of 10 percent when the result is calculated using the applicable standard equation or 20 percent when calculated using the reference method equation.

4.3 TEST SCHEDULE

The test program will be performed over a one-day period. Table 4-3 presents the expected sampling schedule.

TABLE 4-3
TEST SCHEDULE
ZURN BOILER
BLUE LAKE POWER

Day	Activity	Sample Runs	Run Duration
October 24, 2016	Travel to site, set-up	--	--
October 25, 2016	Emissions Tests		
	RATA (O_2, CO, NO_X)	1-9 (up to 12)	21 min. ea.
	Particulate matter	1, 2, 3 of 3	~72 min. ea.
	Ammonia	1, 2, 3 of 3	30 min. each
	Visible emissions	1, 2, 3 of 3	6 min. ea.
	Vol. flow rate & moisture	w/ PM	~72 min. ea.
	Fuel sample	1 of 1	Integrated grab

Note: Mass emission rate compliance for NO_X and CO will be calculated based on the average of three sets of three consecutive RATA test runs (e.g., RATA Tests 1, 2, 3 will be used for Compliance Test 1 and so on).

4.4 TEST PROCEDURES

Descriptions of the test methods are included in Appendix A. Brief descriptions, including any site-specific applications or modifications, are included in the subsections which follow here. Where any conflicts exist in the descriptions, the site-specific description here in Section 4.1 will take precedence. A list of sampling procedures is outlined in Table 4-4.

TABLE 4-4
TEST PROCEDURES
ZURN HOGGED WOOD-FIRED BOILER
BLUE LAKE POWER

Parameter	Measurement Principle	Reference Method	Method Detection Limit
O_2	Paramagnetism	EPA 3A	2% of full scale
CO_2	Non-dispersive infrared	EPA 3A	2% of full scale
CO	Gas filter correlation	EPA 10	2% of full scale
NO_X	Chemiluminescence	EPA 7E	2% of full scale
PM_{10}	Gravimetry with condensable analysis	EPA 201A/202	~ 0.0002 gr/dscf
Ammonia	Ion selective electrode analyzer	BAAMQD ST-1B	0.5 ppm
Visible emissions	Certified observer	EPA 9	5% opacity
Vol. flow rate	Pitot & temp. traverse	EPA 2	--
Emission rate	Stoichiometry	EPA 19	--
Moisture content	Gravimetry	EPA 4	--
Fuel analysis	--	ASTM Methods for Solid Fuels	--

4.4.1 Gaseous Emissions Measurements

Concentrations of the gaseous constituents of the stack gas (CO, NO_X, O_2, and CO_2) will be measured using MAQS Antioch'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 will be used to prevent loss of NO_2 in the sampling system. The NO_X analyzer will be 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.

Each set of three 21-minute gaseous emission (O_2, CO_2, CO and NO_X) RATA test runs will be combined to comprise three 63-minute gaseous compliance test runs. A minimum of nine runs will be performed – additional 21-minute test runs may be performed and used in the audit.

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 quartz, titanium, stainless steel 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 MoleDAQ. 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, printouts of the one-minute average values will be provided.

4.4.2 Particulate Matter less than 10µm (PM_{10})

The concentrations and emission rates of PM_{10} will be measured using a combination of EPA Methods 201A and 202 (as updated in December 2010). The measurements will

include filterable and condensable particulate matter (CPM). The Method 201A samples will be handled as described in the method. The Method 202 samples will also be handled as described in Method 202, including the use of "dry" impingers and the required post-test nitrogen purge. Test runs will be of sufficient duration to collect sufficient sample volume (at least 30 dscf for each run) to provide detection limits low enough to meet the objectives of the testing program.

The apparatus will include a stainless-steel sampling nozzle and PM_{10} cyclone apparatus attached to an in-stack stainless-steel filter holder with a quartz fiber filter. The filter holder will be mounted just behind the cyclone at the tip of the sampling probe, which will include a probe extension of heated Teflon tubing to connect the filter holder to the impinger train. The impinger train will be connected through flexible tubing to the control box, which contains the sampling pump and dry gas meter.

The sampling rate will be chosen to provide a size-selective "cut point" of 9 to 11 μm. The nozzle size will be selected to allow isokinetic sampling at the selected traverse points at the calculated sampling rate. The nozzle size may be changed during parts of each test run if necessary to provide isokinetic sampling at traverse points with higher or lower stack gas velocities. The sampling time or "dwell time" at each traverse point will be calculated according to Method 201A.

The filterable "front-half" PM_{10} will be recovered from the sampling apparatus as described in EPA Method 201A. The cyclone and filter holder will be removed from the tip of the probe, capped, and transported to the mobile laboratory for recovery. The sample fractions will include **(a)** the filter, and **(b)** acetone rinses from the back-half of the PM_{10} cyclone.

The impinger train or "back-half" contents will be recovered and analyzed for condensable PM as described in EPA Method 202. After sampling, the "front-half" cyclones and filter will be removed from the tip of the probe, and a leak check will be conducted from the probe extension through the impinger train. Then the probe extension and condenser will be rinsed with a known amount of water into the first impinger or dropout (i.e. with the sampling pump running), the pump will be turned off and the probe extension will be disconnected from the impinger train. The probe extension will then be rinsed with acetone and hexane into the organic rinse sample bottle (#2). The impinger train will be capped and it and the organic rinse sample will be transported to the mobile laboratory.

In the mobile laboratory, the first and second impingers will be weighed to determine the mass of moisture collected. The contents of the first impinger will be rinsed with water into the second impinger, and water will be added as necessary for the subsequent purge. Then the condenser and first impinger will be reattached to the second impinger and the condenser, impingers and CPM filter will be purged with nitrogen for one hour.

After the purge, the sample will be recovered in three fractions. These will include **(#3)** the CPM filter, **(#1)** the water contents and rinses of the condenser, impingers, and filter holder, and **(#2)** the acetone and hexane rinses of the condenser, impingers, and filter holder. The sample containers will be transported to the MAQS Antioch laboratory for analysis.

In the laboratory, the samples will be processed and analyzed as described in Methods 201A and 202, including gravimetric measurement of the residue from the filter, each cyclone acetone rinse, and the aqueous and organic fractions of CPM. The corrected results will be used to determine the concentration of filterable and condensable PM_{10}. The results will be calculated in accordance with 40 CFR 60.8(f).

4.4.3 Visible Emissions

EPA 9 requires that a qualified observer shall use the following procedures for visually determining the opacity. The qualified observer shall stand at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back. The opacity observer shall be recording to the nearest 5 percent at 15-second intervals on an observational record sheet. A minimum of 24 observations shall be recorded per test run. Each momentary observation shall be deemed to represent the average opacity for a 15-second period. Mark Stanfield is certified by CARB to perform visible emissions evaluations in accordance with EPA Method 9.

4.4.4 Relative Accuracy Test Audit (RATA)

Results of the compliance test runs and the supplementary RATA test runs will be used in the RATA of the CEMS. The test results will be used to calculate relative accuracy in units of ppmvd and lbs/MMBtu for the NO_X and CO analyzers. Relative accuracy for the O_2 analyzer will be determined in units of % volume dry. The runs will be 21 minutes in duration.

For each reference method (RM) determination, the flue gas will be sampled at three traverse points along the "measurement line" as described in 40 CFR Part 60, Appendix B. The probe tip will be placed at each point for 7 minutes during the test runs. The differences between the RM sample and the pollutant monitor's readings will be evaluated from a minimum of nine sets of paired monitor and RM test data. From these differences, the 95% confidence coefficient will be calculated, and the relative accuracy determined. Any tests not included in the calculations for the determination of relative accuracy (maximum of three) will be included in the final test report.

The relative accuracy of the O_2 analyzer will be determined in accordance with 40 CFR Part 60, Appendix B, Specification 2. The RATA results are acceptable if the mean

difference between the O_2 monitor's measurements and the corresponding RM measurements is within 1% O_2.

In accordance with 40 CFR, Part 60, Appendix B, Specification 2, NO_X relative accuracy test results (concentrations only) are acceptable if the NO_X relative accuracy does not exceed 20% of the mean value of the RM test data in terms of units of the emission standard (if the average RM results are greater than 50% of the applicable standard). The results must be within 10% of the applicable standard (if the average RM results are less than 50% of the applicable standard).

CO relative accuracy test results (concentrations only) are acceptable if the CO relative accuracy does not exceed either 10% of the mean value of the RM test data in terms of units of the emission standard or 5% of the applicable standard.

Since the NO_X and CO analyzers incorporate equipment for the determination and reporting of pollutant mass emission rates (lb/MMBtu), the systems are technically defined as continuous emission rate monitoring systems (CERMS). In accordance with 40 CFR, Part 60, Appendix B, Specification 6, relative accuracy test results for mass emissions are acceptable if the RA of the CERMS is no greater than 20 percent of the mean value of the RM test data in terms of the units of the emission standard (if the average RM results are above 50% of the applicable standard), or 10 percent of the applicable standard (if the average RM results are below 50% of the applicable standard), whichever is greater.

4.4.5 Ammonia Slip Emissions

Test Description: Ammonia emissions will be measured at a constant sample rate using the procedures and equipment specified in BAAQMD Test Method ST-1B. Triplicate test runs will be 30 minutes in duration and will collect approximately 21 dscf of flue gas. Each NH_3 test will include measurements of moisture content.

Sample Train Operation: The sampling apparatus will include a Teflon probe attached to the impinger train containing four chilled impingers in series. The impinger train will be connected to 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 will be drawn at a rate of approximately 0.75 cfm for each test run.

The first and second impingers will each contain 100 ml of 0.1N hydrochloric acid (HCl), the third will be left empty, and the fourth will contain silica gel. All of the impinger tare weights will be recorded prior to sampling. All glassware and other components coming in contact with the sample will be pre-cleaned using hot water and detergent, tap water and deionized (DI) water, in that order.

The entire sample train will be leak tested once prior to sampling and once following testing. The pre-test leak check will be performed at a nominal vacuum to ensure that leakage does not exceed 0.02 cfm. The post-test leak check will be 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.

Sample Recovery and Analysis: The impingers will be weighed and their weights will be recorded prior to recovery. The impinger contents will be poured directly into a pre-cleaned Nalgene sampling container followed by rinses with DI water. Analysis will be performed by MAQS Antioch using an ion selective electrode. A field blank will also be analyzed and duplicate analyses on one sample will be performed.

4.4.6 Volumetric Flow Rates and Moisture Content

Stack gas volumetric flow rate measurements will be made using calibrated S-type Pitot tube and temperature readings performed with each isokinetic sampling run, as described in EPA Method 2. The moisture content of the flue gas will be determined by EPA Method 4 and will also be performed in conjunction with all isokinetic test runs. O_2 and CO_2 concentrations will be provided from the concurrent EPA Method 3A test runs and will be used for molecular weight calculations. The results will be used with the measured pollutant concentrations for calculation of mass emission rates.

4.4.7 Emission Rates

Emission rates in terms of lb/MMBtu will be calculated according per EPA Method 19 procedures. Particulate matter results in terms of gr/dscf will be determined per EPA Methods 201A and 202.

4.4.8 Fuel Analysis

A composite fuel sample will be collected by BLP personnel from furnace-ready fuel (downstream of the fuel dryer) as close as possible to the point where the fuel is introduced into the boiler furnace. The sample will be analyzed for carbon, hydrogen, oxygen, nitrogen and sulfur (CHONS) as well as ash and moisture content. The results of this analysis will be used to calculate the higher heating value (HHV) and dry fuel factor (F_d). The fuel analysis will be performed by Hazen Research, Inc. in accordance with the ASTM methods listed below.

- ASTM D 2013
- ASTM D 4208 (mod) for coal or E776 (refuse)
- ASTM D 2795
- ASTM D 3172
- ASTM D 3176

- ASTM D 3173
- ASTM D 3174
- ASTM D 5865

4.4.9 Process Data

The plant's process instrumentation will be used to document process conditions during the test runs. Process data that will be collected by plant staff and presented in the report will include the following parameters.

- Multiclone dP
- ESP primary and secondary voltage
- ESP primary and secondary amperage
- ESP total secondary power input
- Primary Current, AAC
- Secondary Current, MADC
- Primary Voltage (VAC RMS)
- Indication/Calculation of Corona Power
- Secondary Voltage Minimum, KV
- Secondary Voltage Average, KV
- Secondary Voltage Maximum, KV
- Sparks Per Minute
- SCR Firing Angle, Deg.
- Average Form Factor

Data from the plant CEMS printouts will be used to determine the relative accuracy of the analyzers.

SECTION 5.0

QUALITY ASSURANCE AND REPORTING

5.1 SAMPLING AND ANALYTICAL QA/QC

MAQS Antioch has instituted a rigorous QA/QC program for all of its air pollution testing. The program ensures that the emission data reported are as accurate as possible. The procedures included in the cited reference methods will be followed for all steps of preparation, sampling, calibration, and analysis. MAQS Antioch will be responsible for preparation, calibration and cleaning of the sampling apparatus. MAQS Antioch will also conduct the sampling and sample recovery, storage and shipping.

Contract laboratories will conduct some of the preparation and sample analyses. The laboratories that will be used are established leaders in development and performance of the reference methods for which they have been selected. Their credentials for adherence to the required quality assurance procedures are well known.

5.2 QUALITY CONTROL REQUIREMENTS

Our Quality Assurance Program Summary, located in Appendix B, provides our equipment maintenance and calibration schedule, quality control acceptance limits, and any corrective action that may be needed. For additional quality control, MAQS Antioch will follow the procedures outlined below:

- Preliminary stack flow and temperature measurements will be taken to assure correct isokinetic sampling.
- All field equipment will undergo a visual inspection prior to testing and will include pre-test calibration checks.
- Glassware will be visually inspected and will be given a final field rinse prior to testing.
- Reagents will be made fresh daily where needed. A new reagent blank will be retained for every new stock of reagent.

5.3 QUALITY ASSURANCE AUDITS

Quality assurance audits will be conducted as part of the test program to ensure that the final results are calculated from the highest quality data. The audits are listed below:

- The dry gas meters used for the outlet sampling locations will be calibrated using a critical orifice (with a known calibration factor) before the commencement of the testing program. The meters will then be checked immediately following the program. The meter values must agree within ±5 percent of the orifice value. If the meters do not pass, the results will have to be evaluated as to their accuracy.
- The S-type Pitot tubes used during the test program will be calibrated using a wind tunnel and standard Pitot tube. The S-type Pitot tubes will again be checked following the test program and must be within ±3 percent of the pre-test value.
- All thermocouples (TCs) used during the test program will be calibrated using three standards (ice water, boiling water, and boiling oil). The TCs will again be checked following the test program and must be within ±1.5 percent of the calibrated range.

5.4 DATA REDUCTION PROCEDURES

The raw data collected during the sampling and analysis procedures will be used to calculate the results of the testing program. The analysis or reduction of the data to the final results will follow these steps, where appropriate to the test method:

1. Check field-sampling data for accuracy and calculate appropriate data averages (e.g., temperatures, pressures, volumes, etc.).
2. Double-check calculation of the data averages.
3. Review in-house and contract laboratory reports and ensure that appropriate and/or required QA/QC steps were followed.
4. Input field and laboratory data to established, verified computer spreadsheets for calculation of volumetric flow rates, mass emission rates or other appropriate results.
5. To verify results, perform example calculations by hand on a single test run for each emission result reported.
6. Compile summary tables of results and review all inputs.

The report will include copies of spreadsheet printouts (data input and results output) and example calculation checks. The field data sheets with average data calculations will also be included. All values found to be below the detection limit of the analytical method will be reported as "less than" ("<") the full detection limit value.

5.5 REPORT FORMAT

MAQS Antioch will prepare a final report to present the test data, calculations, descriptions and results. The report will include a series of the appendices to present copies of the field data sheets, equipment calibration data, and example calculations. MAQS Antioch uses computer spreadsheets to calculate results from field data sheets and laboratory results. One run of every method performed is also hand calculated. The hand calculations are checked against the spreadsheet results and included in the example calculation appendix of the final report. MAQS Antioch understands the "Standard Condition(s)" that are to be used in the are 29.92 inches of mercury and 68 ºF.

The report will be divided into various sections describing the different aspects of the source testing program. Table 5-1 presents a typical Table of Contents to be followed during preparation of each final report. Prior to release by MAQS Antioch, each report will be reviewed and certified by the project manager and either his supervisor or a peer.

TABLE 5-1
TYPICAL REPORT FORMAT
BLUE LAKE POWER, LLC

Title Page
Certification of Report
Executive Summary
Table of Contents

Section

1.0 Introduction and Summary (includes summary tables of average results)
2.0 Source Location Information
- 2.1 Facility Description
- 2.2 Sampling Location
- 2.3 Unit Operating Conditions

3.0 Program Description
- 3.1 Test Program Objectives
- 3.2 Test Contractor and Key Personnel
- 3.3 Laboratory Contractors and Analyses
- 3.4 Test Program Calculations
- 3.5 Program Test Schedule

4.0 Test Procedures
- 4.1 Method Summaries for Criteria Pollutants
- 4.2 Method Summaries for Toxic Air Contaminants
- 4.3 Ancillary Tests

5.0 Quality Assurance and Reporting
6.0 Discussion of Results (includes summary tables of individual results)

Appendices

A Standard Measurement Procedures
B Quality Assurance Program
- B.1 Program Summary
- B.2 ARB Certifications
- B.3 Equipment Calibrations

C Process Data
D Field Data Sheets
E Laboratory Reports
F Emission Calculations
G Chain of Custody Forms

5.6 AVERAGE RESULT SUMMARY

Table 5-2 presents the typical tabular format that will be used to summarize the results in the final source test report. Separate tables will outline the results for each target analyte and compare them to their respective emissions limits.

TABLE 5-2
TYPICAL RESULT SUMMARY
TEST CONDITION
SPECIES

Test No.:	**1-XX**	**2-XX**	**3-XX**	**Average**
Date:	X	X	X	--
Time:	X	X	X	--
Flue Gas:				
O_2, % volume dry	X	X	X	X
CO_2, % volume dry	X	X	X	X
Flue gas temperature °F	X	X	X	X
Moisture content, % volume	X	X	X	X
Volumetric flow rate, dscfm	X	X	X	X
Species:				
ppm volume dry	X	X	X	X
ppm @ 15% O_2	X	X	X	X
lb/hr	X	X	X	X
tons/yr	X	X	X	X
lb/MMBtu	X	X	X	X

SECTION 6.0

PLANT ENTRY AND SAFETY

6.1 SAFETY RESPONSIBILITIES

Mr. Walter Nystrom is the BLP contact for this project and will act as safety coordinator and is responsible for ensuring routine compliance with plant entry, health, and safety requirements. The plant manager has the authority to impose or waive facility restrictions. The MAQS Antioch project manager has the authority to negotiate any deviations from the facility restrictions with the BLP plant manager.

6.2 SAFETY PROGRAM

MAQS Antioch has a comprehensive health and safety program that satisfies State and Federal OSHA requirements. The program includes an Illness and Injury Prevention Program, site-specific safety meetings and training in safety awareness and procedures. The basic elements include: (1) written policies and procedures; (2) routine training of employees and supervisors; (3) medical monitoring when necessary; (4) use of personal protection equipment; (5) hazard communication; (6) pre-test safety meetings; and (7) routine surveillance of on-going test work.

MAQS Antioch will provide all safety-related equipment to its employees. The equipment will include hard hats, safety shoes, safety glasses or goggles, hearing protection and hand protection.

6.3 SAFETY REQUIREMENTS

All test personnel will adhere to the following standard safety measures:

- Attend safety indoctrination session upon initial arrival at the plant and complete the safety checklist.
- Confine selves to the testing and administration areas only.
- Wear hard hats, steel toed boots and high-visibility reflective vests at all times on-site.
- Wear advanced protective eyewear, hearing protection and gloves in designated areas.
- Know the location of first aid equipment and fire extinguishers.
- Refrain from smoking.

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APPENDIX A

MEASUREMENT PROCEDURES

Method:	**Continuous Emission Monitoring (CEM) System**
Reference:	SCAQMD 100.1, CARB 100, EPA 7E, 3A, 10, 6C
Principle:	Sample gas is drawn from the stack or duct through a sample conditioning system and is sent through a sample manifold to a series of gas analyzers for measurement of the concentrations of O_2, CO_2, NOx, CO and SO_2.
Analyzers:	See the description pages for the individual analyzers; those pages follow this description of the sampling system.

The CEM sampling system includes three basic subsystems. These are (1) the sample interface, which includes the probe, connecting tubing, and the sample conditioning and transport system, (2) the gas analyzers and their calibration gases, and (3) the data acquisition system. This section presents a description of the sample interface, the calibration gases, and the data acquisition system. Descriptions of the individual analyzers are provided in following sections.

The sample interface includes components to extract a representative sample from the stack or duct, transport the sample to the analyzers, and remove moisture and particulate material from the sample. The system must also preserve the measured gases and deliver the sample for analysis without significant interference. A diagram of the system is provided in Figure 1. The sample interface system includes the following components.

- Probe – the probe is usually heated to prevent condensation of moisture. In some cases the probe may be unheated, depending on the dynamics of the stack environment (i.e. the temperature is high enough to prevent condensation without heating) and the gases to be measured for the testing program. The probe liner or tubing may be constructed of glass, Teflon, titanium or stainless steel, depending on the stack temperature, the matrix of stack gases and the gases to be measured. The probe length is chosen to provide access to the stack traverse points or sampling point required by the testing methods. When used at sources with significant particulate concentrations, the probe may include a filter either at the tip (in-stack) or in a heated box (out-of-stack).

- Heated line – a short section of flexible, heated Teflon tubing is used to connect the probe to the moisture removal system. The line is less than 6 feet in length except in cases where longer tubing is needed to allow traversing of the stack with a long probe (i.e. for stratification tests).

- Moisture conditioning system – the role of the moisture removal system is to cool the sample gas and condense the moisture for removal, yet to minimize the contact between the sample gas and the condensate. Contact between the sample and condensate may cause scrubbing or other interference with the concentration of some gases, especially the water-soluble gases such as SO_2 and NO_2. The sample must be cooled to 37^{o}F or lower in order to present sufficiently dry sample gas to the analyzers. In most cases, two moisture removal systems are necessary to provide sufficient cooling. The first system includes knockout traps constructed of glass (e.g. “short stem” impingers) or stainless steel immersed in an ice bath. The second system includes thermoelectrically-cooled knockouts with continuous moisture removal pumps, and sufficient cooling capacity to reduce the sample gas temperature to 37^{o}F or

below. The second system may be located at ground level, or on the stack. If the two systems are separated by a connecting line of Teflon tubing, the tubing must be at least 10^{o}F warmer than the temperature of the gas leaving the first conditioner.

- Sample transport – a leak-free diaphragm pump is used to transport sample from the probe and moisture conditioning systems to the analyzers in the mobile lab. The pump may be in the mobile lab as shown in Figure 1, or may be located on the stack platform. In either case, a length of Teflon tubing is used to connect the systems at the sampling location or stack platform to the systems in the mobile lab. The "vacuum side" of the system from the probe to the pump is leak checked before and after the test runs by plugging the tip of the probe and drawing the pump's maximum vacuum (or at least the maximum vacuum recorded during the test runs) on the system and delivering all the sample through a single rotameter. The leak check passes if the total flow is less than 2% of the flow noted during the test runs (usually this means a leak rate below 0.5 scfh).

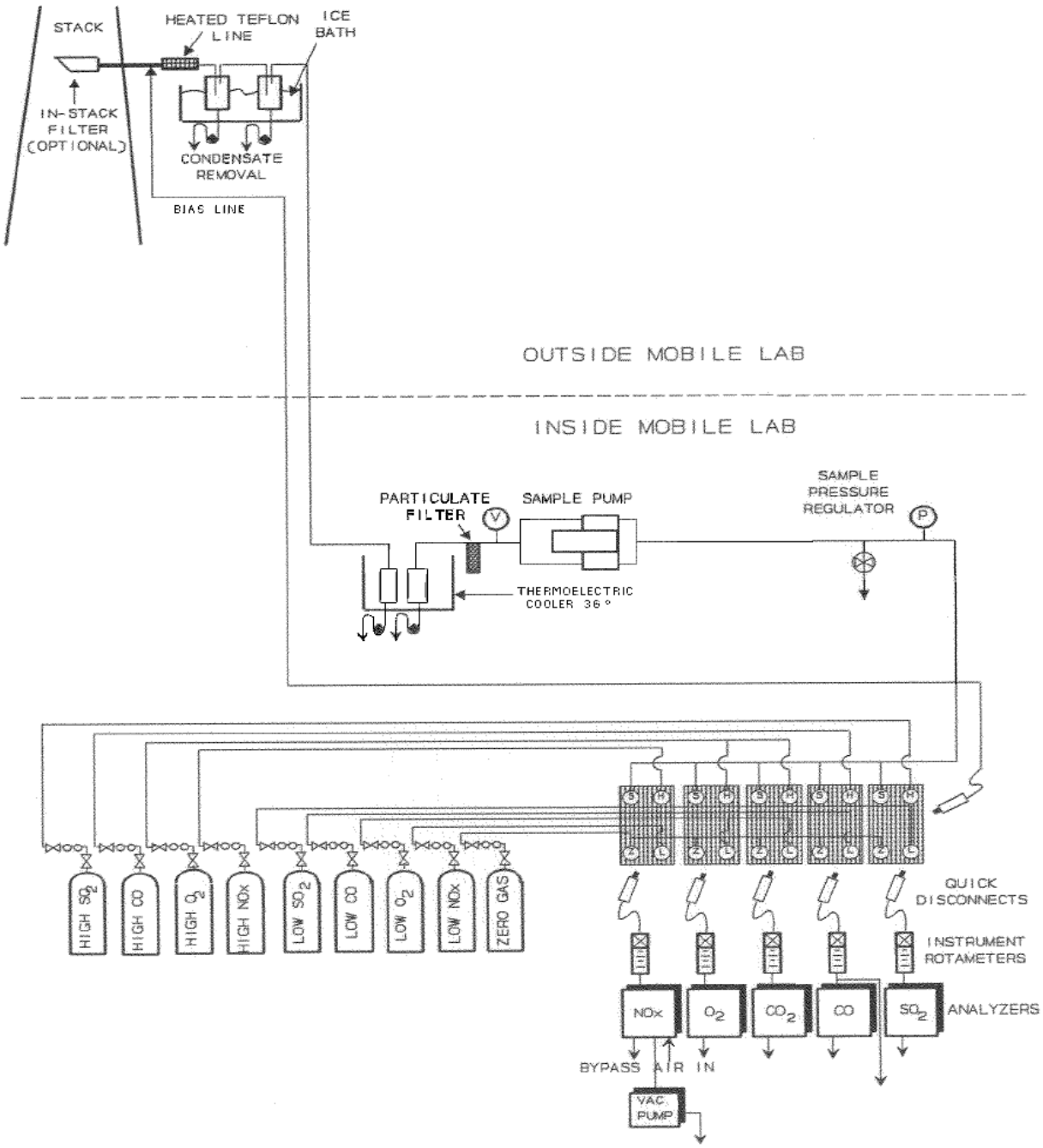
- Sample manifold – the pump delivers sample gas to the analyzers through a manifold system in the mobile lab. The manifold system includes valves for directing sample or calibration gases to any or all analyzers, and for controlling the sample pressure and flow rates. Manifold pressure is modulated using a back-pressure regulator.

- Gas analyzers and calibration gases – the individual gas analyzers are described on separate pages that follow this system description. The gases used for calibration of the analyzers are prepared and analyzed by EPA Protocol and are, at a minimum, certified by the manufacturer to be within 1% of the stated concentration. Each gas cylinder is equipped with a pressure regulator to supply the calibration gas to the analyzer at the same pressure and flow rate as the sample gas. The concentrations of the calibration gases are selected for the range of measurement necessary to determine compliance with emission limits. The gas concentrations necessary are provided in the test method, which must be consulted when choosing the gases to be used for a testing program. The direction of zero, span, or sample gas to each analyzer is accomplished by operation of the sample/calibration selector fittings.

- Calibration error and bias checks – calibration error is determined for each analyzer by directing zero gas, high-range and mid-range gases directly through the manifold to the analyzer. Bias checks are conducted before and after each test run by delivering zero and calibration gases in turn to the "tee" fitting at the back of the sampling probe just prior to the connecting Teflon tubing.

- Data acquisition system – the output of the analyzers is continuously recorded by a digital data acquisition system. The digital system, known as MoleDAQ, provides documentation of the range and calibrations for each analyzer, as well as recording of the output of the analyzer during each calibration error test, bias check and test run. The system also calculates the percent error, percent drift, and the test run results corrected for drift. Results can be provided from "on-site" printouts of one-minute average data, or from text computer files of the data. Where required by regulations, a digital or analog strip chart recorder may also be used to "back-up" the digital data.

Figure 1. CEM System Diagram



Method:	**Oxygen (O2) by Continuous Analyzer**
Reference:	EPA 3A, EPA 20, CARB 100, BAAQMD 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 O2 concentration.
Analyzer:	California Analytical 100P, 110P, 200, 300, or Teledyne 320A
Measurement Principle:	Paramagnetism
Ranges:	0-5, 0-10, 0-25, 0-100% O2
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 stack gas sample is collected and conditioned using the CEM system described previously. A stratification check traverse is 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 O2 by volume.

Method:	**Carbon Dioxide by (CO_2) by Continuous Analyzer**
Reference:	EPA 3A, CARB 100, BAAQMD 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:	California Analytical 100, 200, 300, or Horiba VIA 510
Measurement Principle:	Non-dispersive infrared (NDIR)
Accuracy:	1% of full scale
Ranges::	0-5 minimum, 0-100 maximum
Output:	0-10 V
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 stack 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 as high as 0 to 100% CO_2.

Method:	**Nitrogen Oxides (NO/NOx) by Continuous Analyzer**
Reference:	EPA 7E, EPA 20, CARB 100, BAAQMD ST-13A, SCAQMD 100.1
Principle:	A sample is continuously drawn from the stack gas stream, conditioned, and conveyed to the instrument for direct readout of NO or NOx.
Analyzer:	EcoPhysics CLD 70E, CLD 70S, California Analytical 600 CLD, or Thermo Scientific 42iHL
Measurement Principle:	Chemiluminescence
Ranges:	0-3 ppm minimum to 0-7500 ppm maximum ranges
Output:	0-10 V
Interferences:	Compounds containing nitrogen (other than ammonia) may cause interference.
Response Time:	90%, 1.5 seconds (NO mode) and 1.7 seconds (NOX mode)
Sampling Procedure:	A representative stack 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 chemiluminescence is monitored through an optical filter by a high sensitivity photomultiplier tube, the output of which is electronically processed so it is linearly proportional to the NO concentration. The output of the instrument is in ppm volume dry. In the NOx mode, the gas is passed through a converter which converts NO_2 to NO for a measurement of total NOx concentration. NO_2 can be determined as the difference in readings between the analyzer's NO and NOx modes. Use of a molybdenum catalytic converter instead of a stainless steel high-temperature converter eliminates conversion of NH_3 to NO.

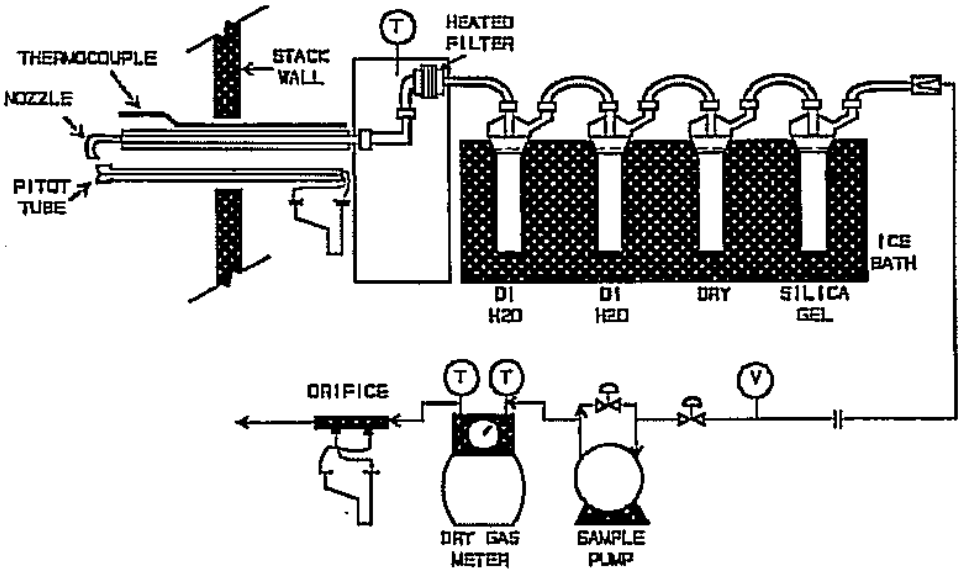
Method:	**Carbon Monoxide (CO) by NDIR/Gas Filter Correlation**
Reference:	EPA 10, CARB 100, BAAQMD ST-6, SCAQMD 100.1
Principle:	A sample is continuously drawn from the flue gas stream, conditioned, and conveyed to the instrument for direct readout of CO concentration.
Analyzer:	TEI Model 48, 48C, or Teledyne 300EM
Measurement Principle:	NDIR/Gas Filter Correlation
Precision:	0.1% ppm
Ranges:	0-1 ppm minimum to 0-5,000 ppm maximum
Output:	0-10 V
Interferences:	Negligible interference from water and CO2
Rise/Fall Times (0-95%):	1 minute @ 1 1pm flow, 30 second integration time
Sampling Procedure:	A representative stack 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. The detector outputs from the two gas filters are correlated by a microprocessor for analysis of the CO concentration.

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 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.

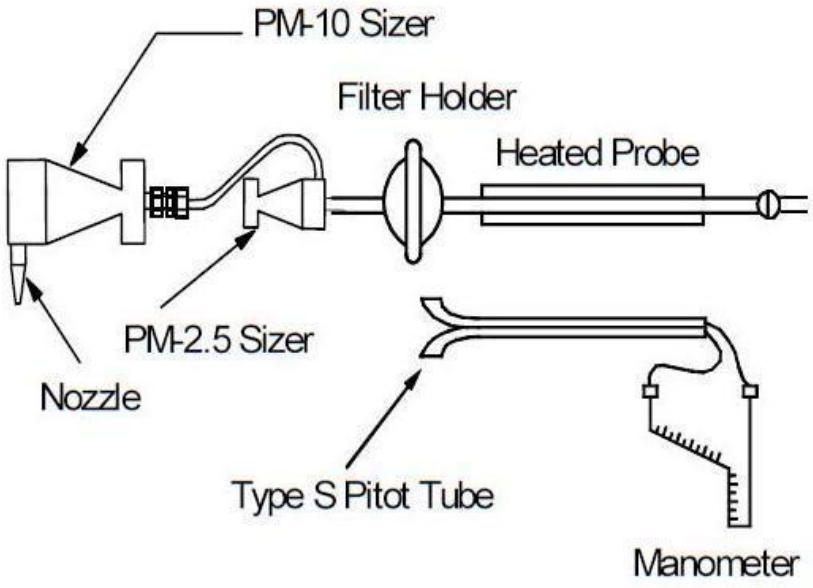
After each sample run, the contents of each of the first two impingers are rinsed with water into a polyethylene sample bottle. The sample bottles are returned to the laboratory for analysis.

Analytical Procedure: The ammonia samples are analyzed by EPA Method 350.3 using an Orion Research Model 940 Microprocessor Ion Analyzer equipped with an ammonia ion selective electrode. The ammonia electrode and reference electrode are 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 NH3 by weight with the specific ion analyzer. By using the NH3 concentration in ppm by weight, the measured liquid volume of the sample solution, and obtaining the volume of the flue gas sample, the stack flue gas NH3 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:	**Filterable PM2.5 and PM10 by EPA Method 201A**
Applicable Ref. Methods	EPA Method 201A, December 2010
Principle:	Sample is extracted from the stack at a constant flow rate through in-stack sizing devices, which aerodynamically separate PM > PM10, PM10 and PM2.5 for collection. The filterable PM2.5 is collected on an in-stack filter and the condensable PM2.5 is collected in a series of impingers. The particulate mass is determined gravimetrically after removal of uncombined water.
Sampling Procedure:	The sampling train used in the tests is shown in the following figure. The sample is drawn from the stack through a nozzle and size separation cyclone(s) into an in-stack filter, through a probe extension of glass, titanium or Teflon tubing connected either directly or with a length of heated flexible Teflon tubing to a set of impingers. The impinger train collects the condensable PM2.5 and removes the moisture from the sample stream. The sample is drawn by a leak-free pump and pushed through a calibrated dry gas meter and orifice meter. The sampling may include just PM2.5 or just PM10 (using one cyclone or the other) or both, as required for the testing program.



Sampling Train for Determination of $PM_{2.5}$ and PM_{10} by EPA Method 201A

Sampling Procedure: (continued)

EPA Method 4 (moisture) and Methods 1 and 2 (velocity) are performed in conjunction with the test. Stack velocity is measured with a Pitot tube at each traverse point to determine the sampling time ("dwell time") at each point and to measure the stack flow rate, and to determine the correct nozzle size to maintain isokinetic sampling. The moisture concentration is determined by weighing the impingers before and after sampling to determine the amount of moisture collected.

The sample is drawn at a constant rate that is calculated to provide aerodynamic separation or "cut point" at 10μm (± 1 μm) and/or at 2.5 μm (± 0.25 μm). The nozzle size is chosen to provide isokinetic sampling within 80 to 120% at each traverse point given that constant sampling rate. If the stack gas velocity at any traverse point lies outside the isokinetic range for the chosen nozzle size, the nozzle may be changed for sampling at those points.

Sample Recovery and Analysis:

Following testing, the following sample fractions are recovered into sample containers:

1. Filter and filter ring (filterable PM2.5)

2. PM > PM10 from the Cyclone 1 inner surfaces – acetone rinses and brushing

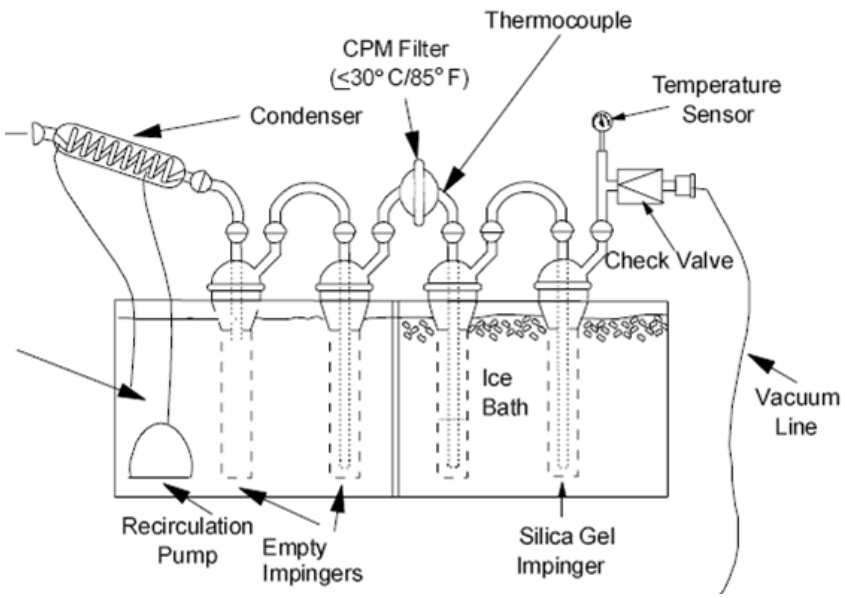
3. PM < PM10 from the Cyclone 1 inner cup and stem, and from the Cyclone 2 inner surfaces – acetone rinses and brushing

4. PM < PM2.5 from the Cyclone 2 inner cup and stem, and filter-holder front-half – acetone rinses and brushing

The rinses (2 through 4) are evaporated at laboratory temperature, desiccated and weighed, and the filter (1) is desiccated and weighed.

The concentrations of PM>PM10, PM10 and PM2.5 are determined by dividing the mass collected by the sampled dry gas volume.

Method:	**PM2.5 Condensable by EPA Method 202**
Applicable Ref. Methods	EPA Method 202 December 2010
Principle:	Sample is extracted from the stack at a constant flow rate through in-stack sizing devices, which aerodynamically separate PM > PM10, PM10 and PM2.5 for collection. The filterable PM2.5 is collected on an in-stack filter and the condensable PM2.5 is collected in a series of impingers. The particulate mass is determined gravimetrically after removal of uncombined water.
Sampling Procedure:	Sample is drawn from the stack through a filterable PM sampling apparatus (as in EPA Methods 5, 17, 201A, etc.) connected either directly or with a length of heated flexible Teflon tubing to the set of impingers shown in the figure below. The impinger train includes a water-cooled condenser, two impingers (that are dry at the beginning of the test run) and a backup CPM filter of Teflon membrane. The train also includes one modified impinger containing 100 ml of distilled water, and an impinger containing silica-gel to remove the moisture from the sample stream. The sample is drawn by a leak-free pump and pushed through a calibrated dry gas meter and orifice meter.



Sampling Train for Determination of Condensable $PM_{2.5}$ by EPA Method 202

Sampling Procedure: (continued)	EPA Method 4 (moisture) and Methods 1 and 2 (velocity) are performed in conjunction with the test. Stack velocity is measured with a Pitot tube at each traverse point to determine sampling parameters for the filterable PM method and to measure the stack flow rate. The moisture concentration is determined by weighing the impingers before and after sampling to determine the amount of moisture collected. The sample is drawn through the impinger train as described in the filterable PM, PM10 or PM2.5 test method.
Sample Recovery and Analysis:	Following testing, the impingers are weighed for stack gas moisture determination. Then tthe condenser and first impinger contents are transferred by rinses with degassed water to the second impinger and the CPM section of the train (condenser through CPM filter holder) is purged with pure nitrogen for one hour. Then the following sample fractions are recovered into sample containers: 1. Aqueous contents of the condenser and the first two impingers with two water rinses, 2. Organic rinses of the condenser and the first two impingers; one with acetone and two rinses with hexane, 3. The CPM filter. The filter (3) is extracted with water and the extract is added to container 1. The filter is then extracted with hexane and the extract is added to container 2. The contents of container 1 are transferred to a separatory funnel and are extracted with hexane. The hexane extract is added to container 2. The aqueous fraction from container 1 is evaporated to about 10 ml at 105°C, then dried at <85oF. The residue is re-hydrated into 100 ml of water and neutralized with NH4OH. The neutralized solution is evaporated at <85oF, desiccated and weighed. The contents of container 2 are evaporated at <85oF, desiccated and weighed. The PM2.5 (CPM) concentration is determined by dividing the mass of PM2.5 collected by the sampled gas volume.

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 fuel flow is metered through metering screws. The data from the fuel metering screws will be recorded and included in the source test report. 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.
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)
O2 = Exhaust Gas Concentration, %
CO2 = Exhaust Gas Concentration, %
Fd = F Factor (O2 Based), dscf/MMBtu
Fc = F Factor (CO2 Based), dscf/MMBtu

Equations

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

or

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

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]

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

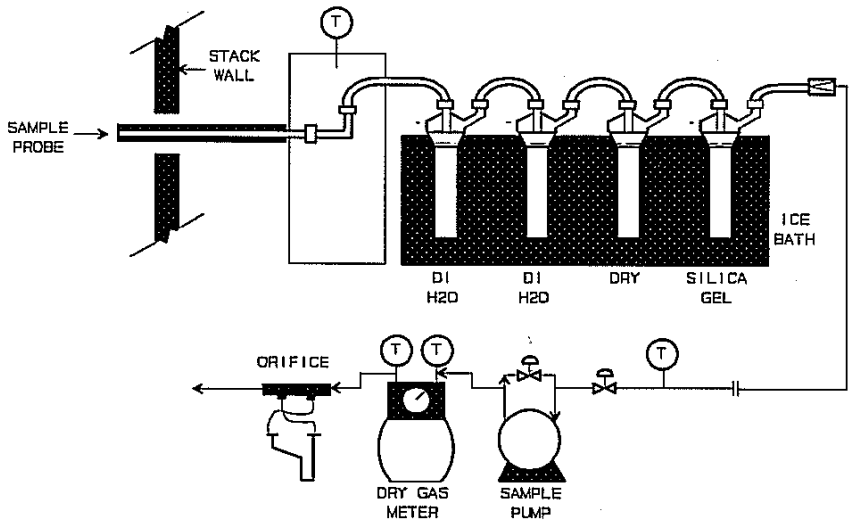
The stack gas volumetric flow rate is determined from the measured stack gas velocity, the area of the stack at the measurement plane, and the measured gas temperature and pressure. The volumetric flow rate is determined from the following set of equations:

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

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

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

Method:	**Determination of Moisture in Stack Gases**
Applicable Ref. Methods:	EPA 4, ARB 1-4, SCAQMD 4.1
Principle:	A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined volumetrically or gravimetrically.
Sampling Procedure:	The sample train used in the tests is shown in the following figure. The sample is drawn at a constant rate through a stainless steel probe. The probe is connected to an impinger train by Teflon tubing. The train consists of two Greenburg-Smith impingers which contain 100 ml water, an empty impinger as a knockout, and an impinger containing silica gel to protect the pump from moisture.



Sample Train for Determination of Moisture by EPA Method 4

Sample Recovery and Analysis:	Following testing, moisture content is determined gravimetrically from initial and final impinger weights.

APPENDIX B

QUALITY ASSURANCE AND CERTIFICATIONS

QUALITY ASSURANCE PROGRAM SUMMARY AND CERTIFICATIONS

Montrose Air Quality Services, LLC (MAQS) 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. MAQS has prepared a QA Manual according to EPA guidelines. The manual serves to document and formalize all of MAQS'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 four QA areas discussed below.

QA Reviews. MAQS'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 change 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. MAQS 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, MAQS 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 MAQS 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. MAQS 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 MAQS's QA Manual.
4. In-house training and MAQS 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. MAQS 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. MAQS personnel maintain membership in the Air and Waste Management Association and in the Source Evaluation Society.

AGENCY CERTIFICATION

MAQS is certified by the CARB as an independent source test contractor for gaseous and particulate measurements. MAQS 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 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	±4Ffor<400F ± 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	Range <± 0.10 mm for micrometer 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 MAQS'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	l. 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. H2S)	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

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER I-16-009

Independent Contractor Approval Pursuant to
California Code of Regulations, title 17, section 91207

The Avogadro Group, LLC

WHEREAS, the Air Resources Board (ARB), pursuant to California Health and Safety Code, section 41512, has established the procedures contained in California Code of Regulations, title 17, section 91200 and following, 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 performing 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), and U.S. Environmental Protection Agency (U.S. EPA) Test Methods 18, 201A, and 202 pursuant to Cal. Code Regs., title 17, section 91200 and following, when the following conditions are met:

1. The Avogadro Group, LLC calibrates its metering system in accordance with section 5.3 of ARB Test Method 5, and establishes and maintains a log of the calibrations;

2. The Avogadro Group, LLC acquires and uses sulfuric acid in accordance with section 3.3.5 of ARB Test Method 8;

3. The Avogadro Group, LLC uses a probe constructed in accordance with section 2.1.3 of ARB Test Method 100;

4. The Avogadro Group, LLC uses noncalculating channels on its data acquisition system or a strip chart in accordance with section 2.2.8 of ARB Test Method 100;

5. The Avogadro Group, LLC includes the following information on all strip charts and/or emissions data sheets: pollutant of interest, source, analyzer range, date and time, zero offsets, and the name(s) of the person(s) operating the instruments;

6. The Avogadro Group, LLC prevents condensate from forming in the sample bag while collecting the sample in accordance with section 8.2.1.4 of U.S. EPA Test Method 18;

7. The Avogadro Group, LLC calibrates and repairs the nozzles it uses for U.S. EPA Test Method 201A in accordance with section 10.1 of U.S. EPA Test Method 5, and establishes and maintains a log of the calibrations, which shall include notes of the repairs on each nozzle;

8. The Avogadro Group acquires and uses 300 to 500 ml glass beakers as required by section 6.2.2 (c) of U.S. EPA Test Method 202;

9. The Avogadro Group acquires and uses a 0 to 100 ml glass burette in 0.1 ml graduations as required by section 6.2.2 (f) of U.S. EPA Test Method 202;

10. The person performing VEE passed ARB Compliance Training Course #100: Fundamentals of Enforcement (FOE)/VEE (Smoke School) and is currently certified to conduct VEE. Any recertification for VEE, following the initial passage of ARB's FOE, must be from a certifying body recognized by ARB at the time VEE is performed; and

WHEREAS, ARB Executive Officer, pursuant to California Health and Safety Code section 39516, issued Executive Order G-02-008, delegating to the Chief of ARB Monitoring and Laboratory Division (MLD) the authority to approve independent testers in accordance with Cal. Code Regs., title 17, section 91200 and following;

NOW, THEREFORE, I, Michael T. Benjamin, Chief of MLD, order that The Avogadro Group, LLC is granted approval from the date of execution of this order until June 30, 2018, to perform the test methods identified above subject to compliance with Cal. Code Regs., title 17, section 91200 and following.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his or her authorized representative may field audit one or more tests performed pursuant to this order for each test method identified above.

Executed at Sacramento, California this 28th day of April 2016.

Dr. Michael T. Benjamin, 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 California Code of Regulations, title 17, section 91207, until June 30, 2018, for those test methods listed below:

ARB Source Test Methods:
1, 2, 3, 4, 5, 8, 17
100 (CO, CO_2, NO_X, O_2, SO_2, THC)

Dr. Michael T. Benjamin, 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 California Code of Regulations, title 17, section 91207, until June 30, 2018, for those test methods listed below:

U.S. EPA Test Methods 18, 201A, and 202
Visible Emissions Evaluation

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

March 25, 2015

To Whom It May Concern,

EPA promulgated minimum competency requirements for firms performing Part 75 emission test programs (Protocol Gas Verification Program and Minimum Competency Requirements for Air Emission Testing, FR 76, No. 59, 17288-17325) on March 28, 2011. The rule, as stated in 40 CFR Part 75, Appendix A, § 6.1.2(a), requires that "On and after March 27, 2012, all relative accuracy test audits (RATAs) of CEMS under this part, and stack testing under §75.19 and Appendix E to this part shall be conducted by an Air Emission Testing Body (AETB) which has provided to the owner or operator of a unit subject to this part the documentation required in paragraph (b) of this section, demonstrating its conformance to ASTM D7036-04 (incorporated by reference, *see* §75.6)."

The rule, as stated in 40 CFR Part 75, Appendix A, § 6.1.2(b), requires that "The owner or operator shall obtain from the AETB a certification that as of the time of testing the AETB is operating in conformance with ASTM D7036-04…The AETB's certification may be limited in scope to the tests identified under paragraph (a). The AETB's certification need not extend to other work it may perform." This letter is written to convey certification of conformance by The Avogadro Group, LLC with those requirements, limited to testing as it pertains to 40 CFR Part 75.

By their signatures below, the Management of The Avogadro Group, LLC, an affiliate of Montrose Air Quality Services, Inc., certify that all relative accuracy testing performed pursuant to 75.74(c)(2)(ii), Section 6.5 of Appendix A or Section 2.3.1 of Appendix B of Part 75, and Stack Testing under 75.19 and Appendix E of Part 75 will be conducted in conformance to ASTM D7036-04 and be overseen and supervised on site by at least one Qualified Individual, as defined in ASTM Standard D7036-04, Section 3.1.15. The performance data collected to indicate conformance with the Standard, as defined in Section 3.1.9 of the Standard, is available to our clients upon request.

Name/Title	Signature	Date
Kevin J. Crosby, VP, Technical		03/27/2015
Wade Latham, Quality Assurance Director		03/27/2015
Dan Duncan, Quality Assurance Manager		04/01/2015
Shane Mascitelli, District Manager		04/02/2015

Implementation Date: 3/25/15
Revision Number: 0
Revision Date: NA

APPENDIX C

PERMIT TO OPERATE

PERMIT TO OPERATE

NCU 097-12

BLUE LAKE POWER COMPANY, LLC
BLUE LAKE, CA

Issue Date: MARCH 18, 1998
First Revision: AUGUST 10, 1999
Transfer of Ownership: May 18, 2010

NORTH COAST UNIFIED AIR QUALITY MANAGEMENT DISTRICT

2300 MYRTLE AVENUE
EUREKA, CALIFORNIA 95501

PHONE (707) 443-3093
FAX (707) 443-3099

NORTH COAST UNIFIED AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

NCU 097-12

THE BLUE LAKE POWER COMPANY, LLC

LEGAL OWNER OR OPERATOR: The Blue Lake Power Company
1615 Continental Street, Suite 100
Redding, CA 96001
Responsible Official: Glenn A. Zane
Plant Contact: Randy Paterson
(707) 845-4831

BUSINESS ACTIVITY: Wood fired steam generation plant producing electricity for sale to PG&E and other customers.

EQUIPMENT LOCATED AT: The plant is located in the northwestern portion of California within the County of Humboldt and is about 20 miles to the northwest of Eureka, the County seat and is located in the city of Blue Lake. The plant is located in an Industrial area of the city adjacent to the mad River. Blue Lake is located on relatively flat terrain within the confines of the Mad River Valley.

Whereas a timely application for a Permit to Operate has been made by The Blue Lake Power Company, LLC (hereinafter called the Permittee) pursuant to Regulation 5 (implementation of federal Title V operating permits) of the Rules and Regulations of the North Coast Unified Air Quality Management District (hereinafter called the District), and said application has been reviewed and found complete by the Air Pollution Control Officer of said District (hereinafter referred to as the Control Officer or NCUAQMD).

Unless otherwise noted, all requirements in this PERMIT are federally enforceable.

This is your Permit to Operate (hereinafter called PERMIT) subject to the following terms and conditions:

LIST OF ABBREVIATIONS

Administrator	Administrator of the Environmental Protection Agency
Act	Clean Air Act
CARB	California Air Resources Board
CEMS	continuous emissions monitoring system
CFR	Code of federal regulations
CO	carbon monoxide
CO_2	carbon dioxide
dscf	dry standard cubic foot
deg. F	degrees Fahrenheit
District	North Coast Unified Air Quality Management District
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
gr/acf	grains per actual cubic foot
gr/dscf	grains per dry standard cubic foot
lbs/hr	pounds per hour
MMBtu	million British thermal units
NOx	nitrogen oxides
NSPS	New Source Performance Standards
O_2	oxygen
pH	hydrogen ion concentration in a solution
ppmv	parts per million by volume
PSD	Prevention of Significant Deterioration
tpy	tons per year
unit	single emissions unit

PERMIT UNITS

A. Combustion Processes

(1) Permit Number - **NS-071(Steam Generator).**
Name - Boiler

I. BASIC EQUIPMENT - The permittee operates a 118,000 pounds steam per hour (185 million Btu/hr heat input) boiler manufactured by Zurn Corporation. An ash reburn chamber is utilized to burn the carbon contained in the ash from the air preheater dropout, and multiclone dropout. Heat from the reburn chamber is directed into the combustion chamber above the grates. The facility uses a 80 million Btu/hr propane burner for use during startups, shutdowns and periods of poor wood combustion.

II. CONTROL EQUIPMENT - Particulate matter is controlled with mechanical multiclones followed by an electrostatic precipitator manufactured by Research Cottrell Corporation. The unit has two separate transformer/rectifier fields and a collection plate area of 21,002 sq.ft. The two fields are rated at 85 KVA. A forced overfire air system is utilized to help control gaseous emissions.

III EMISSIONS LIMITATIONS

A. Particulate Matter

1. Particulate loading - The permittee shall not discharge particulate matter into the atmosphere in excess of 0.04 pounds per million Btu of heat input[Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

2. Visible emissions - The permittee shall not cause to be discharged into the atmosphere any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity. The opacity standard applies at all times except during periods of startup, shutdown, or malfunction[40 CFR 60.43b(f)][Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

B. Carbon Monoxide - The permittee shall not discharge carbon monoxide into the atmosphere in excess of 1.00 pounds per million Btu of heat input on a 3-hour average basis[Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

C. Nitrogen Oxides - The permittee shall not discharge nitrogen oxides (as nitrogen dioxide) into the atmosphere in excess of 0.15 pounds per million Btu of heat input on a 3-hour average basis[Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

IV. COMPLIANCE MONITORING

A. The following methods shall be used for determining compliance with the above emissions limitations:

1. Particulate Matter - CARB Method 5 or other EPA approved method.
The permittee shall be required to have particulate matter from the boiler tested once per calendar year. If the compliance test result is less than one-half the permitted limit, then the next year compliance test may be waived by the District[Regulation 1, Rule 240(d)].

2. Visible Emissions - The permittee shall operate at all times a continuous opacity monitoring system(COMS)[40 CFR 60.48b(a)].

a. 40 CFR 60, Appendix B, Performance Specification 1 shall be the basis for the operation of the COMS[40 CFR 60.49b(b)].

3. Carbon Monoxide and Nitrogen Oxides - CARB Method 100 or other EPA approved method.
No later than July 1, 1999, the permittee shall install, operate at all times and maintain a continuous emissions monitoring system(CEMS) for the determination of carbon monoxide and nitrogen oxides from the boiler. The CEMS shall be operated

in conformance with 40 CFR, Part 60, Appendix B, Performance Specifications, and Appendix F, Quality Assurance Procedures[Regulation 1, Rule 240(d)].
Monitoring shall be conducted in accordance with 40 CFR Part 60.13 unless a more restrictive requirement is contained in the permit.

V. REPORTING AND RECORDKEEPING - see General Provisions, section F.

A. The permittee shall maintain data on the operation of the boiler which shall include the temperature, pressure and flow of steam production[Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

B. The permittee shall maintain records of opacity 6-minute averages[40 CFR 60.49b(f)].

C. The permittee shall report all occurrences of excess emissions to the District in accordance with the timing requirements of Regulation 1, Rule 540, Equipment Breakdown[Regulation 1, Rule 240(d)].

D. A monthly report shall be required which identifies any deviation from these permit requirements including a summary of those deviations attributable to breakdowns reported in accordance with Rule 540. Beginning July 1, 1999 this report shall also include the daily and monthly averages of carbon monoxide, nitrogen oxides, and oxygen emissions. The report shall be due no later than the fifteenth day of the following month[Regulation 1, Rule 240(d)].

E. The permittee shall maintain records of the hourly, daily and monthly averages for carbon monoxide, nitrogen oxides, and oxygen beginning July 1, 1999[Regulation 1, Rule 240(d)].

F. The permittee shall maintain propane fuel usage information in order to calculate the annual capacity factor[40 CFR 60.49b(d)].

VI. OPERATING CONDITIONS - see General Provisions, section C.

A. The boiler shall be fired only with wood wastes and propane. Wood waste means sawmill or lumber wastes; or vegetation which are not treated with any chemicals. Painted wood is allowable provided that the paint is tested for lead. Lumber painted with lead based paints shall not be burned in the boiler[Regulation 1, Rule 240(d)].

B. The steam production from the boiler shall not exceed 118,000 pounds per hour on a monthly average basis[Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

C. The permittee shall continuously operate and maintain an electrostatic precipitator on the exhaust of the boiler[Regulation 1, Rule 220(b) Authority to Construct dated 1/12/84 and reissued on 6/13/86, 10/20/87 and 9/24/91].

D. The annual capacity factor for propane shall not exceed 10% for a calendar year[40 CFR 60.44b(d)]. This equates to a limitation of 1.78 million gallons of propane per calendar year. The annual capacity factor for propane is determined by dividing the actual heat input to the steam generating unit during the calendar year from the combustion of propane, by the potential heat input to the steam generating unit if the steam generating unit had been operated for 8,760 hours at the maximum design heat input capacity[40 CFR 60.43b(e)].

B. Exempt Equipment

Equipment and operations not specifically identified in this permit are not subject to specific federally-enforceable operating conditions or emission limitations. Such equipment and operations are subject to applicable General Provisions of this permit.

GENERAL PROVISIONS

These general provisions apply to all facilities or sources owned or operated by the permittee as detailed in this permit.

A. Fee Payment - The Permittee shall pay an annual permit fee and other fees as required in accordance with Regulation 1, Rule 300 of the District. Failure to pay these fees will result in forfeiture of this Permit to Operate. Operation without a permit subjects the source to potential enforcement action by the District and the US EPA pursuant to section 502(a) of the Clean Air Act as amended in 1990[40 CFR 70.6(a)(7); Regulation 5, Rule 670].

B. Inspection and Entry - Upon presentation of credentials and other documents as may be required by law, the permittee shall allow the District, CARB, EPA or an authorized representative to perform the following:

1. Enter upon the permittee's premises where a regulated facility or emissions-related activity is located or conducted, or where records must be kept under the conditions of this permit.

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit.

3. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit.

4. Sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the conditions of this permit.
[40 CFR 70.6(c)(2); Regulation 5, Rule 610(e)]

C. Facilities Operation

1. Operation under this permit must be conducted in compliance with all data and specifications included in the application which attest to the operator's ability to comply with District Rules and Regulations[Regulation 1, Rule 240(d)].

2. All nonexempt equipment of this permit shall at all times be maintained in good working order and be operated as efficiently as possible to assure compliance with all applicable emission limits[Regulation 1, Rule 240(d)].

3. Operational Limit - This permit is valid for a maximum of 365 days per year at 24 hours per day[Regulation 1, Rule 240(d)].

D. Compliance

1. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Federal Clean Air Act and is grounds for enforcement action(including monetary civil penalties); for permit termination, revocation and reissuance, or modification; or for denial of an application for reissuance of the permit[40 CFR 70.6(a)(6); Regulation 5, Rule 610(g)].

2. The need to halt or reduce activity is not a defense. It shall not be a defense for a permittee in an enforcement action that it would be necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit[40 CFR 70.6(a)(6); Regulation 5, Rule 610(g)].

3. A pending permit action or notification of anticipated noncompliance does not stay any permit condition[Regulation 5, Rule 610(g)(5)].

4. The permittee shall furnish to the District, within a reasonable time, any information that the District may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. Upon request, the permittee shall also furnish to the District copies of records required to be kept by this permit[40 CFR 70.6(a)(6)].

5. The permittee shall provide to the District on an annual basis a completed "Compliance Certification" form which certifies the compliance status of the facility, and on a semi-annual basis a monitoring certification report which provides certification of the monthly monitoring reports. The compliance certification form and monitoring certification report must be signed by a responsible company official and contain a statement that the information contained in the report is true, accurate, and complete. A semi-annual compliance certification report shall be submitted to document the compliance schedule of any source out of compliance[40 CFR 70.6(c); Regulation 5, Rules 460 and 610(g)].

6. Emergency events which occur at the permittee's plant which affect compliance with the terms of this permit must be reported to the District in accordance with Regulation 1, Rule 540. Emergency events are normally outside influences over which the permittee has no control[Regulation 5, Rule 460].

E. Severability - If any term or condition of this permit shall for any reason be adjudged by a court of competent jurisdiction to be invalid, such judgment shall not affect or invalidate the remainder of this permit[40 CFR 70.6(a)(5); Regulation 5, Rule 610(h)].

F. Recordkeeping and Reporting

1. The permittee shall retain records of all required monitoring data and support information including the date, place, time and results of any sampling or analysis, the operating conditions at the time of sampling for a period of at least five (5) years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records and copies of all reports required by this permit[40 CFR 70.6(a)(3)(ii)(B); Regulation 5, Rule 455].

2. The permittee shall report to the District any deviations from these permit requirements, including those attributable to breakdown conditions, the probable cause of the deviations, and any corrective actions or preventive measures taken. Procedures of Regulation 1, Rule 540 shall be followed in the reporting of such deviations. A breakdown log shall be maintained for recordkeeping purposes[40 CFR 70.6(a)(3)(iii)(B); Regulation 5, Rule 460; Regulation 1, Rule 540].

3. The permittee shall report to the District calendar year plant operating information which includes the number of operating days for the boiler, the amount of steam produced and propane burned[Regulation 1, Rule 240(d)].

4. The permittee shall maintain records of any startup or shutdown, any periods of malfunction of the air pollution control equipment, and any periods during which the CEMS or COMS are inoperative[40 CFR 60.7(b)].

5. The permittee shall submit by February 28th of each year, a combined report to comply with the General Provisions sections D.5 and F.3[Regulation 1, Rule 240(d)].

G. Transfer of Ownership -In the event of any changes in control or ownership of these facilities, this permit together with its terms and conditions shall be binding on all subsequent owners and operators. The permittee shall notify the succeeding owner and operator of the existence of this permit and its conditions by letter, a copy of which shall be forwarded to the District[Regulation 1, Rule 240(j)].

H. Reopening for Cause

1. This permit may be modified, revoked, reopened, reissued, or terminated for the following reasons:

a. Additional requirements under the federal Clean Air Act become applicable to the facility for which three or more years remain on the original term of the permit. Such a reopening shall be completed not later than 18 months after promulgation of the applicable requirement. No such reopening is required if the effective date of the requirement is later than the date on which the permit is to expire.

b. The District or EPA determines that the permit contains a material mistake made in establishing the emissions standards or limitations, or other requirements of the permit.

c. The District or EPA determines that the permit must be revised or revoked to assure compliance with the applicable requirements. [40 CFR 70.7(f); Regulation 5, Rule570]

2. The reopening of this permit for a change to be implemented for a specific permit unit will be allowed without the need to reopen the entire permit and all permit units. Should a general condition be changed, all the associated permit units affected would be reopened[Regulation 1, Rule 240(d)].

3. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition[40 CFR 70.6(a)(6)].

I. Property Rights - This permit does not convey any property rights of any sort, or any exclusive privilege[40 CFR 70.6(a)(6)].

J. Permit Renewal and Expiration - This permit is effective on the date of issuance and will expire in five years and must be renewed every five years thereafter. Permit expiration terminates the permittee's right to operate unless a timely and complete renewal application is submitted. For renewal of a permit, the designated representative shall submit a complete District application no earlier than 18 months and no later than 6 months before the expiration date of the current permit[40 CFR 70.5(a); Regulation 5, Rule 405(b)].

K. Permit Modification - The permittee shall submit an application for a minor or significant permit modification in accordance with District Regulation 5[40 CFR 70.5(a); Regulation 5, Rule 405].

L. Prohibitions - These limitations apply to all emissions sources at the permittee's facility unless more specific and limiting requirements are listed for a individual permitted emissions unit in this permit.

1. **Public Nuisance** - The permittee shall not discharge such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have an natural tendency to cause injury or damage to business or property[H&S 41700].

2. **Visible Emissions** - The permittee shall not discharge into the atmosphere from any source whatsoever any air contaminant for a period or periods aggregating more than three (3) minutes in any one hour which is as dark or darker in shade as that designated as No. 2 on the Ringlemann Chart, as published by the United States Bureau of Mines; or of such opacity as to obscure an observer's view to a degree equal to or greater than Ringlemann 2 or forty (40) percent opacity[Regulation 1, Rule 410(a)].

3. **Fugitive Dust Emissions** - The handling, transporting, or open storage of material in such a manner which allow unnecessary amounts of particulate matter to become airborne, shall not be permitted. Reasonable precautions shall be taken to prevent particulate matter from becoming airborne[Regulation 1, Rule 430].

4. **Sulfur Oxide .issions** - The permittee shall not disc. ge into the atmosphere from any single source of emissions whatsoever sulfur oxides, calculated as sulfur dioxide (SO2) in excess of 1,000 ppm[Regulation 1, Rule 440].

5. **Circumvention** - The permittee shall not construct, erect, modify, operate, or use any equipment which conceals an air contaminant emission, which would otherwise constitute a violation of the limitations of this permit, unless the operation or use of said equipment results in a significant reduction in the total emission of air contaminants[Regulation 1, Rule 400(b)].

6. **Regulation 2, Open Burning Procedures** - The permittee shall not ignite or cause to be ignited or suffer, allow or maintain any open outdoor fire for the disposal of rubber, petroleum or plastic wastes, demolition debris, tires, tar paper, wood waste, asphalt shingles, linoleum, cloth, household garbage or other combustible refuse; or for metal salvage or burning of motor vehicle bodies except as provided in Rule 2-102, Exemptions[Regulation 2].

7. **Title VI, Stratospheric Ozone Protection** - The permittee shall comply with the standards for recycling and emissions reduction pursuant to 40 CFR Part 82, Subpart F, and 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners.

8. **National Emission Standard for Asbestos** - The permittee shall comply with the standards of 40 CFR Part 61 Subpart M which regulates demolition and renovation activities at the power plant as pertaining to asbestos materials.

This permit does not authorize the emission of air contaminants in excess of those allowed by the Health and Safety Code of the State of California or the Rules and Regulations of the North Coast Unified Air Quality Management District as stated in this permit. Any regulation or rule not cited in this permit which may be applicable to a particular emission unit will not be enforceable. This permit cannot be considered as permission to violate existing laws, ordinances, regulation or statutes of other governmental agencies. The violation of any of these terms and conditions shall be grounds for revocation of this permit, and shall be a violation of District Rules and Regulations.

NORTH COAST UNIFIED AIR QUALITY MANAGEMENT DISTRICT

2300 MYRTLE AVENUE
EUREKA, CALIFORNIA 95501

PHONE (707) 443-3093
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DATE: 6/30/2010 BY:

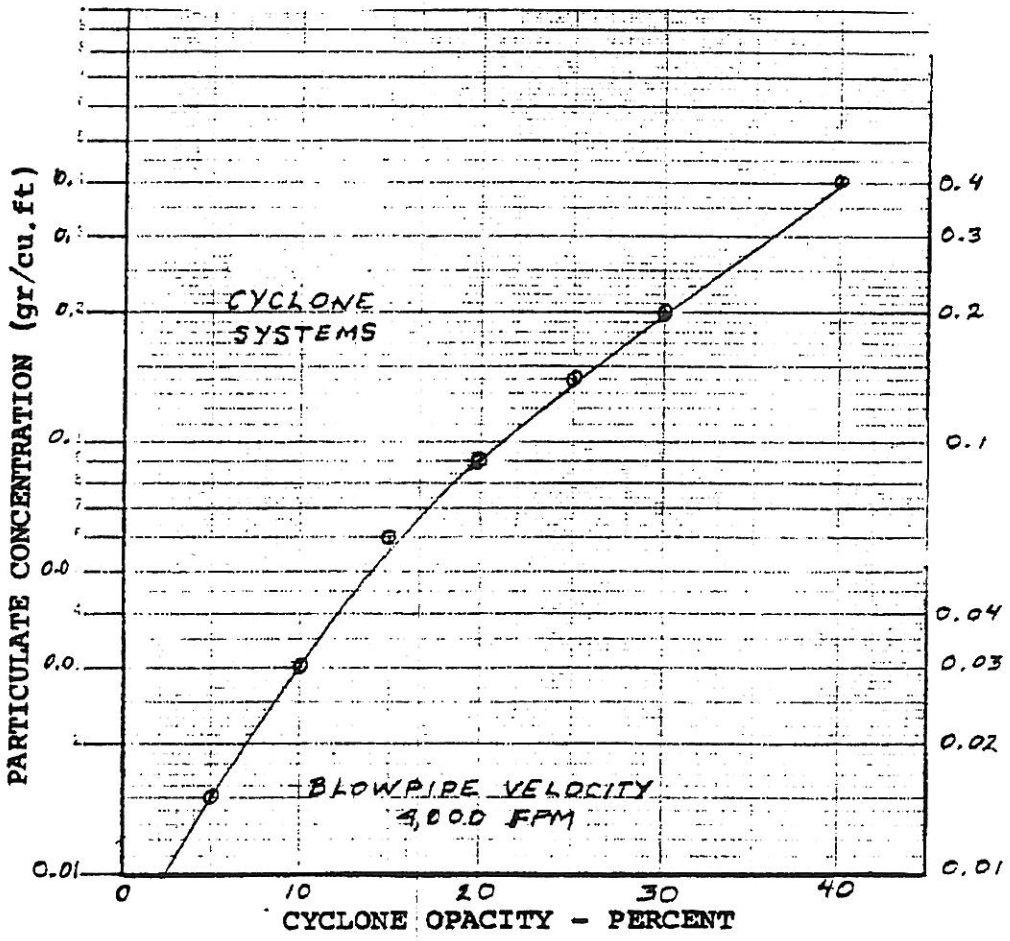
Richard L. Martin, Jr
AIR POLLUTION CONTROL OFFICER

Permit Seal

permits/PL5PO

FIGURE I

CYCLONE TOP OPACITY
vs OUTLET PARTICULATE LOADING
(grains/cubic foot)



APPENDIX D

SITE SPECIFIC SAFETY PLAN

FIELD WORK SAFETY PLAN

Table of Contents:

1.0 Project Personnel Responsibilities

The on-site project manager, or test team leader, is responsible for generating, organizing and compiling this field work safety plan. The project manager is responsible for assuring that adequate training and safety briefing(s) for the activity are provided to those performing the field work. The project supervisor has provided a copy of this field work safety plan and has explained it to each member of the project team prior to field activities.

All test team members are responsible for following the field work safety plan. The test team's safety responsibilities include:

1. Following the field work safety plan.
2. Reporting any unsafe conditions or practices to the project manager.
3. Reporting to the project manager all facts pertaining to incidents which result in injury.
4. Reporting all equipment malfunctions or deficiencies to the project manager and the equipment supplier.
5. Meeting with plant safety personnel and following their site-specific emergency procedures and contractor safety programs.
6. Stop Work Policy – Enforce the stop work policy for any Avogadro operations that threaten the health and safety of the team.

The project manager has the on-site responsibility for ensuring that all team members comply with the field work safety plan. It is the project manager's responsibility to inform all other field personnel of physical and chemical hazards prior to starting work. The project supervisor's responsibilities also include:

1. Providing daily safety briefings for team members and visitors.
2. Updating equipment or procedures to be used at the facility based on any new information gathered at the site.
3. Inspecting all personal protective equipment (PPE) prior to use.
4. Documenting compliance with field work safety plan by completing forms used by The Avogadro Group, LLC.
5. Posting location and route to the nearest medical facility; arranging for emergency transportation to the nearest medical facility.
6. Posting emergency communications procedures.
7. Following all procedures for reporting unsafe conditions and practices.
8. Observing team members for signs of exposure, stress, or other conditions relating to physical conditions and/or work activities.
9. Maintaining site compliance in regards to all client and The Avogadro Group, LLC safety programs (i.e. Hazard Communication, PPE, Emergency Response, Hearing Conservation, Respiratory Protection, and hazardous substance use and safety)
10. Providing to all necessary personnel and agencies, upon request, copies of The Avogadro Group, LLC's written safety plans and documentation of employee training.

The project manager is responsible for reviewing and approving the draft field work safety plan for accuracy and incorporating new information or guidelines which aid the project manager or project supervisor in further definition and control of health and safety hazards associated with the project.

2.0 Training Requirements

Each employee will be familiar with the requirements of this field work safety plan and will participate in site activity and safety briefings and orientation.

All Avogadro employees will have the following training completed as required to maintain both safety compliance and project safety:

Project Managers, Test Team Leaders and Field Technicians

a. Hazard Communication,
b. Emergency Response and Emergency Action Plan Training,
c. Hearing Conservation,
d. Respiratory Protection,
e. Fall protection (including man-lift certification),
f Contractor Electrical Safety,
g. PPE,
h. Hand Power Tool Use/Safety,
i. Ladder and Stairway Safety,
j. Lifting and Back Safety,
k. Lock Out/Tag Out Awareness,
l. Confined Space Awareness,
m. Fire Prevention and Protection,
n. Behavior Based Safety, and
o. First Aid/CPR Safety training

3.0 Personal Protective Equipment

In addition to The Avogadro Group, LLC's field personnel dress code which includes the wearing of *long sleeved shirts* while at job sites, The Avogadro Group, LLC's minimum required personal protective equipment for all employees on-site at all Avogadro project sites includes:

- Hardhats,
- Steel toe work shoes (ANSI rated with leather tops),
- Safety glasses,
- Leather gloves, and
- Hearing protection (double hearing protection may be required at some sites)

Additional PPE may be required as needed to maintain both safety compliance and personal safety. These may include:

- Hot gloves,
- Fall protection safety harness,
- Chemical resistant gloves,
- Chemical resistant goggles with splash protection,
- Chemical resistant suit or apron (MINOR HAZMAT SPILL CLEAN UP ONLY),
- Heat shield and or heat protection suit with mask,
- Respirator, or
- N95 dust mask

Once an employee has successfully completed the training on the proper use, maintenance, and inspection of PPE, it is that employee's responsibility to ensure that his or her PPE is in proper working order.

4.0 Emergency Response

In the event of a plant emergency (i.e. fire, explosion, chemical release, medical emergency, etc) The Avogadro Group, LLC personnel are to follow the client's emergency procedures. Additional Avogadro procedures may be followed but are secondary to the client's procedures.

The Avogadro Group, LLC trains and equips their employees to handle many hazards that may occur on-site. Avogadro employees may assist in emergency procedures but are ultimately responsible for only Avogadro personnel, equipment, and materials. This includes chemicals and samples.

5.0 Hearing Conservation

All Avogadro personnel will follow The Avogadro Group, LLC's program for hearing conservation. In the event that a client's site requires more stringent protection, Avogadro personnel will adhere to the clients hearing conservation program.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

6.0 Hazardous Material and Chemical Use and Safety Guidelines

Avogadro may use various compressed gases and chemicals in small quantities throughout testing.

Avogadro will be operating under Materials of Trade guidelines for the transportation of these chemicals. All chemicals used by Avogadro employees are the sole property of The Avogadro Group, LLC and are not for sale under any circumstance.

Avogadro employees are to strictly follow The Avogadro Group, LLC's written Hazard Communications Program. All personnel will be required to follow proper procedure for labeling and use of hazardous materials and chemicals. This program contains The Avogadro Group, LLC's chemical labeling procedures, SDS information, and chemical list. The project team may use a number of hazardous chemicals during the sampling and analyses of samples. Team members shall follow all safety procedures required in the sampling and analysis methods. Employees shall wear protective eyewear and protective gloves during sampling and during analysis. If splashed with chemicals, the affected areas shall be immediately rinsed in clean water or chemical rinse solution for a minimum of 15 minutes using an ANSI approved rinse device. Eye wash and chemical rinse stations will be available in the mobile laboratory. Medical attention shall be sought as necessary based on the exposure. Staff shall seek medical attention if there is any contact of chemicals with the eyes.

Avogadro will not be generating any hazardous waste during the normal course of testing.

Copies of these programs must be made available to all employees, clients, and/or OSHA inspectors upon request. SDSs are kept on-board every mobile laboratory and are made available to anyone.

7.0 Housekeeping

All areas in and around testing will be kept clear of debris and refuse. All materials and equipment will be organized to limit tripping hazards.

8.0 First Aid

All mobile laboratories will have a stocked and maintained OSHA approved first aid kits on board. These kits will contain basic items to treat only minor cuts, scrapes, and burns. If more than basic first aid is required, medical attention from a certified or trained person will be required.

All Avogadro employees are trained in First Aid and CPR. It is the role of the acting on-site supervisor to ensure proper First Aid is given to all injured Avogadro employees on-site within the confines of their training and to activate Emergency Medical Response if any injury needs medical treatment beyond what can be provided within the confines of their training. First Aid trained personnel employed by The Avogadro Group, LLC are only responsible to give First Aid to Avogadro employees.

Each employee will be made aware of the location and the contents of first aid kits brought on-site.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

9.0 Fire Protection and Prevention

The Avogadro Group, LLC maintains ABC type fire extinguishers on-board all vehicles. Avogadro recognizes that some client's process may be damaged by the use of any "A" type fire extinguisher. In the event that any fire extinguisher must be brought on-site by The Avogadro Group, LLC, the Project Manager or Test Team Leader will ensure that only "B/C" type extinguishers are brought on-site.

All employees are required to follow plant procedures in regards to open flames and smoking. It is the responsibility of the plant to notify the test team of potential flame and fire hazards. In the event that the test requires the use of a flame (i.e. Flame Ionization Detection), the test team leader will be responsible for notifying the plant and following the plant's instructions for safely completing the test.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

10.0 Confined Space

No Avogadro employee is required or will be required to enter any confined spaces.

All Avogadro employees will have awareness level training designed for avoiding confined spaces.

11.0 Respiratory Protection

The Avogadro Group, LLC maintains a Respiratory Protection Program. All aspects of respiratory protection will be done by following this plan. Under no circumstances will any Avogadro employee perform any work that exceeds the limitations of this plan.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

12.0 Hand and Power Tool Use and Inspection

Avogadro does not use any power tools in the course of testing.

All hand tools will be inspected by the user prior to use for signs of excessive wear and condition (rust, burrs, function ability, etc). All tools that are not fit for use will be removed from use, labeled, and replaced.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

13.0 Electrical Safety

All Avogadro employees are trained to follow The Avogadro Group, LLC's Contractor Electrical Safety Plan.

The Avogadro Group, LLC utilizes many **NON-INTRINSICALLY SAFE EQUIPMENT** (i.e. Flame Ionization Detectors, meter boxes, etc.) in the course of normal testing. The Avogadro Group, LLC will notify the plant/company contact prior to powering equipment to ensure that plant safety precautions regarding use of non-intrinsically safe equipment are adhered to.

Employees are to never open panels, junction boxes, or other devices related to the plant power system. If it is necessary to have a device opened, a trained plant person is required to perform all necessary work. Lockout/tag out procedures are to be followed at all times. Observe all appropriate electrical safety procedures when working with electrical equipment of any voltage. Do not handle any exposed electrical conduit, wire, or conductor. Do not disturb any electrical transformer fluids. Avoid wet floors when performing any electrical work.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

All Avogadro employees are Lock Out/Tag Out aware only. If further Lock Out/Tag Out training is required for testing, either appropriate training will be done prior to showing up on-site or a qualified person will perform on-site training. Whichever meets the requirements of the job.

The Avogadro Group, LLC does not own, operate or work on any "energized equipment."

14.0 Fall Protection and Manlift Operation

All Avogadro employees are trained to follow The Avogadro Group, LLC's Fall Protection Plan.

A copy of this program must be made available to all employees, clients, and/or OSHA inspectors upon request.

15.0 Traffic

The Avogadro Group, LLC has established a Driving Safety Program to ensure that all company vehicles are driven and maintained in a safe and healthy manner. Only those employees who have been accepted by Avogadro's automobile insurance company are authorized to drive a motor vehicle on the behalf of the company in the course and scope of work or operate a company owned vehicle. The program is intended to prevent employee injuries and to minimize Avogadro's exposure to loss. The primary goals of the program are as follows:

- To require that all employees driving on behalf of Avogadro drivers must maintain both a current valid motor vehicle license and acceptable driving records.
- To train employees in safe driving practices.

Avogadro employees who drive a company or company rented vehicle or who drive a personal or rented vehicle on behalf of Avogadro must follow general safety controls.

- All drivers and passengers must wear seatbelts.
- Always operate the vehicle in a safe manner.
- Drivers must always use vehicles of the correct size and for the intended use.
- Drivers must always secure all loads and do not exceed the manufacturer's specifications and legal limits for the vehicle.
- Never drive if your vision, hearing, or alertness is impaired due to fatigue, illness, or any other cause. In such instances, Avogadro encourages the use of alternative forms of transportation.
- Never drive while under the influence of alcohol, illegal drugs, prescriptions, or over-the-couther medications that might impair their driving skills.
- Drivers must refrain from using cellular or other communication devices, personal listening devices, and from conducting any other activities which may impede the driver's ability to focus on safely operating the vehicle while it is in motion.
- Writing, sending, or reading text-based communication, including text messaging, instant messaging, operating applications, and e-mail, on a wireless device or cellular phone while driving is prohibited.
- Always drive within the speed limit. (No driver will be required to meet a schedule that would necessitate exceeding the speed limit.)
- Always obey all traffic laws, ordinances, traffic signals, and road signs.

To avoid hazards associated with traffic, employees should be aware of traffic movement at all times and are required to follow all plant safety procedures regarding traffic safety.

16.0 Job Site Hazard Identification

The potential hazards to personnel working at the subject site have been identified as physical hazards of working around equipment (mechanical and electrical equipment, temporary power lines/cables, noise), slips/falls, fatigue, heat stress, and exposure to chemicals. Each potential hazard is described below. Note: this is not an all-inclusive list. Some sites may have additional hazards, which will be included in as an attachment. See attachment 18.1 "Potential Refinery Hazards."

Some work sites may have specific hazards, such as the possibility of exposure to equipment which incorporates the use of asbestos, or exposure to specific hazardous chemicals which approach the OSHA or NIOSH permissible exposure limits.[1] In general, we do not expect to be exposed to these health hazards. If the hazards do exist at particular work sites, it will be the client's responsibility to provide affected Avogadro employees training so that they can complete their tasks safely.

16.1 Physical and Health Hazards

The physical and health hazards can include traffic, working near heavy equipment, working near automatic equipment, temporary and permanent power lines, overhead hazards, pulling and lifting of equipment, slips and falls, climbing and elevated work, chemical exposure, above ground temporary piping, noise, and heat exposure.

16.2 General

Employees must use common sense and follow identified safety procedures when performing field work. Employees are not to climb over or remove any protective barriers unless trained and authorized to do so and proper safety procedures have been implemented. All employees can refuse to perform any field work if they feel they are overly tired, nauseous and/or fatigued to the point that test team and personal safety is at risk. Extreme care must be used when climbing ladders and working on access platforms. Employees must watch and pay careful attention to where they are walking. Employees are to be aware of wet areas and other slip hazards, as they are very common to our everyday activities. There shall be no running.

16.3 Plant Equipment

Employees should be aware of moving parts, which could cause injury when working near equipment. Watch for rotating equipment hazards. Employees are not to remove any guards or protective barriers. Noise levels can be high near operating equipment; hearing protection is to be worn on site at all times.

16.4 Sun, Heat and Cold

Other physical hazards include heat stress or cold stress depending on what the weather is like when the work takes place.

Heat Illness Prevention
CA OSHA Regulation, Title 8 Section 3395

Applies to all outdoor places of employment**.**

Training

Training must be provided to all supervisory and non-supervisory employees in:

- Identifying, evaluating and controlling exposures & symptoms.
- The importance of acclimatization
- Company procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider.
- Company procedures for ensuring that, in the event of emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders.
- Control measures
- The importance of drinking water
- Risk factors
- Emergency procedures
- Employee rights
- Employer responsibility
- **Supervisors must be trained in heat related illness prior to supervision of employees working in the heat. Including procedures to prevent heat illness and procedures to follow when an employee shows symptoms of heat illness.**

Environmental factors

- Working conditions where the possibility of heat illness could occur
- Working in direct sunlight
- Ambient temperature 80°or above
- Required PPE
- Humidity
- Workload and duration

Risk Factors

- Unaccustomed to working in heat
- Physical exertion-work at a steady pace-avoid over exertion
- Medications
- Wearing PPE that traps body heat
- Physical fitness
- Age-older people may have less body water and lower sweat efficiency
- Lack of water consumption

Water

- Employers are required to provide access to potable drinking water in sufficient quantity at the beginning of the work shift.
- Provide 1 quart per employee per hour per shift
- 1 quart x 8 hrs. = 2 Gallons for every employee/day

Shade

- At or below 80 degrees Fahrenheit the employee shall have timely access to shade upon request. For temperatures at or above 80 degrees Fahrenheit, one or more areas with shade shall be provided at all times while employees are present. Shade shall accommodate at least 25% of employees on shift at any one time.
- Employees "suffering from heat illness or believing a preventative recovery period is needed shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes."
- Encourage employees to have a rest break.

FIND SHADE!

  - "Shade" means blockage of direct sunlight.
  - Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool.
  - A vehicle is to be used to provide shade only if the AC is on, so it can be used to cool the body.

High-Heat Procedures

- Employer shall implement high-heat procedures when the temperature equals or exceeds 95° F.
- Supervisors must
    - Ensure effective communication is maintained.
    - Observe employees for alertness and signs or symptoms of heat illness.
    - Remind employees throughout the work shift to drink plenty of water.
    - Maintain close supervision of a new employee for the first 14 days.

Heat Stress

- Occurs when the total heat load on the body exceeds the body's capacity to cool itself.
- Can result in fatigue, skin rashes, and decreased mental alertness that can be a contributor to poor judgment and accidents
- If not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life threatening. These are heat exhaustion and heat stroke.

Heat Cramps

- Heat cramps occurs when the body loses too much salt
- What to do
    - DRINK WATER
    - Replace salt or potassium by drinking electrolyte solutions such as sports drinks eating potassium-rich foods like bananas.

Heat Exhaustion

- Heat exhaustion – the body can't replace fluids/salt lost in sweating
- **The signs and symptoms of heat exhaustion are:**
  - Headache
  - Dizziness
  - Nausea
  - Weakness
  - Fainting
  - Profuse sweating
  - Loss of appetite
  - Dilated pupils
  - Weak and rapid pulse
  - Shallow and rapid breathing
  - Possible cramps in abdomen and extremities
  - Possible vomiting
  - Difficulty walking
  - Cool and sweaty skin to the touch pale to ashen gray coloring.

First Aid for Heat Exhaustion is as follows

- Immediately remove victim to the support area, or if you are the victim proceed to the support area.
- It is important to report to your supervisor any symptoms or signs of heat illness in yourself or your co-workers.
- Start cooling but be careful not to cause a chill (i.e., rest in shade and apply wet towel to forehead; open up and/or remove clothing as much as practical)
- Elevate feet 8-12 inches
- Drink cool water slowly, but only if conscious and not in shock
- If vomiting, and/or the signs and symptoms are not lessening within an hour, **call 911 or the local emergency number** for emergency help and/or transport the victim to emergency room.
- It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

Heat Stroke – DANGER

- Heat Stroke – the body no longer sweats and holds so much heat that the body temperature reaches dangerous levels.
- Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down and the body cannot cool itself sufficiently. As heat is excessively stored in the body, brain damage can result causing permanent disability or death
- Can lead to delirium, convulsions, unconsciousness and death.
- **The signs and symptoms of heat stroke are:**
  - hot, dry skin to the touch
  - reddish coloring
  - body temperature >105 degrees F
  - no sweating
  - mental confusion
  - deep, rapid breathing that sounds like snoring progressing to shallow, weak breathing
  - headache
  - dizziness
  - nausea
  - vomiting
  - weakness
  - dry mouth
  - convulsions
  - muscular twitching
  - sudden collapse
  - possible unconsciousness

Heatstroke is a life-threatening situation. If you suspect someone is suffering from heatstroke, call 9-1-1 or the local emergency number immediately.

First aid for heat stroke is as follows:

- Move the person to a cool place
- Loosen tight clothing
- Remove perspiration soaked clothing
- Apply cool, wet cloths to the skin.
- Fan the person
- If conscious, give small amounts of cool water to drink.
- Place the person on his or her side
- Continue to cool the person by using ice or cold packs on the wrists, ankles, groin, neck and in the armpits.
- Continue to check breathing and circulation.

Review Control Measures at Tailgate Meetings

- Ensure that there is at least 2 gallons of water for each employee for each 8 hour shift.
- Point out areas that may provide shade at your work site.
- Include on JHA
- Include work/rest cycles so that rest periods are taken before excessive fatigue occurs.
- Heat prevention procedures shall be in writing and made available to employees.
- Discuss how employees will call for help.

DRINK WATER!!

- Drink water before and during work in the heat.
- Avoid alcohol and caffeine.
- Plain water, served cool, is excellent. An adequate supply of potable water and drinking cups will be readily available, to provide water during rest periods.

Each workday you start out by putting on your PPE

- Hard Hat
- Safety glasses or Safety goggles
- Steel Toed Boots
- Gloves
- Ear Plugs
- Long sleeved shirts – Dress code

CDC Recommends

- Use sunscreen with a sun protective factor (SPF) 15 or higher, and both UVA and UVB protection.
- Wear clothing to protect exposed skin
- Wear a hat with a wide brim to shade the face, head, ears and neck.
- Wear sunglasses that wrap around and block as close to 100% of both UVA and UVB rays as possible.
- Seek shade, especially during midday hours.
- **EVERYBODY IS AT RISK FOR SKIN CANCER**

Cold Stress

The potential for cold stress is a particular concern when field activities are performed while air temperatures at the site are below 40 degrees F. Limit exposure to outside work during temperature and wind chill extremes and use the correct PPE for any outside work.

Environmental Factors

- Working outside during temperature and wind chill extremes
- Not wearing the required appropriate PPE.
- Pay special attention to protection of the face, head, hands, wrists and feet.

Risk Factors

- Unaccustomed to working in extreme cold.
- Medications.
- Drugs such as nicotine or caffeine because of their diuretic circulatory effects can increase susceptibility to cold.
- Workers with cold or flu or certain diseases, such as diabetes, heart, vascular, and thyroid problems may be more susceptible to the winter elements.
- Becoming exhausted or immobilized, especially due to injury can speed up the effects of the cold weather.

Hypothermia

Hypothermia is the lowering of the body core temperature to the point where it is no longer functioning properly.

Symptoms include:

- Intense shivering.
- Poor coordination, stumbling.
- Loss of memory.
- Thickness of speech and drowsiness.

Hypothermia is insidious, and left untreated, may result in collapse and death.

Dehydration

Dehydration, or the loss of body fluids, occurs gradually in the cold environment and may increase the susceptibility of workers to cold injury due to a significant change in blood flow to the extremities.

- Warm, sweet drinks and soups should be taken to the work site to provide caloric intake and fluid volume.
- Taking certain medication or drugs such as nicotine, or caffeine because of their diuretic circulatory effects can increase susceptibility to cold.

Treatment

Prevent further heat loss, contact emergency services, and transport as soon as possible as directed to a medical facility.

Frostbite

Frostbite is the freezing of body tissue. It may range from minor injury ("frost nip") to complete freezing of an extremity. Untreated frostbitten areas will first become reddened and then become gray or white, particularly on exposed ear lobes, cheeks, or nose. Left untreated, the skin becomes numb and dead white. Watch co-workers for signs of frostbite.

Treatment

Transport as soon as possible to a medical facility.

17.0 Documentation

All documentation will be made available to all employees, clients, and/or OSHA inspectors upon request. This documentation includes daily site safety meetings, training records, training tests, and written plans.

18.0 Attachments

18.1 Potential Refinery Hazards

POTENTIAL REFINERY HAZARDS

The Avogadro Group, LLC performs source testing at refineries such as the ConocoPhillips refinery in Rodeo, CA and the Martinez Refining Company (previously known as the Shell refinery) in Martinez, CA. There are certain health hazards specific to refineries that our employees should be aware of.

Asbestos was used in the construction of the refineries before its use was banned. Attached is an OSHA fact sheet which contains information regarding the health hazards associated with exposure to asbestos particles. Due to the nature of our work, we do not believe our employees will ever be exposed to asbestos at refineries.

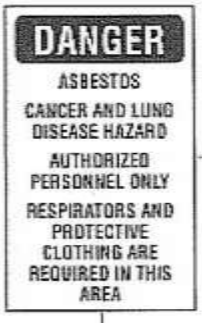
Additional health hazards specific to refineries are exposure to benzene, cadmium, lead, and hydrogen sulfide which are all either produced by or used in petroleum refining operations. The permissible exposure limit (PEL) for benzene in air is 1 ppm based on a time-weighted average during an 8 hour work day. We do not expect to work in areas where the concentration of benzene approaches this PEL. We also do not expect to work in areas which contain significant amounts of liquid benzene.

Exposure to cadmium usually results from working around processes in which cadmium-laden ores are processed. The primary exposure pathway for cadmium is by breathing air which is contaminated with cadmium dust. Cadmium is particularly toxic with a PEL of 5 micrograms per cubic meter. We do not expect to work in areas where this concentration of cadmium is present.

Lead exposure can occur via exposure to breathing air contaminated with lead and by contact through the skin with liquids which contain lead. The PEL for airborne lead is 50 micrograms per cubic meter. We do not expect to work in areas where this concentration of lead is present. We also do not expect to work in areas where exposure to liquids containing lead is a possibility.

Hydrogen sulfide is a byproduct of refinery operations. The NIOSH PEL based on a ten minute time-weighted average is 10 ppm. Exposure to air with a concentration of 100 ppm can be fatal. We do not expect to work in areas where the concentration of hydrogen sulfide approaches the PEL.

It is our policy to ascertain from our refinery clients whether exposure to asbestos, cadmium, lead, and hydrogen sulfide at levels approaching the permissible exposure limits will be likely. If, in the unlikely event that we will be working in an area of the refinery where exposure to these particular health hazards is a possibility, it will be the client's responsibility to provide the affected Avogadro employees training so that they can complete their tasks safely.



OSHA FACT Sheet

Asbestos

What is asbestos?

Asbestos is the name given to a group of naturally occurring minerals used in certain products, such as building materials and vehicle brakes, to resist heat and corrosion. Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these materials that have been chemically treated and/or altered.

What are the dangers of asbestos exposure to workers?

The inhalation of asbestos fibers by workers can cause serious diseases of the lungs and other organs that may not appear until years after the exposure has occurred. For instance, asbestosis can cause a buildup of scar-like tissue in the lungs and result in loss of lung function that often progresses to disability and death. Asbestos fibers associated with these health risks are too small to be seen with the naked eye, and smokers are at higher risk of developing some asbestos-related diseases.

Are you being exposed to asbestos?

General industry employees may be exposed to asbestos during the manufacture of asbestos-containing products or when performing brake and clutch repairs. In the construction industry, exposure occurs when workers disturb asbestos-containing materials during the renovation or demolition of buildings. Employees in the maritime environment also may be exposed when renovating or demolishing ships constructed with asbestos-containing materials. In addition, custodial workers may be exposed through contact with deteriorating asbestos-containing materials in buildings.

Are there any OSHA standards that cover workers exposed to asbestos?

Yes. The Occupational Safety and Health Administration (OSHA) has the following three standards to protect workers from exposure to asbestos in the workplace:

- 29 *CFR* 1926.1101 covers construction work, including alteration, repair, renovation, and demolition of structures containing asbestos.
- 29 *CFR* 1915.1001 covers asbestos exposure during work in shipyards.
- 29 *CFR* 1910.1001 applies to asbestos exposure in general industry, such as exposure during brake and clutch repair, custodial work, and manufacture of asbestos-containing products.

The standards for the construction and shipyard industries classify the hazards of asbestos work activities and prescribe particular requirements for each classification:

- **Class I** is the most potentially hazardous class of asbestos jobs and involves the removal of thermal system insulation and sprayed-on or troweled-on surfacing asbestos-containing materials or presumed asbestos-containing materials.
- **Class II** includes the removal of other types of asbestos-containing materials that are not thermal system insulation, such as resilient flooring and roofing materials containing asbestos.
- **Class III** focuses on repair and maintenance operations where asbestos-containing or presumed asbestos-containing materials are disturbed.
- **Class IV** pertains to custodial activities where employees clean up asbestos-containing waste and debris.

There are equivalent regulations in states with OSHA-approved state plans.

What are the permissible exposure limits for asbestos?

Employee exposure to asbestos must not exceed 0.1 fiber per cubic centimeter (f/cc) of air, averaged over an 8-hour work shift. Short-term exposure must also be limited to not more than 1 f/cc, averaged over 30 minutes. Rotation of employees to achieve compliance with either permissible exposure limit (PEL) is prohibited.

Are employers required to conduct exposure monitoring?

In construction and shipyard work, unless you are able to demonstrate that employee exposures will be below the PELs (a "negative exposure assessment"), you are generally required to conduct daily monitoring for workers in Class I and II regulated areas. For workers in other operations where exposures are expected to exceed one of the PELs, you must conduct periodic monitoring. In general industry, you must perform initial monitoring for workers who may be exposed above a PEL or above the excursion limit. You must conduct subsequent monitoring at reasonable intervals, and in no case at intervals greater than 6 months for employees exposed above a PEL.

Must employers create regulated areas?

You must create controlled zones known as regulated areas that are designed to protect employees where certain work with asbestos is performed. You must limit access to regulated areas to authorized persons who are wearing appropriate respiratory protection. You must also prohibit eating, smoking, drinking, chewing tobacco or gum, and applying cosmetics in these areas. You must display warning signs at each regulated area. In construction and shipyards, workers must perform Class I, II, and III asbestos work (and all other

18.2 OSHA Fact Sheet: Asbestos

Asbestos

operations where asbestos concentrations may exceed a PEL) within regulated areas. In general industry, you must establish regulated areas wherever asbestos concentrations may exceed a PEL.

What compliance methods must employers use to control exposures?

You must control exposures to or below the PELs using engineering controls and work practices to the extent feasible. Where feasible engineering controls and work practices do not ensure worker protection at the exposure limits, you must reduce employee exposures to the lowest levels achievable and then supplement them with respiratory protection to meet the PELs. In construction and shipyards, each work classification has specific control method requirements. In general industry, specific controls are prescribed for brake and clutch repair work. For example, you must prohibit certain practices, such as the use of compressed air, to remove asbestos.

When are employers required to provide respiratory protection for workers?

You must provide and ensure the use of respirators when a PEL is exceeded. In construction and shipyards, you must require workers to use respirators when performing certain work. Generally, the level of exposure determines the type of respirator needed. In addition, the standards specify the type of respirator to be used for certain asbestos work. (See *CFR* 1910.134.) Employees must get respirator training and medical clearance to use respirators.

Are employers required to provide protective clothing for workers?

Yes. For any employee exposed to airborne concentrations of asbestos that exceed a PEL, you must provide and require the use of protective clothing such as coveralls or similar full-body clothing, head coverings, gloves, and foot coverings. You must provide face shields, vented goggles, or other appropriate protective equipment wherever the possibility of eye irritation exists and require workers to wear them.

Must employers provide hygiene facilities?

Yes. You must establish decontamination areas and hygiene practices for employees exposed above a PEL. In addition, employees may not smoke in work areas that might expose them to asbestos.

Do OSHA standards require employers to provide training?

Yes. In construction and shipyards, you must provide training for employees exposed above a PEL and for employees involved in each identified work classification. The specific training requirements depend upon the particular class of work being performed. In general industry, you must provide training to all employees exposed above a PEL. You must also provide asbestos awareness training to employees who perform housekeeping operations covered by the standard. You must place warning labels on all asbestos products, containers, and installed construction materials when feasible.

What are employers required to provide concerning medical examinations?

In construction and shipyards, you must provide medical examinations for workers who, for 30 or more days per year, engage in Class I, II, or III work or experience exposure above a PEL. In general industry, you must provide medical examinations for workers who are exposed above a PEL.

What are the recordkeeping requirements for asbestos exposures?

You must keep accurate records of the following:

- All measurements taken to monitor employee exposure to asbestos—30 years;
- Medical records, including physician's written opinions—duration of the employee's employment plus 30 years; and
- Training records—1 year beyond the last date of employment.

How can you get more information on safety and health?

OSHA has various publications, standards, technical assistance, and compliance tools to help you, and offers extensive assistance through workplace consultation, voluntary protection programs, grants, strategic partnerships, state plans, training, and education. OSHA's *Safety and Health Program Management Guidelines* (*Federal Register* 54:3904-3916, January 26, 1989) detail elements critical to the development of a successful safety and health management system. This and other information are available on OSHA's website.

- For one free copy of OSHA publications, send a self-addressed mailing label to OSHA Publications Office, P.O. Box 37535, Washington, DC 20013-7535; or send a request to our fax at (202) 693-2498, or call us at (202) 693-1888.
- To order OSHA publications online at **www.osha.gov**, go to **Publications** and follow the instructions for ordering.
- To file a complaint by phone, report an emergency, or get OSHA advice, assistance, or products, contact your nearest OSHA office under the "U.S. Department of Labor" listing in your phone book, or call toll-free at **(800) 321-OSHA (6742)**. The teletypewriter (TTY) number is (877) 889-5627.
- To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website.

U.S. Department of Labor
Occupational Safety and Health Administration
2002

JOB HAZARD ANALYSIS FORM

(to be included with all Test Protocols and Field Work Safety Plans)

Project Name: Blue Lake Power - 2016 Source Tests

Project Number: PROJ105445

Project Manager: Mark Stanfield

Pollutants of concern:

☑ CO	☑ NO_X	☐ SO_2	☐ VOC	☐ other

If other, explain: _____

Approximate pollutant concentrations, (ppm):

☐ below 100	☑ 100 to 1,000	☑ 1,000 to 5,000	☐ above 5,000	☐ other

If other, explain: NOx 100-1000, CO 200-2000

Approximate flue gas temperatures, (ºF):

☐ below 210	☑ 210 to 450	☐ 450 to 950	☐ above 950	☐ other

If other, explain: _____

Approximate duct pressures, (iwg):

☐ below -3	☑ -3 to +3	☐ +3 to +7	☐ above +7	☐ other

If other, explain: _____

Approximate sampling platform height, (ft):

☐ below 6	☐ 6 to 50	☑ 50 to 100	☐ above 100	☐ other

If other, explain: _____

Safety barriers around sampling platform:

☑ toe plate	☑ safety rails	☑ tie off point	☑ heat shield	☐ other

If other, explain: _____

JOB HAZARD ANALYSIS FORM

(to be included with all Test Protocols and Field Work Safety Plans)

Excessive noise, (decibels):

☐ below 85 ☑ 85 to 100 ☐ 100 to 110 ☐ above 110 ☐ other

If other, explain: _____

Hazardous atmosphere:

☐ chemical ☐ explosive ☐ biological ☑ fugitive dust ☐ other

If other, explain: _____

Ambient conditions:

☐ inside ☑ outside ☑ wet ☑ slippery ☑ noisy

☑ hot ☑ cold ☑ vibration ☑ dusty ☐ other

If other, explain: _____

Physical demands:

☑ lifting ☑ pulling ☑ bending ☑ kneeling ☑ squatting

☑ standing ☑ pushing ☑ sitting ☑ grasping ☐ other

If other, explain: _____

Personal protective equipment:

☑ hard hat ☑ ear plugs ☐ ear muffs ☑ safety glasses ☐ goggles

☐ leather boots ☑ hard-toe boots ☐ respirators ☑ dust masks ☐ SCBA

☑ gloves ☑ long-sleeves ☐ cold suit ☐ thermal clothes ☑ other

If other, explain: Sun Screen

Driving Directions: Blue Lake Power, LLC
200 Taylor Way, Blue Lake, CA 95525
Emergency Phone Numbers, Medical Care Facilities, and Driving Directions

Primary Emergency Numbers and Facilities:

NOTE: 911 service is available in this area from a land line.
Cell phone use for dialing 911 is NOT recommended.

Occupational Medical Center: (Approximate Distance: __ miles)

ST JOSEPH WORKS OCCUPATIONAL HEALTH SERVICES
2700 Dolbeer St, Eureka, CA **707/445-8121 X5688/5685/5686**

Hours:
Monday – Friday: 8:00am – 5:00pm (closed for lunch > 12:00pm – 1:00pm)
Saturday – Sunday: Closed

Primary ER: (Approximate Distance: 7.5 miles)

MAD RIVER COMMUNITY HOSPITAL
3800 Janes Rd, Arcata, CA.....**707-822-3621 (Main)**
……**707-826-8264 Option 1 (E/R)**

Driving Directions and Map to Emergency Room/Medical Care:

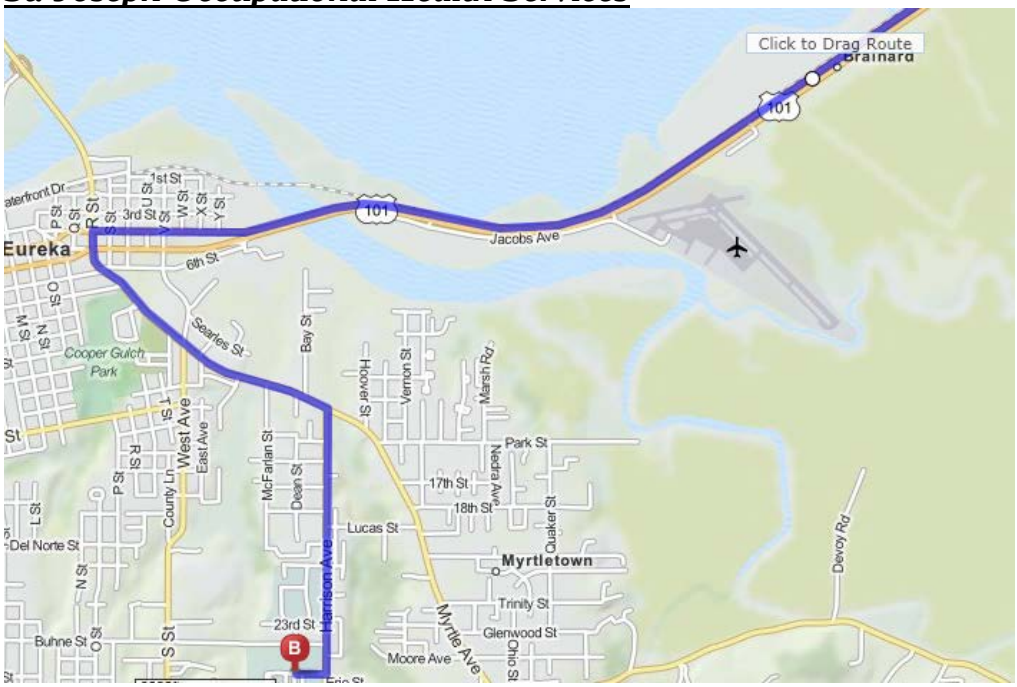
Occupational Medical Center:

1. Start out going east on Taylor Way toward Monda Way
2. Turn left onto Hatchery Rd
3. Turn slight left onto S Railroad Ave
4. Turn right onto Chartin Rd
5. Enter next roundabout and take the 3rd exit onto Blue Lake Blvd.
6. Stay straight to go onto CA-299 W
7. Stay straight to go onto US-101 S
8. Turn left onto R St / CA-255
9. R St/CA-255 becomes Myrtle Ave
10. Turn right onto Harrison Ave
11. Turn right onto St. Joseph Ln
12. Turn left onto Dolbeer St
13. Medical Center is on the right.

Primary ER:

1. Start out going East on Taylor Way toward Hatchery Rd.
2. Turn Left onto Hatchery Rd.
3. Turn slight Left onto S. Railroad Ave.
4. Turn Right onto Chartin Rd.
5. Enter next roundabout and take 3rd exit onto Blue Lake Blvd.
6. Stay straight to go onto CA-299W.
7. Merge onto US-101 N toward Crescent City.
8. Take the Giuntoli Ln/ Janes Rd. exit, Exit 716B.
9. Turn Left.
10. Turn Left onto Giuntoli Ln/Janes Rd.
11. Turn slight Right, Turn Left.
12. Turn slight Right onto Janes Rd.
13. Hospital is on the Right.

St. Joseph Occupational Health Services



Mad River Community Hospital – Primary ER