DOCKETED	
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Project Title:	Compliance - Application for Certification for SMUD's Campbell Soup Cogeneration Project
TN #:	254514
Document Title:	2023 Annual Compliance Report for Campbell Cogen
Description:	2023 Annual Compliance Report for Campbell Cogen
Filer:	Ashley Gutierrez
Organization:	California Energy Commission
Submitter Role:	Commission Staff
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EthosEnergy

Campbell Power Plant
3215 47th Avenue
Sacramento, CA 95824

916-391-2993 (main)

February 9, 2024

Ashley Gutierrez
Compliance Project Manager
California Energy Commission Energy Facilities Citing Division
1516 Ninth St., MS2000
Sacramento, CA 95814-5504

Re: Campbell Power Plant - Annual Compliance Report 2023

Dear Ms. Gutierrez,

Pursuant to California Energy Commission (CEC) Docket Number 93-AFC-3, Section V - Compliance Plan and Monitoring Program, Element II - Project Owner Responsibilities, Condition G - Annual Compliance Report, Campbell Power Plant is submitting the attached Annual Compliance Report for Calendar Year 2023.

If there are any questions, please do not hesitate to call.

Best Regards,

Doug Williamson

Doug Williamson
Campbell Power Plant - Facility Manager
916-391-2993 X4 (0)
916-990-5969 {C)

Cc: Pedro Juarez, SMUD
Rene' Toledo, SMUD
Randall Blank, EthosEnergy

Campbell Power Plant

(Sacramento Finance Authority)

CEC Docket Number: 93-AFC-3

2023 CEC Annual Compliance Report

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1.0 COMPLIANCE MATRIX

See Appendix A for an updated compliance matrix for Campbell Power Plant.

Efficiency

EFF-1 (condition modified on 11/14/2013 when the California Energy Commission approved SPA's petition and changed EFF-1 to read – changes are underlined): For periods when a suitable steam host is accepting steam, the facility shall be operated in accordance with the requirements of Public Resources Code section 25134. For all other periods, Public Resources Code Section 25134 shall not apply to the facility.

[For 2018, Public Resources Code Section 25134 does not apply to the facility.]

a) At least 5% of the cogeneration project's total annual energy output shall be in the form of useful thermal energy.

   Useful thermal export ÷ electric output plus thermal export = Not Applicable

b) The useful annual power output plus one-half the useful annual thermal energy output equals not less than 42.5% of natural gas input.

   Electric MMBTU plus one-half thermal ÷ gas MMBTU = Not Applicable

2023 Facility Parameters	Value	Unit of Measure
Steam Exported	0	Klbs
Steam Enthalpy	0	BTU/Klbs
Condensate Return	0	Klbs
Useful Thermal Export	0	MMBTU
Electric Production (as megawatts)	618,157	MWH
Electric (as heat energy)	2,109,239	MMBTU
Natural Gas Usage	5,136,862	MMBTU

Hazardous Material Handling

HAZ-1 The project owner shall use only those hazardous materials or their equivalent in reportable quantities listed, unless otherwise approved by the CEC CPM.

The plant only uses CEC approved hazardous materials. You will find attached (see Appendix E) a complete list of hazardous materials as submitted October 13, 2023 to

Sacramento County Environmental Management Department. There were no changes to this list in 2023.

Reliability

RELI-1 The project owner shall maintain monthly data sets of power plant reliability and maintenance data.

The project owner shall submit a summary of plant forced outages, including their causes and duration, as well as plant availability factors and forced outage rates for the report period, to the CEC CPM in each annual compliance report following commercial operation of the plant.

2023 Contract Availability	99.90%
2023 Forced Outage Rate	0.10%

Forced Outage	Begin	End	Outage Description
1	8/13/23 08:00	8/13/23 09:31	Flame Detector trouble shooting

Transmission Line Safety and Nuisance

TLSN-3 All radio and television interference records shall be maintained by the project owner, available for CEC CPM inspection, and summarized in the Annual Compliance Reports.

There were no reports of radio or television interference associated with the Campbell Power Plant transmission lines during 2023.

TLSN-5 The project owner shall provide a summary of the inspection results and any clean-up and fire prevention activities along the right of way in the Annual Compliance Report.

In 2023, three trees near the SMUD substation building were removed by the SMUD transmission group because they posed a threat to the substation building. Arborist reported the ‘trees had a basal/trunk defect and posed a risk to the substation perimeter,” The last attachment (F) in this report is the SMUD email documenting the reason and photographs of the area where the trees were removed.

TLSN-8 The project owner shall maintain a record of activities (grounding, notification and correspondence) related to this condition. A summary of these records shall be included in the Annual Compliance Report.

There were no complaints associated with induced voltages on vehicles, fences, or other metallic objects during 2023.

Waste Management

WASTE-1 In the Annual Compliance Report, the project owner shall summarize actual versus planned waste management activities.

Non-Hazardous Solid Waste - disposal of an 8 cubic yard dumpster serviced every week. Based on a full dumpster each service the estimated solid waste would be 416 cubic yards.

Recycled Solid Material – disposal of a 2 cubic yard dumpster serviced every other week. Based on a full dumpster each service the estimated recycled solid material would be 52 cubic yards.

Non-RCRA Hazardous Waste Solid (oily solids) – 78 pounds was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro and Environmental Management Technologies in March.

RCRA Hazardous Waste Liquid – 215 pounds of Laboratory waste was disposed of at US Ecology Nevada, Inc. Beatty, NV by Advanced Chemical Transport Inc. (DBA ACTEnviro) in March.

Non-RCRA Hazardous Waste Liquid – 200 pounds of waste oil was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro in May.

Non-RCRA Hazardous Waste Solid (iron oxide, ammonium salts) – 20 pounds was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro and Environmental Management in May.
RCRA Hazardous Waste Liquid – 185 pounds of Laboratory waste was disposed of at US Ecology Nevada, Inc. Beatty, NV by Advanced Chemical Transport Inc. (DBA ACTEnviro) in May.

Non-Hazardous Waste Liquid – 800 gallons of Waste water wash was disposed of by Advanced Chemical Transport Inc. (DBA ACTEnviro) in June.

Non-RCRA Hazardous Waste Liquid – 45 pounds of waste oil was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro in July.

Non-RCRA Hazardous Waste Solid (oily solids) – 82 pounds was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro and Environmental Management Technologies in September.

RCRA Hazardous Waste Liquid – 259 pounds of Laboratory waste was disposed of at US Ecology Nevada, Inc. Beatty, NV by Advanced Chemical Transport Inc. (DBA ACTEnviro) in September.

Universal Waste – 51 pounds of waste lamps was recycled by ACTEnviro in September.

Universal Waste – 28 pounds of waste batteries was recycled by ACTEnviro in September.

Non-RCRA Hazardous Waste Solid (oily solids) – 316 pounds was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro and Environmental Management Technologies in October.

Non-RCRA Hazardous Waste Liquid – 1216 pounds of waste oil was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro in October.

Non-RCRA Hazardous Waste/Drained Used Oil Filters – 71 pounds - was sent to Environmental Waste Solutions in Parker South, AZ by ACTEnviro in October.

Non-RCRA Hazardous Waste Solid (iron oxide, ammonium salts) – 125 pounds was disposed of at Environmental Waste Solutions in Parker South, AZ by ACTEnviro and Environmental Management in October.

Non-RCRA Hazardous Waste Liquid/Sludge with metals (cooling tower water) – 2550 gallons was disposed of at US Ecology Nevada, Inc. Beatty, NV by ACTEnviro and Environmental Management Technologies in December.

Wastewater Disposal

WATER-2 The project owner shall submit to the CEC CPM a copy of the annual monitoring report submitted to the Regional Water Quality Control Board.

Attached is a copy of the annual report submitted to the State and Regional Water Quality Boards in Appendix B.

Visual Resources

VIS-1 In the Annual Compliance Report during operation, the project owner shall provide to the CEC CPM for review and approval a status report regarding painting maintenance.

In 2023 there was no significant painting maintenance completed.

2.0 SUMMARY OF CURRENT PROJECT OPERATING STATUS AND SIGNIFICANT CHANGES TO FACILITY OPERATIONS

The CAMPBELL POWER PLANT project is operational.

During 2023 the facility completed:

1. Gas Turbine (GT) Major Overhaul
2. GT Generator Inspection
3. GT Generator Breaker overhaul
4. Steam Turbine (ST) Generator Inspection
5. ST Valve Actuator Maintenance
6. Cooling Tower Maintenance
7. Boiler Feed Pump A rebuild
8. HRSG Maintenance

In 2023 CAMPBELL POWER PLANT's Capacity Factor was 43.25%.

3.0 DOCUMENTS AND SUBMITTALS FOR VERIFICATION OF CONDITIONS

Enclosed are the following documents and submittals for verification of the conditions.

1. The Annual Report submitted to the State Water Quality Control Board for the 2022-2023 reporting period (see Appendix B),
2. 2023 SMAQMD Breakdown Reports (see Appendix C), and
3. 2023 RATA/Source Test Report (see Appendix D) and,
4. 2023 Hazardous Materials List (see Appendix E).

4.0 LISTING OF CHANGES TO THE FACILITY AS A RESULT OF COMMISSIONS POST-CERTIFICATION CHANGE/AMENDMENT PROCESS

- The following from last year's Compliance Report applies again this year (due to the postponement of the re-delivery of recycled water. On January 4th, 2024 recycled water flow re-commenced):
    - Commission Order 16-0713-5 (replacing the use of potable water with recycled water in the cooling tower) was adopted at a meeting of the California Energy Commission on July 13, 2016. Recycled water use commenced on July 27, 2020 and was stopped on October 15, 2020.
    - CEC Order No. 22-0309-3 approving Post Certification Petition to Amend allowing for the increase in the cooling tower volatile organic compounds emission rate, which was docketed on 3/11/2022. Recycled water use commenced on June 27, 2022 and was stopped on October 31, 2022.

5.0 EXPLANATION OF ANY SUBMITTAL DEADLINES THAT WERE MISSED

There were no submittal deadlines missed in 2023.

6.0 PERMITS ISSUED IN 2023

In 2023 the following permit(s) were issued for Campbell Power Plant:

- SRSCD sent Discharge Permit #423-002 with an effective date of 1/1/23 and an expiration date of 12/31/2025, on 1/23/23. A Cover letter (for the Permit) revision was received on 5/26/23.
- Received SMAQMD PTO 26874, (Cooling Tower with the use of recycled water; with a date issued of January 25, 2023); revising A/C 26874 on April 5, 2023.
- Received SMAQMD Combustion Turbine PTO 27118, Duct Burner PTO 27116, SCR PTO 27114, CO Catalyst PTO 27115 (revising PTOs: 27275, 14071, 11458 and 11459, respectively) on April 5, 2023.

7.0 PROJECTION OF COMPLIANCE ACTIVITIES SCHEDULED DURING 2024

In 2024 the following activates are scheduled to maintain compliance for SPA.

- 1st Quarter – CEMS Linearity and CGA & Storm Water monitoring
- 2nd Quarter – CEMS Linearity and CGA & Storm Water monitoring (if applicable);
- 3rd Quarter - CEMS Linearity, Biennial Sampling of VOC & Hexavalent Chrome for the Recycled Cooling Tower Water, CGA & Storm Water monitoring (if applicable); and,
- 4th Quarter – Annual Emissions Source Testing, CEMS RATA, Linearity & Storm Water Monitoring

8.0 LIST OF YEAR'S ADDITIONS TO SITE COMPLIANCE FILE

- Campbell's submission to CalOSHA of an annual report as a participant in the Voluntary Protection Program on February 13, 2023.
- CalOSHA Certified Campbell Power Plant as a "STAR" participant in the Voluntary Protection Program for the term February 7, 2023 to February 7, 2026, on January 6, 2023.
- SMUD submitted to SMAQMD a "Change of Information" for Campbell Power Plant Manager contact person on April 24, 2023.
- CEC's CPM issued (via email) Communications Protocol (applicable during the summer months), should Campbell Power Plant experience unplanned incidents that limit generating capacity or impaired operations, that required immediate notification on June 6, 2023.

APPENDIX A

2023 Compliance Matrix.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AIR QUALITY									
AQ-1	The equipment must be properly maintained and operated in accordance with the information submitted with the application manufacture's recommendations at all times.	O R3	CAM	Quarterly Reports	Quarterly	Quarterly	N/A	Ongoing	As part of the Quarterly emissions required by AQ-20
AQ-2	The SMAQMD APCO and/or authorized representatives, must be permitted to do all of the following: a. to enter upon the premises where the source is located or in which any records are required to be kept under the terms and conditions SMAQMD's ATC; b. at reasonable times to have access to and copy any records required to kept under the terms of SMAQMD's ATC; c. to inspect any equipment, operation, or method required in SMAQMD's ATC, and; d. to sample emissions from the source or require samples to be taken	O R3	CAM	None (Ref. AQ-1, AQ-8)	None	N/A	N/A	Ongoing	The project owner must advise appropriate site personnel of this Condition, and provide the Commission CPM with a notification letter that site personnel have been informed regarding this rights of entry described above
AQ-3a	The ATC does not authorize the emission of air contaminants in excess of those allowed by Division 26, Part 4, Chapter 3, of the California H & S Code or the Rules and Regulations of the SMAQMD	O R2	CAM	SMAQMD/CEC Upon Occurrence	None	N/A	N/A	N/A	N/A
AQ-3b	The facility shall not discharge air contaminants that cause injury, detriment, nuisance or annoyance to the public.	C R2 R3	CAM	Quarterly Reports	Quarterly	Quarterly	N/A	Ongoing	As part of the Quarterly emissions required by AQ-20
AQ-4	A legible copy of SMAQMD's ATC must be maintained on the premises with the equipment	O R3	CAM	None	None	N/A	N/A	Ongoing	The project owner must make the site available for inspection by representatives of the District, ARB, and the Commission upon request
AQ-5a	Except as specified in Condition AQ-CM9, concentrations of NO_x emission from the gas turbine and duct burner must not exceed the following limit: 3 ppmv @15% O_2 averaged over any 3-hour consecutive period, excluding start-ups, shutdowns, and short term excursions as defined in AQ-13, AQ-14, and AQ-15. Except as specified in Condition AQ-CM9, concentrations of CO emission from the gas turbine and duct burner must not exceed the following limit: 2 ppmv @15% O2 averaged over any 1-hour consecutive period, excluding start-ups, shutdowns, and short term excursions as defined in AQ-13 and AQ-14.	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-CM9, AQ-19 and AQ-20)	Quarterly	Quarterly	N/A	Ongoing	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20 and submit source test reports required under Condition AQ-25. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-5b	The Turbine and duct burner must meet the following BACT standards: 1. Pollutant - Emission Standard and Work Practice; 2. Nox - 5ppmvd corrected to 15% O2, 3 hour average (A); 3. VOC - The use of an oxidation catalyst (B); 4. CO - 2.0ppmvd corrected to 15% O2, 1 hour average (B); 5. SOx - Use of natural gas (C); PM10/PM2.5 - Use of natural gas and inlet air filtration (C)	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-CM9, AQ-19 and AQ-20)	None	N/A	N/A	Completed	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20 and submit source test reports required under Condition AQ-25. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20). (A) - Based on SMAQMD BACT Determination during the original permitting in 1994. The NOx BACT concentration is for reference only, the applicable regulatory NOx concentration can be found in AQ-5a. (B) - Based on SMAQMD BACT Determination. (C) - Based on SMAQMD BACT Determination during the original permitting in 1994.

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CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AQ-6	Except as specified in Condition AQ-CM10, hourly mass emissions from the gas turbine and duct burner must not exceed the following limits for VOC, NOx, SO2, PM-10/2.5, CO (Normal Steady-state operation), and CO (Worst Case Start-up).	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-CM10, AQ-19 and AQ-20)	Quarterly	Quarterly	N/A	Ongoing	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20 and submit source test reports required under Condition AQ-25. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-7	Emissions from the following equipment at the facility must not exceed the following limits for VOC, NOx, SO2, PM-10/2.5, and CO.	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-CM11, AQ-19 and AQ-20) & SMAQMD PTOs 25725, 24808 and 27117	Quarterly	Quarterly	N/A	Ongoing	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20). Emissions Table now includes VOC & PM2.5 Emissions Limit for the cooling tower.
AQ-8	Combined (quarterly) mass emissions from the following equipment at the facility must not exceed the following limits for VOC, NOx, SOx, PM-10/2.5, and CO including periods containing start-ups, shutdowns, and short term excursions as defined in AQ-13, AQ-14, and AQ-15. This includes GT, DB, and Cooling Tower	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-19 and AQ-20)	Quarterly	Quarterly	N/A	Ongoing	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20).
AQ-9	Concentrations of ammonia (NH3) emissions from the gas turbine and duct burner must not exceed the following limit: 10 ppmv @15% O2 averaged over any 3-hour period, excluding start-ups, shutdowns, and short term excursions as defined in AQ-13, AQ-14, and AQ-15.	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-19 and AQ-20)	Quarterly	Quarterly	N/A	Ongoing	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-10	HAP mass emissions from the facility must not exceed the following limits: Single HAP 9.4 tons/year and Combination of HAPs 24.4 tons/year	O R3	CAM	SMAQMD/CEC Upon Occurrence (Ref. AQ-19 and AQ-20)	Quarterly	Quarterly	N/A	Ongoing	The project owner shall maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-11	The duct burner must not be operated unless the gas turbine is operating.	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	N/A	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20.
AQ-12	Except as specified in Condition AQ-CM3 for the SCR, the turbine and/or the duct burner must not be operated without fully functioning selective catalytic reduction and oxidizing catalyst air pollution control systems, excluding periods of start-ups and shutdowns.	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	N/A	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-13	The duration of the gas turbine's start-up period must not exceed 60 minutes. A. Gas turbine start-ups are defined as the time periods commencing with the introduction of fuel to the gas turbine and ending at the time that 15-minute average NOx concentrations do not exceed 3 ppmv at 15% O2, but in no case exceeding 60 consecutive minutes.	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	N/A	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-14	Gas turbine shutdowns are defined as the 30-minute time period immediately preceding the termination of fuel to the gas turbine.	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	N/A	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)

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AQ-15	Gas turbine short-term excursions are defined as 15-minute periods designated by the applicant that are a direct result of a diffusion mode switchover, not to exceed four consecutive 15-minute periods, when the 15-minute average NOx concentration exceeds 3 ppmv at 15% O2. A. Maximum 3-hour average NOx concentration for periods that include short-term excursions must not exceed 30 ppmv at 15% O2. B. Short-term excursion periods that total in excess of 10 hours per rolling 12-month period must not be excluded from evaluations for compliance with emission limits in Condition Nos. B.1 and B.2.	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	N/A	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-16	The gas turbine and duct burner must only combust natural gas fuel	O R3	CAM	None	None	N/A	N/A	N/A	The project owner must make the site available for inspection by representatives of the District, ARB, and the Commission upon request
AQ-17	The permittee must operate a continuous emission monitoring system that has been approved by the SMAQMD Air Pollution Control Officer for the gas turbine and duct burner.	O R3	CAM	CEMS Records	None	N/A	N/A	N/A	The project owner must provide CEMS protocol for approval by the APCO and CPM. The project owner must make the site available for inspection by representatives of the District, ARB, and the Commission upon request. A summary of significant operation and maintenance events and monitoring records must be included in the quarterly operation report (AQ-20)
AQ-18	The permittee must operate a continuous parameter monitoring system that has been approved by the SMAQMD Air Pollution Control Officer that either measures or calculates and records the following: fuel consumption of GT and DB, and exhaust stack gas flow	O R3	CAM	CEMS Records	None	N/A	N/A	N/A	The project owner must make the site available for inspection by representatives of the District, ARB, and the Commission upon request
AQ-19	The permittee must continuously maintain onsite the following records for the most recent five-year period and must make such records available to the SMAQMD APCO upon request. Quarterly records as specified in the table below must be made available for inspection within 30 days of the end of the quarter.	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-20) & CEMS Records	Quarterly	Q1 - 4/10/2023 Q2 - 7/17/22 Q3 - 10/4/23 Q4 - 1/4/24	N/A	N/A	The project owner must submit appropriate records as required by Condition AQ-20. The project owner must make the site available for inspection by representatives of the District, ARB, and the Commission upon request
AQ-20	Submit to the SMAQMD Air Pollution Control Officer a written report which contains the following information: (EER/NSPS Report)	O R3	CAM	SMAQMD/CEC Upon Request	Quarterly	Q1 - 4/10/2023 Q2 - 7/17/22 Q3 - 10/4/23 Q4 - 1/4/24	N/A	N/A	The project owner must submit quarterly operation reports to the CPM and APCO no later than 30 days following the end of each calendar quarter. This information must be maintained on site for a minimum of five years and must be provided to the CPM and District personnel upon request. The project owner must make the site available for inspection by representatives of the District, ARB, and the Commission upon request
AQ-21	The permittee must surrender (and has surrendered - See Condition AQ-22, AQ-23, and AQ-24) ERCs to the SMAQMD Air Pollution Control Officer to offset the following amount of emissions: (see table)	O R3	CAM	None	None	N/A	N/A	N/A	N/A
AQ-22	The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the ROC emission offset requirements as stated in Condition AQ-21: (see table)	O R2 R3	CAM	None	None	N/A	N/A	N/A	N/A

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AQ-23	The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the NOx emission offset requirements as stated in Condition No. 21: (see table)	O	CAM	None	None	N/A	N/A	N/A	N/A
AQ-24	The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the PM10 emission offset requirements as stated in Condition No. 21: (see table)	O R2	CAM	None	None	N/A	N/A	N/A	N/A
AQ-25	The permittee must perform an ROC, NOx, PM10 and CO source test and CEM accuracy (RATA) test of the gas turbine and duct burner once each calendar year. A. Submit a source test plan to the SMAQMD Air Pollution Control Officer for approval at least 30 days before the source test is to be performed. The source test plan must indicate that U.S. EPA approved test methods are used for NOx and CO. B. Notify the SMAQMD Air Pollution Control Officer at least 7 days prior to the source testing date. C. During the source test the gas turbine and duct burner must be operated at the maximum firing capacity, defined as 90% of the heat input capacity that is achievable based on ambient conditions at the time of the source test. D. Submit the source test results to the SMAQMD Air Pollution Control Officer within 60 days after the completion of the source test(s). E. The SMAQMD Air Pollution Control Officer may waive the ROC and PM10 annual source test requirement every other year if the prior annual source test result indicates that the respective hourly emissions are less than or equal to 75% of the respective hourly emission limit.	O R2 R3	CAM	None	None	Test Completed - 12/5/2023 30-Day Notification on 10/10/2023 7-Day Notification on 11/21/2023 Test Completed - 12/5/2023 Test Submitted - 1/18/24	N/A	Complete	The project owner must submit a test plan to the APCO for approval at least 30 days before the source tests are to be performed. The source test results must be submitted to the APCO and the Commission CPM within 60 days from the completion of the source test
AQ-34a	Prior to operation under the terms of this Authority to Construct, Campbell must surrender the following amounts of ROC and PM10 emission reduction credits. The proposed ROC and PM10 ERC's and their amounts are presented below.	R2	CAM	SMAQMD/CEC Notification	N/A - Submitted as part of previous turbine modifications prior to 2017	N/A	N/A	N/A	The project owner shall provide the District APCO the banking certificates that show the ROC and PM10 reductions of at least the amounts described in this condition. The project owner shall provide the Commission CPM with the copies of the certificates 30 days after approval of this condition.
AQ-S1	The project owner must notify the CPM and the SMAQMD, in writing, of the date the recommissioning period will begin	R R2 R3	CAM	None	None	Recommissioning Completed in 2009; 2017; 2019; 2022	N/A	N/A	The project owner must provide notification of the start of recommissioning to the CPM and SMAQMD at least 30 days before starting the recommissioning activity
AQ-S2	After completing the equipment installation authorized under SMAQMD' ATC, contact SMAQMD to arrange a start-up inspection and CPM must be notified of the startup inspection.	C R2 R3	CAM	SMAQMD/CEC Notification	within 30 days prior to the start-up inspection	6/22/2022	N/A	Complete	Within 30 days prior to the startup inspection, the owner must advise appropriate site personnel of this condition and provide the CPM with a letter that site personnel have been informed regarding the arranged startup inspection.
AQ-S3	The Authority to Construct may serve as a temporary Permit to Operate	C R2	CAM	ATC Issued 2/23/22	None	None	N/A	N/A	ATC 26874's expiration date is 2/23/2024.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AQ-S4	The ATC has been to reviewed and enhanced through New Source Review process by SMAQMD	C R2	CAM	ATC Issued 2/23/22	None	None	N/A	N/A	ATC 26874's expiration date is 2/23/2024.
AQ-S4	The ATC has been reviewed through an Enhanced New Source Review process in accordance with the procedural requirements of Section 401 through 408 of Rule 207 Title V – Federal Operating Permit Program.	R2	CAM	ATC Issued 2/23/22	None			Complete	No verification necessary. ATC 26874 condition S.3. Issued 2/23/2022, expiring on 2/23/2024.
AQ-S5	Campbell must submit to SMAQMD APCO an application to modify the Title V permit with an Administrative Title V Amendment prior to commencing operation/construction with modifications authorized by the ATC.	C R3	CAM	Submit Notification to CPM	Within fifteen (15) working days before the execution of the condition, the facility owner shall notify the SMAQMD APCO and the CPM.	- Partial Startup for CO Limits submitted in February 19 2019 (SPA 19-004). - Title V Admin. Amendment Application for the Cooling Tower Recycled Water project submittted on 11/17/2022 (SFA-CGS 22-005).	TBD	TBD	Submit prior to commencing operation/construction with modifications authorized by SMAQMD's ATC. Within 15 working days before the execution of the condition the owner must notify SMAQMD APCO and CPM.
AQ-CM1	The recommissioning period is defined as follows: The recommissioning period must commence when all mechanical, electrical and control systems associated with the Siemens T-3000 control system are installed and the gas turbine is first fired. The recommissioning period must terminate 30 operating days after commencement, or when the SPA facility has successfully completed performance testing, tuning and shakedown operations and compliance is demonstrated by continuous emissions monitoring equipment, whichever occurs first. For purposes of this condition, operating day" is defined as any calendar day during which fuel is combusted in the turbine or duct burner."	R R3	CAM	None	None	Recommissioning Completed in 2009	N/A	N/A	N/A
AQ-CM2	The facility must record the date that the recommissioning period terminates and submit written notification of this date to the SMAQMD Air Pollution Control Officer within 3 weekdays (Monday through Friday) of such termination.	R R3	CAM	None	None	Recommissioning Completed in 2009	N/A	Complete	The project owner must provide notification of the end of recommissioning to the CPM and SMAQMD within 3 weekdays after completing the recommissioning activity.
AQ-CM3	During the recommissioning period at the earliest feasible opportunity, in accordance with recommendations of the equipment manufacturers and the construction contractor, the gas turbine combustors must be tuned to minimize emissions of CO and NOx.	R R3	CAM	Operator Logs & CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of significant operation and maintenance events must be included in a report of re-commissioning activities provided to the CPM and SMAQMD within 30 days after completing the re-commissioning activity.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AQ-CM4	During the recommissioning period, at the earliest feasible opportunity, in accordance with recommendations of the equipment manufacturers and the construction contractor, the gas turbine and duct burner must operate with the Selective Catalytic Reduction (SCR) system. The SCR system must be adjusted and operated to minimize emissions of NOx.	R R3	CAM	Operator Logs	None	Recommissioning Completed in 2009	N/A	Complete	A summary of significant operation and maintenance events must be included in a report of re-commissioning activities provided to the CPM and SMAQMD within 30 days after completing the re-commissioning activity.
AQ-CM5	During the recommissioning period, compliance with NOx and CO emission limits for the gas turbine and duct burner must be demonstrated through the use of properly operated and maintained continuous emission monitoring systems and continuous parameter monitoring systems for the following: See list	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of monitoring records must be included in a report of re-commissioning activities provide to the CPM and SMAQMD within 30 days after completing re-commissioning activity.
AQ-CM6	During the recommissioning period the monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for the gas turbine and duct burner. Previously approved methods must be used to calculate heat input rates, NOx and CO mass emission rates, and NOx and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to SMAQMD personnel upon request.	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of monitoring records must be included in a report of re-commissioning activities provide to the CPM and SMAQMD within 30 days after completing re-commissioning activity.
AQ-CM7	During the recommissioning period the continuous emission and parameter monitors must be installed, calibrated and operational prior to firing of the gas turbine and duct burner with the new master control system. After initial firing of the gas turbine and duct burner, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of NOx and CO emission concentrations.	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of monitoring records must be included in a report of re-commissioning activities provide to the CPM and SMAQMD within 30 days after completing re-commissioning activity.
AQ-CM8	During the recommissioning period the total number of firing hours of the gas turbine and duct burner without control of NOx emissions by the SCR system must not exceed 100 hours. Such operation of the gas turbine and duct burner shall be limited to discrete recommissioning activities that can only be properly executed without the SCR system fully operational. A. The number of firing hours of the gas turbine and duct burner without control of NOx emissions by the SCR system shall be recorded on an hourly basis during the recommissioning period.	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of monitoring records must be included in a report of re-commissioning activities provide to the CPM and SMAQMD within 30 days after completing re-commissioning activity.
AQ-CM9	During the recommissioning period the total mass emissions of ROC, NOx, SOx, PMI0 and CO that are emitted by the gas turbine and duct burner must accrue towards the quarterly mass emission limits in Condition AQ-8.	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of monitoring records must be included in a report of re-commissioning activities provide to the CPM and SMAQMD within 30 days after completing re-commissioning activity.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AQ-CM10	During the recommissioning period the NOx concentration from the gas turbine and duct burner must not exceed the following limit: NO_x ppm limit	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of significant operation and maintenance events must be included in a report of re-commissioning activities provided to the CPM and SMAQMD within 30 days after completing the re-commissioning activity.
AQ-CM11	During the recommissioning period hourly mass emissions from the gas turbine and duct burner must not exceed the following limits: See table	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of significant operation and maintenance events must be included in a report of re-commissioning activities provided to the CPM and SMAQMD within 30 days after completing the re-commissioning activity.
AQ-CM12	During the recommissioning period daily mass emissions from the gas turbine and duct burner must not exceed the following limits: See table	R R3	CAM	CEMS Records	None	Recommissioning Completed in 2009	N/A	Complete	A summary of significant operation and maintenance events must be included in a report of re-commissioning activities provided to the CPM and SMAQMD within 30 days after completing the re-commissioning activity.
AQ-SC1	The cooling tower must not use any chromium containing water treatment chemicals.	O R2 R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	Complete	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. Water not received compliance determined once in operation
AQ-SC2	The total dissolved solids content of the circulating cooling water must not exceed 3000 ppmw, averaged over any consecutive three hour period on a clock hour basis	O R3	CAM	SMAQMD/CEC Upon Request (Ref. AQ-19 and AQ-20)	None	N/A	N/A	Complete	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20
AQ-SC3	The cooling towers drift rate must not exceed 0.0006%. The project owner shall provide a written vendor statement, prior to installation, declaring the that cooling towers mist eliminators used meet the drift criteria state above.	O R3	CAM	None	None	N/A	N/A	Complete	At least 30 days prior to the installation of drift eliminators on the cooling towers, the project owner must submit to the SMAQMD a written vendor statement declaring that the mist eliminators to be installed meet the drift rate stated above.
AQ-SC4	The following test, reports, and conditions must be met: a. Within 60 days of terminating the recommissioning period but no later than 180 days after commencing the recommissioning period the owner or operator will conduct performance test(s) as per Condition AQ-SC5 and furnish the APCO a written report of the results of such performance test(s) b. The owner or operator must provide the APCO 30 days notice of performance test	R R3	CAM	None	See AQ-SC4	Recommissioning Completed in 2009	N/A	Complete	The project owner must notify the District and perform the source tests described above and submit to the District and the Commission CPM the results of the source tests within 60 days form the completion of the tests, per the requirements of Condition AQ-SC5.
AQ-SC5	The project owner must perform a Nox, ROC, CO, PM10, and NH3 source test and CEM accuracy (RATA) test of the combined cycle combustion turbine with duct fired HRSG during the time frame pursuant to the Condition AQ-SC4	O R3	CAM	None	See AQ-SC4	Test Completed - 12/5/2022	N/A	Complete	The project owner must submit a test plan to the APCO for approval at least 30 days before the source tests are to be performed. The source test results must be submitted to the APCO and the Commission CPM with 60 days from the completion of the source tests.
AQ-SC6	AQ-SC6 As part of the grading and erosion control plans to be submitted to the CPM under the requirement of Condition SOILS-1, the project owner shall include, but not be limited to the following fugitive dust mitigation measures as part of the grading and erosion control plans:	C R2	CAM	Submit to CPM for approval	60 days prior to construction	5/9/2017	N/A	Complete	No control plans required under SOILS-1, therefore no fugitive dust mitigation was required

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AQ-CT1	The turbine, duct burner, and APC SCR and Oxidation catalyst must not discharge into the atmosphere any visible air contaminant other than combined water vapor for a period or periods aggregating more than three minutes in any one hour that is darker than ringlmann No,1 (20% Opacity)	R2 R3	CAM	As part of the Quarterly Air Quality Report (as required by AQ-20), the facility owner shall submit to the Energy Commission CPM a copy of a statement of compliance with the above provisions and regulations.	Quarterly	Q1 - 4/10/2023 Q2 - 7/17/22 Q3 - 10/4/23 Q4 - 1/4/24	TBD	Ongoing	Submit certification as part of AQ-20 reporting to the CPM.
AQ-CT2	Mass Emissions from the cooling tower must not exceed listed hourly, daily, and Quarterly mass emissions limits for VOC, PM10 and PM 2.5	R2 R3	CAM	The project owner shall maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records shall be included in the quarterly operation report (AQ-20).	Quarterly	Q1 - 4/10/2023 Q2 - 7/17/22 Q3 - 10/4/23 Q4 - 1/4/24	TBD	Ongoing	The project owner must maintain appropriate emission data records as required by Conditions AQ-19 and AQ-20. A summary of significant operation and maintenance events and monitoring records must be included in AQ-20.
AQ-CT3	The Sacramento Power Authority must operate a continuous monitoring system that has been approved by the Air Pollution Control Officer that either measures or calculates and records the following - TDS.	R2 R3	CAM	The facility owner must make the site available for inspection by representatives of the SMAQMD, the ARB, and the CPM to verify the continuous monitoring and recordkeeping system is properly installed and operational.	Continuously	NA	NA	NA	The facility owner must make the site available for inspection by representatives of the SMAQMD, the ARB, and the CPM to verify the continuous monitoring and recordkeeping system is properly installed and operational.
AQ-CT4	Testing for VOC/ROC and Hexavalent Chrome (measured as compounds of chrome) of the reclaimed/recycled water inlet to the cooling tower must be performed within 60 days of startup (or if revising the VOC emission limits testing must occur before startup with reclaimed/recycled water) and once every second calendar year thereafter to verify compliance with Condition AQ-CT2 and AQ-SC1.	R2 R3	CAM	At least thirty (30) days before conducting a source test, the facility owner must submit to the SMAQMD and the CPM for their review and approval, a source test plan. The facility owner must notify the SMAQMD and the CPM within seven (7) working days before the project begins initial operation and/or plans to conduct a source test. All source test results must be submitted to the CPM and the SMAQMD within sixty (60) days of the date of the tests.	SMAQMD/CEC	Testing complete - 7/27/22; 30-Day notification on 6/22/22; 7-Day notification on 7/21/22; Test Report submission on 8/25/22	Test plan approval on 7/8/22.	Ongoing	At least thirty (30) days before conducting a source test, the facility owner must submit to the SMAQMD and the CPM for their review and approval, a source test plan. The facility owner must notify the SMAQMD and the CPM within seven (7) working days before the project begins initial operation and/or plans to conduct a source test. All source test results must be submitted to the CPM and the SMAQMD within sixty (60) days of the date of the tests. The CEC was notified of recycled water delivery commencing on 7/27/20.
AQ-CT5	The following records must be continuously maintained onsite for the most recent five year period and must be made available to the Air Pollution Control Officer upon request. Monthly, quarterly, and annual records must be made available within 30 days of the end of the reporting period.	O R3	CAM	The facility owner shall make the site available for inspection by representatives of the SMAQMD, the ARB, and the CPM to verify the continuous monitoring and recordkeeping system is properly installed and operational.	None	NA	NA	NA	The facility owner must make the site available for inspection by representatives of the SMAQMD, the ARB, and the CPM to verify the continuous monitoring and recordkeeping system is properly installed and operational.
AQ-CT6	The project owner must, upon determination of applicability and written notification by the SMAQMD, comply with all applicable requirements of the Air Toxics "Hot Spots" Information and Assessment Act (California Health and Safety Code Section 44300 et seq.)	O R3	CAM	The facility owner must notify the SMAQMD and the CPM within fifteen (15) working days before the execution of this condition.	None	HRA (ESA 194) submitted on 10/7/21	NA	NA	The facility owner must notify the SMAQMD and the CPM within fifteen (15) working days before the execution of this condition.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
AQ-CT7	Prior to commencing operation, the permittee must surrender sufficient ERCs to the SMAQMD Air Pollution Control Officer to offset the following amount of emissions: The applicant has identified three possible credits that individually are sufficient to offset the project VOC emissions. One of the credit certificates originated from the reduction in rice straw burning from the Feather River Air Quality Management District (FRAQMD). The locations of the reduction in rice straw burning are located greater than 15 miles from SCA but less than 50 miles. Two other credits that could potentially be submitted were generated from a shutdown of the compound application process at Campbell Soup Company which is located adjacent to the SPA facility. Therefore, the table below depicts the total quantity of offsets that would be needed to be surrendered for the project.	R2	CAM	At least thirty (30) days prior to the start of construction, the facility owner must provide to the CPM a copy of one of the three certificates listed as follows: SMAQMD #04-00916, or SMAQMD #04-00920 or the signed recertification from Feather River Air Quality Management District and Sacramento Metropolitan Air Quality Management District demonstration the banking certificate (Certificate FRAQMD #99001-T2) which must have been validated.	4/6/2017	04/30/2017 - VOC ERC only for Recycled water. Certificate from Campbell Soup in SMAQMD. - ERC Certificate 04-00917	4/17/2017 & 5/26/2022	Approved by SMAQMD for use for A/C 24808	At least thirty (30) days prior to the start of construction, the facility owner must provide to the CPM a copy of one of the three certificates listed as follows: SMAQMD #04-00916, or SMAQMD #04-00920 or the signed recertification from Feather River Air Quality Management District and Sacramento Metropolitan Air Quality Management District demonstration the banking certificate (Certificate FRAQMD #99001-T2) which must have been validated.
AQ-CT8	The applicant must provide the District, prior to commencing operation under this permit, emission reduction credit certificates in sufficient quantity to offset the emissions increase specified in Condition AQ-CT7. If further source testing of the cooling tower reclaimed/recycled water shows a lower VOC concentration in the reclaimed/recycled water, then the amount of VOC credits submitted may be adjusted downward provided the VOC emission limitations in Conditions AQ-CT2, AQ-7, and AQ-8 are correspondingly adjusted to reflect the revised lower reclaimed/recycled water VOC concentration. Any adjustment of the VOC emission limits and corresponding reduction of VOC credits must occur prior to startup of the cooling tower with reclaimed/recycled water. Source testing must include sampling of the reclaimed/recycled water prior to entering the cooling tower basin.	R2 R3	CAM	Prior to commencing operating of the above activities, the facility owner must provide written notice to the District and the CPM. Any adjustment of the VOC emission limits and corresponding reduction of VOC credits, shall also be in a written notification to the CPM regarding any changes to ERCs.	N/A - No adjustment taken. ERCs surrendered in full (see above).	N/A	N/A	N/A	Prior to commencing operating of the above activities, the facility owner must provide written notice to the District and the CPM. Any adjustment of the VOC emission limits and corresponding reduction of VOC credits, must also be in a written notification to the CPM regarding any changes to ERCs.
BIOLOGICAL RESOURCES									
CULTURAL RESOURCES									
EFFICIENCY CONFORMANCE									
EFF-1	Operation Standard and Efficiency Standard - records and calculations	O	CAM	Monthly Records	CEC Annual Rpt or Upon Request	N/A	N/A	Ongoing	Required in Annual Compliance Report.
FACILITY DESIGN									
GEOLOGY									

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
GEO-3	A Soils Engineering Report as required by Section 1803 of the California Building Code (CBC 2013), or its successor in effect at the time construction of the project were to commence, shall specifically include laboratory test data, associated geotechnical engineering analyses, and a thorough discussion of seismicity; liquefaction; dynamic compaction; compressible soils; corrosive soils; and tsunami. In accordance with CBC, the report must also include recommendations for ground improvement and/or foundation systems necessary to mitigate these potential geologic hazards, if present.	C R2	CAM	Submit Geotechnical Report	17-Jan-17	17-Jan-17	19-Jan-17	Complete	The project owner shall include in the application for a grading permit a copy of the Soils Engineering Report which addresses the potential for strong seismic shaking; liquefaction; dynamic compaction; settlement due to compressible soils; and corrosive soils; and a summary of how the results of the analyses were incorporated into the project foundation and grading plan design for review and comment by the delegate chief building official (CBO). A copy of the Soils Engineering Report, application for grading permit and any comments by the CBO are to be provided to the Compliance Project Manager (CPM) at least 30 days prior to grading for review and approval.

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CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
HAZARDOUS MATERIAL HANDLING									
HAZ-1	List of hazardous materials.	O	CAM	Submit list of hazardous materials used in reportable quantities.	CEC Annual Rpt or Upon Request	N/A	11/12/97	Ongoing	The facility can only use hazardous chemicals/materials listed under HAZ-1, unless otherwise approved by CEC.
HAZ-2	Emergency Response Plan	O	CAM	Draft ER Plan to CPM; 30 day CEC response	CEC - 75 days prior to ops.	10/23/97 SPA 97-379	12/16/97	Complete	
				Final ER Plan to CPM; 15 day final CEC approval	CEC - 30 days after CEC response to draft			Complete	Plan approved 12/16/97.
HAZ-3	Emergency Response Plan	O	CAM	Submit plan to County for comments with copy to CEC; submit any revisions to CEC	Sacramento County CEC 60-days prior delivery	See Comments	5/11/98	Complete	RMPP to County 5/29/97 SPA 97-162; Business Plan to County 6/5/97 SPA 97-168; Both to CEC 6/5/97 SPA 97-169; County has granted permission to bring chemicals on site. Business Plan map revised and submitted 7/17/97 SPA 97-300. RMP (which replaces RMPP) submitted 4/2/98 SPA 98-050. Per J. Scott, HAZ-3 closed 5/11/98.
				Submit any Revisions	Sacramento County CEC Upon Occurrence	Business Plan 07/23/04 RMP 1/31/05	2/3/06	Complete	
HAZ-4	Ammonia storage containment area	O	CAM	None	None	N/A	N/A	N/A	Ammonia containment in service.
HAZ-5	Temporary HCL Spill Containment	O	CAM	Description and specs to CPM for approval; 30 day CEC response	CEC, 30 days after CEC comments	N/A	N/A	N/A	Ammonia containment in service.
				Final description and specs to CPM; 15 day CEC approval response	CEC, 75 days prior delivery	3/5/97 SPA 97-124	N/A	Complete	
HAZ-6	Safety Management Plan	O	CAM	Draft SM plan to CPM for approval; 30 day CEC response	CEC 75 days prior delivery	3/5/97 SPA 97-124	N/A	Complete	
				Final SM plan; 15 day CEC approval response	CEC 30 days after CEC comments	6/5/97 SPA 97-169 8/4/97 SPA 97-313	10/9/1997	Complete	

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
HAZ-7	Ammonia Concentration shall not exceed 30% and tank shall be constructed per ASME	O	CAM	Maintain purchase order records for at least 1 year	CEC Upon Request	N/A	N/A	Ongoing	Concentration limited to 30%. Normal concentration is 24.5%
LAND USE									
NOISE									
NOISE-2	Resolution of Noise Complaints	C & O	CAM	Submit copy of Noise Complaint Resolution Form documenting resolution	SCDEM & CEC 30 days after receipt of complaint	N/A	N/A	Ongoing if Occurs	
				If complaint is not resolved by 30 days, submit updated Resolution Form when mitigation is implemented	SCDEM & CEC as needed	N/A	N/A	Will Start if Occurs	
NOISE-5	Steamblow	C & O	CAM	Submit steamblow schedule to CPM	CEC 10 days prior first steam blow	8/12/97 SPA 97-317 10/14/97 SPA 97-374	N/A	Complete	Commission approved the QuietBlow Steam Blow Amendment submitted 6/27/97 (SPA 97-185).
NOISE-6	Public Notification Program	C & O	CAM	Notify residents within 1 mile	Residents prior start of steam blows	8/12/97 SPA 97-310 8/15/97 SacBee ad	N/A	Complete	Letter sent to residents within 1/2 mile. Also, Sacramento Bee ad placed.
PLANT RELIABILITY									
RELI-1	Plant Reliability Records	O	CAM	Maintain monthly records--available for audit by CEC	N/A	N/A	N/A	On going	
				Summary of forced outages, plant availability factors and forced outage rates	CEC Annual Comp. Rpts	See Annual Report	N/A	On going	Summary required in Annual Compliance Report.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
PUBLIC HEALTH									
Public Health-1	The project owner shall develop and implement a Biocide Use and Monitoring program to ensure that the potential for bacterial growth in cooling water is kept to a minimum. The Biocide Use and Monitoring program shall incorporate, as applicable, the Best Practices and Recommendations for Minimization of Risks Associated with Legionella as outlined in the Cooling Tower Technology Institute July 2008 publication titled "Legionellosis, Guideline: Best Practices for Control of Legionella." The Biocide Use and Monitoring Program shall specifically address full- and part-load plant operation, and short- and long-term shutdowns.	C R2	CAM	Submit Biocide Use and Monitoring Plan	CEC, 60 days prior to commencement of modified cooling tower operations.	10/26/2017	12/13/2017	Complete	At least 60 days prior to the commencement of modified cooling tower operations, the Biocide Use and Monitoring program shall be provided to the CPM for review and approval.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
SAFETY AND FIRE PROTECTION									
SAF-1	Operations Safety and Health Program	O	CAM	Submit final version, w/ OSHA comments, to CPM and notify CEC all plans and records are present on-site	OSHA	10/28/97 SPA 97-382	5/11/1998	Complete	
					CEC	10/28/97 SPA 97-383			
					30 days prior ops.	4/14/98 SPA 98-053			
SAF-2	Operation FPPP	O	CAM	Submit approved plan and letter from Fire Dept. to CPM	City Fire Dept.	10/23/97 SPA 97-379		Complete	Plan submitted to the Sacramento City Fire Dept.
					CEC	11/12/97 SPA 97-390			
					30 days prior ops.	N/A			
SAF-3	Operation EAP	O	CAM	Submit approved plan and letter from Fire Dept. to CPM	City Fire Dept.	10/23/97 SPA 97-379		Complete	Plan submitted to the Sacramento City Fire Dept.
					CEC	11/12/97 SPA 97-390			
					30 days prior ops.	N/A			
SOCIOECONOMICS									
SOIL RESOURCES									
SOILS-1	Erosion & Sediment Control Plan--including temporary and permanent erosion control measures	C & O	CAM	Plan and drawings approved by Sac County to CPM	Sac County	4/11/96 CNF	5/30/96 Cnty appvl	Complete	
					CEC	5/31/96 SPA 96-375	6/12/96 (verbal)		
					30 days prior rough grading	7/10/97 SPA 97-194			
TRANSMISSION LINE SAFETY AND NUISANCE									
TLSN-3	Radio & TV Interference Records	O	CAM	Interference records maintained, available for CEC inspection, and summarized	CEC Annual Compl Rpt	N/A	N/A	Will Start if Occurs	Maintain written records of all complaints for 5 years. There have been no complaints to date.
				Copy of measurements, conclusions and agreements reached	CEC Upon completion of measurements	N/A	N/A	Will Start if Occurs	Measurements to be taken if any complaints of noise or interference on RR signal circuits. There have been no complaints to date.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
TLSN-4	Radio Frequency Noise Measurements	O	CAM	If mitigation necessary, send proof to CEC that mitigation has been implemented	CEC If Needed in Annual Compl Rpt	See Annual Report	N/A	Will Start if Occurs	Information required in Annual Compliance Report if interference occurs.
TLSN-5	Transmission Line Right of way free of flammable mtls.	O	CAM	Project owner shall provide a summary of the inspection results and any cleanup and fire prevention activities along the right of way	CEC Annual Compl Rpt	See Annual Report	N/A	On Going	Summary required in Annual Compliance Report.
TLSN-8	Radio Complaints Due to Induced Voltage	O	CAM	Summary of activities (grounding, notification and correspondence)	CEC Annual Compl Rpt	See Annual Report	N/A	Will Start if Occurs	Summary required in Annual Compliance Report.
TRAFFIC & TRANSPORTATION									
TRANS-4	Transportation Management Plan (TMP)	O	CAM	Submit TMP to CPM for approval	CEC 60 days prior ops.	10/14/97 SPA 97-370 11/24/97 SPA 97-403	12/8/97 (verbal)	Complete On Going	
TRANS-6	Hazardous Materials Compliance	C & O	CAM	Maintain copies of shipping manifests on site	Upon request	N/A	N/A	On Going	
TRANSMISSION SYSTEM ENGINEERING									
TRAFFIC & TRANSPORTATION									
VIS-1	Painting Maintenance	O	CAM	Status report on painting maintenance to CEC for review and approval	CEC Annual Compl Rpt	See Annual Report	N/A	On going	Summary required in Annual Compliance Report.
VIS-2	Lighting Complaint Resolution	C & O	CAM	Keep records on-site	Upon request		N/A	N/A	

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
TRAFFIC & TRANSPORTATION									
WASTE-1	Submit a Waste Management Plan	O	CAM	Submit operation waste mgmt plan for approval	CEC 60 days prior ops.	11/20/97 SPA 97-376 11/24/97 SPA 97-402	12/4/97 (verbal)	Complete	
				Submit summary of planned versus actual waste management activities	CEC Annual Compl Rpt	See Annual Report	N/A		Summary required in Annual Compliance Report.
WASTE-3	Waste Enforcement Action	O	CAM	Written notification of enforcement action taken or proposed against any waste contractor, if necessary	CEC 10 working days after becoming aware of action	None	N/A	N/A	
WATER RESOURCES									
WATER-2	Obtain an NPDES for the facility	O	CAM	Annual Monitoring Report; submit in Annual Compliance Report	SRWQCB CEC Following start of Ops.	See Annual Report	N/A	On Going	
				Notify CEC of any changes or renewal of the permit	CEC If necessary	N/A	N/A	Will start if Occurs	
WATER -5	Prior to site discharge of generated industrial wastewater to the sanitary sewer for ultimate disposal to the Regional San's Sacramento Regional Wastewater Treatment Plant (SRWTP), the project owner shall obtain a Permit for Industrial Wastewater Discharge and comply with the wastewater discharge limitations, pretreatment requirements, peak flow restrictions, payment of fees, and monitoring and reporting requirements of SRWTP as applicable for construction.	R2	CAM	SRCSD Permit Submitted	CEC	2/1/2021	1/23/2023 Received SRCSD Permit #423-002 with expiration of 12/31/2025.	Complete	At least 30 days prior to Campbell's discharge of industrial wastewater generated using recycled water for project operation, the project owner shall provide the CPM with a copy of its Permit for Industrial Wastewater Discharge from Regional San as applicable for construction. The CPM shall be notified in writing within 10 days of any reported non-compliance with Regional San's SRWTP discharge requirements, including corrective measures for non-compliance and the results of implementing those measures.

CAMPBELL POWER PLANT - 2023 COMPLIANCE MATRIX (CEC Docket #: 93-AFC-03C)									
CEC Condition No.	**Description of Condition**	**O / C / R / R2 / R3**	**RESP**	**Verification Requirements**	**Agency / Due Dates**	**Submittal Date / No.**	**Approval Date**	**Status**	**Comments / Action Required**
WATER-6	Prior to use of recycled water for wet cooling operations, the project owner shall provide the CPM a copy of the executed Recycled Water Purchase Agreement (agreement) with the recycled water producer, Regional San, for the supply and delivery of tertiary treated recycled water to Campbell. Campbell shall not connect to the Regional San's recycled water pipeline without the final agreement in place. The project owner shall comply with the requirements of Title 22 and Title 17 of the California Code of Regulations and section 13523 of the California Water Code.	R2	CAM	Recycled Water Purchase Agreement Between CAM and SRCSD	CEC	2/1/2018	8/22/2017	Complete	No later than 30 days prior to the connection to the Regional San's recycled water pipeline, the project owner shall submit a copy of the executed agreement for the long-term supply and delivery of tertiary treated recycled water to Campbell. The agreement shall specify a maximum delivery rate of 1 MGD and total maximum use of 1,120 AFY and shall specify all terms and costs for the delivery and use of recycled water by Campbell. No later than 30 days prior to connection to the Regional San's recycled water main, the project owner shall submit to the CPM a copy of the Engineering Report and Cross Connection inspection and approval report from the California Department of Public Health and all water reuse requirements issued by the CVRWQCB.
WATER-7	The project owner shall use tertiary treated recycled water supplied from the Regional San's Water Reclamation Facility (WRF) as its primary source for evaporative cooling of the steam cycle in the cooling towers and landscape irrigation. Annual usage (excluding fire suppression) shall not exceed 1,120 acre-feet per year (AFY). Prior to the use of recycled water for commercial operation, the project owner shall install and maintain metering devices as part of the water supply and distribution system or verify that the recycled water supplier will provide adequate metering or billing to the project owner to document project water use as required to monitor and record in gallons per day the total volume(s) of water supplied to Campbell from this water source. The metering devices shall be operational for the life of the project. The project may use potable water for backup and blending purposes in cases of interruptions in delivery of the recycled water, and when recycled water quantities or water quality are not sufficient for project use. Potable water shall not be used exclusively for evaporative cooling unless the source of recycled water is unavailable in the event of an emergency. For purposes of this condition, the term emergency shall mean the inability for Campbell to take or for Regional San to deliver recycled water to Campbell in a quantity and quality sufficient to meet Campbell water constituent criteria limits for plant performance due to other circumstances beyond the control of the project owner	R2	CAM	The project owner shall prepare an annual summary, which will include the monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal. The project owner shall report to the CPM any upsets in the delivery of the recycled water, deliveries of insufficient quantities, and water quality for use by Campbell.	CEC	2/6/2024	TBD	Ongoing	The project owner shall prepare an annual summary, which will include the monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary will also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal. The project owner shall report to the CPM any upsets in the delivery of the recycled water, deliveries of insufficient quantities, and water quality for use by Campbell. Recycled water flow commenced on July 28, 2020. Flow was stopped, SRCSD on October 15, 2020 because SRCSD changed the recycled water process. Flow began again on June 27, 2023 and stopped on October 31, 2023 due to a process issue with SRCSD. A projected date for recyclyced water to return is TBD. WATER-7 annual summary is on the next page.

O/C Column:
C = During Construction
O = Operations related (however, may occur during construction)
R = Recommissioning phase in 2009
R2 = Recommissioning (2 times) for Recycled Water Project: Commission orders 16-0713-5 & 22-0309-3
R3 = Recommissioning for Wet Compression, HR3 burner upgrades, Increase CO limits (PTA docketed 12/14/18)

APPENDIX B

Annual report submitted to the State Water Quality Control Board for 2022-2023.

State of California
STATE WATER RESOURCES CONTROL BOARD

GAVIN NEWSOM
GOVERNOR

2022-2023
ANNUAL REPORT
FOR STORM WATER DISCHARGES
ASSOCIATED WITH INDUSTRIAL ACTIVITIES

Reporting Period July 1, 2022 through June 30, 2023

Retain a copy of the completed Annual Report for your records.

Please remember that a Notice of Termination and new Notice of Intent are required whenever a facility operation is relocated or changes ownership.

If you have any questions, please contact your Regional Board Industrial Storm Water Permit Contact. The names, telephone numbers, and e-mail addresses of the Regional Board contacts, as well was the Regional Board office addresses, can be found at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/contact.shtml

General Information

A. Facility Information WDID: 5S34I019346

Business Name: Campbell Power Plant
Physical Address: 3215 47th Ave
City: Sacramento
State: CA
Zip: 95824
Contact Person: Jeremy Johnson
Phone: 916-391-2993
Email: ieremY.iohnson2@smud.ora
Standard Industrial Classification (SIC) Codes: 4911-Electric Services

B. Facility Owner Information

Business Name: Sacramento Power Authority
Mailing Address: 3215 47th Avenue
City: Sacramento
State: CA
Zip: 95824
Contact Person: RYder Couch
Phone: 916-732-5817
Email: rvder.couch@SMUD.ora

C. Facility Billing Information

Business Name: Ethos Eneray Power Plant Services
Mailing Address: 3215 47th Ave
City: Sacramento
State: CA
Zip: 95824
Contact Person: Jeremy Johnson
Phone: 916-391-2993 Ext: 4
Email: ieremy.iohnson@ethosenerayarouo.com

Question Information

1. Has the Discharger conducted monthly visual observations (including authorized and unauthorized Non-Storm Water Discharges and Best Management Practices) in accordance with Section **XI.A.1?**

IZJYes ONo

If No, see Attachment 1, Summary of Explanation.

2. Has the Discharger conducted sampling event visual observations at each discharge location where a sample was obtained in accordance with Section XI.A.2?

IZJYes D No

If No, see Attachment 1, Summary of Explanation.

3. Did you sample the required number of Qualifying Storm Events during the reporting year for all discharge locations, in accordance with Section XI.B?

IZJYes D No

If No, see Attachment 1, Summary of Explanation.

4. How many storm water discharge locations are at your facility?

1

5. Has the Discharger chosen to select Alternative Discharge Locations in accordance with Section XI.C.3?

OYes ☒ No

6. Has the Discharger reduced the number of sampling locations within a drainage area in accordance with the Representative Sampling Reduction in Section XI.C.4?

IZJ Yes ☐ No

6.1. Has the Discharger reduced the frequency of sampling at the facility area in accordance with the Sample Frequency Reduction in Section XI.C.7?

IZJ Yes ☐ No

7. Permitted facilities located within an impaired watershed must assess for potential pollutants that may be present in the facility's industrial storm water discharge. Using the table below, populated based on the facility's location, indicate the presence of the potential pollutant at the facility.

See Attachment 2 for the List of Identified Pollutants within the Impaired Watershed.

8. Has the Discharger included the above pollutants in the SWPPP pollutant source assessment and assessed the need for analytical monitoring for the pollutants?

IZJYes ☐ No

If No, what date will the parameter(s) will be added to the SWPPP and Monitoring Implementation Plan?

9. Were all samples collected in accordance with Section XI.B.5?

IZJ Yes ☐ No

If No, see Attachment 1, Summary of Explanation.

10. Has any contained storm water been discharged from the facility this reporting year?

O Yes IZJ No

If Yes, see Attachment 1, Summary of Explanation.

11. Has the Discharger conducted one (1) annual evaluation during the reporting year as required in Section XV?

IZJYes ☐ No

If Yes, what date was the annual evaluation conducted? 05/05/2023

If No, see Attachment 1, Summary of Explanation.

12. Has the Discharger maintained records on-site for the reporting year in accordance with XXI.J.3?

IZ! Yes ☐ No

If No, see Attachment 1, Summary of Explanation.

If your facility is subject to Effluent Limitation Guidelines in Attachment F of the Industrial General Permit, include your specific requirements as an attachment to the Annual Report (attach as file type: Supporting Documentation).

ANNUAL REPORT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel propoerly gether and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name: Eddie McCormick

Title: Facility Manager Date: 07/10/2023

2022-2023

Annual Report for WDID 5S34I019346

Question Explanations

Explanation Question	Explanation Text
Question 3	The facility has a Sampling Frequency Reduction Certification and is only required to collect two (2) discharge samples per reporting year. Samples were collected in December 2022 and January 2023.

Summary of Attachments

Attachment Type	Attachment Title	Description	Date Uploaded	Part Number	Attachment Hash

2022-2023

Annual Report for WDID 5S34I019346

List of Identified Pollutants in the Watershed

Parameter	Pollutant	Present at Facility?
CarcinoQenic Pesticide Screen	Group A Pesticides	No
Chlorovrifos	Chlorovrifos	No
Diazinon	Diazinon	No
Dieldrin	Dieldrin	No
Dioxin compounds (including 2,3,7,8-TCDD)	Dioxin compounds (including 2,3,7,8-TCDD)	No
Furan Comoounds	Furan Compounds	No
Metals Screen	Mercury	No
Metals Screen	Selenium	No
PCBs (Polychlorinated biphenyls)	PCBs (Polvchlorinated biohenvls\ (dioxin-like\	No
PCBs (Polvchlorinated biphenvlsl	PCBs (Polychlorinated biphenyfs)	No
Soecific Conductivitv	Electrical Conductivitv	No
Total DDT (includinQ DOD, ODE and DDT)	DDT (Dichlorodiphenyftrichloroethane)	No
Total chlordane (sum of isomers: cis- and trans-nonachlor, oxychlordane, alpha- and gamma-chlordane)	Chlordane	No

*** Does your facility storm water flow to one or more TMDL water bodies or watersheds listed in Attachment E? Not Selected**

APPENDIX C

There were no breakdowns and therefore there were no SMAQMD breakdown reports submitted for 2023.

APPENDIX D

2023 Source/RATA Test Report.

Testing Solutions for a Better World

EMISSION COMPLIANCE TEST AND RELATIVE ACCURACY TEST AUDIT FOR THE SIEMENS, V84.2, UNIT #1 PREPARED FOR SACRAMENTO FINANCE AUTHORITY AT THE CAMPBELL POWER PLANT SACRAMENTO, CALIFORNIA DECEMBER 5, 2023

Permit No: TV2007-14-02B

Report Date: January 23, 2024

Corporate Headquarters
1600 W. Tacoma Street
Broken Arrow, OK 74012

AIR HYGIENE, INC.

(918) 307-8865 or (888) 461-8778
www.airhygiene.com

Remote Testing Offices
Chicago, IL
Shreveport, LA
Las Vegas, NV
Pittsburgh, PA
Fort Worth, TX
Salt Lake City, UT

EMISSION COMPLIANCE TEST AND RELATIVE ACCURACY TEST AUDIT FOR THE SIEMENS, V84.2, UNIT #1 PREPARED FOR SACRAMENTO FINANCE AUTHORITY AT THE CAMPBELL POWER PLANT SACRAMENTO, CALIFORNIA DECEMBER 5, 2023

Prepared and Reviewed by:

Bradley Wright
Test Manager

Gavin Dolsky, QI
Staff Engineer – Report Manager

I, _____
Mars A. Sharief, QSTI
Sr. Regional Manager-Chicago, IL
certify that this testing was conducted and this report was created in conformance with the requirements of ASTM D7036

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Emission Compliance Test and Relative Accuracy Test Audit
Siemens, V84.2, Unit #1
Sacramento Finance Authority
Campbell Power Plant
Sacramento, California
December 5, 2023

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the Relative Accuracy Test Audit (RATA) and emission testing study for nitrogen oxides (NOx), carbon monoxide (CO), ammonia (NH_3), particulate matter (PM/PM_{10}), carbon dioxide (CO_2), and oxygen (O_2) from the exhaust of the Siemens, V84.2, Unit #1 for Sacramento Finance Authority at the Campbell Power Plant in Sacramento, California. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on December 5, 2023.

The accumulated data from the RATA provides the figures for evaluating the acceptability of the operation of the on-site continuous emission monitoring system (CEMS) for the monitoring of NOx, CO, and O_2 from the Siemens, V84.2, Unit #1 for Sacramento Finance Authority at the Campbell Power Plant in Sacramento, California.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to perform the periodic quality assurance (QA) RATA on the CEMS that serves the Siemens, V84.2, Unit #1 for Sacramento Finance Authority at the Campbell Power Plant in Sacramento, California as required by operating permit (25725, 14071, 11458, 11459), and the Permit to Operate 21738 . Reference method (RM) testing followed the Code of Federal Regulations (CFR), Title 40 (40 CFR), Part 60 (40 CFR 60), Appendix A, Methods 1, 3A, 7E, 10, and 19. RM values are compared with the on-site CEMS to document performance as required in the 40 CFR 60, Appendix B, Performance Specifications (PS) and 40 CFR 75 Appendix A and B. All relative accuracies were established on-site and were governed by the following sets of rules:

In accordance with 40 CFR 60, Appendix B, PS 2, Section 13.2, the NOx (ppm@15%O_2 and lb/hr) RATA results are acceptable if the relative accuracy (RA) does not exceed 20.0 percent when average emissions during the test are greater than 50 percent of the emission standard or alternative relative accuracy (ARA) does not exceed 10.0 percent when the average emissions during the test are less than 50 percent of the emission standard. Part 60 further requires that the unit be operating at greater than 50 percent of normal load.

In accordance with 40 CFR 75, Appendix A, Section 3.3.2(a) and (b), the NOx (lb/MMBtu) RATA results are acceptable if the relative accuracy (RA) does not exceed 10.0 percent or if during the RATA the average NOx emission rate is less than or equal to 0.200 lb/MMBtu and the average difference between the CEMS and reference method (RM) values does not exceed 0.020 lb/MMBtu. Passing this set of criteria requires the CEMS to be retested after no more than two operating quarters. Alternatively, in accordance with 40 CFR 75, Appendix B, Section 2.3.1.2(a) and (f), and Appendix B, Figure 2, the NOx RATA results are acceptable if the RA does not exceed 7.5 percent or if during the RATA the average NOx emission rate is less than or equal to 0.200 lb/MMBtu and the average difference between the CEMS and RM values does not exceed 0.015 lb/MMBtu. Passing this set of criteria allows the CEMS to be retested after four operating quarters or at least within eight calendar quarters.

In accordance with 40 CFR 60, Appendix B, PS 3, Section 13.2, the O_2 (%) RATA results are acceptable if the relative accuracy (RA) does not exceed 20.0 percent or if the average difference between the CEMS and reference method (RM) values does not exceed plus or minus 1.0 percent of the measured value.

In accordance with 40 CFR 60, Appendix B, PS 4 and 4A, Sections 13.2 of each, the CO (ppm@15%O_2 and lb/hr) relative accuracy (RA) test results are acceptable if the RA does not exceed 10.0 percent, if the average difference between the CEMS and reference method (RM) values plus the 2.5 percent confidence coefficient (2.5%CC) does not exceed 5.0 parts per million (ppm), or if the alternative relative accuracy (ARA) does not exceed 5.0 percent. Part 60 further requires that the unit be operating at greater than 50 percent of normal load.

In addition, the test also serves as a periodic compliance emission test to document levels of selected pollutants. The information will be used to confirm compliance with Condition 17(c) of PTO 21738 and operating permit (25725, 14071, 11458, 11459) issued by the Sacramento Metropolitan Air Quality Management District (SMAQMD). The specific objective was to determine the emission concentration of NOx, CO, NH_3, PM/PM_{10}, CO_2, and O_2 from the exhaust of SPA Siemens, V84.2, Unit #1 while operating at base load with duct burners in operation.

1.2 SUMMARY OF TEST PROGRAM

The following list details pertinent information related to this specific project:

1.2.1 Participating Organizations
- Sacramento Metropolitan Air Quality Management District (SMAQMD)
- Sacramento Finance Authority
- EthosEnergy Group
- Air Hygiene

1.2.2 Industry
- Electric Utility / Electric Services

1.2.3 Air Permit and Federal Requirements
- Permit Number: TV2007-14-02B
- 40 CFR 60, Appendix B, Performance Specifications (PS)
- 40 CFR 75, Appendix A and B

1.2.4 Plant Location
- Campbell Power Plant in Sacramento, California
  - 3215 47th Avenue, Sacramento, California 95824
  - Federal Registry System / Facility Registry Service (FRS) No. – 110001174844
  - Source Classification Code (SCC) – 20100201

1.2.5 Equipment Tested
- Siemens, V84.2, Unit #1
- NOx and O_2 Analyzer (Thermo Scientific 42i-LS, Serial No. 1162880011)
- CO Analyzer (Thermo Scientific 48i, Serial No. 1162880012)

1.2.6 Emission Points
- Exhaust from the Siemens, V84.2, Unit #1
- For all gases and NH_3, one sample point in the exhaust duct from the Siemens, V84.2, Unit #1, determined after conducting a stratification test
- For all wet chemistry testing, 24 sampling points in the exhaust duct from the Siemens, V84.2, Unit #1

1.2.7 Emission Parameters Measured

- NOx
- CO
- NH_3
- PM/PM_{10}
- CO_2
- O_2

1.2.8 Date of Emission Test

- December 5, 2023

1.2.9 Federal and State Certifications

- Stack Testing Accreditation Council AETB Certificate No. 3796.02
- International Standard ISO/IEC 17025:2005 Certificate No. 3796.01
- State of California Air Resources Board Certification

1.3 KEY PERSONNEL

Sacramento Finance Authority:	Pedro Juarez (pedro.juarez@smud.org)	916-732-6139
EthosEnergy:	Randall Blank (Randall.Blank@ethosenergy.com)	916-391-2993
SMAQMD:	Harry Radke (HRadke@airquality.org)	916-825-6842
Air Hygiene:	Mars Sharief (msharief@airhygiene.com)	918-307-8865
Air Hygiene:	Saud Altamini	918-307-8865
Air Hygiene:	Jordan Frakes	918-307-8865
Air Hygiene:	Jayden Miller	918-307-8865
Air Hygiene:	Preston Baker	918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Sacramento Finance Authority's Siemens, V84.2, Unit #1 located at the Campbell Power Plant on December 5, 2023 are summarized in the following tables and relate only to the items tested.

TABLE 2.1
SUMMARY OF SIEMENS, V84.2, UNIT #CT1 RATA RESULTS

Pollutant	Units	Criteria			Results	Passed / Test Frequency
		CFR	Specification / Section	Standard		
NOx	ppmvd@15%O_2	Part 60	Appendix B, Performance Specification 2, Section 13.2	RA ≤ 20.0%, or ARA ≤ 10.0%	RA = 4.0%	YES / ANNUAL
NOx	lb/hr	Part 60	Appendix B, Performance Specification 2, Section 13.2	RA ≤ 20.0%, or ARA ≤ 10.0%	RA = 2.8%	YES / ANNUAL
NOx	lb/MMBtu	Part 75	Appendix A, Section 3.3.2(a),(b) Appendix B, Section 2.3.1.2(a),(f), Figure 2	RA ≤ 10.0%, or if lb/MMBtu ≤ 0.200, d ≤ ±0.020 lb/MMBtu Annual Incentive RA ≤ 7.5%, or if lb/MMBtu ≤ 0.2, d ≤ ±0.015 lb/MMBtu	RA = 7.4% BAF=1.000	YES / ANNUAL
O_2	%vd	Part 60	Appendix B, Performance Specification 3, Section 13.2	RA ≤ 20.0%, or d ≤ ±1.0%	RA = 0.7%	YES / ANNUAL
CO	ppmvd@15%O_2	Part 60	Appendix B, Performance Specification 4, 4A, from all Section 13.2	RA ≤ 10.0%, or d + 2.5% CC ≤ ±5 ppmv, or ARA ≤ 5%	|d|+2.5%CC = 0.3 ppm@	YES / ANNUAL
CO	lb/hr	Part 60	Appendix B, Performance Specification 4, 4A Section 13.2	RA ≤ 10.0%, or d + 2.5% CC ≤ ±5 ppmv, or ARA ≤ 5%	|d|+2.5%CC = 0.7 lb/hr	YES / ANNUAL
Load	MW	Part 60	Appendix B, Performance Specifications	> 50% max load	178.6	WITHIN TOLERANCE
Load	MW	Part 75	Appendix A and B	normal or secondary normal load range	178.6	WITHIN TOLERANCE

Notes: RA = relative accuracy, ARA = alternative relative accuracy, RM = reference method value, d = difference between RM and CEMS value, CC = confidence coefficient, BAF = bias adjustment factor

The RATA passed for all pollutants (NOx, CO, and O_2) in all units (ppmvd@15%O_2, lb/hr, lb/MMBtu, and %vd) under all 40 CFR 60 and 40 CFR 75 criteria.

Specifically, NOx in units of ppm, ppm@15%O_2, and lb/hr, passed 40 CFR 60 criteria with RA's less than 20 percent. NOx in units of lb/MMBtu passed the 40 CFR 75 annual incentive criteria with an RA less than 7.5 percent. Also, the Bias Adjustment Factor test passed with an adjustment factor equal to 1.0 (no adjustment required). O_2 in units of % passed the 40 CFR 60 annual criteria with a RA less than 20 percent. CO in units of ppm and ppm@15%O_2 passed the 40 CFR 60 alternative criteria with a concentration difference between the RM and CEMS analyzers plus the confidence coefficient of less than 5 ppm. CO in units of lb/hr passed the 40 CFR 60 alternative criteria with a concentration difference between the RM and CEMS analyzers plus the confidence coefficient of less than 5 lb/hr.

Unit load was within the 40 CFR 60 required criteria of greater than 50 percent of the maximum load and also fell within the normal load criteria as defined by the plants Quality Control and Monitoring Plan which defined the upper and lower boundary on the unit and the normal and secondary normal load ranges.

TABLE 2.2
SUMMARY OF SIEMENS, V84.2, UNIT #CT1 RESULTS

Parameter	High Load, Run - C1	High Load, Run - C2	High Load, Run - C3	Average	Permit Limits
Date (mm/dd/yy)	12/05/23	12/05/23	12/05/23	12/05/23	--
Start Time (hh:mm:ss)	8:32:26	10:02:26	11:32:26	8:32:26	--
End Time (hh:mm:ss)	9:52:56	11:22:56	12:52:56	12:52:56	--
Run Duration (min / run)	81	81	81	81	--
Bar. Pressure (in. Hg)	30.15	30.16	30.12	30.14	--
Amb. Temp. (°F)	49	55	61	55	--
Rel. Humidity (%)	90	78	66	78	--
Spec. Humidity (lb water / lb air)	0.006555	0.007092	0.007459	0.007035	--
Turbine Fuel Flow (SCFH)	1,196,010	1,181,700	1,166,700	1,181,470	--
Stack Flow (RM19) (SCFH)	37,647,935	37,004,860	36,648,218	37,100,338	--
Power Output (megawatts)	182.0	179.0	176.0	179.0	--
NOx (ppmvd)	2.65	2.64	2.67	2.65	--
NOx (ppmvd@15%O_2)	2.61	2.59	2.63	2.61	3
NOx (lb/hr)	11.91	11.65	11.69	11.75	17.76
NOx (lb/MMBtu)	0.010	0.009	0.010	0.010	--
CO (ppmvd)	0.16	0.09	0.05	0.10	--
CO (ppmvd@15%O_2)	0.16	0.09	0.05	0.10	2
CO (lb/hr)	0.45	0.25	0.13	0.27	7.22
CO (lb/MMBtu)	0.000	0.000	0.000	0.000	--
Total PM_{10} (mg)	3.46	4.42	4.12	4.00	--
Total PM_{10} (g/dscf)	3.32E-05	3.96E-05	4.49E-05	3.92E-05	--
Total PM_{10} (gr/dscf)	5.13E-04	6.11E-04	6.93E-04	6.05E-04	--
Total PM_{10} (kg/hr)	1.31	1.66	1.57	1.51	--
Total PM_{10} (lb/hr)	2.89	3.65	3.47	3.34	7.00
Total PM_{10} (lb/MMBtu)	0.0022	0.0027	0.0030	0.0027	--
Fuel Sulfur (wt %)	1.80E-04	--	--	1.80E-04	--
Fuel Sulfur (grains / 100 scf)	0.058	--	--	0.058	0.5
NH_3 (ppmvd)	0.14	0.32	0.17	0.21	--
NH_3 (ppmvd@15%O_2)	0.14	0.31	0.16	0.20	10
NH_3 (lb/MMBtu)	0.0002	0.0004	0.0002	0.0003	--
CO_2 (%vd)	3.55	3.44	3.45	3.48	--
O_2 (%vd)	14.92	14.89	14.91	14.91	--

The results of all measured pollutant emissions were below the required limits. All testing was performed without any real or apparent errors. All testing was conducted according to the approved testing protocol.

Mr. Harry Radke of SMAQMD was present on-site on December 5, 2023 to observe portions of the RATA and compliance testing.

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

Sacramento Finance Authority owns and EthosEnergy operates Campbell Power Plant located at 3215 47th Avenue in Sacramento, California. Campbell Power Plant includes a 103 megawatt (MW) Siemens V84.2 natural gas turbine, duct burners (DB), and heat recovery steam generator (HRSG) with a 55.9 MW steam turbine. The units incorporate a water spray premixed combustion system served by a selective catalytic reduction (SCR) system.

3.2 SAMPLING LOCATION

The unit exhaust stack is vertical, circular and measures 17 feet (ft) (204 inches) in diameter at the test ports which are approximately 92 ft above grade level with an exit elevation of approximately 100 ft above grade level. The test ports are located approximately 34 ft (408 inches) downstream and approximately 8.5 ft (102 inches) upstream from the nearest disturbances. Air Hygiene has field verified the measurable dimensions. Non-field verified dimensions are provided by Sacramento Finance Authority. All exhaust samples for gaseous emissions were continuously drawn from the exhaust system at the sample ports from a single point determined after conducting a stratification test. During the stratification test three points were traversed from each of the four ports. The probe was allowed to remain at a point for at least two times the system response time. For PM/PM_{10} testing, an initial velocity traverse was performed across the stack from 24 total points. All PM/PM_{10} sampling occurred from the same 24 points by leaving the probe at each for an equal amount of time in order to draw at least 60 dry standard cubic feet of gas through the sample train. All NH_3 sampling occurred from a single point in the stack.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the Siemens, V84.2, Unit #1 at the Campbell Power Plant was performed following United States Environmental Protection Agency (EPA) methods described by the Code of Federal Regulations (CFR). Table 4.1 outlines the specific methods performed on December 5, 2023.

TABLE 4.1
SUMMARY OF SAMPLING METHODS

Pollutant or Parameter	Sampling Method	Analysis Method
Sample Point Location	EPA Method 1	Equal Area Method
Stack Flow Rate	EPA Method 2	S-Type Pitot Tube
Oxygen	EPA Method 3A	Paramagnetic Cell
Carbon Dioxide	EPA Method 3A	Nondispersive Infrared Analyzer
Stack Moisture Content	EPA Method 4	Gravimetric Analysis

Pollutant or Parameter	Sampling Method	Analysis Method
Particulate Matter	EPA Method 5	Front Half Filterables
Nitrogen Oxides	EPA Method 7E	Chemiluminescent Analyzer
Carbon Monoxide	EPA Method 10	Nondispersive Infrared Analyzer
Stack Emission Rate	EPA Method 19	Dry Oxygen F Factor
Particulate Matter	EPA Method 202	Back Half Condensables
Ammonia Slip	BAAQMD ST-1B	BAAQMD LAB-1AM
Sulfur Content Analysis	GPA 2261 and ASTM D5504	Fuel Gas Sample and Laboratory Analysis

4.2 INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used during these tests conform with the methods outlined in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, Methods 1, 2, 3A, 4, 5, 7E, 10, 19; 40 CFR 51, Appendix M, 202; and Bay Area Air Quality Management District (BAAQMD) ST-1B, LAB-1A.

Figure 4.1 depicts the sample system used for the real-time gas analyzer tests. The gas sample was continuously pulled through the probe and transported, via heat-traced Teflon® tubing, to a stainless steel minimum-contact condenser designed to dry the sample. Transportation of the sample, through Teflon® tubing, continued into the sample manifold within the mobile laboratory via a stainless steel/Teflon® diaphragm pump. From the manifold, the sample was partitioned to the real-time analyzers through rotameters that controlled the flow rate of the sample.

Figure 4.1 shows that the sample system was also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allowed for convenient performance of system bias checks as required by the testing methods.

All instruments were housed in a climate controlled, trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e., NOx calibration gases).

Table 4.2 provides a description of the analyzers used for the instrument portion of the tests. All data from the continuous monitoring instruments were recorded on a Logic Beach Portable Data Logging System which retrieves calibrated electronic data from each instrument every one second and reports an average of the collected data every 30 seconds.

Ten test runs of approximately 21 minutes each were conducted on the Siemens, V84.2, Unit #1 for NOx, CO, CO_2, and O_2. Three test runs pulling at least 60 dry standard cubic feet of sample were run for the PM/PM_{10} testing. Three runs of approximately 45 minutes each were conducted for NH_3.

The stack gas analysis for O_2 and CO_2 concentrations was performed in accordance with procedures set forth in EPA Method 3A. The O_2 analyzer uses a paramagnetic cell detector, and the CO_2 analyzer uses a continuous nondispersive infrared analyzer.

EPA Method 7E was used to determine concentrations of NOx. A chemiluminescent analyzer was used to determine the nitrogen oxides concentration in the gas stream. A NO_2 in air manufacturer-certified gas cylinder was used to verify at least a 90 percent NO_2 conversion on the day of the test.

CO emission concentrations were quantified in accordance with procedures set forth in EPA Method 10. A continuous nondispersive infrared (NDIR) analyzer was used for this purpose.

TABLE 4.2
ANALYTICAL INSTRUMENTATION

Parameter	Manufacturer and Model	Range	Sensitivity	Detection Principle
NOx	THERMO 42i-LS	User may select up to 5,000 ppm	0.1 ppm	Thermal reduction of NO_2 to NO. Chemiluminescence of reaction of NO with O_3. Detection by PMT. Inherently linear for listed ranges.
CO	THERMO 48i	User may select up to 10,000 ppm	0.1 ppm	Infrared absorption, gas filter correlation detector, microprocessor-based linearization.
CO_2	THERMO 410i	0-20%	0.1%	Nondispersive infrared
O_2	THERMO 410i	0-25%	0.1%	Paramagnetic cell, inherently linear.

Figures 4.2 and 4.3 represent the sample system used for the wet chemistry tests (PM_{10}, NH_3). A heated stainless-steel probe with a glass liner and glass nozzle was inserted into the sample ports of the stack to extract gas measurements from the emission stream through a filter and glass impinger train. Flow rates were monitored with oil filled manometers and total sample volumes were measured with a dry gas meter. Glassware that is used to collect and analyze Method 202 condensable particulate samples is cleaned prior to the test with soap and water, and rinsed using tap water, deionized water, acetone, and finally, hexane. After cleaning, Air Hygiene incorporates glassware baked at 300°C for six hours rather than the alternative of collecting a field train proof blank.

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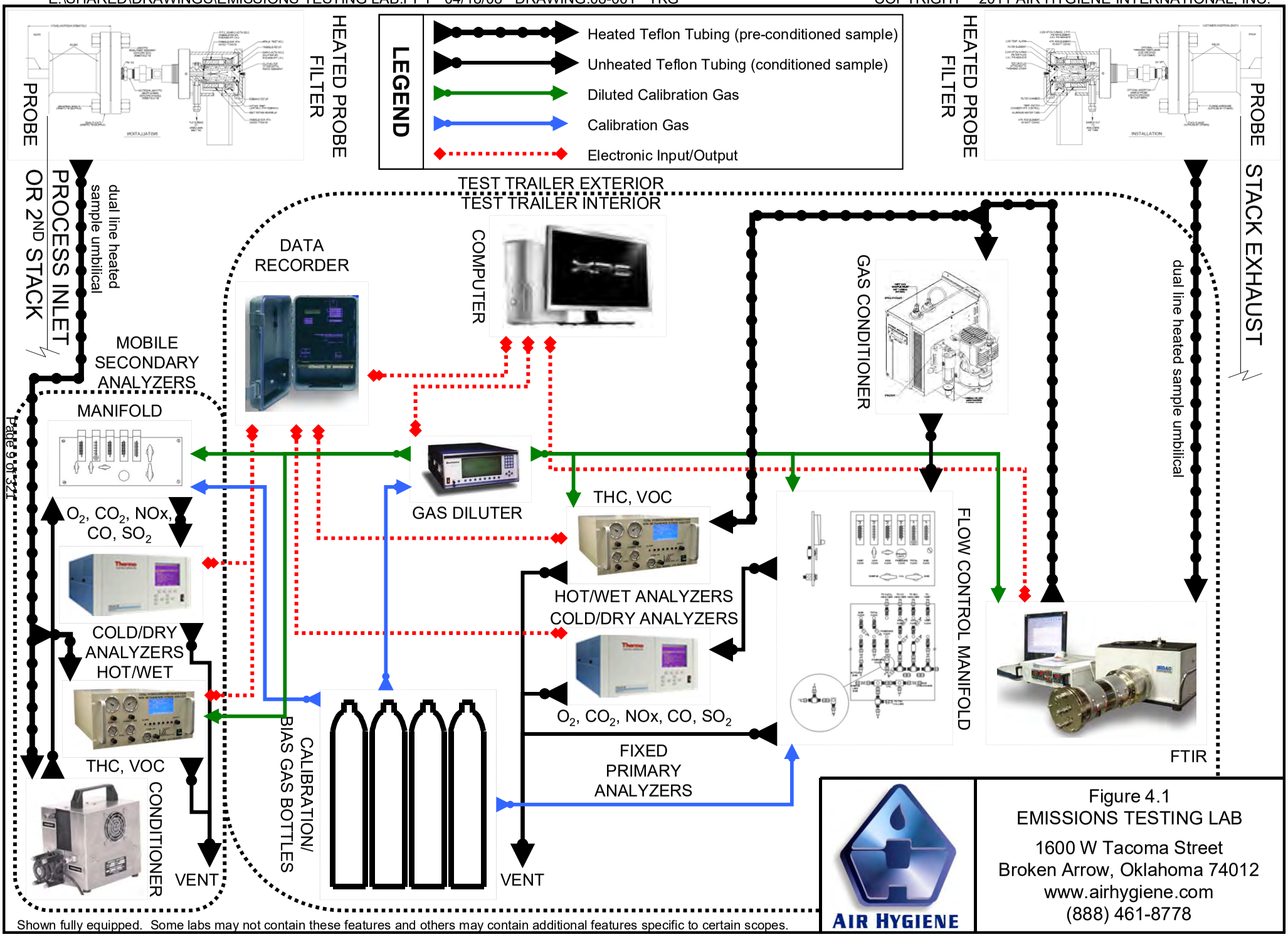

Shown fully equipped. Some labs may not contain these features and others may contain additional features specific to certain scopes.

Figure 4.1
EMISSIONS TESTING LAB

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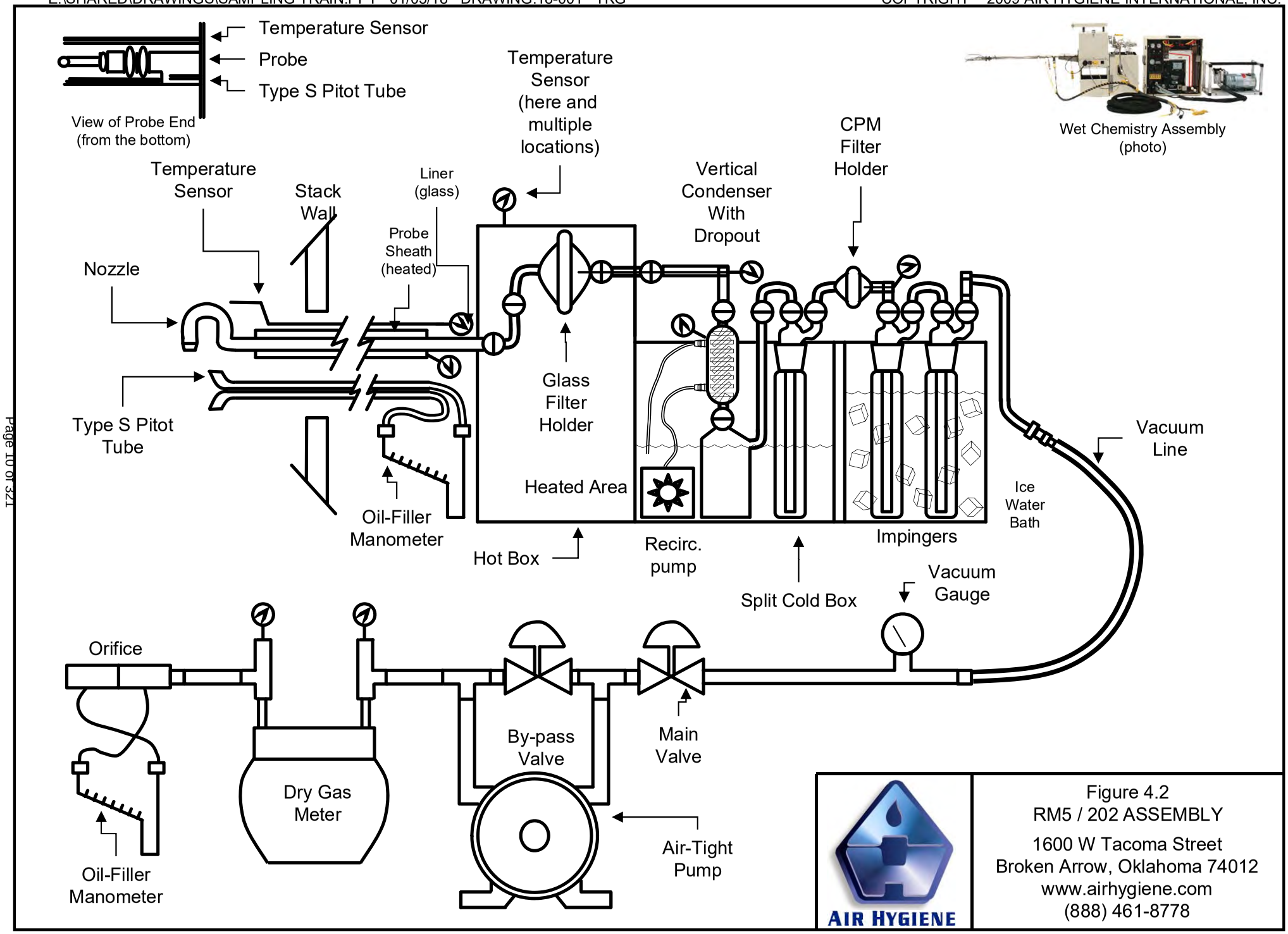

Figure 4.2
RM5 / 202 ASSEMBLY

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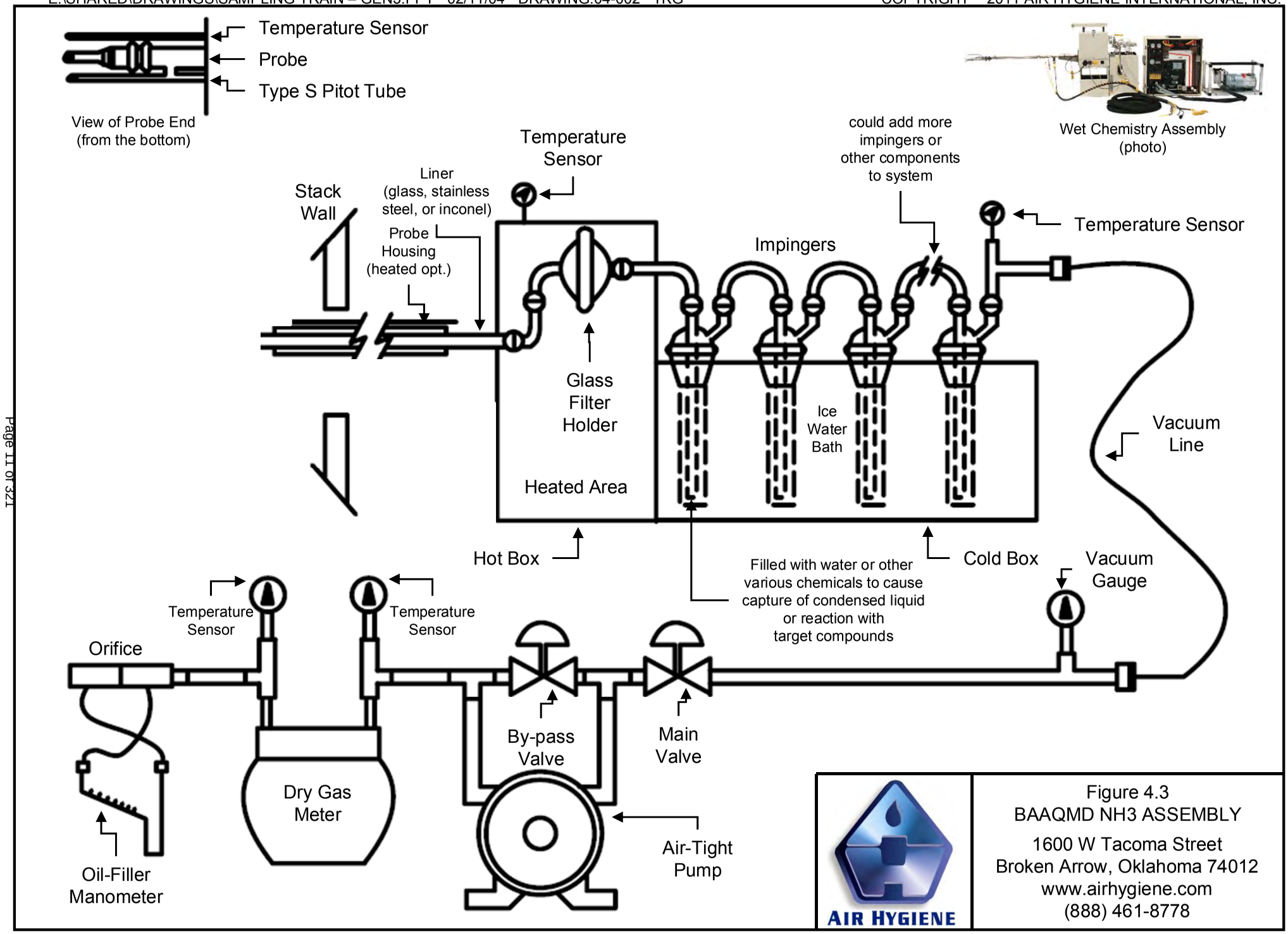

Figure 4.3
BAAQMD NH3 ASSEMBLY

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APPENDIX A

TEST RESULTS AND CALCULATIONS

TABLE A.1:
EMISSIONS TESTING SCHEDULE

Unit	Load	Test Type	Run	Date	Start	Stop	Time Sync	Duration
CT1	Normal	Stratification Test	1	12/05/23	6:58:26	7:47:26	DAHS	0:49:30
CT1	Normal	Gas RATA	1	12/05/23	8:32:26	8:52:56	DAHS	0:21:00
CT1	Normal	Gas RATA	2	12/05/23	9:02:26	9:22:56	DAHS	0:21:00
CT1	Normal	Gas RATA	3	12/05/23	9:32:26	9:52:56	DAHS	0:21:00
CT1	Normal	Gas RATA	4	12/05/23	10:02:26	10:22:56	DAHS	0:21:00
CT1	Normal	Gas RATA	5	12/05/23	10:32:26	10:52:56	DAHS	0:21:00
CT1	Normal	Gas RATA	6	12/05/23	11:02:26	11:22:56	DAHS	0:21:00
CT1	Normal	Gas RATA	7	12/05/23	11:32:26	11:52:56	DAHS	0:21:00
CT1	Normal	Gas RATA	8	12/05/23	12:02:26	12:22:56	DAHS	0:21:00
CT1	Normal	Gas RATA	9	12/05/23	12:32:26	12:52:56	DAHS	0:21:00
CT1	Normal	Gas RATA	10	12/05/23	13:02:26	13:22:56	DAHS	0:21:00
CT1	Normal	Compliance Gases	1	12/05/23	8:32:26	9:52:56	DAHS	1:21
CT1	Normal	Compliance Gases	2	12/05/23	10:02:26	11:22:56	DAHS	1:21
CT1	Normal	Compliance Gases	3	12/05/23	11:32:26	12:52:56	DAHS	1:21
CT1	Normal	Ammonia Slip	NH3-1	12/05/23	8:32:00	9:17:00	DAHS	0:45
CT1	Normal	Ammonia Slip	NH3-2	12/05/23	11:00:00	11:45:00	DAHS	0:45
CT1	Normal	Ammonia Slip	NH3-3	12/05/23	12:19:00	13:04:00	DAHS	0:45
CT1	Normal	Preliminaries	V1	12/05/23	6:45:00	7:15:00	DAHS	0:30
CT1	Normal	Particulates	PM-1	12/05/23	7:17:00	9:35:00	DAHS	2:18
CT1	Normal	Particulates	PM-2	12/05/23	10:27:00	12:45:00	DAHS	2:18
CT1	Normal	Particulates	PM-3	12/05/23	13:12:00	15:29:00	DAHS	2:17

Note: DAHS Time (PST)

EXAMPLE CALCULATIONS (INFORMATION)

Specific Humidity (RH_{sp})

Note: RHsp (gr/lb) calculated using temperature, relative humidity, and barometric pressure with psychrometric chart, psychrometric calculator, or built in psychrometric algorithm.

$$RH_{sp}(lb/lb) = \left[\left(\frac{gr}{lb}\right) \times \frac{lb}{7000\,gr}\right]$$

$$RH_{sp} = \frac{45.88\ gr}{lb} \times \frac{1\ lb}{7000\ gr} = 0.006555\ \frac{lb\ H_2O}{lb\ Air}$$

EXAMPLE CALCULATIONS (CALIBRATION)

Analyzer Calibration Error

RM 7E, (02-27-14), 12.2 Analyzer Calibration Error. For non-dilution systems, use Equation 7E-1 to calculate the analyzer calibration error for the low-, mid-, and high-level calibration gases. (calc for NOx analyzer mid gas, if applicable)

$$ACE = \left(\frac{C_{Dir} - C_V}{CS}\right) \times 100 \qquad \text{Eq. 7E-1}$$

$$ACE = \frac{5.04\ ppm - 5.06\ ppm}{9.05\ ppm} \times 100 = -0.22\ \%$$

EXAMPLE CALCULATIONS (BIAS, DRIFT, AND CORRECTED RAW AVERAGE)

System Bias

RM 7E, (02-27-14), 12.3 System Bias. For non-dilution systems, use Equation 7E-2 to calculate the system bias separately for the low-level and upscale calibration gases. (calc for NOx analyzer upscale gas, Run 1 initial bias, if applicable)

$$SB = \left(\frac{C_S - C_{Dir}}{CS}\right) \times 100 \qquad \text{Eq. 7E-2}$$

$$SB = \frac{4.92\ ppm - 5.04\ ppm}{9.05\ ppm} \times 100 = -1.33\ \%$$

Drift Assessment

RM 7E, (02-27-14), 12.5 Drift Assessment. Use Equation 7E-4 to separately calculate the low-level and upscale drift over each test run. (calc for NOx analyzer upscale drift, Run 1, if applicable)

$$D = \left|SB_{final} - SB_i\right| \qquad \text{Eq. 7E-4}$$

$$D = |\ -0.33\ \% - -1.33\ \%\ | = 0.99\ \%$$

Alternative Drift and Bias

RM 7E, (02-27-14), 13.2 / 13.3 System Bias and Drift. Alternatively, the results are acceptable if |Cs – Cdir| is ≤ 0.5 ppmv or if |Cs – Cv| is ≤ 0.5 ppmv (as applicable). (calc for NOx analyzer initial upscale, Run 1, if applicable)

$$SB/D_{Alt} = \left|C_S - C_{Dir}\right| \qquad \text{Eq. Section 13.2 and 13.3}$$

$$SB/D_{Alt} = |\ 4.92\ ppm - 5.04\ ppm\ | = 0.12\ ppm$$

Bias Adjusted Average

RM 7E, (02-27-14), 12.6 Effluent Gas Concentration. For each test run, calculate Cavg, the arithmetic average of all valid NOx concentration values (e.g., 1-minute averages). Then adjust the value of Cavg for bias, using Equation 7E-5b. (calc for NOx analyzer, Run 1, if applicable)

$$C_{Gas} = \left(C_{Avg} - C_O\right) \times \left(\frac{C_{MA}}{C_M - C_O}\right) \qquad \text{Eq. 7E-5b}$$

$$C_{Gas} = \left(2.61\ ppm - 0.04\ ppm\right)\left(\frac{5.06\ ppm}{4.97\ ppm - 0.04\ ppm}\right) = 2.64\ ppm$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (RUNS)

Stack Exhaust Flow (Q_S) - RM19

$$Q_S = \left(\frac{FFactor \times Q_f \times HHV}{1{,}000{,}000}\right) \times \left(\frac{20.9\%}{20.9\% - C_{Gas(O2)}}\right)$$

Note: Equation presented in EPA Emission Measurement Center (EMC), Frequently Asked Questions (FAQ) for Method 19

$$Q_S = \frac{8{,}710.00\ SCF}{MMBtu} \times \frac{1{,}200{,}160.00\ SCF}{hr} \times \frac{1{,}060.30\ Btu}{SCF} \times \frac{MMBtu}{10^6\ Btu} \times \left(\frac{20.90\%}{20.9\% - 14.9\ \%}\right) = 38{,}786{,}790.03\ SCFH$$

Diluent-Corrected Pollutant Concentration, O_2 Based

RM 20, (11-26-02), 7.3.1 Correction of Pollutant Concentration Using O_2 Concentration. Calculate the O_2 corrected pollutant concentration, as follows: (calc for NOx gas, Run 1, if applicable) [now contained in applicable Subpart]

$$C_{adj} = C_{Gas(Target)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}}\right) \quad \text{Eq. 20-4}$$

$$C_{adj} = 2.64\ ppm \times \left(\frac{20.9\% - 15.00\ \%}{20.9\% - 14.93\ \%}\right) = 2.61\ ppm@15\%O_2$$

Emissions Rate (lb/hr)

Calculation for pound per hour emission rate. Calculate, as follows: (calc for NOx gas Run 1, if applicable)

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

$$E_{lb/hr} = \frac{2.64\ ppmvd}{10^6\ ppm/part} \times \frac{38{,}786{,}790\ DSCFH \times 46.01\ lb/lb\text{-}mol}{385.23\ SCF/lb\text{-}mol} = \frac{12.24\ lb}{hr}$$

Emissions Rate (lb/MMBtu)

RM 19, (02-27-14), 12.2 Emission Rates of PM, SO_2, and NOx. Select from the following sections the applicable procedure to compute the PM, SO_2, or NOx emission rate (E) in ng/J (lb/million Btu). (calc for NOx gas Run 1, if applicable)

Oxygen Based

12.2.1 Oxygen-Based F Factor, Dry Basis. When measurements are on a dry basis for both O_2 (%O_2d) and pollutant (Cd) concentrations, use the following equation:

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 20.9\%}{20.9\% - C_{Gas(O2)}} \quad \text{Eq. 19-1}$$

$$E_{lb/MMBtu} = \frac{2.64\ ppm \times 8{,}710.00\ SCF/MMBtu \times 0.0000001194\ lb/ppm{*}ft^3 \times 20.9\%}{20.9\% - 14.93\ \%} = \frac{0.010\ lb}{MMBtu}$$

Conversion Constant

Convc for NOx

$$Conv_c(lb/ppm \cdot ft^3) = \frac{\frac{MW}{G}}{10^6}$$

$$Conv_c = \frac{\frac{46.01\ lb}{lb{\bullet}mole} \times \frac{lb{\bullet}mole}{385.23\ SCF}}{10^6} = \frac{0.0000001194\ lb}{ppm\text{-}ft^3}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (RATA RESULTS)

Difference (d)

40 CFR 75, App A, (12-17-09), 7.3.1 Arithmetic Mean. Calculate the arithmetic mean of the differences, d , of a data set as follows. (calc for NOx lb/MMBtu data, if applicable. Note: This is an example calculation which may not have any bearing on the actual test requirements.)

$$d = \sum_{i=1}^{n} d_i$$ Eq. A-7

d = 0.010 lb/MMBtu - 0.010 lb/MMBtu = 0.000 lb/MMBtu

Standard Deviation

40 CFR 75, App A, (12-17-09), 7.3.2 Standard Deviation. Calculate the standard deviation, Sd, of a data set as follows:
(calc for NOx lb/MMBtu data, if applicable. Note: This is an example calculation which may not have any bearing on the actual test requirements.)

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left[\frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}\right]}{n-1}}$$ Eq. A-8

$$S_d = \sqrt{\frac{0.000 \text{ lb/MMBtu}^2 - \frac{(-0.003 \text{ lb/MMBtu})^2}{9}}{9 - 1}} = 0.001 \text{ lb/MMBtu}$$

Confidence Coefficient

40 CFR 75, App A, (12-17-09), 7.3.3 Confidence Coefficient. Calculate the confidence coefficient (one-tailed), cc, of a data set as follows. (calc for NOx lb/MMBtu data, if applicable. Note: This is an example calculation which may not have any bearing on the actual test requirements.)

$$CC = t_{0.025} \times \frac{S_d}{\sqrt{n}}$$ Eq. A-9

$$CC = 2.306 \times \frac{0.001 \text{ lb/MMBtu}}{\sqrt{9}} = 0.000 \text{ lb/MMBtu}$$

T-Values	n	2	3	4	5	6	7	8	9
	$t_{0.025}$	12.706	4.303	3.182	2.776	2.571	2.447	2.365	2.306

2.5 percent confidence coefficients

Relative Accuracy

40 CFR 75, App A, (12-17-09), 7.3.4 Relative Accuracy. Calculate the relative accuracy of a data set using the following equation. (calc for NOx lb/MMBtu data, if applicable. Note: This is an example calculation which may not have any bearing on the actual test requirements.)

$$RA = \frac{|d_{AVG}| + |CC|}{RM_{AVG}} \times 100$$ Eq. A-10

$$RA = \frac{|0.000 \text{ lb/MMBtu}| + |0.000 \text{ lb/MMBtu}|}{0.010 \text{ lb/MMBtu}} \times 100 = 7.42 \%$$

Bias Adjustment Factor (BAF)

40 CFR 75, App A, (12-17-09), 7.6.5 Bias Adjustment. (a) If the monitor or monitoring system fails to meet the bias test requirement, adjust the value obtained from the monitor using the following equation: (calc for NOx lb/MMBtu data, if applicable. Note: This is an example calculation which may not have any bearing on the actual test requirements.)

$$BAF = 1 + \left(\frac{|d_{AVG}|}{CEM_{AVG}}\right)$$ Eq. A-12

d_{AVG}= 0.000 < |CC| = 0.000 ⇨ BAF = 1 + $\frac{|\quad| \text{ lb/MMBtu}}{\text{lb/MMBtu}}$ = 1.000 lb/MMBtu

Note: BAF only applies if the mean difference (d) is greater than the absolute value of the confidence coefficient.

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

RM 7E, (08-15-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

ACE = Analyzer calibration error, percent of calibration span.
B_{WS} = Moisture content of sample gas as measured by Method 4 or other approved method, percent/100.
C_{Avg} = Average unadjusted gas concentration indicated by data recorder for the test run.
C_D = Pollutant concentration adjusted to dry conditions.
C_{Dir} = Measured concentration of a calibration gas (low, mid, or high) when introduced in direct calibration mode.
C_{Gas} = Average effluent gas concentration adjusted for bias.
C_M = Average of initial and final system calibration bias (or 2-point system calibration error) check responses for the upscale calibration gas.
C_{MA} = Actual concentration of the upscale calibration gas, ppmv.
C_O = Average of the initial and final system calibration bias (or 2-point system calibration error) check responses from the low-level (or zero) calibration gas.
C_S = Measured concentration of a calibration gas (low, mid, or high) when introduced in system calibration mode.
C_{SS} = Concentration of NOx measured in the spiked sample.
C_{Spike} = Concentration of NOx in the undiluted spike gas.
C_{Calc} = Calculated concentration of NOx in the spike gas diluted in the sample.
C_V = Manufacturer certified concentration of a calibration gas (low, mid, or high).
C_W = Pollutant concentration measured under moist sample conditions, wet basis.
CS = Calibration span.
D = Drift assessment, percent of calibration span.
E_p = The predicted response for the low-level and mid-level gases based on a linear response line between the zero and high-level response.
Eff_{NO2} = NO_2 to NO converter efficiency, percent.
H = High calibration gas, designator.
L = Low calibration gas, designator.
M = Mid calibration gas, designator.
NOFinal = The average NO concentration observed with the analyzer in the NO mode during the converter efficiency test in Section 16.2.2.
NOxCorr = The NOx concentration corrected for the converter efficiency.
NOxFinal = The final NOx concentration observed during the converter efficiency test in Section 16.2.2.
NOxPeak = The highest NOx concentration observed during the converter efficiency test in Section 16.2.2.
Q_{Spike} = Flow rate of spike gas introduced in system calibration mode, L/min.
Q_{Total} = Total sample flow rate during the spike test, L/min.
R = Spike recovery, percent.
SB = System bias, percent of calibration span.
SB_i = Pre-run system bias, percent of calibration span.
SB_f = Post-run system bias, percent of calibration span.
SB / D_{Alt} = Alternative absolute difference criteria to pass bias and/or drift checks.
SCE = System calibration error, percent of calibration span.
SCE_i = Pre-run system calibration error, percent of calibration span.
SCE_{final} = Post-run system calibration error, percent of calibration span.
Z = Zero calibration gas, designator.

40CFR60.355(b)(1), (09-20-06), Nomenclature. The terms used in the equations are defined as follows:

P_r = reference combustor inlet absolute pressure at 101.3 kilopascals ambient pressure, mm Hg
P_o = observed combustor inlet absolute pressure at test, mm Hg
H_o = observed humidity of ambient air, g H_2O/g air
e = transcendental constant, 2.718
T_a = ambient temperature, K

Small Engine and FTIR Nomenclature. The terms used in the equations are defined as follows:

bhp = brake horsepower
hp = horsepower
Q_{sys} = system flow (lpm)
Q_m = matrix spike flow (lpm)

RM 19, (07-29-06), 12.1 Nomenclature. The terms used in the equations are defined as follows:

AdjFactor = Percent oxygen or carbon dioxide adjustment applied to a target pollutant
B_{wa} = Moisture fraction of ambient air, percent.
Btu = British thermal unit
$\%_C$ = Concentration of carbon from an ultimate analysis of fuel, weight percent.
$\%_{CO2d}$,$\%_{CO2w}$ = Concentration of carbon dioxide on a dry and wet basis, respectively, percent.
CIP / CDP = Combustor inlet pressure / compressor discharge pressure (mm Hg); note, some manufactures reference as PCD.
E = Pollutant emission rate, ng/J (lb/million Btu).
E_a = Average pollutant rate for the specified performance test period, ng/J (lb/million Btu).
E_{ao}, E_{ai} = Average pollutant rate of the control device, outlet and inlet, respectively, for the performance test period, ng/J (lb/million Btu).
E_{bi} = Pollutant rate from the steam generating unit, ng/J (lb/million Btu).
E_{bo} = Pollutant emission rate from the steam generating unit, ng/J (lb/million Btu).
E_{ci} = Pollutant rate in combined effluent, ng/J (lb/million Btu).
E_{co} = Pollutant emission rate in combined effluent, ng/J (lb/million Btu).
E_d = Average pollutant rate for each sampling period (e.g.,24-hr Method 6B sample or 24-hr fuel sample) or for each fuel lot (e.g., amount of fuel bunkered), ng/J (lb/million Btu).
E_{di} = Average inlet SO_2 rate for each sampling period d, ng/J (lb/million Btu).
E_g = Pollutant rate from gas turbine, ng/J (lb/million Btu).
E_{ga} = Daily geometric average pollutant rate, ng/J (lbs/million Btu) or ppm corrected to 7 percent O_2.
E_{jo},E_{ji} = Matched pair hourly arithmetic average pollutant rate, outlet and inlet, respectively, ng/J (lb/million Btu) or ppm corrected to 7 percent O_2.
E_h = Hourly average pollutant, ng/J (lb/million Btu).
E_{hj} = Hourly arithmetic average pollutant rate for hour "j," ng/J (lb/million Btu) or ppm corrected to 7 percent O_2.
EXP = Natural logarithmic base (2.718) raised to the value enclosed by brackets.
Fc = Ratio of the volume of carbon dioxide produced to the gross calorific value of the fuel from Method 19
F_d, F_w, F_c = Volumes of combustion components per unit of heat content, scm/J (scf/million Btu).
ft^3 = cubic feet
G = ideal gas conversion factor
(385.23 SCF/lb-mol at 68 deg F & 14.696 psia)
GCM = gross Btu per SCF (constant, compound based)
GCV = Gross calorific value of the fuel consistent with the ultimate analysis, kJ/kg (Btu/lb).
GCV_p, GCV_r = Gross calorific value for the product and raw fuel lots, respectively, dry basis, kJ/kg (Btu/lb).
$\%_H$ = Concentration of hydrogen from an ultimate analysis of fuel, weight percent.
H_b = Heat input rate to the steam generating unit from fuels fired in the steam generating unit, J/hr (million Btu/hr).
H_g = Heat input rate to gas turbine from all fuels fired in the gas turbine, J/hr (million Btu/hr).
$\%_{H2O}$ = Concentration of water from an ultimate analysis of fuel, weight percent.
H_r = Total numbers of hours in the performance test period (e.g., 720 hours for 30-day performance test period).
K = volume of combustion component per pound of component (constant)
K = Conversion factor, 10^{-5} (kJ/J)/(%) [10^6 Btu/million Btu].
K_c = (9.57 scm/kg)/% [(1.53 scf/lb)/%].
K_{cc} = (2.0 scm/kg)/% [(0.321 scf/lb)/%].
K_{hd} = (22.7 scm/kg)/% [(3.64 scf/lb)/%].
K_{hw} = (34.74 scm/kg)/% [(5.57 scf/lb)/%].
K_n = (0.86 scm/kg)/% [(0.14 scf/lb)/%].
K_o = (2.85 scm/kg)/% [(0.46 scf/lb)/%].
K_s = (3.54 scm/kg)/% [(0.57 scf/lb)/%].
K_{sulfur} = $2x10^4$ Btu/wt%-MMBtu
K_w = (1.30 scm/kg)/% [(0.21 scf/lb)/%].
lb = pound
ln = Natural log of indicated value.
L_p,L_r = Weight of the product and raw fuel lots, respectively, metric ton (ton).
$\%_N$ = Concentration of nitrogen from an ultimate analysis of fuel, weight percent.
$M_{\%}$ = mole percent
mol = mole
MW = molecular weight (lb/lb-mol)
MW_{AIR} = molecular weight of air (28.9625 lb/lb-mole)[1]
NCM = net Btu per SCF (constant based on compound)
$\%_O$ = Concentration of oxygen from an ultimate analysis of fuel, weight percent.
$\%_{O2d}$, $\%_{O2w}$ = Concentration of oxygen on a dry and wet basis, respectively, percent.
P_B = barometric pressure, in Hg
P_s = Potential SO2 emissions, percent.
$\%_S$ = Sulfur content of as-fired fuel lot, dry basis, weight percent.
S_e = Standard deviation of the hourly average pollutant rates for each performance test period, ng/J (lb/million Btu).
$\%_{Sf}$ = Concentration of sulfur from an ultimate analysis of fuel, weight percent.
S(wt%) = weight percent of sulfur, per lab analysis by appropriate ASTM standard
S_i = Standard deviation of the hourly average inlet pollutant rates for each performance test period, ng/J (lb/million Btu).
S_o = Standard deviation of the hourly average emission rates for each performance test period, ng/J (lb/million Btu).
$\%S_p$, $\%S_r$ = Sulfur content of the product and raw fuel lots respectively, dry basis, weight percent.
SCF = standard cubic feet
SH = specific humidity, pounds of water per pound of air
$t_{0.95}$ = Values shown in Table 19-3 for the indicated number of data points n.
T_{amb} = ambient temperature, °F
W/D Factor = 1.0236 = conv. at 14.696 psia and
68 deg F (ref. Civil Eng. Ref. Manual, 7th Ed.)
X_{CO2}=CO_2 Correction factor, percent.
X_k = Fraction of total heat input from each type of fuel k.

Calculations, Formulas, and Constants

The following information supports the spreadsheets for this testing project.

Given Data:

Ideal Gas Conversion Factor = 385.23 SCF/lb-mol at 68 deg F & 14.696 psia

Fuel Heating Value is based upon Air Hygiene's fuel gas calculation sheet. All calculations are based upon a correction to 68 deg F & 14.696 psia

High Heating Values (HHV) are used for the Fuel Heating Value, F-Factor, and Fuel Flow Data per EPA requirements.

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Molecular Weight of NOx (lb/lb-mole) =	46.01
Molecular Weight of CO (lb/lb-mole) =	28.00
Molecular Weight of SO_2 (lb/lb-mole) =	64.00
Molecular Weight of THC (propane) (lb/lb-mole) =	44.00
Molecular Weight of VOC (methane) (lb/lb-mole) =	16.00
Molecular Weight of NH_3 (lb/lb-mole) =	17.03
Molecular Weight of HCHO (lb/lb-mole) =	30.03
Molecular Weight of CO_2 and N_2O (lb/lb-mole) =	44.01

40CFR60, App. A., RM 19, Table 19-1

Conversion Constant for NOx =	0.0000001194351
Conversion Constant for CO =	0.0000000726839
Conversion Constant for SO_2 =	0.0000001661345
Conversion Constant for THC =	0.0000001142175
Conversion Constant for VOC (methane) =	0.0000000415336
Conversion Constant for NH_3 =	0.0000000442074
Conversion Constant for HCHO =	0.0000000779534
Conversion Constant for CO_2 and N_2O =	0.0000001142434

NOTE: units are lb/ppm*ft^3

Formulas:

1. Corrected Raw Average (C_{Gas}), 40CFR60, App. A, RM 7E, Eq. 7E-5 (08/15/06)

$$C_{Gas} = \left(C_{Avg} - C_O\right) \times \left(\frac{C_{MA}}{C_M - C_O}\right)$$

2. Correction to % O_2, 40CFR60, App. A, RM 20, Eq. 20-5 (11/26/02)

$$C_{adj} = C_{Gas(Target)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}}\right)$$

3. Correction to % O_2 and ISO Conditions

$$C_{ISO} = C_{Adj} \times \sqrt{\frac{P_r}{P_o}} \times e^{(19 \times (H_O - 0.00633))} \times \left(\frac{288}{T_a}\right)^{1.53}$$

4. Method 19 stack exhaust flow (scfh) [ref. EPA EMC FAQ Method 19]

$$Q_S = \left(\frac{FFactor \times Q_f \times HHV}{1{,}000{,}000}\right) \times \left(\frac{20.9\%}{20.9\% - C_{Gas(O2)}}\right)$$

5. Emission Rate in lb/hr

$$E_{lb/hr} = \frac{C_{Gas}}{10^6} \times \frac{Q_S \times MW}{G}$$

6. Emission Rate in tons per year

$$E_{ton/yr} = \frac{E_{lb/hr} \times hr_{year}}{2000}$$

7. Emission Concentration in lb/MMBtu (O_2 based)

$$E_{lb/MMBtu} = \frac{C_{Gas} \times F_d Factor \times Conv_C \times 20.9\%}{20.9\% - C_{Gas(O2)}}$$

8. Emission Concentration in g/hp*hr

$$E_{g/hp\cdot hr} = \frac{E_{lb/hr} \times 453.6}{mw \times 1341.022} \; or \; \frac{E_{lb/hr} \times 453.6}{hp}$$

RATA SHEET CALCULATIONS

d = Reference Method Data - CEMS Data

S_d = Standard Deviation

CC = Confident Coefficient

n = number of runs

$t_{0.025}$ = 2.5 percent confidence coefficient T-values

RA = relative accuracy

ARA = alternative relative accuracy

BAF = Bias adjustment factor

n	t	n	t	n	t
2	12.706	7	2.447	12	2.201
3	4.303	8	2.365	13	2.179
4	3.182	9	2.306	14	2.160
5	2.776	10	2.262	15	2.145
6	2.571	11	2.228	16	2.131

1. Difference

$$d = \sum_{i=1}^{n} d_i$$

2. Standard Deviation

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left[\frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}\right]}{n-1}}$$

3. Confident Coefficient

$$CC = t_{0.025} \times \frac{S_d}{\sqrt{n}}$$

4. Relative Accuracy

$$RA = \frac{|d_{AVG}| + |CC|}{RM_{AVG}} \times 100$$

5. Alternative Relative Accuracy

$$ARA = \frac{|d_{AVG}| + |CC|}{AS} \times 100$$

5. Bias Adjustment Factor

$$BAF = 1 + \left(\frac{|d_{AVG}|}{CEM_{AVG}}\right)$$

Nomenclature

- %CO = carbon monoxide concentration (%)
- $\%CO_2$ = carbon dioxide concentration (%)
- $\%N_2$ = nitrogen concentration (%)
- $\%O_2$ = oxygen concentration (%)
- $\%O_{2,wet}$ = Oxygen content of gas stream, % by volume of wet gas. (Note: The oxygen percentage used in Method 201A, Equation 3 is on a wet gas basis. That means that since oxygen is typically measured on a dry gas basis, the measured percent O2 must be multiplied by the quantity (1 - B_{ws}) to convert to the actual volume fraction. Therefore, $\%O_{2,wet} = (1 - B_{ws}) * \%O_{2,\,dry}$)
- $(\%EA)_{avg}$ = average excess air (%)
- $(F_o)_{avg}$ = average calculated fuel factor
- $[(\Delta p)^{0.5}]_{avg}$ = Average of square roots of the velocity pressures measured during the preliminary traverse, inches W.C.
- μ = Gas viscosity, micropoise
- 12.0 = Constant calculated as 60 percent of 20.5 square inch cross-sectional area of combined cyclone head, square inches
- 17.03 = mg/milliequivalents for ammonium ion
- 22.4 = liters of ideal gas per lb-mol of substance at 0°C and 1 atm (ref. Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg)
- 24.04 = liters of ideal gas per lb-mol of substance at 20°C and 1 atm (ref. Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg)
- 5.02×10^4 = constant derived from the molecular weight and correcting standard temperature and pressure (ref. Bay Area Air Quality Management District, Source Test Procedure ST-1B, Ammonia Integrated Sampling, Adopted January 20, 1982, Regulation 7-303)
- A = distance upstream (in.)
- A_D = stack diameters upstream (dia.)
- An = Area of nozzle, square feet
- A_s = area of stack (ft^2)
- B = distance downstream (in.)
- B_D = stack diameters downstream (dia.)
- b_f = Average blockage factor calculated in Equation 26, dimensionless
- B_{wm} = meter moisture content (%)
- B_{ws} = stack moisture content (%)
- C = Cunningham correction factor for particle diameter, Dp, and calculated using the actual stack gas temperature, dimensionless
- C_1 = -150.3162 (micropoise)
- C_2 = 18.0614 (micropoise/$K^{0.5}$) = 13.4622 (micropoise/$R^{0.5}$)
- $C_3 = 1.19183 \times 10^6$ (micropoise/K^2) = 3.86153×10^6 (micropoise/R^2)
- C_4 = 0.591123 (micropoise)
- C_5 = 91.9723 (micropoise)
- $C_6 = 4.91705 \times 10^{-5}$ (micropoise/K^2) = 1.51761×10^{-5} (micropoise/R^2)
- C_a = Acetone blank concentration, mg/mg
- C_b = Concentration of NH3 ion in the back half of train (breakthrough)
- C_f = Concentration of NH3 ion in the front half of train (main catch)
- C_{fPM10} = Conc. of filterable PM_{10}, gr/dscf
- $C_{fPM2.5}$ = Conc. of filterable $PM_{2.5}$, gr/dscf
- C_k = K Factor Constant, 849.8
- C_n = nozzle diameter constant, 0.03575
- C_p' = Coefficient for the pitot used in the preliminary traverse, dimensionless

Nomenclature

- C_p = Pitot coefficient for the combined cyclone pitot, dimensionless
- C_{cpm} = Concentration of the condensable PM in the stack gas, dry basis, corrected to standard conditions, milligrams/dry standard cubic foot.
- C_r = Re-estimated Cunningham correction factor for particle diameter equivalent to the actual cut size diameter and calculated using the actual stack gas temperature, dimensionless
- D_{50} = Particle cut diameter, micrometers
- $D_{50(N+1)}$ = D_{50} value for cyclone IV calculated during the N+1 iterative step, micrometers
- $D_{50\text{-}1}$ = Re-calculated particle cut diameters based on re-estimated C_r, micrometers
- D_{50LL} = Cut diameter for cyclone I corresponding to the 2.25 micrometer cut diameter for cyclone IV, micrometer
- D_{50N} = D_{50} value for cyclone IV calculated during the Nth iterative step, micrometers
- D_{50T} = Cyclone I cut diameter corresponding to the middle of the overlap zone shown in Method 201A, Figure 10 of Section 17, micrometers
- D_e = equivalent stack diameter (in.)
- ΔH@ = ΔH @ 0.75 scfm (in. H2O)
- ΔH_{avg} = average orifice pressure (in. H_2O)
- D_n = Inner diameter of sampling nozzle mounted on Cyclone I, inches
- D_{na} = actual nozzle diameter (in.)
- D_p = Physical particle size, micrometers
- Δp = velocity head (in. H_2O)
- Δp_1 = velocity head at first current traverse point (in. H_2O)
- $\Delta p'_1$ = velocity head at first preliminary traverse point (in. H_2O)
- Δp_{avg} = average pitot tube differential pressure (in. H_2O)
- Δp_n = velocity head at subsequent current traverse point (in. H_2O)
- Δp_{RM2} = method 2 velocity head (in. H_2O)
- D_s = diameter of stack (in.)
- F_d = fuel f-factor (dscf/MMBtu)
- f_{O2} = stack gas fraction of O_2, by volume, dry basis
- I = Percent isokinetic sampling, dimensionless
- K_1 = standard volume correction, 17.65°R/in. Hg
- K_4 = isokinetic conversion constant, 0.0945min•in.Hg/sec•°R
- K_5 = water mass to std water vapor, 0.04716 ft^3/g
- K_p = 85.49, ((ft/sec)/(pounds/mole -°R))
- L = length of stack (in.)
- L_{fw} = distance to far wall of stack (in.)
- L_{nw} = distance to near wall of stack (in.) [reference]
- $m_{\#x}$ = weight measurements (g)
- M_1 = Milligrams of PM collected on the filter, less than or equal to 2.5 micrometers
- M_2 = Milligrams of PM recovered from Container #2 (acetone blank corrected), greater than 10 micrometers
- M_3 = Milligrams of PM recovered from Container #3 (acetone blank corrected), less than or equal to 10 and greater than 2.5 micrometers
- M_4 = Milligrams of PM recovered from Container #4 (acetone blank corrected), less than or equal to 2.5 micrometers
- m_a = Mass of residue of acetone after evaporation, mg
- m_c = Mass of the NH4+ added to sample to form ammonium sulfate, mg
- m_{cpm} = Mass of the total condensable PM, mg
- M_d = Molecular weight of dry gas, pounds/pound mole

Nomenclature

- m_{fb} = Mass of total CPM in field train recovery blank, mg
- m_{fx} = final weight, avg of last two measurements (g)
- mg = Milligram
- mg/L = Milligram per liter
- m_i = Mass of inorganic CPM, mg
- m_{ib} = Mass of inorganic CPM in field train recovery blank, mg
- M_n = total particulates (mg)
- m_o = Mass of organic CPM, mg
- m_{ob} = Mass of organic CPM in field train blank, mg
- m_r = Mass of dried sample from inorganic fraction, mg
- m_{tx} = tare weight (g)
- MW = molecular weight (lb/lb-mole)
- M_w = Molecular weight of wet gas, pounds/pound mole
- N = Normality of ammonium hydroxide titrant
- N_a = null angle (deg.)
- N_{re} = Reynolds number, dimensionless
- N_{tp} = Number of iterative steps or total traverse points
- P_b = P_{bar} = barometric pressure (in. Hg)
- P_{bar} = barometric pressure (in. Hg)
- ppmCO = carbon monoxide concentration (ppm)
- ppmv = Parts per million by volume
- ppmw = Parts per million by weight
- P_s = absolute stack pressure (in. Hg)
- P_{static} = static pressure (in. H_2O)
- P_{std} = standard pressure, 29.92 in. Hg
- Θ = total sampling time (min)
- Q_{aw} = average stack wet flow rate (ascf/min)
- Q_I = Sampling rate for cyclone I to achieve specified D_{50}
- Q_m = estimated orifice flow rate, 0.750 acfm, else Vm/Q from previous run
- Q_s = Sampling rate for cyclone I to achieve specified D_{50}
- $Q_{s(std)}$ = total cyclone flow rate at standard conditions (dscf/min)
- Q_{sd} = dry standard stack flow rate (dscfm)
- Q_{sST} = Dry gas sampling rate through the sampling assembly, dscfm
- Q_{sw} = wet standard stack flow rate (ascfm)
- R_{max} = Nozzle/stack velocity ratio parameter, dimensionless
- R_{min} = Nozzle/stack velocity ratio parameter, dimensionless
- t_1 = Sampling time at point 1, min
- t_m = average gas meter temperature (^oF)
- t_m = average meter temperature (^oF)
- T_m = Meter box and orifice gas temperature, ^oR
- t_n = Sampling time at point n, min
- t_r = Total projected run time, min
- T_s = Absolute stack gas temperature, ^oR
- T_{std} = standard temperature, 68^oF, 528^oR
- T_u = absolute temperature offset, 460^oR
- V_a = Volume of acetone blank, ml
- V_{aw} = Volume of acetone used in sample recovery wash, ml
- V_b = Volume of aliquot taken for IC analysis, ml

Nomenclature

- V_c = Quantity of water captured in impingers and silica gel, ml
- V_f = final impinger volume (ml)
- V_i = initial impinger volume (ml)
- V_{ic} = Volume of impinger contents sample, ml
- V_m = Dry gas meter volume sampled, acf
- $V_{m(std)}$ = standard meter volume (dscf)
- v_{max} = Maximum gas velocity calculated from Equations 18 or 19, ft/sec
- v_{max} = maximum nozzle velocity (ft/sec)
- V_{mf} = final dry gas meter reading (dcf)
- V_{mi} = initial dry gas meter reading (dcf)
- v_{min} = Minimum gas velocity calculated from Method 201A, Equations 16 or 17, ft/sec
- V_{ms} = Dry gas meter volume sampled, corrected to standard conditions, dscf
- v_n = Sample gas velocity in the nozzle, ft/sec
- v_{org} = organics wash volume (ml)
- V_p = Volume of water added during train purge
- v_s = average stack gas velocity (ft/sec)
- v_{sl} = local velocity (ft/sec)
- V_t = total impinger volume (ml) = ;(V_f-V_i)
- V_t = Volume of NH4OH titrant, ml
- $V_{w(std)}$ = volume of water vapor in gas sample at standard conditions (scf)
- v_x = blank volume (ml)
- W = width of stack (in.)
- $W_{2,3,4}$ = Weight of PM recovered from Containers #2, #3, and #4, mg
- W_a = Weight of blank residue in acetone used to recover samples, mg
- W_f = final impinger weight (g)
- W_i = initial impinger weight (g)
- W_t = total impinger weight (g) = ;(W_f-W_i)
- w_x = blank weight of solids (g)
- Y = meter calibration factor (a.k.a gamma)
- Z = Ratio between estimated cyclone IV D_{50} values, dimensionless
- γ = Dry gas meter gamma value, dimensionless
- ΔH = Meter box orifice pressure drop, inches W.C.
- $\Delta H@$ = Pressure drop across orifice at flow rate of 0.75 scfm at standard conditions, inches W.C. (Note: Specific to each orifice and meter box.)
- Δp_1 = Velocity pressure measured at point 1, inches W.C.
- Δp_{avg} = Average velocity pressure, inches W.C.
- Δp_m = Observed velocity pressure using S-type pitot tube in preliminary traverse, inches W.C.
- Δp_{max} = Maximum velocity pressure, inches W.C.
- Δp_{min} = Minimum velocity pressure, inches W.C.
- Δp_n = Velocity pressure measured at point n during the test run, inches W.C.
- Δp_s = Velocity pressure calculated in Method 201a, Equation 25, inches W.C.
- Δp_{s1} = Velocity pressure adjusted for combined cyclone pitot tube, inches W.C.
- Δp_{s2} = Velocity pressure corrected for blockage, inches W.C.
- θ = Total run time, min
- ρ_a = Density of acetone, mg/ml (see label on bottle)
- Σ_n = total number of sampling points

EXAMPLE CALCULATIONS (Reference Method 1 - Circular Stack)

Diameter of Stack (in.)

$$D(in.) = L_{fw} - L_{nw}$$

D (in.) = 216.50 in. - 12.50 in. = 204.00 in.

Area of Stack (ft^2)

$$A_s(ft^2) = \pi \times \left(\frac{D}{2 \times 12}\right)^2$$

A_s (ft^2) = 3.14 x ($\frac{204.00 \text{ in.}}{2 \text{ x } 12\text{in./ft}}$)^2 = 226.98 ft^2

Stack Diameters Downstream

$$B_D(dia.) = \frac{B}{D}$$

B_D (dia.) = $\frac{408.00 \text{ in.}}{204.00 \text{ in.}}$ = 2.00 diameters

Stack Diameters Upstream

$$A_D(dia.) = \frac{A}{D}$$

A_D (dia.) = $\frac{102.00 \text{ in.}}{204.00 \text{ in.}}$ = 0.50 diameters

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 3a) [Values from Run 1 test]

Carbon Monoxide Concentration (%)

$$\%CO = \frac{ppmCO}{10{,}000}$$

$$\%CO\ (\%) = \frac{0.00 \quad ppm}{10{,}000\ ppm/\%} = 0.0000 \quad \%$$

Nitrogen Concentration (%)

$$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$$

$$\%N_2\ (\%) = 100 - 3.50\ \% - 15.00\ \% - 0.00\ / 10{,}000\ \% = 81.5\ \%$$

Stack Dry Molecular Weight (lb/lb-mole)

$$M_d\,(lb/lb-mol) = \sum\left(\frac{MW_{comp}}{100} \times \%component\right)$$

$$M_d\ (lb/lb\text{-}mol) = \left(\frac{44\ lb/lb\text{-}mol}{100} \times 3.50\ \%\right) + \left(\frac{32\ lb/lb\text{-}mol}{100} \times 15.00\ \%\right) + \left(\frac{28\ lb/lb\text{-}mol}{100} \times \left[\frac{0.00}{10{,}000} + 81.50\right]\right) = \frac{29.16\ lb}{lb\text{-}mol}$$

Stack Wet Molecular Weight (lb/lb-mole)

$$M_S\,(lb/lb-mol) = \left[M_d \times \left(1 - \frac{B_{WS}}{100}\right)\right] + \left[MW_{H_2O} \times \frac{B_{WS}}{100}\right]$$

$$M_S\ (lb/lb\text{-}mol) = \left\{\frac{29.16\ lb}{lb\text{-}mol} \times \left(1 - \frac{7.27\ \%}{100}\right)\right\} + \left\{\frac{18\ lb}{lb\text{-}mol} \times \frac{7.27\ \%}{100}\right\} = \frac{28.35\ lb}{lb\text{-}mol}$$

Average Calculated Fuel Factor (F_o)

$$F_{o(avg)} = \frac{\left[20.9 - (\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}{(\%CO_2)_{avg} + (\%CO)_{avg}}$$

$$F_{o(avg)} = \frac{20.9\% - 15.00\ \% - (0.5 \times 0.000\ \%)}{3.50\ \% + 0.000\ \%} = 1.686$$

Average Excess Air (%)

$$\%EA_{avg}(\%) = \frac{100 \times \left[(\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}{(0.264 \times (N_2)_{avg}) - \left[(\%O_2)_{avg} - (0.5 \times (\%CO)_{avg})\right]}$$

$$(\%EA)_{AVG} = \frac{100 \times \{15.00\ \% - (0.5 \times 0.000\ \%)\}}{(0.264 \times 81.50\ \%) - \{15.00\ \% - (0.5 \times 0.000\ \%)\}} = 230.20\ \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 2) [Values from Run 1 test]

Absolute Stack Pressure (in. Hg)

$$P_S(in.Hg) = P_b + \frac{P_{static}}{13.6}$$

P_s (in. Hg) = 30.13 in. Hg + $\frac{-0.74 \text{ in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}}$ = 30.08 in. Hg

Average Stack Gas Velocity (ft/sec)

$$v_s(ft/\sec) = K_p \times C_p \times \left(\sqrt{\Delta p}\right)_{avg} \times \sqrt{\frac{(t_s)_{avg} + T_u}{P_s \times M_s}}$$

v_{sl} (ft/sec) =

$$\left(\frac{85.49 \text{ ft (lb/lb-mol)(in. Hg)}}{\text{sec } (^oR)(\text{in. } H_2O)}\right)^{1/2} \times 0.82 \times 1.08 \text{ in.}H_2O^{1/2} \times \sqrt{\frac{239.00 + 460\ ^oR}{30.08 \text{ in. Hg} \times 28.35 \text{ lb/lb-mol}}} = \frac{68.5 \text{ ft}}{\text{sec}}$$

Average Stack Dry Standard Flow Rate (dscfh)

$$Q_{sd}(dscfh) = \frac{60 \times 60 \times \left(1 - \frac{B_{ws}}{100}\right) \times v_s \times A_s \times T_{std} \times P_s}{(t_s + T_u) \times P_{std}}$$

Q_{sd} (dscf/hr) = $\frac{3600 \text{ sec}}{\text{hr}}$ x (1 - $\frac{7.27\ \%}{100}$) x $\frac{68.50 \text{ ft}}{\text{sec}}$ x 226.98 ft^2 x

$\frac{68.00 + 460\ ^oR}{239.00 + 460\ ^oR}$ x $\frac{30.08 \text{ in. Hg}}{29.92 \text{ in. Hg}}$ = $\frac{39{,}411{,}006.79 \text{ dscf}}{\text{hr}}$

Average Stack Wet Flow Rate (acfm)

$$Q_{aw}(acfm) = 60 \times v_s \times A_s$$

Q_{aw} (acf/min) = $\frac{60 \text{ sec}}{\text{min}}$ x $\frac{68.50 \text{ ft}}{\text{sec}}$ x 226.98 ft^2 = $\frac{932{,}871.22 \text{ acf}}{\text{min}}$

Average Stack Wet Standard Flow Rate (ascfh)

$$Q_{sw}(ascfh) = \frac{60 \times Q_{aw} \times T_{std} \times P_s}{(t_s + T_u) \times P_{std}}$$

Q_{sw} (ascf/hr) = $\frac{60 \text{ min}}{\text{hr}}$ x $\frac{932{,}871.22 \text{ acf}}{\text{min}}$ x

$\frac{68.00 + 460\ ^oR}{239.00 + 460\ ^oR}$ x $\frac{30.08 \text{ in. Hg}}{29.92 \text{ in. Hg}}$ = $\frac{42{,}499{,}344.63 \text{ ascf}}{\text{hr}}$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Reference Method 4) [Values from Run 1 test]

Water Volume Weighed (scf)

$$V_{wsg\,(std)}(scf) = W_t \times K_5$$

$V_{wsg(std)}$ = 173.20 g x 0.04716 ft^3/g = 8.168 scf

Standard Meter Volume (dscf)

$$V_{m(std)}(dscf) = \frac{K_1 \times Y \times V_m \times \left(P_b + \frac{\Delta H_{avg}}{13.6}\right)}{(t_m)_{avg} + T_u}$$

$$V_{m(std)} = \frac{\frac{17.65\ ^oR}{in.\ Hg} \times 0.97 \times 106.53\ dcf \times \left(30.13\ in.\ Hg + \frac{2.46\ in.\ H_2O}{13.6\ in.\ H_2O\ /\ in.\ Hg}\right)}{72.46\ ^oF + 460\ ^oR} = 104.24\ dscf$$

Calculated Moisture Content (%)

$$B_{ws(calc)}(\%) = 100 \times \frac{V_{wsg(std)}}{V_{wsg(std)} + V_{m(std)}}$$

$$B_{ws(calc)} = 100 \times \frac{8.17\ dscf}{8.17\ dscf + 104.24\ dscf} = 7.27\ \%$$

Saturated Moisture Content (%)

$$B_{ws(svp)}(\%) = 100 \times \frac{10^{6.691 - \frac{3144}{t_{s(avg)} + 390.86}}}{P_b + \frac{P_{static}}{13.6}} \leq 100$$

$$B_{ws(svp)} = 100 \times \frac{10^{\left(6.691 - \frac{3144}{239.00\ ^oF + 390.86}\right)}}{30.13\ in.\ Hg + \frac{-0.74\ in.\ H_2O}{13.6\ in.\ H_2O\ /\ in.\ Hg}} \leq 100 = 100.00\ \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Isokinetic Sampling) [Values from Run 1 test]

Desired Orifice (in. H_2O) (first point)

$$\Delta H_d(in.H_2O) = K \times \Delta p$$

ΔH_d (in. H_2O) = 2.06 x 0.84 in. H_2O = 1.73 in. H_2O

Absolute Meter Pressure (in. Hg)

$$P_m(in.Hg) = P_b + \frac{\Delta H@}{13.6}$$

P_m (in. Hg) = 30.13 in. Hg + $\frac{1.81 \text{ in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}}$ = 30.26 in. Hg

Recommended Nozzle Diameter (in.)

$$D_{ni}(in.) = \sqrt{\frac{C_n \times Q_m \times P_m}{(t_m + T_u) \times C_p} \times \left(\frac{1 - \frac{B_{wm}}{100}}{1 - \frac{B_{ws}}{100}}\right)} \times \sqrt{(t_s + T_u) \times \left[\frac{M_d \times \left(1 - \frac{B_{ws}}{100}\right) + \left(18 \times \frac{B_{ws}}{100}\right)}{P_s \times \Delta p_{avg}}\right]}$$

$$D_{ni}(in.) = \sqrt{\frac{0.03575 \text{ (lb-mole•}^{o}\text{R•in. } H_2O)^{1/2}\text{•min•in.}^2}{\text{acf•in. Hg}^{3/4}\text{•lb}^{1/2}} \times 0.75 \text{ acf} \times 30.26 \text{ in. Hg} \times \left(\frac{1 - \frac{0.00\%}{100}}{1 - \frac{7.27\%}{100}}\right) \times \sqrt{\frac{(239.00\ ^{o}F + 460^{o}R) \times \left(\frac{29.16 \text{ lb}}{\text{lb-mole}} \times \left(1 - \frac{7.27\%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \times \frac{7.27\%}{100}\right)\right)}{(72.46\ ^{o}F + 460^{o}R) \times 0.82 \times 30.08 \text{ in. Hg} \times 1.08 \text{ in. } H_2O}}} = 0.214 \text{ in.}$$

ΔP to ΔH Isokinetic Factor

$$K = C_k \times C_p^2 \times \Delta H@ \times D_{na}^4 \times \left[\frac{M_d \times \left(1 - \frac{B_{wm}}{100}\right) + \left(18 \times \frac{B_{wm}}{100}\right)}{M_d \times \left(1 - \frac{B_{ws}}{100}\right) + \left(18 \times \frac{B_{ws}}{100}\right)}\right] \times \left(\frac{1 - \frac{B_{ws}}{100}}{1 - \frac{B_{wm}}{100}}\right)^2 \times \left(\frac{t_m + T_u}{ts + T_u}\right) \times \frac{P_s}{P_m}$$

$$K = \frac{849.8}{\text{in. } H_2O\text{•in.}^4} \times 0.82^2 \times 1.81 \text{ in. } H_2O \times 0.23^4 \times \left(\frac{1 - \frac{7.27\%}{100}}{1 - \frac{0.00\%}{100}}\right)^2 \times \frac{72.46\ ^{o}F + 460^{o}R}{239.00\ ^{o}F + 460^{o}R} \times \left(\frac{\frac{29.16 \text{ lb}}{\text{lb/mole}} \times \left(1 - \frac{0.00\%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \times \frac{0.00\%}{100}\right)}{\frac{29.16 \text{ lb}}{\text{lb/mole}} \times \left(1 - \frac{7.27\%}{100}\right) + \left(\frac{18 \text{ lb}}{\text{lb-mol}} \times \frac{7.27\%}{100}\right)}\right) \times \frac{30.08 \text{ in. Hg}}{30.26 \text{ in. Hg}} = 2.06$$

Percent Isokinetic (%) (first point)

$$I(\%) = \frac{K_4 \times \left((t_s)_{avg} + T_u\right) \times V_{m(std)}}{\left(\Theta \times \left(v_{s(1)}\right)_{avg} \times P_s \times \pi \times \left(\frac{D_{na}}{2} \times \frac{1}{12}\right)^2\right) \times \left(1 - \frac{B_{ws}}{100}\right)}$$

$$I(\%) = \frac{\frac{0.0945 \text{ min•in. Hg}}{\text{sec•}^{o}\text{R}} \times (235.00\ ^{o}F + 460\ ^{o}R) \times 3.67 \text{ dscf}}{5.00 \text{ min} \times \frac{58.11 \text{ ft}}{\text{sec}} \times 30.08 \text{ in. Hg} \times 3.14 \times \left(\frac{0.23 \text{ in.}}{2} \times \frac{\text{ft.}}{12 \text{ in.}}\right)^2 \times \left(1 - \frac{7.27\%}{100}\right)} = 100.06\ \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Isokinetic Sampling) [Values from Run 1 test]

Cumulative Percent Isokinetic (%) (weighted average of all points)

$$I(\%) = \sum_{1-n} \frac{\left[I(\%) \times V_{m(std)}\right]_{1-n}}{V_{m(std)_{1-n}}}$$

Using Method 5, Eq 5-8 to determine intermediate isokinetics at each point, weighted averaging of the cumulative isokinetics is necessary since all points are not equal, and determined by using the dry standard meter volume collected at each point to weight the cumulative average. Intermediate isokinetics and dry standard meter volumes are found at each point. At each point the cumulative sum is found of each value and the quotient of the two used to determine the cumulative isokinetics for each residual point (n).

Pt	In (%)	x	Vm(std)n	=	I (%)n	∑(I (%)n)	/	∑(Vm(std)n)	=	I (%)
A-1	100.06	x	3.666	=	366.82	366.82	/	3.67	=	100.1
A-2	101.58	x	3.652	=	370.97	737.78	/	7.32	=	100.8
A-3	98.93	x	3.622	=	358.37	1096.15	/	10.94	=	100.2
A-4	100.77	x	3.648	=	367.63	1463.78	/	14.59	=	100.3
A-5	102.77	x	3.807	=	391.25	1855.03	/	18.40	=	100.8
A-6	101.13	x	3.591	=	363.16	2218.20	/	21.99	=	100.9
B-1	101.85	x	4.593	=	467.83	2686.03	/	26.58	=	101.1
B-2	102.11	x	4.434	=	452.74	3138.77	/	31.01	=	101.2
B-3	97.53	x	5.506	=	537.07	3675.84	/	36.52	=	100.7
B-4	100.83	x	5.552	=	559.85	4235.69	/	42.07	=	100.7
B-5	102.73	x	4.874	=	500.69	4736.38	/	46.95	=	100.9
B-6	100.80	x	4.027	=	405.94	5142.32	/	50.97	=	100.9
C-1	99.36	x	4.345	=	431.76	5574.07	/	55.32	=	100.8
C-2	100.04	x	5.204	=	520.58	6094.65	/	60.52	=	100.7
C-3	102.65	x	5.498	=	564.39	6659.05	/	66.02	=	100.9
C-4	98.85	x	5.145	=	508.64	7167.69	/	71.17	=	100.7
C-5	100.76	x	5.252	=	529.21	7696.90	/	76.42	=	100.7
C-6	103.25	x	4.522	=	466.82	8163.73	/	80.94	=	100.9
D-1	104.20	x	3.610	=	376.22	8539.94	/	84.55	=	101.0
D-2	99.62	x	3.736	=	372.22	8912.16	/	88.29	=	100.9
D-3	104.05	x	4.363	=	453.91	9366.07	/	92.65	=	101.1
D-4	102.48	x	4.028	=	412.80	9778.87	/	96.68	=	101.2
D-5	96.74	x	3.993	=	386.30	10165.17	/	100.67	=	101.0
D-6	105.39	x	3.530	=	372.02	10537.19	/	104.20	=>	101.1
Last Pt										

Percent Isokinetic (%) (intermediate equation, all points)
[equivalent to taking an average of point-by-point isokinetics without weighting the average (e.g. all points equal)]

$$I(\%) = \frac{K_4 \times \left((t_s)_{avg} + T_u\right) \times V_{m(std)}}{\left(\Theta \times \left(v_{s(l)}\right)_{avg} \times P_s \times \pi \times \left(\frac{D_{na}}{2} \times \frac{1}{12}\right)^2\right) \times \left(1 - \frac{B_{ws}}{100}\right)}$$

$$I(\%) = \frac{\frac{0.0945 \text{ min•in. Hg}}{\text{sec•}^{o}\text{R}} \times (239.00\ ^{o}\text{F} + 460\ ^{o}\text{R}) \times 104.24 \text{ dscf}}{120.00 \text{ min} \times \frac{68.50 \text{ ft}}{\text{sec}} \times 30.08 \text{ in. Hg} \times 3.14 \times \left(\frac{0.23 \text{ in.}}{2} \times \frac{\text{ft.}}{12 \text{ in.}}\right)^2 \times \left(1 - \frac{7.27\ \%}{100}\right)} = 101.14\ \%$$

Raw Data Percent Isokinetic (%)
[utilizes the raw data equation for isokinetics from Method 5]

$$I(\%) = \frac{100\left((t_s)_{avg} + T_u\right)\left[K_4 V_{1c} + \frac{V_m Y}{(t_m)_{avg} + T_u}\left(P_{bar} + \frac{\Delta H}{13.6}\right)\right]}{60\left(\Theta \times \left(v_{s(l)}\right)_{avg} \times P_s \times \pi \times \left(\frac{D_{na}}{2} \times \frac{1}{12}\right)^2\right)}$$

$$I(\%) = \frac{100 \times (239.00\ ^{o}\text{F} + 460\ ^{o}\text{R}) \times \left[\frac{0.002669 \text{ ft}^3\text{•in. Hg}}{\text{ml•}^{o}\text{R}} \times 173.5 \text{ ml} + \frac{106.53 \text{ dcf} \times 0.974}{72.46\ ^{o}\text{F} + 460\ ^{o}\text{R}} \left(30.13 \text{ in Hg} + \frac{2.458}{13.6}\right)\right]}{60 \times 120.00 \text{ min} \times \frac{68.50 \text{ ft}}{\text{sec}} \times 30.08 \text{ in. Hg} \times 3.14 \times \left(\frac{0.23 \text{ in.}}{2} \times \frac{\text{ft.}}{12 \text{ in.}}\right)^2} = 101.09\ \%$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Gravimetric Analysis) [Values from Run 1 test]

Blank Concentration [Acetone Blank Weight of Solids] (mg/ml)

$$C_x(mg/ml) = \frac{1000 \times w_x}{v_x}$$

$$C_x \text{ (mg/ml)} = \frac{1000 \text{ mg}}{\text{g}} \times \frac{0.0001 \text{ g}}{220.00 \text{ ml}} = \frac{0.0002 \text{ mg}}{\text{ml}} = \frac{\text{mg}}{\text{ml}}$$

Blank Adjustment [Acetone Blank Weight of Solids and Probe Wash] (mg)

$$W_x(mg) = v_x \times C_x$$

W_x (mg) = 100.00 ml x 0.0002 mg/ml = 0.02 mg < Sample Gain

Sample Gain [Probe Wash] (mg)

$$m_x(mg) = (m_{fx} - m_{tx}) \times 1000$$

$$m_x \text{ (mg)} = \frac{1000 \text{ mg}}{\text{g}} \times (127.04 \text{ g} - 127.03 \text{ g}) = 1.75 \text{ mg}$$

Adjusted Sample Gain [Probe Wash] (mg)

$$m_{xadj}(mg) = m_x - W_x$$

m_{xadj} (mg) = 1.75 mg - 0.02 mg = 1.73 mg

0.1N NH_4OH Correction (mg)

$$m_c(mg) = 17.03 \times V_t \times N$$

m_c (mg) = 17.03 x 0.00 ml x 0.1 N = 0.00 mg

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (Analysis) [Values from Run 1 test - Filterable PM_{10} Mass]

Stack Filterable Concentration (g/dscf)

$$c_s(g/dscf) = 0.001 \times \frac{M_n}{V_{m(std)}}$$

$$c_s \text{ (g/dscf)} = \frac{\text{g}}{\text{1000 mg}} \times \frac{\text{1.73 mg}}{\text{104.24 dscf}} = \frac{\text{1.66E-05 g}}{\text{dscf}}$$

Stack Filterable Concentration (gr/dscf)

$$c_s^{'}(gr/dscf) = 0.001 \times \frac{M_n}{V_{m(std)}} \times \frac{7000}{453.592}$$

$$c'_s \text{ (gr/dscf)} = \frac{\text{g}}{\text{1000 mg}} \times \frac{\text{1.73 mg}}{\text{104.24 dscf}} \times \frac{\text{7000 gr}}{\text{lb}} \times \frac{\text{lb}}{\text{453.592 g}} = \frac{\text{2.56E-04 gr}}{\text{dscf}}$$

Filterable Emissions Rate (kg/hr)

$$E(kg/hr) = c_s \times Q_{sd} \times \frac{kg}{1000\ g}$$

$$E \text{ (kg/hr)} = \frac{\text{kg}}{\text{1000 g}} \times \frac{\text{1.66E-05 g}}{\text{dscf}} \times \frac{\text{39,411,007 dscf}}{\text{hr}} = \frac{\text{0.65 kg}}{\text{hr}}$$

Filterable Emissions Rate (lb/hr)

$$E^{'}(lb/hr) = \frac{M_n \times Q_{sd}}{V_{m(std)}} \times \frac{lb \times g}{453.592g \times 1000mg}$$

$$E' \text{ (lb/hr)} = \frac{\text{g}}{\text{1000 mg}} \times \frac{\text{lb}}{\text{453.592 g}} \times \frac{\text{1.73 mg}}{\text{104.24 dscf}} \times \frac{\text{39,411,007 dscf}}{\text{hr}} = \frac{\text{1.44 lb}}{\text{hr}}$$

Filterable Emissions Rate (tpy)

$$E^{''}(ton/yr) = E^{'} \times \frac{8760}{2000}$$

$$E'' \text{ (tpy)} = \frac{\text{ton}}{\text{2000 lb}} \times \frac{\text{8,760 hr}}{\text{yr}} \times \frac{\text{1.44 lb}}{\text{hr}} = \frac{\text{6.31 ton}}{\text{yr}}$$

Filterable Emissions Rate (lb/MMBtu)

Oxygen Based:

$$E'''(lb/MMBtu) = \frac{M_n \times F_d}{V_{m(std)} \times 1000 \times 453.592} \times \left(\frac{20.9}{20.9 - \%O_2}\right)$$

$$E''' \text{ (lb/MMBtu)} = \frac{\text{g}}{\text{1000 mg}} \times \frac{\text{lb}}{\text{453.592 g}} \times \frac{\text{1.73 mg}}{\text{104.24 dscf}} \times \frac{\text{8,655.58 dscf}}{\text{MMBtu}} \times \left(\frac{\text{20.9}}{\text{20.9 - 15.0 \%}}\right) = \frac{\text{0.0011 lb}}{\text{MMBtu}}$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

EXAMPLE CALCULATIONS (BAAQMD ST-1B Ammonia Analysis) [Values from Run 1 test]

Total Weight of NH_3 (g)

$$W(g) = \frac{(C_{fb} \times V_{NH3})}{10^6}$$

$$W\ (g) = \frac{\left(\frac{0.19\ \ mg}{L} \times \frac{315.00\ \ ml}{1}\right)}{10^6} = 5.95E\text{-}05\ \ g$$

NH_3 Concentration (ppmvd)

$$C_{NH3}(ppmvd) = \frac{5.02x10^4 \times W}{(V_m)_{dscf}}$$

$$C_{NH3}\ (ppmvd) = \frac{5.02x10^4\ x\ \ 5.95E\text{-}05\ \ g}{21.38\ \ dscf} = 0.14\ \ ppmvd$$

NH_3 Concentration (ppmvd@15%O_2)

$$C_{adj} = C_{Gas(Target)} \times \left(\frac{20.9\% - AdjFactor}{20.9\% - C_{Gas(O2)}}\right)$$

$$C_{adj} = 0.14\ \ ppmvd\ x\ \left(\frac{20.9\% -\ 15.00\ \%}{20.9\% -\ 15.0\ \%}\right) = 0.14\ \ ppmvd@15\%O_2$$

Note: Lack of significant figures may cause rounding errors between actual calculations and example calculations.

TEST RESULTS AND CALCULATIONS

RATA Test Results

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
NOx RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(ppmvd)	(ppmvd)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	2.60	2.70	-0.1000	0.01
2	09:02 - 09:22	YES	182.0	2.60	2.70	-0.1000	0.01
3	09:32 - 09:52	YES	181.0	2.60	2.60	0.0000	0.00
4	10:02 - 10:22	YES	180.0	2.60	2.70	-0.1000	0.01
5	10:32 - 10:52	YES	179.0	2.60	2.70	-0.1000	0.01
6	11:02 - 11:22	NO	178.0	2.60	2.70		
7	11:32 - 11:52	YES	177.0	2.60	2.70	-0.1000	0.01
8	12:02 - 12:22	YES	176.0	2.70	2.70	0.0000	0.00
9	12:32 - 12:52	YES	175.0	2.70	2.70	0.0000	0.00
10	13:02 - 13:22	YES	175.0	2.70	2.70	0.0000	0.00
11		NO					
12		NO					
		Total	**1608.0**	**23.70**	**24.20**	**-0.500000**	**0.050000**
		Average	**178.7**	**2.63**	**2.69**	**-0.055556**	

Number of Runs	9
Standard Deviation	0.052705
T-value	2.306
Confidence Coefficient	0.040512

Relative Accuracy = 3.6%

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
CO RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(ppmvd)	(ppmvd)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	0.20	0.40	-0.2000	0.04
2	09:02 - 09:22	YES	182.0	0.20	0.30	-0.1000	0.01
3	09:32 - 09:52	YES	181.0	0.10	0.30	-0.2000	0.04
4	10:02 - 10:22	YES	180.0	0.10	0.30	-0.2000	0.04
5	10:32 - 10:52	YES	179.0	0.10	0.30	-0.2000	0.04
6	11:02 - 11:22	NO	178.0	0.10	0.30		
7	11:32 - 11:52	YES	177.0	0.10	0.30	-0.2000	0.04
8	12:02 - 12:22	YES	176.0	0.00	0.30	-0.3000	0.09
9	12:32 - 12:52	YES	175.0	0.00	0.30	-0.3000	0.09
10	13:02 - 13:22	YES	175.0	0.00	0.30	-0.3000	0.09
11		NO					
12		NO					
	Total		**1608.0**	**0.80**	**2.80**	**-2.000000**	**0.480000**
	Average		**178.7**	**0.09**	**0.31**	**-0.222222**	

Number of Runs	9
Standard Deviation	0.066667
T-value	2.306
Confidence Coefficient	0.051244

Relative Accuracy =	**307.7%**
|d (difference in ppm)| + CC =	**0.3**

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
O_2 RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(%vd)	(%vd)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	14.90	14.90	0.0000	0.00
2	09:02 - 09:22	YES	182.0	14.90	14.90	0.0000	0.00
3	09:32 - 09:52	YES	181.0	14.90	15.00	-0.1000	0.01
4	10:02 - 10:22	YES	180.0	14.90	15.00	-0.1000	0.01
5	10:32 - 10:52	YES	179.0	14.90	15.00	-0.1000	0.01
6	11:02 - 11:22	NO	178.0	14.90	15.00		
7	11:32 - 11:52	YES	177.0	14.90	15.00	-0.1000	0.01
8	12:02 - 12:22	YES	176.0	14.90	15.00	-0.1000	0.01
9	12:32 - 12:52	YES	175.0	14.90	15.00	-0.1000	0.01
10	13:02 - 13:22	YES	175.0	14.90	15.00	-0.1000	0.01
11		NO					
12		NO					
	Total		**1608.0**	**134.10**	**134.80**	**-0.700000**	**0.070000**
	Average		**178.7**	**14.90**	**14.98**	**-0.077778**	

Number of Runs	9
Standard Deviation	0.044096
T-value	2.306
Confidence Coefficient	0.033895

Average Difference =	**-0.1**
Relative Accuracy =	**0.7%**

Part 60, Appendix B, Performance Specification 3,
13.2 CEMS Relative Accuracy Performance Specification. The RA of the CEMS must be no greater than 20 percent of the mean value of the reference method (RM) data. The results are also acceptable if the absolute value of the difference between the mean RM value and the mean CEMS value is less than or equal to 1.0 percent O2 (or CO2).

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December 5, 2023
Siemens, V84.2, Unit #CT1
NOx RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(ppmvd@15%O_2)	(ppmvd@15%O_2)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	2.60	2.60	0.0000	0.00
2	09:02 - 09:22	YES	182.0	2.60	2.60	0.0000	0.00
3	09:32 - 09:52	YES	181.0	2.60	2.60	0.0000	0.00
4	10:02 - 10:22	YES	180.0	2.60	2.70	-0.1000	0.01
5	10:32 - 10:52	YES	179.0	2.60	2.70	-0.1000	0.01
6	11:02 - 11:22	NO	178.0	2.60	2.70		
7	11:32 - 11:52	YES	177.0	2.60	2.70	-0.1000	0.01
8	12:02 - 12:22	YES	176.0	2.60	2.70	-0.1000	0.01
9	12:32 - 12:52	YES	175.0	2.60	2.70	-0.1000	0.01
10	13:02 - 13:22	YES	175.0	2.60	2.70	-0.1000	0.01
11		NO					
12		NO					
	Total		**1608.0**	**23.40**	**24.00**	**-0.600000**	**0.060000**
	Average		**178.7**	**2.60**	**2.67**	**-0.066667**	

Number of Runs	9
Standard Deviation	0.050000
T-value	2.306
Confidence Coefficient	0.038433

Relative Accuracy = 4.0%

Part 60, Appendix B, Performance Specification 2,
8.4.1 RA Test Period. Conduct the RA test according to the procedure given in Sections 8.4.2 through 8.4.6 while the affected facility is operating at more than 50 percent of normal load, or as specified in an applicable subpart.
13.2 Relative Accuracy Performance Specification. The RA of the CEMS must be no greater than 20 percent when RM is used in the denominator of Eq. 2-6 (average emissions during test are greater than 50 percent of the emission standard) or 10 percent when the applicable emission standard (permit limit) is used in the denominator of Eq. 2-6 (average emissions during test are less than 50 percent of the emission standard).
Eq. 2.6 RA=([|d|+|CC|]*100)/RM

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Siemens, V84.2, Unit #CT1
CO RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(ppmvd@15%O_2)	(ppmvd@15%O_2)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	0.20	0.40	-0.2000	0.04
2	09:02 - 09:22	YES	182.0	0.20	0.30	-0.1000	0.01
3	09:32 - 09:52	YES	181.0	0.10	0.30	-0.2000	0.04
4	10:02 - 10:22	YES	180.0	0.10	0.30	-0.2000	0.04
5	10:32 - 10:52	YES	179.0	0.10	0.30	-0.2000	0.04
6	11:02 - 11:22	NO	178.0	0.10	0.30		
7	11:32 - 11:52	YES	177.0	0.10	0.30	-0.2000	0.04
8	12:02 - 12:22	YES	176.0	0.00	0.30	-0.3000	0.09
9	12:32 - 12:52	YES	175.0	0.00	0.30	-0.3000	0.09
10	13:02 - 13:22	YES	175.0	0.00	0.30	-0.3000	0.09
11		NO					
12		NO					
	Total		**1608.0**	**0.80**	**2.80**	**-2.000000**	**0.480000**
	Average		**178.7**	**0.09**	**0.31**	**-0.222222**	

Number of Runs	9
Standard Deviation	0.066667
T-value	2.306
Confidence Coefficient	0.051244

Relative Accuracy =	**307.7%**
Applicable Standard =	**2.00**
Alternative Relative Accuracy =	**13.7%**
|d (difference in ppm@)| + CC =	**0.3**

Part 60, Appendix B, Performance Specification 4,
1.2.1 This specification is for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification was developed primarily for CEMS having span values of 1,000 ppmv CO.
13.2 Relative Accuracy. The RA of the CEMS must be no greater than 10 percent when the average RM value is used to calculate RA or 5 percent when the applicable emission standard (permit limit) is used to calculate RA.

Part 60, Appendix B, Performance Specification 4A,
1.2.1 This specification is for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification was developed primarily for CEMS that comply with low emission standards (less than 200 ppmv).
13.2 Relative Accuracy. The RA of the CEMS must be no greater than 10 percent when the average RM value is used to calculate RA, 5 percent when the applicable emission standard (permit limit) is used to calculate RA, or within 5 ppmv when the RA is calculated as the absolute average difference between the RM and CEMS plus the 2.5 percent confidence coefficient.

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Siemens, V84.2, Unit #CT1
NOx RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(lb/hr)	(lb/hr)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	12.20	12.40	-0.2000	0.04
2	09:02 - 09:22	YES	182.0	12.00	12.30	-0.3000	0.09
3	09:32 - 09:52	YES	181.0	11.90	12.20	-0.3000	0.09
4	10:02 - 10:22	YES	180.0	12.00	12.30	-0.3000	0.09
5	10:32 - 10:52	YES	179.0	11.90	12.30	-0.4000	0.16
6	11:02 - 11:22	NO	178.0	11.80	12.20		
7	11:32 - 11:52	YES	177.0	11.90	12.20	-0.3000	0.09
8	12:02 - 12:22	YES	176.0	12.00	12.30	-0.3000	0.09
9	12:32 - 12:52	YES	175.0	12.00	12.30	-0.3000	0.09
10	13:02 - 13:22	YES	175.0	11.90	12.20	-0.3000	0.09
11		NO					
12		NO					
		Total	**1608.0**	**107.80**	**110.50**	**-2.700000**	**0.830000**
		Average	**178.7**	**11.98**	**12.28**	**-0.300000**	

Number of Runs	9
Standard Deviation	0.050000
T-value	2.306
Confidence Coefficient	0.038433

Relative Accuracy = 2.8%

Part 60, Appendix B, Performance Specification 2,
8.4.1 RA Test Period. Conduct the RA test according to the procedure given in Sections 8.4.2 through 8.4.6 while the affected facility is operating at more than 50 percent of normal load, or as specified in an applicable subpart.
13.2 Relative Accuracy Performance Specification. The RA of the CEMS must be no greater than 20 percent when RM is used in the denominator of Eq. 2-6 (average emissions during test are greater than 50 percent of the emission standard) or 10 percent when the applicable emission standard (permit limit) is used in the denominator of Eq. 2-6 (average emissions during test are less than 50 percent of the emission standard).
Eq. 2.6 RA=([|d|+|CC|]*100)/RM

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Siemens, V84.2, Unit #CT1
CO RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(lb/hr)	(lb/hr)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	0.60	1.10	-0.5000	0.25
2	09:02 - 09:22	YES	182.0	0.40	0.90	-0.5000	0.25
3	09:32 - 09:52	YES	181.0	0.40	0.90	-0.5000	0.25
4	10:02 - 10:22	YES	180.0	0.30	0.90	-0.6000	0.36
5	10:32 - 10:52	YES	179.0	0.30	0.90	-0.6000	0.36
6	11:02 - 11:22	NO	178.0	0.20	0.90		
7	11:32 - 11:52	YES	177.0	0.20	0.80	-0.6000	0.36
8	12:02 - 12:22	YES	176.0	0.10	0.80	-0.7000	0.49
9	12:32 - 12:52	YES	175.0	0.10	0.80	-0.7000	0.49
10	13:02 - 13:22	YES	175.0	0.10	0.80	-0.7000	0.49
11		NO					
12		NO					
	Total		**1608.0**	**2.50**	**7.90**	**-5.400000**	**3.300000**
	Average		**178.7**	**0.28**	**0.88**	**-0.600000**	

Number of Runs	9
Standard Deviation	0.086603
T-value	2.306
Confidence Coefficient	0.066568

Relative Accuracy =	**240.0%**
Applicable Standard =	**7.22**
Alternative Relative Accuracy =	**9.2%**
|d (difference in lb/hr)| + CC =	**0.7**

Part 60, Appendix B, Performance Specification 4,
1.2.1 This specification is for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification was developed primarily for CEMS having span values of 1,000 ppmv CO.
13.2 Relative Accuracy. The RA of the CEMS must be no greater than 10 percent when the average RM value is used to calculate RA or 5 percent when the applicable emission standard (permit limit) is used to calculate RA.

Part 60, Appendix B, Performance Specification 4A,
1.2.1 This specification is for evaluating the acceptability of carbon monoxide (CO) continuous emission monitoring systems (CEMS) at the time of installation or soon after and whenever specified in an applicable subpart of the regulations. This specification was developed primarily for CEMS that comply with low emission standards (less than 200 ppmv).
13.2 Relative Accuracy. The RA of the CEMS must be no greater than 10 percent when the average RM value is used to calculate RA, 5 percent when the applicable emission standard (permit limit) is used to calculate RA, or within 5 ppmv when the RA is calculated as the absolute average difference between the RM and CEMS plus the 2.5 percent confidence coefficient.

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Siemens, V84.2, Unit #CT1
NOx RATA Data Sheet
Campbell Power Plant

RUN #	RUN TIME	USED	UNIT LOAD	RM	CEMS	RM-CEMS	
			(MW)	(lb/MMBtu)	(lb/MMBtu)	(diff)	($diff^2$)
1	08:32 - 08:52	YES	183.0	0.010	0.010	0.0000	0.0000
2	09:02 - 09:22	YES	182.0	0.009	0.010	-0.0010	0.0000
3	09:32 - 09:52	YES	181.0	0.009	0.010	-0.0010	0.0000
4	10:02 - 10:22	YES	180.0	0.010	0.010	0.0000	0.0000
5	10:32 - 10:52	YES	179.0	0.009	0.010	-0.0010	0.0000
6	11:02 - 11:22	NO	178.0	0.009	0.010		
7	11:32 - 11:52	YES	177.0	0.010	0.010	0.0000	0.0000
8	12:02 - 12:22	YES	176.0	0.010	0.010	0.0000	0.0000
9	12:32 - 12:52	YES	175.0	0.010	0.010	0.0000	0.0000
10	13:02 - 13:22	YES	175.0	0.010	0.010	0.0000	0.0000
11		NO					
12		NO					
		Total	**1608.0**	**0.087**	**0.090**	**-0.003000**	**0.000003**
		Average	**178.7**	**0.010**	**0.010**	**-0.000333**	

Number of Runs	9
Standard Deviation	0.000500
T-value	2.306
Confidence Coefficient	0.000384

Relative Accuracy = 7.4%

If the mean difference is less than or equal to the absolute value of the confidence coefficient, then the Bias Test passes and the bias adjustment factor is not applicable.

Mean Difference =	-0.0003
Confidence Coefficient =	0.0004

BAF = 1 + (abs. value mean difference/avg. CEMS reading)

Average CEMS Reading =	0.010
BAF =	**1.000**

Part 75, Appendix A,
3.3.2 Relative Accuracy for NOX-Diluent Continuous Emission Monitoring Systems
(a) The relative accuracy for NOX-diluent continuous emission monitoring systems shall not exceed 10.0 percent.
(b) For affected units where the average of the reference method measurements of NOX emission rate (this means lb/MMBtu) during the relative accuracy test audit is less than or equal to 0.200 lb/mmBtu, the difference between the mean value of the continuous emission monitoring system measurements and the reference method mean value shall not exceed ±0.020 lb/mmBtu, wherever the relative accuracy specification of 10.0 percent is not achieved.

7.6.5 Bias Adjustment

(b) For single-load RATAs of SO2 pollutant concentration monitors, NOX concentration monitoring systems, and NOX-diluent monitoring systems and for the single-load flow RATAs required or allowed under section 6.5.2 of this appendix and sections 2.3.1.3(b) and 2.3.1.3(c) of Appendix B to this part, the appropriate BAF is determined directly from the RATA results at normal load, using Equation A-12. Notwithstanding, when a NOX concentration CEMS or an SO2 CEMS or a NOX-diluent CEMS installed on a low-emitting affected unit (i.e., average SO2 or NOX concentration during the RATA ≦ 250 ppm or average NOX emission rate ≦ 0.200 lb/mmBtu) meets the normal 10.0 percent relative accuracy specification (as calculated using Equation A-10) or the alternate relative accuracy specification in section 3.3 of this appendix for low-emitters, but fails the bias test, the BAF may either be determined using Equation A-12, or a default BAF of 1.111 may be used.

Part 75, Appendix B,

2.3.1.2 Reduced RATA Frequencies. Relative accuracy test audits of primary and redundant backup SO2 pollutant concentration monitors, CO2 pollutant concentration monitors (including O2 monitors used to determine CO2 emissions), CO2 or O2 diluent monitors used to determine heat input, moisture monitoring systems, NOX concentration monitoring systems, flow monitors, NOX-diluent monitoring systems or SO2-diluent monitoring systems may be performed annually (i.e., once every four successive QA operating quarters, rather than once every two successive QA operating quarters) if any of the following conditions are met for the specific monitoring system involved:

(a) The relative accuracy during the audit of an SO2 or CO2 pollutant concentration monitor (including an O2 pollutant monitor used to measure CO2 using the procedures in appendix F to this part), or of a CO2 or O2 diluent monitor used to determine heat input, or of a NOX concentration monitoring system, or of a NOX-diluent monitoring system, or of an SO2-diluent continuous emissions monitoring system is ≤ 7.5 percent;

(f) For units with low NOX emission rates (average NOX emission rate measured by the reference method during the RATA ≤ 0.200 lb/mmBtu), when a NOX-diluent continuous emission monitoring system fails to achieve a relative accuracy ≤ 7.5 percent, but the monitoring system mean value from the RATA, calculated using Equation A-7 in appendix A to this part, is within ± 0.015 lb/mmBtu of the reference method mean value;

Figure 2 to Appendix B of Part 75_Relative Accuracy Test Frequency Incentive System.

RATA	Semiannual(percent)(1)	Annual(1)
SO2 or NOX(3)	7.5% < RA ≤ 10.0% or ± 15.0 ppm(2)	RA ≤ 7.5% or ± 12.0 ppm(2)
SO2-diluent	7.5% < RA ≤ 10.0% or ± 0.030 lb/mmBtu(2)	RA ≤ 7.5% or ± 0.025 lb/mmBtu(2)
NOX-diluent	7.5% < RA ≤ 10.0% or ± 0.020 lb/mmBtu(2)	RA ≤ 7.5% or ± 0.015 lb/mmBtu(2)
Flow	7.5% < RA ≤ 10.0% or ± 2.0 fps(2)	RA ≤ 7.5% or ± 1.5 fps
CO2 or O2	7.5% < RA ≤ 10.0% or ± 1.0% CO2/O2(2)	RA ≤ 7.5% or ± 0.7% CO2/O2(2)
Moisture	7.5% < RA ≤ 10.0% or ± 1.5% H2O(2)	RA ≤ 7.5% or ± 1.0% H2O(2)

(1) The deadline for the next RATA is the end of the second (if semiannual) or fourth (if annual) successive QA operating quarter following the quarter in which the CEMS was last tested. Exclude calendar quarters with fewer than 168 unit operating hours (or, for common stacks and bypass stacks, exclude quarters with fewer than 168 stack operating hours) in determining the RATA deadline. For SO2 monitors, QA operating quarters in which only very low sulfur fuel as defined in § 72.2, is combusted may also be excluded. However, the exclusion of calendar quarters is limited as follows: the deadline for the next RATA shall be no more than 8 calendar quarters after the quarter in which a RATA was last performed.

(2) The difference between monitor and reference method mean values applies to moisture monitors, CO2, and O2 monitors, low emitters, or low flow, only.

(3) A NOX concentration monitoring system used to determine NOX mass emissions under § 75.71.

TEST RESULTS AND CALCULATIONS

Gases Emissions Data

Sacramento Finance Authority

Air Permit Number:	TV2007-14-02B
Plant Name or Location:	Campbell Power Plant
Date:	December 5, 2023
Project Number:	ethos-23-campbell.ca-comp#1
Manufacturer & Equipment:	Siemens
Model:	V84.2
Unit Number:	CT1
Test Load:	High
Tester(s) / Test Unit(s):	MS/JF/SA/PB/JM/192/211

		RUN		
	UNITS	**C1**	**C2**	**C3**
Start Time	hh:mm:ss	08:32:26	10:02:26	11:32:26
End Time	hh:mm:ss	09:52:56	11:22:56	12:52:56
Bar. Pressure	in. Hg	30.15	30.16	30.12
Amb. Temp.	°F	49	55	61
Rel. Humidity	%	90	78	66
Spec. Humidity	lb water / lb air	0.006555	0.007092	0.007459
Date	mm/dd/yy	12/05/23	12/05/23	12/05/23
Turbine Fuel Flow	SCFH	1,196,010	1,181,700	1,166,700
Power Output	megawatts	182.0	179.0	176.0

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Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,196,010	SCFH

Weather Data

Barometric Pressure	30.15	in. Hg
Relative Humidity	90	%
Ambient Temperature	49	^{o}F
Specific Humidity	0.006555	lb H_2O / lb air

Unit Data

Unit Load	182.0	megawatts
Stack Exhaust Flow (M19)	37,647,935	SCFH

High Load, Run - C1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 8:32:26	10460	14.58	2.60	0.20	3.58
12/05/23 8:32:56	10490	14.57	2.65	0.20	3.58
12/05/23 8:33:26	10520	14.60	2.65	0.19	3.56
12/05/23 8:33:56	10550	14.63	2.66	0.20	3.56
12/05/23 8:34:26	10580	14.59	2.63	0.18	3.57
12/05/23 8:34:56	10610	14.58	2.61	0.20	3.56
12/05/23 8:35:26	10640	14.62	2.63	0.20	3.55
12/05/23 8:35:56	10670	14.60	2.63	0.19	3.56
12/05/23 8:36:26	10700	14.61	2.63	0.20	3.56
12/05/23 8:36:56	10730	14.61	2.61	0.20	3.56
12/05/23 8:37:26	10760	14.61	2.61	0.21	3.55
12/05/23 8:37:56	10790	14.59	2.60	0.20	3.54
12/05/23 8:38:26	10820	14.62	2.60	0.21	3.55
12/05/23 8:38:56	10850	14.60	2.61	0.21	3.56
12/05/23 8:39:26	10880	14.60	2.60	0.23	3.56
12/05/23 8:39:56	10910	14.61	2.61	0.21	3.56
12/05/23 8:40:26	10940	14.59	2.59	0.21	3.54
12/05/23 8:40:56	10970	14.60	2.61	0.21	3.54
12/05/23 8:41:26	11000	14.60	2.62	0.22	3.55
12/05/23 8:41:56	11030	14.58	2.62	0.21	3.54
12/05/23 8:42:26	11060	14.61	2.59	0.20	3.54
12/05/23 8:42:56	11090	14.60	2.60	0.20	3.55
12/05/23 8:43:26	11120	14.61	2.62	0.20	3.55
12/05/23 8:43:56	11150	14.60	2.63	0.20	3.55
12/05/23 8:44:26	11180	14.59	2.60	0.19	3.56
12/05/23 8:44:56	11210	14.58	2.60	0.19	3.56
12/05/23 8:45:26	11240	14.58	2.58	0.19	3.56
12/05/23 8:45:56	11270	14.60	2.60	0.20	3.56
12/05/23 8:46:26	11300	14.58	2.59	0.19	3.56
12/05/23 8:46:56	11330	14.59	2.61	0.19	3.57
12/05/23 8:47:26	11360	14.61	2.61	0.19	3.56
12/05/23 8:47:56	11390	14.59	2.61	0.19	3.56
12/05/23 8:48:26	11420	14.60	2.59	0.19	3.57
12/05/23 8:48:56	11450	14.57	2.62	0.19	3.58
12/05/23 8:49:26	11480	14.59	2.59	0.17	3.58
12/05/23 8:49:56	11510	14.56	2.58	0.18	3.57
12/05/23 8:50:26	11540	14.59	2.56	0.17	3.57
12/05/23 8:50:56	11570	14.57	2.58	0.18	3.57
12/05/23 8:51:26	11600	14.59	2.59	0.18	3.58
12/05/23 8:51:56	11630	14.58	2.61	0.16	3.58
12/05/23 8:52:26	11660	14.60	2.63	0.18	3.59
12/05/23 8:52:56	11690	14.59	2.62	0.17	3.60
12/05/23 9:02:26	12260	14.61	2.56	0.16	3.62
12/05/23 9:02:56	12290	14.62	2.53	0.16	3.62
12/05/23 9:03:26	12320	14.60	2.54	0.17	3.61
12/05/23 9:03:56	12350	14.62	2.56	0.16	3.59
12/05/23 9:04:26	12380	14.61	2.56	0.16	3.58
12/05/23 9:04:56	12410	14.60	2.56	0.14	3.56
12/05/23 9:05:26	12440	14.58	2.55	0.16	3.56
12/05/23 9:05:56	12470	14.61	2.62	0.13	3.55
12/05/23 9:06:26	12500	14.62	2.59	0.16	3.54
12/05/23 9:06:56	12530	14.60	2.56	0.15	3.53
12/05/23 9:07:26	12560	14.62	2.58	0.16	3.52

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Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,196,010	SCFH

Weather Data

Barometric Pressure	30.15	in. Hg
Relative Humidity	90	%
Ambient Temperature	49	^{o}F
Specific Humidity	0.006555	lb H_2O / lb air

Unit Data

Unit Load	182.0	megawatts
Stack Exhaust Flow (M19)	37,647,935	SCFH

High Load, Run - C1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 9:07:56	12590	14.59	2.57	0.15	3.51
12/05/23 9:08:26	12620	14.60	2.58	0.15	3.51
12/05/23 9:08:56	12650	14.61	2.58	0.16	3.51
12/05/23 9:09:26	12680	14.59	2.56	0.16	3.50
12/05/23 9:09:56	12710	14.61	2.57	0.16	3.50
12/05/23 9:10:26	12740	14.58	2.56	0.15	3.50
12/05/23 9:10:56	12770	14.61	2.59	0.15	3.50
12/05/23 9:11:26	12800	14.59	2.59	0.15	3.51
12/05/23 9:11:56	12830	14.59	2.61	0.16	3.50
12/05/23 9:12:26	12860	14.59	2.61	0.16	3.50
12/05/23 9:12:56	12890	14.61	2.68	0.16	3.51
12/05/23 9:13:26	12920	14.61	2.64	0.15	3.49
12/05/23 9:13:56	12950	14.61	2.49	0.16	3.49
12/05/23 9:14:26	12980	14.61	2.47	0.15	3.49
12/05/23 9:14:56	13010	14.61	2.49	0.15	3.48
12/05/23 9:15:26	13040	14.59	2.53	0.15	3.50
12/05/23 9:15:56	13070	14.58	2.59	0.16	3.50
12/05/23 9:16:26	13100	14.60	2.64	0.16	3.50
12/05/23 9:16:56	13130	14.56	2.70	0.16	3.50
12/05/23 9:17:26	13160	14.59	2.67	0.17	3.48
12/05/23 9:17:56	13190	14.59	2.66	0.15	3.48
12/05/23 9:18:26	13220	14.61	2.68	0.15	3.49
12/05/23 9:18:56	13250	14.60	2.66	0.15	3.48
12/05/23 9:19:26	13280	14.57	2.67	0.15	3.49
12/05/23 9:19:56	13310	14.60	2.66	0.14	3.48
12/05/23 9:20:26	13340	14.59	2.65	0.14	3.47
12/05/23 9:20:56	13370	14.59	2.65	0.14	3.47
12/05/23 9:21:26	13400	14.58	2.63	0.14	3.47
12/05/23 9:21:56	13430	14.58	2.62	0.14	3.46
12/05/23 9:22:26	13460	14.60	2.62	0.14	3.46
12/05/23 9:22:56	13490	14.56	2.61	0.15	3.46
12/05/23 9:32:26	14060	14.59	2.57	0.15	3.52
12/05/23 9:32:56	14090	14.59	2.60	0.14	3.53
12/05/23 9:33:26	14120	14.59	2.60	0.14	3.53
12/05/23 9:33:56	14150	14.59	2.61	0.14	3.54
12/05/23 9:34:26	14180	14.59	2.60	0.13	3.53
12/05/23 9:34:56	14210	14.60	2.61	0.14	3.54
12/05/23 9:35:26	14240	14.60	2.58	0.13	3.54
12/05/23 9:35:56	14270	14.59	2.56	0.13	3.54
12/05/23 9:36:26	14300	14.59	2.55	0.14	3.54
12/05/23 9:36:56	14330	14.63	2.57	0.14	3.54
12/05/23 9:37:26	14360	14.60	2.59	0.14	3.51
12/05/23 9:37:56	14390	14.58	2.62	0.14	3.50
12/05/23 9:38:26	14420	14.58	2.62	0.16	3.49
12/05/23 9:38:56	14450	14.58	2.60	0.15	3.48
12/05/23 9:39:26	14480	14.59	2.60	0.14	3.48
12/05/23 9:39:56	14510	14.62	2.60	0.14	3.47
12/05/23 9:40:26	14540	14.61	2.57	0.15	3.47
12/05/23 9:40:56	14570	14.56	2.53	0.15	3.47
12/05/23 9:41:26	14600	14.58	2.58	0.15	3.47
12/05/23 9:41:56	14630	14.59	2.57	0.14	3.47
12/05/23 9:42:26	14660	14.58	2.60	0.15	3.47
12/05/23 9:42:56	14690	14.57	2.60	0.14	3.47

Sacramento Finance Authority
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Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,196,010	SCFH

Weather Data

Barometric Pressure	30.15	in. Hg
Relative Humidity	90	%
Ambient Temperature	49	^{o}F
Specific Humidity	0.006555	lb H_2O / lb air

Unit Data

Unit Load	182.0	megawatts
Stack Exhaust Flow (M19)	37,647,935	SCFH

High Load, Run - C1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 9:43:26	14720	14.56	2.60	0.15	3.48
12/05/23 9:43:56	14750	14.59	2.57	0.13	3.48
12/05/23 9:44:26	14780	14.58	2.60	0.14	3.48
12/05/23 9:44:56	14810	14.60	2.61	0.14	3.49
12/05/23 9:45:26	14840	14.59	2.61	0.13	3.48
12/05/23 9:45:56	14870	14.58	2.61	0.13	3.48
12/05/23 9:46:26	14900	14.58	2.57	0.12	3.49
12/05/23 9:46:56	14930	14.59	2.58	0.13	3.49
12/05/23 9:47:26	14960	14.60	2.56	0.13	3.48
12/05/23 9:47:56	14990	14.61	2.58	0.13	3.49
12/05/23 9:48:26	15020	14.60	2.57	0.13	3.48
12/05/23 9:48:56	15050	14.58	2.57	0.13	3.48
12/05/23 9:49:26	15080	14.59	2.60	0.13	3.47
12/05/23 9:49:56	15110	14.58	2.60	0.13	3.46
12/05/23 9:50:26	15140	14.62	2.60	0.12	3.47
12/05/23 9:50:56	15170	14.61	2.59	0.13	3.46
12/05/23 9:51:26	15200	14.58	2.58	0.13	3.46
12/05/23 9:51:56	15230	14.61	2.60	0.14	3.47
12/05/23 9:52:26	15260	14.59	2.57	0.14	3.46
12/05/23 9:52:56	15290	14.60	2.56	0.12	3.46
RAW AVERAGE		**14.59**	**2.60**	**0.16**	**3.52**

		O_2	NOx	CO	CO_2
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016	INST-C2-0026
		(%)	**(ppmvd)**	**(ppmvd)**	**(%)**
Bias	**Initial Zero**	0.03	0.02	0.00	0.05
	Final Zero	0.01	0.02	0.00	0.00
	Avg. Zero	0.02	0.02	0.00	0.03
	Initial UpScale	11.76	4.92	5.15	8.86
	Final UpScale	11.80	4.97	5.15	8.80
	Avg. UpScale	11.78	4.95	5.15	8.83
Upscale Cal Gas		12.04	5.06	5.20	8.94

EMISSIONS DATA	O_2	NOx	CO	CO_2
Corrected Raw Average (ppm/% [vol] dry basis)	14.92	2.65	0.16	3.55
Concentration (ppmvd@ 15%O_2)	N/A	2.61	0.16	N/A
Emission Rate (lb/hr)	N/A	11.91	0.45	N/A
Emission Rate (lb/MMBtu)	N/A	0.010	0.000	N/A

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Campbell Power Plant

Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,181,700	SCFH

Weather Data

Barometric Pressure	30.16	in. Hg
Relative Humidity	78	%
Ambient Temperature	55	^{o}F
Specific Humidity	0.007092	lb H_2O / lb air

Unit Data

Unit Load	179.0	megawatts
Stack Exhaust Flow (M19)	37,004,860	SCFH

High Load, Run - C2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 10:02:26	15860	14.60	2.57	0.12	3.45
12/05/23 10:02:56	15890	14.62	2.57	0.12	3.45
12/05/23 10:03:26	15920	14.58	2.56	0.12	3.45
12/05/23 10:03:56	15950	14.63	2.57	0.13	3.45
12/05/23 10:04:26	15980	14.61	2.58	0.12	3.45
12/05/23 10:04:56	16010	14.60	2.54	0.11	3.46
12/05/23 10:05:26	16040	14.60	2.58	0.11	3.45
12/05/23 10:05:56	16070	14.61	2.56	0.13	3.44
12/05/23 10:06:26	16100	14.60	2.58	0.13	3.44
12/05/23 10:06:56	16130	14.59	2.61	0.11	3.43
12/05/23 10:07:26	16160	14.60	2.61	0.13	3.42
12/05/23 10:07:56	16190	14.59	2.57	0.11	3.42
12/05/23 10:08:26	16220	14.58	2.58	0.12	3.41
12/05/23 10:08:56	16250	14.62	2.57	0.12	3.42
12/05/23 10:09:26	16280	14.61	2.59	0.11	3.41
12/05/23 10:09:56	16310	14.59	2.57	0.12	3.40
12/05/23 10:10:26	16340	14.59	2.57	0.13	3.41
12/05/23 10:10:56	16370	14.60	2.59	0.13	3.41
12/05/23 10:11:26	16400	14.61	2.58	0.12	3.41
12/05/23 10:11:56	16430	14.61	2.62	0.11	3.42
12/05/23 10:12:26	16460	14.60	2.59	0.10	3.41
12/05/23 10:12:56	16490	14.59	2.61	0.11	3.41
12/05/23 10:13:26	16520	14.62	2.57	0.11	3.41
12/05/23 10:13:56	16550	14.59	2.57	0.11	3.42
12/05/23 10:14:26	16580	14.60	2.55	0.11	3.43
12/05/23 10:14:56	16610	14.60	2.55	0.11	3.44
12/05/23 10:15:26	16640	14.61	2.59	0.11	3.43
12/05/23 10:15:56	16670	14.61	2.60	0.11	3.45
12/05/23 10:16:26	16700	14.62	2.63	0.12	3.45
12/05/23 10:16:56	16730	14.60	2.63	0.11	3.45
12/05/23 10:17:26	16760	14.61	2.61	0.11	3.45
12/05/23 10:17:56	16790	14.60	2.63	0.11	3.45
12/05/23 10:18:26	16820	14.60	2.64	0.12	3.45
12/05/23 10:18:56	16850	14.62	2.61	0.11	3.45
12/05/23 10:19:26	16880	14.60	2.61	0.11	3.44
12/05/23 10:19:56	16910	14.60	2.60	0.11	3.45
12/05/23 10:20:26	16940	14.61	2.64	0.11	3.45
12/05/23 10:20:56	16970	14.59	2.62	0.09	3.45
12/05/23 10:21:26	17000	14.62	2.62	0.09	3.45
12/05/23 10:21:56	17030	14.63	2.62	0.10	3.45
12/05/23 10:22:26	17060	14.60	2.62	0.09	3.44
12/05/23 10:22:56	17090	14.60	2.61	0.09	3.44
12/05/23 10:32:26	17660	14.60	2.58	0.10	3.45
12/05/23 10:32:56	17690	14.60	2.57	0.10	3.46
12/05/23 10:33:26	17720	14.60	2.61	0.11	3.45
12/05/23 10:33:56	17750	14.62	2.58	0.10	3.45
12/05/23 10:34:26	17780	14.62	2.60	0.11	3.45
12/05/23 10:34:56	17810	14.62	2.58	0.10	3.45
12/05/23 10:35:26	17840	14.61	2.59	0.11	3.46
12/05/23 10:35:56	17870	14.63	2.61	0.10	3.46
12/05/23 10:36:26	17900	14.62	2.57	0.09	3.45
12/05/23 10:36:56	17930	14.62	2.58	0.10	3.46
12/05/23 10:37:26	17960	14.61	2.65	0.12	3.46

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Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,181,700	SCFH

Weather Data

Barometric Pressure	30.16	in. Hg
Relative Humidity	78	%
Ambient Temperature	55	^{o}F
Specific Humidity	0.007092	lb H_2O / lb air

Unit Data

Unit Load	179.0	megawatts
Stack Exhaust Flow (M19)	37,004,860	SCFH

High Load, Run - C2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 10:37:56	17990	14.63	2.66	0.10	3.45
12/05/23 10:38:26	18020	14.64	2.65	0.10	3.45
12/05/23 10:38:56	18050	14.64	2.63	0.10	3.44
12/05/23 10:39:26	18080	14.64	2.59	0.09	3.43
12/05/23 10:39:56	18110	14.64	2.47	0.09	3.44
12/05/23 10:40:26	18140	14.62	2.43	0.09	3.44
12/05/23 10:40:56	18170	14.65	2.42	0.10	3.45
12/05/23 10:41:26	18200	14.65	2.44	0.08	3.45
12/05/23 10:41:56	18230	14.65	2.46	0.10	3.43
12/05/23 10:42:26	18260	14.64	2.49	0.09	3.43
12/05/23 10:42:56	18290	14.64	2.53	0.08	3.42
12/05/23 10:43:26	18320	14.60	2.54	0.10	3.42
12/05/23 10:43:56	18350	14.62	2.55	0.09	3.43
12/05/23 10:44:26	18380	14.64	2.51	0.09	3.42
12/05/23 10:44:56	18410	14.62	2.56	0.10	3.42
12/05/23 10:45:26	18440	14.61	2.59	0.09	3.43
12/05/23 10:45:56	18470	14.62	2.65	0.08	3.42
12/05/23 10:46:26	18500	14.62	2.63	0.07	3.42
12/05/23 10:46:56	18530	14.63	2.64	0.07	3.43
12/05/23 10:47:26	18560	14.63	2.64	0.07	3.43
12/05/23 10:47:56	18590	14.63	2.63	0.09	3.42
12/05/23 10:48:26	18620	14.63	2.61	0.09	3.43
12/05/23 10:48:56	18650	14.64	2.62	0.07	3.42
12/05/23 10:49:26	18680	14.64	2.62	0.07	3.42
12/05/23 10:49:56	18710	14.61	2.62	0.07	3.43
12/05/23 10:50:26	18740	14.63	2.62	0.07	3.42
12/05/23 10:50:56	18770	14.63	2.63	0.08	3.43
12/05/23 10:51:26	18800	14.65	2.65	0.07	3.42
12/05/23 10:51:56	18830	14.64	2.58	0.07	3.41
12/05/23 10:52:26	18860	14.63	2.55	0.07	3.42
12/05/23 10:52:56	18890	14.65	2.59	0.07	3.42
12/05/23 11:02:26	19460	14.63	2.56	0.07	3.45
12/05/23 11:02:56	19490	14.65	2.56	0.07	3.45
12/05/23 11:03:26	19520	14.65	2.55	0.07	3.43
12/05/23 11:03:56	19550	14.64	2.55	0.07	3.44
12/05/23 11:04:26	19580	14.65	2.55	0.07	3.44
12/05/23 11:04:56	19610	14.63	2.57	0.08	3.43
12/05/23 11:05:26	19640	14.64	2.60	0.07	3.44
12/05/23 11:05:56	19670	14.62	2.59	0.07	3.43
12/05/23 11:06:26	19700	14.64	2.60	0.07	3.43
12/05/23 11:06:56	19730	14.63	2.63	0.06	3.43
12/05/23 11:07:26	19760	14.63	2.61	0.06	3.42
12/05/23 11:07:56	19790	14.64	2.59	0.06	3.41
12/05/23 11:08:26	19820	14.65	2.59	0.06	3.42
12/05/23 11:08:56	19850	14.65	2.59	0.07	3.41
12/05/23 11:09:26	19880	14.65	2.59	0.06	3.40
12/05/23 11:09:56	19910	14.66	2.58	0.06	3.40
12/05/23 11:10:26	19940	14.63	2.59	0.07	3.39
12/05/23 11:10:56	19970	14.66	2.56	0.07	3.41
12/05/23 11:11:26	20000	14.66	2.59	0.07	3.42
12/05/23 11:11:56	20030	14.65	2.58	0.07	3.41
12/05/23 11:12:26	20060	14.66	2.59	0.06	3.41
12/05/23 11:12:56	20090	14.65	2.61	0.06	3.41

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Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,181,700	SCFH

Weather Data

Barometric Pressure	30.16	in. Hg
Relative Humidity	78	%
Ambient Temperature	55	^{o}F
Specific Humidity	0.007092	lb H_2O / lb air

Unit Data

Unit Load	179.0	megawatts
Stack Exhaust Flow (M19)	37,004,860	SCFH

High Load, Run - C2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 11:13:26	20120	14.67	2.63	0.06	3.40
12/05/23 11:13:56	20150	14.66	2.55	0.07	3.40
12/05/23 11:14:26	20180	14.66	2.44	0.07	3.42
12/05/23 11:14:56	20210	14.66	2.49	0.07	3.42
12/05/23 11:15:26	20240	14.65	2.50	0.06	3.43
12/05/23 11:15:56	20270	14.67	2.53	0.08	3.46
12/05/23 11:16:26	20300	14.64	2.57	0.07	3.46
12/05/23 11:16:56	20330	14.64	2.57	0.07	3.47
12/05/23 11:17:26	20360	14.63	2.59	0.07	3.48
12/05/23 11:17:56	20390	14.65	2.59	0.07	3.47
12/05/23 11:18:26	20420	14.66	2.57	0.06	3.47
12/05/23 11:18:56	20450	14.67	2.58	0.06	3.47
12/05/23 11:19:26	20480	14.65	2.54	0.06	3.47
12/05/23 11:19:56	20510	14.67	2.55	0.07	3.47
12/05/23 11:20:26	20540	14.67	2.57	0.07	3.46
12/05/23 11:20:56	20570	14.67	2.57	0.08	3.45
12/05/23 11:21:26	20600	14.66	2.54	0.07	3.45
12/05/23 11:21:56	20630	14.66	2.55	0.08	3.46
12/05/23 11:22:26	20660	14.63	2.55	0.08	3.47
12/05/23 11:22:56	20690	14.64	2.57	0.08	3.49
RAW AVERAGE		**14.63**	**2.58**	**0.09**	**3.44**

		O_2	NOx	CO	CO_2
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016	INST-C2-0026
		(%)	**(ppmvd)**	**(ppmvd)**	**(%)**
Bias	**Initial Zero**	0.01	0.02	0.00	0.00
	Final Zero	0.02	0.04	0.00	0.10
	Avg. Zero	0.02	0.03	0.00	0.05
	Initial UpScale	11.80	4.97	5.15	8.80
	Final UpScale	11.86	4.88	5.10	8.88
	Avg. UpScale	11.83	4.93	5.13	8.84
Upscale Cal Gas		12.04	5.06	5.20	8.94

EMISSIONS DATA	O_2	NOx	CO	CO_2
Corrected Raw Average (ppm/% [vol] dry basis)	14.89	2.64	0.09	3.44
Concentration (ppmvd@ 15%O_2)	N/A	2.59	0.09	N/A
Emission Rate (lb/hr)	N/A	11.65	0.25	N/A
Emission Rate (lb/MMBtu)	N/A	0.009	0.000	N/A

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Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,166,700	SCFH

Weather Data

Barometric Pressure	30.12	in. Hg
Relative Humidity	66	%
Ambient Temperature	61	^{o}F
Specific Humidity	0.007459	lb H_2O / lb air

Unit Data

Unit Load	176.0	megawatts
Stack Exhaust Flow (M19)	36,648,218	SCFH

High Load, Run - C3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 11:32:26	21260	14.63	2.54	0.11	3.53
12/05/23 11:32:56	21290	14.65	2.52	0.11	3.53
12/05/23 11:33:26	21320	14.67	2.54	0.10	3.51
12/05/23 11:33:56	21350	14.68	2.56	0.10	3.51
12/05/23 11:34:26	21380	14.67	2.55	0.09	3.52
12/05/23 11:34:56	21410	14.66	2.56	0.08	3.50
12/05/23 11:35:26	21440	14.66	2.56	0.08	3.47
12/05/23 11:35:56	21470	14.67	2.57	0.08	3.47
12/05/23 11:36:26	21500	14.66	2.57	0.08	3.46
12/05/23 11:36:56	21530	14.67	2.57	0.06	3.45
12/05/23 11:37:26	21560	14.67	2.56	0.07	3.45
12/05/23 11:37:56	21590	14.67	2.56	0.08	3.44
12/05/23 11:38:26	21620	14.68	2.56	0.07	3.45
12/05/23 11:38:56	21650	14.67	2.56	0.07	3.45
12/05/23 11:39:26	21680	14.67	2.60	0.06	3.44
12/05/23 11:39:56	21710	14.65	2.58	0.07	3.43
12/05/23 11:40:26	21740	14.67	2.60	0.07	3.43
12/05/23 11:40:56	21770	14.67	2.60	0.06	3.43
12/05/23 11:41:26	21800	14.67	2.58	0.06	3.43
12/05/23 11:41:56	21830	14.66	2.57	0.06	3.43
12/05/23 11:42:26	21860	14.66	2.59	0.06	3.44
12/05/23 11:42:56	21890	14.66	2.61	0.06	3.46
12/05/23 11:43:26	21920	14.67	2.59	0.06	3.48
12/05/23 11:43:56	21950	14.67	2.63	0.07	3.48
12/05/23 11:44:26	21980	14.67	2.58	0.06	3.49
12/05/23 11:44:56	22010	14.68	2.66	0.05	3.50
12/05/23 11:45:26	22040	14.68	2.69	0.06	3.48
12/05/23 11:45:56	22070	14.67	2.52	0.04	3.49
12/05/23 11:46:26	22100	14.67	2.54	0.05	3.49
12/05/23 11:46:56	22130	14.67	2.53	0.03	3.48
12/05/23 11:47:26	22160	14.69	2.49	0.05	3.48
12/05/23 11:47:56	22190	14.64	2.52	0.04	3.48
12/05/23 11:48:26	22220	14.66	2.60	0.05	3.47
12/05/23 11:48:56	22250	14.69	2.66	0.05	3.47
12/05/23 11:49:26	22280	14.65	2.68	0.05	3.45
12/05/23 11:49:56	22310	14.68	2.68	0.05	3.44
12/05/23 11:50:26	22340	14.67	2.64	0.06	3.44
12/05/23 11:50:56	22370	14.66	2.64	0.06	3.44
12/05/23 11:51:26	22400	14.66	2.62	0.05	3.43
12/05/23 11:51:56	22430	14.64	2.62	0.06	3.42
12/05/23 11:52:26	22460	14.68	2.66	0.06	3.41
12/05/23 11:52:56	22490	14.68	2.65	0.05	3.40
12/05/23 12:02:26	23060	14.65	2.50	0.05	3.43
12/05/23 12:02:56	23090	14.67	2.54	0.04	3.43
12/05/23 12:03:26	23120	14.66	2.62	0.05	3.43
12/05/23 12:03:56	23150	14.66	2.62	0.05	3.42
12/05/23 12:04:26	23180	14.68	2.61	0.05	3.42
12/05/23 12:04:56	23210	14.67	2.62	0.05	3.41
12/05/23 12:05:26	23240	14.67	2.62	0.04	3.40
12/05/23 12:05:56	23270	14.71	2.61	0.04	3.41
12/05/23 12:06:26	23300	14.68	2.59	0.04	3.40
12/05/23 12:06:56	23330	14.67	2.66	0.03	3.41
12/05/23 12:07:26	23360	14.68	2.71	0.04	3.41

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Campbell Power Plant

Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,166,700	SCFH

Weather Data

Barometric Pressure	30.12	in. Hg
Relative Humidity	66	%
Ambient Temperature	61	^{o}F
Specific Humidity	0.007459	lb H_2O / lb air

Unit Data

Unit Load	176.0	megawatts
Stack Exhaust Flow (M19)	36,648,218	SCFH

High Load, Run - C3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 12:07:56	23390	14.70	2.72	0.04	3.41
12/05/23 12:08:26	23420	14.71	2.71	0.03	3.41
12/05/23 12:08:56	23450	14.71	2.62	0.05	3.41
12/05/23 12:09:26	23480	14.69	2.61	0.04	3.40
12/05/23 12:09:56	23510	14.69	2.59	0.05	3.41
12/05/23 12:10:26	23540	14.67	2.60	0.04	3.41
12/05/23 12:10:56	23570	14.68	2.61	0.05	3.40
12/05/23 12:11:26	23600	14.68	2.59	0.04	3.39
12/05/23 12:11:56	23630	14.67	2.58	0.04	3.40
12/05/23 12:12:26	23660	14.68	2.64	0.04	3.40
12/05/23 12:12:56	23690	14.69	2.63	0.03	3.39
12/05/23 12:13:26	23720	14.68	2.64	0.05	3.39
12/05/23 12:13:56	23750	14.69	2.63	0.04	3.38
12/05/23 12:14:26	23780	14.66	2.62	0.05	3.38
12/05/23 12:14:56	23810	14.69	2.63	0.02	3.38
12/05/23 12:15:26	23840	14.66	2.65	0.04	3.37
12/05/23 12:15:56	23870	14.68	2.67	0.04	3.37
12/05/23 12:16:26	23900	14.67	2.62	0.04	3.38
12/05/23 12:16:56	23930	14.69	2.61	0.04	3.38
12/05/23 12:17:26	23960	14.66	2.63	0.04	3.38
12/05/23 12:17:56	23990	14.70	2.64	0.03	3.39
12/05/23 12:18:26	24020	14.68	2.65	0.04	3.39
12/05/23 12:18:56	24050	14.71	2.65	0.05	3.39
12/05/23 12:19:26	24080	14.67	2.60	0.03	3.40
12/05/23 12:19:56	24110	14.70	2.61	0.04	3.40
12/05/23 12:20:26	24140	14.68	2.62	0.04	3.41
12/05/23 12:20:56	24170	14.70	2.62	0.03	3.42
12/05/23 12:21:26	24200	14.68	2.64	0.03	3.42
12/05/23 12:21:56	24230	14.69	2.64	0.03	3.42
12/05/23 12:22:26	24260	14.69	2.65	0.03	3.43
12/05/23 12:22:56	24290	14.69	2.64	0.02	3.42
12/05/23 12:32:26	24860	14.68	2.64	0.04	3.41
12/05/23 12:32:56	24890	14.68	2.63	0.05	3.40
12/05/23 12:33:26	24920	14.69	2.64	0.03	3.40
12/05/23 12:33:56	24950	14.69	2.64	0.04	3.41
12/05/23 12:34:26	24980	14.67	2.63	0.04	3.40
12/05/23 12:34:56	25010	14.67	2.62	0.04	3.40
12/05/23 12:35:26	25040	14.69	2.65	0.04	3.41
12/05/23 12:35:56	25070	14.68	2.65	0.03	3.41
12/05/23 12:36:26	25100	14.69	2.64	0.04	3.41
12/05/23 12:36:56	25130	14.68	2.65	0.04	3.41
12/05/23 12:37:26	25160	14.69	2.63	0.04	3.41
12/05/23 12:37:56	25190	14.70	2.64	0.04	3.41
12/05/23 12:38:26	25220	14.69	2.63	0.04	3.42
12/05/23 12:38:56	25250	14.68	2.65	0.05	3.42
12/05/23 12:39:26	25280	14.70	2.64	0.03	3.43
12/05/23 12:39:56	25310	14.69	2.64	0.04	3.44
12/05/23 12:40:26	25340	14.68	2.68	0.04	3.43
12/05/23 12:40:56	25370	14.67	2.65	0.03	3.44
12/05/23 12:41:26	25400	14.69	2.66	0.04	3.45
12/05/23 12:41:56	25430	14.67	2.65	0.04	3.45
12/05/23 12:42:26	25460	14.69	2.68	0.03	3.45
12/05/23 12:42:56	25490	14.68	2.65	0.04	3.47

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Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,656	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,040	Btu/SCF fuel
Turbine Fuel Flow	1,166,700	SCFH

Weather Data

Barometric Pressure	30.12	in. Hg
Relative Humidity	66	%
Ambient Temperature	61	^{o}F
Specific Humidity	0.007459	lb H_2O / lb air

Unit Data

Unit Load	176.0	megawatts
Stack Exhaust Flow (M19)	36,648,218	SCFH

High Load, Run - C3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)	CO_2 (%vd)
12/05/23 12:43:26	25520	14.68	2.65	0.03	3.47
12/05/23 12:43:56	25550	14.69	2.66	0.03	3.46
12/05/23 12:44:26	25580	14.72	2.64	0.02	3.47
12/05/23 12:44:56	25610	14.70	2.64	0.02	3.46
12/05/23 12:45:26	25640	14.71	2.63	0.03	3.44
12/05/23 12:45:56	25670	14.69	2.65	0.03	3.45
12/05/23 12:46:26	25700	14.69	2.65	0.04	3.44
12/05/23 12:46:56	25730	14.67	2.62	0.03	3.43
12/05/23 12:47:26	25760	14.70	2.62	0.03	3.43
12/05/23 12:47:56	25790	14.69	2.62	0.03	3.42
12/05/23 12:48:26	25820	14.68	2.62	0.02	3.41
12/05/23 12:48:56	25850	14.69	2.62	0.03	3.42
12/05/23 12:49:26	25880	14.72	2.63	0.03	3.42
12/05/23 12:49:56	25910	14.70	2.60	0.02	3.41
12/05/23 12:50:26	25940	14.68	2.60	0.03	3.41
12/05/23 12:50:56	25970	14.70	2.61	0.04	3.43
12/05/23 12:51:26	26000	14.68	2.62	0.03	3.42
12/05/23 12:51:56	26030	14.68	2.61	0.03	3.43
12/05/23 12:52:26	26060	14.70	2.61	0.04	3.44
12/05/23 12:52:56	26090	14.68	2.63	0.03	3.44
RAW AVERAGE		**14.68**	**2.62**	**0.05**	**3.43**

		O_2	NOx	CO	CO_2
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016	INST-C2-0026
		(%)	**(ppmvd)**	**(ppmvd)**	**(%)**
Bias	**Initial Zero**	0.02	0.04	0.00	0.10
	Final Zero	0.04	0.08	0.00	0.00
	Avg. Zero	0.03	0.06	0.00	0.05
	Initial UpScale	11.86	4.88	5.10	8.88
	Final UpScale	11.86	4.93	5.03	8.74
	Avg. UpScale	11.86	4.91	5.07	8.81
Upscale Cal Gas		12.04	5.06	5.20	8.94

EMISSIONS DATA	O_2	NOx	CO	CO_2
Corrected Raw Average (ppm/% [vol] dry basis)	14.91	2.67	0.05	3.45
Concentration (ppmvd@ 15%O_2)	N/A	2.63	0.05	N/A
Emission Rate (lb/hr)	N/A	11.69	0.13	N/A
Emission Rate (lb/MMBtu)	N/A	0.010	0.000	N/A

TEST RESULTS AND CALCULATIONS

PM/PM_{10} Emissions Data

METHOD 5 (FRONT) AND 202 (BACK) - RESULTS

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Historical Data	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
Run Start Time	07:17	10:27	13:12		hh:mm	
Run Stop Time	09:35	12:45	15:29		hh:mm	
Test Date	12/05/23	12/05/23	12/05/23		mm/dd/yy	
Load	High	High	High		% or w/DB	--
Meter Calibration Factor	0.974	0.974	0.974			
Pitot Tube Coefficient	0.8215	0.8215	0.8215			
Average Nozzle Diameter	0.233	0.233	0.233		in	
Stack Test Data	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
Initial Meter Volume	492.780	600.510	715.330		ft^3	
Final Meter Volume	599.310	715.010	810.030		ft^3	
Total Meter Volume	106.530	114.500	94.700	105.243	ft^3	
Total Sampling Time	120.00	120.00	120.00	120.00	min	
Average Meter Temperature	72.46	75.33	75.75	74.51	°F	
Average Stack Temperature	239.00	250.92	246.58	245.50	°F	
Barometric Pressure	30.13	30.15	30.07	30.12	in Hg	
Stack Static Pressure	-0.74	-0.74	-0.74	-0.74	in H_2O	
Absolute Stack Pressure	30.08	30.10	30.02	30.06	in Hg	
Average Orifice Pressure Drop	2.46	2.80	1.93	2.40	in H_2O	
Absolute Meter Pressure	30.26	30.28	30.20	30.25	in Hg	
Avg Square Root Pitot Pressure	1.08	1.15	0.97	1.07	√(in H_2O)	
Moisture Content Data	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
Impinger Water Weight Gain	148.90	161.70	135.80	148.80	g	
Silica Gel Weight Gain	24.30	26.90	19.40	23.53	g	
Total Water Volume Collected	173.51	188.94	155.48	172.64	ml	
Standard Water Vapor Volume	8.17	8.89	7.32	8.13	scf	
Standard Meter Volume	104.2	111.6	91.8	102.5	dscf	
Standard Metric Meter Volume	3.0	3.2	2.6	2.9	dscm	
Calculated Stack Moisture	7.27	7.38	7.38	7.34	%	
Saturated Stack Moisture	100.00	100.00	100.00	100.00	%	
Reported Stack Moisture Content	7.27	7.38	7.38	7.34	%	
Gas Analysis Data	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
Carbon Dioxide Content	3.5	3.5	3.5	3.5	%	
Oxygen Content	15.0	15.0	15.0	15.0	%	
Carbon Monoxide Content	0.0	0.0	0.0	0.0	ppm	
Nitrogen Content	81.5	81.5	81.5	81.5	%	
Stack Dry Molecular Weight	29.16	29.16	29.16	29.16	lb/lb-mole	
Stack Wet Molecular Weight	28.35	28.34	28.34	28.34	lb/lb-mole	

METHOD 5 (FRONT) AND 202 (BACK) - RESULTS

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Calculated Fuel Factor	1.686	1.686	1.686	1.686		
Fuel F-Factor	8655.58	8655.58	8655.58	8655.58	dscf/MMBtu	
Percent Excess Air	230.2	230.2	230.2	230.2	%	
Volumetric Flow Rate Data	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
Average Stack Gas Velocity	68.50	73.90	61.84	68.08	ft/sec	
Stack Cross-Sectional Area	226.98	226.98	226.98	226.98	ft^2	
Actual Stack Flow Rate	932,871	1,006,480	842,209	927,187	acfm	
Wet Standard Stack Flow Rate	42,499	45,114	37,882	41,832	wkscfh	
Dry Standard Stack Flow Rate	39,411,007	41,783,946	35,083,979	38,759,644	dscfh	
Percent of Isokinetic Rate	101.1	102.1	100.4	101.2	%	
Gravimetric Analysis	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
NH_4OH Correction	0.0000	0.0000	0.0000	0.0000	ml	
NH_4OH Correction	0.0000	0.0000	0.0000	0.0000	mg	
Emission Rate Data	**CT1-PM-1**	**CT1-PM-2**	**CT1-PM-3**	**Average**	**Units**	**Limits**
Filterable PM_{10} Mass	1.73	0.97	2.07	1.59	mg	--
Filterable PM_{10} Concentration	1.66E-05	8.70E-06	2.25E-05	1.59E-05	g/dscf	--
	2.56E-04	1.34E-04	3.48E-04	2.46E-04	gr/dscf	--
Filterable PM_{10} Emission Rate	0.65	0.36	0.79	0.60	kg/hr	--
	1.44	0.80	1.74	1.33	lb/hr	--
	6.31	3.51	7.64	5.82	tpy	--
	0.0011	0.0006	0.0015	0.0011	lb/MMBtu	--
Condensable PM_{10} Mass	1.73	3.45	2.05	2.41	mg	--
Condensable PM_{10} Concentration	1.66E-05	3.09E-05	2.23E-05	2.33E-05	g/dscf	--
	2.57E-04	4.77E-04	3.45E-04	3.60E-04	gr/dscf	--
Condensable PM_{10} Emission Rate	0.66	1.29	0.78	0.91	kg/hr	--
	1.45	2.85	1.73	2.01	lb/hr	--
	6.33	12.47	7.57	8.79	tpy	--
	0.0011	0.0021	0.0015	0.0016	lb/MMBtu	--
Total PM_{10} Mass	3.46	4.42	4.12	4.00	mg	--
Total PM_{10} Concentration	3.32E-05	3.96E-05	4.49E-05	3.92E-05	g/dscf	--
	5.13E-04	6.11E-04	6.93E-04	6.05E-04	gr/dscf	--
Total PM_{10} Emission Rate	1.31	1.66	1.57	1.51	kg/hr	--
	2.89	3.65	3.47	3.34	lb/hr	7.00
	12.64	15.98	15.20	14.61	tpy	--
	0.0022	0.0027	0.0030	0.0027	lb/MMBtu	--

METHOD 5 (FRONT) AND 202 (BACK) SOURCE SAMPLING TITLE PAGE

Source Information	
Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Fuel Type	Gas, Natural

Test Information			
Project #		ethos-23-campbell.ca-comp#1	
Operator		JF	
Date for Preliminary Run	(mm/dd/yy)	12/05/23	
Standard Temperature		68	°F
Standard Pressure		29.92	in Hg
Required Sample Vol.	indust. spec.	60	scf
Run Duration	≥ 2 min/point	120	minutes
Unit Number		CT1	
Base Run Number		CT1-PM	
Number of Ports Available		4	
Number of Ports Used		4	
Port Inside Diameter		6.00	in
Stack Shape		Circular	

Test Equipment Information					
Run		**1**	**2**	**3**	
Test Date	(mm/dd/yy)	12/05/23	12/05/23	12/05/23	
Load		High	High	High	% or w/DB
Meter Box Number	from ACS	samp-cp-0021	samp-cp-0021	samp-cp-0021	
Meter Calibration Factor	(Y)	0.974	0.974	0.974	
Orifice Meter Coefficient	($\Delta H_@$)	1.812	1.812	1.812	in H_2O
Non-Console Manometer Used		No	No	No	
Pitot Identification	from ACS	A6223	A6223	A6223	
Pitot Tube Coefficient	(C_p)	0.8215	0.8215	0.8215	
Nozzle Number	from ACS	F8	F8	F8	
Nozzle Diameter	(D_n)	0.233	0.233	0.233	in
Probe Number	from ACS	samp-hp-0165	samp-hp-0165	samp-hp-0165	
Probe Length		96.0	96.0	96.0	in
(SS, Glass ….) Liner Material	from list	glass	glass	glass	
Sample Case / Oven Number	from ACS	samp-bh-0032	samp-bh-0032	samp-bh-0032	
Impinger Case Number	from ACS	samp-cc-0011	samp-cc-0028	samp-cc-0011	

Testing Company Information	
Company Name	Air Hygiene International, Inc. (Tulsa, Oklahoma)
Address	1600 W Tacoma Street
City, State Zip	Broken Arrow, Oklahoma 74012
Project Manager	Mars Sharief
Phone Number	(918) 307-8865
Fax Number	(918) 307-9131

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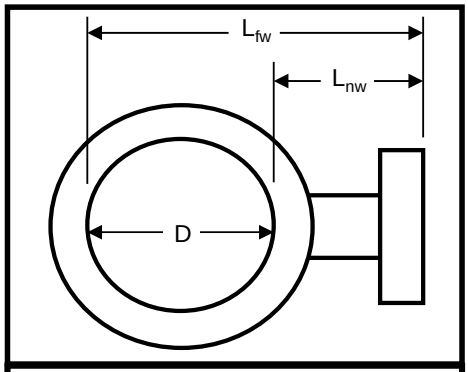
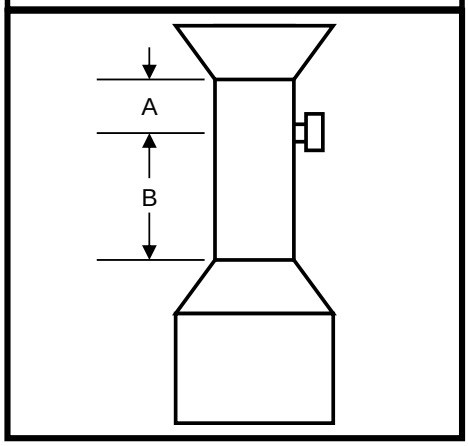
METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	Campbell Power Plant	**Date**	12/05/23
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Stack Type**	Circular
Operator	JF	**Ports Available**	4
Project #	ethos-23-campbell.ca-comp#1	**Ports Used**	4
Stack Size	Large (>24 inch diameter)	**Port ID (inches)**	6.00

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	216.50	in
Distance to Near Wall of Stack	(L_{nw})	12.50	in
Diameter of Stack	(D)	204.00	in
Area of Stack	(A_s)	226.98	ft²



Distance from Port to Disturbances			
Distance Upstream	(A)	102.00	in
Diameters Upstream	(A_D)	0.50	diameters
Distance Downstream	(B)	408.00	in
Diameters Downstream	(B_D)	2.00	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**	
Down Stream	**Up Stream**	**Particulate Points**	**Velocity Points**
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		24	16
Downstream Spec		24	16
Traverse Pts Required		24	16

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

- (●) Method 1 Trav
- ( ) 12 Point PM Trav (M201a ONLY)
- ( ) Velocity

Number of Traverse Points Used			
4	**Ports by**	6	**Across**
24	**Pts Used**	24	**Required**

Location of Traverse Points in Circular Stacks									
Traverse Point Number	(Fraction of Stack Dimension from Inside Wall to Traverse Point) Number of Traverse Points Across the Stack								
	2	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**
1	.146	.067	.044	.032	.026	.021	.018	.016	.014
2	.854	.250	.146	.105	.082	.067	.057	.049	.044
3		.750	.296	.194	.146	.118	.099	.085	.075
4		.933	.704	.323	.226	.177	.146	.125	.109
5			.854	.677	.342	.250	.201	.169	.146
6			.956	.806	.658	.356	.269	.220	.188
7				.895	.774	.644	.366	.283	.236
8				.968	.854	.750	.634	.375	.296
9					.918	.823	.731	.625	.382
10					.974	.882	.799	.717	.618
11						.933	.854	.780	.704
12						.979	.901	.831	.764

Traverse Point Locations			
Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
		in	in
1	0.021	4 2/8	16 6/8
2	0.067	13 5/8	26 1/8
3	0.118	24 1/8	36 5/8
4	0.177	36 1/8	48 5/8
5	0.250	51	63 4/8
6	0.356	72 5/8	85 1/8
7			
8			
9			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	Campbell Power Plant		
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine		
Operator	JF		
Project #	ethos-23-campbell.ca-comp#1		
Pitot Leak Check	x	**PreTest**	x	**PostTest**

Preliminary Run Date	12/05/23		
Stack Type	Circular		
Ports Available	4		
Thermocouple ID	samp-hp-0099		
Pitot Coefficient	0.8223	**Pitot Identification**	A7793

Stack Dimensions			
Area of Stack	(A_s)	226.98	ft²
Diameter of Stack	(D)	204.00	in

Pressures			
Barometric Pressure	(P_b)	30.13	in Hg
Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.08	in Hg

Stack Gas Composition			
Composition Data:	**Actual Composition**		
Carbon Dioxide Concentration	(%CO_2)	3.50	%vd
Oxygen Concentration	(%O_2)	15.00	%vd
Carbon Monoxide Concentration	(ppmCO)	0.00	ppmvd
Nitrogen Concentration	(%N_2)	81.50	%vd
Stack Moisture Content	(B_{ws})	8.00	%
Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
Stack Wet Molecular Weight	(M_w)	28.27	lb/lb-mole

Results			
Avg Stack Gas Velocity	(v_s)	68.55	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	38,845,978	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	647,433	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	933,620	acf/min
Avg Stack Wet Std Flow Rate	(Q_{sw})	42,223,889	ascf/hr

40 CFR 60, Method 2G, Section 8.11.1 (but applies to all Method 2 type static pressure measurements):
If a Type S probe is used for this measurement, position the probe at or between any traverse point(s) and rotate the probe until a null differential pressure reading is obtained. Disconnect the tubing from one of the pressure ports; read and record the ΔP. For pressure devices with one-directional scales, if a deflection in the positive direction is noted with the negative side disconnected, then the static pressure is positive. Likewise, if a deflection in the positive direction is noted with the positive side disconnected, then the static pressure is negative.

Velocity Traverse Data

Run Number	CT1-PM-V1				
Run Time	06:45	**Start**	07:15	**End**	
Traverse Point	**Velocity Head** (Δp)	**Null Angle** (N_a)	**Zero Deg Pressure** ($0^o{}_a$)	**Stack Temp** (t_s)	**Local Velocity** ($v_{s(l)}$)
	in H_2O	deg	in H_2O	°F	ft/sec
A-1	1.20	0	0.00	232	69.48
A-2	1.40	-5	0.15	241	75.53
A-3	1.20	0	0.00	244	70.08
A-4	0.99	-5	0.12	242	63.56
A-5	0.67	-5	0.16	239	52.18
A-6	0.42	-10	0.30	233	41.13
B-1	1.40	-10	0.45	236	75.26
B-2	1.60	-10	0.40	236	80.46
B-3	1.90	0	0.00	237	87.74
B-4	1.90	0	0.00	237	87.74
B-5	1.50	0	0.00	233	77.73
B-6	1.20	-5	0.15	232	69.48
C-1	1.10	-5	0.15	257	67.71
C-2	1.70	0	0.00	250	83.76
C-3	2.20	0	0.00	250	95.29
C-4	2.00	0	0.00	247	90.66
C-5	1.60	-5	0.10	243	80.86
C-6	1.20	-5	0.25	241	69.93
D-1	0.80	0	0.00	243	57.18
D-2	0.89	-5	0.15	259	60.99
D-3	0.75	0	0.00	258	55.95
D-4	0.45	0	0.00	259	43.37
D-5	0.46	-5	0.20	255	43.72
D-6	0.48	-5	0.15	255	44.67
Average	1.21	3		244	
	1.07	**= Square roots of Δp**			
Standard deviation of null angles =				3.5	

METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

Plant Name	Campbell Power Plant	**Preliminary Run Date**	12/05/23		
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Operator**	JF		
Project #	ethos-23-campbell.ca-comp#1	**# of Ports Used**	1 (gas probe)		
Fuel Type	Gas, Natural	**Min. Fuel Factor**	1.600	**Max. Fuel Factor**	1.836

Gas Analysis Data									
Run Number	CT1-PM-1		**Date**	12/05/23	**Run Start Time**	07:17		**Run Stop Time**	09:35
Sample Analysis Time	**CO_2 Conc.**	**O_2 Conc.**	**CO Conc.**	**N_2 Conc.**	**Dry Molecular Weight**	**Calculated Fuel Factor**		**Excess Air**	**Fuel Factor in Range**
	(%CO_2)	(%O_2)	(ppmCO)	(%N_2)	(M_d)	(Fo)avg		(%EA)avg	
hh:mm	%	%	ppm	%	lb/lb-mole			%	
02:18	3.5	15.0	0.0	81.5	29.16	1.686		230.2	YES

Gas Analysis Data									
Run Number	CT1-PM-2		**Date**	12/05/23	**Run Start Time**	10:27		**Run Stop Time**	12:45
Sample Analysis Time	**CO_2 Conc.**	**O_2 Conc.**	**CO Conc.**	**N_2 Conc.**	**Dry Molecular Weight**	**Calculated Fuel Factor**		**Excess Air**	**Fuel Factor in Range**
	(%CO_2)	(%O_2)	(ppmCO)	(%N_2)	(M_d)	(Fo)avg		(%EA)avg	
hh:mm	%	%	ppm	%	lb/lb-mole			%	
02:18	3.5	15.0	0.0	81.5	29.16	1.686		230.2	YES

Gas Analysis Data									
Run Number	CT1-PM-3		**Date**	12/05/23	**Run Start Time**	13:12		**Run Stop Time**	15:29
Sample Analysis Time	**CO_2 Conc.**	**O_2 Conc.**	**CO Conc.**	**N_2 Conc.**	**Dry Molecular Weight**	**Calculated Fuel Factor**		**Excess Air**	**Fuel Factor in Range**
	(%CO_2)	(%O_2)	(ppmCO)	(%N_2)	(M_d)	(Fo)avg		(%EA)avg	
hh:mm	%	%	ppm	%	lb/lb-mole			%	
02:17	3.5	15.0	0.0	81.5	29.16	1.686		230.2	YES

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	Campbell Power Plant	**Preliminary Run Date**	12/05/23
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Operator**	JF
Project #	ethos-23-campbell.ca-comp#1	**Ports Used**	4

Scale Daily Calibration					
Scale Number	SAMP-SC-0031	**Standard**	**Result**	**Difference**	**Pass/Fail**
Date		(g)	(g)	(g)	(± 0.5 g)
Test Day 1	12/05/23	500	499.8	-0.2	Pass

Moisture Content Data									
Run Number		CT1-PM-1		**Date**	12/05/23	**Start Time**	07:17	**Stop Time**	09:35
Meter Box Number		samp-cp-0021			**Meter Cal Factor**		(Y)	0.974	
Total Meter Volume		(V_m)	106.530	dcf	**Barometric Pressure**		(P_b)	30.13	in Hg
Average Stack Temp		$(t_s)_{avg}$	239	°F	**Stack Static Pressure**		(P_{static})	-0.74	in H_2O
Average Meter Temp		$(t_m)_{avg}$	72	°F	**Avg Orifice Pressure**		$(\Delta H)_{avg}$	2.46	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		(g)	(g)	(g)	(g)				
Contents		Dry	Dry	DI Water	Sil Gel				
Final Value	(V_f),(W_f)	495.20	616.40	708.60	849.40				
Initial Value	(V_i),(W_i)	359.80	611.60	699.90	825.10				
Net Value	(V_n),(W_n)	135.4	4.8	8.7	24.3				
Results									
Total Weight		(W_t)	173.20	g	**Water Vol Weighed**		($V_{wsg(std)}$)	8.168	scf
Std Meter Volume		($V_{m(std)}$)	104.235	dscf	**Sat. Moisture Content**		($B_{ws(svp)}$)	100.00	%
Calc Moisture Content		($B_{ws(calc)}$)	7.27	%	**Final Moisture Content**		(B_{ws})	7.27	%

Moisture Content Data									
Run Number		CT1-PM-2		**Date**	12/05/23	**Start Time**	10:27	**Stop Time**	12:45
Meter Box Number		samp-cp-0021			**Meter Cal Factor**		(Y)	0.974	
Total Meter Volume		(V_m)	114.500	dcf	**Barometric Pressure**		(P_b)	30.15	in Hg
Average Stack Temp		$(t_s)_{avg}$	251	°F	**Stack Static Pressure**		(P_{static})	-0.74	in H_2O
Average Meter Temp		$(t_m)_{avg}$	75	°F	**Avg Orifice Pressure**		$(\Delta H)_{avg}$	2.80	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		(g)	(g)	(g)	(g)				
Contents		Dry	Dry	DI Water	Sil Gel				
Final Value	(V_f),(W_f)	500.70	620.60	739.30	839.50				
Initial Value	(V_i),(W_i)	372.80	611.50	714.60	812.60				
Net Value	(V_n),(W_n)	127.9	9.1	24.7	26.9				
Results									
Total Weight		(W_t)	188.60	g	**Water Vol Weighed**		($V_{wsg(std)}$)	8.894	scf
Std Meter Volume		($V_{m(std)}$)	111.597	dscf	**Sat. Moisture Content**		($B_{ws(svp)}$)	100.00	%
Calc Moisture Content		($B_{ws(calc)}$)	7.38	%	**Final Moisture Content**		(B_{ws})	7.38	%

Moisture Content Data									
Run Number		CT1-PM-3		**Date**	12/05/23	**Start Time**	13:12	**Stop Time**	15:29
Meter Box Number		samp-cp-0021			**Meter Cal Factor**		(Y)	0.974	
Total Meter Volume		(V_m)	94.700	dcf	**Barometric Pressure**		(P_b)	30.07	in Hg
Average Stack Temp		$(t_s)_{avg}$	247	°F	**Stack Static Pressure**		(P_{static})	-0.74	in H_2O
Average Meter Temp		$(t_m)_{avg}$	76	°F	**Avg Orifice Pressure**		$(\Delta H)_{avg}$	1.93	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		(g)	(g)	(g)	(g)				
Contents		Dry	Dry	DI Water	Sil Gel				
Final Value	(V_f),(W_f)	479.30	615.70	717.40	788.60				
Initial Value	(V_i),(W_i)	360.00	614.00	702.60	769.20				
Net Value	(V_n),(W_n)	119.3	1.7	14.8	19.4				
Results									
Total Weight		(W_t)	155.20	g	**Water Vol Weighed**		($V_{wsg(std)}$)	7.319	scf
Std Meter Volume		($V_{m(std)}$)	91.791	dscf	**Sat. Moisture Content**		($B_{ws(svp)}$)	100.00	%
Calc Moisture Content		($B_{ws(calc)}$)	7.38	%	**Final Moisture Content**		(B_{ws})	7.38	%

METHOD 5 (FRONT) AND 202 (BACK) SOURCE SAMPLING TITLE PAGE ISOKINETIC SAMPLING DATA

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Date	12/05/23
Operator	JF
Run Number	CT1-PM-1

Filter #	**Ideal Nozzle Diameter and IsoKinetic Factor Setup**			
2675	**Pitot Coefficient / ID**	(C_p)	0.8215	A6223
CT1-PM-1-CPM	**Average Stack Temp**	(t_s)	239.0	°F
	Average Meter Temp	(t_m)	72.5	
	Orifice Meter Coefficient	($\Delta H@$)	1.812	in H_2O
	Square Root ΔP	($\Delta p^{1/2}_{avg}$)	1.08	in H_2O
	Stack Moisture Content	(B_{ws})	7.27	%
	Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
	Estimated Orifice Flow Rate	(Q_m)	0.75	acfm
	ΔP to ΔH Isokinetic Factor	(K)	2.06	

Leak Checks		*[change]*		*[level]*		*[time]*	
Train	**Pre**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
PASS	**Post**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
Pitot	**Pre (+)**	0.00	in H_2O	5.6	in H_2O for	15.0	sec [≥15]
PASS	**Pre (-)**	0.00	in H_2O	5.8	in H_2O for	15.0	sec [≥15]
	Post (+)	0.00	in H_2O	5.3	in H_2O for	15.0	sec [≥15]
	Post (-)	0.00	in H_2O	5.2	in H_2O for	15.0	sec [≥15]

Sampling Equipment			
Meter Box Number	samp-cp-0021		
Meter Cal Factor	(Y)	0.974	
Nozzle Number	F8		
Average Nozzle Diameter	(D_{na})	0.2333	in
Suggested Nozzle Diameter	(D_{nl})	0.2142	in
Probe Number	samp-hp-0165		in
Probe Length	96		in
Liner Material	glass		
Sample Case / Oven Number	samp-bh-0032		
Impinger Case Number	samp-cc-0011		

Pressures			
Barometric Pressure	(P_b)	30.13	in Hg
Stack Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.08	in Hg
Absolute Meter Pressure	(P_m)	30.26	in Hg

Nozzle Measurements			**ID: F8**	
Pre	0.232	0.234	0.234	**PASS**
Post	0.232	0.234	0.234	**PASS**

Barometer ID
SAMP-WE-0054
Scale ID
SAMP-SC-0031

Run Time			
Start	07:17	**End**	09:35

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**						
Pre	359.8	611.6	699.9	825.1					**Wash Volumes**					ml
Post	495.2	616.4	708.6	849.4										ml

Identification Nos.		samp-cp-0021	samp-cp-0021	samp-cp-0021			samp-hp-0165	samp-hp-0165	samp-bh-0032	samp-cc-0011	1032	4022	samp-cp-0021	samp-cp-0021					
Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp (248±25°F)**	**Filter Temp (248±25°F)**	**Impinger Exit Temp (≤68°F)**	**Cond. Temp (≤85°F)**	**CPM Filter Temp (76.5±8.5°F)**	**Meter Inlet Temp (t_{mi})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumul. Meter Volume (V_m)$_{std}$**	**Cumul. Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft³	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	°F	°F	in Hg	√(in H_2O)	ft/sec	dscf	%	dscf
A-1	0.0	00:00:00	492.780	0.84	1.733	1.70	235	249	250	49	39	85	62	3.0	0.92	58.11	3.666	100.1	87.987
A-2	5.0	00:05:00	496.460	0.81	1.671	1.70	236	250	250	41	40	70	64	3.0	0.90	57.11	7.318	100.8	87.819
A-3	10.0	00:10:00	500.140	0.84	1.733	1.70	236	250	248	41	43	70	64	3.0	0.92	58.16	10.941	100.2	87.525
A-4	15.0	00:15:00	503.790	0.82	1.691	1.70	235	250	250	42	43	71	66	3.0	0.91	57.42	14.589	100.3	87.532
A-5	20.0	00:20:00	507.480	0.86	1.774	1.80	236	250	253	42	43	72	66	3.0	0.93	58.84	18.396	100.8	88.300
A-6	25.0	00:25:00	511.330	0.79	1.629	1.60	236	250	254	43	47	76	67	3.0	0.89	56.40	21.987	100.9	87.948
B-1	30.0	00:30:00	514.970	1.30	2.681	2.70	250	250	233	43	40	76	70	5.0	1.14	73.07	26.580	101.1	91.132
B-2	35.0	00:35:00	519.640	1.20	2.475	2.50	247	249	247	45	43	75	70	5.0	1.10	70.06	31.014	101.2	93.042
B-3	40.0	00:40:00	524.150	2.00	4.125	4.10	237	250	248	47	45	74	71	8.0	1.41	89.80	36.520	100.7	97.388
B-4	45.0	00:45:00	529.740	1.90	3.919	3.90	236	250	249	50	47	75	72	8.0	1.38	87.46	42.073	100.7	100.975
B-5	50.0	00:50:00	535.390	1.40	2.888	2.90	231	250	246	52	49	74	74	5.0	1.18	74.81	46.946	100.9	102.429
B-6	55.0	00:55:00	540.380	0.99	2.042	2.00	229	250	248	53	51	75	75	4.0	0.99	62.82	50.974	100.9	101.947
C-1	60.0	01:00:00	544.520	1.20	2.475	2.50	237	247	253	50	54	74	76	4.0	1.10	69.56	55.319	100.8	102.127
C-2	65.0	01:05:00	548.990	1.70	3.506	3.50	238	244	253	51	58	76	76	6.0	1.30	82.85	60.522	100.7	103.753
C-3	70.0	01:10:00	554.330	1.80	3.713	3.70	237	243	249	57	64	75	77	6.0	1.34	85.19	66.020	100.9	105.633
C-4	75.0	01:15:00	559.980	1.70	3.506	3.50	237	244	249	57	64	75	78	6.0	1.30	82.79	71.166	100.7	106.749
C-5	80.0	01:20:00	565.280	1.70	3.506	3.50	235	249	253	59	69	74	78	6.0	1.30	82.67	76.418	100.7	107.884
C-6	85.0	01:25:00	570.690	1.20	2.475	2.50	235	249	252	61	72	73	77	5.0	1.10	69.46	80.939	100.9	107.919
D-1	90.0	01:30:00	575.350	0.75	1.547	1.50	234	250	247	59	72	78	77	3.0	0.87	54.87	84.550	101.0	106.800
D-2	95.0	01:35:00	579.080	0.88	1.815	1.80	235	250	247	57	75	74	76	3.0	0.94	59.48	88.286	100.9	105.943
D-3	100.0	01:40:00	582.930	1.10	2.269	2.30	235	250	247	56	76	73	76	4.0	1.05	66.50	92.649	101.1	105.884
D-4	105.0	01:45:00	587.420	1.00	2.063	2.10	259	249	248	58	79	76	75	4.0	1.00	64.49	96.677	101.2	105.465
D-5	110.0	01:50:00	591.560	1.10	2.269	2.30	257	250	251	58	79	76	76	4.0	1.05	67.55	100.670	101.0	105.047
D-6	115.0	01:55:00	595.670	0.72	1.485	1.50	253	249	253	58	79	77	76	3.0	0.85	54.50	104.200	101.1	104.200
Last Pt	120.0	02:00:00	599.310																
Final Val	120.0	02:00:00	599.310											8.0	**Final Values**		104.200	101.1	
Average Values				1.19		2.46	239	249	249	51	57	75	72		1.08	68.50			
													72						

Notes:

METHOD 5 (FRONT) AND 202 (BACK) SOURCE SAMPLING TITLE PAGE ISOKINETIC SAMPLING DATA

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Date	12/05/23
Operator	JF
Run Number	CT1-PM-2

Filter #
2670
CT1-PM-2-CPM

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Coefficient / ID	(C_p)	0.8215	A6223
Average Stack Temp	(t_s)	250.9	°F
Average Meter Temp	(t_m)	75.3	
Orifice Meter Coefficient	($\Delta H@$)	1.812	in H_2O
Square Root ΔP	($\Delta p^{1/2}_{avg}$)	1.15	in H_2O
Stack Moisture Content	(B_{ws})	7.38	%
Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.87	acfm
ΔP to ΔH Isokinetic Factor	(K)	2.03	

Leak Checks		*[change]*		*[level]*		*[time]*	
Train	**Pre**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
PASS	**Post**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
Pitot	**Pre (+)**	0.00	in H_2O	4.5	in H_2O for	15.0	sec [≥15]
PASS	**Pre (-)**	0.00	in H_2O	4.1	in H_2O for	15.0	sec [≥15]
	Post (+)	0.00	in H_2O	5.2	in H_2O for	15.0	sec [≥15]
	Post (-)	0.00	in H_2O	5.6	in H_2O for	15.0	sec [≥15]

Sampling Equipment			
Meter Box Number	samp-cp-0021		
Meter Cal Factor	(Y)	0.974	
Nozzle Number	F8		
Average Nozzle Diameter	(D_{na})	0.2333	in
Suggested Nozzle Diameter	(D_{n})	0.2270	in
Probe Number	samp-hp-0165		in
Probe Length	96		in
Liner Material	glass		
Sample Case / Oven Number	samp-bh-0032		
Impinger Case Number	samp-cc-0028		

Pressures			
Barometric Pressure	(P_b)	30.15	in Hg
Stack Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.10	in Hg
Absolute Meter Pressure	(P_m)	30.28	in Hg

Nozzle Measurements			**ID: F8**	
Pre	0.232	0.234	0.234	**PASS**
Post	0.232	0.234	0.234	**PASS**

Barometer ID
SAMP-WE-0054
Scale ID
SAMP-SC-0031

Run Time			
Start	10:27	**End**	12:45

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	372.8	611.5	714.6	812.6				
Post	500.7	620.6	739.3	839.5				

Wash Volumes					
					ml
					ml

Identification Nos.		samp-cp-0021	samp-cp-0021	samp-cp-0021			samp-hp-0165	samp-hp-0165	samp-bh-0032	samp-cc-0028	**1054**	**3138**	**samp-cp-0021**		samp-cp-0021					
Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp (248±25°F)**	**Filter Temp (248±25°F)**	**Impinger Exit Temp (≤68°F)**	**Cond. Temp (≤85°F)**	**CPM Filter Temp (76.5±8.5°F)**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumul. Meter Volume (V_m)$_{std}$**	**Cumul. Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft³	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	°F	°F	°F	in Hg	√(in H_2O)	ft/sec	dscf	%	dscf
A-1	0.0	00:00:00	600.510	0.80	1.628	1.70	260	246	250	68	59	70	71	71	2.0	0.89	57.72	3.744	106.6	89.845
A-2	5.0	00:05:00	604.330	0.82	1.669	1.70	260	248	252	68	60	71	71	71	2.0	0.91	58.44	7.370	104.4	88.434
A-3	10.0	00:10:00	608.030	1.00	2.035	2.10	257	265	252	68	64	70	73	73	2.0	1.00	64.40	11.464	104.3	91.714
A-4	15.0	00:15:00	612.220	1.20	2.442	2.50	258	255	251	60	67	69	73	73	4.0	1.10	70.59	15.641	102.3	93.847
A-5	20.0	00:20:00	616.490	0.85	1.730	1.80	257	258	249	55	70	70	74	74	2.0	0.92	59.37	19.296	102.0	92.623
A-6	25.0	00:25:00	620.240	0.94	1.913	1.90	256	256	253	55	73	69	74	74	2.0	0.97	62.39	23.284	102.5	93.136
B-1	30.0	00:30:00	624.330	1.30	2.645	2.70	261	255	253	53	58	70	74	74	4.0	1.14	73.63	27.953	102.8	95.840
B-2	35.0	00:35:00	629.110	1.40	2.849	2.90	258	254	251	48	53	70	74	74	5.0	1.18	76.25	32.586	102.3	97.757
B-3	40.0	00:40:00	633.850	1.70	3.459	3.50	257	252	251	49	55	69	76	76	5.0	1.30	83.96	37.598	101.7	100.261
B-4	45.0	00:45:00	638.990	2.00	4.070	4.10	247	252	251	49	61	70	76	76	5.0	1.41	90.43	43.203	101.5	103.687
B-5	50.0	00:50:00	644.730	1.70	3.459	3.50	245	251	247	50	69	71	76	76	5.0	1.30	83.26	48.576	101.8	105.983
B-6	55.0	00:55:00	650.240	1.60	3.256	3.30	242	250	251	50	72	72	76	76	5.0	1.26	80.60	53.702	101.8	107.404
C-1	60.0	01:00:00	655.500	1.30	2.645	2.70	249	251	248	50	72	73	75	75	4.0	1.14	73.01	58.373	101.9	107.765
C-2	65.0	01:05:00	660.290	1.70	3.459	3.50	242	248	251	49	72	72	75	75	5.0	1.30	83.08	63.628	101.9	109.077
C-3	70.0	01:10:00	665.670	1.60	3.256	3.30	241	247	251	51	74	70	77	77	5.0	1.26	80.54	68.736	101.9	109.977
C-4	75.0	01:15:00	670.920	1.50	3.052	3.10	241	265	252	53	75	70	78	78	5.0	1.22	77.98	73.802	102.0	110.703
C-5	80.0	01:20:00	676.140	1.70	3.459	3.50	237	264	250	55	79	71	78	78	5.0	1.30	82.78	78.989	101.9	111.514
C-6	85.0	01:25:00	681.480	1.00	2.035	2.10	228	258	247	55	79	71	77	77	4.0	1.00	63.08	83.160	102.0	110.880
D-1	90.0	01:30:00	685.780	1.10	2.238	2.30	261	248	253	51	77	71	76	76	4.0	1.05	67.73	87.341	101.9	110.325
D-2	95.0	01:35:00	690.080	1.30	2.645	2.70	260	249	247	50	78	70	76	76	4.0	1.14	73.58	91.944	102.0	110.333
D-3	100.0	01:40:00	694.810	1.20	2.442	2.50	260	249	253	47	45	70	77	77	4.0	1.10	70.69	96.391	102.1	110.161
D-4	105.0	01:45:00	699.390	1.70	3.459	3.50	259	248	248	48	48	71	77	77	5.0	1.30	84.08	101.598	102.0	110.834
D-5	110.0	01:50:00	704.740	1.60	3.256	3.30	244	249	248	48	49	72	77	77	5.0	1.26	80.71	106.705	102.0	111.345
D-6	115.0	01:55:00	709.990	1.40	2.849	2.90	242	250	247	48	52	71	77	77	5.0	1.18	75.39	111.584	102.1	111.584
Last Pt	120.0	02:00:00	715.010																	
Final Val	120.0	02:00:00	715.010											**Max Vac**	5.0	**Final Values**		111.584	102.1	
Average Values				1.35		2.80	251	253	250	53	65	71	75	75		1.15	73.90			
													75							

Notes:

METHOD 5 (FRONT) AND 202 (BACK) SOURCE SAMPLING TITLE PAGE ISOKINETIC SAMPLING DATA

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Date	12/05/23
Operator	JF
Run Number	CT1-PM-3

Filter #
2676
CT1-PM-3-CPM

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Coefficient / ID	(C_p)	0.8215	A6223
Average Stack Temp	(t_s)	246.6	°F
Average Meter Temp	(t_m)	75.8	
Orifice Meter Coefficient	($\Delta H@$)	1.812	in H_2O
Square Root ΔP	($\Delta p^{1/2}_{avg}$)	0.97	in H_2O
Stack Moisture Content	(B_{ws})	7.38	%
Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.93	acfm
ΔP to ΔH Isokinetic Factor	(K)	2.05	

Leak Checks		*[change]*		*[level]*		*[time]*	
Train	**Pre**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
PASS	**Post**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
Pitot	**Pre (+)**	0.00	in H_2O	5.6	in H_2O for	15.0	sec [≥15]
PASS	**Pre (-)**	0.00	in H_2O	5.7	in H_2O for	15.0	sec [≥15]
	Post (+)	0.00	in H_2O	4.5	in H_2O for	15.0	sec [≥15]
	Post (-)	0.00	in H_2O	5.6	in H_2O for	15.0	sec [≥15]

Sampling Equipment			
Meter Box Number	samp-cp-0021		
Meter Cal Factor	(Y)	0.974	
Nozzle Number	F8		
Average Nozzle Diameter	(D_{na})	0.2333	in
Suggested Nozzle Diameter	(D_n)	0.2449	in
Probe Number	samp-hp-0165		in
Probe Length	96		in
Liner Material	glass		
Sample Case / Oven Number	samp-bh-0032		
Impinger Case Number	samp-cc-0011		

Pressures			
Barometric Pressure	(P_b)	30.07	in Hg
Stack Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.02	in Hg
Absolute Meter Pressure	(P_m)	30.20	in Hg

Nozzle Measurements			**ID: F8**	
Pre	0.232	0.234	0.234	**PASS**
Post	0.232	0.234	0.234	**PASS**

Barometer ID
SAMP-WE-0054
Scale ID
SAMP-SC-0031

Run Time			
Start	13:12	**End**	15:29

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	360.0	614.0	702.6	769.2				
Post	479.3	615.7	717.4	788.6				

Wash Volumes					
					ml
					ml

Identification Nos.		samp-cp-0021	samp-cp-0021	samp-cp-0021			samp-hp-0165	samp-hp-0165	samp-bh-0032	samp-cc-0011	1032	4022	samp-cp-0021		samp-cp-0021					
Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp (248±25°F)**	**Filter Temp (248±25°F)**	**Impinger Exit Temp (≤68°F)**	**Cond. Temp (≤85°F)**	**CPM Filter Temp (76.5±8.5°F)**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumul. Meter Volume (V_m)$_{std}$**	**Cumul. Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft³	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	°F	°F	°F	in Hg	√(in H_2O)	ft/sec	dscf	%	dscf
A-1	0.0	00:00:00	715.330	1.20	2.459	2.40	261	248	251	57	38	75	74	74	4.0	1.10	70.83	4.352	101.4	104.444
A-2	5.0	00:05:00	719.800	1.30	2.663	2.60	260	248	251	49	41	74	76	76	4.0	1.14	73.67	8.825	100.7	105.905
A-3	10.0	00:10:00	724.410	1.20	2.459	2.40	261	255	250	52	42	74	76	76	4.0	1.10	70.83	13.268	101.7	106.141
A-4	15.0	00:15:00	728.990	1.90	3.893	3.80	260	254	250	50	43	73	76	76	5.0	1.38	89.07	18.552	100.6	111.314
A-5	20.0	00:20:00	734.420	1.90	3.893	3.80	259	255	252	51	45	73	77	77	5.5	1.38	89.01	23.924	100.3	114.837
A-6	25.0	00:25:00	739.950	1.60	3.278	3.20	261	253	247	52	45	74	77	77	5.0	1.26	81.79	29.046	100.8	116.184
B-1	30.0	00:30:00	745.230	0.82	1.680	1.70	256	255	251	52	44	73	76	76	3.0	0.91	58.35	32.813	101.4	112.500
B-2	35.0	00:35:00	749.120	0.80	1.639	1.60	260	256	248	49	46	73	76	76	3.0	0.89	57.80	36.414	101.5	109.241
B-3	40.0	00:40:00	752.840	0.79	1.619	1.60	257	257	253	52	49	72	76	76	3.0	0.89	57.31	40.063	101.8	106.835
B-4	45.0	00:45:00	756.610	0.84	1.721	1.70	259	257	254	52	54	72	76	76	3.0	0.92	59.18	43.617	101.6	104.680
B-5	50.0	00:50:00	760.280	1.20	2.459	2.40	259	256	253	53	59	71	76	76	3.0	1.10	70.74	47.788	101.2	104.264
B-6	55.0	00:55:00	764.580	0.78	1.598	1.60	253	257	248	53	64	71	77	77	3.0	0.88	56.79	50.899	100.5	101.798
C-1	60.0	01:00:00	767.800	0.75	1.537	1.50	232	256	251	54	64	72	75	75	3.0	0.87	54.86	54.457	100.6	100.537
C-2	65.0	01:05:00	771.470	0.72	1.475	1.50	235	259	252	52	66	75	76	76	3.0	0.85	53.87	57.912	100.7	99.278
C-3	70.0	01:10:00	775.040	0.71	1.455	1.40	236	255	250	53	69	74	75	75	3.0	0.84	53.53	61.305	100.7	98.088
C-4	75.0	01:15:00	778.540	0.75	1.537	1.50	235	257	248	53	71	71	75	75	3.0	0.87	54.98	64.747	100.7	97.121
C-5	80.0	01:20:00	782.090	0.76	1.557	1.50	235	257	248	53	73	72	76	76	3.0	0.87	55.35	68.183	100.6	96.258
C-6	85.0	01:25:00	785.640	0.72	1.475	1.50	235	259	252	54	72	75	76	76	3.0	0.85	53.87	71.551	100.5	95.401
D-1	90.0	01:30:00	789.120	0.76	1.557	1.50	232	258	248	57	72	75	75	75	3.0	0.87	55.23	75.061	100.5	94.814
D-2	95.0	01:35:00	792.740	0.78	1.598	1.60	234	254	248	53	73	77	75	75	3.0	0.88	56.03	78.533	100.4	94.240
D-3	100.0	01:40:00	796.320	0.71	1.455	1.40	235	255	253	54	74	78	76	76	3.0	0.84	53.49	81.987	100.5	93.700
D-4	105.0	01:45:00	799.890	0.73	1.496	1.50	234	256	253	55	74	79	76	76	3.0	0.85	54.20	85.317	100.4	93.073
D-5	110.0	01:50:00	803.330	0.72	1.475	1.50	235	254	249	55	74	79	75	75	3.0	0.85	53.87	88.788	100.5	92.648
D-6	115.0	01:55:00	806.910	0.61	1.250	1.20	234	254	251	55	75	80	75	75	2.0	0.78	49.55	91.811	100.4	91.811
Last Pt	120.0	02:00:00	810.030																	
Final Val	120.0	02:00:00	810.030											**Max Vac**	5.5	**Final Values**		91.811	100.4	
Average Values				0.96		1.93	247	255	250	53	59	74	76	76		0.97	61.84			
													76							

Notes:

SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Name	Campbell Power Plant	**Date**	12/05/23
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Operator**	JF
Project #	ethos-23-campbell.ca-comp#1		

Run History Data				
Run Number	CT1-PM-1	CT1-PM-2	CT1-PM-3	
Run Start Time	07:17	10:27	13:12	(hh:mm)
Run Stop Time	09:35	12:45	15:29	(hh:mm)
Train Prepared By	MS	MS	MS	
Train Recovered By	MS	MS	MS	
Recovery Date	12/05/23	12/05/23	12/05/23	(mm/dd/yy)
Relinquished By	MS	MS	MS	
Received By	AHI Lab	AHI Lab	AHI Lab	
Relinquished Date	12/07/23	12/07/23	12/07/23	(mm/dd/yy)
Relinquished Time	18:00	18:00	18:00	(hh:mm)

Equipment Identification Numbers			
Impinger Case	samp-bh-0032	samp-bh-0032	samp-bh-0032
Sample Box	samp-cc-0011	samp-cc-0028	samp-cc-0011
PM Filter	2675	2670	2676
CPM Filter	CT1-PM-1-CPM	CT1-PM-2-CPM	CT1-PM-3-CPM

Sample Blank Taken	☑	YES

Moisture Content Data					
Impingers 1, 2, and 3 - Liquid Weight					
Final Weight	(W_f)	1820.2	1860.6	1812.4	g
Initial Weight	(W_i)	1671.3	1698.9	1676.6	g
Net Weight	(W_n)	148.9	161.7	135.8	g
Comments					
Impinger 4 - Silica Gel Weight					
Final Weight	(W_f)	849.4	839.5	788.6	g
Initial Weight	(W_i)	825.1	812.6	769.2	g
Net Weight	(W_n)	24.3	26.9	19.4	g
Comments					
Total Water Collected					
Total Weight	(W_{lc})	173.2	188.6	155.2	g
Total Volume	(V_{lc})	173.5	188.9	155.5	ml

TEST RESULTS AND CALCULATIONS

Ammonia Slip Emissions Data

BAAQMD ST-1B (AMMONIA) [SINGLE POINT] - RESULTS

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Historical Data	**CT1-NH3-1**	**CT1-NH3-2**	**CT1-NH3-3**	**Average**	**Units**	**Limits**
Run Start Time	08:32	11:00	12:19		hh:mm	
Run Stop Time	09:17	11:45	13:04		hh:mm	
Test Date	12/05/23	12/05/23	12/05/23		mm/dd/yy	
Load	High	High	High		% or w/DB	--
Meter Calibration Factor	0.957	0.957	0.957			
Stack Test Data	**CT1-NH3-1**	**CT1-NH3-2**	**CT1-NH3-3**	**Average**	**Units**	**Limits**
Initial Meter Volume	906.070	933.250	958.420		ft^3	
Final Meter Volume	928.280	955.260	980.380		ft^3	
Total Meter Volume	22.210	22.010	21.960	22.060	ft^3	
Total Sampling Time	45.00	45.00	45.00	45.00	min	
Average Meter Temperature	69.60	70.80	73.20	71.20	°F	
Average Stack Temperature	236.20	234.00	233.20	234.47	°F	
Barometric Pressure	30.13	30.15	30.15	30.14	in Hg	
Stack Static Pressure	-0.74	-0.74	-0.74	-0.74	in H_2O	
Absolute Stack Pressure	30.08	30.10	30.10	30.09	in Hg	
Average Orifice Pressure Drop	0.78	0.78	0.78	0.78	in H_2O	
Absolute Meter Pressure	30.27	30.29	30.29	30.28	in Hg	
Moisture Content Data	**CT1-NH3-1**	**CT1-NH3-2**	**CT1-NH3-3**	**Average**	**Units**	**Limits**
Impinger Water Weight Gain	34.20	35.70	31.90	33.93	g	
Silica Gel Weight Gain	3.90	4.80	3.40	4.03	g	
Total Water Volume Collected	38.17	40.57	35.36	38.04	ml	
Standard Water Vapor Volume	1.80	1.91	1.66	1.79	scf	
Standard Meter Volume	21.4	21.2	21.0	21.2	dscf	
Standard Metric Meter Volume	0.6	0.6	0.6	0.6	dscm	
Calculated Stack Moisture	7.75	8.28	7.34	7.79	%	
Saturated Stack Moisture	100.00	100.00	100.00	100.00	%	
Reported Stack Moisture Content	7.75	8.28	7.34	7.79	%	
Gas Analysis Data	**CT1-NH3-1**	**CT1-NH3-2**	**CT1-NH3-3**	**Average**	**Units**	**Limits**
Carbon Dioxide Content	3.5	3.5	3.5	3.5	%	
Oxygen Content	15.0	15.0	15.0	15.0	%	
Carbon Monoxide Content	0.0	0.0	0.0	0.0	ppm	
Nitrogen Content	81.5	81.5	81.5	81.5	%	
Stack Dry Molecular Weight	29.16	29.16	29.16	29.16	lb/lb-mole	
Stack Wet Molecular Weight	28.29	28.24	28.34	28.29	lb/lb-mole	
Calculated Fuel Factor	1.686	1.686	1.686	1.686		
Percent Excess Air	230.2	230.2	230.2	230.2	%	
Ammonia Analysis (BAAQMD)	**CT1-NH3-1**	**CT1-NH3-2**	**CT1-NH3-3**	**Average**	**Units**	**Limits**
Sample Number	CT1-NH3-1-C1	CT1-NH3-2-C1	CT1-NH3-3-C1			
Lab Log Number	232534-52148	232534-52149	232534-52150			
Results	0.1889	0.3390	0.1888	0.2389	mg/l	
Practical Quantitation Limit	0.0100	0.0100	0.0100	0.0100	mg/l	
Blank Results	0.1889	0.1889	0.1889	0.1889	mg/l	
Sample Volume	315	395	367	359	ml	
Total Weight of NH_3	0.00006	0.00013	0.00007	0.00009	g	
NH_3 Concentration	0.14	0.32	0.17	0.21	ppmvd	--
NH_3 Concentration	0.14	0.32	0.17	0.21	ppm@15%O_2	10

BAAQMD ST-1B (AMMONIA) [SINGLE POINT] SOURCE SAMPLING TITLE PAGE

Source Information	
Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Fuel Type	Gas, Natural

Test Information			
Project #		ethos-23-campbell.ca-comp#1	
Operator		JF	
Date for Preliminary Run	(mm/dd/yy)	12/05/23	
Standard Temperature		68	°F
Standard Pressure		29.92	in Hg
Required Sample Vol.	Sec. 5.4	21	scf
Run Duration	Sec. 8.1	45	minutes
Unit Number		CT1	
Base Run Number		CT1-NH3	
Number of Ports Available		4	
Number of Ports Used		1	
Port Inside Diameter		6.00	in
Stack Shape		Circular	

Test Equipment Information					
Run		**1**	**2**	**3**	
Test Date	(mm/dd/yy)	12/05/23	12/05/23	12/05/23	
Load		High	High	High	% or w/DB
Meter Box Number	from ACS	samp-cp-0016	samp-cp-0016	samp-cp-0016	
Meter Calibration Factor	(Y)	0.957	0.957	0.957	
Orifice Meter Coefficient	($\Delta H_@$)	1.881	1.881	1.881	in H_2O
Non-Console Manometer Used		No	No	No	
Probe Number	from ACS	samp-hp-0099	samp-hp-0099	samp-hp-0099	
Probe Length		96.0	96.0	96.0	in
(SS, Glass ….) Liner Material	from list	glass	glass	glass	
Sample Case / Oven Number	from ACS	samp-msc-0001	samp-msc-0001	samp-msc-0001	
Impinger Case Number	from ACS	samp-bc-0041	samp-bc-0037	samp-bc-0041	

Testing Company Information	
Company Name	Air Hygiene International, Inc. (Tulsa, Oklahoma)
Address	1600 W Tacoma Street
City, State Zip	Broken Arrow, Oklahoma 74012
Project Manager	Mars Sharief
Phone Number	(918) 307-8865
Fax Number	(918) 307-9131

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METHOD 3a - DETERMINATION OF DRY MOLECULAR WEIGHT BY ANALYZER

Plant Name	Campbell Power Plant	**Preliminary Run Date**	12/05/23		
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Operator**	JF		
Project #	ethos-23-campbell.ca-comp#1	**# of Ports Used**	1 (gas probe)		
Fuel Type	Gas, Natural	**Min. Fuel Factor**	1.600	**Max. Fuel Factor**	1.836

Gas Analysis Data									
Run Number	CT1-NH3-1		**Date**	12/05/23	**Run Start Time**	08:32		**Run Stop Time**	09:17
Sample Analysis Time	**CO_2 Conc.**	**O_2 Conc.**	**CO Conc.**	**N_2 Conc.**	**Dry Molecular Weight**	**Calculated Fuel Factor**		**Excess Air**	**Fuel Factor in Range**
	(%CO_2)	(%O_2)	(ppmCO)	(%N_2)	(M_d)	(Fo)avg		(%EA)avg	
hh:mm	%	%	ppm	%	lb/lb-mole			%	
00:45	3.5	15.0	0.0	81.5	29.16	1.686		230.2	YES

Gas Analysis Data									
Run Number	CT1-NH3-2		**Date**	12/05/23	**Run Start Time**	11:00		**Run Stop Time**	11:45
Sample Analysis Time	**CO_2 Conc.**	**O_2 Conc.**	**CO Conc.**	**N_2 Conc.**	**Dry Molecular Weight**	**Calculated Fuel Factor**		**Excess Air**	**Fuel Factor in Range**
	(%CO_2)	(%O_2)	(ppmCO)	(%N_2)	(M_d)	(Fo)avg		(%EA)avg	
hh:mm	%	%	ppm	%	lb/lb-mole			%	
00:45	3.5	15.0	0.0	81.5	29.16	1.686		230.2	YES

Gas Analysis Data									
Run Number	CT1-NH3-3		**Date**	12/05/23	**Run Start Time**	12:19		**Run Stop Time**	13:04
Sample Analysis Time	**CO_2 Conc.**	**O_2 Conc.**	**CO Conc.**	**N_2 Conc.**	**Dry Molecular Weight**	**Calculated Fuel Factor**		**Excess Air**	**Fuel Factor in Range**
	(%CO_2)	(%O_2)	(ppmCO)	(%N_2)	(M_d)	(Fo)avg		(%EA)avg	
hh:mm	%	%	ppm	%	lb/lb-mole			%	
00:45	3.5	15.0	0.0	81.5	29.16	1.686		230.2	YES

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	Campbell Power Plant	**Preliminary Run Date**	12/05/23
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Operator**	JF
Project #	ethos-23-campbell.ca-comp#1	**Ports Used**	1

Scale Daily Calibration					
Scale Number	SAMP-SC-0031	**Standard**	**Result**	**Difference**	**Pass/Fail**
Date		(g)	(g)	(g)	(± 0.5 g)
Test Day 1	12/05/23	500	499.8	-0.2	Pass

Moisture Content Data									
Run Number		CT1-NH3-1		**Date**	12/05/23	**Start Time**	08:32	**Stop Time**	09:17
Meter Box Number		samp-cp-0016			**Meter Cal Factor**		(Y)	0.957	
Total Meter Volume		(V_m)	22.210	dcf	**Barometric Pressure**		(P_b)	30.13	in Hg
Average Stack Temp		$(t_s)_{avg}$	236	°F	**Stack Static Pressure**		(P_{static})	-0.74	in H_2O
Average Meter Temp		$(t_m)_{avg}$	70	°F	**Avg Orifice Pressure**		$(\Delta H)_{avg}$	0.78	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		(g)	(g)	(g)	(g)				
Contents		HCl	HCl	-	Sil Gel				
Final Value	(V_f),(W_f)	742.10	743.70	620.90	814.40				
Initial Value	(V_i),(W_i)	716.50	736.50	619.50	810.50				
Net Value	(V_n),(W_n)	25.6	7.2	1.4	3.9				
Results									
Total Weight		(W_t)	38.10	g	**Water Vol Weighed**		($V_{wsg(std)}$)	1.797	scf
Std Meter Volume		($V_{m(std)}$)	21.380	dscf	**Sat. Moisture Content**		($B_{ws(svp)}$)	100.00	%
Calc Moisture Content		($B_{ws(calc)}$)	7.75	%	**Final Moisture Content**		(B_{ws})	7.75	%

Moisture Content Data									
Run Number		CT1-NH3-2		**Date**	12/05/23	**Start Time**	11:00	**Stop Time**	11:45
Meter Box Number		samp-cp-0016			**Meter Cal Factor**		(Y)	0.957	
Total Meter Volume		(V_m)	22.010	dcf	**Barometric Pressure**		(P_b)	30.15	in Hg
Average Stack Temp		$(t_s)_{avg}$	234	°F	**Stack Static Pressure**		(P_{static})	-0.74	in H_2O
Average Meter Temp		$(t_m)_{avg}$	71	°F	**Avg Orifice Pressure**		$(\Delta H)_{avg}$	0.78	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		(g)	(g)	(g)	(g)				
Contents		HCl	HCl	-	Sil Gel				
Final Value	(V_f),(W_f)	751.60	735.20	628.30	859.60				
Initial Value	(V_i),(W_i)	719.90	730.50	629.00	854.80				
Net Value	(V_n),(W_n)	31.7	4.7	-0.7	4.8				
Results									
Total Weight		(W_t)	40.50	g	**Water Vol Weighed**		($V_{wsg(std)}$)	1.910	scf
Std Meter Volume		($V_{m(std)}$)	21.154	dscf	**Sat. Moisture Content**		($B_{ws(svp)}$)	100.00	%
Calc Moisture Content		($B_{ws(calc)}$)	8.28	%	**Final Moisture Content**		(B_{ws})	8.28	%

Moisture Content Data									
Run Number		CT1-NH3-3		**Date**	12/05/23	**Start Time**	12:19	**Stop Time**	13:04
Meter Box Number		samp-cp-0016			**Meter Cal Factor**		(Y)	0.957	
Total Meter Volume		(V_m)	21.960	dcf	**Barometric Pressure**		(P_b)	30.15	in Hg
Average Stack Temp		$(t_s)_{avg}$	233	°F	**Stack Static Pressure**		(P_{static})	-0.74	in H_2O
Average Meter Temp		$(t_m)_{avg}$	73	°F	**Avg Orifice Pressure**		$(\Delta H)_{avg}$	0.78	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**	**Impinger 8**
		(g)	(g)	(g)	(g)				
Contents		HCl	HCl	-	Sil Gel				
Final Value	(V_f),(W_f)	753.90	749.60	624.60	817.80				
Initial Value	(V_i),(W_i)	724.80	746.50	624.90	814.40				
Net Value	(V_n),(W_n)	29.1	3.1	-0.3	3.4				
Results									
Total Weight		(W_t)	35.30	g	**Water Vol Weighed**		($V_{wsg(std)}$)	1.665	scf
Std Meter Volume		($V_{m(std)}$)	21.011	dscf	**Sat. Moisture Content**		($B_{ws(svp)}$)	100.00	%
Calc Moisture Content		($B_{ws(calc)}$)	7.34	%	**Final Moisture Content**		(B_{ws})	7.34	%

BAAQMD ST-1B (AMMONIA) [SINGLE POINT] SOURCE SAMPLING TITLE PAGE ISOKINETIC SAMPLING DATA

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Date	12/05/23
Operator	JF
Run Number	CT1-NH3-1

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Coefficient / ID	(C_p)		
Average Stack Temp	(t_s)	236.2	°F
Average Meter Temp	(t_m)	69.6	
Orifice Meter Coefficient	($\Delta H@$)	1.881	in H_2O
Square Root ΔP	($\Delta p^{1/2}_{avg}$)		in H_2O
Stack Moisture Content	(B_{ws})	7.75	%
Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.75	acfm
ΔP to ΔH Isokinetic Factor	(K)		

Leak Checks		*[change]*		*[level]*		*[time]*	
Train	**Pre**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
PASS	**Post**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]

Sampling Equipment			
Meter Box Number	samp-cp-0016		
Meter Cal Factor	(Y)	0.957	
Nozzle Number			
Average Nozzle Diameter	(D_{na})		in
Suggested Nozzle Diameter	(D_{ni})		in
Probe Number	samp-hp-0099		in
Probe Length	96		in
Liner Material	glass		
Sample Case / Oven Number	samp-msc-0001		
Impinger Case Number	samp-bc-0041		

Pressures			
Barometric Pressure	(P_b)	30.13	in Hg
Stack Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.08	in Hg
Absolute Meter Pressure	(P_m)	30.27	in Hg

Barometer ID
SAMP-WE-0054
Scale ID
SAMP-SC-0031

Run Time			
Start	08:32	**End**	09:17

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	716.5	736.5	619.5	810.5				
Post	742.1	743.7	620.9	814.4				

Wash Volumes					
					ml
					ml

Identification Nos.	samp-cp-0016	samp-cp-0016	samp-cp-0016			samp-hp-0099	samp-hp-0099	samp-msc-0001	samp-bc-0041			**samp-cp-0016**		samp-cp-0016					
Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp (248±25°F)**	**Filter Temp**	**Impinger Exit Temp (≤45°F)**	**Cond. Temp (≤--°F)**	**CPM Filter Temp (--±--°F)**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumul. Meter Volume (V_m)$_{std}$**	**Cumul. Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft³	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	°F	°F	°F	in Hg	√(in H_2O)	ft/sec	dscf	%	dscf
A-1	0.0	00:00:00	906.070	--		0.78	237	232	--	44	--	--	67	67	1.0			2.447		22.027
A-1	5.0	00:05:00	908.600	--		0.78	238	233	--	40	--	--	68	68	1.0			2.395		10.776
A-1	10.0	00:10:00	911.080	--		0.78	238	236	--	40	--	--	68	68	1.0			2.366		7.097
A-1	15.0	00:15:00	913.530	--		0.78	237	234	--	42	--	--	69	69	1.0			2.361		5.313
A-1	20.0	00:20:00	915.980	--		0.78	237	234	--	42	--	--	70	70	1.0			2.386		4.294
A-1	25.0	00:25:00	918.460	--		0.78	235	235	--	44	--	--	70	70	1.0			2.462		3.694
A-1	30.0	00:30:00	921.020	--		0.78	235	232	--	44	--	--	71	71	1.0			2.256		2.901
A-1	35.0	00:35:00	923.370	--		0.78	235	232	--	44	--	--	71	71	1.0			2.352		2.646
A-1	40.0	00:40:00	925.820	--		0.78	235	230	--	44	--	--	71	71	1.0			2.362		2.362
A-1	45.0	00:45:00	928.280	--		0.78	235	231	--	44	--	--	71	71	1.0					
Final Val	45.0	00:45:00	928.280											**Max Vac**	1.0	**Final Values**		2.362		
Average Values						0.78	236	233		43			70	70						
													70							

Notes:

BAAQMD ST-1B (AMMONIA) [SINGLE POINT] SOURCE SAMPLING TITLE PAGE ISOKINETIC SAMPLING DATA

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Date	12/05/23
Operator	JF
Run Number	CT1-NH3-2

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Coefficient / ID	(C_p)		
Average Stack Temp	(t_s)	234.0	°F
Average Meter Temp	(t_m)	70.8	
Orifice Meter Coefficient	(ΔH@)	1.881	in H_2O
Square Root ΔP	($\Delta p^{1/2}_{avg}$)		in H_2O
Stack Moisture Content	(B_{ws})	8.28	%
Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.48	acfm
ΔP to ΔH Isokinetic Factor	(K)		

Leak Checks		*[change]*		*[level]*		*[time]*	
Train	**Pre**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
PASS	**Post**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]

Sampling Equipment			
Meter Box Number	samp-cp-0016		
Meter Cal Factor	(Y)	0.957	
Nozzle Number			
Average Nozzle Diameter	(D_{na})		in
Suggested Nozzle Diameter	(D_{ni})		in
Probe Number	samp-hp-0099		in
Probe Length	96		in
Liner Material	glass		
Sample Case / Oven Number	samp-msc-0001		
Impinger Case Number	samp-bc-0037		

Pressures			
Barometric Pressure	(P_b)	30.15	in Hg
Stack Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.10	in Hg
Absolute Meter Pressure	(P_m)	30.29	in Hg

Barometer ID
SAMP-WE-0054
Scale ID
SAMP-SC-0031

Run Time			
Start	11:00	**End**	11:45

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	719.9	730.5	629.0	854.8				
Post	751.6	735.2	628.3	859.6				

Wash Volumes					
					ml
					ml

Identification Nos.	samp-cp-0016	samp-cp-0016	samp-cp-0016			samp-hp-0099	samp-hp-0099	samp-msc-0001	samp-bc-0037			**samp-cp-0016**		samp-cp-0016					
Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp (248±25°F)**	**Filter Temp**	**Impinger Exit Temp (≤45°F)**	**Cond. Temp (≤--°F)**	**CPM Filter Temp (--±--°F)**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumul. Meter Volume (V_m)$_{std}$**	**Cumul. Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft³	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	°F	°F	°F	in Hg	√(in H_2O)	ft/sec	dscf	%	dscf
A-1	0.0	00:00:00	933.250	--		0.78	234	223	--	45	--	--	69	69	1.0			2.392		21.525
A-1	5.0	00:05:00	935.730	--		0.78	234	233	--	40	--	--	69	69	1.0			2.353		10.589
A-1	10.0	00:10:00	938.170	--		0.78	234	232	--	38	--	--	70	70	1.0			2.329		6.988
A-1	15.0	00:15:00	940.590	--		0.78	234	235	--	38	--	--	70	70	1.0			2.349		5.284
A-1	20.0	00:20:00	943.030	--		0.78	234	234	--	38	--	--	71	71	1.0			2.517		4.531
A-1	25.0	00:25:00	945.650	--		0.78	234	233	--	40	--	--	71	71	1.0			2.152		3.228
A-1	30.0	00:30:00	947.890	--		0.78	234	233	--	41	--	--	72	72	1.0			2.330		2.996
A-1	35.0	00:35:00	950.320	--		0.78	234	235	--	42	--	--	72	72	1.0			2.474		2.783
A-1	40.0	00:40:00	952.900	--		0.78	234	234	--	42	--	--	72	72	1.0			2.263		2.263
A-1	45.0	00:45:00	955.260	--		0.78	234	234	--	44	--	--	72	72	1.0					
Final Val	45.0	00:45:00	955.260											**Max Vac**	1.0	**Final Values**		2.263		
Average Values						0.78	234	233		41			71	71						
													71							

Notes:

BAAQMD ST-1B (AMMONIA) [SINGLE POINT] SOURCE SAMPLING TITLE PAGE ISOKINETIC SAMPLING DATA

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Date	12/05/23
Operator	JF
Run Number	CT1-NH3-3

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Coefficient / ID	(C_p)		
Average Stack Temp	(t_s)	233.2	°F
Average Meter Temp	(t_m)	73.2	
Orifice Meter Coefficient	($\Delta H@$)	1.881	in H_2O
Square Root ΔP	($\Delta p^{1/2}_{avg}$)		in H_2O
Stack Moisture Content	(B_{ws})	7.34	%
Stack Dry Molecular Weight	(M_d)	29.16	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.47	acfm
ΔP to ΔH Isokinetic Factor	(K)		

Leak Checks		*[change]*		*[level]*		*[time]*	
Train	**Pre**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]
PASS	**Post**	0.000	ft³/min@	15.0	in Hg for	60.0	sec [≥60]

Sampling Equipment			
Meter Box Number	samp-cp-0016		
Meter Cal Factor	(Y)	0.957	
Nozzle Number			
Average Nozzle Diameter	(D_{na})		in
Suggested Nozzle Diameter	(D_{ni})		in
Probe Number	samp-hp-0099		in
Probe Length	96		in
Liner Material	glass		
Sample Case / Oven Number	samp-msc-0001		
Impinger Case Number	samp-bc-0041		

Pressures			
Barometric Pressure	(P_b)	30.15	in Hg
Stack Static Pressure	(P_{static})	-0.74	in H_2O
Absolute Stack Pressure	(P_s)	30.10	in Hg
Absolute Meter Pressure	(P_m)	30.29	in Hg

Barometer ID
SAMP-WE-0054
Scale ID
SAMP-SC-0031

Run Time			
Start	12:19	**End**	13:04

Weights	**Imp 1**	**Imp 2**	**Imp 3**	**Imp 4**	**Imp 5**	**Imp 6**	**Imp 7**	**Imp 8**
Pre	724.8	746.5	624.9	814.4				
Post	753.9	749.6	624.6	817.8				

Wash Volumes					
					ml
					ml

Identification Nos.	samp-cp-0016	samp-cp-0016	samp-cp-0016			samp-hp-0099	samp-hp-0099	samp-msc-0001	samp-bc-0041			samp-cp-0016		samp-cp-0016					
Traverse Point #	**Sampling Time (Θ)**	**Timer Time**	**Dry Gas Meter Reading (V_m)**	**Velocity Head (Δp)**	**Desired Orifice ΔH (ΔH_d)**	**Actual Orifice ΔH (ΔH_a)**	**Stack Temp (t_s)**	**Probe Temp (248±25°F)**	**Filter Temp**	**Impinger Exit Temp (≤45°F)**	**Cond. Temp (≤--°F)**	**CPM Filter Temp (--±--°F)**	**Meter Inlet Temp (t_{mi})**	**Meter Outlet Temp (t_{mo})**	**Pump Vacuum**	**Square Root ΔP ($\Delta p^{1/2}$)**	**Local Stack Velocity (v_s)$_l$**	**Cumul. Meter Volume (V_m)$_{std}$**	**Cumul. Percent IsoKinetic (I)**	**Est-Run Meter Volume (V_m)$_{std}$**
	min	hh:mm:ss	ft³	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	°F	°F	°F	in Hg	√(in H_2O)	ft/sec	dscf	%	dscf
A-1	0.0	00:00:00	958.420	--		0.78	233	225	--	45	--	--	72	72	1.0			2.474		22.266
A-1	5.0	00:05:00	961.000	--		0.78	234	232	--	44	--	--	72	72	1.0			2.129		9.580
A-1	10.0	00:10:00	963.220	--		0.78	233	233	--	44	--	--	73	73	1.0			2.345		7.035
A-1	15.0	00:15:00	965.670	--		0.78	233	232	--	44	--	--	73	73	1.0			2.335		5.255
A-1	20.0	00:20:00	968.110	--		0.78	233	233	--	43	--	--	73	73	1.0			2.335		4.204
A-1	25.0	00:25:00	970.550	--		0.78	233	234	--	43	--	--	73	73	1.0			2.259		3.388
A-1	30.0	00:30:00	972.910	--		0.78	233	235	--	44	--	--	74	74	1.0			2.407		3.095
A-1	35.0	00:35:00	975.430	--		0.78	234	232	--	44	--	--	74	74	1.0			2.331		2.622
A-1	40.0	00:40:00	977.870	--		0.78	233	234	--	44	--	--	74	74	1.0			2.398		2.398
A-1	45.0	00:45:00	980.380	--		0.78	233	233	--	44	--	--	74	74	1.0					
Final Val	45.0	00:45:00	980.380											**Max Vac**	1.0	**Final Values**		2.398		
Average Values						0.78	233	232		44			73	73						
													73							

Notes:

SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Name	Campbell Power Plant	**Date**	12/05/23
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine	**Operator**	JF
Project #	ethos-23-campbell.ca-comp#1		

Run History Data				
Run Number	CT1-NH3-1	CT1-NH3-2	CT1-NH3-3	
Run Start Time	08:32	11:00	12:19	(hh:mm)
Run Stop Time	09:17	11:45	13:04	(hh:mm)
Train Prepared By	MS	MS	MS	
Train Recovered By	MS	MS	MS	
Recovery Date	12/05/23	12/05/23	12/05/23	(mm/dd/yy)
Relinquished By	MS	MS	MS	
Received By	AAC Lab	AAC Lab	AAC Lab	
Relinquished Date	12/07/23	12/07/23	12/07/23	(mm/dd/yy)
Relinquished Time	18:00	18:00	18:00	(hh:mm)

Equipment Identification Numbers			
Impinger Case	samp-msc-0001	samp-msc-0001	samp-msc-0001
Sample Box	samp-bc-0041	samp-bc-0037	samp-bc-0041

Sample Blank Taken	☑	YES

Moisture Content Data					
Impingers 1, 2, and 3 - Liquid Weight					
Final Weight	(W_f)	2106.7	2115.1	2128.1	g
Initial Weight	(W_i)	2072.5	2079.4	2096.2	g
Net Weight	(W_n)	34.2	35.7	31.9	g
Comments					
Impinger 4 - Silica Gel Weight					
Final Weight	(W_f)	814.4	859.6	817.8	g
Initial Weight	(W_i)	810.5	854.8	814.4	g
Net Weight	(W_n)	3.9	4.8	3.4	g
Comments					
Total Water Collected					
Total Weight	(W_{lc})	38.1	40.5	35.3	g
Total Volume	(V_{lc})	38.2	40.6	35.4	ml

APPENDIX B

CEMS AND REFERENCE METHOD DATA AND UNIT OPERATIONS PARAMETERS

Sacramento Finance Authority

Air Permit Number:	TV2007-14-02B
Plant Name or Location:	Campbell Power Plant
Date:	December 5, 2023
Project Number:	ethos-23-campbell.ca-comp#1
Manufacturer & Equipment:	Siemens
Model:	V84.2
Unit Number:	CT1
Test Load:	Normal
Tester(s) / Test Unit(s):	MS/JF/SA/PB/JM/192/211

		RUN									
	UNITS	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Start Time	hh:mm:ss	08:32:26	09:02:26	09:32:26	10:02:26	10:32:26	11:02:26	11:32:26	12:02:26	12:32:26	13:02:26
End Time	hh:mm:ss	08:52:56	09:22:56	09:52:56	10:22:56	10:52:56	11:22:56	11:52:56	12:22:56	12:52:56	13:22:56
Bar. Pressure	in. Hg	30.15	30.15	30.16	30.16	30.14	30.12	30.12	30.10	30.09	30.06
Amb. Temp.	°F	49	52	53	55	57	61	61	62	64	65
Rel. Humidity	%	90	86	81	78	76	66	66	64	61	57
Spec. Humidity	lb water / lb air	0.006555	0.007006	0.006843	0.007092	0.007439	0.007459	0.007459	0.007499	0.007673	0.007429
Total Fuel Flow	SCFH	1,200,160	1,195,800	1,192,040	1,187,660	1,181,500	1,175,190	1,170,840	1,165,780	1,163,970	1,160,910
Power Output	megawatts	183.0	182.0	181.0	180.0	179.0	178.0	177.0	176.0	175.0	175.0
Fuel Gas GCV	btu/scf	1,060.30	1,060.30	1,059.60	1,059.60	1,059.60	1,059.60	1,059.50	1,059.30	1,059.00	1,059.60
O_2 CEMS Data	%vd	14.9	14.9	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
NOx CEMS Data	ppmvd	2.70	2.70	2.60	2.70	2.70	2.70	2.70	2.70	2.70	2.70
	ppmvd@15%O_2	2.60	2.60	2.60	2.70	2.70	2.70	2.70	2.70	2.70	2.70
	lb/hr	12.40	12.34	12.23	12.32	12.25	12.16	12.20	12.30	12.28	12.21
	lb/MMBtu	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
CO CEMS Data	ppmvd	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	ppmvd@15%O_2	0.40	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	lb/hr	1.07	0.94	0.92	0.93	0.92	0.86	0.83	0.81	0.82	0.83

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CEMS AND REFERENCE METHOD DATA

CEMS Data
(provided by Sacramento Finance Authority)

Relative Accuracy Test Data
CEMS Results (NOx)
Siemens, V84.2, Unit #CT1

Parameter:	Oxides of Nitrogen
Date of Test:	December 5, 2023
Reference Method:	EPA Method 7E
CEMS Analyzer Type:	Chemiluminescence
Manufacturer:	Thermo Scientific
Model #:	42i-LS
Serial #:	1162880011

RUN #	RUN TIME	UNIT LOAD	CONCENTRATIONS		RATES	
		(MW)	(ppmvd)	(ppmvd@15%O_2)	(lb/hr)	(lb/MMBtu)
1	08:32 - 08:52	183.0	2.70	2.60	12.40	0.010
2	09:02 - 09:22	182.0	2.70	2.60	12.34	0.010
3	09:32 - 09:52	181.0	2.60	2.60	12.23	0.010
4	10:02 - 10:22	180.0	2.70	2.70	12.32	0.010
5	10:32 - 10:52	179.0	2.70	2.70	12.25	0.010
6	11:02 - 11:22	178.0	2.70	2.70	12.16	0.010
7	11:32 - 11:52	177.0	2.70	2.70	12.20	0.010
8	12:02 - 12:22	176.0	2.70	2.70	12.30	0.010
9	12:32 - 12:52	175.0	2.70	2.70	12.28	0.010
10	13:02 - 13:22	175.0	2.70	2.70	12.21	0.010
11						
12						

Relative Accuracy Test Data
CEMS Results (CO)
Siemens, V84.2, Unit #CT1

Parameter:	Carbon Monoxide
Date of Test:	December 5, 2023
Reference Method:	EPA Method 10
CEMS Analyzer Type:	Infrared Absorption
Manufacturer:	Thermo Scientific
Model #:	48i
Serial #:	1162880012

RUN #	RUN TIME	UNIT LOAD	CONCENTRATIONS		RATES	
		(MW)	(ppmvd)	(ppmvd@15%O_2)	(lb/hr)	(lb/MMBtu)
1	08:32 - 08:52	183.0	0.40	0.40	1.07	
2	09:02 - 09:22	182.0	0.30	0.30	0.94	
3	09:32 - 09:52	181.0	0.30	0.30	0.92	
4	10:02 - 10:22	180.0	0.30	0.30	0.93	
5	10:32 - 10:52	179.0	0.30	0.30	0.92	
6	11:02 - 11:22	178.0	0.30	0.30	0.86	
7	11:32 - 11:52	177.0	0.30	0.30	0.83	
8	12:02 - 12:22	176.0	0.30	0.30	0.81	
9	12:32 - 12:52	175.0	0.30	0.30	0.82	
10	13:02 - 13:22	175.0	0.30	0.30	0.83	
11						
12						

Relative Accuracy Test Data
CEMS Results (O_2)
Siemens, V84.2, Unit #CT1

Parameter:	Oxygen
Date of Test:	December 5, 2023
Reference Method:	EPA Method 3A
CEMS Analyzer Type:	Paramagnetic Cell
Manufacturer:	Thermo Scientific
Model #:	42i-LS
Serial #:	1162880011

RUN #	RUN TIME	UNIT LOAD (MW)	CONC. (%vd)
1	08:32 - 08:52	183.0	14.90
2	09:02 - 09:22	182.0	14.90
3	09:32 - 09:52	181.0	15.00
4	10:02 - 10:22	180.0	15.00
5	10:32 - 10:52	179.0	15.00
6	11:02 - 11:22	178.0	15.00
7	11:32 - 11:52	177.0	15.00
8	12:02 - 12:22	176.0	15.00
9	12:32 - 12:52	175.0	15.00
10	13:02 - 13:22	175.0	15.00
11			
12			

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 08:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 08:32	1.05	0.4	0.4	8,710.0	12,020.0	1,060.3
12/05/23 08:33	1.07	0.4	0.4	8,710.0	12,003.2	1,060.3
12/05/23 08:34	1.06	0.4	0.4	8,710.0	12,021.7	1,060.3
12/05/23 08:35	1.09	0.4	0.4	8,710.0	12,015.3	1,060.3
12/05/23 08:36	1.13	0.4	0.4	8,710.0	11,997.7	1,060.2
12/05/23 08:37	1.15	0.4	0.4	8,710.0	12,003.1	1,060.3
12/05/23 08:38	1.15	0.4	0.4	8,710.0	12,001.9	1,060.3
12/05/23 08:39	1.15	0.4	0.4	8,710.0	12,011.4	1,060.2
12/05/23 08:40	1.13	0.4	0.4	8,710.0	11,998.1	1,060.3
12/05/23 08:41	1.16	0.4	0.4	8,710.0	11,994.8	1,060.3
12/05/23 08:42	1.13	0.4	0.4	8,710.0	11,991.5	1,060.3
12/05/23 08:43	1.09	0.4	0.4	8,710.0	11,988.1	1,060.3
12/05/23 08:44	1.06	0.4	0.4	8,710.0	12,006.2	1,060.3
12/05/23 08:45	1.06	0.4	0.4	8,710.0	11,985.3	1,060.3
12/05/23 08:46	1.05	0.4	0.4	8,710.0	12,010.5	1,060.3
12/05/23 08:47	0.99	0.4	0.3	8,710.0	12,007.9	1,060.3
12/05/23 08:48	1.01	0.4	0.4	8,710.0	11,992.0	1,060.3
12/05/23 08:49	1.00	0.4	0.4	8,710.0	11,986.4	1,060.3
12/05/23 08:50	0.95	0.3	0.3	8,710.0	12,002.0	1,060.3
12/05/23 08:51	0.97	0.3	0.3	8,710.0	12,000.7	1,060.3
12/05/23 08:52	1.01	0.4	0.4	8,710.0	11,994.9	1,060.3
Average	1.07	0.4	0.4	8,710.0	12,001.6	1,060.3
Minimum	0.95	0.3	0.3	8,710.0	11,985.3	1,060.2
Maximum	1.16	0.4	0.4	8,710.0	12,021.7	1,060.3
Summation	22.46	8.2	8.1	182,910.0	252,032.7	22,266.1
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 08:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 08:32	183	12.56	0.010	2.7	2.7	14.9
12/05/23 08:33	183	12.52	0.010	2.7	2.7	14.9
12/05/23 08:34	183	12.42	0.010	2.7	2.6	14.9
12/05/23 08:35	183	12.43	0.010	2.7	2.6	14.9
12/05/23 08:36	183	12.46	0.010	2.7	2.7	14.9
12/05/23 08:37	183	12.41	0.010	2.7	2.6	14.9
12/05/23 08:38	183	12.40	0.010	2.7	2.6	14.9
12/05/23 08:39	183	12.29	0.010	2.7	2.6	14.9
12/05/23 08:40	183	12.46	0.010	2.7	2.7	14.9
12/05/23 08:41	183	12.46	0.010	2.7	2.7	14.9
12/05/23 08:42	183	12.40	0.010	2.7	2.6	14.9
12/05/23 08:43	183	12.40	0.010	2.7	2.6	14.9
12/05/23 08:44	183	12.34	0.010	2.7	2.6	14.9
12/05/23 08:45	183	12.25	0.010	2.7	2.6	14.9
12/05/23 08:46	183	12.35	0.010	2.7	2.6	14.9
12/05/23 08:47	183	12.47	0.010	2.7	2.7	14.9
12/05/23 08:48	183	12.44	0.010	2.7	2.7	14.9
12/05/23 08:49	183	12.27	0.010	2.7	2.6	14.9
12/05/23 08:50	183	12.24	0.009	2.6	2.6	14.9
12/05/23 08:51	183	12.44	0.010	2.7	2.7	14.9
12/05/23 08:52	183	12.49	0.010	2.7	2.7	14.9
Average	183	12.40	0.010	2.7	2.6	14.9
Minimum	183	12.24	0.009	2.6	2.6	14.9
Maximum	183	12.56	0.010	2.7	2.7	14.9
Summation	3,843	260.50	0.209	56.6	55.5	312.9
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 09:02 Through 12/05/2023 09:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 09:02	1.04	0.4	0.4	8,710.0	11,976.7	1,060.3
12/05/23 09:03	1.02	0.4	0.4	8,710.0	11,954.8	1,060.3
12/05/23 09:04	0.99	0.4	0.3	8,710.0	11,971.2	1,060.2
12/05/23 09:05	0.98	0.3	0.3	8,710.0	11,967.9	1,060.3
12/05/23 09:06	0.92	0.3	0.3	8,710.0	11,965.3	1,060.3
12/05/23 09:07	0.96	0.3	0.3	8,710.0	11,967.2	1,060.3
12/05/23 09:08	0.98	0.3	0.3	8,710.0	11,967.8	1,060.3
12/05/23 09:09	0.98	0.3	0.3	8,710.0	11,965.1	1,060.3
12/05/23 09:10	0.90	0.3	0.3	8,710.0	11,961.9	1,060.3
12/05/23 09:11	0.92	0.3	0.3	8,710.0	11,980.2	1,060.3
12/05/23 09:12	0.95	0.3	0.3	8,710.0	11,948.6	1,060.3
12/05/23 09:13	0.89	0.3	0.3	8,710.0	11,911.7	1,060.3
12/05/23 09:14	0.92	0.3	0.3	8,710.0	11,934.7	1,060.3
12/05/23 09:15	0.97	0.3	0.3	8,710.0	11,970.3	1,060.3
12/05/23 09:16	0.90	0.3	0.3	8,710.0	11,954.6	1,060.3
12/05/23 09:17	0.90	0.3	0.3	8,710.0	11,954.0	1,060.3
12/05/23 09:18	0.89	0.3	0.3	8,710.0	11,956.4	1,060.3
12/05/23 09:19	0.89	0.3	0.3	8,710.0	11,974.2	1,060.3
12/05/23 09:20	0.87	0.3	0.3	8,710.0	11,953.4	1,060.3
12/05/23 09:21	0.89	0.3	0.3	8,710.0	11,942.7	1,060.3
12/05/23 09:22	0.93	0.3	0.3	8,710.0	11,939.5	1,060.2
Average	0.94	0.3	0.3	8,710.0	11,958.0	1,060.3
Minimum	0.87	0.3	0.3	8,710.0	11,911.7	1,060.2
Maximum	1.04	0.4	0.4	8,710.0	11,980.2	1,060.3
Summation	19.69	6.6	6.5	182,910.0	251,118.2	22,266.1
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 09:02 Through 12/05/2023 09:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 09:02	182	12.22	0.009	2.6	2.6	14.9
12/05/23 09:03	182	12.21	0.009	2.6	2.6	14.9
12/05/23 09:04	182	12.34	0.010	2.7	2.6	14.9
12/05/23 09:05	182	12.23	0.009	2.6	2.6	14.9
12/05/23 09:06	182	12.16	0.009	2.6	2.6	14.9
12/05/23 09:07	182	12.32	0.010	2.7	2.6	14.9
12/05/23 09:08	182	12.29	0.010	2.7	2.6	14.9
12/05/23 09:09	182	12.17	0.009	2.6	2.6	14.9
12/05/23 09:10	182	12.19	0.009	2.6	2.6	14.9
12/05/23 09:11	182	12.41	0.010	2.7	2.7	14.9
12/05/23 09:12	182	12.46	0.010	2.7	2.7	14.9
12/05/23 09:13	181	12.19	0.010	2.6	2.6	15.0
12/05/23 09:14	182	11.83	0.010	2.6	2.5	15.0
12/05/23 09:15	182	12.17	0.010	2.6	2.6	15.0
12/05/23 09:16	182	12.61	0.010	2.7	2.7	14.9
12/05/23 09:17	182	12.61	0.010	2.7	2.7	15.0
12/05/23 09:18	182	12.70	0.010	2.7	2.7	15.0
12/05/23 09:19	182	12.70	0.010	2.7	2.7	15.0
12/05/23 09:20	182	12.54	0.010	2.7	2.7	15.0
12/05/23 09:21	182	12.44	0.010	2.7	2.7	15.0
12/05/23 09:22	182	12.32	0.010	2.7	2.6	15.0
Average	182	12.34	0.010	2.7	2.6	14.9
Minimum	181	11.83	0.009	2.6	2.5	14.9
Maximum	182	12.70	0.010	2.7	2.7	15.0
Summation	3,821	259.11	0.204	55.8	55.3	313.8
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 09:32 Through 12/05/2023 09:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 09:32	0.89	0.3	0.3	8,710.0	11,934.1	1,059.6
12/05/23 09:33	0.91	0.3	0.3	8,710.0	11,938.2	1,059.6
12/05/23 09:34	0.93	0.3	0.3	8,710.0	11,936.4	1,059.6
12/05/23 09:35	0.90	0.3	0.3	8,710.0	11,924.2	1,059.6
12/05/23 09:36	0.87	0.3	0.3	8,710.0	11,934.8	1,059.6
12/05/23 09:37	0.93	0.3	0.3	8,710.0	11,931.5	1,059.6
12/05/23 09:38	0.90	0.3	0.3	8,710.0	11,932.4	1,059.6
12/05/23 09:39	0.86	0.3	0.3	8,710.0	11,927.4	1,059.6
12/05/23 09:40	0.89	0.3	0.3	8,710.0	11,934.5	1,059.6
12/05/23 09:41	0.90	0.3	0.3	8,710.0	11,928.1	1,059.6
12/05/23 09:42	0.90	0.3	0.3	8,710.0	11,921.2	1,059.6
12/05/23 09:43	0.92	0.3	0.3	8,710.0	11,917.3	1,059.6
12/05/23 09:44	0.95	0.3	0.3	8,710.0	11,915.6	1,059.6
12/05/23 09:45	0.98	0.3	0.3	8,710.0	11,905.8	1,059.6
12/05/23 09:46	0.97	0.3	0.3	8,710.0	11,901.6	1,059.6
12/05/23 09:47	0.98	0.3	0.3	8,710.0	11,910.4	1,059.6
12/05/23 09:48	0.98	0.3	0.3	8,710.0	11,940.3	1,059.6
12/05/23 09:49	0.92	0.3	0.3	8,710.0	11,902.9	1,059.6
12/05/23 09:50	0.94	0.3	0.3	8,710.0	11,897.6	1,059.6
12/05/23 09:51	0.92	0.3	0.3	8,710.0	11,892.2	1,059.6
12/05/23 09:52	0.89	0.3	0.3	8,710.0	11,902.9	1,059.6
Average	0.92	0.3	0.3	8,710.0	11,920.4	1,059.6
Minimum	0.86	0.3	0.3	8,710.0	11,892.2	1,059.6
Maximum	0.98	0.3	0.3	8,710.0	11,940.3	1,059.6
Summation	19.33	6.3	6.3	182,910.0	250,329.4	22,251.6
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 09:32 Through 12/05/2023 09:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 09:32	182	12.20	0.009	2.6	2.6	14.9
12/05/23 09:33	181	12.25	0.010	2.6	2.6	15.0
12/05/23 09:34	181	12.29	0.010	2.7	2.6	15.0
12/05/23 09:35	181	12.12	0.010	2.6	2.6	15.0
12/05/23 09:36	181	12.19	0.010	2.6	2.6	15.0
12/05/23 09:37	181	12.35	0.010	2.7	2.7	15.0
12/05/23 09:38	181	12.41	0.010	2.7	2.7	15.0
12/05/23 09:39	181	12.26	0.010	2.7	2.6	15.0
12/05/23 09:40	181	12.15	0.010	2.6	2.6	15.0
12/05/23 09:41	181	12.19	0.010	2.6	2.6	15.0
12/05/23 09:42	181	12.26	0.010	2.6	2.6	15.0
12/05/23 09:43	181	12.12	0.010	2.6	2.6	15.0
12/05/23 09:44	181	12.20	0.009	2.6	2.6	14.9
12/05/23 09:45	181	12.33	0.010	2.7	2.7	15.0
12/05/23 09:46	181	12.17	0.009	2.6	2.6	14.9
12/05/23 09:47	181	12.10	0.009	2.6	2.6	14.9
12/05/23 09:48	181	12.19	0.009	2.6	2.6	14.9
12/05/23 09:49	181	12.31	0.010	2.7	2.6	14.9
12/05/23 09:50	181	12.28	0.010	2.7	2.6	15.0
12/05/23 09:51	181	12.19	0.009	2.6	2.6	14.9
12/05/23 09:52	181	12.21	0.010	2.6	2.6	15.0
Average	181	12.23	0.010	2.6	2.6	15.0
Minimum	181	12.10	0.009	2.6	2.6	14.9
Maximum	182	12.41	0.010	2.7	2.7	15.0
Summation	3,802	256.77	0.204	55.3	54.9	314.3
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:02 Through 12/05/2023 10:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 10:02	0.84	0.3	0.3	8,710.0	11,882.7	1,059.6
12/05/23 10:03	0.89	0.3	0.3	8,710.0	11,885.7	1,059.6
12/05/23 10:04	0.94	0.3	0.3	8,710.0	11,884.5	1,059.6
12/05/23 10:05	0.91	0.3	0.3	8,710.0	11,899.5	1,059.6
12/05/23 10:06	0.97	0.3	0.3	8,710.0	11,903.1	1,059.6
12/05/23 10:07	0.99	0.4	0.3	8,710.0	11,887.9	1,059.6
12/05/23 10:08	0.99	0.4	0.3	8,710.0	11,877.6	1,059.6
12/05/23 10:09	1.00	0.4	0.4	8,710.0	11,874.5	1,059.6
12/05/23 10:10	0.95	0.3	0.3	8,710.0	11,883.0	1,059.6
12/05/23 10:11	0.96	0.3	0.3	8,710.0	11,877.6	1,059.6
12/05/23 10:12	0.93	0.3	0.3	8,710.0	11,869.2	1,059.6
12/05/23 10:13	0.94	0.3	0.3	8,710.0	11,884.3	1,059.6
12/05/23 10:14	0.92	0.3	0.3	8,710.0	11,856.8	1,059.6
12/05/23 10:15	0.96	0.3	0.3	8,710.0	11,876.0	1,059.6
12/05/23 10:16	0.94	0.3	0.3	8,710.0	11,871.5	1,059.6
12/05/23 10:17	0.93	0.3	0.3	8,710.0	11,879.9	1,059.6
12/05/23 10:18	0.89	0.3	0.3	8,710.0	11,864.0	1,059.6
12/05/23 10:19	0.90	0.3	0.3	8,710.0	11,866.4	1,059.6
12/05/23 10:20	0.87	0.3	0.3	8,710.0	11,849.6	1,059.6
12/05/23 10:21	0.88	0.3	0.3	8,710.0	11,861.2	1,059.6
12/05/23 10:22	0.87	0.3	0.3	8,710.0	11,872.9	1,059.6
Average	0.93	0.3	0.3	8,710.0	11,876.6	1,059.6
Minimum	0.84	0.3	0.3	8,710.0	11,849.6	1,059.6
Maximum	1.00	0.4	0.4	8,710.0	11,903.1	1,059.6
Summation	19.47	6.6	6.4	182,910.0	249,407.9	22,251.6
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:02 Through 12/05/2023 10:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 10:02	181	12.24	0.010	2.7	2.6	15.0
12/05/23 10:03	180	12.27	0.010	2.7	2.6	15.0
12/05/23 10:04	180	12.22	0.010	2.7	2.6	15.0
12/05/23 10:05	181	12.24	0.010	2.7	2.6	15.0
12/05/23 10:06	181	12.33	0.010	2.7	2.7	14.9
12/05/23 10:07	180	12.29	0.010	2.7	2.6	14.9
12/05/23 10:08	180	12.23	0.010	2.7	2.6	14.9
12/05/23 10:09	180	12.18	0.010	2.7	2.6	14.9
12/05/23 10:10	180	12.25	0.010	2.7	2.6	14.9
12/05/23 10:11	180	12.41	0.010	2.7	2.7	14.9
12/05/23 10:12	180	12.29	0.010	2.7	2.7	15.0
12/05/23 10:13	180	12.16	0.010	2.6	2.6	15.0
12/05/23 10:14	180	12.07	0.010	2.6	2.6	15.0
12/05/23 10:15	180	12.32	0.010	2.7	2.7	15.0
12/05/23 10:16	180	12.46	0.010	2.7	2.7	15.0
12/05/23 10:17	180	12.44	0.010	2.7	2.7	15.0
12/05/23 10:18	180	12.54	0.010	2.7	2.7	15.0
12/05/23 10:19	180	12.38	0.010	2.7	2.7	15.0
12/05/23 10:20	180	12.51	0.010	2.7	2.7	15.0
12/05/23 10:21	180	12.50	0.010	2.7	2.7	15.0
12/05/23 10:22	180	12.44	0.010	2.7	2.7	15.0
Average	180	12.32	0.010	2.7	2.7	15.0
Minimum	180	12.07	0.010	2.6	2.6	14.9
Maximum	181	12.54	0.010	2.7	2.7	15.0
Summation	3,783	258.77	0.210	56.5	55.7	314.4
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:32 Through 12/05/2023 10:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 10:32	0.95	0.3	0.3	8,710.0	11,852.1	1,059.6
12/05/23 10:33	0.94	0.3	0.3	8,710.0	11,837.3	1,059.6
12/05/23 10:34	0.90	0.3	0.3	8,710.0	11,835.1	1,059.6
12/05/23 10:35	0.93	0.3	0.3	8,710.0	11,810.0	1,059.6
12/05/23 10:36	0.94	0.3	0.3	8,710.0	11,828.4	1,059.6
12/05/23 10:37	0.94	0.3	0.3	8,710.0	11,813.8	1,059.6
12/05/23 10:38	0.94	0.3	0.3	8,710.0	11,797.4	1,059.6
12/05/23 10:39	0.90	0.3	0.3	8,710.0	11,778.2	1,059.6
12/05/23 10:40	0.85	0.3	0.3	8,710.0	11,806.4	1,059.6
12/05/23 10:41	0.83	0.3	0.3	8,710.0	11,818.6	1,059.6
12/05/23 10:42	0.90	0.3	0.3	8,710.0	11,792.9	1,059.6
12/05/23 10:43	0.88	0.3	0.3	8,710.0	11,798.0	1,059.6
12/05/23 10:44	0.93	0.3	0.3	8,710.0	11,829.6	1,059.6
12/05/23 10:45	0.93	0.3	0.3	8,710.0	11,827.2	1,059.6
12/05/23 10:46	0.95	0.3	0.3	8,710.0	11,817.9	1,059.6
12/05/23 10:47	0.95	0.3	0.3	8,710.0	11,822.0	1,059.6
12/05/23 10:48	0.95	0.3	0.3	8,710.0	11,819.7	1,059.6
12/05/23 10:49	0.93	0.3	0.3	8,710.0	11,797.2	1,059.6
12/05/23 10:50	1.00	0.4	0.4	8,710.0	11,798.5	1,059.6
12/05/23 10:51	0.95	0.3	0.3	8,710.0	11,808.8	1,059.6
12/05/23 10:52	0.91	0.3	0.3	8,710.0	11,825.9	1,059.6
Average	0.92	0.3	0.3	8,710.0	11,815.0	1,059.6
Minimum	0.83	0.3	0.3	8,710.0	11,778.2	1,059.6
Maximum	1.00	0.4	0.4	8,710.0	11,852.1	1,059.6
Summation	19.40	6.4	6.4	182,910.0	248,115.0	22,251.6
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:32 Through 12/05/2023 10:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 10:32	180	12.18	0.010	2.7	2.6	14.9
12/05/23 10:33	179	12.37	0.010	2.7	2.7	14.9
12/05/23 10:34	179	12.32	0.010	2.7	2.7	15.0
12/05/23 10:35	179	12.31	0.010	2.7	2.7	15.0
12/05/23 10:36	179	12.20	0.010	2.7	2.6	15.0
12/05/23 10:37	179	12.46	0.010	2.7	2.7	15.0
12/05/23 10:38	179	12.44	0.010	2.7	2.7	15.0
12/05/23 10:39	178	11.95	0.010	2.6	2.6	15.0
12/05/23 10:40	179	11.61	0.009	2.5	2.5	15.0
12/05/23 10:41	179	11.76	0.010	2.6	2.6	15.0
12/05/23 10:42	178	12.00	0.010	2.6	2.6	15.0
12/05/23 10:43	179	12.08	0.010	2.6	2.6	15.0
12/05/23 10:44	179	12.13	0.010	2.6	2.6	15.0
12/05/23 10:45	179	12.51	0.010	2.7	2.7	15.0
12/05/23 10:46	179	12.49	0.010	2.7	2.7	15.0
12/05/23 10:47	179	12.50	0.010	2.7	2.7	15.0
12/05/23 10:48	179	12.47	0.010	2.7	2.7	15.0
12/05/23 10:49	179	12.35	0.010	2.7	2.7	15.0
12/05/23 10:50	179	12.46	0.010	2.7	2.7	15.0
12/05/23 10:51	179	12.30	0.010	2.7	2.7	15.0
12/05/23 10:52	179	12.27	0.010	2.7	2.7	15.0
Average	179	12.25	0.010	2.7	2.7	15.0
Minimum	178	11.61	0.009	2.5	2.5	14.9
Maximum	180	12.51	0.010	2.7	2.7	15.0
Summation	3,758	257.16	0.209	56.0	55.8	314.8
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:02 Through 12/05/2023 11:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 11:02	0.83	0.3	0.3	8,710.0	11,761.9	1,059.6
12/05/23 11:03	0.84	0.3	0.3	8,710.0	11,783.0	1,059.6
12/05/23 11:04	0.85	0.3	0.3	8,710.0	11,791.7	1,059.6
12/05/23 11:05	0.89	0.3	0.3	8,710.0	11,784.7	1,059.5
12/05/23 11:06	0.91	0.3	0.3	8,710.0	11,765.1	1,059.6
12/05/23 11:07	0.92	0.3	0.3	8,710.0	11,745.3	1,059.6
12/05/23 11:08	0.87	0.3	0.3	8,710.0	11,737.7	1,059.6
12/05/23 11:09	0.90	0.3	0.3	8,710.0	11,733.2	1,059.6
12/05/23 11:10	0.92	0.3	0.3	8,710.0	11,760.0	1,059.6
12/05/23 11:11	0.90	0.3	0.3	8,710.0	11,742.5	1,059.6
12/05/23 11:12	0.88	0.3	0.3	8,710.0	11,740.2	1,059.6
12/05/23 11:13	0.89	0.3	0.3	8,710.0	11,720.1	1,059.6
12/05/23 11:14	0.90	0.3	0.3	8,710.0	11,759.4	1,059.6
12/05/23 11:15	0.86	0.3	0.3	8,710.0	11,759.9	1,059.6
12/05/23 11:16	0.85	0.3	0.3	8,710.0	11,784.1	1,059.6
12/05/23 11:17	0.87	0.3	0.3	8,710.0	11,743.2	1,059.5
12/05/23 11:18	0.79	0.3	0.3	8,710.0	11,728.4	1,059.6
12/05/23 11:19	0.79	0.3	0.3	8,710.0	11,727.7	1,059.5
12/05/23 11:20	0.84	0.3	0.3	8,710.0	11,737.2	1,059.6
12/05/23 11:21	0.77	0.3	0.3	8,710.0	11,748.4	1,059.5
12/05/23 11:22	0.82	0.3	0.3	8,710.0	11,736.7	1,059.5
Average	0.86	0.3	0.3	8,710.0	11,751.9	1,059.6
Minimum	0.77	0.3	0.3	8,710.0	11,720.1	1,059.5
Maximum	0.92	0.3	0.3	8,710.0	11,791.7	1,059.6
Summation	18.09	6.3	6.3	182,910.0	246,790.4	22,251.1
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:02 Through 12/05/2023 11:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 11:02	178	12.31	0.010	2.7	2.7	15.0
12/05/23 11:03	178	12.21	0.010	2.7	2.7	15.0
12/05/23 11:04	178	12.17	0.010	2.7	2.6	15.0
12/05/23 11:05	178	12.16	0.010	2.7	2.6	15.0
12/05/23 11:06	178	12.27	0.010	2.7	2.7	15.0
12/05/23 11:07	178	12.24	0.010	2.7	2.7	15.0
12/05/23 11:08	177	12.33	0.010	2.7	2.7	15.0
12/05/23 11:09	177	12.15	0.010	2.7	2.7	15.0
12/05/23 11:10	178	12.21	0.010	2.7	2.7	15.0
12/05/23 11:11	178	12.15	0.010	2.7	2.7	15.0
12/05/23 11:12	177	12.24	0.010	2.7	2.7	15.0
12/05/23 11:13	177	12.17	0.010	2.7	2.7	15.0
12/05/23 11:14	178	11.84	0.010	2.6	2.6	15.0
12/05/23 11:15	178	12.00	0.010	2.6	2.6	15.0
12/05/23 11:16	178	12.22	0.010	2.7	2.7	15.0
12/05/23 11:17	178	12.22	0.010	2.7	2.7	15.0
12/05/23 11:18	177	12.12	0.010	2.7	2.6	15.0
12/05/23 11:19	177	12.06	0.010	2.6	2.6	15.0
12/05/23 11:20	178	12.18	0.010	2.7	2.7	15.0
12/05/23 11:21	178	12.14	0.010	2.7	2.6	15.0
12/05/23 11:22	177	12.08	0.010	2.6	2.6	15.0
Average	178	12.17	0.010	2.7	2.7	15.0
Minimum	177	11.84	0.010	2.6	2.6	15.0
Maximum	178	12.33	0.010	2.7	2.7	15.0
Summation	3,731	255.47	0.210	56.3	55.9	315.0
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:32 Through 12/05/2023 11:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 11:32	0.88	0.3	0.3	8,710.0	11,728.4	1,059.5
12/05/23 11:33	0.83	0.3	0.3	8,710.0	11,706.7	1,059.6
12/05/23 11:34	0.84	0.3	0.3	8,710.0	11,721.7	1,059.6
12/05/23 11:35	0.85	0.3	0.3	8,710.0	11,709.5	1,059.6
12/05/23 11:36	0.80	0.3	0.3	8,710.0	11,698.5	1,059.5
12/05/23 11:37	0.77	0.3	0.3	8,710.0	11,731.8	1,059.5
12/05/23 11:38	0.78	0.3	0.3	8,710.0	11,710.9	1,059.5
12/05/23 11:39	0.79	0.3	0.3	8,710.0	11,715.8	1,059.5
12/05/23 11:40	0.78	0.3	0.3	8,710.0	11,698.1	1,059.5
12/05/23 11:41	0.78	0.3	0.3	8,710.0	11,723.2	1,059.5
12/05/23 11:42	0.85	0.3	0.3	8,710.0	11,715.5	1,059.6
12/05/23 11:43	0.84	0.3	0.3	8,710.0	11,720.6	1,059.5
12/05/23 11:44	0.83	0.3	0.3	8,710.0	11,702.6	1,059.5
12/05/23 11:45	0.89	0.3	0.3	8,710.0	11,714.6	1,059.5
12/05/23 11:46	0.88	0.3	0.3	8,710.0	11,669.2	1,059.5
12/05/23 11:47	0.88	0.3	0.3	8,710.0	11,657.6	1,059.6
12/05/23 11:48	0.87	0.3	0.3	8,710.0	11,686.6	1,059.6
12/05/23 11:49	0.83	0.3	0.3	8,710.0	11,717.7	1,059.5
12/05/23 11:50	0.89	0.3	0.3	8,710.0	11,726.8	1,059.5
12/05/23 11:51	0.85	0.3	0.3	8,710.0	11,734.0	1,059.6
12/05/23 11:52	0.80	0.3	0.3	8,710.0	11,687.5	1,059.6
Average	0.83	0.3	0.3	8,710.0	11,708.4	1,059.5
Minimum	0.77	0.3	0.3	8,710.0	11,657.6	1,059.5
Maximum	0.89	0.3	0.3	8,710.0	11,734.0	1,059.6
Summation	17.51	6.3	6.3	182,910.0	245,877.3	22,250.3
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:32 Through 12/05/2023 11:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 11:32	177	12.05	0.010	2.7	2.6	15.0
12/05/23 11:33	177	12.14	0.010	2.7	2.7	15.0
12/05/23 11:34	177	12.11	0.010	2.7	2.6	15.0
12/05/23 11:35	177	12.11	0.010	2.7	2.6	15.0
12/05/23 11:36	177	12.18	0.010	2.7	2.7	15.0
12/05/23 11:37	177	12.22	0.010	2.7	2.7	15.0
12/05/23 11:38	177	12.25	0.010	2.7	2.7	15.0
12/05/23 11:39	177	12.15	0.010	2.7	2.7	15.0
12/05/23 11:40	177	12.28	0.010	2.7	2.7	15.0
12/05/23 11:41	177	12.29	0.010	2.7	2.7	15.0
12/05/23 11:42	177	12.27	0.010	2.7	2.7	15.0
12/05/23 11:43	177	12.33	0.010	2.7	2.7	15.0
12/05/23 11:44	177	12.29	0.010	2.7	2.7	15.0
12/05/23 11:45	177	12.40	0.010	2.7	2.7	15.0
12/05/23 11:46	176	12.25	0.010	2.7	2.7	14.9
12/05/23 11:47	176	12.09	0.010	2.7	2.7	15.0
12/05/23 11:48	176	11.78	0.010	2.6	2.6	15.0
12/05/23 11:49	177	11.78	0.010	2.6	2.6	15.0
12/05/23 11:50	177	12.37	0.010	2.7	2.7	15.0
12/05/23 11:51	177	12.55	0.010	2.8	2.7	14.9
12/05/23 11:52	177	12.34	0.010	2.7	2.7	15.0
Average	177	12.20	0.010	2.7	2.7	15.0
Minimum	176	11.78	0.010	2.6	2.6	14.9
Maximum	177	12.55	0.010	2.8	2.7	15.0
Summation	3,714	256.23	0.210	56.6	56.2	314.8
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:02 Through 12/05/2023 12:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 12:02	0.79	0.3	0.3	8,710.0	11,694.2	1,059.5
12/05/23 12:03	0.82	0.3	0.3	8,710.0	11,670.9	1,059.5
12/05/23 12:04	0.90	0.3	0.3	8,710.0	11,669.8	1,059.5
12/05/23 12:05	0.87	0.3	0.3	8,710.0	11,680.4	1,059.6
12/05/23 12:06	0.85	0.3	0.3	8,710.0	11,679.7	1,059.5
12/05/23 12:07	0.88	0.3	0.3	8,710.0	11,644.5	1,059.5
12/05/23 12:08	0.87	0.3	0.3	8,710.0	11,647.4	1,059.6
12/05/23 12:09	0.87	0.3	0.3	8,710.0	11,668.8	1,059.6
12/05/23 12:10	0.82	0.3	0.3	8,710.0	11,656.9	1,059.6
12/05/23 12:11	0.86	0.3	0.3	8,710.0	11,669.4	1,059.6
12/05/23 12:12	0.83	0.3	0.3	8,710.0	11,662.9	1,059.5
12/05/23 12:13	0.81	0.3	0.3	8,710.0	11,663.7	1,059.6
12/05/23 12:14	0.78	0.3	0.3	8,710.0	11,637.0	1,059.5
12/05/23 12:15	0.75	0.3	0.3	8,710.0	11,659.7	1,058.8
12/05/23 12:16	0.77	0.3	0.3	8,710.0	11,632.0	1,058.8
12/05/23 12:17	0.75	0.3	0.3	8,710.0	11,634.7	1,058.8
12/05/23 12:18	0.76	0.3	0.3	8,710.0	11,648.5	1,058.8
12/05/23 12:19	0.78	0.3	0.3	8,710.0	11,640.5	1,058.8
12/05/23 12:20	0.76	0.3	0.3	8,710.0	11,645.4	1,058.8
12/05/23 12:21	0.79	0.3	0.3	8,710.0	11,655.6	1,058.8
12/05/23 12:22	0.80	0.3	0.3	8,710.0	11,651.3	1,058.8
Average	0.81	0.3	0.3	8,710.0	11,657.8	1,059.3
Minimum	0.75	0.3	0.3	8,710.0	11,632.0	1,058.8
Maximum	0.90	0.3	0.3	8,710.0	11,694.2	1,059.6
Summation	17.11	6.3	6.3	182,910.0	244,813.3	22,244.5
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:02 Through 12/05/2023 12:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 12:02	176	12.18	0.010	2.7	2.7	15.0
12/05/23 12:03	176	12.46	0.010	2.8	2.7	15.0
12/05/23 12:04	176	12.34	0.010	2.7	2.7	15.0
12/05/23 12:05	176	12.27	0.010	2.7	2.7	15.0
12/05/23 12:06	176	12.38	0.010	2.7	2.7	14.9
12/05/23 12:07	176	12.54	0.010	2.8	2.8	14.9
12/05/23 12:08	176	12.45	0.010	2.8	2.7	15.0
12/05/23 12:09	176	12.12	0.010	2.7	2.7	15.0
12/05/23 12:10	176	12.21	0.010	2.7	2.7	15.0
12/05/23 12:11	176	12.22	0.010	2.7	2.7	15.0
12/05/23 12:12	176	12.41	0.010	2.7	2.7	15.0
12/05/23 12:13	176	12.33	0.010	2.7	2.7	15.0
12/05/23 12:14	175	12.35	0.010	2.7	2.7	15.0
12/05/23 12:15	176	12.36	0.010	2.7	2.7	15.0
12/05/23 12:16	175	12.23	0.010	2.7	2.7	15.0
12/05/23 12:17	175	12.16	0.010	2.7	2.7	15.0
12/05/23 12:18	175	12.28	0.010	2.7	2.7	15.0
12/05/23 12:19	175	12.25	0.010	2.7	2.7	15.0
12/05/23 12:20	176	12.28	0.010	2.7	2.7	15.0
12/05/23 12:21	176	12.27	0.010	2.7	2.7	15.0
12/05/23 12:22	176	12.28	0.010	2.7	2.7	15.0
Average	176	12.30	0.010	2.7	2.7	15.0
Minimum	175	12.12	0.010	2.7	2.7	14.9
Maximum	176	12.54	0.010	2.8	2.8	15.0
Summation	3,691	258.37	0.210	57.0	56.8	314.8
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:32 Through 12/05/2023 12:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 12:32	0.80	0.3	0.3	8,710.0	11,630.8	1,058.8
12/05/23 12:33	0.81	0.3	0.3	8,710.0	11,640.2	1,058.8
12/05/23 12:34	0.78	0.3	0.3	8,710.0	11,644.4	1,058.8
12/05/23 12:35	0.78	0.3	0.3	8,710.0	11,622.4	1,058.8
12/05/23 12:36	0.81	0.3	0.3	8,710.0	11,643.0	1,058.8
12/05/23 12:37	0.73	0.3	0.3	8,710.0	11,645.8	1,058.8
12/05/23 12:38	0.74	0.3	0.3	8,710.0	11,655.3	1,058.8
12/05/23 12:39	0.84	0.3	0.3	8,710.0	11,657.9	1,058.8
12/05/23 12:40	0.78	0.3	0.3	8,710.0	11,651.9	1,058.8
12/05/23 12:41	0.81	0.3	0.3	8,710.0	11,656.7	1,058.8
12/05/23 12:42	0.84	0.3	0.3	8,710.0	11,652.4	1,058.8
12/05/23 12:43	0.83	0.3	0.3	8,710.0	11,622.1	1,058.8
12/05/23 12:44	0.89	0.3	0.3	8,710.0	11,638.6	1,058.8
12/05/23 12:45	0.88	0.3	0.3	8,710.0	11,644.7	1,058.8
12/05/23 12:46	0.86	0.3	0.3	8,710.0	11,636.9	1,059.1
12/05/23 12:47	0.87	0.3	0.3	8,710.0	11,646.4	1,059.6
12/05/23 12:48	0.84	0.3	0.3	8,710.0	11,621.8	1,059.6
12/05/23 12:49	0.86	0.3	0.3	8,710.0	11,609.5	1,059.6
12/05/23 12:50	0.83	0.3	0.3	8,710.0	11,635.7	1,059.6
12/05/23 12:51	0.80	0.3	0.3	8,710.0	11,645.8	1,059.6
12/05/23 12:52	0.84	0.3	0.3	8,710.0	11,632.4	1,059.6
Average	0.82	0.3	0.3	8,710.0	11,639.7	1,059.0
Minimum	0.73	0.3	0.3	8,710.0	11,609.5	1,058.8
Maximum	0.89	0.3	0.3	8,710.0	11,657.9	1,059.6
Summation	17.22	6.3	6.3	182,910.0	244,434.7	22,239.9
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:32 Through 12/05/2023 12:52
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 12:32	175	12.42	0.010	2.8	2.7	15.0
12/05/23 12:33	175	12.32	0.010	2.7	2.7	15.0
12/05/23 12:34	176	12.25	0.010	2.7	2.7	15.0
12/05/23 12:35	175	12.35	0.010	2.7	2.7	15.0
12/05/23 12:36	175	12.41	0.010	2.7	2.7	15.0
12/05/23 12:37	175	12.35	0.010	2.7	2.7	15.0
12/05/23 12:38	176	12.40	0.010	2.7	2.7	15.0
12/05/23 12:39	176	12.35	0.010	2.7	2.7	15.0
12/05/23 12:40	176	12.40	0.010	2.7	2.7	15.0
12/05/23 12:41	176	12.31	0.010	2.7	2.7	15.0
12/05/23 12:42	176	12.33	0.010	2.7	2.7	15.0
12/05/23 12:43	175	12.29	0.010	2.7	2.7	15.0
12/05/23 12:44	175	12.22	0.010	2.7	2.7	15.0
12/05/23 12:45	175	12.22	0.010	2.7	2.7	14.9
12/05/23 12:46	175	12.25	0.010	2.7	2.7	15.0
12/05/23 12:47	176	12.22	0.010	2.7	2.7	15.0
12/05/23 12:48	175	12.16	0.010	2.7	2.7	14.9
12/05/23 12:49	175	12.14	0.010	2.7	2.7	14.9
12/05/23 12:50	175	12.17	0.010	2.7	2.7	15.0
12/05/23 12:51	176	12.12	0.010	2.7	2.7	15.0
12/05/23 12:52	175	12.26	0.010	2.7	2.7	15.0
Average	175	12.28	0.010	2.7	2.7	15.0
Minimum	175	12.12	0.010	2.7	2.7	14.9
Maximum	176	12.42	0.010	2.8	2.7	15.0
Summation	3,683	257.94	0.210	56.8	56.7	314.7
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:02 Through 12/05/2023 13:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 13:02	0.87	0.3	0.3	8,710.0	11,587.4	1,059.6
12/05/23 13:03	0.87	0.3	0.3	8,710.0	11,590.6	1,059.6
12/05/23 13:04	0.87	0.3	0.3	8,710.0	11,607.9	1,059.6
12/05/23 13:05	0.82	0.3	0.3	8,710.0	11,643.8	1,059.6
12/05/23 13:06	0.87	0.3	0.3	8,710.0	11,599.1	1,059.6
12/05/23 13:07	0.82	0.3	0.3	8,710.0	11,559.3	1,059.6
12/05/23 13:08	0.84	0.3	0.3	8,710.0	11,591.4	1,059.6
12/05/23 13:09	0.82	0.3	0.3	8,710.0	11,604.7	1,059.6
12/05/23 13:10	0.82	0.3	0.3	8,710.0	11,619.9	1,059.6
12/05/23 13:11	0.80	0.3	0.3	8,710.0	11,616.2	1,059.6
12/05/23 13:12	0.79	0.3	0.3	8,710.0	11,650.7	1,059.6
12/05/23 13:13	0.79	0.3	0.3	8,710.0	11,630.0	1,059.6
12/05/23 13:14	0.75	0.3	0.3	8,710.0	11,612.9	1,059.6
12/05/23 13:15	0.75	0.3	0.3	8,710.0	11,603.2	1,059.6
12/05/23 13:16	0.77	0.3	0.3	8,710.0	11,566.9	1,059.6
12/05/23 13:17	0.81	0.3	0.3	8,710.0	11,584.2	1,059.6
12/05/23 13:18	0.80	0.3	0.3	8,710.0	11,600.0	1,059.6
12/05/23 13:19	0.82	0.3	0.3	8,710.0	11,613.9	1,059.6
12/05/23 13:20	0.85	0.3	0.3	8,710.0	11,609.7	1,059.6
12/05/23 13:21	0.92	0.3	0.3	8,710.0	11,653.5	1,059.6
12/05/23 13:22	0.88	0.3	0.3	8,710.0	11,646.4	1,059.6
Average	0.83	0.3	0.3	8,710.0	11,609.1	1,059.6
Minimum	0.75	0.3	0.3	8,710.0	11,559.3	1,059.6
Maximum	0.92	0.3	0.3	8,710.0	11,653.5	1,059.6
Summation	17.33	6.3	6.3	182,910.0	243,791.7	22,251.6
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:02 Through 12/05/2023 13:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit	(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23 13:02	174	12.32	0.010	2.7	2.7	15.0
12/05/23 13:03	175	12.17	0.010	2.7	2.7	15.0
12/05/23 13:04	175	12.23	0.010	2.7	2.7	14.9
12/05/23 13:05	175	12.25	0.010	2.7	2.7	15.0
12/05/23 13:06	175	12.34	0.010	2.8	2.7	14.9
12/05/23 13:07	174	12.08	0.010	2.7	2.7	15.0
12/05/23 13:08	174	11.71	0.010	2.6	2.6	15.0
12/05/23 13:09	175	11.68	0.010	2.6	2.6	15.0
12/05/23 13:10	175	12.03	0.010	2.7	2.7	15.0
12/05/23 13:11	175	12.29	0.010	2.7	2.7	15.0
12/05/23 13:12	175	12.46	0.010	2.8	2.7	14.9
12/05/23 13:13	175	12.57	0.010	2.8	2.8	14.9
12/05/23 13:14	175	12.77	0.010	2.8	2.8	15.0
12/05/23 13:15	175	12.53	0.010	2.8	2.8	15.0
12/05/23 13:16	175	12.26	0.010	2.7	2.7	15.0
12/05/23 13:17	174	11.87	0.010	2.6	2.6	15.0
12/05/23 13:18	175	11.83	0.010	2.6	2.6	15.0
12/05/23 13:19	175	12.14	0.010	2.7	2.7	15.0
12/05/23 13:20	175	12.17	0.010	2.7	2.7	14.9
12/05/23 13:21	176	12.25	0.010	2.7	2.7	14.9
12/05/23 13:22	176	12.45	0.010	2.8	2.7	14.9
Average	175	12.21	0.010	2.7	2.7	15.0
Minimum	174	11.68	0.010	2.6	2.6	14.9
Maximum	176	12.77	0.010	2.8	2.8	15.0
Summation	3,673	256.40	0.210	56.9	56.6	314.3
Geometric Mean						
Included Data Points	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

CEMS AND REFERENCE METHOD DATA

Reference Method Data

Relative Accuracy Test Data
Reference Method Results (NOx)
Siemens, V84.2, Unit #CT1

Parameter:	Oxides of Nitrogen
Date of Test:	December 5, 2023
Reference Method:	EPA Method 7E
RM Analyzer Type:	Chemiluminescence
Manufacturer:	THERMO 42i-LS
Model #:	
Serial #:	INST-NX-0073

RUN #	RUN TIME	UNIT LOAD	CONCENTRATIONS		RATES	
		(MW)	(ppmvd)	(ppmvd@15%O_2)	(lb/hr)	(lb/MMBtu)
1	08:32 - 08:52	183.0	2.64	2.61	12.24	0.010
2	09:02 - 09:22	182.0	2.60	2.56	11.95	0.009
3	09:32 - 09:52	181.0	2.61	2.56	11.92	0.009
4	10:02 - 10:22	180.0	2.64	2.59	12.00	0.010
5	10:32 - 10:52	179.0	2.62	2.57	11.86	0.009
6	11:02 - 11:22	178.0	2.61	2.57	11.80	0.009
7	11:32 - 11:52	177.0	2.65	2.60	11.87	0.010
8	12:02 - 12:22	176.0	2.68	2.64	12.00	0.010
9	12:32 - 12:52	175.0	2.68	2.65	12.04	0.010
10	13:02 - 13:22	175.0	2.67	2.64	11.95	0.010
11						
12						

Relative Accuracy Test Data
Reference Method Results (CO)
Siemens, V84.2, Unit #CT1

Parameter:	Carbon Monoxide
Date of Test:	December 5, 2023
Reference Method:	EPA Method 10
RM Analyzer Type:	Infrared Absorption
Manufacturer:	THERMO 48i
Model #:	
Serial #:	INST-CO-0016

RUN #	RUN TIME	UNIT LOAD	CONCENTRATIONS		RATES	
		(MW)	(ppmvd)	(ppmvd@15%O_2)	(lb/hr)	(lb/MMBtu)
1	08:32 - 08:52	183.0	0.20	0.20	0.56	
2	09:02 - 09:22	182.0	0.15	0.15	0.43	
3	09:32 - 09:52	181.0	0.14	0.14	0.38	
4	10:02 - 10:22	180.0	0.11	0.11	0.32	
5	10:32 - 10:52	179.0	0.09	0.09	0.25	
6	11:02 - 11:22	178.0	0.07	0.07	0.19	
7	11:32 - 11:52	177.0	0.07	0.07	0.18	
8	12:02 - 12:22	176.0	0.04	0.04	0.11	
9	12:32 - 12:52	175.0	0.04	0.03	0.10	
10	13:02 - 13:22	175.0	0.04	0.04	0.11	
11						
12						

Relative Accuracy Test Data
Reference Method Results (O_2)
Siemens, V84.2, Unit #CT1

Parameter:	Oxygen
Date of Test:	December 5, 2023
Reference Method:	EPA Method 3A
RM Analyzer Type:	Paramagnetic Cell
Manufacturer:	
Model #:	THERMO 410i
Serial #:	INST-C2-0026

RUN #	RUN TIME	UNIT LOAD (MW)	CONC. (%vd)
1	08:32 - 08:52	183.0	14.93
2	09:02 - 09:22	182.0	14.90
3	09:32 - 09:52	181.0	14.89
4	10:02 - 10:22	180.0	14.87
5	10:32 - 10:52	179.0	14.89
6	11:02 - 11:22	178.0	14.90
7	11:32 - 11:52	177.0	14.88
8	12:02 - 12:22	176.0	14.91
9	12:32 - 12:52	175.0	14.93
10	13:02 - 13:22	175.0	14.93
11			
12			

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,200,160	SCFH

Weather Data

Barometric Pressure	30.15	in. Hg
Relative Humidity	90	%
Ambient Temperature	49	°F
Specific Humidity	0.006555	lb H_2O / lb air

Unit Data

Unit Load	183.0	megawatts
Stack Exhaust Flow (M19)	38,786,790	SCFH

Normal Load, Run - 1

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 8:32:26	10460	14.58	2.60	0.20
12/05/23 8:32:56	10490	14.57	2.65	0.20
12/05/23 8:33:26	10520	14.60	2.65	0.19
12/05/23 8:33:56	10550	14.63	2.66	0.20
12/05/23 8:34:26	10580	14.59	2.63	0.18
12/05/23 8:34:56	10610	14.58	2.61	0.20
12/05/23 8:35:26	10640	14.62	2.63	0.20
12/05/23 8:35:56	10670	14.60	2.63	0.19
12/05/23 8:36:26	10700	14.61	2.63	0.20
12/05/23 8:36:56	10730	14.61	2.61	0.20
12/05/23 8:37:26	10760	14.61	2.61	0.21
12/05/23 8:37:56	10790	14.59	2.60	0.20
12/05/23 8:38:26	10820	14.62	2.60	0.21
12/05/23 8:38:56	10850	14.60	2.61	0.21
12/05/23 8:39:26	10880	14.60	2.60	0.23
12/05/23 8:39:56	10910	14.61	2.61	0.21
12/05/23 8:40:26	10940	14.59	2.59	0.21
12/05/23 8:40:56	10970	14.60	2.61	0.21
12/05/23 8:41:26	11000	14.60	2.62	0.22
12/05/23 8:41:56	11030	14.58	2.62	0.21
12/05/23 8:42:26	11060	14.61	2.59	0.20
12/05/23 8:42:56	11090	14.60	2.60	0.20
12/05/23 8:43:26	11120	14.61	2.62	0.20
12/05/23 8:43:56	11150	14.60	2.63	0.20
12/05/23 8:44:26	11180	14.59	2.60	0.19
12/05/23 8:44:56	11210	14.58	2.60	0.19
12/05/23 8:45:26	11240	14.58	2.58	0.19
12/05/23 8:45:56	11270	14.60	2.60	0.20
12/05/23 8:46:26	11300	14.58	2.59	0.19
12/05/23 8:46:56	11330	14.59	2.61	0.19
12/05/23 8:47:26	11360	14.61	2.61	0.19
12/05/23 8:47:56	11390	14.59	2.61	0.19
12/05/23 8:48:26	11420	14.60	2.59	0.19
12/05/23 8:48:56	11450	14.57	2.62	0.19
12/05/23 8:49:26	11480	14.59	2.59	0.17
12/05/23 8:49:56	11510	14.56	2.58	0.18
12/05/23 8:50:26	11540	14.59	2.56	0.17
12/05/23 8:50:56	11570	14.57	2.58	0.18
12/05/23 8:51:26	11600	14.59	2.59	0.18
12/05/23 8:51:56	11630	14.58	2.61	0.16
12/05/23 8:52:26	11660	14.60	2.63	0.18
12/05/23 8:52:56	11690	14.59	2.62	0.17
RAW AVERAGE		**14.59**	**2.61**	**0.20**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.03	0.02	0.00
	Final Zero	0.01	0.05	0.00
	Avg. Zero	0.02	0.04	0.00
	Initial UpScale	11.76	4.92	5.15
	Final UpScale	11.79	5.01	5.14
	Avg. UpScale	11.78	4.97	5.15
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.93	2.64	0.20
Concentration (ppmvd@ 15%O_2)	N/A	2.61	0.20
Emission Rate (lb/hr)	N/A	12.24	0.56
Emission Rate (lb/MMBtu)	N/A	0.010	0.000

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,195,800	SCFH

Weather Data

Barometric Pressure	30.15	in. Hg
Relative Humidity	86	%
Ambient Temperature	52	°F
Specific Humidity	0.007006	lb H_2O / lb air

Unit Data

Unit Load	182.0	megawatts
Stack Exhaust Flow (M19)	38,486,533	SCFH

Normal Load, Run - 2

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 9:02:26	12260	14.61	2.56	0.16
12/05/23 9:02:56	12290	14.62	2.53	0.16
12/05/23 9:03:26	12320	14.60	2.54	0.17
12/05/23 9:03:56	12350	14.62	2.56	0.16
12/05/23 9:04:26	12380	14.61	2.56	0.16
12/05/23 9:04:56	12410	14.60	2.56	0.14
12/05/23 9:05:26	12440	14.58	2.55	0.16
12/05/23 9:05:56	12470	14.61	2.62	0.13
12/05/23 9:06:26	12500	14.62	2.59	0.16
12/05/23 9:06:56	12530	14.60	2.56	0.15
12/05/23 9:07:26	12560	14.62	2.58	0.16
12/05/23 9:07:56	12590	14.59	2.57	0.15
12/05/23 9:08:26	12620	14.60	2.58	0.15
12/05/23 9:08:56	12650	14.61	2.58	0.16
12/05/23 9:09:26	12680	14.59	2.56	0.16
12/05/23 9:09:56	12710	14.61	2.57	0.16
12/05/23 9:10:26	12740	14.58	2.56	0.15
12/05/23 9:10:56	12770	14.61	2.59	0.15
12/05/23 9:11:26	12800	14.59	2.59	0.15
12/05/23 9:11:56	12830	14.59	2.61	0.16
12/05/23 9:12:26	12860	14.59	2.61	0.16
12/05/23 9:12:56	12890	14.61	2.68	0.16
12/05/23 9:13:26	12920	14.61	2.64	0.15
12/05/23 9:13:56	12950	14.61	2.49	0.16
12/05/23 9:14:26	12980	14.61	2.47	0.15
12/05/23 9:14:56	13010	14.61	2.49	0.15
12/05/23 9:15:26	13040	14.59	2.53	0.15
12/05/23 9:15:56	13070	14.58	2.59	0.16
12/05/23 9:16:26	13100	14.60	2.64	0.16
12/05/23 9:16:56	13130	14.56	2.70	0.16
12/05/23 9:17:26	13160	14.59	2.67	0.17
12/05/23 9:17:56	13190	14.59	2.66	0.15
12/05/23 9:18:26	13220	14.61	2.68	0.15
12/05/23 9:18:56	13250	14.60	2.66	0.15
12/05/23 9:19:26	13280	14.57	2.67	0.15
12/05/23 9:19:56	13310	14.60	2.66	0.14
12/05/23 9:20:26	13340	14.59	2.65	0.14
12/05/23 9:20:56	13370	14.59	2.65	0.14
12/05/23 9:21:26	13400	14.58	2.63	0.14
12/05/23 9:21:56	13430	14.58	2.62	0.14
12/05/23 9:22:26	13460	14.60	2.62	0.14
12/05/23 9:22:56	13490	14.56	2.61	0.15
RAW AVERAGE		**14.60**	**2.60**	**0.15**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.01	0.05	0.00
	Final Zero	0.01	0.04	0.00
	Avg. Zero	0.01	0.05	0.00
	Initial UpScale	11.79	5.01	5.14
	Final UpScale	11.80	5.01	5.15
	Avg. UpScale	11.80	5.01	5.15
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.90	2.60	0.15
Concentration (ppmvd@ 15%O_2)	N/A	2.56	0.15
Emission Rate (lb/hr)	N/A	11.95	0.43
Emission Rate (lb/MMBtu)	N/A	0.009	0.000

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Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,192,040	SCFH

Weather Data

Barometric Pressure	30.16	in. Hg
Relative Humidity	81	%
Ambient Temperature	53	^{o}F
Specific Humidity	0.006843	lb H_2O / lb air

Unit Data

Unit Load	181.0	megawatts
Stack Exhaust Flow (M19)	38,260,421	SCFH

Normal Load, Run - 3

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 9:32:26	14060	14.59	2.57	0.15
12/05/23 9:32:56	14090	14.59	2.60	0.14
12/05/23 9:33:26	14120	14.59	2.60	0.14
12/05/23 9:33:56	14150	14.59	2.61	0.14
12/05/23 9:34:26	14180	14.59	2.60	0.13
12/05/23 9:34:56	14210	14.60	2.61	0.14
12/05/23 9:35:26	14240	14.60	2.58	0.13
12/05/23 9:35:56	14270	14.59	2.56	0.13
12/05/23 9:36:26	14300	14.59	2.55	0.14
12/05/23 9:36:56	14330	14.63	2.57	0.14
12/05/23 9:37:26	14360	14.60	2.59	0.14
12/05/23 9:37:56	14390	14.58	2.62	0.14
12/05/23 9:38:26	14420	14.58	2.62	0.16
12/05/23 9:38:56	14450	14.58	2.60	0.15
12/05/23 9:39:26	14480	14.59	2.60	0.14
12/05/23 9:39:56	14510	14.62	2.60	0.14
12/05/23 9:40:26	14540	14.61	2.57	0.15
12/05/23 9:40:56	14570	14.56	2.53	0.15
12/05/23 9:41:26	14600	14.58	2.58	0.15
12/05/23 9:41:56	14630	14.59	2.57	0.14
12/05/23 9:42:26	14660	14.58	2.60	0.15
12/05/23 9:42:56	14690	14.57	2.60	0.14
12/05/23 9:43:26	14720	14.56	2.60	0.15
12/05/23 9:43:56	14750	14.59	2.57	0.13
12/05/23 9:44:26	14780	14.58	2.60	0.14
12/05/23 9:44:56	14810	14.60	2.61	0.14
12/05/23 9:45:26	14840	14.59	2.61	0.13
12/05/23 9:45:56	14870	14.58	2.61	0.13
12/05/23 9:46:26	14900	14.58	2.57	0.12
12/05/23 9:46:56	14930	14.59	2.58	0.13
12/05/23 9:47:26	14960	14.60	2.56	0.13
12/05/23 9:47:56	14990	14.61	2.58	0.13
12/05/23 9:48:26	15020	14.60	2.57	0.13
12/05/23 9:48:56	15050	14.58	2.57	0.13
12/05/23 9:49:26	15080	14.59	2.60	0.13
12/05/23 9:49:56	15110	14.58	2.60	0.13
12/05/23 9:50:26	15140	14.62	2.60	0.12
12/05/23 9:50:56	15170	14.61	2.59	0.13
12/05/23 9:51:26	15200	14.58	2.58	0.13
12/05/23 9:51:56	15230	14.61	2.60	0.14
12/05/23 9:52:26	15260	14.59	2.57	0.14
12/05/23 9:52:56	15290	14.60	2.56	0.12
RAW AVERAGE		**14.59**	**2.59**	**0.14**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.01	0.04	0.00
	Final Zero	0.01	0.02	0.00
	Avg. Zero	0.01	0.03	0.00
	Initial UpScale	11.80	5.01	5.15
	Final UpScale	11.80	4.97	5.15
	Avg. UpScale	11.80	4.99	5.15
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.89	2.61	0.14
Concentration (ppmvd@ 15%O_2)	N/A	2.56	0.14
Emission Rate (lb/hr)	N/A	11.92	0.38
Emission Rate (lb/MMBtu)	N/A	0.009	0.000

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Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,187,660	SCFH

Weather Data

Barometric Pressure	30.16	in. Hg
Relative Humidity	78	%
Ambient Temperature	55	^{o}F
Specific Humidity	0.007092	lb H_2O / lb air

Unit Data

Unit Load	180.0	megawatts
Stack Exhaust Flow (M19)	38,007,180	SCFH

Normal Load, Run - 4

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 10:02:26	15860	14.60	2.57	0.12
12/05/23 10:02:56	15890	14.62	2.57	0.12
12/05/23 10:03:26	15920	14.58	2.56	0.12
12/05/23 10:03:56	15950	14.63	2.57	0.13
12/05/23 10:04:26	15980	14.61	2.58	0.12
12/05/23 10:04:56	16010	14.60	2.54	0.11
12/05/23 10:05:26	16040	14.60	2.58	0.11
12/05/23 10:05:56	16070	14.61	2.56	0.13
12/05/23 10:06:26	16100	14.60	2.58	0.13
12/05/23 10:06:56	16130	14.59	2.61	0.11
12/05/23 10:07:26	16160	14.60	2.61	0.13
12/05/23 10:07:56	16190	14.59	2.57	0.11
12/05/23 10:08:26	16220	14.58	2.58	0.12
12/05/23 10:08:56	16250	14.62	2.57	0.12
12/05/23 10:09:26	16280	14.61	2.59	0.11
12/05/23 10:09:56	16310	14.59	2.57	0.12
12/05/23 10:10:26	16340	14.59	2.57	0.13
12/05/23 10:10:56	16370	14.60	2.59	0.13
12/05/23 10:11:26	16400	14.61	2.58	0.12
12/05/23 10:11:56	16430	14.61	2.62	0.11
12/05/23 10:12:26	16460	14.60	2.59	0.10
12/05/23 10:12:56	16490	14.59	2.61	0.11
12/05/23 10:13:26	16520	14.62	2.57	0.11
12/05/23 10:13:56	16550	14.59	2.57	0.11
12/05/23 10:14:26	16580	14.60	2.55	0.11
12/05/23 10:14:56	16610	14.60	2.55	0.11
12/05/23 10:15:26	16640	14.61	2.59	0.11
12/05/23 10:15:56	16670	14.61	2.60	0.11
12/05/23 10:16:26	16700	14.62	2.63	0.12
12/05/23 10:16:56	16730	14.60	2.63	0.11
12/05/23 10:17:26	16760	14.61	2.61	0.11
12/05/23 10:17:56	16790	14.60	2.63	0.11
12/05/23 10:18:26	16820	14.60	2.64	0.12
12/05/23 10:18:56	16850	14.62	2.61	0.11
12/05/23 10:19:26	16880	14.60	2.61	0.11
12/05/23 10:19:56	16910	14.60	2.60	0.11
12/05/23 10:20:26	16940	14.61	2.64	0.11
12/05/23 10:20:56	16970	14.59	2.62	0.09
12/05/23 10:21:26	17000	14.62	2.62	0.09
12/05/23 10:21:56	17030	14.63	2.62	0.10
12/05/23 10:22:26	17060	14.60	2.62	0.09
12/05/23 10:22:56	17090	14.60	2.61	0.09
RAW AVERAGE		**14.60**	**2.59**	**0.11**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.01	0.02	0.00
	Final Zero	0.02	0.03	0.00
	Avg. Zero	0.02	0.03	0.00
	Initial UpScale	11.80	4.97	5.15
	Final UpScale	11.85	4.91	5.10
	Avg. UpScale	11.83	4.94	5.13
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	**O_2**	**NOx**	**CO**
Corrected Raw Average (ppm/%[vol] dry basis)	14.87	2.64	0.11
Concentration (ppmvd@ 15%O_2)	N/A	2.59	0.11
Emission Rate (lb/hr)	N/A	12.00	0.32
Emission Rate (lb/MMBtu)	N/A	0.010	0.000

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Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,181,500	SCFH

Weather Data

Barometric Pressure	30.14	in. Hg
Relative Humidity	76	%
Ambient Temperature	57	^{o}F
Specific Humidity	0.007439	lb H_2O / lb air

Unit Data

Unit Load	179.0	megawatts
Stack Exhaust Flow (M19)	37,899,228	SCFH

Normal Load, Run - 5

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 10:32:26	17660	14.60	2.58	0.10
12/05/23 10:32:56	17690	14.60	2.57	0.10
12/05/23 10:33:26	17720	14.60	2.61	0.11
12/05/23 10:33:56	17750	14.62	2.58	0.10
12/05/23 10:34:26	17780	14.62	2.60	0.11
12/05/23 10:34:56	17810	14.62	2.58	0.10
12/05/23 10:35:26	17840	14.61	2.59	0.11
12/05/23 10:35:56	17870	14.63	2.61	0.10
12/05/23 10:36:26	17900	14.62	2.57	0.09
12/05/23 10:36:56	17930	14.62	2.58	0.10
12/05/23 10:37:26	17960	14.61	2.65	0.12
12/05/23 10:37:56	17990	14.63	2.66	0.10
12/05/23 10:38:26	18020	14.64	2.65	0.10
12/05/23 10:38:56	18050	14.64	2.63	0.10
12/05/23 10:39:26	18080	14.64	2.59	0.09
12/05/23 10:39:56	18110	14.64	2.47	0.09
12/05/23 10:40:26	18140	14.62	2.43	0.09
12/05/23 10:40:56	18170	14.65	2.42	0.10
12/05/23 10:41:26	18200	14.65	2.44	0.08
12/05/23 10:41:56	18230	14.65	2.46	0.10
12/05/23 10:42:26	18260	14.64	2.49	0.09
12/05/23 10:42:56	18290	14.64	2.53	0.08
12/05/23 10:43:26	18320	14.60	2.54	0.10
12/05/23 10:43:56	18350	14.62	2.55	0.09
12/05/23 10:44:26	18380	14.64	2.51	0.09
12/05/23 10:44:56	18410	14.62	2.56	0.10
12/05/23 10:45:26	18440	14.61	2.59	0.09
12/05/23 10:45:56	18470	14.62	2.65	0.08
12/05/23 10:46:26	18500	14.62	2.63	0.07
12/05/23 10:46:56	18530	14.63	2.64	0.07
12/05/23 10:47:26	18560	14.63	2.64	0.07
12/05/23 10:47:56	18590	14.63	2.63	0.09
12/05/23 10:48:26	18620	14.63	2.61	0.09
12/05/23 10:48:56	18650	14.64	2.62	0.07
12/05/23 10:49:26	18680	14.64	2.62	0.07
12/05/23 10:49:56	18710	14.61	2.62	0.07
12/05/23 10:50:26	18740	14.63	2.62	0.07
12/05/23 10:50:56	18770	14.63	2.63	0.08
12/05/23 10:51:26	18800	14.65	2.65	0.07
12/05/23 10:51:56	18830	14.64	2.58	0.07
12/05/23 10:52:26	18860	14.63	2.55	0.07
12/05/23 10:52:56	18890	14.65	2.59	0.07
RAW AVERAGE		**14.63**	**2.58**	**0.09**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.02	0.03	0.00
	Final Zero	0.03	0.05	0.00
	Avg. Zero	0.03	0.04	0.00
	Initial UpScale	11.85	4.91	5.10
	Final UpScale	11.82	4.98	5.08
	Avg. UpScale	11.84	4.95	5.09
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.89	2.62	0.09
Concentration (ppmvd@ 15%O_2)	N/A	2.57	0.09
Emission Rate (lb/hr)	N/A	11.86	0.25
Emission Rate (lb/MMBtu)	N/A	0.009	0.000

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Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,175,190	SCFH

Weather Data

Barometric Pressure	30.12	in. Hg
Relative Humidity	66	%
Ambient Temperature	61	^{o}F
Specific Humidity	0.007459	lb H_2O / lb air

Unit Data

Unit Load	178.0	megawatts
Stack Exhaust Flow (M19)	37,800,543	SCFH

Normal Load, Run - 6

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 11:02:26	19460	14.63	2.56	0.07
12/05/23 11:02:56	19490	14.65	2.56	0.07
12/05/23 11:03:26	19520	14.65	2.55	0.07
12/05/23 11:03:56	19550	14.64	2.55	0.07
12/05/23 11:04:26	19580	14.65	2.55	0.07
12/05/23 11:04:56	19610	14.63	2.57	0.08
12/05/23 11:05:26	19640	14.64	2.60	0.07
12/05/23 11:05:56	19670	14.62	2.59	0.07
12/05/23 11:06:26	19700	14.64	2.60	0.07
12/05/23 11:06:56	19730	14.63	2.63	0.06
12/05/23 11:07:26	19760	14.63	2.61	0.06
12/05/23 11:07:56	19790	14.64	2.59	0.06
12/05/23 11:08:26	19820	14.65	2.59	0.06
12/05/23 11:08:56	19850	14.65	2.59	0.07
12/05/23 11:09:26	19880	14.65	2.59	0.06
12/05/23 11:09:56	19910	14.66	2.58	0.06
12/05/23 11:10:26	19940	14.63	2.59	0.07
12/05/23 11:10:56	19970	14.66	2.56	0.07
12/05/23 11:11:26	20000	14.66	2.59	0.07
12/05/23 11:11:56	20030	14.65	2.58	0.07
12/05/23 11:12:26	20060	14.66	2.59	0.06
12/05/23 11:12:56	20090	14.65	2.61	0.06
12/05/23 11:13:26	20120	14.67	2.63	0.06
12/05/23 11:13:56	20150	14.66	2.55	0.07
12/05/23 11:14:26	20180	14.66	2.44	0.07
12/05/23 11:14:56	20210	14.66	2.49	0.07
12/05/23 11:15:26	20240	14.65	2.50	0.06
12/05/23 11:15:56	20270	14.67	2.53	0.08
12/05/23 11:16:26	20300	14.64	2.57	0.07
12/05/23 11:16:56	20330	14.64	2.57	0.07
12/05/23 11:17:26	20360	14.63	2.59	0.07
12/05/23 11:17:56	20390	14.65	2.59	0.07
12/05/23 11:18:26	20420	14.66	2.57	0.06
12/05/23 11:18:56	20450	14.67	2.58	0.06
12/05/23 11:19:26	20480	14.65	2.54	0.06
12/05/23 11:19:56	20510	14.67	2.55	0.07
12/05/23 11:20:26	20540	14.67	2.57	0.07
12/05/23 11:20:56	20570	14.67	2.57	0.08
12/05/23 11:21:26	20600	14.66	2.54	0.07
12/05/23 11:21:56	20630	14.66	2.55	0.08
12/05/23 11:22:26	20660	14.63	2.55	0.08
12/05/23 11:22:56	20690	14.64	2.57	0.08
RAW AVERAGE		**14.65**	**2.57**	**0.07**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.03	0.05	0.00
	Final Zero	0.02	0.04	0.00
	Avg. Zero	0.03	0.05	0.00
	Initial UpScale	11.82	4.98	5.08
	Final UpScale	11.86	4.88	5.10
	Avg. UpScale	11.84	4.93	5.09
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.90	2.61	0.07
Concentration (ppmvd@ 15%O_2)	N/A	2.57	0.07
Emission Rate (lb/hr)	N/A	11.80	0.19
Emission Rate (lb/MMBtu)	N/A	0.009	0.000

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Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,170,840	SCFH

Weather Data

Barometric Pressure	30.12	in. Hg
Relative Humidity	66	%
Ambient Temperature	61	^{o}F
Specific Humidity	0.007459	lb H_2O / lb air

Unit Data

Unit Load	177.0	megawatts
Stack Exhaust Flow (M19)	37,526,484	SCFH

Normal Load, Run - 7

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 11:32:26	21260	14.63	2.54	0.11
12/05/23 11:32:56	21290	14.65	2.52	0.11
12/05/23 11:33:26	21320	14.67	2.54	0.10
12/05/23 11:33:56	21350	14.68	2.56	0.10
12/05/23 11:34:26	21380	14.67	2.55	0.09
12/05/23 11:34:56	21410	14.66	2.56	0.08
12/05/23 11:35:26	21440	14.66	2.56	0.08
12/05/23 11:35:56	21470	14.67	2.57	0.08
12/05/23 11:36:26	21500	14.66	2.57	0.08
12/05/23 11:36:56	21530	14.67	2.57	0.06
12/05/23 11:37:26	21560	14.67	2.56	0.07
12/05/23 11:37:56	21590	14.67	2.56	0.08
12/05/23 11:38:26	21620	14.68	2.56	0.07
12/05/23 11:38:56	21650	14.67	2.56	0.07
12/05/23 11:39:26	21680	14.67	2.60	0.06
12/05/23 11:39:56	21710	14.65	2.58	0.07
12/05/23 11:40:26	21740	14.67	2.60	0.07
12/05/23 11:40:56	21770	14.67	2.60	0.06
12/05/23 11:41:26	21800	14.67	2.58	0.06
12/05/23 11:41:56	21830	14.66	2.57	0.06
12/05/23 11:42:26	21860	14.66	2.59	0.06
12/05/23 11:42:56	21890	14.66	2.61	0.06
12/05/23 11:43:26	21920	14.67	2.59	0.06
12/05/23 11:43:56	21950	14.67	2.63	0.07
12/05/23 11:44:26	21980	14.67	2.58	0.06
12/05/23 11:44:56	22010	14.68	2.66	0.05
12/05/23 11:45:26	22040	14.68	2.69	0.06
12/05/23 11:45:56	22070	14.67	2.52	0.04
12/05/23 11:46:26	22100	14.67	2.54	0.05
12/05/23 11:46:56	22130	14.67	2.53	0.03
12/05/23 11:47:26	22160	14.69	2.49	0.05
12/05/23 11:47:56	22190	14.64	2.52	0.04
12/05/23 11:48:26	22220	14.66	2.60	0.05
12/05/23 11:48:56	22250	14.69	2.66	0.05
12/05/23 11:49:26	22280	14.65	2.68	0.05
12/05/23 11:49:56	22310	14.68	2.68	0.05
12/05/23 11:50:26	22340	14.67	2.64	0.06
12/05/23 11:50:56	22370	14.66	2.64	0.06
12/05/23 11:51:26	22400	14.66	2.62	0.05
12/05/23 11:51:56	22430	14.64	2.62	0.06
12/05/23 11:52:26	22460	14.68	2.66	0.06
12/05/23 11:52:56	22490	14.68	2.65	0.05
RAW AVERAGE		**14.67**	**2.59**	**0.07**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.02	0.04	0.00
	Final Zero	0.03	0.05	0.00
	Avg. Zero	0.03	0.05	0.00
	Initial UpScale	11.86	4.88	5.10
	Final UpScale	11.88	4.93	5.06
	Avg. UpScale	11.87	4.91	5.08
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.88	2.65	0.07
Concentration (ppmvd@ 15%O_2)	N/A	2.60	0.07
Emission Rate (lb/hr)	N/A	11.87	0.18
Emission Rate (lb/MMBtu)	N/A	0.010	0.000

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,059	Btu/SCF fuel
Total Fuel Flow	1,165,780	SCFH

Weather Data

Barometric Pressure	30.10	in. Hg
Relative Humidity	64	%
Ambient Temperature	62	°F
Specific Humidity	0.007499	lb H_2O / lb air

Unit Data

Unit Load	176.0	megawatts
Stack Exhaust Flow (M19)	37,522,738	SCFH

Normal Load, Run - 8

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 12:02:26	23060	14.65	2.50	0.05
12/05/23 12:02:56	23090	14.67	2.54	0.04
12/05/23 12:03:26	23120	14.66	2.62	0.05
12/05/23 12:03:56	23150	14.66	2.62	0.05
12/05/23 12:04:26	23180	14.68	2.61	0.05
12/05/23 12:04:56	23210	14.67	2.62	0.05
12/05/23 12:05:26	23240	14.67	2.62	0.04
12/05/23 12:05:56	23270	14.71	2.61	0.04
12/05/23 12:06:26	23300	14.68	2.59	0.04
12/05/23 12:06:56	23330	14.67	2.66	0.03
12/05/23 12:07:26	23360	14.68	2.71	0.04
12/05/23 12:07:56	23390	14.70	2.72	0.04
12/05/23 12:08:26	23420	14.71	2.71	0.03
12/05/23 12:08:56	23450	14.71	2.62	0.05
12/05/23 12:09:26	23480	14.69	2.61	0.04
12/05/23 12:09:56	23510	14.69	2.59	0.05
12/05/23 12:10:26	23540	14.67	2.60	0.04
12/05/23 12:10:56	23570	14.68	2.61	0.05
12/05/23 12:11:26	23600	14.68	2.59	0.04
12/05/23 12:11:56	23630	14.67	2.58	0.04
12/05/23 12:12:26	23660	14.68	2.64	0.04
12/05/23 12:12:56	23690	14.69	2.63	0.03
12/05/23 12:13:26	23720	14.68	2.64	0.05
12/05/23 12:13:56	23750	14.69	2.63	0.04
12/05/23 12:14:26	23780	14.66	2.62	0.05
12/05/23 12:14:56	23810	14.69	2.63	0.02
12/05/23 12:15:26	23840	14.66	2.65	0.04
12/05/23 12:15:56	23870	14.68	2.67	0.04
12/05/23 12:16:26	23900	14.67	2.62	0.04
12/05/23 12:16:56	23930	14.69	2.61	0.04
12/05/23 12:17:26	23960	14.66	2.63	0.04
12/05/23 12:17:56	23990	14.70	2.64	0.03
12/05/23 12:18:26	24020	14.68	2.65	0.04
12/05/23 12:18:56	24050	14.71	2.65	0.05
12/05/23 12:19:26	24080	14.67	2.60	0.03
12/05/23 12:19:56	24110	14.70	2.61	0.04
12/05/23 12:20:26	24140	14.68	2.62	0.04
12/05/23 12:20:56	24170	14.70	2.62	0.03
12/05/23 12:21:26	24200	14.68	2.64	0.03
12/05/23 12:21:56	24230	14.69	2.64	0.03
12/05/23 12:22:26	24260	14.69	2.65	0.03
12/05/23 12:22:56	24290	14.69	2.64	0.02
RAW AVERAGE		**14.68**	**2.63**	**0.04**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.03	0.05	0.00
	Final Zero	0.06	0.08	0.00
	Avg. Zero	0.05	0.07	0.00
	Initial UpScale	11.88	4.93	5.06
	Final UpScale	11.85	4.88	5.04
	Avg. UpScale	11.87	4.91	5.05
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.91	2.68	0.04
Concentration (ppmvd@ 15%O_2)	N/A	2.64	0.04
Emission Rate (lb/hr)	N/A	12.00	0.11
Emission Rate (lb/MMBtu)	N/A	0.010	0.000

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,059	Btu/SCF fuel
Total Fuel Flow	1,163,970	SCFH

Weather Data

Barometric Pressure	30.09	in. Hg
Relative Humidity	61	%
Ambient Temperature	64	^{o}F
Specific Humidity	0.007673	lb H_2O / lb air

Unit Data

Unit Load	175.0	megawatts
Stack Exhaust Flow (M19)	37,582,532	SCFH

Normal Load, Run - 9

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 12:32:26	24860	14.68	2.64	0.04
12/05/23 12:32:56	24890	14.68	2.63	0.05
12/05/23 12:33:26	24920	14.69	2.64	0.03
12/05/23 12:33:56	24950	14.69	2.64	0.04
12/05/23 12:34:26	24980	14.67	2.63	0.04
12/05/23 12:34:56	25010	14.67	2.62	0.04
12/05/23 12:35:26	25040	14.69	2.65	0.04
12/05/23 12:35:56	25070	14.68	2.65	0.03
12/05/23 12:36:26	25100	14.69	2.64	0.04
12/05/23 12:36:56	25130	14.68	2.65	0.04
12/05/23 12:37:26	25160	14.69	2.63	0.04
12/05/23 12:37:56	25190	14.70	2.64	0.04
12/05/23 12:38:26	25220	14.69	2.63	0.04
12/05/23 12:38:56	25250	14.68	2.65	0.05
12/05/23 12:39:26	25280	14.70	2.64	0.03
12/05/23 12:39:56	25310	14.69	2.64	0.04
12/05/23 12:40:26	25340	14.68	2.68	0.04
12/05/23 12:40:56	25370	14.67	2.65	0.03
12/05/23 12:41:26	25400	14.69	2.66	0.04
12/05/23 12:41:56	25430	14.67	2.65	0.04
12/05/23 12:42:26	25460	14.69	2.68	0.03
12/05/23 12:42:56	25490	14.68	2.65	0.04
12/05/23 12:43:26	25520	14.68	2.65	0.03
12/05/23 12:43:56	25550	14.69	2.66	0.03
12/05/23 12:44:26	25580	14.72	2.64	0.02
12/05/23 12:44:56	25610	14.70	2.64	0.02
12/05/23 12:45:26	25640	14.71	2.63	0.03
12/05/23 12:45:56	25670	14.69	2.65	0.03
12/05/23 12:46:26	25700	14.69	2.65	0.04
12/05/23 12:46:56	25730	14.67	2.62	0.03
12/05/23 12:47:26	25760	14.70	2.62	0.03
12/05/23 12:47:56	25790	14.69	2.62	0.03
12/05/23 12:48:26	25820	14.68	2.62	0.02
12/05/23 12:48:56	25850	14.69	2.62	0.03
12/05/23 12:49:26	25880	14.72	2.63	0.03
12/05/23 12:49:56	25910	14.70	2.60	0.02
12/05/23 12:50:26	25940	14.68	2.60	0.03
12/05/23 12:50:56	25970	14.70	2.61	0.04
12/05/23 12:51:26	26000	14.68	2.62	0.03
12/05/23 12:51:56	26030	14.68	2.61	0.03
12/05/23 12:52:26	26060	14.70	2.61	0.04
12/05/23 12:52:56	26090	14.68	2.63	0.03
RAW AVERAGE		**14.69**	**2.64**	**0.03**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.06	0.08	0.00
	Final Zero	0.04	0.08	0.00
	Avg. Zero	0.05	0.08	0.00
	Initial UpScale	11.85	4.88	5.04
	Final UpScale	11.86	4.93	5.03
	Avg. UpScale	11.86	4.91	5.04
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.93	2.68	0.04
Concentration (ppmvd@ 15%O_2)	N/A	2.65	0.03
Emission Rate (lb/hr)	N/A	12.04	0.10
Emission Rate (lb/MMBtu)	N/A	0.010	0.000

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
Campbell Power Plant

Fuel Data

Fuel Fd factor	8,710	SCF exh/MMBtu
Fuel Heating Value (HHV)	1,060	Btu/SCF fuel
Total Fuel Flow	1,160,910	SCFH

Weather Data

Barometric Pressure	30.06	in. Hg
Relative Humidity	57	%
Ambient Temperature	65	^{o}F
Specific Humidity	0.007429	lb H_2O / lb air

Unit Data

Unit Load	175.0	megawatts
Stack Exhaust Flow (M19)	37,528,739	SCFH

Normal Load, Run - 10

Date/Time (mm/dd/yy hh:mm:ss)	Elapsed Time (seconds)	O_2 (%vd)	NOx (ppmvd)	CO (ppmvd)
12/05/23 13:02:26	26660	14.67	2.63	0.04
12/05/23 13:02:56	26690	14.68	2.61	0.03
12/05/23 13:03:26	26720	14.71	2.63	0.04
12/05/23 13:03:56	26750	14.70	2.61	0.04
12/05/23 13:04:26	26780	14.70	2.60	0.03
12/05/23 13:04:56	26810	14.69	2.62	0.03
12/05/23 13:05:26	26840	14.72	2.63	0.04
12/05/23 13:05:56	26870	14.71	2.62	0.03
12/05/23 13:06:26	26900	14.69	2.61	0.04
12/05/23 13:06:56	26930	14.67	2.70	0.03
12/05/23 13:07:26	26960	14.71	2.70	0.04
12/05/23 13:07:56	26990	14.73	2.54	0.04
12/05/23 13:08:26	27020	14.71	2.52	0.05
12/05/23 13:08:56	27050	14.72	2.52	0.03
12/05/23 13:09:26	27080	14.73	2.51	0.03
12/05/23 13:09:56	27110	14.71	2.49	0.05
12/05/23 13:10:26	27140	14.71	2.52	0.04
12/05/23 13:10:56	27170	14.69	2.57	0.04
12/05/23 13:11:26	27200	14.70	2.62	0.04
12/05/23 13:11:56	27230	14.68	2.63	0.04
12/05/23 13:12:26	27260	14.69	2.62	0.05
12/05/23 13:12:56	27290	14.67	2.66	0.04
12/05/23 13:13:26	27320	14.70	2.68	0.04
12/05/23 13:13:56	27350	14.67	2.71	0.04
12/05/23 13:14:26	27380	14.69	2.78	0.05
12/05/23 13:14:56	27410	14.68	2.74	0.04
12/05/23 13:15:26	27440	14.70	2.75	0.03
12/05/23 13:15:56	27470	14.74	2.71	0.03
12/05/23 13:16:26	27500	14.71	2.67	0.04
12/05/23 13:16:56	27530	14.70	2.64	0.02
12/05/23 13:17:26	27560	14.70	2.58	0.03
12/05/23 13:17:56	27590	14.71	2.56	0.03
12/05/23 13:18:26	27620	14.71	2.55	0.03
12/05/23 13:18:56	27650	14.71	2.53	0.04
12/05/23 13:19:26	27680	14.69	2.58	0.02
12/05/23 13:19:56	27710	14.70	2.62	0.05
12/05/23 13:20:26	27740	14.67	2.61	0.10
12/05/23 13:20:56	27770	14.70	2.63	0.04
12/05/23 13:21:26	27800	14.69	2.65	0.04
12/05/23 13:21:56	27830	14.69	2.63	0.05
12/05/23 13:22:26	27860	14.69	2.65	0.03
12/05/23 13:22:56	27890	14.68	2.70	0.05
RAW AVERAGE		**14.70**	**2.62**	**0.04**

		O_2	NOx	CO
	Serial Number:	INST-C2-0026	INST-NX-0073	INST-CO-0016
		(%)	**(ppmvd)**	**(ppmvd)**
Bias	**Initial Zero**	0.04	0.08	0.00
	Final Zero	0.06	0.06	0.00
	Avg. Zero	0.05	0.07	0.00
	Initial UpScale	11.86	4.93	5.03
	Final UpScale	11.86	4.90	5.02
	Avg. UpScale	11.86	4.92	5.03
Upscale Cal Gas		12.04	5.06	5.20

EMISSIONS DATA	O_2	NOx	CO
Corrected Raw Average (ppm/%[vol] dry basis)	14.93	2.67	0.04
Concentration (ppmvd@ 15%O_2)	N/A	2.64	0.04
Emission Rate (lb/hr)	N/A	11.95	0.11
Emission Rate (lb/MMBtu)	N/A	0.010	0.000

UNIT OPERATION PARAMETERS

Operations Data – Compliance Gases

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 06:58 Through 12/05/2023 07:47
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	06:58	1.06	0.4	0.4	8,710.0	12,058.8	1,061.0
12/05/23	06:59	1.13	0.4	0.4	8,710.0	12,044.9	1,061.0
12/05/23	07:00	1.11	0.4	0.4	8,710.0	12,059.3	1,061.0
12/05/23	07:01	1.07	0.4	0.4	8,710.0	12,059.8	1,061.0
12/05/23	07:02	1.07	0.4	0.4	8,710.0	12,061.5	1,061.0
12/05/23	07:03	1.11	0.4	0.4	8,710.0	12,057.2	1,061.0
12/05/23	07:04	1.08	0.4	0.4	8,710.0	12,072.5	1,061.0
12/05/23	07:05	1.08	0.4	0.4	8,710.0	12,056.2	1,061.0
12/05/23	07:06	1.05	0.4	0.4	8,710.0	12,052.4	1,061.0
12/05/23	07:07	1.03	0.4	0.4	8,710.0	12,057.3	1,061.0
12/05/23	07:08	1.06	0.4	0.4	8,710.0	12,056.2	1,061.0
12/05/23	07:09	1.08	0.4	0.4	8,710.0	12,071.2	1,061.0
12/05/23	07:10	1.05	0.4	0.4	8,710.0	12,066.3	1,061.0
12/05/23	07:11	1.02	0.4	0.4	8,710.0	12,062.9	1,061.0
12/05/23	07:12	1.04	0.4	0.4	8,710.0	12,062.2	1,061.0
12/05/23	07:13	1.05	0.4	0.4	8,710.0	12,053.7	1,061.0
12/05/23	07:14	0.98	0.3	0.3	8,710.0	12,040.9	1,061.0
12/05/23	07:15	1.00	0.4	0.3	8,710.0	12,047.2	1,061.0
12/05/23	07:16	1.02	0.4	0.4	8,710.0	12,056.1	1,061.0
12/05/23	07:17	0.99	0.4	0.3	8,710.0	12,045.6	1,061.0
12/05/23	07:18	0.96	0.3	0.3	8,710.0	12,050.4	1,061.0
12/05/23	07:19	1.01	0.4	0.4	8,710.0	12,050.3	1,061.0
12/05/23	07:20	0.97	0.3	0.3	8,710.0	12,045.0	1,061.0
12/05/23	07:21	1.01	0.4	0.4	8,710.0	12,072.8	1,061.0
12/05/23	07:22	1.06	0.4	0.4	8,710.0	12,048.8	1,061.0
12/05/23	07:23	1.03	0.4	0.4	8,710.0	12,067.4	1,061.0
12/05/23	07:24	1.13	0.4	0.4	8,710.0	12,061.3	1,061.0
12/05/23	07:25	1.12	0.4	0.4	8,710.0	12,054.5	1,061.0
12/05/23	07:26	1.09	0.4	0.4	8,710.0	12,074.9	1,061.0
12/05/23	07:27	1.15	0.4	0.4	8,710.0	12,057.8	1,061.0
12/05/23	07:28	1.15	0.4	0.4	8,710.0	12,090.9	1,061.0
12/05/23	07:29	1.10	0.4	0.4	8,710.0	12,070.4	1,061.0
12/05/23	07:30	1.08	0.4	0.4	8,710.0	12,078.6	1,061.0
12/05/23	07:31	1.09	0.4	0.4	8,710.0	12,084.3	1,061.0
12/05/23	07:32	1.08	0.4	0.4	8,710.0	12,077.7	1,061.0
12/05/23	07:33	1.08	0.4	0.4	8,710.0	12,073.2	1,061.0
12/05/23	07:34	1.06	0.4	0.4	8,710.0	12,077.2	1,061.0
12/05/23	07:35	1.06	0.4	0.4	8,710.0	12,072.4	1,061.0
12/05/23	07:36	1.09	0.4	0.4	8,710.0	12,076.3	1,061.0
12/05/23	07:37	1.07	0.4	0.4	8,710.0	12,075.3	1,061.0
12/05/23	07:38	1.08	0.4	0.4	8,710.0	12,087.0	1,061.0
12/05/23	07:39	1.03	0.4	0.4	8,710.0	12,064.8	1,061.0
12/05/23	07:40	1.01	0.4	0.4	8,710.0	12,082.1	1,061.0
12/05/23	07:41	1.02	0.4	0.4	8,710.0	12,073.5	1,061.0
12/05/23	07:42	1.01	0.4	0.4	8,710.0	12,088.3	1,061.0
12/05/23	07:43	0.97	0.3	0.3	8,710.0	12,064.6	1,061.0
12/05/23	07:44	1.03	0.4	0.4	8,710.0	12,058.8	1,061.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 06:58 Through 12/05/2023 07:47
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	06:58	184	12.00	0.009	2.6	2.5	14.9
12/05/23	06:59	184	11.87	0.009	2.6	2.5	14.9
12/05/23	07:00	184	11.80	0.009	2.5	2.5	14.9
12/05/23	07:01	184	11.80	0.009	2.5	2.5	14.9
12/05/23	07:02	184	11.85	0.009	2.6	2.5	14.9
12/05/23	07:03	184	12.09	0.009	2.6	2.6	14.9
12/05/23	07:04	184	12.04	0.009	2.6	2.6	14.9
12/05/23	07:05	184	12.27	0.010	2.7	2.6	14.9
12/05/23	07:06	184	12.12	0.009	2.6	2.6	14.9
12/05/23	07:07	184	11.58	0.009	2.5	2.5	14.9
12/05/23	07:08	184	11.82	0.009	2.6	2.5	14.9
12/05/23	07:09	184	12.23	0.009	2.6	2.6	14.9
12/05/23	07:10	184	12.53	0.010	2.7	2.7	14.9
12/05/23	07:11	184	12.35	0.010	2.7	2.6	14.9
12/05/23	07:12	184	12.45	0.010	2.7	2.6	14.9
12/05/23	07:13	184	12.42	0.010	2.7	2.6	14.9
12/05/23	07:14	184	12.30	0.010	2.7	2.6	14.9
12/05/23	07:15	184	12.32	0.010	2.7	2.6	14.9
12/05/23	07:16	184	12.23	0.009	2.6	2.6	14.9
12/05/23	07:17	184	12.36	0.010	2.7	2.6	14.9
12/05/23	07:18	184	12.39	0.010	2.7	2.6	14.9
12/05/23	07:19	184	12.28	0.009	2.6	2.6	14.9
12/05/23	07:20	184	12.36	0.010	2.7	2.6	14.9
12/05/23	07:21	184	12.35	0.010	2.7	2.6	14.9
12/05/23	07:22	184	12.38	0.010	2.7	2.6	14.9
12/05/23	07:23	184	12.27	0.009	2.6	2.6	14.9
12/05/23	07:24	184	12.34	0.010	2.7	2.6	14.9
12/05/23	07:25	184	12.30	0.010	2.7	2.6	14.9
12/05/23	07:26	184	12.17	0.009	2.6	2.6	14.9
12/05/23	07:27	184	12.26	0.009	2.6	2.6	14.9
12/05/23	07:28	184	12.37	0.010	2.7	2.6	14.9
12/05/23	07:29	184	12.31	0.010	2.7	2.6	14.9
12/05/23	07:30	184	12.33	0.010	2.7	2.6	14.9
12/05/23	07:31	185	12.38	0.010	2.7	2.6	14.9
12/05/23	07:32	184	12.66	0.010	2.7	2.7	14.9
12/05/23	07:33	184	12.35	0.010	2.7	2.6	14.9
12/05/23	07:34	184	12.28	0.009	2.6	2.6	14.9
12/05/23	07:35	184	12.14	0.009	2.6	2.6	14.9
12/05/23	07:36	184	12.23	0.009	2.6	2.6	14.9
12/05/23	07:37	184	12.30	0.009	2.6	2.6	14.9
12/05/23	07:38	184	12.31	0.009	2.6	2.6	14.9
12/05/23	07:39	184	12.24	0.009	2.6	2.6	14.9
12/05/23	07:40	184	12.21	0.009	2.6	2.6	14.9
12/05/23	07:41	184	12.19	0.009	2.6	2.6	14.9
12/05/23	07:42	184	12.27	0.009	2.6	2.6	14.9
12/05/23	07:43	184	12.24	0.009	2.6	2.6	14.9
12/05/23	07:44	184	12.09	0.009	2.6	2.6	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 06:58 Through 12/05/2023 07:47
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 07:45	1.00	0.4	0.3	8,710.0	12,073.5	1,061.0
12/05/23 07:46	1.02	0.4	0.4	8,710.0	12,075.2	1,061.0
12/05/23 07:47	1.03	0.4	0.4	8,710.0	12,063.1	1,061.0
Average	1.05	0.4	0.4	8,710.0	12,064.7	1,061.0
Minimum	0.96	0.3	0.3	8,710.0	12,040.9	1,061.0
Maximum	1.15	0.4	0.4	8,710.0	12,090.9	1,061.0
Summation	52.67	19.6	19.3	435,500.0	603,232.6	53,050.0
Geometric Mean						
Included Data Points	50	50	50	50	50	50
Total number of Data Points	50	50	50	50	50	50

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 06:58 Through 12/05/2023 07:47
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	07:45	184	12.18	0.009	2.6	2.6	14.9
12/05/23	07:46	184	12.14	0.009	2.6	2.6	14.9
12/05/23	07:47	184	12.26	0.009	2.6	2.6	14.9
Average		184	12.22	0.009	2.6	2.6	14.9
Minimum		184	11.58	0.009	2.5	2.5	14.9
Maximum		185	12.66	0.010	2.7	2.7	14.9
Summation		9,201	611.01	0.470	131.7	129.5	745.0
Geometric Mean							
Included Data Points		50	50	50	50	50	50
Total number of Data Points		50	50	50	50	50	50

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	08:32	1.05	0.4	0.4	8,710.0	12,020.0	1,060.3
12/05/23	08:33	1.07	0.4	0.4	8,710.0	12,003.2	1,060.3
12/05/23	08:34	1.06	0.4	0.4	8,710.0	12,021.7	1,060.3
12/05/23	08:35	1.09	0.4	0.4	8,710.0	12,015.3	1,060.3
12/05/23	08:36	1.13	0.4	0.4	8,710.0	11,997.7	1,060.2
12/05/23	08:37	1.15	0.4	0.4	8,710.0	12,003.1	1,060.3
12/05/23	08:38	1.15	0.4	0.4	8,710.0	12,001.9	1,060.3
12/05/23	08:39	1.15	0.4	0.4	8,710.0	12,011.4	1,060.2
12/05/23	08:40	1.13	0.4	0.4	8,710.0	11,998.1	1,060.3
12/05/23	08:41	1.16	0.4	0.4	8,710.0	11,994.8	1,060.3
12/05/23	08:42	1.13	0.4	0.4	8,710.0	11,991.5	1,060.3
12/05/23	08:43	1.09	0.4	0.4	8,710.0	11,988.1	1,060.3
12/05/23	08:44	1.06	0.4	0.4	8,710.0	12,006.2	1,060.3
12/05/23	08:45	1.06	0.4	0.4	8,710.0	11,985.3	1,060.3
12/05/23	08:46	1.05	0.4	0.4	8,710.0	12,010.5	1,060.3
12/05/23	08:47	0.99	0.4	0.3	8,710.0	12,007.9	1,060.3
12/05/23	08:48	1.01	0.4	0.4	8,710.0	11,992.0	1,060.3
12/05/23	08:49	1.00	0.4	0.4	8,710.0	11,986.4	1,060.3
12/05/23	08:50	0.95	0.3	0.3	8,710.0	12,002.0	1,060.3
12/05/23	08:51	0.97	0.3	0.3	8,710.0	12,000.7	1,060.3
12/05/23	08:52	1.01	0.4	0.4	8,710.0	11,994.9	1,060.3
12/05/23	08:53	0.95	0.3	0.3	8,710.0	11,982.8	1,060.3
12/05/23	08:54	0.94	0.3	0.3	8,710.0	12,001.6	1,060.3
12/05/23	08:55	0.94	0.3	0.3	8,710.0	11,971.2	1,060.3
12/05/23	08:56	0.91	0.3	0.3	8,710.0	11,962.2	1,060.3
12/05/23	08:57	0.90	0.3	0.3	8,710.0	11,997.2	1,060.3
12/05/23	08:58	0.94	0.3	0.3	8,710.0	11,984.5	1,060.3
12/05/23	08:59	0.98	0.3	0.3	8,710.0	11,984.4	1,060.3
12/05/23	09:00	1.03	0.4	0.4	8,710.0	11,980.1	1,060.3
12/05/23	09:01	1.02	0.4	0.4	8,710.0	11,985.1	1,060.3
12/05/23	09:02	1.04	0.4	0.4	8,710.0	11,976.7	1,060.3
12/05/23	09:03	1.02	0.4	0.4	8,710.0	11,954.8	1,060.3
12/05/23	09:04	0.99	0.4	0.3	8,710.0	11,971.2	1,060.2
12/05/23	09:05	0.98	0.3	0.3	8,710.0	11,967.9	1,060.3
12/05/23	09:06	0.92	0.3	0.3	8,710.0	11,965.3	1,060.3
12/05/23	09:07	0.96	0.3	0.3	8,710.0	11,967.2	1,060.3
12/05/23	09:08	0.98	0.3	0.3	8,710.0	11,967.8	1,060.3
12/05/23	09:09	0.98	0.3	0.3	8,710.0	11,965.1	1,060.3
12/05/23	09:10	0.90	0.3	0.3	8,710.0	11,961.9	1,060.3
12/05/23	09:11	0.92	0.3	0.3	8,710.0	11,980.2	1,060.3
12/05/23	09:12	0.95	0.3	0.3	8,710.0	11,948.6	1,060.3
12/05/23	09:13	0.89	0.3	0.3	8,710.0	11,911.7	1,060.3
12/05/23	09:14	0.92	0.3	0.3	8,710.0	11,934.7	1,060.3
12/05/23	09:15	0.97	0.3	0.3	8,710.0	11,970.3	1,060.3
12/05/23	09:16	0.90	0.3	0.3	8,710.0	11,954.6	1,060.3
12/05/23	09:17	0.90	0.3	0.3	8,710.0	11,954.0	1,060.3
12/05/23	09:18	0.89	0.3	0.3	8,710.0	11,956.4	1,060.3

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	08:32	183	12.56	0.010	2.7	2.7	14.9
12/05/23	08:33	183	12.52	0.010	2.7	2.7	14.9
12/05/23	08:34	183	12.42	0.010	2.7	2.6	14.9
12/05/23	08:35	183	12.43	0.010	2.7	2.6	14.9
12/05/23	08:36	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:37	183	12.41	0.010	2.7	2.6	14.9
12/05/23	08:38	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:39	183	12.29	0.010	2.7	2.6	14.9
12/05/23	08:40	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:41	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:42	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:43	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:44	183	12.34	0.010	2.7	2.6	14.9
12/05/23	08:45	183	12.25	0.010	2.7	2.6	14.9
12/05/23	08:46	183	12.35	0.010	2.7	2.6	14.9
12/05/23	08:47	183	12.47	0.010	2.7	2.7	14.9
12/05/23	08:48	183	12.44	0.010	2.7	2.7	14.9
12/05/23	08:49	183	12.27	0.010	2.7	2.6	14.9
12/05/23	08:50	183	12.24	0.009	2.6	2.6	14.9
12/05/23	08:51	183	12.44	0.010	2.7	2.7	14.9
12/05/23	08:52	183	12.49	0.010	2.7	2.7	14.9
12/05/23	08:53	182	12.41	0.010	2.7	2.7	15.0
12/05/23	08:54	183	12.24	0.009	2.6	2.6	14.9
12/05/23	08:55	182	12.38	0.010	2.7	2.6	14.9
12/05/23	08:56	182	12.32	0.010	2.7	2.6	15.0
12/05/23	08:57	183	12.25	0.010	2.6	2.6	15.0
12/05/23	08:58	182	12.25	0.009	2.6	2.6	14.9
12/05/23	08:59	182	12.37	0.010	2.7	2.6	14.9
12/05/23	09:00	182	12.41	0.010	2.7	2.7	14.9
12/05/23	09:01	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:02	182	12.22	0.009	2.6	2.6	14.9
12/05/23	09:03	182	12.21	0.009	2.6	2.6	14.9
12/05/23	09:04	182	12.34	0.010	2.7	2.6	14.9
12/05/23	09:05	182	12.23	0.009	2.6	2.6	14.9
12/05/23	09:06	182	12.16	0.009	2.6	2.6	14.9
12/05/23	09:07	182	12.32	0.010	2.7	2.6	14.9
12/05/23	09:08	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:09	182	12.17	0.009	2.6	2.6	14.9
12/05/23	09:10	182	12.19	0.009	2.6	2.6	14.9
12/05/23	09:11	182	12.41	0.010	2.7	2.7	14.9
12/05/23	09:12	182	12.46	0.010	2.7	2.7	14.9
12/05/23	09:13	181	12.19	0.010	2.6	2.6	15.0
12/05/23	09:14	182	11.83	0.010	2.6	2.5	15.0
12/05/23	09:15	182	12.17	0.010	2.6	2.6	15.0
12/05/23	09:16	182	12.61	0.010	2.7	2.7	14.9
12/05/23	09:17	182	12.61	0.010	2.7	2.7	15.0
12/05/23	09:18	182	12.70	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	09:19	0.89	0.3	0.3	8,710.0	11,974.2	1,060.3
12/05/23	09:20	0.87	0.3	0.3	8,710.0	11,953.4	1,060.3
12/05/23	09:21	0.89	0.3	0.3	8,710.0	11,942.7	1,060.3
12/05/23	09:22	0.93	0.3	0.3	8,710.0	11,939.5	1,060.2
12/05/23	09:23	0.98	0.3	0.3	8,710.0	11,938.4	1,060.3
12/05/23	09:24	0.97	0.3	0.3	8,710.0	11,933.2	1,060.3
12/05/23	09:25	1.02	0.4	0.4	8,710.0	11,935.8	1,060.3
12/05/23	09:26	1.00	0.4	0.4	8,710.0	11,930.5	1,060.3
12/05/23	09:27	0.98	0.4	0.3	8,710.0	11,932.8	1,060.3
12/05/23	09:28	0.96	0.3	0.3	8,710.0	11,939.0	1,060.3
12/05/23	09:29	0.96	0.3	0.3	8,710.0	11,940.4	1,060.3
12/05/23	09:30	0.92	0.3	0.3	8,710.0	11,941.2	1,060.3
12/05/23	09:31	0.95	0.3	0.3	8,710.0	11,944.5	1,060.2
12/05/23	09:32	0.89	0.3	0.3	8,710.0	11,934.1	1,059.6
12/05/23	09:33	0.91	0.3	0.3	8,710.0	11,938.2	1,059.6
12/05/23	09:34	0.93	0.3	0.3	8,710.0	11,936.4	1,059.6
12/05/23	09:35	0.90	0.3	0.3	8,710.0	11,924.2	1,059.6
12/05/23	09:36	0.87	0.3	0.3	8,710.0	11,934.8	1,059.6
12/05/23	09:37	0.93	0.3	0.3	8,710.0	11,931.5	1,059.6
12/05/23	09:38	0.90	0.3	0.3	8,710.0	11,932.4	1,059.6
12/05/23	09:39	0.86	0.3	0.3	8,710.0	11,927.4	1,059.6
12/05/23	09:40	0.89	0.3	0.3	8,710.0	11,934.5	1,059.6
12/05/23	09:41	0.90	0.3	0.3	8,710.0	11,928.1	1,059.6
12/05/23	09:42	0.90	0.3	0.3	8,710.0	11,921.2	1,059.6
12/05/23	09:43	0.92	0.3	0.3	8,710.0	11,917.3	1,059.6
12/05/23	09:44	0.95	0.3	0.3	8,710.0	11,915.6	1,059.6
12/05/23	09:45	0.98	0.3	0.3	8,710.0	11,905.8	1,059.6
12/05/23	09:46	0.97	0.3	0.3	8,710.0	11,901.6	1,059.6
12/05/23	09:47	0.98	0.3	0.3	8,710.0	11,910.4	1,059.6
12/05/23	09:48	0.98	0.3	0.3	8,710.0	11,940.3	1,059.6
12/05/23	09:49	0.92	0.3	0.3	8,710.0	11,902.9	1,059.6
12/05/23	09:50	0.94	0.3	0.3	8,710.0	11,897.6	1,059.6
12/05/23	09:51	0.92	0.3	0.3	8,710.0	11,892.2	1,059.6
12/05/23	09:52	0.89	0.3	0.3	8,710.0	11,902.9	1,059.6
	Average	0.97	0.3	0.3	8,710.0	11,960.1	1,060.1
	Minimum	0.86	0.3	0.3	8,710.0	11,892.2	1,059.6
	Maximum	1.16	0.4	0.4	8,710.0	12,021.7	1,060.3
	Summation	78.83	27.0	26.7	705,510.0	968,765.2	85,869.1
	Geometric Mean						
	Included Data Points	81	81	81	81	81	81
	Total number of Data Points	81	81	81	81	81	81

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	09:19	182	12.70	0.010	2.7	2.7	15.0
12/05/23	09:20	182	12.54	0.010	2.7	2.7	15.0
12/05/23	09:21	182	12.44	0.010	2.7	2.7	15.0
12/05/23	09:22	182	12.32	0.010	2.7	2.6	15.0
12/05/23	09:23	182	12.48	0.010	2.7	2.7	14.9
12/05/23	09:24	182	12.42	0.010	2.7	2.7	14.9
12/05/23	09:25	181	12.32	0.010	2.7	2.6	14.9
12/05/23	09:26	181	12.30	0.010	2.7	2.6	14.9
12/05/23	09:27	181	12.29	0.010	2.7	2.6	14.9
12/05/23	09:28	182	12.28	0.010	2.7	2.6	14.9
12/05/23	09:29	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:30	182	12.19	0.009	2.6	2.6	14.9
12/05/23	09:31	182	12.20	0.009	2.6	2.6	14.9
12/05/23	09:32	182	12.20	0.009	2.6	2.6	14.9
12/05/23	09:33	181	12.25	0.010	2.6	2.6	15.0
12/05/23	09:34	181	12.29	0.010	2.7	2.6	15.0
12/05/23	09:35	181	12.12	0.010	2.6	2.6	15.0
12/05/23	09:36	181	12.19	0.010	2.6	2.6	15.0
12/05/23	09:37	181	12.35	0.010	2.7	2.7	15.0
12/05/23	09:38	181	12.41	0.010	2.7	2.7	15.0
12/05/23	09:39	181	12.26	0.010	2.7	2.6	15.0
12/05/23	09:40	181	12.15	0.010	2.6	2.6	15.0
12/05/23	09:41	181	12.19	0.010	2.6	2.6	15.0
12/05/23	09:42	181	12.26	0.010	2.6	2.6	15.0
12/05/23	09:43	181	12.12	0.010	2.6	2.6	15.0
12/05/23	09:44	181	12.20	0.009	2.6	2.6	14.9
12/05/23	09:45	181	12.33	0.010	2.7	2.7	15.0
12/05/23	09:46	181	12.17	0.009	2.6	2.6	14.9
12/05/23	09:47	181	12.10	0.009	2.6	2.6	14.9
12/05/23	09:48	181	12.19	0.009	2.6	2.6	14.9
12/05/23	09:49	181	12.31	0.010	2.7	2.6	14.9
12/05/23	09:50	181	12.28	0.010	2.7	2.6	15.0
12/05/23	09:51	181	12.19	0.009	2.6	2.6	14.9
12/05/23	09:52	181	12.21	0.010	2.6	2.6	15.0
Average		182	12.32	0.010	2.7	2.6	14.9
Minimum		181	11.83	0.009	2.6	2.5	14.9
Maximum		183	12.70	0.010	2.7	2.7	15.0
Summation		14,741	998.07	0.793	215.8	212.9	1,209.5
Geometric Mean							
Included Data Points		81	81	81	81	81	81
Total number of Data Points		81	81	81	81	81	81

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:02 Through 12/05/2023 11:22
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	10:02	0.84	0.3	0.3	8,710.0	11,882.7	1,059.6
12/05/23	10:03	0.89	0.3	0.3	8,710.0	11,885.7	1,059.6
12/05/23	10:04	0.94	0.3	0.3	8,710.0	11,884.5	1,059.6
12/05/23	10:05	0.91	0.3	0.3	8,710.0	11,899.5	1,059.6
12/05/23	10:06	0.97	0.3	0.3	8,710.0	11,903.1	1,059.6
12/05/23	10:07	0.99	0.4	0.3	8,710.0	11,887.9	1,059.6
12/05/23	10:08	0.99	0.4	0.3	8,710.0	11,877.6	1,059.6
12/05/23	10:09	1.00	0.4	0.4	8,710.0	11,874.5	1,059.6
12/05/23	10:10	0.95	0.3	0.3	8,710.0	11,883.0	1,059.6
12/05/23	10:11	0.96	0.3	0.3	8,710.0	11,877.6	1,059.6
12/05/23	10:12	0.93	0.3	0.3	8,710.0	11,869.2	1,059.6
12/05/23	10:13	0.94	0.3	0.3	8,710.0	11,884.3	1,059.6
12/05/23	10:14	0.92	0.3	0.3	8,710.0	11,856.8	1,059.6
12/05/23	10:15	0.96	0.3	0.3	8,710.0	11,876.0	1,059.6
12/05/23	10:16	0.94	0.3	0.3	8,710.0	11,871.5	1,059.6
12/05/23	10:17	0.93	0.3	0.3	8,710.0	11,879.9	1,059.6
12/05/23	10:18	0.89	0.3	0.3	8,710.0	11,864.0	1,059.6
12/05/23	10:19	0.90	0.3	0.3	8,710.0	11,866.4	1,059.6
12/05/23	10:20	0.87	0.3	0.3	8,710.0	11,849.6	1,059.6
12/05/23	10:21	0.88	0.3	0.3	8,710.0	11,861.2	1,059.6
12/05/23	10:22	0.87	0.3	0.3	8,710.0	11,872.9	1,059.6
12/05/23	10:23	0.91	0.3	0.3	8,710.0	11,856.5	1,059.6
12/05/23	10:24	0.89	0.3	0.3	8,710.0	11,863.6	1,059.6
12/05/23	10:25	0.92	0.3	0.3	8,710.0	11,852.3	1,059.6
12/05/23	10:26	0.99	0.4	0.4	8,710.0	11,854.1	1,059.5
12/05/23	10:27	0.96	0.3	0.3	8,710.0	11,858.3	1,059.6
12/05/23	10:28	1.01	0.4	0.4	8,710.0	11,858.2	1,059.6
12/05/23	10:29	1.00	0.4	0.4	8,710.0	11,868.6	1,059.6
12/05/23	10:30	0.97	0.3	0.3	8,710.0	11,868.8	1,059.6
12/05/23	10:31	0.95	0.3	0.3	8,710.0	11,849.4	1,059.6
12/05/23	10:32	0.95	0.3	0.3	8,710.0	11,852.1	1,059.6
12/05/23	10:33	0.94	0.3	0.3	8,710.0	11,837.3	1,059.6
12/05/23	10:34	0.90	0.3	0.3	8,710.0	11,835.1	1,059.6
12/05/23	10:35	0.93	0.3	0.3	8,710.0	11,810.0	1,059.6
12/05/23	10:36	0.94	0.3	0.3	8,710.0	11,828.4	1,059.6
12/05/23	10:37	0.94	0.3	0.3	8,710.0	11,813.8	1,059.6
12/05/23	10:38	0.94	0.3	0.3	8,710.0	11,797.4	1,059.6
12/05/23	10:39	0.90	0.3	0.3	8,710.0	11,778.2	1,059.6
12/05/23	10:40	0.85	0.3	0.3	8,710.0	11,806.4	1,059.6
12/05/23	10:41	0.83	0.3	0.3	8,710.0	11,818.6	1,059.6
12/05/23	10:42	0.90	0.3	0.3	8,710.0	11,792.9	1,059.6
12/05/23	10:43	0.88	0.3	0.3	8,710.0	11,798.0	1,059.6
12/05/23	10:44	0.93	0.3	0.3	8,710.0	11,829.6	1,059.6
12/05/23	10:45	0.93	0.3	0.3	8,710.0	11,827.2	1,059.6
12/05/23	10:46	0.95	0.3	0.3	8,710.0	11,817.9	1,059.6
12/05/23	10:47	0.95	0.3	0.3	8,710.0	11,822.0	1,059.6
12/05/23	10:48	0.95	0.3	0.3	8,710.0	11,819.7	1,059.6

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:02 Through 12/05/2023 11:22
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	10:02	181	12.24	0.010	2.7	2.6	15.0
12/05/23	10:03	180	12.27	0.010	2.7	2.6	15.0
12/05/23	10:04	180	12.22	0.010	2.7	2.6	15.0
12/05/23	10:05	181	12.24	0.010	2.7	2.6	15.0
12/05/23	10:06	181	12.33	0.010	2.7	2.7	14.9
12/05/23	10:07	180	12.29	0.010	2.7	2.6	14.9
12/05/23	10:08	180	12.23	0.010	2.7	2.6	14.9
12/05/23	10:09	180	12.18	0.010	2.7	2.6	14.9
12/05/23	10:10	180	12.25	0.010	2.7	2.6	14.9
12/05/23	10:11	180	12.41	0.010	2.7	2.7	14.9
12/05/23	10:12	180	12.29	0.010	2.7	2.7	15.0
12/05/23	10:13	180	12.16	0.010	2.6	2.6	15.0
12/05/23	10:14	180	12.07	0.010	2.6	2.6	15.0
12/05/23	10:15	180	12.32	0.010	2.7	2.7	15.0
12/05/23	10:16	180	12.46	0.010	2.7	2.7	15.0
12/05/23	10:17	180	12.44	0.010	2.7	2.7	15.0
12/05/23	10:18	180	12.54	0.010	2.7	2.7	15.0
12/05/23	10:19	180	12.38	0.010	2.7	2.7	15.0
12/05/23	10:20	180	12.51	0.010	2.7	2.7	15.0
12/05/23	10:21	180	12.50	0.010	2.7	2.7	15.0
12/05/23	10:22	180	12.44	0.010	2.7	2.7	15.0
12/05/23	10:23	180	12.44	0.010	2.7	2.7	15.0
12/05/23	10:24	180	12.51	0.010	2.7	2.7	15.0
12/05/23	10:25	180	12.29	0.010	2.7	2.7	15.0
12/05/23	10:26	180	12.33	0.010	2.7	2.7	15.0
12/05/23	10:27	180	12.37	0.010	2.7	2.7	14.9
12/05/23	10:28	180	12.35	0.010	2.7	2.7	14.9
12/05/23	10:29	180	12.34	0.010	2.7	2.7	14.9
12/05/23	10:30	180	12.32	0.010	2.7	2.7	14.9
12/05/23	10:31	180	12.34	0.010	2.7	2.7	14.9
12/05/23	10:32	180	12.18	0.010	2.7	2.6	14.9
12/05/23	10:33	179	12.37	0.010	2.7	2.7	14.9
12/05/23	10:34	179	12.32	0.010	2.7	2.7	15.0
12/05/23	10:35	179	12.31	0.010	2.7	2.7	15.0
12/05/23	10:36	179	12.20	0.010	2.7	2.6	15.0
12/05/23	10:37	179	12.46	0.010	2.7	2.7	15.0
12/05/23	10:38	179	12.44	0.010	2.7	2.7	15.0
12/05/23	10:39	178	11.95	0.010	2.6	2.6	15.0
12/05/23	10:40	179	11.61	0.009	2.5	2.5	15.0
12/05/23	10:41	179	11.76	0.010	2.6	2.6	15.0
12/05/23	10:42	178	12.00	0.010	2.6	2.6	15.0
12/05/23	10:43	179	12.08	0.010	2.6	2.6	15.0
12/05/23	10:44	179	12.13	0.010	2.6	2.6	15.0
12/05/23	10:45	179	12.51	0.010	2.7	2.7	15.0
12/05/23	10:46	179	12.49	0.010	2.7	2.7	15.0
12/05/23	10:47	179	12.50	0.010	2.7	2.7	15.0
12/05/23	10:48	179	12.47	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:02 Through 12/05/2023 11:22
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 10:49	0.93	0.3	0.3	8,710.0	11,797.2	1,059.6
12/05/23 10:50	1.00	0.4	0.4	8,710.0	11,798.5	1,059.6
12/05/23 10:51	0.95	0.3	0.3	8,710.0	11,808.8	1,059.6
12/05/23 10:52	0.91	0.3	0.3	8,710.0	11,825.9	1,059.6
12/05/23 10:53	0.87	0.3	0.3	8,710.0	11,814.7	1,059.6
12/05/23 10:54	0.87	0.3	0.3	8,710.0	11,817.7	1,059.6
12/05/23 10:55	0.88	0.3	0.3	8,710.0	11,791.8	1,059.6
12/05/23 10:56	0.84	0.3	0.3	8,710.0	11,796.9	1,059.6
12/05/23 10:57	0.87	0.3	0.3	8,710.0	11,776.2	1,059.6
12/05/23 10:58	0.85	0.3	0.3	8,710.0	11,804.6	1,059.6
12/05/23 10:59	0.86	0.3	0.3	8,710.0	11,782.9	1,059.6
12/05/23 11:00	0.83	0.3	0.3	8,710.0	11,761.0	1,059.6
12/05/23 11:01	0.85	0.3	0.3	8,710.0	11,787.7	1,059.6
12/05/23 11:02	0.83	0.3	0.3	8,710.0	11,761.9	1,059.6
12/05/23 11:03	0.84	0.3	0.3	8,710.0	11,783.0	1,059.6
12/05/23 11:04	0.85	0.3	0.3	8,710.0	11,791.7	1,059.6
12/05/23 11:05	0.89	0.3	0.3	8,710.0	11,784.7	1,059.5
12/05/23 11:06	0.91	0.3	0.3	8,710.0	11,765.1	1,059.6
12/05/23 11:07	0.92	0.3	0.3	8,710.0	11,745.3	1,059.6
12/05/23 11:08	0.87	0.3	0.3	8,710.0	11,737.7	1,059.6
12/05/23 11:09	0.90	0.3	0.3	8,710.0	11,733.2	1,059.6
12/05/23 11:10	0.92	0.3	0.3	8,710.0	11,760.0	1,059.6
12/05/23 11:11	0.90	0.3	0.3	8,710.0	11,742.5	1,059.6
12/05/23 11:12	0.88	0.3	0.3	8,710.0	11,740.2	1,059.6
12/05/23 11:13	0.89	0.3	0.3	8,710.0	11,720.1	1,059.6
12/05/23 11:14	0.90	0.3	0.3	8,710.0	11,759.4	1,059.6
12/05/23 11:15	0.86	0.3	0.3	8,710.0	11,759.9	1,059.6
12/05/23 11:16	0.85	0.3	0.3	8,710.0	11,784.1	1,059.6
12/05/23 11:17	0.87	0.3	0.3	8,710.0	11,743.2	1,059.5
12/05/23 11:18	0.79	0.3	0.3	8,710.0	11,728.4	1,059.6
12/05/23 11:19	0.79	0.3	0.3	8,710.0	11,727.7	1,059.5
12/05/23 11:20	0.84	0.3	0.3	8,710.0	11,737.2	1,059.6
12/05/23 11:21	0.77	0.3	0.3	8,710.0	11,748.4	1,059.5
12/05/23 11:22	0.82	0.3	0.3	8,710.0	11,736.7	1,059.5
Average	0.90	0.3	0.3	8,710.0	11,817.0	1,059.6
Minimum	0.77	0.3	0.3	8,710.0	11,720.1	1,059.5
Maximum	1.01	0.4	0.4	8,710.0	11,903.1	1,059.6
Summation	73.28	25.0	24.8	705,510.0	957,176.6	85,827.0
Geometric Mean						
Included Data Points	81	81	81	81	81	81
Total number of Data Points	81	81	81	81	81	81

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:02 Through 12/05/2023 11:22
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	10:49	179	12.35	0.010	2.7	2.7	15.0
12/05/23	10:50	179	12.46	0.010	2.7	2.7	15.0
12/05/23	10:51	179	12.30	0.010	2.7	2.7	15.0
12/05/23	10:52	179	12.27	0.010	2.7	2.7	15.0
12/05/23	10:53	179	12.31	0.010	2.7	2.7	15.0
12/05/23	10:54	179	12.45	0.010	2.7	2.7	15.0
12/05/23	10:55	179	12.36	0.010	2.7	2.7	15.0
12/05/23	10:56	179	12.35	0.010	2.7	2.7	15.0
12/05/23	10:57	178	12.35	0.010	2.7	2.7	15.0
12/05/23	10:58	179	12.31	0.010	2.7	2.7	15.0
12/05/23	10:59	178	12.43	0.010	2.7	2.7	15.0
12/05/23	11:00	178	12.26	0.010	2.7	2.7	15.0
12/05/23	11:01	178	12.42	0.010	2.7	2.7	15.0
12/05/23	11:02	178	12.31	0.010	2.7	2.7	15.0
12/05/23	11:03	178	12.21	0.010	2.7	2.7	15.0
12/05/23	11:04	178	12.17	0.010	2.7	2.6	15.0
12/05/23	11:05	178	12.16	0.010	2.7	2.6	15.0
12/05/23	11:06	178	12.27	0.010	2.7	2.7	15.0
12/05/23	11:07	178	12.24	0.010	2.7	2.7	15.0
12/05/23	11:08	177	12.33	0.010	2.7	2.7	15.0
12/05/23	11:09	177	12.15	0.010	2.7	2.7	15.0
12/05/23	11:10	178	12.21	0.010	2.7	2.7	15.0
12/05/23	11:11	178	12.15	0.010	2.7	2.7	15.0
12/05/23	11:12	177	12.24	0.010	2.7	2.7	15.0
12/05/23	11:13	177	12.17	0.010	2.7	2.7	15.0
12/05/23	11:14	178	11.84	0.010	2.6	2.6	15.0
12/05/23	11:15	178	12.00	0.010	2.6	2.6	15.0
12/05/23	11:16	178	12.22	0.010	2.7	2.7	15.0
12/05/23	11:17	178	12.22	0.010	2.7	2.7	15.0
12/05/23	11:18	177	12.12	0.010	2.7	2.6	15.0
12/05/23	11:19	177	12.06	0.010	2.6	2.6	15.0
12/05/23	11:20	178	12.18	0.010	2.7	2.7	15.0
12/05/23	11:21	178	12.14	0.010	2.7	2.6	15.0
12/05/23	11:22	177	12.08	0.010	2.6	2.6	15.0
	Average	179	12.27	0.010	2.7	2.7	15.0
	Minimum	177	11.61	0.009	2.5	2.5	14.9
	Maximum	181	12.54	0.010	2.7	2.7	15.0
	Summation	14,499	993.93	0.809	217.4	216.0	1,213.7
	Geometric Mean						
	Included Data Points	81	81	81	81	81	81
	Total number of Data Points	81	81	81	81	81	81

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:32 Through 12/05/2023 12:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	11:32	0.88	0.3	0.3	8,710.0	11,728.4	1,059.5
12/05/23	11:33	0.83	0.3	0.3	8,710.0	11,706.7	1,059.6
12/05/23	11:34	0.84	0.3	0.3	8,710.0	11,721.7	1,059.6
12/05/23	11:35	0.85	0.3	0.3	8,710.0	11,709.5	1,059.6
12/05/23	11:36	0.80	0.3	0.3	8,710.0	11,698.5	1,059.5
12/05/23	11:37	0.77	0.3	0.3	8,710.0	11,731.8	1,059.5
12/05/23	11:38	0.78	0.3	0.3	8,710.0	11,710.9	1,059.5
12/05/23	11:39	0.79	0.3	0.3	8,710.0	11,715.8	1,059.5
12/05/23	11:40	0.78	0.3	0.3	8,710.0	11,698.1	1,059.5
12/05/23	11:41	0.78	0.3	0.3	8,710.0	11,723.2	1,059.5
12/05/23	11:42	0.85	0.3	0.3	8,710.0	11,715.5	1,059.6
12/05/23	11:43	0.84	0.3	0.3	8,710.0	11,720.6	1,059.5
12/05/23	11:44	0.83	0.3	0.3	8,710.0	11,702.6	1,059.5
12/05/23	11:45	0.89	0.3	0.3	8,710.0	11,714.6	1,059.5
12/05/23	11:46	0.88	0.3	0.3	8,710.0	11,669.2	1,059.5
12/05/23	11:47	0.88	0.3	0.3	8,710.0	11,657.6	1,059.6
12/05/23	11:48	0.87	0.3	0.3	8,710.0	11,686.6	1,059.6
12/05/23	11:49	0.83	0.3	0.3	8,710.0	11,717.7	1,059.5
12/05/23	11:50	0.89	0.3	0.3	8,710.0	11,726.8	1,059.5
12/05/23	11:51	0.85	0.3	0.3	8,710.0	11,734.0	1,059.6
12/05/23	11:52	0.80	0.3	0.3	8,710.0	11,687.5	1,059.6
12/05/23	11:53	0.83	0.3	0.3	8,710.0	11,705.5	1,059.6
12/05/23	11:54	0.83	0.3	0.3	8,710.0	11,692.4	1,059.6
12/05/23	11:55	0.77	0.3	0.3	8,710.0	11,686.0	1,059.6
12/05/23	11:56	0.77	0.3	0.3	8,710.0	11,654.8	1,059.6
12/05/23	11:57	0.79	0.3	0.3	8,710.0	11,673.3	1,059.6
12/05/23	11:58	0.76	0.3	0.3	8,710.0	11,696.8	1,059.5
12/05/23	11:59	0.74	0.3	0.3	8,710.0	11,710.3	1,059.5
12/05/23	12:00	0.77	0.3	0.3	8,710.0	11,710.3	1,059.6
12/05/23	12:01	0.76	0.3	0.3	8,710.0	11,678.1	1,059.5
12/05/23	12:02	0.79	0.3	0.3	8,710.0	11,694.2	1,059.5
12/05/23	12:03	0.82	0.3	0.3	8,710.0	11,670.9	1,059.5
12/05/23	12:04	0.90	0.3	0.3	8,710.0	11,669.8	1,059.5
12/05/23	12:05	0.87	0.3	0.3	8,710.0	11,680.4	1,059.6
12/05/23	12:06	0.85	0.3	0.3	8,710.0	11,679.7	1,059.5
12/05/23	12:07	0.88	0.3	0.3	8,710.0	11,644.5	1,059.5
12/05/23	12:08	0.87	0.3	0.3	8,710.0	11,647.4	1,059.6
12/05/23	12:09	0.87	0.3	0.3	8,710.0	11,668.8	1,059.6
12/05/23	12:10	0.82	0.3	0.3	8,710.0	11,656.9	1,059.6
12/05/23	12:11	0.86	0.3	0.3	8,710.0	11,669.4	1,059.6
12/05/23	12:12	0.83	0.3	0.3	8,710.0	11,662.9	1,059.5
12/05/23	12:13	0.81	0.3	0.3	8,710.0	11,663.7	1,059.6
12/05/23	12:14	0.78	0.3	0.3	8,710.0	11,637.0	1,059.5
12/05/23	12:15	0.75	0.3	0.3	8,710.0	11,659.7	1,058.8
12/05/23	12:16	0.77	0.3	0.3	8,710.0	11,632.0	1,058.8
12/05/23	12:17	0.75	0.3	0.3	8,710.0	11,634.7	1,058.8
12/05/23	12:18	0.76	0.3	0.3	8,710.0	11,648.5	1,058.8

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:32 Through 12/05/2023 12:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	11:32	177	12.05	0.010	2.7	2.6	15.0
12/05/23	11:33	177	12.14	0.010	2.7	2.7	15.0
12/05/23	11:34	177	12.11	0.010	2.7	2.6	15.0
12/05/23	11:35	177	12.11	0.010	2.7	2.6	15.0
12/05/23	11:36	177	12.18	0.010	2.7	2.7	15.0
12/05/23	11:37	177	12.22	0.010	2.7	2.7	15.0
12/05/23	11:38	177	12.25	0.010	2.7	2.7	15.0
12/05/23	11:39	177	12.15	0.010	2.7	2.7	15.0
12/05/23	11:40	177	12.28	0.010	2.7	2.7	15.0
12/05/23	11:41	177	12.29	0.010	2.7	2.7	15.0
12/05/23	11:42	177	12.27	0.010	2.7	2.7	15.0
12/05/23	11:43	177	12.33	0.010	2.7	2.7	15.0
12/05/23	11:44	177	12.29	0.010	2.7	2.7	15.0
12/05/23	11:45	177	12.40	0.010	2.7	2.7	15.0
12/05/23	11:46	176	12.25	0.010	2.7	2.7	14.9
12/05/23	11:47	176	12.09	0.010	2.7	2.7	15.0
12/05/23	11:48	176	11.78	0.010	2.6	2.6	15.0
12/05/23	11:49	177	11.78	0.010	2.6	2.6	15.0
12/05/23	11:50	177	12.37	0.010	2.7	2.7	15.0
12/05/23	11:51	177	12.55	0.010	2.8	2.7	14.9
12/05/23	11:52	177	12.34	0.010	2.7	2.7	15.0
12/05/23	11:53	177	12.35	0.010	2.7	2.7	15.0
12/05/23	11:54	177	12.50	0.010	2.8	2.7	15.0
12/05/23	11:55	176	12.49	0.010	2.8	2.7	15.0
12/05/23	11:56	176	12.37	0.010	2.7	2.7	15.0
12/05/23	11:57	176	12.19	0.010	2.7	2.7	15.0
12/05/23	11:58	176	11.80	0.010	2.6	2.6	15.0
12/05/23	11:59	177	12.01	0.010	2.6	2.6	15.0
12/05/23	12:00	177	12.36	0.010	2.7	2.7	15.0
12/05/23	12:01	176	12.18	0.010	2.7	2.7	15.0
12/05/23	12:02	176	12.18	0.010	2.7	2.7	15.0
12/05/23	12:03	176	12.46	0.010	2.8	2.7	15.0
12/05/23	12:04	176	12.34	0.010	2.7	2.7	15.0
12/05/23	12:05	176	12.27	0.010	2.7	2.7	15.0
12/05/23	12:06	176	12.38	0.010	2.7	2.7	14.9
12/05/23	12:07	176	12.54	0.010	2.8	2.8	14.9
12/05/23	12:08	176	12.45	0.010	2.8	2.7	15.0
12/05/23	12:09	176	12.12	0.010	2.7	2.7	15.0
12/05/23	12:10	176	12.21	0.010	2.7	2.7	15.0
12/05/23	12:11	176	12.22	0.010	2.7	2.7	15.0
12/05/23	12:12	176	12.41	0.010	2.7	2.7	15.0
12/05/23	12:13	176	12.33	0.010	2.7	2.7	15.0
12/05/23	12:14	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:15	176	12.36	0.010	2.7	2.7	15.0
12/05/23	12:16	175	12.23	0.010	2.7	2.7	15.0
12/05/23	12:17	175	12.16	0.010	2.7	2.7	15.0
12/05/23	12:18	175	12.28	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:32 Through 12/05/2023 12:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	12:19	0.78	0.3	0.3	8,710.0	11,640.5	1,058.8
12/05/23	12:20	0.76	0.3	0.3	8,710.0	11,645.4	1,058.8
12/05/23	12:21	0.79	0.3	0.3	8,710.0	11,655.6	1,058.8
12/05/23	12:22	0.80	0.3	0.3	8,710.0	11,651.3	1,058.8
12/05/23	12:23	0.82	0.3	0.3	8,710.0	11,640.4	1,058.8
12/05/23	12:24	0.80	0.3	0.3	8,710.0	11,629.2	1,058.8
12/05/23	12:25	0.83	0.3	0.3	8,710.0	11,635.4	1,058.8
12/05/23	12:26	0.85	0.3	0.3	8,710.0	11,626.5	1,058.8
12/05/23	12:27	0.84	0.3	0.3	8,710.0	11,629.2	1,058.8
12/05/23	12:28	0.83	0.3	0.3	8,710.0	11,627.8	1,058.8
12/05/23	12:29	0.83	0.3	0.3	8,710.0	11,631.9	1,058.8
12/05/23	12:30	0.84	0.3	0.3	8,710.0	11,631.4	1,058.8
12/05/23	12:31	0.85	0.3	0.3	8,710.0	11,643.7	1,058.8
12/05/23	12:32	0.80	0.3	0.3	8,710.0	11,630.8	1,058.8
12/05/23	12:33	0.81	0.3	0.3	8,710.0	11,640.2	1,058.8
12/05/23	12:34	0.78	0.3	0.3	8,710.0	11,644.4	1,058.8
12/05/23	12:35	0.78	0.3	0.3	8,710.0	11,622.4	1,058.8
12/05/23	12:36	0.81	0.3	0.3	8,710.0	11,643.0	1,058.8
12/05/23	12:37	0.73	0.3	0.3	8,710.0	11,645.8	1,058.8
12/05/23	12:38	0.74	0.3	0.3	8,710.0	11,655.3	1,058.8
12/05/23	12:39	0.84	0.3	0.3	8,710.0	11,657.9	1,058.8
12/05/23	12:40	0.78	0.3	0.3	8,710.0	11,651.9	1,058.8
12/05/23	12:41	0.81	0.3	0.3	8,710.0	11,656.7	1,058.8
12/05/23	12:42	0.84	0.3	0.3	8,710.0	11,652.4	1,058.8
12/05/23	12:43	0.83	0.3	0.3	8,710.0	11,622.1	1,058.8
12/05/23	12:44	0.89	0.3	0.3	8,710.0	11,638.6	1,058.8
12/05/23	12:45	0.88	0.3	0.3	8,710.0	11,644.7	1,058.8
12/05/23	12:46	0.86	0.3	0.3	8,710.0	11,636.9	1,059.1
12/05/23	12:47	0.87	0.3	0.3	8,710.0	11,646.4	1,059.6
12/05/23	12:48	0.84	0.3	0.3	8,710.0	11,621.8	1,059.6
12/05/23	12:49	0.86	0.3	0.3	8,710.0	11,609.5	1,059.6
12/05/23	12:50	0.83	0.3	0.3	8,710.0	11,635.7	1,059.6
12/05/23	12:51	0.80	0.3	0.3	8,710.0	11,645.8	1,059.6
12/05/23	12:52	0.84	0.3	0.3	8,710.0	11,632.4	1,059.6
	Average	0.82	0.3	0.3	8,710.0	11,667.0	1,059.3
	Minimum	0.73	0.3	0.3	8,710.0	11,609.5	1,058.8
	Maximum	0.90	0.3	0.3	8,710.0	11,734.0	1,059.6
	Summation	66.35	24.3	24.3	705,510.0	945,028.3	85,800.0
	Geometric Mean						
	Included Data Points	81	81	81	81	81	81
	Total number of Data Points	81	81	81	81	81	81

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:32 Through 12/05/2023 12:52
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	12:19	175	12.25	0.010	2.7	2.7	15.0
12/05/23	12:20	176	12.28	0.010	2.7	2.7	15.0
12/05/23	12:21	176	12.27	0.010	2.7	2.7	15.0
12/05/23	12:22	176	12.28	0.010	2.7	2.7	15.0
12/05/23	12:23	175	12.51	0.010	2.8	2.8	15.0
12/05/23	12:24	175	12.30	0.010	2.7	2.7	15.0
12/05/23	12:25	175	12.27	0.010	2.7	2.7	15.0
12/05/23	12:26	175	12.29	0.010	2.7	2.7	15.0
12/05/23	12:27	175	12.23	0.010	2.7	2.7	15.0
12/05/23	12:28	175	12.26	0.010	2.7	2.7	15.0
12/05/23	12:29	175	12.18	0.010	2.7	2.7	15.0
12/05/23	12:30	175	12.39	0.010	2.7	2.7	15.0
12/05/23	12:31	175	12.38	0.010	2.7	2.7	15.0
12/05/23	12:32	175	12.42	0.010	2.8	2.7	15.0
12/05/23	12:33	175	12.32	0.010	2.7	2.7	15.0
12/05/23	12:34	176	12.25	0.010	2.7	2.7	15.0
12/05/23	12:35	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:36	175	12.41	0.010	2.7	2.7	15.0
12/05/23	12:37	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:38	176	12.40	0.010	2.7	2.7	15.0
12/05/23	12:39	176	12.35	0.010	2.7	2.7	15.0
12/05/23	12:40	176	12.40	0.010	2.7	2.7	15.0
12/05/23	12:41	176	12.31	0.010	2.7	2.7	15.0
12/05/23	12:42	176	12.33	0.010	2.7	2.7	15.0
12/05/23	12:43	175	12.29	0.010	2.7	2.7	15.0
12/05/23	12:44	175	12.22	0.010	2.7	2.7	15.0
12/05/23	12:45	175	12.22	0.010	2.7	2.7	14.9
12/05/23	12:46	175	12.25	0.010	2.7	2.7	15.0
12/05/23	12:47	176	12.22	0.010	2.7	2.7	15.0
12/05/23	12:48	175	12.16	0.010	2.7	2.7	14.9
12/05/23	12:49	175	12.14	0.010	2.7	2.7	14.9
12/05/23	12:50	175	12.17	0.010	2.7	2.7	15.0
12/05/23	12:51	176	12.12	0.010	2.7	2.7	15.0
12/05/23	12:52	175	12.26	0.010	2.7	2.7	15.0
Average		176	12.27	0.010	2.7	2.7	15.0
Minimum		175	11.78	0.010	2.6	2.6	14.9
Maximum		177	12.55	0.010	2.8	2.8	15.0
Summation		14,251	993.60	0.810	219.1	218.2	1,214.3
Geometric Mean							
Included Data Points		81	81	81	81	81	81
Total number of Data Points		81	81	81	81	81	81

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

UNIT OPERATION PARAMETERS

Operations Data – PM/PM_{10}

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 06:45 Through 12/05/2023 07:15
Time Online Criteria: 1 minute(s)

Source	UNIT1					
Parameter	CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit	(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23 06:45	1.16	0.4	0.4	8,710.0	12,123.2	1,061.0
12/05/23 06:46	1.14	0.4	0.4	8,710.0	12,096.1	1,061.0
12/05/23 06:47	1.10	0.4	0.4	8,710.0	12,071.6	1,061.0
12/05/23 06:48	1.11	0.4	0.4	8,710.0	12,055.0	1,061.0
12/05/23 06:49	1.08	0.4	0.4	8,710.0	12,047.1	1,061.0
12/05/23 06:50	1.04	0.4	0.4	8,710.0	12,063.0	1,061.0
12/05/23 06:51	1.06	0.4	0.4	8,710.0	12,075.6	1,061.0
12/05/23 06:52	1.04	0.4	0.4	8,710.0	12,095.2	1,061.0
12/05/23 06:53	1.04	0.4	0.4	8,710.0	12,087.7	1,061.0
12/05/23 06:54	1.02	0.4	0.4	8,710.0	12,120.2	1,061.0
12/05/23 06:55	1.07	0.4	0.4	8,710.0	12,099.5	1,061.0
12/05/23 06:56	1.04	0.4	0.4	8,710.0	12,081.1	1,061.0
12/05/23 06:57	1.09	0.4	0.4	8,710.0	12,071.6	1,061.0
12/05/23 06:58	1.06	0.4	0.4	8,710.0	12,058.8	1,061.0
12/05/23 06:59	1.13	0.4	0.4	8,710.0	12,044.9	1,061.0
12/05/23 07:00	1.11	0.4	0.4	8,710.0	12,059.3	1,061.0
12/05/23 07:01	1.07	0.4	0.4	8,710.0	12,059.8	1,061.0
12/05/23 07:02	1.07	0.4	0.4	8,710.0	12,061.5	1,061.0
12/05/23 07:03	1.11	0.4	0.4	8,710.0	12,057.2	1,061.0
12/05/23 07:04	1.08	0.4	0.4	8,710.0	12,072.5	1,061.0
12/05/23 07:05	1.08	0.4	0.4	8,710.0	12,056.2	1,061.0
12/05/23 07:06	1.05	0.4	0.4	8,710.0	12,052.4	1,061.0
12/05/23 07:07	1.03	0.4	0.4	8,710.0	12,057.3	1,061.0
12/05/23 07:08	1.06	0.4	0.4	8,710.0	12,056.2	1,061.0
12/05/23 07:09	1.08	0.4	0.4	8,710.0	12,071.2	1,061.0
12/05/23 07:10	1.05	0.4	0.4	8,710.0	12,066.3	1,061.0
12/05/23 07:11	1.02	0.4	0.4	8,710.0	12,062.9	1,061.0
12/05/23 07:12	1.04	0.4	0.4	8,710.0	12,062.2	1,061.0
12/05/23 07:13	1.05	0.4	0.4	8,710.0	12,053.7	1,061.0
12/05/23 07:14	0.98	0.3	0.3	8,710.0	12,040.9	1,061.0
12/05/23 07:15	1.00	0.4	0.3	8,710.0	12,047.2	1,061.0
Average	1.07	0.4	0.4	8,710.0	12,068.6	1,061.0
Minimum	0.98	0.3	0.3	8,710.0	12,040.9	1,061.0
Maximum	1.16	0.4	0.4	8,710.0	12,123.2	1,061.0
Summation	33.06	12.3	12.2	270,010.0	374,127.4	32,891.0
Geometric Mean						
Included Data Points	31	31	31	31	31	31
Total number of Data Points	31	31	31	31	31	31

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 06:45 Through 12/05/2023 07:15
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	06:45	185	12.22	0.009	2.6	2.6	14.9
12/05/23	06:46	185	11.96	0.009	2.6	2.5	14.9
12/05/23	06:47	184	11.90	0.009	2.6	2.5	14.9
12/05/23	06:48	184	11.81	0.009	2.5	2.5	14.9
12/05/23	06:49	184	11.67	0.009	2.5	2.5	14.9
12/05/23	06:50	184	11.58	0.009	2.5	2.5	14.9
12/05/23	06:51	184	11.75	0.009	2.5	2.5	14.9
12/05/23	06:52	184	11.61	0.009	2.5	2.5	14.9
12/05/23	06:53	184	11.85	0.009	2.5	2.5	14.9
12/05/23	06:54	185	12.20	0.009	2.6	2.6	14.9
12/05/23	06:55	185	12.32	0.009	2.6	2.6	14.9
12/05/23	06:56	184	12.23	0.009	2.6	2.6	14.9
12/05/23	06:57	184	12.07	0.009	2.6	2.6	14.9
12/05/23	06:58	184	12.00	0.009	2.6	2.5	14.9
12/05/23	06:59	184	11.87	0.009	2.6	2.5	14.9
12/05/23	07:00	184	11.80	0.009	2.5	2.5	14.9
12/05/23	07:01	184	11.80	0.009	2.5	2.5	14.9
12/05/23	07:02	184	11.85	0.009	2.6	2.5	14.9
12/05/23	07:03	184	12.09	0.009	2.6	2.6	14.9
12/05/23	07:04	184	12.04	0.009	2.6	2.6	14.9
12/05/23	07:05	184	12.27	0.010	2.7	2.6	14.9
12/05/23	07:06	184	12.12	0.009	2.6	2.6	14.9
12/05/23	07:07	184	11.58	0.009	2.5	2.5	14.9
12/05/23	07:08	184	11.82	0.009	2.6	2.5	14.9
12/05/23	07:09	184	12.23	0.009	2.6	2.6	14.9
12/05/23	07:10	184	12.53	0.010	2.7	2.7	14.9
12/05/23	07:11	184	12.35	0.010	2.7	2.6	14.9
12/05/23	07:12	184	12.45	0.010	2.7	2.6	14.9
12/05/23	07:13	184	12.42	0.010	2.7	2.6	14.9
12/05/23	07:14	184	12.30	0.010	2.7	2.6	14.9
12/05/23	07:15	184	12.32	0.010	2.7	2.6	14.9
	Average	184	12.03	0.009	2.6	2.6	14.9
	Minimum	184	11.58	0.009	2.5	2.5	14.9
	Maximum	185	12.53	0.010	2.7	2.7	14.9
	Summation	5,708	373.01	0.286	80.4	79.2	461.9
	Geometric Mean						
	Included Data Points	31	31	31	31	31	31
	Total number of Data Points	31	31	31	31	31	31

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	07:17	0.99	0.4	0.3	8,710.0	12,045.6	1,061.0
12/05/23	07:18	0.96	0.3	0.3	8,710.0	12,050.4	1,061.0
12/05/23	07:19	1.01	0.4	0.4	8,710.0	12,050.3	1,061.0
12/05/23	07:20	0.97	0.3	0.3	8,710.0	12,045.0	1,061.0
12/05/23	07:21	1.01	0.4	0.4	8,710.0	12,072.8	1,061.0
12/05/23	07:22	1.06	0.4	0.4	8,710.0	12,048.8	1,061.0
12/05/23	07:23	1.03	0.4	0.4	8,710.0	12,067.4	1,061.0
12/05/23	07:24	1.13	0.4	0.4	8,710.0	12,061.3	1,061.0
12/05/23	07:25	1.12	0.4	0.4	8,710.0	12,054.5	1,061.0
12/05/23	07:26	1.09	0.4	0.4	8,710.0	12,074.9	1,061.0
12/05/23	07:27	1.15	0.4	0.4	8,710.0	12,057.8	1,061.0
12/05/23	07:28	1.15	0.4	0.4	8,710.0	12,090.9	1,061.0
12/05/23	07:29	1.10	0.4	0.4	8,710.0	12,070.4	1,061.0
12/05/23	07:30	1.08	0.4	0.4	8,710.0	12,078.6	1,061.0
12/05/23	07:31	1.09	0.4	0.4	8,710.0	12,084.3	1,061.0
12/05/23	07:32	1.08	0.4	0.4	8,710.0	12,077.7	1,061.0
12/05/23	07:33	1.08	0.4	0.4	8,710.0	12,073.2	1,061.0
12/05/23	07:34	1.06	0.4	0.4	8,710.0	12,077.2	1,061.0
12/05/23	07:35	1.06	0.4	0.4	8,710.0	12,072.4	1,061.0
12/05/23	07:36	1.09	0.4	0.4	8,710.0	12,076.3	1,061.0
12/05/23	07:37	1.07	0.4	0.4	8,710.0	12,075.3	1,061.0
12/05/23	07:38	1.08	0.4	0.4	8,710.0	12,087.0	1,061.0
12/05/23	07:39	1.03	0.4	0.4	8,710.0	12,064.8	1,061.0
12/05/23	07:40	1.01	0.4	0.4	8,710.0	12,082.1	1,061.0
12/05/23	07:41	1.02	0.4	0.4	8,710.0	12,073.5	1,061.0
12/05/23	07:42	1.01	0.4	0.4	8,710.0	12,088.3	1,061.0
12/05/23	07:43	0.97	0.3	0.3	8,710.0	12,064.6	1,061.0
12/05/23	07:44	1.03	0.4	0.4	8,710.0	12,058.8	1,061.0
12/05/23	07:45	1.00	0.4	0.3	8,710.0	12,073.5	1,061.0
12/05/23	07:46	1.02	0.4	0.4	8,710.0	12,075.2	1,061.0
12/05/23	07:47	1.03	0.4	0.4	8,710.0	12,063.1	1,061.0
12/05/23	07:48	1.05	0.4	0.4	8,710.0	12,075.7	1,061.0
12/05/23	07:49	1.06	0.4	0.4	8,710.0	12,048.5	1,061.0
12/05/23	07:50	1.11	0.4	0.4	8,710.0	12,062.4	1,061.0
12/05/23	07:51	1.11	0.4	0.4	8,710.0	12,075.2	1,061.0
12/05/23	07:52	1.15	0.4	0.4	8,710.0	12,057.9	1,061.0
12/05/23	07:53	1.09	0.4	0.4	8,710.0	12,071.2	1,061.0
12/05/23	07:54	1.09	0.4	0.4	8,710.0	12,063.7	1,061.0
12/05/23	07:55	1.08	0.4	0.4	8,710.0	12,053.2	1,061.0
12/05/23	07:56	1.09	0.4	0.4	8,710.0	12,067.9	1,061.0
12/05/23	07:57	1.06	0.4	0.4	8,710.0	12,054.6	1,061.0
12/05/23	07:58	1.08	0.4	0.4	8,710.0	12,045.5	1,061.0
12/05/23	07:59	1.07	0.4	0.4	8,710.0	12,058.9	1,061.0
12/05/23	08:00	1.04	0.4	0.4	8,710.0	12,057.9	1,061.0
12/05/23	08:01	1.01	0.4	0.4	8,710.0	12,053.4	1,061.0
12/05/23	08:02	1.08	0.4	0.4	8,710.0	12,040.5	1,061.0
12/05/23	08:03	1.03	0.4	0.4	8,710.0	12,054.2	1,061.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	07:17	184	12.36	0.010	2.7	2.6	14.9
12/05/23	07:18	184	12.39	0.010	2.7	2.6	14.9
12/05/23	07:19	184	12.28	0.009	2.6	2.6	14.9
12/05/23	07:20	184	12.36	0.010	2.7	2.6	14.9
12/05/23	07:21	184	12.35	0.010	2.7	2.6	14.9
12/05/23	07:22	184	12.38	0.010	2.7	2.6	14.9
12/05/23	07:23	184	12.27	0.009	2.6	2.6	14.9
12/05/23	07:24	184	12.34	0.010	2.7	2.6	14.9
12/05/23	07:25	184	12.30	0.010	2.7	2.6	14.9
12/05/23	07:26	184	12.17	0.009	2.6	2.6	14.9
12/05/23	07:27	184	12.26	0.009	2.6	2.6	14.9
12/05/23	07:28	184	12.37	0.010	2.7	2.6	14.9
12/05/23	07:29	184	12.31	0.010	2.7	2.6	14.9
12/05/23	07:30	184	12.33	0.010	2.7	2.6	14.9
12/05/23	07:31	185	12.38	0.010	2.7	2.6	14.9
12/05/23	07:32	184	12.66	0.010	2.7	2.7	14.9
12/05/23	07:33	184	12.35	0.010	2.7	2.6	14.9
12/05/23	07:34	184	12.28	0.009	2.6	2.6	14.9
12/05/23	07:35	184	12.14	0.009	2.6	2.6	14.9
12/05/23	07:36	184	12.23	0.009	2.6	2.6	14.9
12/05/23	07:37	184	12.30	0.009	2.6	2.6	14.9
12/05/23	07:38	184	12.31	0.009	2.6	2.6	14.9
12/05/23	07:39	184	12.24	0.009	2.6	2.6	14.9
12/05/23	07:40	184	12.21	0.009	2.6	2.6	14.9
12/05/23	07:41	184	12.19	0.009	2.6	2.6	14.9
12/05/23	07:42	184	12.27	0.009	2.6	2.6	14.9
12/05/23	07:43	184	12.24	0.009	2.6	2.6	14.9
12/05/23	07:44	184	12.09	0.009	2.6	2.6	14.9
12/05/23	07:45	184	12.18	0.009	2.6	2.6	14.9
12/05/23	07:46	184	12.14	0.009	2.6	2.6	14.9
12/05/23	07:47	184	12.26	0.009	2.6	2.6	14.9
12/05/23	07:48	184	12.12	0.009	2.6	2.6	14.9
12/05/23	07:49	184	11.99	0.009	2.6	2.5	14.9
12/05/23	07:50	184	11.85	0.009	2.6	2.5	14.9
12/05/23	07:51	184	11.99	0.009	2.6	2.5	14.9
12/05/23	07:52	184	12.07	0.009	2.6	2.6	14.9
12/05/23	07:53	184	12.07	0.009	2.6	2.6	14.9
12/05/23	07:54	184	12.28	0.010	2.7	2.6	14.9
12/05/23	07:55	184	12.55	0.010	2.7	2.7	14.9
12/05/23	07:56	184	12.56	0.010	2.7	2.7	14.9
12/05/23	07:57	184	12.48	0.010	2.7	2.6	14.9
12/05/23	07:58	184	12.29	0.010	2.7	2.6	14.9
12/05/23	07:59	184	12.23	0.009	2.6	2.6	14.9
12/05/23	08:00	184	12.28	0.009	2.6	2.6	14.9
12/05/23	08:01	184	12.51	0.010	2.7	2.7	14.9
12/05/23	08:02	184	12.66	0.010	2.7	2.7	14.9
12/05/23	08:03	184	12.54	0.010	2.7	2.7	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	08:04	1.01	0.4	0.4	8,710.0	12,042.8	1,061.0
12/05/23	08:05	1.03	0.4	0.4	8,710.0	12,052.5	1,061.0
12/05/23	08:06	1.04	0.4	0.4	8,710.0	12,053.1	1,061.0
12/05/23	08:07	1.03	0.4	0.4	8,710.0	12,028.4	1,061.0
12/05/23	08:08	1.02	0.4	0.4	8,710.0	12,029.7	1,061.0
12/05/23	08:09	1.00	0.4	0.3	8,710.0	12,041.5	1,061.0
12/05/23	08:10	1.03	0.4	0.4	8,710.0	12,038.8	1,061.0
12/05/23	08:11	1.04	0.4	0.4	8,710.0	12,036.2	1,061.0
12/05/23	08:12	1.05	0.4	0.4	8,710.0	12,048.2	1,061.0
12/05/23	08:13	1.10	0.4	0.4	8,710.0	12,022.3	1,061.0
12/05/23	08:14	1.15	0.4	0.4	8,710.0	12,033.5	1,061.0
12/05/23	08:15	1.12	0.4	0.4	8,710.0	12,054.5	1,061.0
12/05/23	08:16	1.10	0.4	0.4	8,710.0	12,041.4	1,061.0
12/05/23	08:17	1.12	0.4	0.4	8,710.0	12,039.0	1,061.0
12/05/23	08:18	1.14	0.4	0.4	8,710.0	12,019.4	1,061.0
12/05/23	08:19	1.06	0.4	0.4	8,710.0	12,018.2	1,061.0
12/05/23	08:20	1.06	0.4	0.4	8,710.0	12,024.3	1,061.0
12/05/23	08:21	1.07	0.4	0.4	8,710.0	12,010.9	1,061.0
12/05/23	08:22	1.06	0.4	0.4	8,710.0	12,016.9	1,061.0
12/05/23	08:23	1.05	0.4	0.4	8,710.0	12,020.3	1,061.0
12/05/23	08:24	1.00	0.4	0.3	8,710.0	12,020.7	1,061.0
12/05/23	08:25	1.04	0.4	0.4	8,710.0	12,014.4	1,061.0
12/05/23	08:26	1.05	0.4	0.4	8,710.0	12,032.4	1,061.0
12/05/23	08:27	1.03	0.4	0.4	8,710.0	12,013.3	1,061.0
12/05/23	08:28	1.03	0.4	0.4	8,710.0	12,012.9	1,060.8
12/05/23	08:29	1.03	0.4	0.4	8,710.0	12,008.7	1,060.3
12/05/23	08:30	1.07	0.4	0.4	8,710.0	12,020.4	1,060.3
12/05/23	08:31	1.04	0.4	0.4	8,710.0	12,006.8	1,060.3
12/05/23	08:32	1.05	0.4	0.4	8,710.0	12,020.0	1,060.3
12/05/23	08:33	1.07	0.4	0.4	8,710.0	12,003.2	1,060.3
12/05/23	08:34	1.06	0.4	0.4	8,710.0	12,021.7	1,060.3
12/05/23	08:35	1.09	0.4	0.4	8,710.0	12,015.3	1,060.3
12/05/23	08:36	1.13	0.4	0.4	8,710.0	11,997.7	1,060.2
12/05/23	08:37	1.15	0.4	0.4	8,710.0	12,003.1	1,060.3
12/05/23	08:38	1.15	0.4	0.4	8,710.0	12,001.9	1,060.3
12/05/23	08:39	1.15	0.4	0.4	8,710.0	12,011.4	1,060.2
12/05/23	08:40	1.13	0.4	0.4	8,710.0	11,998.1	1,060.3
12/05/23	08:41	1.16	0.4	0.4	8,710.0	11,994.8	1,060.3
12/05/23	08:42	1.13	0.4	0.4	8,710.0	11,991.5	1,060.3
12/05/23	08:43	1.09	0.4	0.4	8,710.0	11,988.1	1,060.3
12/05/23	08:44	1.06	0.4	0.4	8,710.0	12,006.2	1,060.3
12/05/23	08:45	1.06	0.4	0.4	8,710.0	11,985.3	1,060.3
12/05/23	08:46	1.05	0.4	0.4	8,710.0	12,010.5	1,060.3
12/05/23	08:47	0.99	0.4	0.3	8,710.0	12,007.9	1,060.3
12/05/23	08:48	1.01	0.4	0.4	8,710.0	11,992.0	1,060.3
12/05/23	08:49	1.00	0.4	0.4	8,710.0	11,986.4	1,060.3
12/05/23	08:50	0.95	0.3	0.3	8,710.0	12,002.0	1,060.3

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	08:04	184	12.36	0.010	2.7	2.6	14.9
12/05/23	08:05	184	12.31	0.009	2.6	2.6	14.9
12/05/23	08:06	184	12.42	0.010	2.7	2.6	14.9
12/05/23	08:07	184	12.49	0.010	2.7	2.7	14.9
12/05/23	08:08	184	12.45	0.010	2.7	2.6	14.9
12/05/23	08:09	184	12.38	0.010	2.7	2.6	14.9
12/05/23	08:10	184	12.31	0.009	2.6	2.6	14.9
12/05/23	08:11	184	12.34	0.010	2.7	2.6	14.9
12/05/23	08:12	184	12.45	0.010	2.7	2.6	14.9
12/05/23	08:13	183	12.45	0.010	2.7	2.6	14.9
12/05/23	08:14	184	12.44	0.010	2.7	2.6	14.9
12/05/23	08:15	184	12.44	0.010	2.7	2.6	14.9
12/05/23	08:16	184	12.44	0.010	2.7	2.6	14.9
12/05/23	08:17	183	12.39	0.010	2.7	2.6	14.9
12/05/23	08:18	183	12.37	0.010	2.7	2.6	14.9
12/05/23	08:19	183	12.35	0.010	2.7	2.6	14.9
12/05/23	08:20	183	12.35	0.010	2.7	2.6	14.9
12/05/23	08:21	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:22	183	12.52	0.010	2.7	2.7	14.9
12/05/23	08:23	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:24	183	12.44	0.010	2.7	2.6	14.9
12/05/23	08:25	183	12.36	0.010	2.7	2.6	14.9
12/05/23	08:26	183	12.55	0.010	2.7	2.7	14.9
12/05/23	08:27	183	12.63	0.010	2.7	2.7	14.9
12/05/23	08:28	183	12.63	0.010	2.7	2.7	14.9
12/05/23	08:29	183	12.54	0.010	2.7	2.7	14.9
12/05/23	08:30	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:31	183	12.52	0.010	2.7	2.7	14.9
12/05/23	08:32	183	12.56	0.010	2.7	2.7	14.9
12/05/23	08:33	183	12.52	0.010	2.7	2.7	14.9
12/05/23	08:34	183	12.42	0.010	2.7	2.6	14.9
12/05/23	08:35	183	12.43	0.010	2.7	2.6	14.9
12/05/23	08:36	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:37	183	12.41	0.010	2.7	2.6	14.9
12/05/23	08:38	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:39	183	12.29	0.010	2.7	2.6	14.9
12/05/23	08:40	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:41	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:42	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:43	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:44	183	12.34	0.010	2.7	2.6	14.9
12/05/23	08:45	183	12.25	0.010	2.7	2.6	14.9
12/05/23	08:46	183	12.35	0.010	2.7	2.6	14.9
12/05/23	08:47	183	12.47	0.010	2.7	2.7	14.9
12/05/23	08:48	183	12.44	0.010	2.7	2.7	14.9
12/05/23	08:49	183	12.27	0.010	2.7	2.6	14.9
12/05/23	08:50	183	12.24	0.009	2.6	2.6	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	08:51	0.97	0.3	0.3	8,710.0	12,000.7	1,060.3
12/05/23	08:52	1.01	0.4	0.4	8,710.0	11,994.9	1,060.3
12/05/23	08:53	0.95	0.3	0.3	8,710.0	11,982.8	1,060.3
12/05/23	08:54	0.94	0.3	0.3	8,710.0	12,001.6	1,060.3
12/05/23	08:55	0.94	0.3	0.3	8,710.0	11,971.2	1,060.3
12/05/23	08:56	0.91	0.3	0.3	8,710.0	11,962.2	1,060.3
12/05/23	08:57	0.90	0.3	0.3	8,710.0	11,997.2	1,060.3
12/05/23	08:58	0.94	0.3	0.3	8,710.0	11,984.5	1,060.3
12/05/23	08:59	0.98	0.3	0.3	8,710.0	11,984.4	1,060.3
12/05/23	09:00	1.03	0.4	0.4	8,710.0	11,980.1	1,060.3
12/05/23	09:01	1.02	0.4	0.4	8,710.0	11,985.1	1,060.3
12/05/23	09:02	1.04	0.4	0.4	8,710.0	11,976.7	1,060.3
12/05/23	09:03	1.02	0.4	0.4	8,710.0	11,954.8	1,060.3
12/05/23	09:04	0.99	0.4	0.3	8,710.0	11,971.2	1,060.2
12/05/23	09:05	0.98	0.3	0.3	8,710.0	11,967.9	1,060.3
12/05/23	09:06	0.92	0.3	0.3	8,710.0	11,965.3	1,060.3
12/05/23	09:07	0.96	0.3	0.3	8,710.0	11,967.2	1,060.3
12/05/23	09:08	0.98	0.3	0.3	8,710.0	11,967.8	1,060.3
12/05/23	09:09	0.98	0.3	0.3	8,710.0	11,965.1	1,060.3
12/05/23	09:10	0.90	0.3	0.3	8,710.0	11,961.9	1,060.3
12/05/23	09:11	0.92	0.3	0.3	8,710.0	11,980.2	1,060.3
12/05/23	09:12	0.95	0.3	0.3	8,710.0	11,948.6	1,060.3
12/05/23	09:13	0.89	0.3	0.3	8,710.0	11,911.7	1,060.3
12/05/23	09:14	0.92	0.3	0.3	8,710.0	11,934.7	1,060.3
12/05/23	09:15	0.97	0.3	0.3	8,710.0	11,970.3	1,060.3
12/05/23	09:16	0.90	0.3	0.3	8,710.0	11,954.6	1,060.3
12/05/23	09:17	0.90	0.3	0.3	8,710.0	11,954.0	1,060.3
12/05/23	09:18	0.89	0.3	0.3	8,710.0	11,956.4	1,060.3
12/05/23	09:19	0.89	0.3	0.3	8,710.0	11,974.2	1,060.3
12/05/23	09:20	0.87	0.3	0.3	8,710.0	11,953.4	1,060.3
12/05/23	09:21	0.89	0.3	0.3	8,710.0	11,942.7	1,060.3
12/05/23	09:22	0.93	0.3	0.3	8,710.0	11,939.5	1,060.2
12/05/23	09:23	0.98	0.3	0.3	8,710.0	11,938.4	1,060.3
12/05/23	09:24	0.97	0.3	0.3	8,710.0	11,933.2	1,060.3
12/05/23	09:25	1.02	0.4	0.4	8,710.0	11,935.8	1,060.3
12/05/23	09:26	1.00	0.4	0.4	8,710.0	11,930.5	1,060.3
12/05/23	09:27	0.98	0.4	0.3	8,710.0	11,932.8	1,060.3
12/05/23	09:28	0.96	0.3	0.3	8,710.0	11,939.0	1,060.3
12/05/23	09:29	0.96	0.3	0.3	8,710.0	11,940.4	1,060.3
12/05/23	09:30	0.92	0.3	0.3	8,710.0	11,941.2	1,060.3
12/05/23	09:31	0.95	0.3	0.3	8,710.0	11,944.5	1,060.2
12/05/23	09:32	0.89	0.3	0.3	8,710.0	11,934.1	1,059.6
12/05/23	09:33	0.91	0.3	0.3	8,710.0	11,938.2	1,059.6
12/05/23	09:34	0.93	0.3	0.3	8,710.0	11,936.4	1,059.6
12/05/23	09:35	0.90	0.3	0.3	8,710.0	11,924.2	1,059.6
	Average	1.03	0.4	0.4	8,710.0	12,014.7	1,060.6

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	08:51	183	12.44	0.010	2.7	2.7	14.9
12/05/23	08:52	183	12.49	0.010	2.7	2.7	14.9
12/05/23	08:53	182	12.41	0.010	2.7	2.7	15.0
12/05/23	08:54	183	12.24	0.009	2.6	2.6	14.9
12/05/23	08:55	182	12.38	0.010	2.7	2.6	14.9
12/05/23	08:56	182	12.32	0.010	2.7	2.6	15.0
12/05/23	08:57	183	12.25	0.010	2.6	2.6	15.0
12/05/23	08:58	182	12.25	0.009	2.6	2.6	14.9
12/05/23	08:59	182	12.37	0.010	2.7	2.6	14.9
12/05/23	09:00	182	12.41	0.010	2.7	2.7	14.9
12/05/23	09:01	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:02	182	12.22	0.009	2.6	2.6	14.9
12/05/23	09:03	182	12.21	0.009	2.6	2.6	14.9
12/05/23	09:04	182	12.34	0.010	2.7	2.6	14.9
12/05/23	09:05	182	12.23	0.009	2.6	2.6	14.9
12/05/23	09:06	182	12.16	0.009	2.6	2.6	14.9
12/05/23	09:07	182	12.32	0.010	2.7	2.6	14.9
12/05/23	09:08	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:09	182	12.17	0.009	2.6	2.6	14.9
12/05/23	09:10	182	12.19	0.009	2.6	2.6	14.9
12/05/23	09:11	182	12.41	0.010	2.7	2.7	14.9
12/05/23	09:12	182	12.46	0.010	2.7	2.7	14.9
12/05/23	09:13	181	12.19	0.010	2.6	2.6	15.0
12/05/23	09:14	182	11.83	0.010	2.6	2.5	15.0
12/05/23	09:15	182	12.17	0.010	2.6	2.6	15.0
12/05/23	09:16	182	12.61	0.010	2.7	2.7	14.9
12/05/23	09:17	182	12.61	0.010	2.7	2.7	15.0
12/05/23	09:18	182	12.70	0.010	2.7	2.7	15.0
12/05/23	09:19	182	12.70	0.010	2.7	2.7	15.0
12/05/23	09:20	182	12.54	0.010	2.7	2.7	15.0
12/05/23	09:21	182	12.44	0.010	2.7	2.7	15.0
12/05/23	09:22	182	12.32	0.010	2.7	2.6	15.0
12/05/23	09:23	182	12.48	0.010	2.7	2.7	14.9
12/05/23	09:24	182	12.42	0.010	2.7	2.7	14.9
12/05/23	09:25	181	12.32	0.010	2.7	2.6	14.9
12/05/23	09:26	181	12.30	0.010	2.7	2.6	14.9
12/05/23	09:27	181	12.29	0.010	2.7	2.6	14.9
12/05/23	09:28	182	12.28	0.010	2.7	2.6	14.9
12/05/23	09:29	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:30	182	12.19	0.009	2.6	2.6	14.9
12/05/23	09:31	182	12.20	0.009	2.6	2.6	14.9
12/05/23	09:32	182	12.20	0.009	2.6	2.6	14.9
12/05/23	09:33	181	12.25	0.010	2.6	2.6	15.0
12/05/23	09:34	181	12.29	0.010	2.7	2.6	15.0
12/05/23	09:35	181	12.12	0.010	2.6	2.6	15.0
	Average	183	12.34	0.010	2.7	2.6	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Minimum	0.87	0.3	0.3	8,710.0	11,911.7	1,059.6
Maximum	1.16	0.4	0.4	8,710.0	12,090.9	1,061.0
Summation	142.48	51.6	50.9	1,210,690.0	1,670,046.9	147,428.6
Geometric Mean						
Included Data Points	139	139	139	139	139	139
Total number of Data Points	139	139	139	139	139	139

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 07:17 Through 12/05/2023 09:35
Time Online Criteria: 1 minute(s)

Minimum	181	11.83	0.009	2.6	2.5	14.9
Maximum	185	12.70	0.010	2.7	2.7	15.0
Summation	25,449	1,715.82	1.350	370.7	364.6	2,072.6
Geometric Mean						
Included Data Points	139	139	139	139	139	139
Total number of Data Points	139	139	139	139	139	139

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	10:27	0.96	0.3	0.3	8,710.0	11,858.3	1,059.6
12/05/23	10:28	1.01	0.4	0.4	8,710.0	11,858.2	1,059.6
12/05/23	10:29	1.00	0.4	0.4	8,710.0	11,868.6	1,059.6
12/05/23	10:30	0.97	0.3	0.3	8,710.0	11,868.8	1,059.6
12/05/23	10:31	0.95	0.3	0.3	8,710.0	11,849.4	1,059.6
12/05/23	10:32	0.95	0.3	0.3	8,710.0	11,852.1	1,059.6
12/05/23	10:33	0.94	0.3	0.3	8,710.0	11,837.3	1,059.6
12/05/23	10:34	0.90	0.3	0.3	8,710.0	11,835.1	1,059.6
12/05/23	10:35	0.93	0.3	0.3	8,710.0	11,810.0	1,059.6
12/05/23	10:36	0.94	0.3	0.3	8,710.0	11,828.4	1,059.6
12/05/23	10:37	0.94	0.3	0.3	8,710.0	11,813.8	1,059.6
12/05/23	10:38	0.94	0.3	0.3	8,710.0	11,797.4	1,059.6
12/05/23	10:39	0.90	0.3	0.3	8,710.0	11,778.2	1,059.6
12/05/23	10:40	0.85	0.3	0.3	8,710.0	11,806.4	1,059.6
12/05/23	10:41	0.83	0.3	0.3	8,710.0	11,818.6	1,059.6
12/05/23	10:42	0.90	0.3	0.3	8,710.0	11,792.9	1,059.6
12/05/23	10:43	0.88	0.3	0.3	8,710.0	11,798.0	1,059.6
12/05/23	10:44	0.93	0.3	0.3	8,710.0	11,829.6	1,059.6
12/05/23	10:45	0.93	0.3	0.3	8,710.0	11,827.2	1,059.6
12/05/23	10:46	0.95	0.3	0.3	8,710.0	11,817.9	1,059.6
12/05/23	10:47	0.95	0.3	0.3	8,710.0	11,822.0	1,059.6
12/05/23	10:48	0.95	0.3	0.3	8,710.0	11,819.7	1,059.6
12/05/23	10:49	0.93	0.3	0.3	8,710.0	11,797.2	1,059.6
12/05/23	10:50	1.00	0.4	0.4	8,710.0	11,798.5	1,059.6
12/05/23	10:51	0.95	0.3	0.3	8,710.0	11,808.8	1,059.6
12/05/23	10:52	0.91	0.3	0.3	8,710.0	11,825.9	1,059.6
12/05/23	10:53	0.87	0.3	0.3	8,710.0	11,814.7	1,059.6
12/05/23	10:54	0.87	0.3	0.3	8,710.0	11,817.7	1,059.6
12/05/23	10:55	0.88	0.3	0.3	8,710.0	11,791.8	1,059.6
12/05/23	10:56	0.84	0.3	0.3	8,710.0	11,796.9	1,059.6
12/05/23	10:57	0.87	0.3	0.3	8,710.0	11,776.2	1,059.6
12/05/23	10:58	0.85	0.3	0.3	8,710.0	11,804.6	1,059.6
12/05/23	10:59	0.86	0.3	0.3	8,710.0	11,782.9	1,059.6
12/05/23	11:00	0.83	0.3	0.3	8,710.0	11,761.0	1,059.6
12/05/23	11:01	0.85	0.3	0.3	8,710.0	11,787.7	1,059.6
12/05/23	11:02	0.83	0.3	0.3	8,710.0	11,761.9	1,059.6
12/05/23	11:03	0.84	0.3	0.3	8,710.0	11,783.0	1,059.6
12/05/23	11:04	0.85	0.3	0.3	8,710.0	11,791.7	1,059.6
12/05/23	11:05	0.89	0.3	0.3	8,710.0	11,784.7	1,059.5
12/05/23	11:06	0.91	0.3	0.3	8,710.0	11,765.1	1,059.6
12/05/23	11:07	0.92	0.3	0.3	8,710.0	11,745.3	1,059.6
12/05/23	11:08	0.87	0.3	0.3	8,710.0	11,737.7	1,059.6
12/05/23	11:09	0.90	0.3	0.3	8,710.0	11,733.2	1,059.6
12/05/23	11:10	0.92	0.3	0.3	8,710.0	11,760.0	1,059.6
12/05/23	11:11	0.90	0.3	0.3	8,710.0	11,742.5	1,059.6
12/05/23	11:12	0.88	0.3	0.3	8,710.0	11,740.2	1,059.6
12/05/23	11:13	0.89	0.3	0.3	8,710.0	11,720.1	1,059.6

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	10:27	180	12.37	0.010	2.7	2.7	14.9
12/05/23	10:28	180	12.35	0.010	2.7	2.7	14.9
12/05/23	10:29	180	12.34	0.010	2.7	2.7	14.9
12/05/23	10:30	180	12.32	0.010	2.7	2.7	14.9
12/05/23	10:31	180	12.34	0.010	2.7	2.7	14.9
12/05/23	10:32	180	12.18	0.010	2.7	2.6	14.9
12/05/23	10:33	179	12.37	0.010	2.7	2.7	14.9
12/05/23	10:34	179	12.32	0.010	2.7	2.7	15.0
12/05/23	10:35	179	12.31	0.010	2.7	2.7	15.0
12/05/23	10:36	179	12.20	0.010	2.7	2.6	15.0
12/05/23	10:37	179	12.46	0.010	2.7	2.7	15.0
12/05/23	10:38	179	12.44	0.010	2.7	2.7	15.0
12/05/23	10:39	178	11.95	0.010	2.6	2.6	15.0
12/05/23	10:40	179	11.61	0.009	2.5	2.5	15.0
12/05/23	10:41	179	11.76	0.010	2.6	2.6	15.0
12/05/23	10:42	178	12.00	0.010	2.6	2.6	15.0
12/05/23	10:43	179	12.08	0.010	2.6	2.6	15.0
12/05/23	10:44	179	12.13	0.010	2.6	2.6	15.0
12/05/23	10:45	179	12.51	0.010	2.7	2.7	15.0
12/05/23	10:46	179	12.49	0.010	2.7	2.7	15.0
12/05/23	10:47	179	12.50	0.010	2.7	2.7	15.0
12/05/23	10:48	179	12.47	0.010	2.7	2.7	15.0
12/05/23	10:49	179	12.35	0.010	2.7	2.7	15.0
12/05/23	10:50	179	12.46	0.010	2.7	2.7	15.0
12/05/23	10:51	179	12.30	0.010	2.7	2.7	15.0
12/05/23	10:52	179	12.27	0.010	2.7	2.7	15.0
12/05/23	10:53	179	12.31	0.010	2.7	2.7	15.0
12/05/23	10:54	179	12.45	0.010	2.7	2.7	15.0
12/05/23	10:55	179	12.36	0.010	2.7	2.7	15.0
12/05/23	10:56	179	12.35	0.010	2.7	2.7	15.0
12/05/23	10:57	178	12.35	0.010	2.7	2.7	15.0
12/05/23	10:58	179	12.31	0.010	2.7	2.7	15.0
12/05/23	10:59	178	12.43	0.010	2.7	2.7	15.0
12/05/23	11:00	178	12.26	0.010	2.7	2.7	15.0
12/05/23	11:01	178	12.42	0.010	2.7	2.7	15.0
12/05/23	11:02	178	12.31	0.010	2.7	2.7	15.0
12/05/23	11:03	178	12.21	0.010	2.7	2.7	15.0
12/05/23	11:04	178	12.17	0.010	2.7	2.6	15.0
12/05/23	11:05	178	12.16	0.010	2.7	2.6	15.0
12/05/23	11:06	178	12.27	0.010	2.7	2.7	15.0
12/05/23	11:07	178	12.24	0.010	2.7	2.7	15.0
12/05/23	11:08	177	12.33	0.010	2.7	2.7	15.0
12/05/23	11:09	177	12.15	0.010	2.7	2.7	15.0
12/05/23	11:10	178	12.21	0.010	2.7	2.7	15.0
12/05/23	11:11	178	12.15	0.010	2.7	2.7	15.0
12/05/23	11:12	177	12.24	0.010	2.7	2.7	15.0
12/05/23	11:13	177	12.17	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	11:14	0.90	0.3	0.3	8,710.0	11,759.4	1,059.6
12/05/23	11:15	0.86	0.3	0.3	8,710.0	11,759.9	1,059.6
12/05/23	11:16	0.85	0.3	0.3	8,710.0	11,784.1	1,059.6
12/05/23	11:17	0.87	0.3	0.3	8,710.0	11,743.2	1,059.5
12/05/23	11:18	0.79	0.3	0.3	8,710.0	11,728.4	1,059.6
12/05/23	11:19	0.79	0.3	0.3	8,710.0	11,727.7	1,059.5
12/05/23	11:20	0.84	0.3	0.3	8,710.0	11,737.2	1,059.6
12/05/23	11:21	0.77	0.3	0.3	8,710.0	11,748.4	1,059.5
12/05/23	11:22	0.82	0.3	0.3	8,710.0	11,736.7	1,059.5
12/05/23	11:23	0.84	0.3	0.3	8,710.0	11,737.5	1,059.5
12/05/23	11:24	0.85	0.3	0.3	8,710.0	11,719.1	1,059.5
12/05/23	11:25	0.89	0.3	0.3	8,710.0	11,716.8	1,059.5
12/05/23	11:26	0.90	0.3	0.3	8,710.0	11,724.0	1,059.6
12/05/23	11:27	0.94	0.3	0.3	8,710.0	11,739.0	1,059.5
12/05/23	11:28	0.91	0.3	0.3	8,710.0	11,738.8	1,059.6
12/05/23	11:29	0.90	0.3	0.3	8,710.0	11,734.1	1,059.6
12/05/23	11:30	0.83	0.3	0.3	8,710.0	11,716.0	1,059.6
12/05/23	11:31	0.87	0.3	0.3	8,710.0	11,707.4	1,059.6
12/05/23	11:32	0.88	0.3	0.3	8,710.0	11,728.4	1,059.5
12/05/23	11:33	0.83	0.3	0.3	8,710.0	11,706.7	1,059.6
12/05/23	11:34	0.84	0.3	0.3	8,710.0	11,721.7	1,059.6
12/05/23	11:35	0.85	0.3	0.3	8,710.0	11,709.5	1,059.6
12/05/23	11:36	0.80	0.3	0.3	8,710.0	11,698.5	1,059.5
12/05/23	11:37	0.77	0.3	0.3	8,710.0	11,731.8	1,059.5
12/05/23	11:38	0.78	0.3	0.3	8,710.0	11,710.9	1,059.5
12/05/23	11:39	0.79	0.3	0.3	8,710.0	11,715.8	1,059.5
12/05/23	11:40	0.78	0.3	0.3	8,710.0	11,698.1	1,059.5
12/05/23	11:41	0.78	0.3	0.3	8,710.0	11,723.2	1,059.5
12/05/23	11:42	0.85	0.3	0.3	8,710.0	11,715.5	1,059.6
12/05/23	11:43	0.84	0.3	0.3	8,710.0	11,720.6	1,059.5
12/05/23	11:44	0.83	0.3	0.3	8,710.0	11,702.6	1,059.5
12/05/23	11:45	0.89	0.3	0.3	8,710.0	11,714.6	1,059.5
12/05/23	11:46	0.88	0.3	0.3	8,710.0	11,669.2	1,059.5
12/05/23	11:47	0.88	0.3	0.3	8,710.0	11,657.6	1,059.6
12/05/23	11:48	0.87	0.3	0.3	8,710.0	11,686.6	1,059.6
12/05/23	11:49	0.83	0.3	0.3	8,710.0	11,717.7	1,059.5
12/05/23	11:50	0.89	0.3	0.3	8,710.0	11,726.8	1,059.5
12/05/23	11:51	0.85	0.3	0.3	8,710.0	11,734.0	1,059.6
12/05/23	11:52	0.80	0.3	0.3	8,710.0	11,687.5	1,059.6
12/05/23	11:53	0.83	0.3	0.3	8,710.0	11,705.5	1,059.6
12/05/23	11:54	0.83	0.3	0.3	8,710.0	11,692.4	1,059.6
12/05/23	11:55	0.77	0.3	0.3	8,710.0	11,686.0	1,059.6
12/05/23	11:56	0.77	0.3	0.3	8,710.0	11,654.8	1,059.6
12/05/23	11:57	0.79	0.3	0.3	8,710.0	11,673.3	1,059.6
12/05/23	11:58	0.76	0.3	0.3	8,710.0	11,696.8	1,059.5
12/05/23	11:59	0.74	0.3	0.3	8,710.0	11,710.3	1,059.5
12/05/23	12:00	0.77	0.3	0.3	8,710.0	11,710.3	1,059.6

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	11:14	178	11.84	0.010	2.6	2.6	15.0
12/05/23	11:15	178	12.00	0.010	2.6	2.6	15.0
12/05/23	11:16	178	12.22	0.010	2.7	2.7	15.0
12/05/23	11:17	178	12.22	0.010	2.7	2.7	15.0
12/05/23	11:18	177	12.12	0.010	2.7	2.6	15.0
12/05/23	11:19	177	12.06	0.010	2.6	2.6	15.0
12/05/23	11:20	178	12.18	0.010	2.7	2.7	15.0
12/05/23	11:21	178	12.14	0.010	2.7	2.6	15.0
12/05/23	11:22	177	12.08	0.010	2.6	2.6	15.0
12/05/23	11:23	177	12.08	0.010	2.6	2.6	15.0
12/05/23	11:24	177	12.09	0.010	2.7	2.6	15.0
12/05/23	11:25	177	12.07	0.010	2.7	2.6	15.0
12/05/23	11:26	177	12.10	0.010	2.7	2.6	15.0
12/05/23	11:27	177	12.12	0.010	2.7	2.6	15.0
12/05/23	11:28	177	12.08	0.010	2.7	2.6	15.0
12/05/23	11:29	177	12.03	0.010	2.6	2.6	15.0
12/05/23	11:30	177	12.01	0.010	2.6	2.6	15.0
12/05/23	11:31	177	11.92	0.010	2.6	2.6	15.0
12/05/23	11:32	177	12.05	0.010	2.7	2.6	15.0
12/05/23	11:33	177	12.14	0.010	2.7	2.7	15.0
12/05/23	11:34	177	12.11	0.010	2.7	2.6	15.0
12/05/23	11:35	177	12.11	0.010	2.7	2.6	15.0
12/05/23	11:36	177	12.18	0.010	2.7	2.7	15.0
12/05/23	11:37	177	12.22	0.010	2.7	2.7	15.0
12/05/23	11:38	177	12.25	0.010	2.7	2.7	15.0
12/05/23	11:39	177	12.15	0.010	2.7	2.7	15.0
12/05/23	11:40	177	12.28	0.010	2.7	2.7	15.0
12/05/23	11:41	177	12.29	0.010	2.7	2.7	15.0
12/05/23	11:42	177	12.27	0.010	2.7	2.7	15.0
12/05/23	11:43	177	12.33	0.010	2.7	2.7	15.0
12/05/23	11:44	177	12.29	0.010	2.7	2.7	15.0
12/05/23	11:45	177	12.40	0.010	2.7	2.7	15.0
12/05/23	11:46	176	12.25	0.010	2.7	2.7	14.9
12/05/23	11:47	176	12.09	0.010	2.7	2.7	15.0
12/05/23	11:48	176	11.78	0.010	2.6	2.6	15.0
12/05/23	11:49	177	11.78	0.010	2.6	2.6	15.0
12/05/23	11:50	177	12.37	0.010	2.7	2.7	15.0
12/05/23	11:51	177	12.55	0.010	2.8	2.7	14.9
12/05/23	11:52	177	12.34	0.010	2.7	2.7	15.0
12/05/23	11:53	177	12.35	0.010	2.7	2.7	15.0
12/05/23	11:54	177	12.50	0.010	2.8	2.7	15.0
12/05/23	11:55	176	12.49	0.010	2.8	2.7	15.0
12/05/23	11:56	176	12.37	0.010	2.7	2.7	15.0
12/05/23	11:57	176	12.19	0.010	2.7	2.7	15.0
12/05/23	11:58	176	11.80	0.010	2.6	2.6	15.0
12/05/23	11:59	177	12.01	0.010	2.6	2.6	15.0
12/05/23	12:00	177	12.36	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	12:01	0.76	0.3	0.3	8,710.0	11,678.1	1,059.5
12/05/23	12:02	0.79	0.3	0.3	8,710.0	11,694.2	1,059.5
12/05/23	12:03	0.82	0.3	0.3	8,710.0	11,670.9	1,059.5
12/05/23	12:04	0.90	0.3	0.3	8,710.0	11,669.8	1,059.5
12/05/23	12:05	0.87	0.3	0.3	8,710.0	11,680.4	1,059.6
12/05/23	12:06	0.85	0.3	0.3	8,710.0	11,679.7	1,059.5
12/05/23	12:07	0.88	0.3	0.3	8,710.0	11,644.5	1,059.5
12/05/23	12:08	0.87	0.3	0.3	8,710.0	11,647.4	1,059.6
12/05/23	12:09	0.87	0.3	0.3	8,710.0	11,668.8	1,059.6
12/05/23	12:10	0.82	0.3	0.3	8,710.0	11,656.9	1,059.6
12/05/23	12:11	0.86	0.3	0.3	8,710.0	11,669.4	1,059.6
12/05/23	12:12	0.83	0.3	0.3	8,710.0	11,662.9	1,059.5
12/05/23	12:13	0.81	0.3	0.3	8,710.0	11,663.7	1,059.6
12/05/23	12:14	0.78	0.3	0.3	8,710.0	11,637.0	1,059.5
12/05/23	12:15	0.75	0.3	0.3	8,710.0	11,659.7	1,058.8
12/05/23	12:16	0.77	0.3	0.3	8,710.0	11,632.0	1,058.8
12/05/23	12:17	0.75	0.3	0.3	8,710.0	11,634.7	1,058.8
12/05/23	12:18	0.76	0.3	0.3	8,710.0	11,648.5	1,058.8
12/05/23	12:19	0.78	0.3	0.3	8,710.0	11,640.5	1,058.8
12/05/23	12:20	0.76	0.3	0.3	8,710.0	11,645.4	1,058.8
12/05/23	12:21	0.79	0.3	0.3	8,710.0	11,655.6	1,058.8
12/05/23	12:22	0.80	0.3	0.3	8,710.0	11,651.3	1,058.8
12/05/23	12:23	0.82	0.3	0.3	8,710.0	11,640.4	1,058.8
12/05/23	12:24	0.80	0.3	0.3	8,710.0	11,629.2	1,058.8
12/05/23	12:25	0.83	0.3	0.3	8,710.0	11,635.4	1,058.8
12/05/23	12:26	0.85	0.3	0.3	8,710.0	11,626.5	1,058.8
12/05/23	12:27	0.84	0.3	0.3	8,710.0	11,629.2	1,058.8
12/05/23	12:28	0.83	0.3	0.3	8,710.0	11,627.8	1,058.8
12/05/23	12:29	0.83	0.3	0.3	8,710.0	11,631.9	1,058.8
12/05/23	12:30	0.84	0.3	0.3	8,710.0	11,631.4	1,058.8
12/05/23	12:31	0.85	0.3	0.3	8,710.0	11,643.7	1,058.8
12/05/23	12:32	0.80	0.3	0.3	8,710.0	11,630.8	1,058.8
12/05/23	12:33	0.81	0.3	0.3	8,710.0	11,640.2	1,058.8
12/05/23	12:34	0.78	0.3	0.3	8,710.0	11,644.4	1,058.8
12/05/23	12:35	0.78	0.3	0.3	8,710.0	11,622.4	1,058.8
12/05/23	12:36	0.81	0.3	0.3	8,710.0	11,643.0	1,058.8
12/05/23	12:37	0.73	0.3	0.3	8,710.0	11,645.8	1,058.8
12/05/23	12:38	0.74	0.3	0.3	8,710.0	11,655.3	1,058.8
12/05/23	12:39	0.84	0.3	0.3	8,710.0	11,657.9	1,058.8
12/05/23	12:40	0.78	0.3	0.3	8,710.0	11,651.9	1,058.8
12/05/23	12:41	0.81	0.3	0.3	8,710.0	11,656.7	1,058.8
12/05/23	12:42	0.84	0.3	0.3	8,710.0	11,652.4	1,058.8
12/05/23	12:43	0.83	0.3	0.3	8,710.0	11,622.1	1,058.8
12/05/23	12:44	0.89	0.3	0.3	8,710.0	11,638.6	1,058.8
12/05/23	12:45	0.88	0.3	0.3	8,710.0	11,644.7	1,058.8
	Average	0.85	0.3	0.3	8,710.0	11,722.8	1,059.4

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	12:01	176	12.18	0.010	2.7	2.7	15.0
12/05/23	12:02	176	12.18	0.010	2.7	2.7	15.0
12/05/23	12:03	176	12.46	0.010	2.8	2.7	15.0
12/05/23	12:04	176	12.34	0.010	2.7	2.7	15.0
12/05/23	12:05	176	12.27	0.010	2.7	2.7	15.0
12/05/23	12:06	176	12.38	0.010	2.7	2.7	14.9
12/05/23	12:07	176	12.54	0.010	2.8	2.8	14.9
12/05/23	12:08	176	12.45	0.010	2.8	2.7	15.0
12/05/23	12:09	176	12.12	0.010	2.7	2.7	15.0
12/05/23	12:10	176	12.21	0.010	2.7	2.7	15.0
12/05/23	12:11	176	12.22	0.010	2.7	2.7	15.0
12/05/23	12:12	176	12.41	0.010	2.7	2.7	15.0
12/05/23	12:13	176	12.33	0.010	2.7	2.7	15.0
12/05/23	12:14	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:15	176	12.36	0.010	2.7	2.7	15.0
12/05/23	12:16	175	12.23	0.010	2.7	2.7	15.0
12/05/23	12:17	175	12.16	0.010	2.7	2.7	15.0
12/05/23	12:18	175	12.28	0.010	2.7	2.7	15.0
12/05/23	12:19	175	12.25	0.010	2.7	2.7	15.0
12/05/23	12:20	176	12.28	0.010	2.7	2.7	15.0
12/05/23	12:21	176	12.27	0.010	2.7	2.7	15.0
12/05/23	12:22	176	12.28	0.010	2.7	2.7	15.0
12/05/23	12:23	175	12.51	0.010	2.8	2.8	15.0
12/05/23	12:24	175	12.30	0.010	2.7	2.7	15.0
12/05/23	12:25	175	12.27	0.010	2.7	2.7	15.0
12/05/23	12:26	175	12.29	0.010	2.7	2.7	15.0
12/05/23	12:27	175	12.23	0.010	2.7	2.7	15.0
12/05/23	12:28	175	12.26	0.010	2.7	2.7	15.0
12/05/23	12:29	175	12.18	0.010	2.7	2.7	15.0
12/05/23	12:30	175	12.39	0.010	2.7	2.7	15.0
12/05/23	12:31	175	12.38	0.010	2.7	2.7	15.0
12/05/23	12:32	175	12.42	0.010	2.8	2.7	15.0
12/05/23	12:33	175	12.32	0.010	2.7	2.7	15.0
12/05/23	12:34	176	12.25	0.010	2.7	2.7	15.0
12/05/23	12:35	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:36	175	12.41	0.010	2.7	2.7	15.0
12/05/23	12:37	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:38	176	12.40	0.010	2.7	2.7	15.0
12/05/23	12:39	176	12.35	0.010	2.7	2.7	15.0
12/05/23	12:40	176	12.40	0.010	2.7	2.7	15.0
12/05/23	12:41	176	12.31	0.010	2.7	2.7	15.0
12/05/23	12:42	176	12.33	0.010	2.7	2.7	15.0
12/05/23	12:43	175	12.29	0.010	2.7	2.7	15.0
12/05/23	12:44	175	12.22	0.010	2.7	2.7	15.0
12/05/23	12:45	175	12.22	0.010	2.7	2.7	14.9
	Average	177	12.25	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Minimum	0.73	0.3	0.3	8,710.0	11,622.1	1,058.8
Maximum	1.01	0.4	0.4	8,710.0	11,868.8	1,059.6
Summation	118.48	42.0	42.0	1,210,690.0	1,629,474.7	147,256.4
Geometric Mean						
Included Data Points	139	139	139	139	139	139
Total number of Data Points	139	139	139	139	139	139

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 10:27 Through 12/05/2023 12:45
Time Online Criteria: 1 minute(s)

Minimum	175	11.61	0.009	2.5	2.5	14.9
Maximum	180	12.55	0.010	2.8	2.8	15.0
Summation	24,613	1,702.37	1.389	374.2	372.2	2,083.8
Geometric Mean						
Included Data Points	139	139	139	139	139	139
Total number of Data Points	139	139	139	139	139	139

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	13:12	0.79	0.3	0.3	8,710.0	11,650.7	1,059.6
12/05/23	13:13	0.79	0.3	0.3	8,710.0	11,630.0	1,059.6
12/05/23	13:14	0.75	0.3	0.3	8,710.0	11,612.9	1,059.6
12/05/23	13:15	0.75	0.3	0.3	8,710.0	11,603.2	1,059.6
12/05/23	13:16	0.77	0.3	0.3	8,710.0	11,566.9	1,059.6
12/05/23	13:17	0.81	0.3	0.3	8,710.0	11,584.2	1,059.6
12/05/23	13:18	0.80	0.3	0.3	8,710.0	11,600.0	1,059.6
12/05/23	13:19	0.82	0.3	0.3	8,710.0	11,613.9	1,059.6
12/05/23	13:20	0.85	0.3	0.3	8,710.0	11,609.7	1,059.6
12/05/23	13:21	0.92	0.3	0.3	8,710.0	11,653.5	1,059.6
12/05/23	13:22	0.88	0.3	0.3	8,710.0	11,646.4	1,059.6
12/05/23	13:23	0.89	0.3	0.3	8,710.0	11,615.7	1,059.5
12/05/23	13:24	0.91	0.3	0.3	8,710.0	11,682.3	1,059.6
12/05/23	13:25	0.87	0.3	0.3	8,710.0	11,644.6	1,059.6
12/05/23	13:26	0.86	0.3	0.3	8,710.0	11,555.5	1,059.6
12/05/23	13:27	0.82	0.3	0.3	8,710.0	11,565.9	1,059.6
12/05/23	13:28	0.79	0.3	0.3	8,710.0	11,550.0	1,059.6
12/05/23	13:29	0.87	0.3	0.3	8,710.0	11,600.1	1,059.6
12/05/23	13:30	0.82	0.3	0.3	8,710.0	11,605.0	1,059.6
12/05/23	13:31	0.82	0.3	0.3	8,710.0	11,611.3	1,059.6
12/05/23	13:32	0.87	0.3	0.3	8,710.0	11,608.6	1,059.6
12/05/23	13:33	0.85	0.3	0.3	8,710.0	11,575.4	1,059.6
12/05/23	13:34	0.79	0.3	0.3	8,710.0	11,577.9	1,059.6
12/05/23	13:35	0.83	0.3	0.3	8,710.0	11,606.8	1,059.6
12/05/23	13:36	0.81	0.3	0.3	8,710.0	11,590.7	1,059.6
12/05/23	13:37	0.81	0.3	0.3	8,710.0	11,560.3	1,059.5
12/05/23	13:38	0.83	0.3	0.3	8,710.0	11,559.9	1,059.6
12/05/23	13:39	0.90	0.3	0.3	8,710.0	11,547.2	1,059.6
12/05/23	13:40	0.91	0.3	0.3	8,710.0	11,603.6	1,059.6
12/05/23	13:41	0.88	0.3	0.3	8,710.0	11,641.7	1,059.6
12/05/23	13:42	0.88	0.3	0.3	8,710.0	11,625.4	1,059.6
12/05/23	13:43	0.90	0.3	0.3	8,710.0	11,600.1	1,059.6
12/05/23	13:44	0.89	0.3	0.3	8,710.0	11,570.2	1,059.6
12/05/23	13:45	0.84	0.3	0.3	8,710.0	11,587.7	1,059.6
12/05/23	13:46	0.86	0.3	0.3	8,710.0	11,570.3	1,059.6
12/05/23	13:47	0.84	0.3	0.3	8,710.0	11,594.9	1,059.6
12/05/23	13:48	0.83	0.3	0.3	8,710.0	11,564.8	1,059.6
12/05/23	13:49	0.80	0.3	0.3	8,710.0	11,589.4	1,059.6
12/05/23	13:50	0.84	0.3	0.3	8,710.0	11,584.2	1,059.6
12/05/23	13:51	0.81	0.3	0.3	8,710.0	11,599.2	1,059.6
12/05/23	13:52	0.83	0.3	0.3	8,710.0	11,586.8	1,059.6
12/05/23	13:53	0.82	0.3	0.3	8,710.0	11,584.7	1,059.5
12/05/23	13:54	0.85	0.3	0.3	8,710.0	11,573.5	1,059.6
12/05/23	13:55	0.84	0.3	0.3	8,710.0	11,577.6	1,059.6
12/05/23	13:56	0.87	0.3	0.3	8,710.0	11,582.7	1,059.6
12/05/23	13:57	0.88	0.3	0.3	8,710.0	11,593.6	1,059.6
12/05/23	13:58	0.85	0.3	0.3	8,710.0	11,586.9	1,059.6

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	13:12	175	12.46	0.010	2.8	2.7	14.9
12/05/23	13:13	175	12.57	0.010	2.8	2.8	14.9
12/05/23	13:14	175	12.77	0.010	2.8	2.8	15.0
12/05/23	13:15	175	12.53	0.010	2.8	2.8	15.0
12/05/23	13:16	175	12.26	0.010	2.7	2.7	15.0
12/05/23	13:17	174	11.87	0.010	2.6	2.6	15.0
12/05/23	13:18	175	11.83	0.010	2.6	2.6	15.0
12/05/23	13:19	175	12.14	0.010	2.7	2.7	15.0
12/05/23	13:20	175	12.17	0.010	2.7	2.7	14.9
12/05/23	13:21	176	12.25	0.010	2.7	2.7	14.9
12/05/23	13:22	176	12.45	0.010	2.8	2.7	14.9
12/05/23	13:23	175	12.56	0.010	2.8	2.8	14.9
12/05/23	13:24	176	12.10	0.010	2.7	2.7	14.9
12/05/23	13:25	176	12.43	0.010	2.8	2.7	14.9
12/05/23	13:26	174	12.68	0.010	2.8	2.8	14.9
12/05/23	13:27	174	11.97	0.010	2.7	2.7	15.0
12/05/23	13:28	174	11.68	0.010	2.6	2.6	15.0
12/05/23	13:29	175	11.95	0.010	2.7	2.6	15.0
12/05/23	13:30	175	12.28	0.010	2.7	2.7	14.9
12/05/23	13:31	175	12.36	0.010	2.8	2.7	14.9
12/05/23	13:32	175	12.40	0.010	2.8	2.7	14.9
12/05/23	13:33	174	12.30	0.010	2.7	2.7	15.0
12/05/23	13:34	174	12.10	0.010	2.7	2.7	15.0
12/05/23	13:35	175	12.11	0.010	2.7	2.7	15.0
12/05/23	13:36	174	12.56	0.010	2.8	2.8	14.9
12/05/23	13:37	174	12.52	0.010	2.8	2.8	15.0
12/05/23	13:38	174	12.06	0.010	2.7	2.7	15.0
12/05/23	13:39	174	11.81	0.010	2.6	2.6	15.0
12/05/23	13:40	175	11.51	0.010	2.6	2.5	15.0
12/05/23	13:41	175	11.91	0.009	2.6	2.6	14.9
12/05/23	13:42	175	12.83	0.011	2.9	2.8	14.9
12/05/23	13:43	175	12.68	0.010	2.8	2.8	14.9
12/05/23	13:44	174	12.23	0.010	2.7	2.7	14.9
12/05/23	13:45	175	12.07	0.010	2.7	2.7	14.9
12/05/23	13:46	174	12.06	0.010	2.7	2.7	15.0
12/05/23	13:47	175	12.04	0.010	2.7	2.7	15.0
12/05/23	13:48	174	12.06	0.010	2.7	2.7	14.9
12/05/23	13:49	174	12.01	0.010	2.7	2.7	14.9
12/05/23	13:50	174	12.11	0.010	2.7	2.7	15.0
12/05/23	13:51	175	12.07	0.010	2.7	2.7	15.0
12/05/23	13:52	175	12.17	0.010	2.7	2.7	15.0
12/05/23	13:53	174	12.21	0.010	2.7	2.7	15.0
12/05/23	13:54	174	12.18	0.010	2.7	2.7	15.0
12/05/23	13:55	174	12.09	0.010	2.7	2.7	15.0
12/05/23	13:56	174	12.01	0.010	2.7	2.7	15.0
12/05/23	13:57	175	11.89	0.010	2.7	2.6	15.0
12/05/23	13:58	175	12.07	0.010	2.7	2.7	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	13:59	0.93	0.3	0.3	8,710.0	11,594.6	1,059.6
12/05/23	14:00	0.94	0.3	0.3	8,710.0	11,579.9	1,059.6
12/05/23	14:01	0.93	0.3	0.3	8,710.0	11,583.0	1,059.6
12/05/23	14:02	0.96	0.4	0.3	8,710.0	11,592.7	1,059.6
12/05/23	14:03	0.91	0.3	0.3	8,710.0	11,590.4	1,059.6
12/05/23	14:04	0.89	0.3	0.3	8,710.0	11,578.6	1,059.6
12/05/23	14:05	0.88	0.3	0.3	8,710.0	11,583.8	1,059.6
12/05/23	14:06	0.88	0.3	0.3	8,710.0	11,585.7	1,059.6
12/05/23	14:07	0.87	0.3	0.3	8,710.0	11,567.5	1,059.6
12/05/23	14:08	0.83	0.3	0.3	8,710.0	11,563.1	1,059.6
12/05/23	14:09	0.84	0.3	0.3	8,710.0	11,562.5	1,059.6
12/05/23	14:10	0.82	0.3	0.3	8,710.0	11,579.6	1,059.6
12/05/23	14:11	0.82	0.3	0.3	8,710.0	11,591.4	1,059.6
12/05/23	14:12	0.82	0.3	0.3	8,710.0	11,571.0	1,059.6
12/05/23	14:13	0.86	0.3	0.3	8,710.0	11,552.1	1,059.6
12/05/23	14:14	0.87	0.3	0.3	8,710.0	11,568.8	1,059.6
12/05/23	14:15	0.86	0.3	0.3	8,710.0	11,572.6	1,060.5
12/05/23	14:16	0.85	0.3	0.3	8,710.0	11,566.4	1,061.7
12/05/23	14:17	0.89	0.3	0.3	8,710.0	11,585.0	1,061.7
12/05/23	14:18	0.93	0.3	0.3	8,710.0	11,564.3	1,061.7
12/05/23	14:19	0.93	0.3	0.3	8,710.0	11,570.4	1,061.7
12/05/23	14:20	0.92	0.3	0.3	8,710.0	11,564.6	1,061.8
12/05/23	14:21	0.92	0.3	0.3	8,710.0	11,563.3	1,062.5
12/05/23	14:22	0.86	0.3	0.3	8,710.0	11,568.9	1,062.5
12/05/23	14:23	0.86	0.3	0.3	8,710.0	11,580.0	1,062.5
12/05/23	14:24	0.87	0.3	0.3	8,710.0	11,588.0	1,062.5
12/05/23	14:25	0.84	0.3	0.3	8,710.0	11,558.7	1,062.5
12/05/23	14:26	0.85	0.3	0.3	8,710.0	11,569.9	1,062.5
12/05/23	14:27	0.84	0.3	0.3	8,710.0	11,530.3	1,062.5
12/05/23	14:28	0.86	0.3	0.3	8,710.0	11,565.8	1,062.5
12/05/23	14:29	0.84	0.3	0.3	8,710.0	11,582.5	1,062.5
12/05/23	14:30	0.83	0.3	0.3	8,710.0	11,565.5	1,062.5
12/05/23	14:31	0.77	0.3	0.3	8,710.0	11,544.4	1,062.5
12/05/23	14:32	0.80	0.3	0.3	8,710.0	11,542.3	1,062.5
12/05/23	14:33	0.81	0.3	0.3	8,710.0	11,543.2	1,062.5
12/05/23	14:34	0.82	0.3	0.3	8,710.0	11,567.7	1,062.5
12/05/23	14:35	0.84	0.3	0.3	8,710.0	11,580.0	1,062.5
12/05/23	14:36	0.92	0.3	0.3	8,710.0	11,575.0	1,062.5
12/05/23	14:37	0.89	0.3	0.3	8,710.0	11,582.2	1,062.5
12/05/23	14:38	0.87	0.3	0.3	8,710.0	11,549.5	1,062.5
12/05/23	14:39	0.88	0.3	0.3	8,710.0	11,558.7	1,062.5
12/05/23	14:40	0.90	0.3	0.3	8,710.0	11,558.2	1,062.5
12/05/23	14:41	0.87	0.3	0.3	8,710.0	11,549.9	1,062.5
12/05/23	14:42	0.87	0.3	0.3	8,710.0	11,561.9	1,062.5
12/05/23	14:43	0.91	0.3	0.3	8,710.0	11,548.5	1,062.5
12/05/23	14:44	0.86	0.3	0.3	8,710.0	11,545.9	1,062.5
12/05/23	14:45	0.84	0.3	0.3	8,710.0	11,572.4	1,062.5

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	13:59	175	12.17	0.010	2.7	2.7	14.9
12/05/23	14:00	175	12.06	0.010	2.7	2.7	14.9
12/05/23	14:01	175	12.11	0.010	2.7	2.7	14.9
12/05/23	14:02	175	12.10	0.010	2.7	2.7	14.9
12/05/23	14:03	175	12.05	0.010	2.7	2.7	14.9
12/05/23	14:04	174	12.04	0.010	2.7	2.7	14.9
12/05/23	14:05	174	12.07	0.010	2.7	2.7	14.9
12/05/23	14:06	174	12.16	0.010	2.7	2.7	14.9
12/05/23	14:07	174	12.12	0.010	2.7	2.7	15.0
12/05/23	14:08	174	12.04	0.010	2.7	2.7	15.0
12/05/23	14:09	174	12.18	0.010	2.7	2.7	14.9
12/05/23	14:10	174	12.18	0.010	2.7	2.7	15.0
12/05/23	14:11	175	12.16	0.010	2.7	2.7	15.0
12/05/23	14:12	174	12.22	0.010	2.7	2.7	15.0
12/05/23	14:13	174	12.08	0.010	2.7	2.7	15.0
12/05/23	14:14	174	12.08	0.010	2.7	2.7	15.0
12/05/23	14:15	174	12.04	0.010	2.7	2.7	15.0
12/05/23	14:16	174	12.11	0.010	2.7	2.7	14.9
12/05/23	14:17	175	12.15	0.010	2.7	2.7	14.9
12/05/23	14:18	174	12.12	0.010	2.7	2.7	14.9
12/05/23	14:19	174	12.24	0.010	2.7	2.7	14.9
12/05/23	14:20	174	12.25	0.010	2.7	2.7	14.9
12/05/23	14:21	174	12.19	0.010	2.7	2.7	14.9
12/05/23	14:22	174	12.14	0.010	2.7	2.7	14.9
12/05/23	14:23	175	12.20	0.010	2.7	2.7	14.9
12/05/23	14:24	175	12.34	0.010	2.8	2.7	14.9
12/05/23	14:25	174	12.15	0.010	2.7	2.7	14.9
12/05/23	14:26	174	12.18	0.010	2.7	2.7	14.9
12/05/23	14:27	174	12.09	0.010	2.7	2.7	14.9
12/05/23	14:28	174	11.81	0.010	2.6	2.6	15.0
12/05/23	14:29	174	11.75	0.010	2.6	2.6	15.0
12/05/23	14:30	174	11.97	0.010	2.7	2.6	15.0
12/05/23	14:31	174	12.00	0.010	2.7	2.7	15.0
12/05/23	14:32	174	11.99	0.010	2.7	2.7	15.0
12/05/23	14:33	174	12.01	0.010	2.7	2.7	14.9
12/05/23	14:34	174	11.92	0.010	2.7	2.6	14.9
12/05/23	14:35	174	11.87	0.009	2.6	2.6	14.9
12/05/23	14:36	174	12.28	0.010	2.7	2.7	14.9
12/05/23	14:37	174	12.49	0.010	2.8	2.8	14.9
12/05/23	14:38	174	12.35	0.010	2.8	2.7	14.9
12/05/23	14:39	174	12.24	0.010	2.7	2.7	14.9
12/05/23	14:40	174	12.38	0.010	2.8	2.7	14.9
12/05/23	14:41	174	12.27	0.010	2.7	2.7	14.9
12/05/23	14:42	174	12.21	0.010	2.7	2.7	14.9
12/05/23	14:43	174	12.41	0.010	2.8	2.7	14.9
12/05/23	14:44	174	12.40	0.010	2.8	2.7	14.9
12/05/23	14:45	175	12.41	0.010	2.8	2.7	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	14:46	0.81	0.3	0.3	8,710.0	11,565.5	1,062.5
12/05/23	14:47	0.83	0.3	0.3	8,710.0	11,544.4	1,062.6
12/05/23	14:48	0.81	0.3	0.3	8,710.0	11,539.1	1,062.5
12/05/23	14:49	0.77	0.3	0.3	8,710.0	11,535.8	1,062.5
12/05/23	14:50	0.83	0.3	0.3	8,710.0	11,559.0	1,062.5
12/05/23	14:51	0.79	0.3	0.3	8,710.0	11,534.2	1,062.5
12/05/23	14:52	0.81	0.3	0.3	8,710.0	11,534.0	1,062.5
12/05/23	14:53	0.86	0.3	0.3	8,710.0	11,532.4	1,062.5
12/05/23	14:54	0.88	0.3	0.3	8,710.0	11,528.4	1,062.6
12/05/23	14:55	0.87	0.3	0.3	8,710.0	11,542.6	1,062.5
12/05/23	14:56	0.91	0.3	0.3	8,710.0	11,543.6	1,062.5
12/05/23	14:57	0.84	0.3	0.3	8,710.0	11,512.4	1,062.7
12/05/23	14:58	0.89	0.3	0.3	8,710.0	11,542.6	1,063.2
12/05/23	14:59	0.89	0.3	0.3	8,710.0	11,528.3	1,063.2
12/05/23	15:00	0.88	0.3	0.3	8,710.0	11,556.4	1,063.2
12/05/23	15:01	0.88	0.3	0.3	8,710.0	11,577.3	1,063.2
12/05/23	15:02	0.87	0.3	0.3	8,710.0	11,541.7	1,063.2
12/05/23	15:03	0.81	0.3	0.3	8,710.0	11,538.0	1,063.2
12/05/23	15:04	0.84	0.3	0.3	8,710.0	11,541.3	1,063.2
12/05/23	15:05	0.82	0.3	0.3	8,710.0	11,555.6	1,063.2
12/05/23	15:06	0.83	0.3	0.3	8,710.0	11,568.2	1,063.2
12/05/23	15:07	0.84	0.3	0.3	8,710.0	11,524.7	1,063.2
12/05/23	15:08	0.77	0.3	0.3	8,710.0	11,520.7	1,063.2
12/05/23	15:09	0.80	0.3	0.3	8,710.0	11,481.9	1,063.2
12/05/23	15:10	0.80	0.3	0.3	8,710.0	11,533.6	1,063.2
12/05/23	15:11	0.77	0.3	0.3	8,710.0	11,575.0	1,063.2
12/05/23	15:12	0.81	0.3	0.3	8,710.0	11,559.7	1,063.2
12/05/23	15:13	0.83	0.3	0.3	8,710.0	11,576.3	1,063.2
12/05/23	15:14	0.87	0.3	0.3	8,710.0	11,557.3	1,063.2
12/05/23	15:15	0.88	0.3	0.3	8,710.0	11,531.2	1,063.2
12/05/23	15:16	0.87	0.3	0.3	8,710.0	11,533.0	1,063.2
12/05/23	15:17	0.90	0.3	0.3	8,710.0	11,522.1	1,063.2
12/05/23	15:18	0.90	0.3	0.3	8,710.0	11,544.3	1,063.2
12/05/23	15:19	0.81	0.3	0.3	8,710.0	11,554.7	1,063.2
12/05/23	15:20	0.88	0.3	0.3	8,710.0	11,572.7	1,063.2
12/05/23	15:21	0.87	0.3	0.3	8,710.0	11,555.0	1,063.2
12/05/23	15:22	0.84	0.3	0.3	8,710.0	11,567.8	1,063.2
12/05/23	15:23	0.79	0.3	0.3	8,710.0	11,547.3	1,063.2
12/05/23	15:24	0.83	0.3	0.3	8,710.0	11,546.9	1,063.2
12/05/23	15:25	0.84	0.3	0.3	8,710.0	11,551.5	1,063.2
12/05/23	15:26	0.80	0.3	0.3	8,710.0	11,546.4	1,063.2
12/05/23	15:27	0.80	0.3	0.3	8,710.0	11,534.6	1,063.2
12/05/23	15:28	0.80	0.3	0.3	8,710.0	11,570.2	1,063.2
12/05/23	15:29	0.81	0.3	0.3	8,710.0	11,565.1	1,062.0
	Average	0.85	0.3	0.3	8,710.0	11,570.7	1,061.3
	Minimum	0.75	0.3	0.3	8,710.0	11,481.9	1,059.5

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	14:46	174	12.31	0.010	2.8	2.7	14.9
12/05/23	14:47	174	12.27	0.010	2.7	2.7	14.9
12/05/23	14:48	174	12.26	0.010	2.7	2.7	15.0
12/05/23	14:49	174	12.22	0.010	2.7	2.7	15.0
12/05/23	14:50	174	12.31	0.010	2.7	2.7	15.0
12/05/23	14:51	174	12.38	0.010	2.8	2.7	15.0
12/05/23	14:52	174	12.30	0.010	2.7	2.7	15.0
12/05/23	14:53	174	12.32	0.010	2.8	2.7	14.9
12/05/23	14:54	174	12.37	0.010	2.8	2.7	14.9
12/05/23	14:55	174	12.22	0.010	2.7	2.7	14.9
12/05/23	14:56	174	12.25	0.010	2.7	2.7	14.9
12/05/23	14:57	174	12.13	0.010	2.7	2.7	14.9
12/05/23	14:58	174	12.23	0.010	2.7	2.7	14.9
12/05/23	14:59	174	12.22	0.010	2.7	2.7	14.9
12/05/23	15:00	174	12.32	0.010	2.7	2.7	14.9
12/05/23	15:01	175	12.22	0.010	2.7	2.7	14.9
12/05/23	15:02	174	12.35	0.010	2.8	2.7	14.9
12/05/23	15:03	174	12.39	0.010	2.8	2.7	14.9
12/05/23	15:04	174	12.37	0.010	2.8	2.7	14.9
12/05/23	15:05	174	12.38	0.010	2.8	2.7	14.9
12/05/23	15:06	174	12.48	0.010	2.8	2.8	14.9
12/05/23	15:07	174	12.70	0.010	2.8	2.8	14.9
12/05/23	15:08	174	12.64	0.010	2.8	2.8	15.0
12/05/23	15:09	173	12.32	0.010	2.8	2.7	15.0
12/05/23	15:10	174	11.88	0.010	2.6	2.6	15.0
12/05/23	15:11	174	12.00	0.010	2.7	2.6	15.0
12/05/23	15:12	174	12.59	0.010	2.8	2.8	14.9
12/05/23	15:13	174	12.64	0.010	2.8	2.8	14.9
12/05/23	15:14	174	12.67	0.010	2.8	2.8	14.9
12/05/23	15:15	174	12.51	0.010	2.8	2.8	14.9
12/05/23	15:16	174	12.34	0.010	2.8	2.7	14.9
12/05/23	15:17	174	12.27	0.010	2.7	2.7	14.9
12/05/23	15:18	174	12.16	0.010	2.7	2.7	14.9
12/05/23	15:19	174	12.35	0.010	2.8	2.7	14.9
12/05/23	15:20	174	12.37	0.010	2.8	2.7	14.9
12/05/23	15:21	174	12.38	0.010	2.8	2.7	14.9
12/05/23	15:22	174	12.42	0.010	2.8	2.7	14.9
12/05/23	15:23	174	12.48	0.010	2.8	2.8	14.9
12/05/23	15:24	174	12.42	0.010	2.8	2.7	14.9
12/05/23	15:25	174	12.55	0.010	2.8	2.8	14.9
12/05/23	15:26	174	12.37	0.010	2.8	2.7	14.9
12/05/23	15:27	174	12.30	0.010	2.7	2.7	15.0
12/05/23	15:28	174	12.28	0.010	2.7	2.7	15.0
12/05/23	15:29	174	12.30	0.010	2.7	2.7	15.0
	Average	174	12.23	0.010	2.7	2.7	14.9
	Minimum	173	11.51	0.009	2.6	2.5	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Maximum	0.96	0.4	0.3	8,710.0	11,682.3	1,063.2
Summation	117.17	41.5	41.4	1,201,980.0	1,596,759.4	146,457.7
Geometric Mean						
Included Data Points	138	138	138	138	138	138
Total number of Data Points	138	138	138	138	138	138

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 13:12 Through 12/05/2023 15:29
Time Online Criteria: 1 minute(s)

Maximum	176	12.83	0.011	2.9	2.8	15.0
Summation	24,054	1,687.39	1.379	376.3	372.9	2,061.3
Geometric Mean						
Included Data Points	138	138	138	138	138	138
Total number of Data Points	138	138	138	138	138	138

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

UNIT OPERATION PARAMETERS

Operations Data – NH_3

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:17
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	08:32	1.05	0.4	0.4	8,710.0	12,020.0	1,060.3
12/05/23	08:33	1.07	0.4	0.4	8,710.0	12,003.2	1,060.3
12/05/23	08:34	1.06	0.4	0.4	8,710.0	12,021.7	1,060.3
12/05/23	08:35	1.09	0.4	0.4	8,710.0	12,015.3	1,060.3
12/05/23	08:36	1.13	0.4	0.4	8,710.0	11,997.7	1,060.2
12/05/23	08:37	1.15	0.4	0.4	8,710.0	12,003.1	1,060.3
12/05/23	08:38	1.15	0.4	0.4	8,710.0	12,001.9	1,060.3
12/05/23	08:39	1.15	0.4	0.4	8,710.0	12,011.4	1,060.2
12/05/23	08:40	1.13	0.4	0.4	8,710.0	11,998.1	1,060.3
12/05/23	08:41	1.16	0.4	0.4	8,710.0	11,994.8	1,060.3
12/05/23	08:42	1.13	0.4	0.4	8,710.0	11,991.5	1,060.3
12/05/23	08:43	1.09	0.4	0.4	8,710.0	11,988.1	1,060.3
12/05/23	08:44	1.06	0.4	0.4	8,710.0	12,006.2	1,060.3
12/05/23	08:45	1.06	0.4	0.4	8,710.0	11,985.3	1,060.3
12/05/23	08:46	1.05	0.4	0.4	8,710.0	12,010.5	1,060.3
12/05/23	08:47	0.99	0.4	0.3	8,710.0	12,007.9	1,060.3
12/05/23	08:48	1.01	0.4	0.4	8,710.0	11,992.0	1,060.3
12/05/23	08:49	1.00	0.4	0.4	8,710.0	11,986.4	1,060.3
12/05/23	08:50	0.95	0.3	0.3	8,710.0	12,002.0	1,060.3
12/05/23	08:51	0.97	0.3	0.3	8,710.0	12,000.7	1,060.3
12/05/23	08:52	1.01	0.4	0.4	8,710.0	11,994.9	1,060.3
12/05/23	08:53	0.95	0.3	0.3	8,710.0	11,982.8	1,060.3
12/05/23	08:54	0.94	0.3	0.3	8,710.0	12,001.6	1,060.3
12/05/23	08:55	0.94	0.3	0.3	8,710.0	11,971.2	1,060.3
12/05/23	08:56	0.91	0.3	0.3	8,710.0	11,962.2	1,060.3
12/05/23	08:57	0.90	0.3	0.3	8,710.0	11,997.2	1,060.3
12/05/23	08:58	0.94	0.3	0.3	8,710.0	11,984.5	1,060.3
12/05/23	08:59	0.98	0.3	0.3	8,710.0	11,984.4	1,060.3
12/05/23	09:00	1.03	0.4	0.4	8,710.0	11,980.1	1,060.3
12/05/23	09:01	1.02	0.4	0.4	8,710.0	11,985.1	1,060.3
12/05/23	09:02	1.04	0.4	0.4	8,710.0	11,976.7	1,060.3
12/05/23	09:03	1.02	0.4	0.4	8,710.0	11,954.8	1,060.3
12/05/23	09:04	0.99	0.4	0.3	8,710.0	11,971.2	1,060.2
12/05/23	09:05	0.98	0.3	0.3	8,710.0	11,967.9	1,060.3
12/05/23	09:06	0.92	0.3	0.3	8,710.0	11,965.3	1,060.3
12/05/23	09:07	0.96	0.3	0.3	8,710.0	11,967.2	1,060.3
12/05/23	09:08	0.98	0.3	0.3	8,710.0	11,967.8	1,060.3
12/05/23	09:09	0.98	0.3	0.3	8,710.0	11,965.1	1,060.3
12/05/23	09:10	0.90	0.3	0.3	8,710.0	11,961.9	1,060.3
12/05/23	09:11	0.92	0.3	0.3	8,710.0	11,980.2	1,060.3
12/05/23	09:12	0.95	0.3	0.3	8,710.0	11,948.6	1,060.3
12/05/23	09:13	0.89	0.3	0.3	8,710.0	11,911.7	1,060.3
12/05/23	09:14	0.92	0.3	0.3	8,710.0	11,934.7	1,060.3
12/05/23	09:15	0.97	0.3	0.3	8,710.0	11,970.3	1,060.3
12/05/23	09:16	0.90	0.3	0.3	8,710.0	11,954.6	1,060.3
12/05/23	09:17	0.90	0.3	0.3	8,710.0	11,954.0	1,060.3

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:17
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	08:32	183	12.56	0.010	2.7	2.7	14.9
12/05/23	08:33	183	12.52	0.010	2.7	2.7	14.9
12/05/23	08:34	183	12.42	0.010	2.7	2.6	14.9
12/05/23	08:35	183	12.43	0.010	2.7	2.6	14.9
12/05/23	08:36	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:37	183	12.41	0.010	2.7	2.6	14.9
12/05/23	08:38	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:39	183	12.29	0.010	2.7	2.6	14.9
12/05/23	08:40	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:41	183	12.46	0.010	2.7	2.7	14.9
12/05/23	08:42	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:43	183	12.40	0.010	2.7	2.6	14.9
12/05/23	08:44	183	12.34	0.010	2.7	2.6	14.9
12/05/23	08:45	183	12.25	0.010	2.7	2.6	14.9
12/05/23	08:46	183	12.35	0.010	2.7	2.6	14.9
12/05/23	08:47	183	12.47	0.010	2.7	2.7	14.9
12/05/23	08:48	183	12.44	0.010	2.7	2.7	14.9
12/05/23	08:49	183	12.27	0.010	2.7	2.6	14.9
12/05/23	08:50	183	12.24	0.009	2.6	2.6	14.9
12/05/23	08:51	183	12.44	0.010	2.7	2.7	14.9
12/05/23	08:52	183	12.49	0.010	2.7	2.7	14.9
12/05/23	08:53	182	12.41	0.010	2.7	2.7	15.0
12/05/23	08:54	183	12.24	0.009	2.6	2.6	14.9
12/05/23	08:55	182	12.38	0.010	2.7	2.6	14.9
12/05/23	08:56	182	12.32	0.010	2.7	2.6	15.0
12/05/23	08:57	183	12.25	0.010	2.6	2.6	15.0
12/05/23	08:58	182	12.25	0.009	2.6	2.6	14.9
12/05/23	08:59	182	12.37	0.010	2.7	2.6	14.9
12/05/23	09:00	182	12.41	0.010	2.7	2.7	14.9
12/05/23	09:01	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:02	182	12.22	0.009	2.6	2.6	14.9
12/05/23	09:03	182	12.21	0.009	2.6	2.6	14.9
12/05/23	09:04	182	12.34	0.010	2.7	2.6	14.9
12/05/23	09:05	182	12.23	0.009	2.6	2.6	14.9
12/05/23	09:06	182	12.16	0.009	2.6	2.6	14.9
12/05/23	09:07	182	12.32	0.010	2.7	2.6	14.9
12/05/23	09:08	182	12.29	0.010	2.7	2.6	14.9
12/05/23	09:09	182	12.17	0.009	2.6	2.6	14.9
12/05/23	09:10	182	12.19	0.009	2.6	2.6	14.9
12/05/23	09:11	182	12.41	0.010	2.7	2.7	14.9
12/05/23	09:12	182	12.46	0.010	2.7	2.7	14.9
12/05/23	09:13	181	12.19	0.010	2.6	2.6	15.0
12/05/23	09:14	182	11.83	0.010	2.6	2.5	15.0
12/05/23	09:15	182	12.17	0.010	2.6	2.6	15.0
12/05/23	09:16	182	12.61	0.010	2.7	2.7	14.9
12/05/23	09:17	182	12.61	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:17
Time Online Criteria: 1 minute(s)

Average	1.01	0.4	0.3	8,710.0	11,983.3	1,060.3
Minimum	0.89	0.3	0.3	8,710.0	11,911.7	1,060.2
Maximum	1.16	0.4	0.4	8,710.0	12,021.7	1,060.3
Summation	46.29	16.2	16.0	400,660.0	551,233.8	48,773.5
Geometric Mean						
Included Data Points	46	46	46	46	46	46
Total number of Data Points	46	46	46	46	46	46

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 08:32 Through 12/05/2023 09:17
Time Online Criteria: 1 minute(s)

Average	182	12.34	0.010	2.7	2.6	14.9
Minimum	181	11.83	0.009	2.6	2.5	14.9
Maximum	183	12.61	0.010	2.7	2.7	15.0
Summation	8,394	567.83	0.451	122.9	121.0	686.1
Geometric Mean						
Included Data Points	46	46	46	46	46	46
Total number of Data Points	46	46	46	46	46	46

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:00 Through 12/05/2023 11:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	11:00	0.83	0.3	0.3	8,710.0	11,761.0	1,059.6
12/05/23	11:01	0.85	0.3	0.3	8,710.0	11,787.7	1,059.6
12/05/23	11:02	0.83	0.3	0.3	8,710.0	11,761.9	1,059.6
12/05/23	11:03	0.84	0.3	0.3	8,710.0	11,783.0	1,059.6
12/05/23	11:04	0.85	0.3	0.3	8,710.0	11,791.7	1,059.6
12/05/23	11:05	0.89	0.3	0.3	8,710.0	11,784.7	1,059.5
12/05/23	11:06	0.91	0.3	0.3	8,710.0	11,765.1	1,059.6
12/05/23	11:07	0.92	0.3	0.3	8,710.0	11,745.3	1,059.6
12/05/23	11:08	0.87	0.3	0.3	8,710.0	11,737.7	1,059.6
12/05/23	11:09	0.90	0.3	0.3	8,710.0	11,733.2	1,059.6
12/05/23	11:10	0.92	0.3	0.3	8,710.0	11,760.0	1,059.6
12/05/23	11:11	0.90	0.3	0.3	8,710.0	11,742.5	1,059.6
12/05/23	11:12	0.88	0.3	0.3	8,710.0	11,740.2	1,059.6
12/05/23	11:13	0.89	0.3	0.3	8,710.0	11,720.1	1,059.6
12/05/23	11:14	0.90	0.3	0.3	8,710.0	11,759.4	1,059.6
12/05/23	11:15	0.86	0.3	0.3	8,710.0	11,759.9	1,059.6
12/05/23	11:16	0.85	0.3	0.3	8,710.0	11,784.1	1,059.6
12/05/23	11:17	0.87	0.3	0.3	8,710.0	11,743.2	1,059.5
12/05/23	11:18	0.79	0.3	0.3	8,710.0	11,728.4	1,059.6
12/05/23	11:19	0.79	0.3	0.3	8,710.0	11,727.7	1,059.5
12/05/23	11:20	0.84	0.3	0.3	8,710.0	11,737.2	1,059.6
12/05/23	11:21	0.77	0.3	0.3	8,710.0	11,748.4	1,059.5
12/05/23	11:22	0.82	0.3	0.3	8,710.0	11,736.7	1,059.5
12/05/23	11:23	0.84	0.3	0.3	8,710.0	11,737.5	1,059.5
12/05/23	11:24	0.85	0.3	0.3	8,710.0	11,719.1	1,059.5
12/05/23	11:25	0.89	0.3	0.3	8,710.0	11,716.8	1,059.5
12/05/23	11:26	0.90	0.3	0.3	8,710.0	11,724.0	1,059.6
12/05/23	11:27	0.94	0.3	0.3	8,710.0	11,739.0	1,059.5
12/05/23	11:28	0.91	0.3	0.3	8,710.0	11,738.8	1,059.6
12/05/23	11:29	0.90	0.3	0.3	8,710.0	11,734.1	1,059.6
12/05/23	11:30	0.83	0.3	0.3	8,710.0	11,716.0	1,059.6
12/05/23	11:31	0.87	0.3	0.3	8,710.0	11,707.4	1,059.6
12/05/23	11:32	0.88	0.3	0.3	8,710.0	11,728.4	1,059.5
12/05/23	11:33	0.83	0.3	0.3	8,710.0	11,706.7	1,059.6
12/05/23	11:34	0.84	0.3	0.3	8,710.0	11,721.7	1,059.6
12/05/23	11:35	0.85	0.3	0.3	8,710.0	11,709.5	1,059.6
12/05/23	11:36	0.80	0.3	0.3	8,710.0	11,698.5	1,059.5
12/05/23	11:37	0.77	0.3	0.3	8,710.0	11,731.8	1,059.5
12/05/23	11:38	0.78	0.3	0.3	8,710.0	11,710.9	1,059.5
12/05/23	11:39	0.79	0.3	0.3	8,710.0	11,715.8	1,059.5
12/05/23	11:40	0.78	0.3	0.3	8,710.0	11,698.1	1,059.5
12/05/23	11:41	0.78	0.3	0.3	8,710.0	11,723.2	1,059.5
12/05/23	11:42	0.85	0.3	0.3	8,710.0	11,715.5	1,059.6
12/05/23	11:43	0.84	0.3	0.3	8,710.0	11,720.6	1,059.5
12/05/23	11:44	0.83	0.3	0.3	8,710.0	11,702.6	1,059.5
12/05/23	11:45	0.89	0.3	0.3	8,710.0	11,714.6	1,059.5

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:00 Through 12/05/2023 11:45
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	11:00	178	12.26	0.010	2.7	2.7	15.0
12/05/23	11:01	178	12.42	0.010	2.7	2.7	15.0
12/05/23	11:02	178	12.31	0.010	2.7	2.7	15.0
12/05/23	11:03	178	12.21	0.010	2.7	2.7	15.0
12/05/23	11:04	178	12.17	0.010	2.7	2.6	15.0
12/05/23	11:05	178	12.16	0.010	2.7	2.6	15.0
12/05/23	11:06	178	12.27	0.010	2.7	2.7	15.0
12/05/23	11:07	178	12.24	0.010	2.7	2.7	15.0
12/05/23	11:08	177	12.33	0.010	2.7	2.7	15.0
12/05/23	11:09	177	12.15	0.010	2.7	2.7	15.0
12/05/23	11:10	178	12.21	0.010	2.7	2.7	15.0
12/05/23	11:11	178	12.15	0.010	2.7	2.7	15.0
12/05/23	11:12	177	12.24	0.010	2.7	2.7	15.0
12/05/23	11:13	177	12.17	0.010	2.7	2.7	15.0
12/05/23	11:14	178	11.84	0.010	2.6	2.6	15.0
12/05/23	11:15	178	12.00	0.010	2.6	2.6	15.0
12/05/23	11:16	178	12.22	0.010	2.7	2.7	15.0
12/05/23	11:17	178	12.22	0.010	2.7	2.7	15.0
12/05/23	11:18	177	12.12	0.010	2.7	2.6	15.0
12/05/23	11:19	177	12.06	0.010	2.6	2.6	15.0
12/05/23	11:20	178	12.18	0.010	2.7	2.7	15.0
12/05/23	11:21	178	12.14	0.010	2.7	2.6	15.0
12/05/23	11:22	177	12.08	0.010	2.6	2.6	15.0
12/05/23	11:23	177	12.08	0.010	2.6	2.6	15.0
12/05/23	11:24	177	12.09	0.010	2.7	2.6	15.0
12/05/23	11:25	177	12.07	0.010	2.7	2.6	15.0
12/05/23	11:26	177	12.10	0.010	2.7	2.6	15.0
12/05/23	11:27	177	12.12	0.010	2.7	2.6	15.0
12/05/23	11:28	177	12.08	0.010	2.7	2.6	15.0
12/05/23	11:29	177	12.03	0.010	2.6	2.6	15.0
12/05/23	11:30	177	12.01	0.010	2.6	2.6	15.0
12/05/23	11:31	177	11.92	0.010	2.6	2.6	15.0
12/05/23	11:32	177	12.05	0.010	2.7	2.6	15.0
12/05/23	11:33	177	12.14	0.010	2.7	2.7	15.0
12/05/23	11:34	177	12.11	0.010	2.7	2.6	15.0
12/05/23	11:35	177	12.11	0.010	2.7	2.6	15.0
12/05/23	11:36	177	12.18	0.010	2.7	2.7	15.0
12/05/23	11:37	177	12.22	0.010	2.7	2.7	15.0
12/05/23	11:38	177	12.25	0.010	2.7	2.7	15.0
12/05/23	11:39	177	12.15	0.010	2.7	2.7	15.0
12/05/23	11:40	177	12.28	0.010	2.7	2.7	15.0
12/05/23	11:41	177	12.29	0.010	2.7	2.7	15.0
12/05/23	11:42	177	12.27	0.010	2.7	2.7	15.0
12/05/23	11:43	177	12.33	0.010	2.7	2.7	15.0
12/05/23	11:44	177	12.29	0.010	2.7	2.7	15.0
12/05/23	11:45	177	12.40	0.010	2.7	2.7	15.0

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:00 Through 12/05/2023 11:45
Time Online Criteria: 1 minute(s)

Average	0.85	0.3	0.3	8,710.0	11,736.3	1,059.6
Minimum	0.77	0.3	0.3	8,710.0	11,698.1	1,059.5
Maximum	0.94	0.3	0.3	8,710.0	11,791.7	1,059.6
Summation	39.21	13.8	13.8	400,660.0	539,869.7	48,739.7
Geometric Mean						
Included Data Points	46	46	46	46	46	46
Total number of Data Points	46	46	46	46	46	46

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 11:00 Through 12/05/2023 11:45
Time Online Criteria: 1 minute(s)

Average	177	12.17	0.010	2.7	2.7	15.0
Minimum	177	11.84	0.010	2.6	2.6	15.0
Maximum	178	12.42	0.010	2.7	2.7	15.0
Summation	8,158	559.72	0.460	123.4	122.2	690.0
Geometric Mean						
Included Data Points	46	46	46	46	46	46
Total number of Data Points	46	46	46	46	46	46

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:19 Through 12/05/2023 13:04
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		CO#/HR	COPPM	COPPMC	FD	GASFLOW	GASGCV
Unit		(lbs/hr)	(ppm)	(ppm)	(dscf/mBt)	(100scfh)	(btu/scf)
12/05/23	12:19	0.78	0.3	0.3	8,710.0	11,640.5	1,058.8
12/05/23	12:20	0.76	0.3	0.3	8,710.0	11,645.4	1,058.8
12/05/23	12:21	0.79	0.3	0.3	8,710.0	11,655.6	1,058.8
12/05/23	12:22	0.80	0.3	0.3	8,710.0	11,651.3	1,058.8
12/05/23	12:23	0.82	0.3	0.3	8,710.0	11,640.4	1,058.8
12/05/23	12:24	0.80	0.3	0.3	8,710.0	11,629.2	1,058.8
12/05/23	12:25	0.83	0.3	0.3	8,710.0	11,635.4	1,058.8
12/05/23	12:26	0.85	0.3	0.3	8,710.0	11,626.5	1,058.8
12/05/23	12:27	0.84	0.3	0.3	8,710.0	11,629.2	1,058.8
12/05/23	12:28	0.83	0.3	0.3	8,710.0	11,627.8	1,058.8
12/05/23	12:29	0.83	0.3	0.3	8,710.0	11,631.9	1,058.8
12/05/23	12:30	0.84	0.3	0.3	8,710.0	11,631.4	1,058.8
12/05/23	12:31	0.85	0.3	0.3	8,710.0	11,643.7	1,058.8
12/05/23	12:32	0.80	0.3	0.3	8,710.0	11,630.8	1,058.8
12/05/23	12:33	0.81	0.3	0.3	8,710.0	11,640.2	1,058.8
12/05/23	12:34	0.78	0.3	0.3	8,710.0	11,644.4	1,058.8
12/05/23	12:35	0.78	0.3	0.3	8,710.0	11,622.4	1,058.8
12/05/23	12:36	0.81	0.3	0.3	8,710.0	11,643.0	1,058.8
12/05/23	12:37	0.73	0.3	0.3	8,710.0	11,645.8	1,058.8
12/05/23	12:38	0.74	0.3	0.3	8,710.0	11,655.3	1,058.8
12/05/23	12:39	0.84	0.3	0.3	8,710.0	11,657.9	1,058.8
12/05/23	12:40	0.78	0.3	0.3	8,710.0	11,651.9	1,058.8
12/05/23	12:41	0.81	0.3	0.3	8,710.0	11,656.7	1,058.8
12/05/23	12:42	0.84	0.3	0.3	8,710.0	11,652.4	1,058.8
12/05/23	12:43	0.83	0.3	0.3	8,710.0	11,622.1	1,058.8
12/05/23	12:44	0.89	0.3	0.3	8,710.0	11,638.6	1,058.8
12/05/23	12:45	0.88	0.3	0.3	8,710.0	11,644.7	1,058.8
12/05/23	12:46	0.86	0.3	0.3	8,710.0	11,636.9	1,059.1
12/05/23	12:47	0.87	0.3	0.3	8,710.0	11,646.4	1,059.6
12/05/23	12:48	0.84	0.3	0.3	8,710.0	11,621.8	1,059.6
12/05/23	12:49	0.86	0.3	0.3	8,710.0	11,609.5	1,059.6
12/05/23	12:50	0.83	0.3	0.3	8,710.0	11,635.7	1,059.6
12/05/23	12:51	0.80	0.3	0.3	8,710.0	11,645.8	1,059.6
12/05/23	12:52	0.84	0.3	0.3	8,710.0	11,632.4	1,059.6
12/05/23	12:53	0.81	0.3	0.3	8,710.0	11,634.1	1,059.6
12/05/23	12:54	0.77	0.3	0.3	8,710.0	11,587.4	1,059.6
12/05/23	12:55	0.78	0.3	0.3	8,710.0	11,597.0	1,059.6
12/05/23	12:56	0.78	0.3	0.3	8,710.0	11,600.3	1,059.6
12/05/23	12:57	0.73	0.3	0.3	8,710.0	11,609.9	1,059.6
12/05/23	12:58	0.76	0.3	0.3	8,710.0	11,656.5	1,059.6
12/05/23	12:59	0.81	0.3	0.3	8,710.0	11,635.1	1,059.6
12/05/23	13:00	0.81	0.3	0.3	8,710.0	11,605.0	1,059.6
12/05/23	13:01	0.82	0.3	0.3	8,710.0	11,608.6	1,059.6
12/05/23	13:02	0.87	0.3	0.3	8,710.0	11,587.4	1,059.6
12/05/23	13:03	0.87	0.3	0.3	8,710.0	11,590.6	1,059.6
12/05/23	13:04	0.87	0.3	0.3	8,710.0	11,607.9	1,059.6

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:19 Through 12/05/2023 13:04
Time Online Criteria: 1 minute(s)

Source		UNIT1					
Parameter		LOADMW	NOX#/H60	NOX#/MM	NOXPPM	NOXPPMC	O2
Unit		(MW)	(lbs/hr)	(lb/mmBtu)	(ppm)	(ppm)	(percent)
12/05/23	12:19	175	12.25	0.010	2.7	2.7	15.0
12/05/23	12:20	176	12.28	0.010	2.7	2.7	15.0
12/05/23	12:21	176	12.27	0.010	2.7	2.7	15.0
12/05/23	12:22	176	12.28	0.010	2.7	2.7	15.0
12/05/23	12:23	175	12.51	0.010	2.8	2.8	15.0
12/05/23	12:24	175	12.30	0.010	2.7	2.7	15.0
12/05/23	12:25	175	12.27	0.010	2.7	2.7	15.0
12/05/23	12:26	175	12.29	0.010	2.7	2.7	15.0
12/05/23	12:27	175	12.23	0.010	2.7	2.7	15.0
12/05/23	12:28	175	12.26	0.010	2.7	2.7	15.0
12/05/23	12:29	175	12.18	0.010	2.7	2.7	15.0
12/05/23	12:30	175	12.39	0.010	2.7	2.7	15.0
12/05/23	12:31	175	12.38	0.010	2.7	2.7	15.0
12/05/23	12:32	175	12.42	0.010	2.8	2.7	15.0
12/05/23	12:33	175	12.32	0.010	2.7	2.7	15.0
12/05/23	12:34	176	12.25	0.010	2.7	2.7	15.0
12/05/23	12:35	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:36	175	12.41	0.010	2.7	2.7	15.0
12/05/23	12:37	175	12.35	0.010	2.7	2.7	15.0
12/05/23	12:38	176	12.40	0.010	2.7	2.7	15.0
12/05/23	12:39	176	12.35	0.010	2.7	2.7	15.0
12/05/23	12:40	176	12.40	0.010	2.7	2.7	15.0
12/05/23	12:41	176	12.31	0.010	2.7	2.7	15.0
12/05/23	12:42	176	12.33	0.010	2.7	2.7	15.0
12/05/23	12:43	175	12.29	0.010	2.7	2.7	15.0
12/05/23	12:44	175	12.22	0.010	2.7	2.7	15.0
12/05/23	12:45	175	12.22	0.010	2.7	2.7	14.9
12/05/23	12:46	175	12.25	0.010	2.7	2.7	15.0
12/05/23	12:47	176	12.22	0.010	2.7	2.7	15.0
12/05/23	12:48	175	12.16	0.010	2.7	2.7	14.9
12/05/23	12:49	175	12.14	0.010	2.7	2.7	14.9
12/05/23	12:50	175	12.17	0.010	2.7	2.7	15.0
12/05/23	12:51	176	12.12	0.010	2.7	2.7	15.0
12/05/23	12:52	175	12.26	0.010	2.7	2.7	15.0
12/05/23	12:53	175	12.46	0.010	2.8	2.7	15.0
12/05/23	12:54	175	12.34	0.010	2.7	2.7	15.0
12/05/23	12:55	175	11.98	0.010	2.6	2.6	15.0
12/05/23	12:56	175	11.54	0.010	2.6	2.5	15.0
12/05/23	12:57	175	11.78	0.010	2.6	2.6	15.0
12/05/23	12:58	175	12.23	0.010	2.7	2.7	15.0
12/05/23	12:59	175	12.61	0.010	2.8	2.8	14.9
12/05/23	13:00	175	12.63	0.010	2.8	2.8	15.0
12/05/23	13:01	175	12.48	0.010	2.8	2.8	15.0
12/05/23	13:02	174	12.32	0.010	2.7	2.7	15.0
12/05/23	13:03	175	12.17	0.010	2.7	2.7	15.0
12/05/23	13:04	175	12.23	0.010	2.7	2.7	14.9

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:19 Through 12/05/2023 13:04
Time Online Criteria: 1 minute(s)

Average	0.82	0.3	0.3	8,710.0	11,631.4	1,059.1
Minimum	0.73	0.3	0.3	8,710.0	11,587.4	1,058.8
Maximum	0.89	0.3	0.3	8,710.0	11,657.9	1,059.6
Summation	37.52	13.8	13.8	400,660.0	535,042.8	48,719.5
Geometric Mean						
Included Data Points	46	46	46	46	46	46
Total number of Data Points	46	46	46	46	46	46

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

Average Data

Plant: SPA Cogen III
Interval: 1 Minute
Type: Roll
Report Period: 12/05/2023 12:19 Through 12/05/2023 13:04
Time Online Criteria: 1 minute(s)

Average	175	12.27	0.010	2.7	2.7	15.0
Minimum	174	11.54	0.010	2.6	2.5	14.9
Maximum	176	12.63	0.010	2.8	2.8	15.0
Summation	8,060	564.60	0.460	124.5	124.2	689.5
Geometric Mean						
Included Data Points	46	46	46	46	46	46
Total number of Data Points	46	46	46	46	46	46

F = Unit Offline **E = Exceedance** **C = Calibration** **S = Substituted** **I = Invalid**
M = Maintenance **T = Out Of Control** *** = Suspect** **U = Startup** **D = Shutdown**

APPENDIX C

CALIBRATION GAS CERTIFICATIONS

Sacramento Finance Authority
December 5, 2023
Siemens, V84.2, Unit #CT1
AETB/QI and PGVP RATA Data Sheet
Campbell Power Plant

AirEmissionTestingData - Level 3

QILastName	QIFirstName	QIMiddleInitial	AETBName	AETBPhoneNumber	AETBEmail	ExamDate	ProviderName	ProviderEmail
Sharief	Mars	A	Air Hygiene International Inc	888-461-8778	info@airhygiene.com	03/30/2022	Source Evaluation Society	qstiprogram@gmail.com

ProtocolGasData - Level 3

GasLevelCode	GasTypeCode	CylinderIdentifier	VendorIdentifier	ExpirationDate
LOW	ZERO			
MID	BALN,CO2,O2	CC765425	G12023	10/15/2031
HIGH	BALN,CO2,O2	CC732946	G12023	5/21/2031
MID	BALN,CO,NO,NOX	EB0033088	G12023	10/24/2026
HIGH	BALN,CO,NO,NOX	CC719768	G12023	10/3/2026

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

CERTIFICATE OF ANALYSIS
(Zero Ambient Nitrogen)

Cylinder Number:	CC768882	**Certification Date:**	10/02/2023
Product ID Number:	121026	**Expiration Date:**	09/30/2031
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA #	CC768882.20231002-0	**Lot Number:**	CC768882.20231002
Customer PO. NO.:		**Tracking Number:**	108968521
Customer:		**Previous Certification Dates:**	

This mixture is for laboratory use only, not for drug, household or other use.
This mixture is certified in Mole % to be within ±2% of the actual number reported with a confidence of 95%.
This mixture was manufactured by scale; weights traceable to N.I.S.T. Certificate #822/266926-02.
Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Composing Material: Zero Ambient Nitrogen, Cert., Sz152

Component	Specification	Concentration
Nitrogen	Balance	Balance
Oxygen as Impurity	<1.0 PPM	<1.0 PPM
Carbon Dioxide as Impurity	<0.5 PPM	<0.5 PPM
Carbon Monoxide as Impurity	<0.5 PPM	<0.5 PPM
Total Oxides of Nitrogen as Impurity	<0.1 PPM	<0.1 PPM
Sulfur Dioxide as Impurity	<0.1 PPM	<0.1 PPM
Total Hydrocarbons as Impurity	<0.1 PPM	<0.1 PPM

Red Ball Technical Gas Service
PGVP Vendor ID # G12023
Information and Ordering
800-551-8150
Fax (318-425-6309)

Accreditation #62754

Hayden Hartley
Analyst

Version 02-B, Revised on 2015-05-27

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12023

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC519919	**Certification Date:**	04/08/2023
Product ID Number:	124731	**Expiration Date:**	04/07/2026
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC519919.20230320-0	**Lot Number:**	CC519919.20230320
Customer PO. NO.:		**Tracking Number:**	103898360
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Nitrogen Dioxide	**50.6 PPM**	±0.6 PPM	FTIR	03/31/2023, 04/08/2023
Air	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC723479	CC723479.20201021	05/05/2025	GMIS	AIR	NO2	63.1 PPM	1.074	C2190301.02

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
NO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	03/31/2023
NO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	04/07/2023

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Jasmine Godfrey

Jasmine Godfrey
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12023

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0033088	**Certification Date:**	10/25/2023
Product ID Number:	125564	**Expiration Date:**	10/24/2026
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0033088.20231009-0	**Lot Number:**	EB0033088.20231009
Customer PO. NO.:		**Tracking Number:**	056561331
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Monoxide	**5.20 PPM**	±0.06 PPM	GCF	10/16/2023
Nitric Oxide	**5.06 PPM**	±0.03 PPM	Chemiluminescence	10/16/2023, 10/25/2023
Total Oxides of Nitrogen	5.06 PPM			
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC764285	CC764285.20230306	09/20/2027	GMIS	N2	NO	10.12 PPM	0.422	C2281801.03
EB0013666	EB0013666.20160725	01/08/2028	GMIS	N2	CO	6.17 PPM	1.058	091002
SX31740	SX31740.20220824	05/18/2026	GMIS	N2	NO	15.06 PPM	0.364	C2281801.03
SX54335	SX54335.20220616	04/02/2026	GMIS	N2	NO	30.84 PPM	0.526	SRM 1687b

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
NO	Chemiluminescence	Thermo	T42C	42C-68400-360	09/20/2023
CO	GCF	Thermo	T48i	11708001	10/13/2023
NO	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	10/24/2023

SMART-CERT

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Timothy Davis
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12023

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC719768	**Certification Date:**	10/04/2023
Product ID Number:	124737	**Expiration Date:**	10/03/2026
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC719768.20230919-0	**Lot Number:**	CC719768.20230919
Customer PO. NO.:		**Tracking Number:**	098491315
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Monoxide	**8.89 PPM**	±0.06 PPM	GCF	09/27/2023
Nitric Oxide	**9.05 PPM**	±0.06 PPM	Chemiluminescence	09/27/2023, 10/04/2023
Total Oxides of Nitrogen	9.15 PPM			
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC764285	CC764285.20230306	09/20/2027	GMIS	N2	NO	10.12 PPM	0.422	C2281801.03
EB0013666	EB0013666.20160725	01/08/2028	GMIS	N2	CO	6.17 PPM	1.058	091002
EB0063781	EB0063781.20220107	04/10/2031	GMIS	N2	CO	18.75 PPM	0.281	SRM 2636a
EB0072316	EB0072316.20221130	06/20/2031	GMIS	N2	NO	58.98 PPM	0.519	C2281801.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
CO	GCF	Thermo	T48i	11708001	09/05/2023
NO	Chemiluminescence	Thermo	42i-HL	1162380008	08/28/2023
NO	Chemiluminescence	Thermo	T42C	42C-68400-360	09/13/2023

SMART-CERT

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Brittany Johnson
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12023

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC765425	**Certification Date:**	10/17/2023
Product ID Number:	124606	**Expiration Date:**	10/15/2031
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC765425.20231009-0	**Lot Number:**	CC765425.20231009
Customer PO. NO.:		**Tracking Number:**	108815919
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**8.94 %**	±0.09 %	FTIR	10/17/2023
Oxygen	**12.04 %**	±0.04 %	Electrochemical Cell	10/13/2023
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC716408	CC716408.20230109	07/09/2031	GMIS	N2	O2	12.003 %	0.122	SRM 2659a
CC749559	CC749559.20230108	07/09/2031	GMIS	N2	O2	20.01 %	0.112	SRM 2659a
EB0022021	EB0022021.20180323	07/15/2026	GMIS	N2	CO2	14.9 %	0.777	101001

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	Electrochemical Cell	Thermo	60i	12104510909	09/28/2023
CO2	FTIR	MKS	MKS 2031DJG2EKVS13T	017146467	10/16/2023

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Aaron Varelas

Aaron Varelas
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12023

PJLA Calibration and Testing
Accreditation #62754

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	CC732946	**Certification Date:**	05/23/2023
Product ID Number:	124605	**Expiration Date:**	05/21/2031
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	CC732946.20230516-0	**Lot Number:**	CC732946.20230516
Customer PO. NO.:		**Tracking Number:**	101356426
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G2.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**18.64 %**	±0.09 %	NDIR	05/23/2023
Oxygen	**20.95 %**	±0.03 %	MPA	05/22/2023
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC722723	CC722723.20211012	05/01/2030	GMIS	N2	O2	19.99 %	0.128	SRM 2659a
EB0004315	EB0004315.20201022	04/05/2030	GMIS	N2	CO2	24.75 %	0.237	C2190301.03

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	05/22/2023
CO2	NDIR	Thermo	410i	1162980025	05/23/2023

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Hayden Hartley

Hayden Hartley
Analyst
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17

APPENDIX D

QUALITY ASSURANCE AND QUALITY CONTROL DATA

COMBUSTION TESTING QUALITY ASSURANCE ACTIVITIES

In conformance with ASTM D7036 Section 15.3.11 and 13, all testing was performed without any real or apparent errors, except for those that would be listed in Section 2.0 of this report. In addition, all testing was conducted according to the approved testing protocol, test methods, Air Hygiene Quality Manual, or ASTM D7036, except for specifics noted in Section 2.0 of this report. Several quality assurance activities were undertaken before, during, and after this testing project. This section of the report combined with the documentation in Appendix C describes each of those activities.

Each instrument's response was checked and adjusted in the field prior to the collection of data via multi-point calibration. The instrument's linearity was checked by adjusting its zero and span responses to zero nitrogen and an upscale calibration gas in the range of the expected concentrations. The instrument response was then challenged with other calibration gases of known concentration and accepted as being linear if the response of the other calibration gases agreed within plus or minus two percent of the range of predicted values. When NOx was measured using a chemiluminescent analyzer, complete with converting catalyst, NO_2 to NO conversion was checked via direct connect with a manufacturer-certified concentration of NO_2 in a balance of air and conversion was verified to be between 90 and 110 percent.

After each test run, the analyzers were checked for zero and span drift. This allowed each test run to be bracketed by calibrations and documents the precision of the data just collected. The criterion for acceptable data is that the instrument drift is no more than three percent of the full-scale response. The quality assurance worksheets in the following pages summarize all multipoint calibration checks and zero to span checks performed during the tests. These worksheets (as prepared from the data records of Appendix A) show that no drifts of more than three percent occurred in the zero to span checks following each test run.

The sampling systems were leak checked by demonstrating that a vacuum greater than 10 in Hg could be held for at least one minute with a decline of less than one inch of Hg. A leak test was conducted after the sample system was set up and before the system was dismantled. This test was conducted to ensure that ambient air had not diluted the sample. Any leakage detected prior to the tests would be repaired and another leak check conducted before testing commenced. No leaks were found during the pre or post-test leak checks.

The absence of leaks in the sampling system was also verified by a sampling system bias check. The sampling system's integrity was tested by comparing the responses of the analyzers to the calibration gases introduced via two paths. The first path was directly into the analyzer and the second path via the sample system at the sample probe. Any difference in the instrument responses by these two methods was attributed to sampling system bias or leakage. The criterion for acceptance is agreement within five percent of the span of the analyzer. The control gases used to calibrate the instruments were analyzed and certified by the compressed gas vendors to plus or minus one percent accuracy for all gases. EPA Protocol No. 1 was used, where applicable, to assign the concentration values traceable to the National Institute of Standards and Technology (NIST), Standard Reference Materials (SRM's). The gas calibration sheets as prepared by the vendor are contained in Appendix C.

Air Hygiene collected and reported the enclosed test data in accordance with the procedures and quality assurance activities described in this test report. Air Hygiene makes no warranty as to the suitability of the test methods. Air Hygiene also assumes no liability relating to the interpretation and use of the test data.

INSTRUMENTAL ANALYSIS
QUALITY ASSURANCE DATA

Date: December 5, 2023
Company: Sacramento Finance Authority
Location: Sacramento, California
Techs: MS / JM /SA / JF / PB

Sample System Leak Check

Date	Sample System	Leak Rate (l/min)
December 5, 2023	1	0

ethos-23-campbell.ca-comp#1-CT1-Report

STAC STACK TESTING ACCREDITATION COUNCIL

A2LA American Association for Laboratory Accreditation

Accredited Air Emission Testing Body

A2LA has accredited

AIR HYGIENE INTERNATIONAL, INC.

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 22nd day of January 2022.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3796.02
Valid to December 31, 2023
Revised November 15, 2023

This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.

Accredited Laboratory

A2LA has accredited

AIR HYGIENE INTERNATIONAL, INC.

Broken Arrow, OK

for technical competence in the field of

Environmental Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the A2LA *R219 – Specific Requirements – TNI Field Sampling and Measurement Organization Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 27th day of January 2022

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3796.01
Valid to December 31, 2023
Revised November 15, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Envrionmental Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

AIR HYGIENE INTERNATIONAL, INC.
1600 W Tacoma St
Broken Arrow, OK 74012
Mr. Jake Fahlenkamp Phone: 918-307-8865
jake@airhygiene.com

ENVIRONMENTAL

Valid To: December 31, 2023 Certificate Number: 3796.01

In recognition of the successful completion of the A2LA evaluation process, including an evaluation of the laboratory's compliance with ISO/IEC 17025:2017, and The NELAC Institute Field Activities Program (NEFAP) Field Sampling and Measurement Organization Volume 1 (TNI FSMO V1 2014, Rev 2.0), accreditation is granted to this organization to perform recognized methods using the following sampling and measurement technologies:

Matrix: Air

Sampling Technologies:

Filter – EPA Methods 5, 5A, 5B, 5D, 5E, 5F, 5H, 5I, 13A, 13B, 15A, 16A, 17, 23, 26, 26A, 29 and 201A; CARB Method 5

Gas Analyzer – EPA Methods 3A, 6C, 7e, 10, 16C, 20, 25A, 318, 320, and 321; ASTM 6348, 6522, and 6652; CTM-022 and 030; CARB Method 100; SCAQMD Method 100.1

Absorption in Impinger Solution – EPA Methods 8a (CTM-013), 11, 12, 13A, 13B, 15A, 16A, 17, 23, 26, 26A, 29, 202, 306, 308 and 316; CTM-013B; CTM-027; BAAQMD ST-1B; ASTM D6784

Tedlar Bag or Stainless Canisters – EPA Methods 18, TO-1, TO-2, TO-3, TO-5, TO-11, TO-12, TO-13, TO-14 and TO-15

Sorbent Trap – 30B

Technology	**Test Method(s)[1]**
Representative Measurement of Pollutants	EPA Methods 1, 1A; CARB Method 1; SCAQMD Method 1
Flow Rate Measurements	EPA Methods 2, 2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H; CARB Method 2; SCAQMD 2; CTM-041

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Technology	**Test Method(s)[1]**
Paramagnetic Cell	EPA Methods 3A, 20; CARB Method 100; SCAQMD Method 100.1
Non-Dispersive Infrared	EPA Methods 3A, 10; CARB Method 100; SCAQMD Method 100.1
Gravimetric	EPA Methods 4, 5, 5A, 5B, 5D, 5E, 5F, 5H, 5I, 17, 201A, 202; CARB Method 4, CARB 5; SCAQMD Method 4
Ultraviolet	EPA Methods 6C, 16C, 20; CARB Method 100; SCAQMD Method 100.1
Chemiluminescence	EPA Methods 7E, 20; EPA Alt-013; CARB Method 100; SCAQMD Method 100.1
Barium Thorin Titration	EPA Method 8a; CTM-013, 15A, 16A; NCASI 8A, CTM-013B
Visual Observation	EPA Methods 9, 22
Iodometric	EPA Method 11
Ion Specific Electrode	EPA Methods 13B, 350.3; BAAQMD LAB-1A
Ion Chromatography	EPA Methods 26, 26A; CTM 027, CTM-013B
UV-VIS	NCASI 98.01
Flame Ionization	EPA Method 25A
Thermal	EPA Method 30B

Technology	**Test Method(s)[1]**
Fourier Transform Infrared Spectroscopy	EPA Methods 318, 320, 321; ASTM D6348-12
Electrochemical	CTM-022, CTM-030; ASTM 6522-00, ASTM 6652
Dilution System	EPA Method 205
Calculations and Performance Specifications	Performance Specifications 1, 2, 3, 4, 4A, 4B, 5, 6, 7, 8, 8A, 11, 12A, 12B, 15, 16, 18; EPA Method 19 EPA Method 3 CARB Method 3 SCAQMD Method 3

[1]Accreditation covers the organization listed above as well as the following AETB and FSMO entities:
(Mobile Trailer Unit #s 207, 208, 211, 212, 213, 215, 216, 217, 218, 219, 220, 701 (Mobile lab))
Add 221, 222, 223, 224, 225, 703, 801, 303/172

November 15, 2022

Jake Falenkamp
Air Hygiene International, Incorporated
1600 West Tacoma Street
Broken Arrow, Oklahoma 74012
jake@airhygiene.com

Dear Jake Falenkamp:

I am pleased to inform you that the California Air Resources Board (CARB) has renewed Air Hygiene International, Inc. as an Independent Contractor, by means of the enclosed Executive Order I-22-007. This approval will allow Air Hygiene International, Inc. to perform CARB Methods 1, 2, 3, 4, 5, 20, and 100 (CO, CO_2, SO_2, NOx, O_2, THC) and U.S. Environmental Protection Agency (U.S. EPA) Test Methods 201A and 202. The approval is valid through June 30, 2024, during which time additional audits of Air Hygiene International, Inc.'s testing ability may be performed.

If you have questions or need further assistance, please contact Daniel Moore at *daniel.moore@arb.ca.gov*.

Sincerely,

Michael Miguel Digitally signed by Michael Miguel
Date: 2022.11.15 10:35:18 -08'00'

Mike Miguel, Acting Chief, Monitoring and Laboratory Division

Enclosure

cc: (via email)

Daniel Moore, Monitoring and Laboratory Division

State of California
Air Resources Board

Executive Order I-22-007

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

Air Hygiene International, Incorporated

Whereas, the California Air Resources Board (CARB), 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 CARB;

Whereas, it has been determined that Air Hygiene International, Incorporated meets the requirements of CARB for performing CARB Test Methods 1, 2, 3, 4, 5, 20, and 100 (CO, CO_2, NO_X, O_2, SO_2, THC), and U.S. Environmental Protection Agency (U.S. EPA) Test Methods 201A and 202 pursuant to Cal. Code Regs., tit. 17, § 91200 and following, when the subsequent conditions are met:

1. Air Hygiene International, Incorporated calibrates its metering system in accordance with section 5.3 of CARB Test Method 5, and establishes and maintains a log of the calibrations;
2. Air Hygiene International, Incorporated 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;
3. Air Hygiene International, Incorporated acquires and uses 300-500-mL glass beakers in accordance with Section 6.2.2(c) of U.S. EPA Test Method 202;
4. Air Hygiene International, Incorporated locks its sample storage areas or seals its sample containers when they are not being processed; and

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

Now, therefore, I, Mike Miguel, Acting Chief of MLD, order that Air Hygiene International, Incorporated is granted approval from the date of execution of this Executive Order through June 30, 2024, to perform the test methods identified above, subject to compliance with Cal. Code Regs., tit. 17, § 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 Executive Order for each test method identified above.

Be it is further ordered that Executive Order I-19-002 is superseded by this order.

Executed at Sacramento, California this 15th day of November 2022.

Michael Miguel Digitally signed by Michael Miguel Date: 2022.11.15 10:37:17 -08'00'

Mike Miguel, Acting Chief
Monitoring and Laboratory Division

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

MUBASHIR "MARS" A. SHARIEF

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS

ISSUED THIS 5TH DAY OF JULY 2020 AND EFFECTIVE UNTIL JULY 4TH, 2025

Peter R. Westlin, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Tina Sanderson, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-129

SOURCE EVALUATION SOCIETY 1995 NORTH CAROLINA

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

MUBASHIR (MARS) A. SHARIEF

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GASEOUS POLLUTANTS SOURCE SAMPLING METHODS

ISSUED THIS 29TH DAY OF MARCH 2022 AND EFFECTIVE UNTIL MARCH 28TH, 2027

Peter R. Westlin, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Tina Sanderson, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-129

SOURCE EVALUATION SOCIETY CORPORATE SEAL 1995 NORTH CAROLINA

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

MUBASHIR (MARS) A. SHARIEF

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 30TH DAY OF MARCH 2022 AND EFFECTIVE UNTIL MARCH 29TH, 2027

Peter R. Westlin, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Tina Sanderson, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-129

SOURCE EVALUATION SOCIETY CORPORATE SEAL 1995 NORTH CAROLINA

QUALITY ASSURANCE AND QUALITY CONTROL DATA

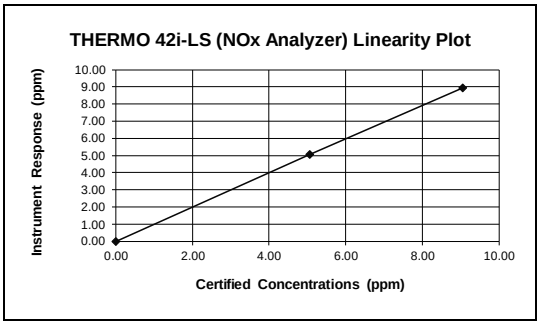
Reference Method Analyzer Daily Calibration Data

Calibration Date: December 5, 2023
Client: Sacramento Finance Authority

Location: Campbell Power Plant - Unit CT1

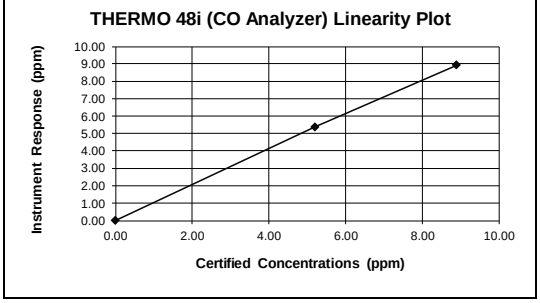
NOx Span (ppm) = 9.05

THERMO 42i-LS (NOx Analyzer)						
Certified Concentration (ppm)	Instrument Response (ppm)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (ppm)	Pass (±2%, ≤0.5ppm)
0.00	0.00	CC768882	09/30/31	0.00	0.00	YES (%)
5.06	5.04	EB0033088	10/24/26	-0.22	0.02	YES (%)
9.05	8.93	CC719768	10/03/26	-1.33	0.12	YES (%)
Linearity = 1.013						



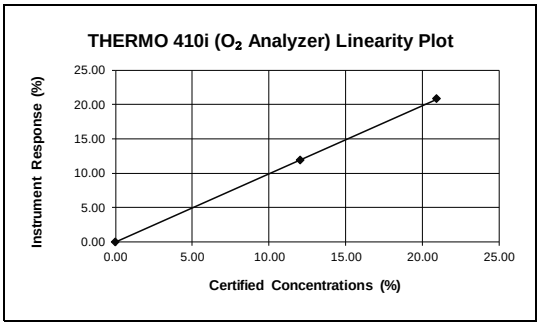
CO Span (ppm) = 8.89

THERMO 48i (CO Analyzer)						
Certified Concentration (ppm)	Instrument Response (ppm)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (ppm)	Pass (±2%, ≤0.5ppm)
0.00	0.01	CC768882	09/30/31	0.11	0.01	YES (%)
5.20	5.36	EB0033088	10/24/26	1.80	0.16	YES (%)
8.89	8.93	CC719768	10/03/26	0.45	0.04	YES (%)
Linearity = 0.995						



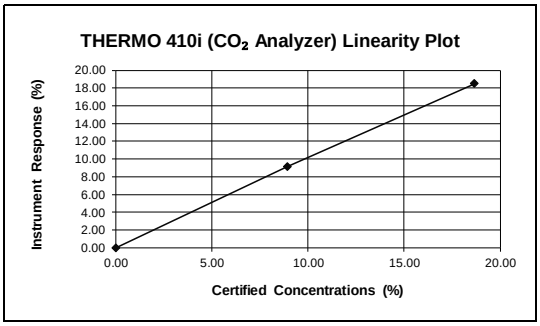
O_2 Span (%) = 20.95

THERMO 410i (O_2 Analyzer)						
Certified Concentration (%)	Instrument Response (%)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (%)	Pass (±2%, ≤0.5%)
0.00	0.00	CC768882	09/30/31	0.00	0.00	YES (%)
12.04	11.94	CC765425	10/15/31	-0.48	0.10	YES (%)
20.95	20.81	CC732946	05/21/31	-0.67	0.14	YES (%)
Linearity = 1.007						



CO_2 Span (%) = 18.64

THERMO 410i (CO_2 Analyzer)						
Certified Concentration (%)	Instrument Response (%)	Cylinder Number	Expiration Date	Calibration Error (%)	Absolute Conc. (%)	Pass (±2%, ≤0.5%)
0.00	0.00	CC768882	09/30/31	0.00	0.00	YES (%)
8.94	9.12	CC765425	10/15/31	0.97	0.18	YES (%)
18.64	18.49	CC732946	05/21/31	-0.80	0.15	YES (%)
Linearity = 1.008						



NOx Converter Efficiency

Date: December 5, 2023

Analyzer: INST-NX-0073

RM 7E, (02-27-14), Sections 7.1.4; 8.2.4.1; 12.7; and 13.5 Introduce NO_2 to the analyzer and record the NOx concentration displayed. ... Calculate the converter efficiency using Equation 7E-7. The specification for converter efficiency must be met. ... Air Hygiene also references ALT-0013 for specific NO_2 concentration (40-60 ppm) and EPA Traceability Protocol requirements (±2%).

Cylinder Number	CC519919
Expiration Date	04/07/26

Audit Gas:	NO_2 Concentration (C_v), ppmvd	**50.60**
Converter Efficiency Calculations:		
	Analyzer Reading, NO Channel, ppmvd	**2.84**
	Analyzer Reading, NOx Channel, ppmvd	**49.02**
	Analyzer Reading, NO_2 Channel ($C_{Dir(NO2)}$), ppmvd	**46.18**
	Converter Efficiency, %	**91.26**

RM 7E, (02-27-14), 13.5 NO_2 to NO Conversion Efficiency Test (as applicable). The NO_2 to NO conversion efficiency, calculated according to Equation 7E-7, must be greater than or equal to 90 percent.

$$Eff_{NO2} = \left(\frac{C_{Dir}}{C_V}\right) \times 100$$

Eq. 7E-7 = $\frac{46.18 \text{ ppmvd}}{50.60 \text{ ppmvd}}$ x 100 = 91.26%

Date/Time	Elapsed Time	NOx	NO
mm/dd/yy hh:mm:ss	Seconds	ppmvd	ppmvd
12/05/23 06:02:16	1450	48.77	2.88
12/05/23 06:02:26	1460	48.80	2.88
12/05/23 06:02:36	1470	48.83	2.87
12/05/23 06:02:46	1480	48.90	2.87
12/05/23 06:02:56	1490	48.98	2.87
12/05/23 06:03:06	1500	49.01	2.86
12/05/23 06:03:16	***1510***	***49.02***	***2.84***
12/05/23 06:03:26	1520	49.00	2.83
12/05/23 06:03:36	1530	48.98	2.83
12/05/23 06:03:46	1540	48.94	2.83
12/05/23 06:03:56	1550	48.89	2.87
12/05/23 06:04:06	1560	48.37	2.94

DRIFT AND BIAS CHECK AND RESPONSE TIME CALCULATOR

Strat Test Pre and Post QA/QC Check	O_2	NOx
Initial Zero	0.01	-0.01
Final Zero	0.03	0.02
Avg. Zero	0.02	0.01
Initial UpScale	11.70	4.96
Final UpScale	11.76	4.92
Avg. UpScale	11.73	4.94
Sys Resp (Zero)	0.00	0.00
Sys Resp (Upscale)	11.94	5.04
Upscale Cal Gas	12.04	5.06
Initial Zero Bias	0.05%	-0.11%
Final Zero Bias	0.14%	0.22%
Zero Drift	0.10%	0.33%
Initial Upscale Bias	-1.15%	-0.88%
Final Upscale Bias	-0.86%	-1.33%
Upscale Drift	0.29%	0.44%
Alternative Specification Abs Diff: Initial Zero	0.01	0.01
Alternative Specification Abs Diff: Final Zero	0.03	0.02
Alternative Specification Abs Diff: Initial Upscale	0.24	0.08
Alternative Specification Abs Diff: Final Upscale	0.18	0.12
Calibration Span	20.95	9.05
3% of Cal. Span (drift)	0.63	0.27
5% of Cal. Span (bias)	1.05	0.45

Response Time (min)	1.2	1.5
Sys. Response (min)	1.5	

Date/Time mm/dd/yy hh:mm:ss	z	O_2 %-10	s	z	NOx ppm-10	s	INJECTIONS
12/05/23 06:49:06		14.37			2.60		x
12/05/23 06:49:16		14.39			2.60		
12/05/23 06:49:26		**12.07**			2.62		
12/05/23 06:49:36		5.45			2.64		
12/05/23 06:49:46		2.16			2.66		
12/05/23 06:49:56		0.86			2.75		
12/05/23 06:50:06	x	**0.34**			1.74		
12/05/23 06:50:16		**0.12**			0.52		
12/05/23 06:50:26		**0.06**		x	**0.29**		
12/05/23 06:50:36		**0.03**			**0.17**		
12/05/23 06:50:46		**0.03**			**0.13**		
12/05/23 06:50:56		**0.01**			**0.12**		
12/05/23 06:51:06		**0.00**			**0.11**		
12/05/23 06:51:16		**0.00**			**0.11**		
12/05/23 06:51:26		**0.00**			**0.11**		x
12/05/23 06:51:36		**0.01**			**0.12**		
12/05/23 06:51:46		**0.00**			**0.11**		
12/05/23 06:51:56		2.94			**0.09**		
12/05/23 06:52:06		8.06			**0.08**		
12/05/23 06:52:16		10.18			**0.07**		
12/05/23 06:52:26		11.09			**0.06**		
12/05/23 06:52:36		**11.42**	x		**0.06**		
12/05/23 06:52:46		**11.58**			**0.06**		
12/05/23 06:52:56		**11.64**			**0.05**		
12/05/23 06:53:06		**11.68**			**0.05**		
12/05/23 06:53:16		**11.72**			**0.05**		
12/05/23 06:53:26		**11.75**			**0.05**		
12/05/23 06:53:36		**11.77**			**0.05**		x
12/05/23 06:53:46		**11.77**			**0.05**		
12/05/23 06:53:56		**11.21**			**0.05**		
12/05/23 06:54:06		6.08			**0.05**		
12/05/23 06:54:16		2.44			**0.05**		
12/05/23 06:54:26		0.97			0.96		
12/05/23 06:54:36		**0.35**			1.65		
12/05/23 06:54:46		**0.15**			2.77		
12/05/23 06:54:56		**0.06**			4.49		
12/05/23 06:55:06		**0.02**			**4.89**	x	
12/05/23 06:55:16		**0.03**			**4.94**		
12/05/23 06:55:26		**0.00**			**4.96**		
12/05/23 06:55:36		**0.01**			**4.97**		
12/05/23 06:55:46		**0.00**			**4.98**		
12/05/23 06:55:56		**0.02**			**4.99**		
12/05/23 06:56:06		**0.00**			**5.00**		
12/05/23 06:56:16		**0.00**			5.34		
12/05/23 06:56:26		**0.02**			3.52		
12/05/23 06:56:36		**0.00**			0.91		
12/05/23 06:56:46		**0.00**			**0.33**		
12/05/23 06:56:56		**0.00**			**0.16**		
12/05/23 06:57:06		**0.00**			**0.10**		

DRIFT AND BIAS CHECK			
Normal Load, Run - 1	**O_2**	**NOx**	**CO**
Raw Average	14.59	2.61	0.20
Corrected Average	14.93	2.64	0.20
Initial Zero	0.03	0.02	0.00
Final Zero	0.01	0.05	0.00
Avg. Zero	0.02	0.04	0.00
Initial UpScale	11.76	4.92	5.15
Final UpScale	11.79	5.01	5.14
Avg. UpScale	11.78	4.97	5.15
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.14%	0.22%	-0.11%
Final Zero Bias	0.05%	0.55%	-0.11%
Zero Drift	0.10%	0.33%	0.00%
Initial Upscale Bias	-0.86%	-1.33%	-2.36%
Final Upscale Bias	-0.72%	-0.33%	-2.47%
Upscale Drift	0.14%	0.99%	0.11%
Alternative Specification Abs Diff **Initial Zero**	0.03	0.02	0.01
Alternative Specification Abs Diff **Final Zero**	0.01	0.05	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.18	0.12	0.21
Alternative Specification Abs Diff **Final Upscale**	0.15	0.03	0.22
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 2	**O_2**	**NOx**	**CO**
Raw Average	14.60	2.60	0.15
Corrected Average	14.90	2.60	0.15
Initial Zero	0.01	0.05	0.00
Final Zero	0.01	0.04	0.00
Avg. Zero	0.01	0.05	0.00
Initial UpScale	11.79	5.01	5.14
Final UpScale	11.80	5.01	5.15
Avg. UpScale	11.80	5.01	5.15
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.05%	0.55%	-0.11%
Final Zero Bias	0.05%	0.44%	-0.11%
Zero Drift	0.00%	0.11%	0.00%
Initial Upscale Bias	-0.72%	-0.33%	-2.47%
Final Upscale Bias	-0.67%	-0.33%	-2.36%
Upscale Drift	0.05%	0.00%	0.11%
Alternative Specification Abs Diff **Initial Zero**	0.01	0.05	0.01
Alternative Specification Abs Diff **Final Zero**	0.01	0.04	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.15	0.03	0.22
Alternative Specification Abs Diff **Final Upscale**	0.14	0.03	0.21
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 3	**O_2**	**NOx**	**CO**
Raw Average	14.59	2.59	0.14
Corrected Average	14.89	2.61	0.14
Initial Zero	0.01	0.04	0.00
Final Zero	0.01	0.02	0.00
Avg. Zero	0.01	0.03	0.00
Initial UpScale	11.80	5.01	5.15
Final UpScale	11.80	4.97	5.15
Avg. UpScale	11.80	4.99	5.15
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.05%	0.44%	-0.11%
Final Zero Bias	0.05%	0.22%	-0.11%
Zero Drift	0.00%	0.22%	0.00%
Initial Upscale Bias	-0.67%	-0.33%	-2.36%
Final Upscale Bias	-0.67%	-0.77%	-2.36%
Upscale Drift	0.00%	0.44%	0.00%
Alternative Specification Abs Diff **Initial Zero**	0.01	0.04	0.01
Alternative Specification Abs Diff **Final Zero**	0.01	0.02	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.14	0.03	0.21
Alternative Specification Abs Diff **Final Upscale**	0.14	0.07	0.21
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 4	**O_2**	**NOx**	**CO**
Raw Average	14.60	2.59	0.11
Corrected Average	14.87	2.64	0.11
Initial Zero	0.01	0.02	0.00
Final Zero	0.02	0.03	0.00
Avg. Zero	0.02	0.03	0.00
Initial UpScale	11.80	4.97	5.15
Final UpScale	11.85	4.91	5.10
Avg. UpScale	11.83	4.94	5.13
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.05%	0.22%	-0.11%
Final Zero Bias	0.10%	0.33%	-0.11%
Zero Drift	0.05%	0.11%	0.00%
Initial Upscale Bias	-0.67%	-0.77%	-2.36%
Final Upscale Bias	-0.43%	-1.44%	-2.92%
Upscale Drift	0.24%	0.66%	0.56%
Alternative Specification Abs Diff **Initial Zero**	0.01	0.02	0.01
Alternative Specification Abs Diff **Final Zero**	0.02	0.03	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.14	0.07	0.21
Alternative Specification Abs Diff **Final Upscale**	0.09	0.13	0.26
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 5	**O_2**	**NOx**	**CO**
Raw Average	14.63	2.58	0.09
Corrected Average	14.89	2.62	0.09
Initial Zero	0.02	0.03	0.00
Final Zero	0.03	0.05	0.00
Avg. Zero	0.03	0.04	0.00
Initial UpScale	11.85	4.91	5.10
Final UpScale	11.82	4.98	5.08
Avg. UpScale	11.84	4.95	5.09
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.10%	0.33%	-0.11%
Final Zero Bias	0.14%	0.55%	-0.11%
Zero Drift	0.05%	0.22%	0.00%
Initial Upscale Bias	-0.43%	-1.44%	-2.92%
Final Upscale Bias	-0.57%	-0.66%	-3.15%
Upscale Drift	0.14%	0.77%	0.22%
Alternative Specification Abs Diff **Initial Zero**	0.02	0.03	0.01
Alternative Specification Abs Diff **Final Zero**	0.03	0.05	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.09	0.13	0.26
Alternative Specification Abs Diff **Final Upscale**	0.12	0.06	0.28
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 6	**O_2**	**NOx**	**CO**
Raw Average	14.65	2.57	0.07
Corrected Average	14.90	2.61	0.07
Initial Zero	0.03	0.05	0.00
Final Zero	0.02	0.04	0.00
Avg. Zero	0.03	0.05	0.00
Initial UpScale	11.82	4.98	5.08
Final UpScale	11.86	4.88	5.10
Avg. UpScale	11.84	4.93	5.09
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.14%	0.55%	-0.11%
Final Zero Bias	0.10%	0.44%	-0.11%
Zero Drift	0.05%	0.11%	0.00%
Initial Upscale Bias	-0.57%	-0.66%	-3.15%
Final Upscale Bias	-0.38%	-1.77%	-2.92%
Upscale Drift	0.19%	1.10%	0.22%
Alternative Specification Abs Diff **Initial Zero**	0.03	0.05	0.01
Alternative Specification Abs Diff **Final Zero**	0.02	0.04	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.12	0.06	0.28
Alternative Specification Abs Diff **Final Upscale**	0.08	0.16	0.26
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 7	**O_2**	**NOx**	**CO**
Raw Average	14.67	2.59	0.07
Corrected Average	14.88	2.65	0.07
Initial Zero	0.02	0.04	0.00
Final Zero	0.03	0.05	0.00
Avg. Zero	0.03	0.05	0.00
Initial UpScale	11.86	4.88	5.10
Final UpScale	11.88	4.93	5.06
Avg. UpScale	11.87	4.91	5.08
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.10%	0.44%	-0.11%
Final Zero Bias	0.14%	0.55%	-0.11%
Zero Drift	0.05%	0.11%	0.00%
Initial Upscale Bias	-0.38%	-1.77%	-2.92%
Final Upscale Bias	-0.29%	-1.22%	-3.37%
Upscale Drift	0.10%	0.55%	0.45%
Alternative Specification Abs Diff **Initial Zero**	0.02	0.04	0.01
Final Zero	0.03	0.05	0.01
Initial Upscale	0.08	0.16	0.26
Final Upscale	0.06	0.11	0.30
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 8	**O_2**	**NOx**	**CO**
Raw Average	14.68	2.63	0.04
Corrected Average	14.91	2.68	0.04
Initial Zero	0.03	0.05	0.00
Final Zero	0.06	0.08	0.00
Avg. Zero	0.05	0.07	0.00
Initial UpScale	11.88	4.93	5.06
Final UpScale	11.85	4.88	5.04
Avg. UpScale	11.87	4.91	5.05
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.14%	0.55%	-0.11%
Final Zero Bias	0.29%	0.88%	-0.11%
Zero Drift	0.14%	0.33%	0.00%
Initial Upscale Bias	-0.29%	-1.22%	-3.37%
Final Upscale Bias	-0.43%	-1.77%	-3.60%
Upscale Drift	0.14%	0.55%	0.22%
Alternative Specification Abs Diff **Initial Zero**	0.03	0.05	0.01
Final Zero	0.06	0.08	0.01
Initial Upscale	0.06	0.11	0.30
Final Upscale	0.09	0.16	0.32
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 9	**O_2**	**NOx**	**CO**
Raw Average	14.69	2.64	0.03
Corrected Average	14.93	2.68	0.04
Initial Zero	0.06	0.08	0.00
Final Zero	0.04	0.08	0.00
Avg. Zero	0.05	0.08	0.00
Initial UpScale	11.85	4.88	5.04
Final UpScale	11.86	4.93	5.03
Avg. UpScale	11.86	4.91	5.04
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.29%	0.88%	-0.11%
Final Zero Bias	0.19%	0.88%	-0.11%
Zero Drift	0.10%	0.00%	0.00%
Initial Upscale Bias	-0.43%	-1.77%	-3.60%
Final Upscale Bias	-0.38%	-1.22%	-3.71%
Upscale Drift	0.05%	0.55%	0.11%
Alternative Specification Abs Diff **Initial Zero**	0.06	0.08	0.01
Alternative Specification Abs Diff **Final Zero**	0.04	0.08	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.09	0.16	0.32
Alternative Specification Abs Diff **Final Upscale**	0.08	0.11	0.33
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK			
Normal Load, Run - 10	**O_2**	**NOx**	**CO**
Raw Average	14.70	2.62	0.04
Corrected Average	14.93	2.67	0.04
Initial Zero	0.04	0.08	0.00
Final Zero	0.06	0.06	0.00
Avg. Zero	0.05	0.07	0.00
Initial UpScale	11.86	4.93	5.03
Final UpScale	11.86	4.90	5.02
Avg. UpScale	11.86	4.92	5.03
Sys Resp (Zero)	0.00	0.00	0.01
Sys Resp (Upscale)	11.94	5.04	5.36
Upscale Cal Gas	12.04	5.06	5.20
Initial Zero Bias	0.19%	0.88%	-0.11%
Final Zero Bias	0.29%	0.66%	-0.11%
Zero Drift	0.10%	0.22%	0.00%
Initial Upscale Bias	-0.38%	-1.22%	-3.71%
Final Upscale Bias	-0.38%	-1.55%	-3.82%
Upscale Drift	0.00%	0.33%	0.11%
Alternative Specification Abs Diff **Initial Zero**	0.04	0.08	0.01
Alternative Specification Abs Diff **Final Zero**	0.06	0.06	0.01
Alternative Specification Abs Diff **Initial Upscale**	0.08	0.11	0.33
Alternative Specification Abs Diff **Final Upscale**	0.08	0.14	0.34
Calibration Span	20.95	9.05	8.89
3% of Cal. Span (drift)	0.63	0.27	0.27
5% of Cal. Span (bias)	1.05	0.45	0.44

DRIFT AND BIAS CHECK				
High Load, Run - C1	**O_2**	**NOx**	**CO**	**CO_2**
Raw Average	14.59	2.60	0.16	3.52
Corrected Average	14.92	2.65	0.16	3.55
Initial Zero	0.03	0.02	0.00	0.05
Final Zero	0.01	0.02	0.00	0.00
Avg. Zero	0.02	0.02	0.00	0.03
Initial UpScale	11.76	4.92	5.15	8.86
Final UpScale	11.80	4.97	5.15	8.80
Avg. UpScale	11.78	4.95	5.15	8.83
Sys Resp (Zero)	0.00	0.00	0.01	0.00
Sys Resp (Upscale)	11.94	5.04	5.36	9.12
Upscale Cal Gas	12.04	5.06	5.20	8.94
Initial Zero Bias	0.14%	0.22%	-0.11%	0.27%
Final Zero Bias	0.05%	0.22%	-0.11%	0.00%
Zero Drift	0.10%	0.00%	0.00%	0.27%
Initial Upscale Bias	-0.86%	-1.33%	-2.36%	-1.39%
Final Upscale Bias	-0.67%	-0.77%	-2.36%	-1.71%
Upscale Drift	0.19%	0.55%	0.00%	0.32%
Alternative Specification Abs Diff **Initial Zero**	0.03	0.02	0.01	0.05
Alternative Specification Abs Diff **Final Zero**	0.01	0.02	0.01	0.00
Alternative Specification Abs Diff **Initial Upscale**	0.18	0.12	0.21	0.26
Alternative Specification Abs Diff **Final Upscale**	0.14	0.07	0.21	0.32
Calibration Span	20.95	9.05	8.89	18.70
3% of Cal. Span (drift)	0.63	0.27	0.27	0.56
5% of Cal. Span (bias)	1.05	0.45	0.44	0.94

DRIFT AND BIAS CHECK				
High Load, Run - C2	**O_2**	**NOx**	**CO**	**CO_2**
Raw Average	14.63	2.58	0.09	3.44
Corrected Average	14.89	2.64	0.09	3.44
Initial Zero	0.01	0.02	0.00	0.00
Final Zero	0.02	0.04	0.00	0.10
Avg. Zero	0.02	0.03	0.00	0.05
Initial UpScale	11.80	4.97	5.15	8.80
Final UpScale	11.86	4.88	5.10	8.88
Avg. UpScale	11.83	4.93	5.13	8.84
Sys Resp (Zero)	0.00	0.00	0.01	0.00
Sys Resp (Upscale)	11.94	5.04	5.36	9.12
Upscale Cal Gas	12.04	5.06	5.20	8.94
Initial Zero Bias	0.05%	0.22%	-0.11%	0.00%
Final Zero Bias	0.10%	0.44%	-0.11%	0.53%
Zero Drift	0.05%	0.22%	0.00%	0.53%
Initial Upscale Bias	-0.67%	-0.77%	-2.36%	-1.71%
Final Upscale Bias	-0.38%	-1.77%	-2.92%	-1.28%
Upscale Drift	0.29%	0.99%	0.56%	0.43%
Alternative Specification Abs Diff **Initial Zero**	0.01	0.02	0.01	0.00
Alternative Specification Abs Diff **Final Zero**	0.02	0.04	0.01	0.10
Alternative Specification Abs Diff **Initial Upscale**	0.14	0.07	0.21	0.32
Alternative Specification Abs Diff **Final Upscale**	0.08	0.16	0.26	0.24
Calibration Span	20.95	9.05	8.89	18.70
3% of Cal. Span (drift)	0.63	0.27	0.27	0.56
5% of Cal. Span (bias)	1.05	0.45	0.44	0.94

DRIFT AND BIAS CHECK				
High Load, Run - C3	**O_2**	**NOx**	**CO**	**CO_2**
Raw Average	14.68	2.62	0.05	3.43
Corrected Average	14.91	2.67	0.05	3.45
Initial Zero	0.02	0.04	0.00	0.10
Final Zero	0.04	0.08	0.00	0.00
Avg. Zero	0.03	0.06	0.00	0.05
Initial UpScale	11.86	4.88	5.10	8.88
Final UpScale	11.86	4.93	5.03	8.74
Avg. UpScale	11.86	4.91	5.07	8.81
Sys Resp (Zero)	0.00	0.00	0.01	0.00
Sys Resp (Upscale)	11.94	5.04	5.36	9.12
Upscale Cal Gas	12.04	5.06	5.20	8.94
Initial Zero Bias	0.10%	0.44%	-0.11%	0.53%
Final Zero Bias	0.19%	0.88%	-0.11%	0.00%
Zero Drift	0.10%	0.44%	0.00%	0.53%
Initial Upscale Bias	-0.38%	-1.77%	-2.92%	-1.28%
Final Upscale Bias	-0.38%	-1.22%	-3.71%	-2.03%
Upscale Drift	0.00%	0.55%	0.79%	0.75%
Alternative Specification Abs Diff **Initial Zero**	0.02	0.04	0.01	0.10
Alternative Specification Abs Diff **Final Zero**	0.04	0.08	0.01	0.00
Alternative Specification Abs Diff **Initial Upscale**	0.08	0.16	0.26	0.24
Alternative Specification Abs Diff **Final Upscale**	0.08	0.11	0.33	0.38
Calibration Span	20.95	9.05	8.89	18.70
3% of Cal. Span (drift)	0.63	0.27	0.27	0.56
5% of Cal. Span (bias)	1.05	0.45	0.44	0.94

QUALITY ASSURANCE AND QUALITY CONTROL DATA

Laboratory Data – Gases

RATA - FIELD DATA SHEET

AIR HYGIENE

Company:	Sacramento Municipal Utility District Financing Authority
Location:	Campbell Power Plant
Date:	12/5/2023 Project Code: ethos-23-campbell.ca-comp#1
Unit Make and Model:	Siemens, V84.2, Unit #CT1
Unit Number:	CT1
Serial Number:	N/A
Data Recorded By:	MS
Tested With AHI Unit(s):	Truck(s): 192 Trailer(s): 211
LDEQ Warmup/Cal Req:	On (Day/Time): 12/4/2023 11:30 Cal (Day/Time): 12/5/2023 5:30

CYLINDER INFORMATION		O_2 Serial No.	O_2 Exp. Date	NOx Serial No.	NOx Exp. Date	CO Serial No.	CO Exp. Date
	Low	CC768882	–	CC768882	–	CC768882	–
	Mid	CC765425	10/15/2031	EB0033088	10/24/2026	EB0033088	10/24/2026
	High	CC732946	5/22/2031	CC719768	10/3/2026	CC719768	10/3/2026

Stack Dia. = 204 inches
Measured By: Protocol
Measured With: Protocol

RUN INFORMATION	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8	Run #9	Run #10	Run #11	Run #12
Time Start (hh:mm:ss)	8:32:26	9:02:26	9:32:26	10:02:26	10:32:26	11:02:26	11:32:26	12:02:26	12:32:26	13:02:26		
Time Stop (hh:mm:ss)	8:52:56	9:22:56	9:52:56	10:22:56	10:52:56	11:22:56	11:52:56	12:22:56	12:52:56	13:28:56		
Barometric Pressure (in. Hg)	30.15	30.15	30.16	30.16	30.14	30.13	30.12	30.10	30.09	30.06		
Ambient Temperature (oF)	49	52	53	55	57	59	61	62	64	65		
Relative Humidity (%)	90	86	81	78	76	71	66	64	61	57		

CALIBRATION	O_2		NOx		CO		CO_2	
	Conc.	Actual	Conc.	Actual	Conc.	Actual	Conc.	Actual
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Low Gas								
Mid Gas	12.04	11.94	5.06	5.04	5.20	5.36	8.94	9.12
High Gas	20.95	20.81	9.05	8.93	8.89	8.93	18.70	18.49

REPORT INFORMATION		
	INSTRUMENT	SERIAL #
O_2	THERMO 410i	INST-C2-0026
NOx	THERMO 42i-LS	INST-NX-0073
CO	THERMO 48i	INST-CO-0016
CO_2	THERMO 410i	INST-C2-0026

BIAS	O_2		NOx		CO		CO_2	
	Zero	Mid	Zero	Mid	Zero	Mid	Zero	Mid
Strat	0.01	11.70	-0.01	4.96	0.00	5.19	0.00	8.86
Initial Run #1	0.03	11.76	0.02	4.92	0.00	5.15	0.05	8.86
Run #1 / Run #2	0.01	11.79	0.05	5.01	0.00	5.14	0.13	8.98
Run #2 / Run #3	0.01	11.80	0.04	5.01	0.00	5.15	0.05	8.85
Run #3 / Run #4	0.01	11.80	0.02	4.97	0.00	5.15	0.00	8.80
Run #4 / Run #5	0.02	11.85	0.03	4.91	0.00	5.10	0.04	8.83
Run #5 / Run #6	0.03	11.82	0.05	4.98	0.00	5.08	0.00	8.76
Run #6 / Run #7	0.02	11.86	0.04	4.88	0.00	5.10	0.10	8.88
Run #7 / Run #8	0.03	11.88	0.05	4.93	0.00	5.06	0.00	8.75
Run #8 / Run #9	0.06	11.85	0.08	4.88	0.00	5.04	0.00	8.81
Run #9 / Run #10	0.04	11.86	0.08	4.93	0.00	5.03	0.00	8.74
Run #10 / Run #11	0.06	11.86	0.06	4.10	0.00	5.02	0.02	8.77
Run #11 / Run #12								
Run #12 Final								
Bias Gas Actual Conc.		12.04		5.06		5.20		8.94

NO_2 CONVERSION	
NO_2 Gas (ppm)	50.6
NO Reading (ppm)	2.84
NOx Reading (ppm)	44.02
Cylinder Serial Number	CC519919
Cylinder Expiration Date	4/7/2026

RESPONSE TIME		
	TIME (hh:mm)	RESP (min)
Gas Inject	6 / 14 / 06	
1st Inst. @ 95%	6 / 15 / 06	0 / 00 / 00
2nd Inst. @ 95%	6 / 01 / 26	0 / 1 / 20
3rd Inst. @ 95%	/ /	/ /

Signature: MSH

QUALITY ASSURANCE AND QUALITY CONTROL DATA

Laboratory Data – PM/PM_{10}

SAMPLE ANALYTICAL DATA SHEET

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Analytical Data		**Run**	CT1-PM-1		
Sample Leakage Evident	NO	**Estimated Leak Volume**		0.00	(mg)

Sample Type	Sample Number	Date	Time
Filter	2675	12/14/24	10:00
Probe Wash	250-803	12/14/24	10:00
Inorganic Impinger Contents	250-788	12/14/24	10:00
Organic Impinger Contents	764	12/14/24	10:00

Weight Data			**Run**		1	**Start Time**	07:17
Filter and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	68.3262	12/15/23	10:21	34%	71		
Measurement 2	68.3260	12/16/23	07:29	34%	68.9		
Probe Wash and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	127.0364	12/15/23	10:21	34%	71		
Measurement 2	127.0369	12/16/23	07:29	34%	68.9		
Inorganic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	122.5059	12/15/23	10:21	34%	71		
Measurement 2	122.5062	12/16/23	07:29	34%	68.9		
Organic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	1.7740	12/15/23	10:21	34%	71		
Measurement 2	1.7743	12/16/23	07:29	34%	68.9		

Blank and Titration Concentrations				
Blank Type	**Weight**	**Volume**	**Concentration**	**Mass**
	(g)	(ml)	(mg/ml)	(mg)
Acetone Blank Weight of Solids	0.0001	220.0000	0.000227	--
DI Water Blank Weight of Solids	0.0003	201.0000	0.001741	--
Hexane Blank Weight of Solids	0.0000	179.0000	0.000000	--
0.1N NH_4OH Correction	--	0.0000	--	0.0000

Gravimetric Concentrations			**Run**		1	**Start Time**	07:17
Sample Portion	**Final**	**Tare**	**Gain**	**Volume**	**Blank Adjustment**	**Adjusted Gain**	
	(g)	(g)	(mg)	(ml)	(mg)	(mg)	
Filter	68.3261	0.3693	-0.5000	--	--	0.0000	
Filter Beaker		67.9574		--	--		
Probe Wash	127.0367	127.0349	1.7500	100.0000	0.0227	1.7273	
Inorganic Impinger Contents	122.5061	122.5037	2.3500	223.5472	0.6154	1.7346	
Organic Impinger Contents	1.7742	1.7732	1.0000	382.0000	1.3846	0.0000	

SAMPLE ANALYTICAL DATA SHEET

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Analytical Data		**Run**	CT1-PM-2		
Sample Leakage Evident	NO	**Estimated Leak Volume**		0.00	(mg)

Sample Type	Sample Number	Date	Time
Filter	2670	12/14/24	10:00
Probe Wash	250-390	12/14/24	10:00
Inorganic Impinger Contents	250-362	12/14/24	10:00
Organic Impinger Contents	761	12/14/24	10:00

Weight Data			**Run**		2	**Start Time**	10:27
Filter and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	67.5445	12/15/23	10:21	34%	71		
Measurement 2	67.5444	12/16/23	07:29	34%	68.9		
Probe Wash and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	115.3941	12/15/23	10:21	34%	71		
Measurement 2	115.3945	12/16/23	07:29	34%	68.9		
Inorganic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	114.5152	12/15/23	10:21	34%	71		
Measurement 2	114.5151	12/16/23	07:29	34%	68.9		
Organic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	1.7802	12/15/23	10:21	34%	71		
Measurement 2	1.7807	12/16/23	07:29	34%	68.9		

Blank and Titration Concentrations				
Blank Type	**Weight**	**Volume**	**Concentration**	**Mass**
	(g)	(ml)	(mg/ml)	(mg)
Acetone Blank Weight of Solids	0.0001	220.0000	0.000227	--
DI Water Blank Weight of Solids	0.0003	201.0000	0.001741	--
Hexane Blank Weight of Solids	0.0000	179.0000	0.000000	--
0.1N NH_4OH Correction	--	0.0000	--	0.0000

Gravimetric Concentrations			**Run**		2	**Start Time**	10:27
Sample Portion	**Final**	**Tare**	**Gain**	**Volume**	**Blank Adjustment**	**Adjusted Gain**	
	(g)	(g)	(mg)	(ml)	(mg)	(mg)	
Filter	67.5445	0.3675	-0.1500	--	--	0.0000	
Filter Beaker		67.1771		--	--		
Probe Wash	115.3943	115.3933	1.0000	129.0000	0.0293	0.9707	
Inorganic Impinger Contents	114.5152	114.5124	2.7500	212.7530	0.6154	2.1346	
Organic Impinger Contents	1.7805	1.7778	2.7000	336.0000	1.3846	1.3154	

SAMPLE ANALYTICAL DATA SHEET

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Analytical Data		**Run**	CT1-PM-3		
Sample Leakage Evident	NO	**Estimated Leak Volume**		0.00	(mg)

Sample Type	Sample Number	Date	Time
Filter	2676	12/14/24	10:00
Probe Wash	250-664	12/14/24	10:00
Inorganic Impinger Contents	250-620	12/14/24	10:00
Organic Impinger Contents	763	12/14/24	10:00

Weight Data			**Run**		3	**Start Time**	13:12
Filter and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	65.9371	12/15/23	10:21	34%	71		
Measurement 2	65.9373	12/16/23	07:29	34%	68.9		
Probe Wash and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	121.3842	12/15/23	10:21	34%	71		
Measurement 2	121.3844	12/16/23	07:29	34%	68.9		
Inorganic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	125.3646	12/15/23	10:21	34%	71		
Measurement 2	125.3650	12/16/23	07:29	34%	68.9		
Organic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	1.7650	12/15/23	10:21	34%	71		
Measurement 2	1.7653	12/16/23	07:29	34%	68.9		

Blank and Titration Concentrations				
Blank Type	**Weight**	**Volume**	**Concentration**	**Mass**
	(g)	(ml)	(mg/ml)	(mg)
Acetone Blank Weight of Solids	0.0001	220.0000	0.000227	--
DI Water Blank Weight of Solids	0.0003	201.0000	0.001741	--
Hexane Blank Weight of Solids	0.0000	179.0000	0.000000	--
0.1N NH_4OH Correction	--	0.0000	--	0.0000

Gravimetric Concentrations			**Run**		3	**Start Time**	13:12
Sample Portion	**Final**	**Tare**	**Gain**	**Volume**	**Blank Adjustment**	**Adjusted Gain**	
	(g)	(g)	(mg)	(ml)	(mg)	(mg)	
Filter	65.9372	0.3696	-0.6000	--	--	0.0000	
Filter Beaker		65.5683		--	--		
Probe Wash	121.3843	121.3822	2.1000	135.0000	0.0307	2.0693	
Inorganic Impinger Contents	125.3648	125.3629	1.9000	202.7818	0.6154	1.2846	
Organic Impinger Contents	1.7652	1.7630	2.1500	307.0000	1.3846	0.7654	

SAMPLE ANALYTICAL DATA SHEET

Plant Name	Campbell Power Plant
Sampling Location	Siemens V84.2 Combined Cycle Combustion Turbine
Project #	ethos-23-campbell.ca-comp#1

Analytical Data		**Run**	CT1-PM-FB		
Sample Leakage Evident	NO	**Estimated Leak Volume**		0.00	(mg)

Sample Type	**Sample Number**	**Date**	**Time**
Inorganic Impinger Contents	250-572	12/14/24	10:00
Organic Impinger Contents	762	12/14/24	10:00

Weight Data			**Run**		CT1-PM-FB	**Start Time**	
Inorganic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	123.1142	12/15/23	10:21	34%	71		
Measurement 2	123.1140	12/16/23	07:29	34%	68.9		
Organic Impinger Contents and Beaker Weight	**Weight**	**Date**	**Time**	**Humidity**	**Temp**	**Calibration Audit**	
	(g)	(mm/dd/yy)	(hh:mm)	(%)	°F	(g)	
Measurement 1	1.7672	12/15/23	10:21	34%	71		
Measurement 2	1.7675	12/16/23	07:29	34%	68.9		

Gravimetric Concentrations					
Sample Portion	**Final**	**Tare**	**Gain**		**Actual Gain**
	(g)	(g)	(mg)		(mg)
Inorganic Impinger Contents	123.1141	123.1133	0.6154	max 2 mg total blank adjustment, proportioned	0.8000
Organic Impinger Contents	1.7674	1.7656	1.3846		1.8000

EQUIPMENT / INSTRUMENTATION IDENTIFICATION

Equipment / Instrumentation	Identification No.
Acetone Lot	2md0240
Hexane Lot	23070132
Filterable Particulate Matter Oven ID	LABS-OV-0007
Condensable Particulate Matter Oven ID	LABS-OV-0008
Sonic Bath ID	LABS-UB-0001
LABS-SC-0004 Scale Weight Set ID (1st weights)	LABS-WT-0002
LABS-SC-0004 Scale Weight Set ID (2nd weights)	LABS-WT-0002
LABS-SC-0004 Scale Weight Set ID (3rd weights)	
LABS-SC-0004 Scale Weight Set ID (4th weights)	

Requested Standard Analysis - 5-10 business days after receipt at lab

SAMPLE DESCRIPTION AND LABELING RECORD

Contact Information (deliver results to)

Name: Mars Sharief
Phone: (918) 307-8865
Email: msharief@airhygiene.com

Air Hygiene International, Inc.
1600 W Tacoma Street
Broken Arrow, Oklahoma 74012
(888) 461-8778
www.airhygiene.com

Project Number: ethos-23-campbell.ca-comp#1

Person Taking Samples: JF

Laboratory Analysis Requested: Gravimetric

Sample Number	Location	Date	Volume	Analysis Method: RM 5	RM 202	3/23 acc	--
CT1-PM-1-F	Unit CT1-PM - Run 1 - Filter	12/05/23	N/A	X	~~2670~~ 2711	100-660	2675
CT1-PM-1-PW	Unit CT1-PM - Run 1 - Probe Wash	12/05/23	As Marked	X		100	250-803
CT1-PM-1-IC	Unit CT1-PM - Run 1 - Inorganic Impinger Contents	12/05/23	As Marked		X	364	250-788
CT1-PM-1-Hex	Unit CT1-PM - Run 1 - Organic Impinger Contents	12/05/23	As Marked		X	382	764
CT1-PM-1-CPM	Unit CT1-PM - Run 1 - CPM Filter	12/05/23	N/A		X		
CT1-PM-2-F	Unit CT1-PM - Run 2 - Filter	12/05/23	N/A	X	2670	100-686	
CT1-PM-2-PW	Unit CT1-PM - Run 2 - Probe Wash	12/05/23	As Marked	X		129	250-390
CT1-PM-2-IC	Unit CT1-PM - Run 2 - Inorganic Impinger Contents	12/05/23	As Marked		X	350	250-362
CT1-PM-2-Hex	Unit CT1-PM - Run 2 - Organic Impinger Contents	12/05/23	As Marked		X	336	761
CT1-PM-2-CPM	Unit CT1-PM - Run 2 - CPM Filter	12/05/23	N/A		X		
CT1-PM-3-F	Unit CT1-PM - Run 3 - Filter	12/05/23	N/A	X	2676	100-631	
CT1-PM-3-PW	Unit CT1-PM - Run 3 - Probe Wash	12/05/23	As Marked	X		135	250-664
CT1-PM-3-IC	Unit CT1-PM - Run 3 - Inorganic Impinger Contents	12/05/23	As Marked		X	324	250-620
CT1-PM-3-Hex	Unit CT1-PM - Run 3 - Organic Impinger Contents	12/05/23	As Marked		X	307	763
CT1-PM-3-CPM	Unit CT1-PM - Run 3 - CPM Filter	12/05/23	N/A		X		
CT1-PM-FB-IC	Unit CT1-PM - Run FB - Inorganic Impinger Contents	12/05/23	As Marked		X	320	250-572
CT1-PM-FB-Hex	Unit CT1-PM - Run FB - Organic Impinger Contents	12/05/23	As Marked		X	315	762
CT1-PM-FB-CPM	Unit CT1-PM - Run FB - CPM Filter	12/05/23	N/A		X		
CT1-PM-B1-Acetone	Unit CT1-PM - Blank - Acetone	12/05/23	200		X	220	765
CT1-PM-B2-DI Water	Unit CT1-PM - Blank - DI Water	12/05/23	200	X		201	100-626
CT1-PM-B3-Hexane	Unit CT1-PM - Blank - Hexane	12/05/23	200		X	179	760

Signature	Date	Time	Signature	Date	Time
Mars Sharief	12/07/23	18:00	Alyson Kane	12/13/23	930

QUALITY ASSURANCE AND QUALITY CONTROL DATA

Laboratory Data – NH_3

Atmospheric Analysis & Consulting, Inc.

Client	: Air Hygiene International, Inc
Client Project Name	: ethos-23-campbell.ca-comp#1
Client Project No.	: NA
AAC Project No.	: 232534
Reporting Date	: 12/15/2023

On December 6, 2023, Atmospheric Analysis & Consulting, Inc. received five (5) impinger contents for ammonia analysis by BAAQMD ST-1B. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client Sample ID	AAC Sample ID
CT1-NH3-1-C1	232534-52148
CT1-NH3-2-C1	232534-52149
CT1-NH3-3-C1	232534-52150
CT1-NH3-B1-HCl	232534-52151
CT1-NH3-B2-DI Water	232534-52152

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. The samples were received at a temperature of 9.7°C, which is above the method recommended temperature of 4.0°C. No other problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 5 pages.

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

Cation Analysis by IC

Client	: Air Hygiene International, Inc.	Sampling Date	: 12/05/2023
Client Project Name	: ethos-23-campbell.ca-comp#1	Receiving Date	: 12/06/2023
AAC Project No.	: 232534	Analysis Date	: 12/13/2023
Analyst	: EJ	Reporting Date	: 12/15/2023
Units	: ug/sample		

Ammonia Analysis by BAAQMD ST-1B

Client Sample ID	AAC Sample ID	Sample Volume (mL)	Analysis DF	Ammonia (ug/mL)	Ammonia (ug/sample)	Sample Reporting Limit (ug/sample)
CT1-NH3-1-C1	232534-52148	315	2	<SRL	<SRL	59.5
CT1-NH3-2-C1	232534-52149	395	2	0.339	134	74.6
CT1-NH3-3-C1	232534-52150	367	2	<SRL	<SRL	69.3
CT1-NH3-B1-HCl	232534-52151	180	2	<SRL	<SRL	34.0
CT1-NH3-B2-DI Water	232534-52152	135	2	<SRL	<SRL	25.5

<SRL-compound was analyzed for but not detected at or above the SRL (Sample Reporting Limit)

SRL (ug/sample) = MRL (0.10ug/mL) x Sample Volume (mL) x Analysis Dilution Factor x Method Dilution Factor

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Quality Control/Quality Assurance Report

BAAQMD ST-1B/OSHA-ID 188

Analysis Date : 12/13/2023 Instrument ID : DIONEX IC #2
Analyst : EJ

Calibration Verification of the 09/14/2023 Calibration

Sample ID	Analyte	Target Concentration (ug/mL)	Measured Concentration (ug/mL)	Percent Recovery (%)*
Opening CV	Ammonium	25.0	25.5	102
Continuing CV	Ammonium	25.0	24.8	99.3
Continuing CV	Ammonium	25.0	25.9	104
Continuing CV	Ammonium	25.0	26.0	104
Closing CV	Ammonium	25.0	25.7	103
Second Source	Ammonium	25.0	25.9	104

* Must be 85-115%

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Atmospheric Analysis & Consulting, Inc.

QUALITY CONTROL/ASSURANCE REPORT

BAAQMD ST-1B/OSHA-ID 188

Analysis Date : 12/13/2023
Analyst : EJ

Instrument ID : DIONEX IC #2

Method Blank Analysis

Analyte	Concentration (ug/mL)	Reporting Limit (ug/mL)
Ammonium	<RL	0.100

Laboratory Control Spike Analysis

Analyte	Sample Concentration (ug/mL)	Spike Concentration (ug/mL)	Lab Spike Concentration (ug/mL)	Duplicate Lab Spike Concentration (ug/mL)	Spike Recovery (%)**	Duplicate Spike Recovery (%)**	% RPD****
Ammonium	0.000	12.5	12.9	12.3	103	98.7	4.3

Laboratory Control Spike Analysis II

Analyte	Sample Concentration (ug/mL)	Spike Concentration (ug/mL)	Lab Spike Concentration (ug/mL)	Duplicate Lab Spike Concentration (ug/mL)	Spike Recovery (%)**	Duplicate Spike Recovery (%)**	% RPD****
Ammonium	0.000	12.5	13.5	12.6	108	101	6.9

Matrix Spike Analysis [232534-52151 x2]

Analyte	Sample Concentration (ug/mL)	Spike Concentration (ug/mL)	Matrix Spike Concentration (ug/mL)	Duplicate Matrix Spike Concentration (ug/mL)	Spike Recovery (%)***	Duplicate Spike Recovery (%)***	% RPD****
Ammonium	0.000	12.5	12.8	12.2	102	97.6	4.7

Matrix Spike Analysis [232593-52505 x2]

Analyte	Sample Concentration (ug/mL)	Spike Concentration (ug/mL)	Matrix Spike Concentration (ug/mL)	Duplicate Matrix Spike Concentration (ug/mL)	Spike Recovery (%)***	Duplicate Spike Recovery (%)***	% RPD****
Ammonium	0.000	12.5	12.8	12.4	102	99.2	2.8

Duplicate Sample Analysis

Sample ID	Analyte	Result (ug/mL)	Duplicate Result (ug/mL)	%RPD *	DF
232534-52152	Ammonium	<SRL	<SRL	NA	2
232534-52148	Ammonium	<SRL	<SRL	NA	2
232548-52207	Ammonium	0.570	0.590	3.4	2
232593-52506	Ammonium	<SRL	<SRL	NA	2

* Must be <10%
** Must be 85-115%
*** Must be 75-125%
**** Must be < 25%

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com • (805) 650-1642

232534

Requested Rush Analysis - 4-5 business days after receipt at lab

SAMPLE DESCRIPTION AND LABELING RECORD

Contact Information (deliver results to)

Name: Mars Sharief
Phone: (918) 307-8865
Email: msharief@airhygiene.com

Air Hygiene International, Inc.
1600 W Tacoma Street
Broken Arrow, Oklahoma 74012
(888) 461-8778
www.airhygiene.com

Project Number:	ethos-23-campbell.ca-comp#1	Laboratory Analysis Requested:
Person Taking Samples:	JF	BAAQMD LAB 1A(M)

Sample Number	Location	Date	Volume	Analysis Method			
				NH_3 by IC	--	--	--
CT1-NH3-1-C1	52148 Unit CT1-NH3 - Run 1 - Impinger Contents	12/05/23	As Marked	X			
CT1-NH3-2-C1	52149 Unit CT1-NH3 - Run 2 - Impinger Contents	12/05/23	As Marked	X			
CT1-NH3-3-C1	52150 Unit CT1-NH3 - Run 3 - Impinger Contents	12/05/23	As Marked	X			
CT1-NH3-B1-HCl	52151 Unit CT1-NH3 - Blank - HCl	12/05/23	200	X			
CT1-NH3-B2-DI Water	52152 Unit CT1-NH3 - Blank - DI Water	12/05/23	100	X			

Signature	Date	Time	Signature	Date	Time
Mars Sharief	12/05/23	18:00	[illegible]	12/6/23	1137

9.7° C ≈ 14

APPENDIX E

FUEL ANALYSIS RECORDS

Client: Sacramento Finance Authority
Location: Campbell Power Plant
Date: December 5, 2023
Project #: ethos-23-campbell.ca-comp#1

Natural Gas - Fuel Analysis

Standardized to 68 deg F and 14.696 psia - EPA Standards

Gas Component		Mole (%)	Molecular[1] Weight (lb/lb-mole)	Lbs Component per Lb-Mole of Gas	Wt. % of Component	Ideal Gross[1,3] Heating Value (Btu/ft^3)	Fuel Heat Value [HHV] (Btu/SCF)	Ideal Net[1,3] Heating Value (Btu/ft^3)	Fuel Heat Value [LHV] (Btu/SCF)
Methane	CH_4	91.700	16.0430	14.71	84.15	994.85	912.27	895.75	821.41
Ethane	C_2H_6	5.977	30.0700	1.80	10.28	1,743.15	104.19	1,594.41	95.30
Propane	C_3H_8	0.687	44.0970	0.30	1.73	2,478.35	17.03	2,280.17	15.67
iso-Butane	iC_4H_{10}	0.073	58.1230	0.04	0.24	3,203.11	2.34	2,955.38	2.16
n-Butane	nC_4H_{10}	0.087	58.1230	0.05	0.29	3,213.35	2.81	2,965.62	2.59
Iso-Pentane	iC_5H_{12}	0.016	72.1500	0.01	0.07	3,940.87	0.65	3,643.50	0.60
n-Pentane	nC_5H_{12}	0.012	72.1500	0.01	0.05	3,948.75	0.45	3,648.32	0.42
Hexanes	C_6H_{14}	0.013	86.1770	0.01	0.06	4,684.54	0.59	4,337.82	0.55
Heptanes	C_7H_{16}	0.000	100.2040	0.00	0.00	5,419.94	0.00	5,023.77	0.00
Octanes	C_8H_{18}	0.000	114.2310	0.00	0.00	6,155.14	0.00	5,709.23	0.00
Carbon Dioxide	CO_2	0.904	44.0100	0.40	2.27	0.00	0.00	0.00	0.00
Nitrogen	N_2	0.512	28.0134	0.14	0.82	0.00	0.00	0.00	0.00
Hydrogen Sulfide	H_2S	0.000	34.0800	0.00	0.00	627.54	0.00	578.00	0.00
Oxygen	O_2	0.017	31.9988	0.01	0.03	0.00	0.00	0.00	0.00
Helium	He	0.000	4.0026	0.00	0.00	0.00	0.00	0.00	0.00
Hydrogen	H_2	0.003	2.0159	0.00	0.00	319.34	0.01	269.82	0.01
Totals		**100.000**		**17.48**	**100.00**	**dry**	**1,040.34**	**dry**	**938.70**
						wet[2,5]	**1,016.35**	**wet[2,5]**	**917.05**

Characteristics of Fuel Gas		
Molecular Weight of gas =	17.482	lb/lb-mole
Btu per lb. of gas[4] =	22,924.167	gross (HHV)
Btu per lb. of gas[4] =	20,684.423	net (LHV)
Density of fuel gas[2] =	0.0454	lb/cu. ft
Wt % VOC in fuel gas =	2.44	%
Specific Gravity[1] =	0.6036	

Component	Wt%
carbon	73.84
oxygen	1.68
hydrogen	23.66
nitrogen	0.82
helium	0.00
sulfur	0.00
Total	**100.00**

F-Factor (SCF dry exhaust per MMBtu [HHV]) = 8,655.58
(Based on EPA RM-19) at 68 deg F and 14.696 psia

F-Factor Calculation:

F-Factor = 1,000,000*((3.64*%H)+(1.53*%C)+(0.57*%S)+(0.14*%N)-(0.46*%O))/GCV
GCV = Gross Btu per lb. of gas (HHV)
%H, %C, %S, %N, & %O are percent weight values calculated from fuel analysis and have units of (scf/lb)/%
Density of natural gas based on specific gravity multiplied by density of air at 68 deg F and 14.696 psia.

References:

[1] ASTM D 3588
[2] Civil Engineering Reference Manual, 7th ed. - Michael R. Lindeburg
[3] Mark's Standard Handbook for Mechanical Engineers, 10th ed. - Eugene A. Avallone, Theodore Baumeister III
[4] Introduction to Fluid Mechanics, 3rd ed. - William S. Janna
[5] GPA Reference Bulletin 181-86, revised 1986, reprinted 1995

CLIENT:	Air Hygiene International	**REQUESTED BY:**	Dr. Sean Barnes
CLIENT PROJECT:	ethos-23-campbell.ca-comp#1	**PURCHASE ORDER NO:**	23010115
LABORATORY NO:	101275 Page 1 of 3	**REPORT DATE:**	December 15, 2023
SAMPLE:	Campbell Power Plant- Natural Gas Grid (7019,4630) 2023-12-05		

Composition of Natural Gas by Gas Chromatography (TCD/FID), GPA 2261

	Results, Mol %
Hydrogen	0.0029
Oxygen	0.0167
Nitrogen	0.5116
Carbon Dioxide	0.9037
Methane	91.6998
Ethane	5.9772
Propane	0.6872
iso-Butane	0.0731
n-Butane	0.0873
iso-Pentane	0.0164
n-Pentane	0.0115
Hexane Plus	0.0126
TOTAL	**100.0000**

Calorific Value and Specific Gravity, Calculated at 14.696 psia and 60°F, ASTM D 3588.e

	Results
NET (Dry basis), BTU/scf	955.0
Gross (Dry basis), BTU/scf	1,056
NET (Dry basis), BTU/lb	20,689
Gross (Dry basis), BTU/lb	22,927

Calorific Value and Specific Gravity, Calculated at 14.696 psia and 68°F, ASTM D 3588.e

	Results
NET (Dry basis), BTU/scf	938.6
Gross (Dry basis), BTU/scf	1,040
NET (Dry basis), BTU/lb	20,689
Gross (Dry basis), BTU/lb	22,927

CLIENT:	Air Hygiene International	**REQUESTED BY:**	Dr. Sean Barnes
CLIENT PROJECT:	ethos-23-campbell.ca-comp#1	**PURCHASE ORDER NO:**	23010115
LABORATORY NO:	101275 Page 2 of 3	**REPORT DATE:**	December 15, 2023
SAMPLE:	Campbell Power Plant- Natural Gas Grid (7019,4630) 2023-12-05		

Sulfur Compounds in Natural Gas and Gaseous Fuels by GC, ASTM D 5504

	Results, ppmwt
Hydrogen Sulfide	0.5
Carbonyl Sulfide	0.5
2-Methyl Thiophene	<0.1
2-Pentyl Mercaptan	<0.1
3-Methyl Thiophene	<0.1
Benzothiophene	<0.1
Carbon Disulfide	<0.1
Diethylsulfide	<0.1
Dimethylsulfide	<0.1
Ethyl Mercaptan	0.2
Ethylmethylsulfide	<0.1
Isobutyl Mercaptan	<0.1
Isopropyl Mercaptan	0.1
Methyl Mercaptan	0.4
Methyl-t-butyl Sulfide	<0.1
n-Butyl Mercaptan	<0.1
Propyl Mercaptan	<0.1
Tert-butyl disulfide	<0.1
Tert-Butyl mercaptan	0.9
Tetra-Hydro Thiophene	<0.1
Thiophene	<0.1
Thiophenol	<0.1
Dibenzothiophene	<0.1
1,2-Ethanedithiol	<0.1
Propyl Sulfide	<0.1
1-Hexanethiol	<0.1
1,5-Pentanedithiol	<0.1
Bromothiophene	<0.1
Propyl Disulfide	<0.1
1-Heptanethiol	<0.1
2-Methyl Benzothiophene	<0.1
Phenyl Sulfide	<0.1
1-Nonanethiol	<0.1
2-Butyl Thiophene	<0.1
3-Butyl Thiophene	<0.1

CLIENT:	Air Hygiene International	**REQUESTED BY:**	Dr. Sean Barnes
CLIENT PROJECT:	ethos-23-campbell.ca-comp#1	**PURCHASE ORDER NO:**	23010115
LABORATORY NO:	101275 Page 3 of 3	**REPORT DATE:**	December 15, 2023
SAMPLE:	Campbell Power Plant- Natural Gas Grid (7019,4630) 2023-12-05		

Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, @ 60ºF, wt%	1.83×10^{-4}
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, @ 68ºF, wt%	1.80×10^{-4}
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, @ 60ºF, ppmw	1.83
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, @ 68ºF, ppmw	1.80
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, @ 60ºF, ppmv	1.00
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, @ 68ºF, ppmv	0.98
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, grains/100 scf @ 60ºF	0.059
Sulfur Total Volatile, in Gaseous Hydrocarbons and LPG, ASTM D 5504, grains/100 scf @ 68ºF	0.058

Respectfully submitted
For Texas OilTech Laboratories, L.P.

Mr. Ikenna "Ike" Ezeji
Laboratory Director

SINCE 1985
Quality Controlled Through Analysis
10630 FALLSTONE RD. HOUSTON, TEXAS 77099
P.O. BOX 741905, HOUSTON, TEXAS 77274
TEL: (281) 495-2400
FAX: (281) 495-2410

Conversion Factors (Gas Analysis) to adjust BTU/ft^3 and Sulfur content @60ºF and 68ºF

NET (Dry Basis) BTU/scf @60ºF, factor= 1

NET (Dry Basis) BTU/scf @68ºF, factor= 0.984839

Gross (Dry Basis) BTU/scf @60ºF, factor = 1

Gross (Dry Basis) BTU/scf @68ºF, factor = 0.984839

NET (Dry Basis) BTU/lb @60ºF, factor = 1

NET (Dry Basis) BTU/lb @68ºF, factor = 1

GROSS (Dry Basis) BTU/lb @60ºF, factor= 1

GROSS (Dry Basis) BTU/lb @68ºF, factor= 1

Sulfur Total Volatile, ASTM D 6667 @60ºF, wt% or ppmwt, factor= 1

Sulfur Total Volatile, ASTM D 6667 @68ºF, wt% or ppmwt, factor= 0.984839

Sulfur Total Volatile, ASTM D 6667 @60ºF, grains/100scf = ppmwt @60ºF x 0.0300

Sulfur Total Volatile, ASTM D 6667 @68ºF, grains/100scf = ppmwt @60ºF x 0.0295

Conversion Factors (Liquid Fuel Analysis)

Liquid Fuel BTU/lb @60ºF= Liquid fuel BTU/lb @68ºF

Cert. No.: 0005085, 17025
Quality Management System Certified to ISO 9001:2008, and ISO 17025:2005
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SAMPLE DESCRIPTION AND CHAIN OF CUSTODY RECORD

Air Hygiene International, Inc.
1600 W Tacoma Street
Broken Arrow, Oklahoma 74012
(888) 461-8778
www.airhygiene.com

Project Number:	ethos-23-campbell.ca-comp#1	Laboratory Analysis Requested:	
Person Taking Samples:	Mars Sharief	Fuel Component and Sulfur Analysis	

Sample Number	Location	Date	Pressure	Analysis Method(s) [and target(s)]				
				GPA2261/ASTM 1945 [component analysis]	ASTM 5504 [speciated sulfur content]			
CPP-NG-1	Campbell Power Plant - Natural Gas Grid [primary]	12/05/23	275 psi	X	X	7019		
CPP-NG-2	Campbell Power Plant - Natural Gas Grid [backup]	12/05/23	275 psi	as necessary	as necessary	4630		

Mars Sharief	12/08/23	11:00			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			G. M	12/08/23	01:17
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

APPENDIX F

STRATIFICATION TEST DATA

Source Information	
Company	Sacramento Finance Authority
Plant Name	Campbell Power Plant
Equipment	Siemens V84.2 Combined Cycle Turbine
Location	Sacramento, California

Test Information	
Date	12/05/23
Project #	ethos-23-campbell.ca-comp#1
Unit Number	CT1
Load	Normal
Number of Ports Available	4
Number of Ports Used	4

Stack and Test Type			
○	Isokinetic Traverse (Wet Chemistry Testing)		**Circular Stack**
○	Velocity Traverse (Flow and Flow RATA Test)		
○	Stratification Traverse (Compliance Test)	☐ RM 20	
◉	**Stratification Traverse (RATA)** ☐ Part 60	☑ Part 75	

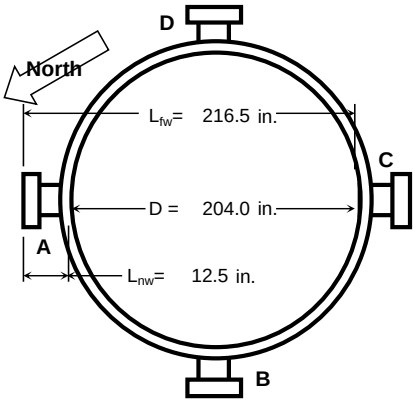
Created with Traverse-AHI v20230306

ethos-23-campbell.ca-comp#1-CT1-trav

METHOD 1 - STRATIFICATION TEST FOR A CIRCULAR SOURCE

Company	Sacramento Finance Authority	**Date**	12/05/23
Plant Name	Campbell Power Plant	**Project #**	ethos-23-campbell.ca-comp#1
Equipment	Siemens V84.2 Combined Cycle Turbine	**# of Ports Available**	4
Location	Sacramento, California	**# of Ports Used**	4

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	216.50	in.
Distance to Near Wall of Stack	(L_{nw})	12.50	in.
Diameter of Stack	(D)	204.00	in.
Area of Stack	(A_s)	226.98	ft^2

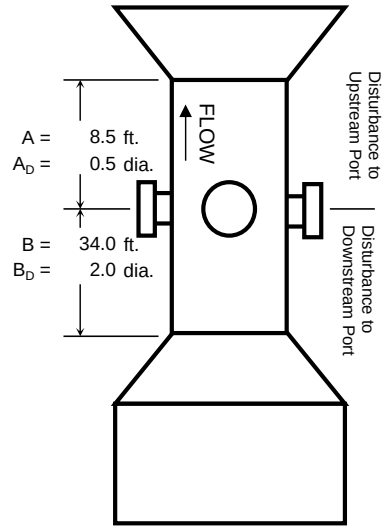


Distance from Disturbances to Port			
Distance Upstream	(A)	102.00	in.
Diameters Upstream	(A_D)	0.50	diameters
Distance Downstream	(B)	408.00	in.
Diameters Downstream	(B_D)	2.00	diameters

Number of Traverse Points Required					
Diameters to Flow Disturbance		Minimum Number of[1] Traverse Points		Minimum Number of Traverse Points Comp Stratification	
Down (B_D) Stream	Up (A_D) Stream	Particulate Points	Velocity Points	Criteria	Points
2.00-4.99	0.50-1.24	24	16	RM 7E 8.1.2	12 RM1 pts
5.00-5.99	1.25-1.49	20	16	Alt 7E 8.1.2	3 points
6.00-6.99	1.50-1.74	16	12		
7.00-7.99	1.75-1.99	12	12		
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]	**Minimum Number of**	
Upstream Spec		24	16	**Traverse Points**	
Downstream Spec		24	16	**RATA Stratification**	
Traverse Pts Required		24	16	**Criteria**	**Points**
				Part75/60	12 RM1 pts
				75 abrv (a)	3 points
				75 abrv (b)	6 points
				12 points	

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.

[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches



Number of Traverse Points Used				
4	**Ports by**	3	**Pts / port**	**Stratification Traverse (RATA)**
12	**Pts Used**	12	**Required**	

Traverse Point Locations			
Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1	4.4%	9	21 4/8
2	14.6%	29 6/8	42 2/8
3	29.6%	60 3/8	72 7/8
4			
5			
6			
7			
8			
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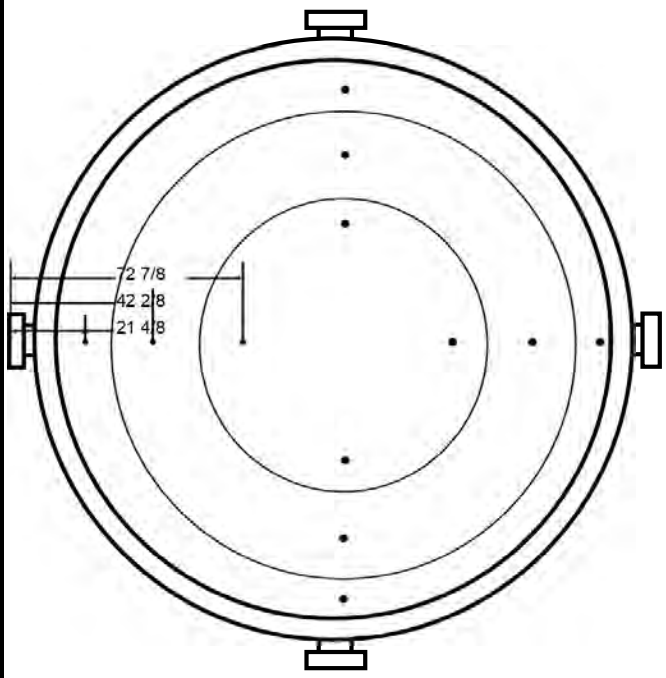


STRATIFICATION TRAVERSE (RATA) RESULTS

Company	Sacramento Finance Authority	**Date**	12/05/23
Plant Name	Campbell Power Plant	**Project #**	ethos-23-campbell.ca-comp#1
Equipment	Siemens V84.2 Combined Cycle Turbine	**# of Ports Available**	4
Location	Sacramento, California	**# of Ports Used**	4

Stack Dimensions				**Traverse Data**			
Diameter or Length of Stack	(D)	204.00	in.	4	**Ports by**	3	**Pts / port**
Width of Stack	(W)		in.	12	**Pts Used**	12	**Required**
Area of Stack	(A_s)	226.98	ft^2	**Run Start**	6:58:26	**Run End**	7:47:26

Traverse Point	**Time Per Point**	**Point Start Time**	**Point Stop Time (Reading)**	**O_2**	**Percent Difference**	**NOx**	**Percent Difference**
	min.	hh:mm:ss	hh:mm:ss	%	%	ppm	%
D-3	3.00	6:58:26	7:01:26	14.44	0.97%	3.09	**10.49%**
D-2	3.00	7:01:26	7:04:26	14.42	1.11%	2.77	0.95%
D-1	3.00	7:04:26	7:07:26	14.45	0.90%	2.72	2.74%
C-3	14.00	7:07:26	7:21:26	14.51	0.49%	2.97	6.20%
C-2	3.00	7:21:26	7:24:26	14.52	0.42%	2.96	5.84%
C-1	3.00	7:24:26	7:27:26	14.50	0.56%	2.93	4.77%
B-3	4.00	7:27:26	7:31:26	14.81	1.57%	2.82	0.83%
B-2	3.00	7:31:26	7:34:26	14.78	1.36%	2.51	10.25%
B-1	3.00	7:34:26	7:37:26	14.82	**1.63%**	2.68	4.17%
A-3	4.00	7:37:26	7:41:26	14.56	0.15%	2.73	2.38%
A-2	3.00	7:41:26	7:44:26	14.58	0.01%	2.66	4.89%
A-1	3.00	7:44:26	7:47:26	14.59	0.06%	2.72	2.74%
Average				14.58		2.80	

			O_2		NOx		
			Criteria	**Results**	**Criteria**	**Results**	**OR criteria**
RATA Part 75	Non-Stratified %	≤	5%	Non (%)	5%	Non (Δ)	Under Part 75 criteria at least one measured pollutant or diluent demonstrates a non-stratified stack with subsequent testing from a single point located at least one meter away from the stack wall.
	Non-Stratified Δ	≤	0.3		3		
	Minimally-Stratified %	≤	10%		10%		
	Minimally-Stratified Δ	≤	0.5		5		
	Stratified	>	10%		10%		
	Outcome		1 point		1 point		
	Location		any point		any point		
	Maximum Concentration		14.82		3.09		
	Upscale Δ = Max Concentration - Average		0.24	Non	0.29	Non	
	Upscale % Difference		1.63%	Non	10.49%	Strat	
	Minimum Concentration		14.42		2.51		
	Downscale Δ = Average - Min Concentration		0.16	Non	0.29	Non	
	Downscale % Difference		1.11%	Non	10.25%	Strat	
	First Point on List Closest to Average		A-2		B-3		
Port Averages with Maximum Concentration Indicator	**Port A Average**		14.58		2.70		
	Port B Average		14.80	<max	2.67		
	Port C Average		14.51		2.95	<max	
	Port D Average		14.44		2.86		
	Port E Average						
	Port F Average						
	Port G Average						

RATA SAMPLE POINTS FOR CIRCULAR STACK

Company	Sacramento Finance Authority	**Date**	12/05/23
Plant Name	Campbell Power Plant	**Project #**	ethos-23-campbell.ca-comp#1
Equipment	Siemens V84.2 Combined Cycle Turbine	**# of Ports Available**	4
Location	Sacramento, California	**# of Ports Used**	4

Stack Dimensions				**Traverse Data**			
Diameter or Length of Stack	(D)	204.00	in.	4	**Ports by**	3	**Pts / port**
Width of Stack	(W)		in.	12	**Pts Used**	12	**Required**
Area of Stack	(A_s)	226.98	ft^2	**Run Start**	6:58:26	**Run End**	7:47:26

40 CFR 75 Criteria

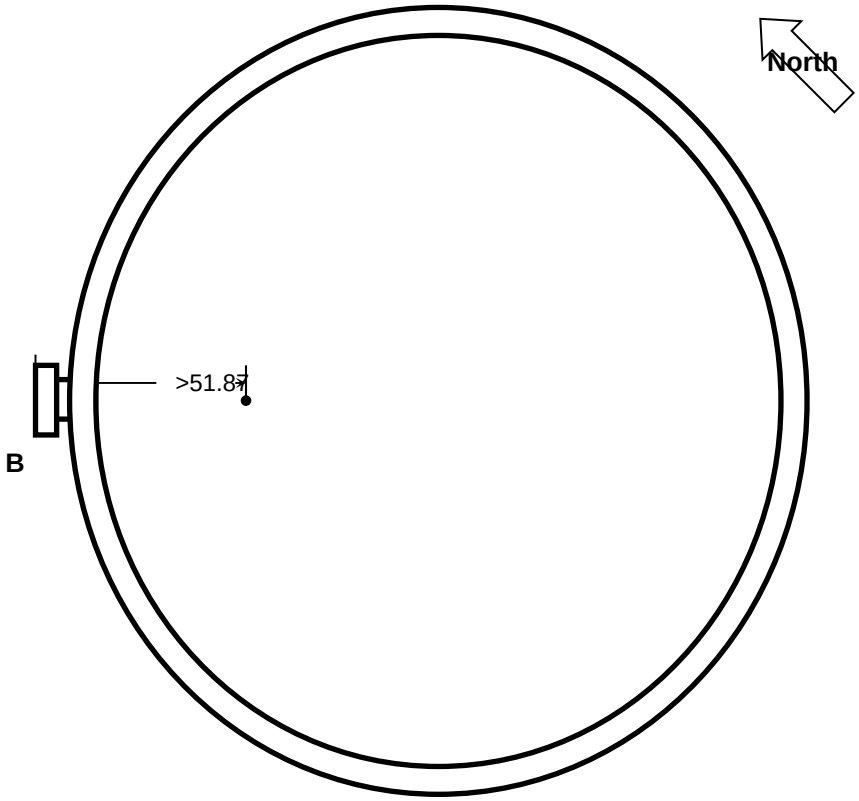
Stratification Results	
Maximum Percent Difference	1.63 % for O_2
Maximum Pollutant Conc. Diff.	0.29 ppm for NOx
Maximum Diluent Conc. Diff.	0.24 % for O_2
Stratification Conclusions	
Comparison	at least one diluent/pollutant
Stack Diameter	D > 93.6 in.

Under Part 75 criteria at least one measured pollutant or diluent demonstrates a non-stratified stack with subsequent testing from a single point located at least one meter away from the stack wall.

Traverse Point Number	**Percent of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Reference Length**
	%	in.	in.
1	>19.3%	>39.37	>51.87
2			
3			

Test Type
- ☐ Moisture, for MW
- ☐ Moisture, for wet-to-dry
- ☑ Gas

- ☐ Use 6.5.6.3(a) points?
- ☐ 6.5.6(b)(2) alt. points could apply



APPENDIX G

EQUIPMENT CALIBRATION RECORDS

METERING SYSTEM DRY GAS METER CALIBRATION SHEET
EPA Reference Method
Metering System Pre-Test Calibration
Air Hygiene Assett ID: samp-cp-0016

Filename: C:\ahi\[SAMP-CP-0016 Calibration 10-27-23.xls]Original (5 point)
Make: apex
Model #: 522
Serial #: 705008

Date: 10/27/23
Barometric Pressure: 29.14 (in. Hg)
Theoretical Critical Vacuum: 13.75 (in. Hg)

DRY GAS METER READINGS

ΔH (in. H2O)	Time (min)	Volume Initial (ft³)	Volume Final (ft³)	Volume Total (ft³)	Initial Temperature Inlet (°F)	Initial Temperature Outlet (°F)
0.33	17.00	92.900	98.440	5.540	69.0	69.0
0.67	12.00	98.440	104.120	5.680	70.0	70.0
1.20	10.00	104.120	110.440	6.320	71.0	71.0
2.00	10.00	110.440	118.620	8.180	72.0	72.0
3.60	10.00	118.620	129.890	11.270	73.0	73.0

Final Temperature Inlet (°F)	Final Temperature Outlet (°F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in. Hg)	Ambient Temperature Initial (°F)	Ambient Temperature Final (°F)	Ambient Temperature Average (°F)
69.0	69.0	340	0.2427	16.0	70.0	70.5	70.3
71.0	71.0	348	0.3491	16.0	70.5	70.7	70.6
71.0	71.0	355	0.4626	16.0	70.7	70.8	70.8
72.0	72.0	363	0.5989	16.0	70.9	70.9	70.9
74.0	74.0	373	0.8199	15.0	71.0	71.0	71.0

RESULTS

DRY GAS METER VOLUME CORRECTED Vm(std) (ft³)	DRY GAS METER VOLUME CORRECTED Vm(std) (liters)	ORIFICE VOLUME CORRECTED Vcr(std) (ft³)	ORIFICE VOLUME CORRECTED Vcr(std) (liters)	ORIFICE VOLUME NOMINAL Vcr (ft³)
5.388	152.58	5.221	147.9	5.386
5.513	156.13	5.300	150.1	5.470
6.137	173.79	5.851	165.7	6.042
7.944	224.96	7.574	214.5	7.823
10.957	310.31	10.368	293.6	10.710

DRY GAS METER CALIBRATION FACTOR Y Variation (number)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	ORIFICE CALIBRATION FACTOR ΔH@ Value (in. H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Variation (in. H2O)
0.012	0.969	1.913	48.59	0.032
0.005	0.961	1.873	47.58	-0.008
-0.003	0.954	1.909	48.50	0.028
-0.003	0.954	1.895	48.15	0.014
-0.010	0.946	1.816	46.12	-0.066
AVERAGE:	**0.957**	**1.881**	47.78	**PASSED**

Notes:

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H_20 that equates to 0.75 cfm of air at 68 °F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarty _____ DATE: 10/27/23 10/27/23

METERING SYSTEM THERMOCOUPLE CALIBRATION SHEET
EPA Reference Method
Metering System Pre-Test Calibration
Air Hygiene Assett ID: samp-cp-0016

Filename: C:\ahi\[SAMP-CP-0016 Calibration 10-27-23.xls]Original (5 point)
Make: apex
Model #: 522
Serial #: 705008

Date: 10/27/23
Barometric Pressure: 29.14 (in. Hg)
Temperature (ASTM cal): 69.80 (°F)

Thermocouple	100 (°F)		600 (°F)		1200 (°F)	
	Reading	% Error	Reading	% Error	Reading	% Error
Stack	101.00	0.50	602.00	0.33	1205.00	0.42
Probe	101.00	0.50	602.00	0.33	1205.00	0.42
Filter	101.00	0.50	602.00	0.33	1205.00	0.42
Dryer	101.00	0.50	602.00	0.33	1205.00	0.42
Aux.	101.00	0.50	602.00	0.33	1205.00	0.42

Note: Calibrated against an ALTEK Thermocouple Source Series 22, ID: samp-tc-0005
Direct temperature output calibrated to ASTM and IPTS standards as outlined in ALTEK Data Sheet 22.

Thermocouple	69.80 (°F)		Responded to heating/cooling with the anticipated outcome?
	Reading	(±°F)	
DGM In	69.0	0.80	yes
DGM Out	69.0	0.80	yes

Note: Calibrated against Reference Thermometer ID: a070717

SIGNATURE: Craig McCarty DATE: 10/27/23 10/27/23

Standard for Calibration of Console Thermocouple Systems

40 CFR, Part 60
Appendix A, Method 5
10.3.2 The temperature data recorded in the field shall be considered valid. If, during calibration, the absolute temperature measured with the sensor being calibrated and the reference sensor **agree within 1.5 percent**, the temperature data taken in the field shall be considered valid.

Standard for Calibration of Individual Thermocouples

EMC, ALT-011: After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacturer, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall **agree to within ±2°F**.

Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

PROBE (STACK), HOTBOX (FILTER), AND GOOSENECK (EXIT) THERMOCOUPLE CALIBRATION SHEET
EPA Reference Method
Metering System Pre-Test Calibration

Air Hygiene Assett ID(s): **Probe:** samp-hp-0086 **Hotbox:** samp-bh-0012 **Gooseneck:** samp-ad-0046

Filename: C:\ahi\[SAMP-CP-0016 Calibration 10-27-23.xls]Original (5 point)
Barometric Pressure: 29.14

Thermo-couples		Temps (°F)	Signature		Date	
Stack	Ref	69.80	Craig McCarty		10/27/23	10/27/23
	Read	70.00				
	±°F	0.20				
Probe	Ref	69.80	Craig McCarty		10/27/23	10/27/23
	Read	70.00				
	±°F	0.20				
Filter	Ref	69.80	Craig McCarty		10/27/23	10/27/23
	Read	70.00				
	±°F	0.20				
Cond.	Ref	69.80	Craig McCarty		10/27/23	10/27/23
	Read	70.00				
	±°F	0.20				
CPM	Ref	69.80	Craig McCarty		10/27/23	10/27/23
	Read	70.00				
	±°F	0.20				
Exit	Ref	69.80	Craig McCarty		10/27/23	10/27/23
	Read	70.00				
	±°F	0.20				

Note: Calibrated against Reference Thermometer ID: a070717

Thermocouple	Responded to heating/cooling with the anticipated outcome?
Stack	yes
Probe	yes
Filter	yes
Cond.	yes
CPM	yes
Exit	yes

Standard for Calibration of Individual Thermocouples

EMC, ALT-011: After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacturer, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall **agree to within ±2°F**.

Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

METERING SYSTEM DRY GAS METER CALIBRATION SHEET
EPA Reference Method
Metering System Post-Test Calibration
Air Hygiene Assett ID: samp-cp-0016

Filename: C:\ahi\[SAMP-CP-0016 Calibration 10-27-23.xls]12-22-23 (3 point)
Make: Apex
Model #: XC-522
Serial #: 0705008

Date: 12/22/23
Barometric Pressure: 29.32 (in. Hg)
Theoretical Critical Vacuum: 13.83 (in. Hg)

DRY GAS METER READINGS

ΔH (in. H2O)	Time (min)	Volume Initial (ft³)	Volume Final (ft³)	Volume Total (ft³)	Initial Temperature Inlet (°F)	Initial Temperature Outlet (°F)
2.00	10.00	6.500	14.650	8.150	68.0	68.0
2.00	10.00	14.650	22.820	8.170	68.0	68.0
2.00	10.00	22.820	31.000	8.180	69.0	69.0

Final Temperature Inlet (°F)	Final Temperature Outlet (°F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in. Hg)	Ambient Temperature Initial (°F)	Ambient Temperature Final (°F)	Ambient Temperature Average (°F)
68.0	68.0	363	0.5989	16.0	69.1	69.4	69.3
69.0	69.0	363	0.5989	16.0	69.4	69.4	69.4
70.0	70.0	363	0.5989	16.0	69.4	69.8	69.6

RESULTS

DRY GAS METER VOLUME CORRECTED Vm(std) (ft³)	DRY GAS METER VOLUME CORRECTED Vm(std) (liters)	ORIFICE VOLUME CORRECTED Vcr(std) (ft³)	ORIFICE VOLUME CORRECTED Vcr(std) (liters)	ORIFICE VOLUME NOMINAL Vcr (ft³)
8.023	227.22	7.633	216.2	7.811
8.035	227.57	7.632	216.1	7.812
8.030	227.41	7.630	216.1	7.813

DRY GAS METER CALIBRATION FACTOR Y Variation (number)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	ORIFICE CALIBRATION FACTOR ΔH@ Value (in. H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Variation (in. H2O)
0.001	0.951	1.892	48.06	0.002
-0.001	0.950	1.891	48.03	0.001
0.000	0.950	1.888	47.96	-0.002
AVERAGE:	**0.950**	**1.890**	48.02	**PASSED**
LAST 5-PT:	**0.957**	**1.881**	**PASSED**	5-PT Date:
% DIFF:	**0.7%**	**0.5%**		10/27/23

40 CFR - CHAPTER I - PART 60
Appendix A, Method 5
10.3.2 Calibration After Use
After each field use, the calibration of the metering system shall be checked by performing three calibration runs at a single, intermediate orifice setting (based on the previous field test)....Calculate the average value of the DGM calibration factor. If the value has changed by more than 5 percent, recalibrate the meter over the full range of orifice settings, as detailed in Section 10.3.1.

10.3.3 Acceptable Variation in Calibration
If the DGM coefficient values obtained before and after a test series differ by more than 5 percent, the test series shall either be voided, or calculations for the test series shall be performed using whichever meter coefficient value (i.e., before or after) gives the lower value of total sample volume.

Notes: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H_20 that equates to 0.75 cfm of air at 68 °F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarty DATE: 12/22/23 12/22/23

METERING SYSTEM THERMOCOUPLE CALIBRATION SHEET
EPA Reference Method
Metering System Post-Test Calibration
Air Hygiene Assett ID: samp-cp-0016

Filename: C:\ahi\[SAMP-CP-0016 Calibration 10-27-23.xls]12-22-23 (3 point)
Make: Apex
Model #: XC-522
Serial #: 0705008

Date: 12/22/23
Barometric Pressure: 29.32 (in. Hg)
Temperature (ASTM cal): 69.10 (°F)

Thermocouple	100	(°F)	600	(°F)	1200	(°F)
	Reading	% Error	Reading	% Error	Reading	% Error
Stack	100.00	0.00	601.00	0.17	1204.00	0.33
Probe	100.00	0.00	601.00	0.17	1204.00	0.33
Filter	100.00	0.00	601.00	0.17	1204.00	0.33
Dryer	100.00	0.00	601.00	0.17	1204.00	0.33
Aux.	100.00	0.00	601.00	0.17	1204.00	0.33

Note: Calibrated against an ALTEK Thermocouple Source Series 22, ID: samp-hp-0086
Direct temperature output calibrated to ASTM and IPTS standards as outlined in ALTEK Data Sheet 22.

Thermocouple	69.10	(°F)	Responded to heating/cooling with the anticipated outcome?
	Reading	(±°F)	
DGM In	69.0	0.10	yes
DGM Out	69.0	0.10	yes

Note: Calibrated against Reference Thermometer ID: a070717

SIGNATURE: Craig McCarty _____ DATE: 12/22/23 12/22/23

Standard for Calibration of Console Thermocouple Systems

40 CFR, Part 60
Appendix A, Method 5
10.3.2 The temperature data recorded in the field shall be considered valid. If, during calibration, the absolute temperature measured with the sensor being calibrated and the reference sensor **agree within 1.5 percent**, the temperature data taken in the field shall be considered valid.

Standard for Calibration of Individual Thermocouples

EMC, ALT-011: After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacturer, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall **agree to within ±2°F**.

Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

PROBE (STACK), HOTBOX (FILTER), AND GOOSENECK (EXIT) THERMOCOUPLE CALIBRATION SHEET
EPA Reference Method
Metering System Post-Test Calibration

Air Hygiene Assett ID(s): **Probe:** samp-hp-0086 **Hotbox:** samp-bh-0012 **Gooseneck:** samp-ad-0046

Filename: C:\ahi\[SAMP-CP-0016 Calibration 10-27-23.xls]12-22-23 (3 point)
Barometric Pressure: 29.32

Thermo-couples		Temps (°F)	Signature		Date	
Stack	Ref	69.30	Craig McCarty		12/22/23	12/22/23
	Read	69.00				
	±°F	0.30				
Probe	Ref	69.30	Craig McCarty		12/22/23	12/22/23
	Read	69.00				
	±°F	0.30				
Filter	Ref	69.30	Craig McCarty		12/22/23	12/22/23
	Read	69.00				
	±°F	0.30				
Cond.	Ref	69.30	Craig McCarty		12/22/23	12/22/23
	Read	69.00				
	±°F	0.30				
CPM	Ref	69.30	Craig McCarty		12/22/23	12/22/23
	Read	69.00				
	±°F	0.30				
Exit	Ref	69.30	Craig McCarty		12/22/23	12/22/23
	Read	69.00				
	±°F	0.30				

Note: Calibrated against Reference Thermometer ID:

Thermocouple	Responded to heating/cooling with the anticipated outcome?
Stack	yes
Probe	yes
Filter	yes
Cond.	yes
CPM	yes
Exit	yes

Standard for Calibration of Individual Thermocouples

EMC, ALT-011: After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacturer, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall **agree to within ±2°F**.

Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

METERING SYSTEM DRY GAS METER CALIBRATION SHEET
EPA Reference Method
Metering System Pre-Test Calibration
Air Hygiene Assett ID: samp-cp-0021

Filename: C:\ahi\[SAMP-CP-0021 Calibration 11-20-23 (exp 11-20-24).xls]Original (5 point)
Make: apex — Date: 11/20/23
Model #: 522 — Barometric Pressure: 28.96 (in. Hg)
Serial #: — Theoretical Critical Vacuum: 13.66 (in. Hg)

DRY GAS METER READINGS

ΔH (in. H2O)	Time (min)	Volume Initial (ft³)	Volume Final (ft³)	Volume Total (ft³)	Initial Temperature Inlet (°F)	Initial Temperature Outlet (°F)
0.32	17.00	455.220	460.750	5.530	69.0	69.0
0.66	12.00	460.750	466.360	5.610	70.0	70.0
1.10	10.00	466.360	472.570	6.210	71.0	71.0
1.90	10.00	472.580	480.580	8.000	72.0	72.0
3.50	10.00	480.580	491.520	10.940	72.0	72.0

Final Temperature Inlet (°F)	Final Temperature Outlet (°F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in. Hg)	Ambient Temperature Initial (°F)	Ambient Temperature Final (°F)	Ambient Temperature Average (°F)
70.0	70.0	340	0.2427	16.0	68.8	69.4	69.1
71.0	71.0	348	0.3491	16.0	69.4	69.8	69.6
71.0	71.0	355	0.4626	16.0	69.8	70.1	70.0
72.0	72.0	363	0.5989	16.0	70.1	70.4	70.3
73.0	73.0	373	0.8199	16.0	70.4	70.5	70.5

RESULTS

DRY GAS METER VOLUME CORRECTED Vm(std) (ft³)	DRY GAS METER VOLUME CORRECTED Vm(std) (liters)	ORIFICE VOLUME CORRECTED Vcr(std) (ft³)	ORIFICE VOLUME CORRECTED Vcr(std) (liters)	ORIFICE VOLUME NOMINAL Vcr (ft³)
5.340	151.22	5.195	147.1	5.380
5.411	153.25	5.272	149.3	5.465
5.991	169.67	5.820	164.8	6.037
7.719	218.60	7.532	213.3	7.818
10.589	299.87	10.309	292.0	10.705

DRY GAS METER CALIBRATION FACTOR Y Variation (number)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	ORIFICE CALIBRATION FACTOR ΔH@ Value (in. H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR ΔH@ Variation (in. H2O)
-0.001	0.973	1.861	47.26	0.049
0.001	0.974	1.853	47.07	0.041
-0.002	0.971	1.758	44.66	-0.054
0.002	0.976	1.810	45.97	-0.002
0.000	0.974	1.778	45.15	-0.034
AVERAGE:	**0.974**	**1.812**	46.02	**PASSED**

Notes:

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter,acceptable tolerance of individual values from the average is +/- 0.02. For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H_20 that equates to 0.75 cfm of air at 68 °F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +/- 0.2. For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

SIGNATURE: Craig McCarty _____ DATE: 11/20/23 11/20/23

METERING SYSTEM THERMOCOUPLE CALIBRATION SHEET
EPA Reference Method
Metering System Pre-Test Calibration
Air Hygiene Assett ID: samp-cp-0021

Filename: C:\ahi\[SAMP-CP-0021 Calibration 11-20-23 (exp 11-20-24).xls]Original (5 point)
Make: apex — Date: 11/20/23
Model #: 522 — Barometric Pressure: 28.85 (in. Hg)
Serial #: — Temperature (ASTM cal): 68.90 (°F)

Thermocouple	100 (°F)		600 (°F)		1200 (°F)	
	Reading	% Error	Reading	% Error	Reading	% Error
Stack	101.00	0.50	604.00	0.67	1207.00	0.58
Probe	101.00	0.50	604.00	0.67	1207.00	0.58
Filter	101.00	0.50	604.00	0.67	1207.00	0.58
Dryer	101.00	0.50	604.00	0.67	1207.00	0.58
Aux.	101.00	0.50	604.00	0.67	1207.00	0.58

Note: Calibrated against an ALTEK Thermocouple Source Series 22, ID: samp-tc-0005
Direct temperature output calibrated to ASTM and IPTS standards as outlined in ALTEK Data Sheet 22.

Thermocouple	68.90 (°F)		Responded to heating/cooling with the anticipated outcome?
	Reading	(±°F)	
DGM In	69.0	0.10	yes
DGM Out	69.0	0.10	yes

Note: Calibrated against Reference Thermometer ID: a070717

SIGNATURE: Craig McCarty DATE: 11/20/23 11/20/23

Standard for Calibration of Console Thermocouple Systems

40 CFR, Part 60
Appendix A, Method 5
10.3.2 The temperature data recorded in the field shall be considered valid. If, during calibration, the absolute temperature measured with the sensor being calibrated and the reference sensor **agree within 1.5 percent**, the temperature data taken in the field shall be considered valid.

Standard for Calibration of Individual Thermocouples

EMC, ALT-011: After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacturer, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall **agree to within ±2°F**.

Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

PROBE (STACK), HOTBOX (FILTER), AND GOOSENECK (EXIT) THERMOCOUPLE CALIBRATION SHEET
EPA Reference Method
Metering System Pre-Test Calibration

Air Hygiene Assett ID(s): **Probe:** samp-hp-0086 **Hotbox:** samp-bh-0012 **Gooseneck:** samp-ad-0046

Filename: C:\ahi\[SAMP-CP-0021 Calibration 11-20-23 (exp 11-20-24).xls]Original (5 point)
Barometric Pressure: 28.85

Thermo-couples		Temps (°F)	Signature		Date	
Stack	Ref	68.90	Craig McCarty		11/20/23	11/20/23
	Read	69.00				
	±°F	0.10				
Probe	Ref	68.90	Craig McCarty		11/20/23	11/20/23
	Read	69.00				
	±°F	0.10				
Filter	Ref	68.90	Craig McCarty		11/20/23	11/20/23
	Read	69.00				
	±°F	0.10				
Cond.	Ref	68.90	Craig McCarty		11/20/23	11/20/23
	Read	69.00				
	±°F	0.10				
CPM	Ref	68.90	Craig McCarty		11/20/23	11/20/23
	Read	69.00				
	±°F	0.10				
Exit	Ref	68.90	Craig McCarty		11/20/23	11/20/23
	Read	69.00				
	±°F	0.10				

Note: Calibrated against Reference Thermometer ID: a070717

Thermocouple	Responded to heating/cooling with the anticipated outcome?
Stack	yes
Probe	yes
Filter	yes
Cond.	yes
CPM	yes
Exit	yes

Standard for Calibration of Individual Thermocouples

EMC, ALT-011: After each test run series, check the accuracy (and, hence, the calibration) of each thermocouple system at ambient temperature, or any other temperature, within the range specified by the manufacturer, using a reference thermometer (either ASTM reference thermometer or a thermometer that has been calibrated against an ASTM reference thermometer). The temperatures of the thermocouple and reference thermometers shall **agree to within ±2°F**.

Check the continuity of the thermocouple by subjecting it to a change in the temperature (e.g.., removing it from the stack or touching an ice cube). This step will also check for loose connections and reversed connections (noted by a wrong change in the temperature).

Alternative Post-Test Metering System Calibration

RM 5, Section 16.3.1.3

samp-cp-0021

$$\gamma_{qa} = \frac{\theta}{V_m}\sqrt{\frac{0.0319T_m}{\Delta H@\left(P_{bar}+\frac{\Delta H_{avg}}{13.6}\right)}\frac{29}{M_d}}\left(\sqrt{\Delta H}\right)_{avg}$$

Parameters	Variable	Run 1	Run 2	Run 3	Units
Run Time	Θ	120.00	120.00	120.00	minutes
Actual Meter Volume	V_m	106.53	114.5	94.7	dcf
Meter Temperature	T_m	532.46	535.33	535.75	°R
Meter Pressure at 0.75 cfm	ΔH@	1.812	1.812	1.812	in. H_2O
Barometric Pressure	P_{bar}	30.13	30.15	30.07	in. Hg
Average Meter Pressure	ΔH_{avg}	2.46	2.80	1.93	in. H_2O
Dry Molecular Weight	M_d	29.16	29.16	29.16	lb/lb-mol
Average √Meter Pressure	$(\Delta H)^{1/2}_{avg}$	1.55	1.66	1.37	$(\text{in. } H_2O)^{1/2}$
Run Specific Gamma	Y_{aq}	0.9666	0.9665	0.9672	

Constants:

0.0319 = (29.92/528) $(0.75)^2$(in. Hg/°R) cfm^2

29 = Dry molecular weight of air, lb/lb-mole

13.6 = conversion from inches of water to inches of mercury

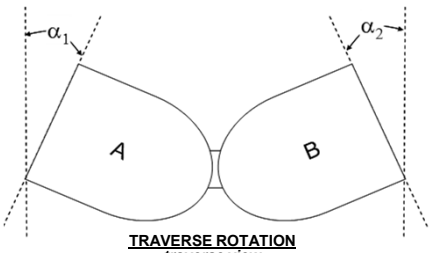
$Y_{aq\ (avg)}$	0.9667
Y_i	0.9740
%Diff	0.75%
Criteria	%Diff <5%
Result	**PASS**

Example Calculation (Run 1)

$$Y_{aq} = \frac{120.00}{106.53} \times \sqrt{\frac{0.0319 \times 532.46}{1.812 \times \left(30.13 + \frac{2.46}{13.6}\right)} \times \frac{29}{29.16}} \times 1.5473 = 0.9666$$

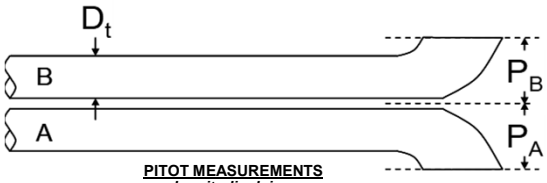
TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot Tube Identification Number	A6223			
Pitot Block ID Number	LABS-GM-0002			
Pitot Tube Assembly Level	✓	adequate		inadequate
Damage to Pitot Tube Ends		yes	✓	no
Damage to Pitot Tube Welds		yes	✓	no



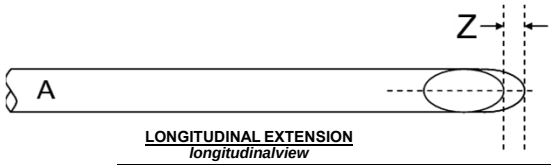
TRAVERSE ROTATION
traverse view

α	PASS	FAIL
$\alpha_1 \leq 10^o$	✓	
$\alpha_2 \leq 10^o$	✓	



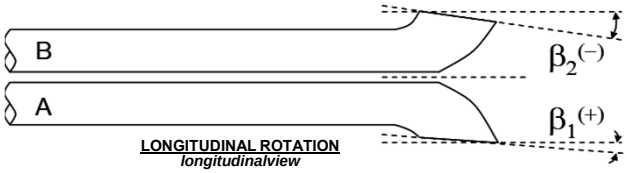
PITOT MEASUREMENTS
longitudinalview

D_t	PASS	FAIL
$^3/_{16}$ in. ≤ $Dt_A \leq {}^3/_8$ in.	✓	
$^3/_{16}$ in. ≤ $Dt_B \leq {}^3/_8$ in.	✓	



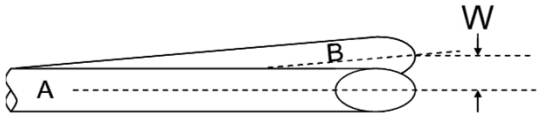
LONGITUDINAL EXTENSION
longitudinalview

Z	PASS	FAIL
Z ≤ $^1/_8$ in.	✓	



LONGITUDINAL ROTATION
longitudinalview

β	PASS	FAIL
$\beta_1 \leq 5^o$	✓	
$\beta_2 \leq 5^o$	✓	



LONGITUDINAL DEFLECTION
longitudinalview

W	PASS	FAIL
Z ≤ $^1/_{32}$ in.	✓	

Comments:

Re-Calibration Required		yes	✓	no

SIGNATURE: Mars Sharief DATE: 12/04/23

Apex Instruments, Inc.
204 Technology Park Lane
Fuquay-Varina, NC 27526

S-TYPE PITOT TUBE CALIBRATION SHEET

Reference USEPA Reference Method 2 (40CFR60, App. A, Meth. 2)

PITOT SERIAL#	A6223	**CALIBRATION DATE:**	11-Aug-15	
PITOT TYPE:	S	**BAROMETRIC PRESSURE:**	29.65	in Hg
STD. PITOT TYPE:	ELLIPSOIDAL	**STATIC PRESSURE**	-0.6	in H_2O
Cp(std):	0.990	**BLOCKAGE %:**	N/A	
PROBE SERIAL#	N/A	**CORRECTION FACTOR:**	1.00	

	SIDE "A" CALIBRATION			
RUN NO.	**Δ Pstd in H_2O**	**Δ Ps in H_2O**	**Cp(s)**	**DEVIATION Cp(s) - avg.Cp(s)**
1	**0.560**	**0.808**	**0.824**	**-0.002**
2	**0.560**	**0.806**	**0.825**	**-0.001**
3	**0.561**	**0.802**	**0.828**	**0.002**
		"A" AVERAGE	**0.826**	**0.0020**

(must be ≤ 0.01)

	SIDE "B" CALIBRATION			
RUN NO.	**Δ Pstd in H_2O**	**Δ Ps in H_2O**	**Cp(s)**	**DEVIATION Cp(s) - avg.Cp(s)**
1	**0.559**	**0.823**	**0.816**	**-0.001**
2	**0.559**	**0.822**	**0.816**	**-0.001**
3	**0.561**	**0.819**	**0.819**	**0.002**
		"B" AVERAGE	**0.817**	**0.0019**

(must be ≤ 0.01)

ACCEPTANCE CRITERIA

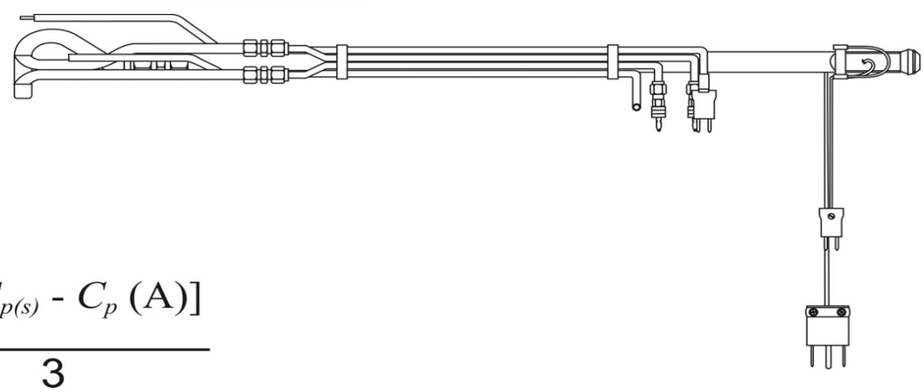
AVERAGE **0.0086** AVG. Cp (A) - AVG. Cp (B) must be ≤ 0.01

If the Average <u>and</u> both Deviation Averages "A" & "B" are ≤ 0.01, then the OVERALL AVERAGE below may be used.

*** If NOT, use the "A" Average <u>OR</u> "B" Average.**

OVERALL AVERAGE **0.8215**

$$C_{p(s)} = C_{p(std)} \sqrt{\frac{\Delta p_{std}}{\Delta p_s}}$$



$$\text{Deviation} = C_{p(s)} - \overline{C_p}(\text{A})$$

$$\text{Avg Dev} = \sigma\,(\text{A}) = \frac{\sum_{1}^{3} [C_{p(s)} - C_p\,(\text{A})]}{3}$$

Method 2 Section 10.1.4.3 For a probe assembly constructed such that its pitot tube is always used in the same orientation, only one side of the pitot tube need be calibrated (the side which will face the flow). The pitot tube must still meet the alignment specifications of Figure 2-2 or 2-3, however, and must have an average deviation (σ) value of 0.01 or less (see section 10.1.4.4).

I certify that the above pitot tube was tested in accordance with the US EPA Method 2 standards.
See the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2, Item 4.

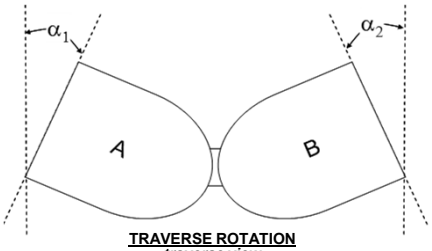
Print Name: BO PRITCHARD

Date 8/11/2015

Signature:

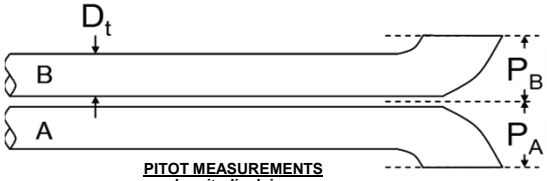
TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot Tube Identification Number	A7793			
Pitot Block ID Number	LABS-GM-0002			
Pitot Tube Assembly Level	✓	adequate		inadequate
Damage to Pitot Tube Ends		yes	✓	no
Damage to Pitot Tube Welds		yes	✓	no



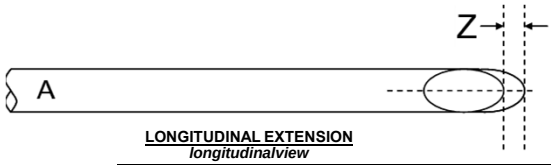
TRAVERSE ROTATION
traverse view

α	PASS	FAIL
$\alpha_1 \leq 10^o$	✓	
$\alpha_2 \leq 10^o$	✓	



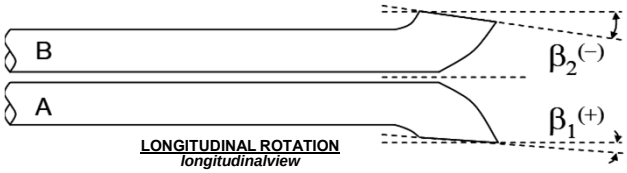
PITOT MEASUREMENTS
longitudinalview

D_t	PASS	FAIL
$^3/_{16}$ in. ≤ $Dt_A \leq {}^3/_8$ in.	✓	
$^3/_{16}$ in. ≤ $Dt_B \leq {}^3/_8$ in.	✓	



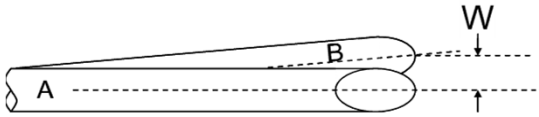
LONGITUDINAL EXTENSION
longitudinalview

Z	PASS	FAIL
Z ≤ $^1/_8$ in.	✓	



LONGITUDINAL ROTATION
longitudinalview

β	PASS	FAIL
$\beta_1 \leq 5^o$	✓	
$\beta_2 \leq 5^o$	✓	



LONGITUDINAL DEFLECTION
longitudinalview

W	PASS	FAIL
Z ≤ $^1/_{32}$ in.	✓	

Comments:

Re-Calibration Required		yes	✓	no

SIGNATURE: Mars Sharief DATE: 12/04/23

APEX INSTRUMENTS SOURCE TESTING EQUIPMENT

Apex Instruments, Inc.
204 Technology Park Lane
Fuquay-Varina, NC 27526

S-TYPE PITOT TUBE CALIBRATION SHEET

Reference USEPA Reference Method 2 (40CFR60, App. A, Meth. 2)

PITOT SERIAL#	A7793	CALIBRATION DATE:	13-Sep-17	
PITOT TYPE:	S	BAROMETRIC PRESSURE:	29.52	in Hg
STD. PITOT TYPE:	ELLIPSOIDAL	STATIC PRESSURE	-0.6	in H_2O
Cp(std):	0.990	BLOCKAGE %:	N/A	
PROBE SERIAL#	N/A	CORRECTION FACTOR:	1.00	

	SIDE "A" CALIBRATION			
RUN NO.	Δ Pstd in H_2O	Δ Ps in H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	0.560	0.805	0.826	0.000
2	0.560	0.805	0.826	0.000
3	0.560	0.804	0.826	0.000
		"A" AVERAGE	0.826	0.0003

(must be ≤ 0.01)

	SIDE "B" CALIBRATION			
RUN NO.	Δ Pstd in H_2O	Δ Ps in H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	0.560	0.818	0.819	0.000
2	0.560	0.819	0.819	0.000
3	0.561	0.821	0.818	0.000
		"B" AVERAGE	0.819	0.0004

(must be ≤ 0.01)

ACCEPTANCE CRITERIA

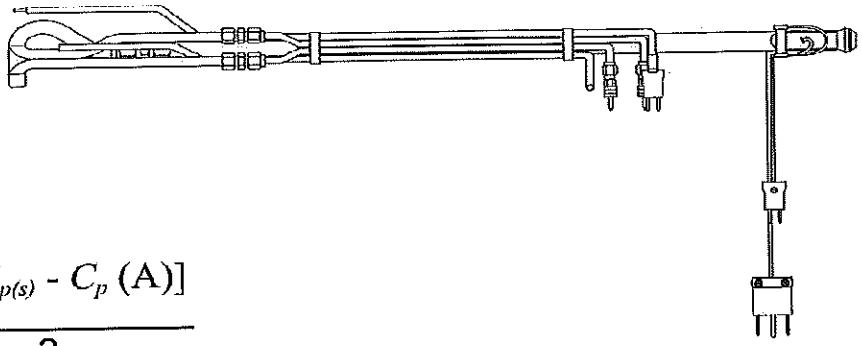
AVERAGE 0.0072 AVG. Cp (A) - AVG. Cp (B) must be ≤ 0.01

If the Average and both Deviation Averages "A" & "B" are ≤ 0.01, then the OVERALL AVERAGE below may be used.

*** If NOT, use the "A" Average OR "B" Average.**

OVERALL AVERAGE 0.8223

$$C_{p(s)} = C_{p(std)} \sqrt{\frac{\Delta p_{std}}{\Delta p_s}}$$



$$\text{Deviation} = C_{p(s)} - \overline{C_p}(A)$$

$$\text{Avg Dev} = \sigma\,(A) = \frac{\sum_{1}^{3} [C_{p(s)} - C_p\,(A)]}{3}$$

Method 2 Section 10.1.4.3 For a probe assembly constructed such that its pitot tube is always used in the same orientation, only one side of the pitot tube need be calibrated (the side which will face the flow). The pitot tube must still meet the alignment specifications of Figure 2-2 or 2-3, however, and must have an average deviation (σ) value of 0.01 or less (see section 10.1.4.4).

I certify that the above pitot tube was tested in accordance with the US EPA Method 2 standards.
See the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2, Item 4.

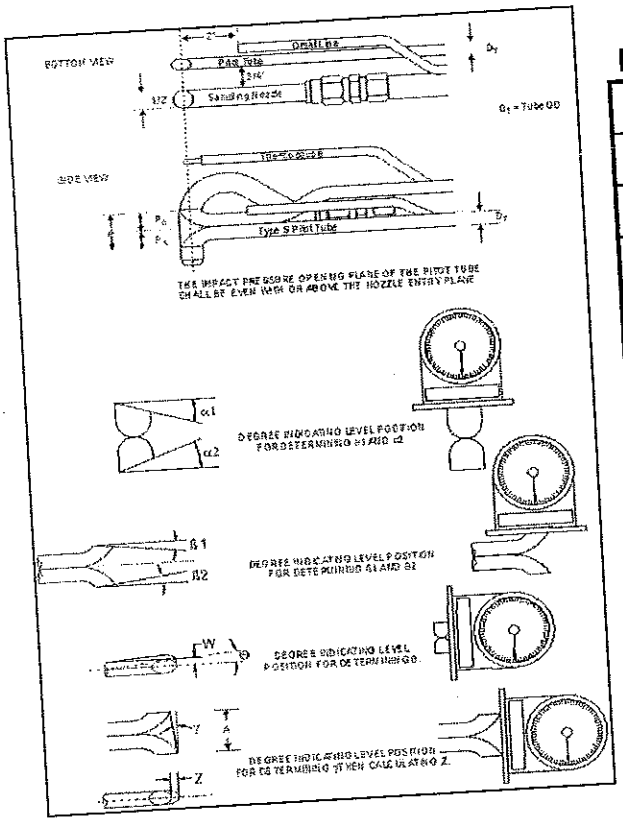
Print Name: Scott Bulger

Signature:

Date 9/13/2017

APEX INSTRUMENTS SOURCE TESTING EQUIPMENT

Type S Pitot Tube Inspection Form



PITOT TUBE/PROBE # 7793

Parameter	Value	Allowable Range	Check
Assembly Level?	yes	Yes	OK
Ports Damaged?	no	No	OK
$\alpha 1$	0	$-10° < \alpha 1 < +10°$	OK
$\alpha 2$	1	$-10° < \alpha 2 < +10°$	OK
1	0	$-5° < b1 < +5°$	OK
1	0	$-5° < \beta 2 < +5°$	OK
γ	0		
0	0		
$Z = A \tan \gamma$	0.000	$Z \leq .125"$	OK
$W = A \tan \theta$	0.000	$W \leq .031"$	OK
Dt	0.375	.188" to .375"	OK
A/2Dt	1.18	$1.05 \leq P_A/D_t \leq 1.5$	OK
A	0.885	$2.1D_t \leq A \leq 3D_t$	OK

Certification

I certify that pitot tube/probe number 7793 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

Certified by: 9-12-17

Personnel (Signature/Date)

Field Balance Weight Verfication
Annual 500g Field Balance Stock Weight vs. 500g ISO 17025 Traceable Weight
Air Hygiene Asset ID: samp-sc-0031

Filename: C:\ahi\[samp-sc-0031_211-expires 102024.xlsm]Balance
Make: Ohaus
Model #: Scout Pro SP2001
Serial #: B346992366
Field Weight #: sc-0031
Trailer #: 211

ISO 17025 Weight ID LABS-WT-0005
ISO S/N 1000128090
ISO Cal Due 8/11/2023

ISO 17025 Certfified Weight (g)	Field Balance Weight (g)	± g
500.00	499.70	0.30

must be within ±0.5g

Sean Barnes (signature) 01/20/23 (date)

ISO 17025 Certfified Weight (g)	Field Balance Weight (g)	± g
500.00	499.60	0.40

must be within ±0.5g

Sean Barnes (signature) 01/20/23 (date)

ISO 17025 Certfified Weight (g)	Field Balance Weight (g)	± g
500.00	499.60	0.40

must be within ±0.5g

Sean Barnes (signature) 01/20/23 (date)

Note: Calibrated against ISO 17025 Certified weight LABS-WT-0005

EPA Method 4 - Section 10.3, EPA Method 5 - Section 10.7, EPA Method 202 - Section 10.3: Field Balance Calibration Check. Check the calibration of the balance used to weigh impingers with a weight that is at least 500g or within 50g of a loaded impinger. The weight must be ASTM E617-13 "Standard Specification for Laboratory Weights and Precision Mass Standards" Class 6 (or better). Daily before used, the field balance must meausure within ±0.5g of the certified mass. If the daily balance calibration check fails, perform corrective measures and repeat the check before using balance.

ISO 17025 Certified 500g Weight is certified annually. Certified weight is used to verify Class 6 or better weight that accompanies each field balance on the balance it will be used. Acceptance critieria is certified weight must be within ±0.5g of Class 6 or better weight.

WEATHER STATION CALIBRATION SHEET
Temperature, Barometric Pressure, and Relative Humidity Periodic Calibration
Air Hygiene Asset ID: SAMP-WE-0054

Filename: C:\ahi\[SAMP-WE-0054_211-expires 012024.xlsm]112013
Make: Kestrel
Model #: 4000
Serial #: 603596

ISO 17025 Weather Station ID SAMP-WE-0033
ISO 17025 S/N A026334
ISO 17025 Cal Due 10/18/2023

ASTM Temp (deg F) (±1.5°)	Thermo. (deg F)	± deg F	ASTM Barometer (in. Hg) (±0.1 in Hg)	Barometric (in. Hg)	± in. Hg	Time
69.70	70.20	0.50	29.46	29.40	0.06	7:55

Sean Barnes — (signature)
01/20/23 — (date)

ASTM Temp (deg F) (±1.5°)	Thermo. (deg F)	± deg F	ASTM Barometer (in. Hg) (±0.1 in Hg)	Barometric (in. Hg)	± in. Hg	Time
68.90	70.40	1.50	29.46	29.40	0.06	8:15

Sean Barnes — (signature)
01/20/23 — (date)

ASTM Temp (deg F) (±1.5°)	Thermo. (deg F)	± deg F	ASTM Barometer (in. Hg) (±0.1 in Hg)	Barometric (in. Hg)	± in. Hg	Time
70.20	70.10	0.10	29.46	29.40	0.06	9:10

;42

Sean Barnes — (signature)
01/20/23 — (date)

ASTM Temp (deg F) (±1.5°)	Thermo. (deg F)	± deg F	ASTM Barometer (in. Hg) (±0.1 in Hg)	Barometric (in. Hg)	± in. Hg	Time
69.90	70.80	0.90	29.46	29.40	0.06	11:45

Sean Barnes — (signature)
01/20/23 — (date)

Note: Verified against ISO 17025 Traceable Barometer and Thermometer (SAMP-WE-0033).

APPENDIX H

SMAQMD CORRESPONDENCE (TEST APPROVAL)

SACRAMENTO METROPOLITAN

AIR QUALITY
MANAGEMENT DISTRICT

August 1, 2023

Doug Williamson
Facility Manager
EthosEnergy/ SMUD Financing Authority dba Campbell Power Plant
3215 47th Avenue
Sacramento, CA 95824

Subject: Limited Waiver of VOC Source Testing Requirement for Campbell Power Plant

Dear Doug Williamson:

The Sacramento Metropolitan Air Quality Management District (District) is in receipt of your letter dated July 25, 2023, requesting a waiver of testing for VOC emissions from Campbell Power Plant for the calendar year 2023.

Your request is based on the language contained in Campbell Power Plant Title V Permit #TV2007-14-02B. Condition 20.E on page 36 of the Title V Permit, in reference to the gas turbine, states:

"The SMAQMD Air Pollution Control Officer may waive the ROC and PM_{10} annual source test requirement every other year if the prior annual source test result indicates that the respective hourly emissions are less than or equal to 75% of the respective hourly emission limit."

The District has reviewed your submittal, which included VOC source test results for the 2022 calendar year and found Campbell Power Plant to meet the District Source Test Waiver requirements. Given this, the District hereby grants a limited waiver to Campbell Power Plant for VOC source testing subject to the following conditions:

1) This waiver is good for one year, covering VOC source testing required for the calendar year 2023.

2) In the calendar year 2024, source testing for VOC will resume per existing permit conditions.

3) Campbell Power Plant may submit a request to waive VOC source testing again for the calendar year 2025. The District will, at that time, review test data submitted again for consideration of another one-year waiver if appropriate.

If you have any questions regarding this matter, please contact Chris Loscher at (916) 825-6837.

Sincerely,

Amy L. Roberts

Amy Roberts
Division Manager

cc: Alberto Ayala, Executive Director/Air Pollution Control Officer
Angela Thompson, Program Manager
Ashley Reynolds, Program Supervisor
Chris Loscher, Air Quality Specialist

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

November 6, 2023

Doug Williamson
Campbell Power Plant/ EthosEnergy
3215 47th Avenue
Sacramento, CA 95824

Subject: SOURCE TEST PLAN, PERMIT NO.: 27118 – APPROVAL

Dear Doug Williamson:

The Sacramento Metropolitan Air Quality Management District (District) is in receipt of your source test plan prepared by Air Hygiene International, Inc. dated August 28, 2023. The testing plan hereby is approved, subject to the following conditions:

1. The emissions testing must be conducted in accordance with the test methods specified in the source test plan.

2. During the course of emission testing, the gas turbine and duct burner shall be operated at the maximum firing capacity, defined as > 90% of the heat input capacity achievable at the time of the source test, based on current ambient conditions. Information to substantiate this must be recorded during the test and submitted with your test results.

3. The testing is scheduled for December 5, 2023. As per normal practice, representatives from the District may be present to observe system operating conditions and test procedures. If there is any change to the specific **start time** of the test, one-week advance notice to District staff is required.

4. As per District Rule 301, Section 311 a source test evaluation fee of $2,320.00 will be charged against the owner or operator of a source whenever the Air Pollution Control Officer finds that a source test is required.

5. A scheduled source test may not be discontinued due solely to the failure of one or more runs to meet applicable standards.

6. The source test report must identify the manufacturer, model and serial number of the analyzers used in the source (Campbell Power Plant/Ethos Energy) continuous emissions monitoring system.

7. Per 40 CFR Part 60, the tester may choose to perform more than nine RATA runs and reject a maximum of three test runs, so long as the total number of RATA test runs is nine or more. The tester must include all data, including the rejected test runs, in the final source test report. All test runs will be evaluated by the District, including any rejected for the RATA,

for compliance with emission limits.

8. The source test report shall include a summary sheet including but not limited to the following information:

    a. Permitted emission limits.
    b. Measured emissions corrected to the appropriate standards.
    c. A statement indicating that all error analyses (drift, bias, etc.) required by the test method(s) were performed per the method, and that the tests were conducted within the allowed limits.

You will be invoiced after the District reviews the submitted test results.

Please be advised the District may reject any source test that is not conducted in accordance with the current test methods specified in condition 1, does not follow the conditions specified in your source test plan, or is not conducted in accordance with District rules or permit conditions.

If you have any questions concerning this matter, please contact me at (916) 825-6837.

Sincerely,

Chris Loscher

Chris Loscher
Air Quality Specialist

cc: danny@airhygiene.com, Air Hygiene International, Inc.

APPENDIX I

SMAQMD AIR PERMITS

rec'd 7/12/19

777 12TH STREET, 3RD FLOOR
SACRAMENTO, CA 95814-1908

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

(916) 874-4800
FAX (916) 874-4899

PERMIT TO OPERATE

ISSUED TO: **SACRAMENTO POWER AUTHORITY (SPA)**

EQUIPMENT LOCATION: **3215 47TH AVE., SACRAMENTO, CA 95825**

PERMIT NO.	EQUIPMENT DESCRIPTION
25725	GAS TURBINE, SIEMENS, MODEL V84.2, COMBINED CYCLE, 1,410 MMBTU/HOUR, NATURAL GAS FUELED WITH A WET COMPRESSION INJECTION SYSTEM.
14071	DUCT BURNER, 200 MMBTU/HOUR, NATURAL GAS FUELED.
11458	AIR POLLUTION CONTROL SELECTIVE CATALYTIC REDUCTION SYSTEM, NOOTER/ERIKSEN, VENTING GAS TURBINE P/O 25725 AND DUCT BURNER P/O 14071.
11459	AIR POLLUTION CONTROL OXIDATION CATALYST SYSTEM, NOOTER/ERIKSEN, VENTING GAS TURBINE P/O 25725 AND DUCT BURNER P/O 14071.

SUBJECT TO THE FOLLOWING CONDITIONS:

GENERAL

1. The equipment must be properly maintained and operated in accordance with the information submitted with the application and the manufacturer's recommendations at all times.
   [Basis: SMAQMD Rule 201, Section 405 and Rule 202, Section 408.1]

2. The Air Pollution Control Officer and/or authorized representatives must be permitted to do all of the following:
   A. Enter the source premises or any location which any records required by this Permit to Operate are kept.
   B. Access and copy any records required by this Permit to Operate.
   C. Inspect or review any equipment, operation, or method required under this Permit to Operate.
   D. Sample emissions from the source or require samples to be taken.
   [Basis: SMAQMD Rule 201, Section 405]

ALBERTO AYALA, PH.D., M.S.E.
AIR POLLUTION CONTROL OFFICER

DATE ISSUED: 06-07-2019
DATE EXPIRES: 06-30-2020 (UNLESS RENEWED)

BY: _____

PERMIT NO.: 25725, 14071, 11458, 11459

REVOCABLE AND NON-TRANSFERABLE

SPL-V1

3. This Permit to Operate does not authorize the emission of air contaminants in excess of those allowed by Division 26, Part 4, Chapter 3, of the California Health and Safety Code or the SMAQMD Rules and Regulations.
[Basis: SMAQMD Rule 201, Sections 303.1, 405]

4. The facility may not discharge air contaminants or other materials that 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 a natural tendency to cause, injury or damage to business or property.
[Basis: SMAQMD Rule 402, Section 301]

5. A legible copy of this Permit to Operate must be maintained on the premises with the equipment.
[Basis: SMAQMD Rule 201, Section 401]

EMISSIONS LIMITATIONS

6. The turbine, duct burner, and APC SCR and oxidation catalyst must not discharge into the atmosphere any visible air contaminant other than uncombined water vapor for a period or periods aggregating more than three minutes in any one hour if the discharge is as dark or darker than Ringelmann No. 1 or is equal to or greater than 20% opacity.
[Basis: SMAQMD Rule 401, Section 301]

7. The turbine and duct burner must meet the following BACT standards:
[Basis: SMAQMD Rule 202, Section 408.2.a]

Pollutant	Emission Standard and Work Practice
NOx	5 ppmvd corrected to 15% oxygen, 3 hour average (A)
VOC	The use of an oxidation catalyst (B)
CO	2.0 ppmvd corrected to 15% oxygen, 1 hour average (B)
SOx	Use of natural gas (C)
PM10	Use of natural gas and inlet air filtration (C)

(A) Based on SMAQMD BACT standard during the original permitting in 1994. The NOx BACT concentration is for reference only, the applicable regulatory NOx concentration can be found in **Condition No. 8**
(B) Based on SMAQMD BACT standard (BACT Determination 203)
(C) Based on SMAQMD BACT standard during the original permitting in 1994.

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8. Concentrations of nitrogen oxides (NOx), carbon monoxide (CO) and ammonia from the gas turbine and duct burner must not exceed the following limit:
[Basis: SMAQMD Rule 202 and Rule 413, Section 302.1(d), and 40 CFR Part 60. 332]

Pollutant	Maximum Allowable Concentration Gas Turbine and Duct Burner
NOx	3 ppmvd corrected to 15% O2, averaged over any consecutive 3 hour period (A)
CO	2.0 ppmvd corrected to 15% O2, averaged over any consecutive 1 hour period (B)
NH3	10 pmvd corrected to 15% O2, averaged over an consecutive 3 hour period (B)

(A) Excluding start-ups, shutdowns and short term excursions as defined in **Condition Nos. 15, 16 and 17**.
(B) Excluding start-ups and shutdowns as defined in **Condition Nos. 15 and 16**.

9. Emissions from the following equipment must not exceed the following limits.
[Basis: SMAQMD Rule 202]

Pollutant	Maximum Allowable Emissions Gas Turbine and Duct Burner lb/hour
VOC	9.01 (A)
NOx	17.76 (B)
SOx	0.97 (C)
PM10	7.00 (D)
PM2.5	6.99 (E)
CO (Normal Steady-State Operation)	7.22 (F)
CO (Worst Case Startup)	550.0 (G)

(A) Averaged over a three hour period, not including periods containing start-ups, shut-downs, and short-term excursions as defined in **Condition Nos. 15, 16, and 17**. Based on a turbine VOC emission factor of 0.00228 lb/MMBTU, duct burner VOC emission factor of 0.029 lb/MMBTU and firing at full capacity.
(B) Averaged over a three hour period, not including periods containing start-ups, shut-downs, and short-term excursions as defined in **Condition Nos. 15, 16, and 17**. Based on data submitted in the application and is monitored by the turbine's NOx CEM system.
(C) Averaged over a three hour period, not including periods containing start-ups, shut-downs, and short-term excursions as defined in **Condition Nos. 15, 16, and 17**. Based on a turbine and duct burner emission factor of 0.0006 lb/mmbtu and firing at full capacity.
(D) Averaged over a three hour period, not including periods containing start-ups, shut-downs, and short-term excursions as defined in **Condition Nos. 15, 16, and 17**. Based on a turbine PM10 emission factor of 0.003546 lb/MMBTU, duct burner PM10 emission factor of 0.01 lb/MMBTU and firing at full capacity.

(E) Averaged over a three hour period, not including periods containing start-ups, shut-downs, and short-term excursions as defined in **Condition Nos. 15, 16, and 17**. PM2.5 emissions are based on a 0.998 PM2.5 to PM10 fraction.

(F) Averaged over a one hour period, not including periods containing start-ups, shut-downs, and short-term excursions as defined in **Condition Nos. 15, 16, and 17**. Based on data submitted in the application and is monitored by the turbine's CO CEM system

(G) Including periods containing start-ups as defined in **Condition No. 15**. Based on data submitted in the application and is monitored by the turbine's CO CEM system

10. Emissions from the following equipment must not exceed the following limits, including periods containing start-ups, shutdowns and short term excursions as defined in **Condition Nos. 15, 16, and 17**.
[Basis: SMAQMD Rule 202]

Pollutant	Maximum Allowable Emissions		
	Gas Turbine and Duct Burner Lb/day	Cooling Tower Lb/day	Total Lb/day
VOC	146.7	N/A (A)	146.7
NOx	384.5	NA	384.5
SOx	21.8	NA	21.8
PM10	142.1	9.7	151.8
PM2.5	141.8	9.7	151.5
CO	1,258.8	NA	1,258.8

(A) Application 24808 for the introduction of non-potable water will add 0.5 lb/day of VOC. This increase will be added upon finalizing the work as described in the Authority to Construct for this application.

11. Emissions from the following equipment must not exceed the following limits, including periods containing start-ups, shutdowns and short term excursions as defined in **Condition Nos. 15, 16, and 17**.
[Basis: SMAQMD Rule 202]

Pollutant	Maximum Allowable Emissions Gas Turbine and Duct Burner				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
VOC	8,792	8,898	13,264	8,968	39,922
NOx	24,209	24,545	26,321	24,725	99,800
SOx	1,814	1,836	1,944	1,853	7,447

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Pollutant	Maximum Allowable Emissions Gas Turbine and Duct Burner				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
PM10	10,183	9,319	11,444	10,769	41,715
PM2.5	10,163	9,300	11,421	10,747	41,631
CO	47,599	47,599	47,599	47,599	190,396

Pollutant	Maximum Allowable Emissions Gas Turbine, Duct Burner and Cooling Tower				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
VOC(A)	8,792	8,898	13,264	8,968	39,922
NOx	24,209	24,545	26,321	24,725	99,800
SOx	1,814	1,836	1,944	1,853	7,447
PM10	11,015	10,160	12,294	11,619	45,088
PM2.5	10,995	10,141	12,271	11,597	45,004
CO	47,599	47,599	47,599	47,599	190,396

(A) Application 24808 for the introduction of non-potable water to the cooling tower will add 44 lb to Q1, 45 lb to Q2, Q3 and Q4 respectively of VOCs. This increase will be added upon finalizing the work as described in the Authority to Construct for this application.

12. HAP mass emissions from the facility must not exceed the following limits:
[Basis: SMAQMD Rule 202]

Equipment	Maximum Allowable HAP Emissions (A) tons/year	
	Single HAP	Combination of HAPs
Total facility	9.4	24.4

(A) The purpose of this limitation is to qualify the gas turbines for the non-applicability of 40 CFR 63 Subpart YYYY - National Emission Standards for Hazardous Air Pollutants for Stationary Gas Turbines.

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EQUIPMENT OPERATION REQUIREMENTS

13. The duct burner must not be operated unless the gas turbine is operating.
[Basis: SMAQMD Rule 201 Section 405]

14. The gas turbine and/or duct burner must not be operated without fully functioning selective catalytic reduction and oxidizing catalyst air pollution control systems, excluding periods of start-ups and shutdowns as defined in Condition Nos. 15 and 16.
[Basis: SMAQMD Rule 201 Section 405]

15. The duration of the gas turbine's start-up period must not exceed 60 minutes.
[Basis: SMAQMD Rule 201 Section 405]
    A. Gas turbine start-ups are defined as the time periods commencing with the introduction of fuel to the gas turbine and ending immediately prior to the time that 15-minute average NOx concentrations do not exceed 3 ppmvd corrected to 15% O2, but in no case exceeding 60 consecutive minutes.

16. Gas turbine shutdowns are defined as the 30-minute time period immediately preceding the termination of fuel to the gas turbine.
[Basis: SMAQMD Rule 201 Section 405]

17. Gas turbine short-term excursions are defined as 15-minute periods designated by the Permittee that are a direct result of a diffusion mode switchover, not to exceed four consecutive 15-minute periods, when the 15-minute average NOx concentration exceeds 3 ppmvd corrected to 15% O2.
    A. Maximum 3-hour average NOx concentration for periods that include short-term excursions must not exceed 30 ppmvd corrected to 15% O2.
    B. Short-term excursion periods that total in excess of 10 hours per rolling 12-month period must not be excluded from evaluations for compliance with emission limits in **Condition Nos. 8 and 9**.
[Basis: SMAQMD Rule 201 Section 405]

18. The gas turbine and duct burner must only combust natural gas fuel.
[Basis: SMAQMD Rule 201 Section 405]

MONITORING REQUIREMENTS

19. The permittee must operate a continuous emission monitoring system that has been approved by the SMAQMD Air Pollution Control Officer for the gas turbine and duct burner.
[Basis: SMAQMD Rule 201 Section 405]
    A. The continuous emission monitoring (CEM) system must monitor and record nitrogen oxides, carbon monoxide and oxygen.
    B. For NOx and O2, the CEM system must comply with U.S. EPA Performance Specifications in 40 CFR 75 Appendix A.
    C. For CO, the CEM system must comply with U.S. EPA Performance Specifications in 40 CFR 60 Appendix B Performance Specification 4 or 4A.

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AIR QUALITY MANAGEMENT DISTRICT

20. The permittee must operate a continuous parameter monitoring system that has been approved by the SMAQMD Air Pollution Control Officer that either measures or calculates and records the following: **[Basis: SMAQMD Rule 201, Rule 202 Rule 413, Section 303.3 and 40 CFR Part 60.334(i)(2)(i)]**

Parameter to be Monitored	Units
A. Fuel consumption of the combined cycle gas turbine	MMBTU/hour of natural gas
B. Fuel consumption of the duct burner	MMBTU/hour of natural gas
C. Exhaust gas flow rate of the combined cycle gas turbine and the duct burner.	kscfh or lb/hr

RECORDKEEPING AND REPORTING REQUIREMENTS

21. The permittee must continuously maintain onsite the following records for the most recent five year period and must make such records available to the SMAQMD Air Pollution Control Officer upon request. Quarterly records as specified in the table below must be made available for inspection within 30 days of the end of the quarter.
[Basis: SMAQMD Rules 201 and 202, and 40 CFR Part 60.334 (j)(1)(iii)(B), 60.334(j)(2)(iii), Part 60.334 (h)(1), Part 60.334(i)(3), Part 60.335(b)(10), 40 CFR Part 75.66(c), and Part 75 Appendix D]

Frequency	Information to be recorded
Upon occurrence	A. Record of the occurrence and duration of any start-up, shutdown or short term excursion. i. The number of consecutive 15-minute periods when the 15-minute average NOx concentration exceeded the limits of **Condition No. 8** during each short-term excursion. ii. The qualified condition(s) under which each short-term excursion occurred, pursuant to SMAQMD Rule No. 413 Section 114. iii. The maximum 6-hour average NOx concentration during the period that includes each short-term excursion. iv. The cumulative total, per calendar year, of all 15-minute periods when the 15-minute average NOx concentration exceeded the limits of **Condition No. 8**. B. Malfunction in operation of the gas turbine. C. Measurements from the continuous emission and parameter monitoring systems. D. Monitoring device and performance testing measurements. E. All continuous monitoring system performance evaluations. F. All continuous monitoring system or monitoring device calibration checks. G. All continuous monitoring system adjustments and maintenance.
Hourly	H. Gas turbine natural gas fuel consumption (MMBTU/hr). I. Duct burner natural gas fuel consumption (MMBTU/hr). J. Indicate when gas turbine start-up occurred. K. NOx emission concentration from the gas turbine and duct burner (ppmvd corrected to 15% O2).

Frequency	Information to be recorded
	L. VOC, NOx, SOx, PM10 and CO hourly emissions (lb/hour) from the gas turbine and duct burner (combined emissions). i. For those pollutants directly monitored (NOx and CO), the hourly emissions must be from the CEM system required pursuant to **Condition No. 19**. ii. For those pollutants that are not directly monitored (VOC, SOx and PM10), the hourly emissions must be calculated based on SMAQMD approved emission factors contained in the footnotes to **Condition No. 9**.
Daily	M. VOC, NOx, SOx, PM10 and CO daily mass emissions from all equipment separately and combined at the facility (lb/day): i. gas turbine and duct burner (for separate reporting the gas turbine and duct burner emission are combined). ii. cooling tower.
Quarterly	N. VOC, NOx, SOx, PM10 and CO quarterly mass emissions from all equipment combined at the facility (lb/quarter). i. gas turbine and duct burner. ii. cooling tower.

22. Submit to the SMAQMD Air Pollution Control Officer a written report which contains the following information. **[Basis: SMAQMD Rules 201 and 202, and 40 CFR Part 60.334 (j)(5)]**

Frequency	Information to be Reported
Quarterly Submitted by: Jan 30 Apr 30 Jul 30 Oct 30 for the previous calendar quarter	A. Whenever the continuous emissions monitoring system is inoperative except for zero and span checks: i. Date and time of non-operation of the continuous emission monitoring system. ii. Nature of the continuous emission monitoring system repairs or adjustments. B. Whenever an emission occurs as measured by the required continuous emissions monitoring system that is in excess of any emission limitation: i. Magnitude of the emission which has been determined to be in excess. ii. Date and time of the commencement and completion of each period of excess emissions. iii. Periods of excess emissions due to startup, shutdown and malfunction must be specifically identified. iv. The nature and cause of any malfunction (if known). v. The corrective action taken or preventive measures adopted. C. If there are no excess emissions or the continuous monitoring system has not been inoperative, repaired or adjusted for a calendar quarter, a report must be submitted stating such information.

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EMISSION REDUCTION CREDIT (ERC) REQUIREMENTS

23. The permittee must surrender (and has surrendered - See **Condition Nos. 24, 25 and 26**) ERCs to the SMAQMD Air Pollution Control Officer to offset the following amount of emissions:
[Basis: SMAQMD Rules 202 Section 302]

Equipment - Gas Turbine, Duct Burner, and Cooling Tower	Amount of Emission Offsets for which ERCs are to be Surrendered (A) lb/quarter			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
VOC	1,292	1,398	5,764	1,468
NOx	24,209	24,545	26,321	24,725
PM10	11,015	10,160	12,294	11,619

(A) Does not include the VOC increase as a results of application 24808

24. The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the VOC emission offset requirements as stated in **Condition No. 23:**
[Basis: SMAQMD Rules 202 Section 302]

ERC Certificate No.	Face Value of Emission Reduction Credit Certificates lb/quarter				IPTR (A)	Offset Ratio	Value Applied to VOC Emission Liability (B) lb/quarter			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
SMAQMD 00-00652 Swansons	1,550	1,678	6,917	1,762	NA	1.2	1,292	1,398	5,764	1,468
Total VOC Emission Offsets							1,292	1,398	5,764	1,468

(A) IPTR = interpollutant trading ratio

(B) Does not include the VOC increase as a results of application 24808

25. The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the NOx emission offset requirements as stated in **Condition No. 23**:
[Basis: SMAQMD Rules 202 Section 302]

ERC Certificate No.	Face Value of Emission Reduction Credit Certificates lb/quarter				IPTR (A)	Offset Ratio	Value Applied to NOx Emission Liability lb/quarter			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
SMAQMD 97-00437 Campbell	23,622	13,491	31,585	20,983	NA	1.2:1	19,685	11,243	26,321	17,486
PCAQMD 98-00002 Formica (VOC)	18,096	53,208	0	28,956	2:1	2:1	4,524	13,302	0	7,239
Total NOx Emission Offsets							24,209	24,545	26,321	24,725

(A) IPTR = interpollutant trading ratio

26. The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the PM10 emission offset requirements as stated in **Condition No. 23**:
[Basis: SMAQMD Rules 202 Section 302]

Offset Source	Face Value of Emission Reduction credit Certificates lb/quarter				IPTR (A)	Offset Ratio	Value Applied to PM10 Emission Liability lb/quarter			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
PCAPCD 99-00003 Sierra Pine	16,523	15,240	18,441	17,429	NA	1.5	11,015	10,160	12,294	11,619
Total PM10 Emission Offsets							11,015	10,160	12,294	11,619

(A) IPTR = interpollutant trading ratio

EMISSION TESTING REQUIREMENTS

27. The permittee must perform a VOC, NOx, PM10, CO and ammonia (NH3) source test and CEM accuracy (RATA) test of the gas turbine and duct burner once each calendar year.
    A. Submit a Source Test Plan to the SMAQMD Air Pollution Control Officer for approval at least 30 days before the source test is to be performed. The Source Test Plan must indicate that U.S. EPA approved test methods are used for NOx and CO.
    B. Notify the SMAQMD Air Pollution Control Officer at least 7 days prior to the source testing date if the date has changed from that approved in the Source Test Plan.

C. During the source test(s), the gas turbine and duct burner must be operated at the maximum firing capacity, defined as ≥ 90% of the heat input capacity achievable at the time of the source test, based on then current ambient conditions.
D. Submit the Source Test Report to the SMAQMD Air Pollution Control Officer within 60 days after the completion of the source test(s).
E. The SMAQMD Air Pollution Control Officer may waive the VOC and PM10 annual source test requirement every other year if the prior annual source test result indicates that the respective hourly emissions are less than or equal to 75% of the respective hourly emission limit.

[Basis: SMAQMD Rule 201, Section 405]

HOT SPOTS PROGRAM REQUIREMENTS

28. The permittee must, upon determination of applicability and written notification by the District, comply with all applicable requirements of the Air Toxics "Hot Spots" Information and Assessment Act (California Health and Safety Code Section 44300 et seq.)
[Basis: SMAQMD Rule 201, Section 303.1]

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SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Your application for this air quality Permit to Operate was evaluated for compliance with Sacramento Metropolitan Air Quality Management District (SMAQMD), state and federal air quality rules. The following list identifies the rules that most commonly apply to the operation of your equipment. Other rules may also be applicable.

SMAQMD RULE NO.	RULE TITLE
201	GENERAL PERMIT REQUIREMENTS (8-24-06)
202	NEW SOURCE REVIEW (8-23-12)
401	RINGELMANN CHART (4-19-83)
402	NUISANCE (8-3-77)
406	SPECIFIC CONTAMINANTS (12-6-78)
420	SULFUR CONTENT OF FUELS (8-13-81)
FEDERAL	REGULATION TITLE
40 CFR 60 SUBPART GG	NSPS FOR STATIONARY GAS TURBINES

The conditions on this Permit to Operate reflect some, but not all, of the requirements of these rules. Because other rule requirements may apply to the operation, the permit holder should be familiar with all of the rules and related requirements. In addition, because future changes in prohibitory rules may establish more stringent requirements that may supersede the conditions listed here, the permit holder should monitor proposed rules and rule adoption actions at SMAQMD.

For further information please consult your SMAQMD rulebook or contact the SMAQMD for assistance.

CSG TITLE V PERMIT

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SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

TITLE V FEDERAL OPERATING PERMIT, TITLE IV ACID RAIN PROGRAM PERMIT AND SMAQMD RULE 201 PERMITS TO OPERATE

TITLE V PERMIT NO.: TV2007-14-02B

PERMIT ISSUED:	PERMIT LAST AMENDED:	PERMIT EXPIRES:
March 01, 2009	January 18, 2012	March 01, 2014

PERMIT ISSUED TO:
Sacramento Power Authority
PO Box 15830, Mail Stop B355
Sacramento, CA 95852-1830

FACILITY LOCATION:
Sacramento Power Authority
3215 47th Avenue
Sacramento, CA 95824

RESPONSIBLE OFFICIAL:
Paul Lau
SPA Representative
(916) 732-6252

CONTACT PERSON:
Dave Blevins
Facility Manager
(916) 391-2993

NATURE OF BUSINESS:
Municipal Electricity Generation
Process Steam Generation

STANDARD INDUSTRIAL CLASSIFICATION (SIC):
4931

Larry Greene
SMAQMD Air Pollution Control Officer

by: _____
Michelle Joe
Air Quality Engineer

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PERMIT SUMMARY

This permit shall serve as a Permit to Operate pursuant to SMAQMD Rule No. 201 (General Permit Requirements) and SMAQMD Rule No. 207 (Title V - Federal Operating Permit Program). Requirements identified in the permit as non-federally enforceable are not enforceable by the U.S. EPA or the public. However, they are enforceable by the SMAQMD.

The permittee's application for this air quality Permit to Operate was evaluated for compliance with SMAQMD, State of California and federal air quality rules and regulations. The following listed rules are those that were found to be applicable at the time of permit review, based on the information submitted with the Title V permit application.

Citation	Description	Rule Adoption Date	Federally Enforceable ?
SMAQMD Rule 101	General Provisions and Definitions	09-03-1998	Yes
SMAQMD Rule 102	Circumvention	05-15-1972	Yes
SMAQMD Rule 105	Emission Statements	04-20-1993	Yes
SMAQMD Rule 201	General Permit Requirements (SIP approved)	11-20-1984	Yes
SMAQMD Rule 201	General Permit Requirements (not SIP approved)	08-24-2006	No
SMAQMD Rule 202	New Source Review (SIP approved)	11-20-1984	Yes
SMAQMD Rule 202	New Source Review (not SIP approved)	02-24-2005	No
SMAQMD Rule 207	Title V - Federal Operating Permit Program (not SIP approved but rule is applicable as part of U.S. EPA approval of the SMAQMD Title V program)	04-26-2001	Yes
SMAQMD Rule 301	Permit Fees - Stationary Source (not SIP approved but Title V fees in rule applicable as part of U.S. EPA approval of the SMAQMD Title V program)	07-02-2007	Yes (Title V provisions only)
SMAQMD Rule 306	Air Toxic Fees (not SIP approved)	03-27-2003	No

PERMIT SUMMARY (continued)

Citation	Description	Rule Adoption Date	Federally Enforceable ?
SMAQMD Rule 307	Clean Air Act Fees	09-26-2002	Yes
SMAQMD Rule 401	Ringelmann Chart	04-05-1983	Yes
SMAQMD Rule 402	Nuisance (not SIP approved)	08-03-1977	No
SMAQMD Rule 403	Fugitive Dust	11-29-1983	Yes
SMAQMD Rule 404	Particulate Matter (see permit shield for specified equipment)	11-20-1984	Yes
SMAQMD Rule 406	Specific Contaminants (see permit shield for specified equipment)	11-29-1983	Yes
SMAQMD Rule 413	Stationary Gas Turbines (see permit shield for specified equipment)	03-24-2005	Yes
SMAQMD Rule 420	Sulfur Content of Fuels (see permit shield for specified equipment)	11-29-1983	Yes
SMAQMD Rule 442	Architectural Coatings (SIP approved)	09-05-1996	Yes
SMAQMD Rule 442	Architectural Coatings (not SIP approved)	05-24-2001	No
SMAQMD Rule 466	Solvent Cleaning (not SIP approved)	09-25-2008	No
SMAQMD Rule 602	Breakdown Conditions: Emergency Variance (not SIP approved)	12-06-1978	No
SMAQMD Rule 801	New Source Performance Standards (not SIP approved)	03-27-2008	No
SMAQMD Rule 904	Airborne Toxic Control Measures (not SIP approved)	03-27-2008	No
CARB Air Toxic Control Measure	State of California Air Toxic Control Measure for Chromate Treated Cooling Towers [CCR 93103] (not SIP approved)	03-09-1989 (A)	No

PERMIT SUMMARY (continued)

Citation	Description	Rule Adoption Date	Federally Enforceable ?
U.S. EPA New Source Performance Standards (NSPS)	Standards of Performance for Industrial - Commercial - Institutional Steam Generating Units [40 CFR 60 Subpart Db (begin at 60.40b)] (see permit shield for specified equipment)	06-13-2007 (B)	Yes
U.S. EPA New Source Performance Standards (NSPS)	Standards of Performance for Stationary Gas Turbines [40 CFR 60 Subpart GG (begin at 60.330)] (see permit shield for specified equipment)	02-24-2006 (B)	Yes
U.S. EPA Acid Rain Program	Acid Rain Program [40 CFR 72-78 (begin at 72.1)]	10-19-2007 (B)	Yes

(A) California Air Resources Board adoption date
(B) U.S. EPA promulgation/amendment date

Future changes in prohibitory rules may establish more stringent requirements that may, at the SMAQMD level, supersede the conditions listed here. For Title V purposes however, the federally enforceable requirements are those found in the Title V permit. Federally enforceable provisions of the Title V permit do not change until the Title V permit is revised.

FACILITY DESCRIPTION

Title V Permit Background

Previous Permit Actions

The following permit actions have occurred since the initial Federal Operating Permit No. 1998-14-01 was issued:

Permit Action	Date Issued	Permit No.
Initial Title V Federal Operating Permit	03-01-2004	TV1998-14-01
1st Administrative Amendment	09-11-2006	TV1998-14-01A
2nd Administrative Amendment	05-22-2007	TV1998-14-01B
1st Renewal Permit	03-01-2009	TV2007-14-01
1st Significant Modification	09-14-2009	TV2007-14-02
1st Administrative Amendment	09-15-2009	TV2007-14-02A

Current Permit Action

This 2nd Administrative Amendment permit to the 1st Administrative Amendment will be assigned the following permit number: TV2007-14-02B.

Facility Description

The following facility description is for informational purposes only and does not contain any applicable federally enforceable requirements.

Sacramento Power Authority generates electricity for the Sacramento Municipal Utility District (SMUD) and produces process steam for use in the operations of Campbell Soup Company. The project is located on a 5.8-acre site adjacent to the Campbell Soup food processing facility at 3215 47th Avenue, Sacramento.

The cogeneration plant is a combined cycle power block. The combined cycle unit consists of the following components:

Combined Cycle Power System:

1. (1) Siemens V84.2 gas turbine, 1410 MMBTU/hour, natural gas fuel, with a nominal rating of 103 MW.
2. (1) duct burner, 200 MMBTU/hour, natural gas fuel.
3. (1) Heat recovery steam generator.
4. (1) 55.9 MW nominal capacity steam turbine generator.

FACILITY DESCRIPTION (continued)

5. (1) Selective catalytic reduction (SCR) NOx air pollution control system.

6. (1) Oxidation catalyst CO and ROC air pollution control system.

Support Equipment:

7. Cooling tower, 3 cell, 45,000 gallons of water/minute, 4,763,000 cfm air flowrate.

Emissions Control Technology

NOx emissions from the gas turbine are controlled with dry low NOx combustor technology and a SCR system to comply with the NOx concentration limit of 3 ppmvd at 15% O2.

ROC and CO emissions from the gas turbine are controlled with an oxidation catalyst system.

NOx emissions from the duct burner are controlled with low NOx burners and a SCR system to comply with the NOx concentration limit of 3 ppmvd at 15% O2.

SO2 and PM10 emissions from the gas turbine and duct burner are controlled by the use of natural gas fuel with no emergency use fuel.

Steam and Electrical Power Generation Process

Process steam for the Campbell Soup Company food processing plant is extracted from the steam turbine generator during the operation of the combined cycle power block. This process is capable of producing 250,000 pounds per hour of steam supply.

Electricity generated by the gas turbine power plant is interconnected with SMUD's transmission lines and distribution system.

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

TITLE V PERMIT MODIFICATIONS AND RENEWAL

1. The permittee shall submit to the SMAQMD Air Pollution Control Officer a complete Title V permit application for renewal no later than 12 months prior to the expiration date of the Title V permit.
   [SMAQMD Rule No. 207 Section 301.4]

2. The permittee shall submit to the SMAQMD Air Pollution Control Officer a complete Title V permit application for minor Title V permit modification when applicable. The application shall be submitted after receiving any required preconstruction permit from the SMAQMD and before commencing operation associated with the Minor Title V permit modification.
   [SMAQMD Rule No. 207 Section 301.6]

3. The permittee shall submit to the SMAQMD Air Pollution Control Officer a complete Title V permit application for Significant Title V permit modification when applicable. The application shall not be submitted prior to receiving any required preconstruction permit from the SMAQMD but no later than 12 months after commencing an operation associated with the Significant Title V permit modification. Where an existing federally enforceable Title V permit condition would prohibit such change in operation or the stationary source is not required to obtain a preconstruction permit, the owner or operator must obtain a Title V permit modification before commencing operation.
   [SMAQMD Rule No. 207 Section 301.7]

4. The permittee shall submit to the SMAQMD Air Pollution Control Officer timely updates to the Title V application as new applicable federal requirements become applicable to the source.
   [SMAQMD Rule No. 207 Section 302.1]

5. The permittee shall submit to the SMAQMD Air Pollution Control Officer any additional information necessary to correct any incorrect information in the Title V permit application upon becoming aware of such incorrect submittal or if the applicant is notified by the SMAQMD Air Pollution Control Officer of such incorrect submittal.
   [SMAQMD Rule No. 207 Section 302.2]

6. The permittee shall submit to the SMAQMD Air Pollution Control Officer any additional information relating to the Title V application within 30 days if such information is requested in writing by the SMAQMD Air Pollution Control Officer.
   [SMAQMD Rule No. 207 Section 302.3]

7. Title V permit expiration terminates the stationary source's right to operate unless a timely and complete Title V permit application for renewal has been submitted and the stationary source complies with SMAQMD Rule No. 207 Sections 303.1(a), (b), (c) and (d), in which case the existing Title V permit will remain in effect until the Title V permit renewal has been issued or denied.
   [SMAQMD Rule No. 207 Section 303.2]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

8. Any Title V application form, report, or compliance certification submitted pursuant to a federally enforceable requirement in this permit shall contain certification by a responsible official. The certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.
[SMAQMD Rule No. 207 Section 304]

9. This Title V permit shall have a 5-year fixed term from the date of issuance. The Title V permit shall have a new 5-year fixed term from the date of final action on reopening if the responsible official chooses to submit to the SMAQMD a complete Title V application for renewal upon reopening of the Title V permit pursuant to SMAQMD Rule No. 207 Sections 411 or 412, and the Title V permit is renewed according to the administrative procedures listed in SMAQMD Rule No. 207 Sections 401 through 408.
[SMAQMD Rule No. 207 Section 306]

COMPLIANCE

10. The permittee shall comply with all conditions of the Title V permit.
[SMAQMD Rule No. 207 Section 305.1(k)(1)]

11. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the Title V permit.
[SMAQMD Rule No. 207 Section 305.1(k)(2)]

12. This Title V permit may be modified, revoked, reopened, and reissued, or terminated for cause.
[SMAQMD Rule No. 207 Section 305.1(k)(3)]

13. The permittee shall furnish to the SMAQMD Air Pollution Control Officer, within a reasonable time, any information that the SMAQMD Air Pollution Control Officer may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit pursuant to SMAQMD Rule No. 207 Section 411, or to determine compliance with this Title V permit. Upon request, the permittee shall also furnish to the SMAQMD Air Pollution Control Officer copies of records required to be kept by conditions of this permit or, for information claimed to be confidential, the permittee may furnish such records directly to the U.S. EPA along with a claim of confidentiality.
[SMAQMD Rule No. 207 Section 305.1(k)(4)]

14. Noncompliance with any federally enforceable requirement in this Title V permit is grounds for Title V permit termination, revocation and reissuance, modification, enforcement action or denial of the Title V permit renewal application. Any violation of the Title V permit shall also be a violation of SMAQMD Rule No. 207.
[SMAQMD Rule No. 207 Section 305.1(k)(5)]

15. A pending Title V permit action (e.g. a proposed permit revision) or notification of anticipated noncompliance does not stay any permit condition.
[SMAQMD Rule No. 207 Section 305.1(k)(6)]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

16. This Title V permit does not convey any property rights of any sort or any exclusive privilege. **[SMAQMD Rule No. 207 Section 305.1(k)(7)]**

17. Upon presentation of credentials and other documents as may be required by law, the permittee shall allow the SMAQMD Air Pollution Control Officer or an authorized representative to perform all of the following:

    A. Enter upon the stationary source's premises where this source is located or emissions related activity is conducted, or where records must be kept under the conditions of this permit;

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

    C. Inspect at reasonable times, the stationary source, equipment (including monitoring and air pollution control equipment), practices and operations regulated or required under this Title V permit, and;

    D. As authorized by the Federal Clean Air Act, sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the Title V permit conditions or applicable federal requirements.

    [SMAQMD Rule No. 207 Section 413.1]

REPORTS AND RECORDKEEPING

18. **Monitoring Reports**

    A. The permittee shall submit to the SMAQMD Air Pollution Control Officer at least once every six months, unless required more frequently by an applicable requirement, reports of all required monitoring.

        i. All instances of deviations from Title V permit monitoring conditions must be clearly identified in such reports.

    B. The reporting periods for this permit shall be January 01 through June 30 and July 01 through December 31. The reports shall be submitted by July 30 and January 30 following each reporting period respectively.

    C. All required reports must be certified by the responsible official and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.

    [SMAQMD Rule No. 207 Section 501.1]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

19. **Compliance Reports**

A. The permittee shall submit to the SMAQMD Air Pollution Control Officer and U.S. EPA (Air-3, U.S. EPA, Region IX) on an annual basis, unless required more frequently by additional applicable federal requirements such as Section 114(a)(3) and 504(b) (42 U.S.C. Sections 7414(a)(3) and 7661c(b)) of the Federal Clean Air Act, a certification of compliance by the responsible official with all terms and conditions contained in the Title V permit, including emission limitations, standards and work practices.

B. The reporting period for this permit shall be January 01 through December 31. The report shall be submitted by January 30 following the reporting period.

C. All required reports must be certified by the responsible official and shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate and complete.

D. The Compliance Certification Report shall include the following:

i. The identification of each term or condition of the Title V permit that is the basis of the certification.

ii. The method(s) used for determining the compliance status of the source, currently and over the reporting period, and whether such method(s) provides continuous or intermittent data.

iii. The status of compliance with the terms and conditions of the Title V permit for the period covered by the certification, based on the method designated in Section D.ii of this condition.

iv. Such other facts as the SMAQMD Air Pollution Control Officer may require to determine the compliance status of the source.

v. In accordance with SMAQMD Rule No. 207 Section 305, a method for monitoring the compliance of the stationary source with its emissions limitations, standards and work practices.

[SMAQMD Rule No. 207 Section 413.4]

20. The permittee shall report, within 24 hours of detection, any deviation from a federally enforceable Title V permit condition not attributable to an emergency. In order to fulfill the reporting requirement of this condition, the permittee shall notify the SMAQMD Air Pollution Control Officer by telephone followed by a written statement describing the nature of the deviation from the federally enforceable permit condition.
[SMAQMD Rule No. 207 Section 501.3]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

21. All monitoring data and support information required by a federally enforceable applicable requirement must be kept by the permittee for a period of 5 years from the date of the monitoring sample, measurement, report or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by the federally enforceable applicable requirements in the Title V permit.
[SMAQMD Rule No. 207 Section 502.3]

RINGELMANN CHART

22. Except as otherwise provided in SMAQMD Rule No. 401 Section 100, the permittee shall not discharge into the atmosphere from any single source of emission whatsoever any air contaminant, other than uncombined water vapor, for a period or periods aggregating more than three minutes in any one hour which is:

    A. As dark or darker in shade as that designated No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines, or

    B. Of such opacity as to obscure a human observer's view, or a certified calibrated in-stack opacity monitoring system to a degree equal to or greater than No. 1 on the Ringelmann Chart.

    [SMAQMD Rule No. 401 Section 301]

PARTICULATE MATTER

23. The permittee shall take every reasonable precaution not to cause or allow the emissions of fugitive dust from being airborne beyond the property line from which the emission originates, from any construction, handling or storage activity, or any wrecking, excavation, grading, clearing of land or solid waste disposal operation. Reasonable precautions shall include, but are not limited to:

    A. Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the construction of roadways or the clearing of land.

    B. Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles and other surfaces which can give rise to airborne dusts;

    C. Other means approved by the SMAQMD Air Pollution Control Officer.

    [SMAQMD Rule No. 403 Section 301]

24. Except as otherwise provided in SMAQMD Rule No. 406, the permittee shall not discharge into the atmosphere, from any source, particulate matter in excess of 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot).
[SMAQMD Rule No. 404 Section 301] [see permit shield for specific equipment - Cooling Tower]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

25. The permittee shall not discharge into the atmosphere particulate matter from the burning of any kind of material containing carbon in a free or combined state, from any single source of emission whatsoever, combustion contaminants in any state or combination thereof exceeding in concentration at the point of discharge: 0.23 grams per dry standard cubic meter (0.1 grains per dry standard cubic foot) of gas calculated to 12% carbon dioxide (CO2) at standard conditions.
[SMAQMD Rule No. 406 Section 302] [see permit shield for specific equipment - Gas Turbine]

SULFUR COMPOUNDS

26. The permittee shall not discharge into the atmosphere, from any single source of emission whatsoever, sulfur compounds in any state or combination thereof exceeding in concentration at the point of discharge: sulfur compounds, calculated as sulfur dioxide (SO2): 0.2% by volume.
[SMAQMD Rule No. 406 Section 301] [see permit shield for specific equipment - Gas Turbine]

27. Except as otherwise provided in SMAQMD Rule No. 420 Section 110, the permittee shall not burn any gaseous fuel containing sulfur compounds in excess of 1.14 grams per cubic meter (50 grains per 100 cubic feet) of gaseous fuel, calculated as hydrogen sulfide at standard conditions, or any liquid fuel or solid fuel having a sulfur content in excess of 0.5% by weight.
[SMAQMD Rule No. 420 Section 301] [see permit shield for specific equipment - Gas Turbine]

ARCHITECTURAL COATING

28. Any coating applied to stationary structures and their appurtenances, to mobile homes, to pavements, or to curbs, shall meet the requirements of SMAQMD Rule No. 442.
[SMAQMD Rule No. 442 (09-05-1996 version)]

29. All VOC-containing materials shall be stored in closed containers when not in use. In use includes, but is not limited to: being accessed, filled, emptied, maintained or repaired.
[SMAQMD Rule No. 442 Section 304 (09-05-1996 version)]

30. The permittee shall not use volatile organic compounds for the cleanup of spray equipment unless equipment for collection of the cleaning compounds and minimizing its evaporation to the atmosphere is used.
[SMAQMD Rule No. 442 Section 305 (09-05-1996 version)]

31. The permittee shall keep a record of all architectural coatings purchased that are not clearly labeled as complying with the VOC content limits contained in SMAQMD Rule No. 442. Compliance in these cases can be determined by maintaining records of the manufacturer's certifications or by Material Safety Data Sheets (MSDS) that demonstrate compliance with the VOC limits of SMAQMD Rule No. 442.
[SMAQMD Rule No. 442 (09-05-1996 version) and SMAQMD Rule No. 207 Section 305]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

EQUIPMENT BREAKDOWNS

32. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology based emission limitations if the following conditions are met:

    A. The affirmative defense of an emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:

        i. An emergency occurred and that the permittee can identify the cause(s) of the emergency.

        ii. The permitted facility was at the time being properly operated.

        iii. During the period of the emergency the permittee took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the Title V permit.

        iv The permittee submitted notice of the emergency to the SMAQMD Air Pollution Control Officer within two working days of the time when emissions limitations were exceeded due to the emergency. The notice must contain a description of the emergency and corrective actions taken.

    B. In any enforcement proceedings, the permittee seeking to establish the occurrence of an emergency has the burden of proof.

    [SMAQMD Rule No. 207 Section 414]

33. The permittee shall notify the SMAQMD Air Pollution Control Officer of any occurrence which constitutes an emergency as defined in SMAQMD Rule No. 207 Section 212 as soon as reasonably possible, but no later than one hour after its detection. If the emergency occurs when the SMAQMD Air Pollution Control Officer cannot be contacted, the report of the emergency shall be made at the commencement of the next regular working day. The notification shall identify the time, specific location, equipment involved and, to the extent known, the cause(s) of the occurrence.

    [SMAQMD Rule No. 207 Section 501.2]

PAYMENT OF FEES

34. The fee for (1) the issuance of an initial Title V operating permit, (2) the renewal and/or inspection of a Title V operating permit, (3) the modification of a Title V operating permit or (4) an administrative Title V permit amendment shall be based on the actual hours spent by the SMAQMD staff in evaluating the application and processing the operating permit. The fee shall be assessed in accordance with the hourly rate established in SMAQMD Rule No. 301 Section 308.12.

    [SMAQMD Rule No. 207 Section 305.7 and SMAQMD Rule No. 301 Section 313]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

35. After the provisions for granting permits as set forth in SMAQMD Rule No. 207 have been complied with, the permittee will be notified by mail of the fee due and payable and the date the fee is due. If the fee is not paid by the specified due date, the fee shall be increased by one half the amount and the applicant/permittee shall be notified by mail of the increased fee. If the increased fee is not paid within 30 days after notice the application/permit will be canceled/revoked and the applicant/permittee will be notified by mail.
[SMAQMD Rule No. 207 Section 305.7]

CLEAN AIR ACT FEES

36. After the U.S. EPA determines that the SMAQMD has failed to demonstrate attainment of the one hour ozone ambient air quality standard by the attainment year, the permittee, operating any major stationary source of ROC or NOx, shall pay the Clean Air Act fees specified by the SMAQMD Air Pollution Control Officer in accordance with SMAQMD Rule No. 307.
[SMAQMD Rule No. 307]

EMISSION STATEMENTS

37. The permittee, when operating any stationary source that emits 25 tons or more per year of ROC or NOx, shall annually provide the SMAQMD Air Pollution Control Officer with a written emission statement showing actual emissions of ROC and NOx from that source.
[SMAQMD Rule No. 105]

ACCIDENTAL RELEASES

38. If the permittee is subject to Section 112(r) of the federal Clean Air Act of 1990 and 40 CFR 68, the permittee shall register and submit to the EPA the required data related to the risk management plan (RMP) for reducing the probability of accidental releases of any regulated substances listed pursuant to Section 112(r)(3) of the CAA as amended in 40 CFR 68.130. The list of substances, threshold quantities and accident prevention regulations promulgated under 40 CFR Part 68 do not limit in any way the general duty provisions under Section 112(r)(1) of the federal Clean Air Act of 1990.
[40 CFR 68]

39. If the permittee is subject to Section 112(r) of the federal Clean Air Act of 1990 and 40 CFR 68, the permittee shall comply with the requirements of 40 CFR Part 68 no later than the latest of the following dates as provided in 68.10(a):

    A. June 21, 1999,

    B. Three years after the date on which a regulated substance is first listed under 68.130, or

    C. The date on which a regulated substance is first present above a threshold quantity in a process.

    [40 CFR 68]

FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

40. If the permittee is subject to Section 112(r) of the federal Clean Air Act of 1990 and 40 CFR 68, the permittee shall submit any additional relevant information requested by any regulatory agency necessary to ensure compliance with the requirements of 40 CFR Part 68.
[40 CFR 68]

41. If the permittee is subject to Section 112(r) of the federal Clean Air Act of 1990 and 40 CFR 68, the permittee shall annually certify compliance with all applicable requirements of Section 112(r) of the federal Clean Air Act of 1990 as part of the annual compliance certification as required by SMAQMD Rule No. 207 Section 413.4.
[40 CFR 68]

TITLE VI REQUIREMENTS (OZONE DEPLETING SUBSTANCES)

42. The permittee, when opening appliances containing CFCs for maintenance, service, repair, or disposal must comply with the required practices pursuant to 40 CFR 82.156.
[40 CFR 82 Subpart F]

43. Equipment used during the maintenance, service, repair, or disposal of appliances containing CFCs must comply with the standards for recycling and recovery equipment pursuant to 40 CFR 82.158.
[40 CFR 82 Subpart F]

44. The permittee, when performing maintenance, service, repair or disposal of appliances containing CFCs must be certified by an approved technician certification program pursuant to 40 CFR 82.161.
[40 CFR 82 Subpart F]

NON-FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

APPLICABILITY

1. The requirements outlined in this section are applicable to the SMAQMD Rule No. 201 Permits to Operate only and are not an enforceable part of the Title V permit.

SMAQMD RULE NO. 201 PERMIT RENEWAL

2. Permits to Operate issued, pursuant to SMAQMD Rule No. 201 (non-Title V Permits to Operate), shall be renewed annually on June 30 and upon payment of the permit renewal fee established pursuant to SMAQMD Rule No. 301.

3. The SMAQMD Air Pollution Control Officer shall review every SMAQMD Rule No. 201 Permit to Operate upon annual renewal, pursuant to California Health and Safety Code Section 42301(c), to determine that permit conditions are adequate to ensure compliance with, and the enforceability of, SMAQMD rules and regulations applicable to the article, machine, equipment or contrivance for which the permit was issued. Applicable SMAQMD rules and regulations shall include those which were in effect at the time the permit was issued or modified, or which have subsequently been adopted and made retroactively applicable to an existing article, machine, equipment or contrivance, by the SMAQMD Board of Directors. The SMAQMD Air Pollution Control Officer shall revise the conditions, if such conditions are not consistent, in accordance with all applicable rules and regulations.

GENERAL

4. The SMAQMD Air Pollution Control Officer and/or authorized representatives, upon the presentation of credentials shall be permitted:

   A. To enter upon the premises where the source is located or in which any records are required to be kept under the terms and conditions of this permit to operate, and

   B. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this Permit to Operate, and

   C. To inspect any equipment, operation, or method required in this Permit to Operate, and

   D. To sample emissions from the source or require samples to be taken.

5. Legible copies of all SMAQMD Rule No. 201 permits shall be maintained on the premises with the equipment.

EQUIPMENT OPERATION

6. The equipment shall be properly maintained.

7. This permit does not authorize the emission of air contaminants in excess of those allowed by Division 26, Part 4, Chapter 3, of the Health and Safety Codes of the State of California or the Rules and Regulations of the Sacramento Metropolitan Air Quality Management District.

NON-FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

EQUIPMENT BREAKDOWNS

8. The permittee shall notify the SMAQMD Air Pollution Control Officer of any occurrence which constitutes a breakdown as defined in SMAQMD Rule No. 602 Section 201 as soon as reasonably possible, but no later than one hour after its detection. If the breakdown occurs when the SMAQMD Air Pollution Control Officer cannot be contacted, the report of breakdown shall be made at the commencement of the next regular working day. The notification shall identify the time, specific location, equipment involved, and to the extent known, the cause(s) of the occurrence.

9. Upon notification of the breakdown condition, the SMAQMD Air Pollution Control Officer shall investigate the breakdown condition in accordance with uniform written procedures and guidelines relating to logging of initial reports on appropriate forms, investigation, and enforcement follow-up. If the occurrence does not constitute a breakdown condition, the SMAQMD Air Pollution Control Officer may take appropriate enforcement action.

10. An occurrence which constitutes a breakdown condition, and which persists only until the end of the production run or 24 hours, whichever is sooner (except for continuous air pollution monitoring equipment, for which the period shall be 96 hours) shall constitute a violation of any applicable emission limitation or restriction prescribed by SMAQMD Rules and Regulations; however, the SMAQMD Air Pollution Control Officer may elect to take no enforcement action if the owner or operator demonstrates to his satisfaction that a breakdown condition exists and the following requirements are met:

    A. The notification required in SMAQMD Rule No. 602 Section 301.1 is made; and

    B. Immediate appropriate corrective measures are undertaken and compliance is achieved, or the process is shutdown for corrective measures before commencement of the next production run or within 24 hours, whichever is sooner (except for continuous air pollution monitoring equipment for which the period shall be 96 hours). If the owner or operator elects to shut down rather than come into immediate compliance, (s)he must nonetheless take whatever steps are possible to minimize the impact of the breakdown within the 24 hour period; and

    C. The breakdown does not interfere with the attainment and maintenance of any national ambient air quality standard.

11. An occurrence which constitutes a breakdown condition shall not persist longer than the end of the production run or 24 hours, whichever is sooner (except for continuous air pollution monitoring equipment, for which the period shall be 96 hours), unless an emergency variance has been obtained.

12. If the breakdown condition will either require more than 24 hours to correct or persists longer than the end of the production run (except for continuous air pollution monitoring equipment, for which the period shall be 96 hours) the owner or operator may, in lieu of shutdown, request the SMAQMD Air Pollution Control Officer to commence the emergency variance procedure set forth in SMAQMD Rule No. 602 Section 304.

NON-FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

13. No emergency variance shall be granted unless the chairperson of the SMAQMD Hearing Board or other designated member(s) of the SMAQMD Hearing Board finds that:

    A. The occurrence constitutes a breakdown condition;

    B. Continued operation is not likely to create an immediate threat or hazard to public health or safety; and

    C. The requirements for a variance set forth in California Health & Safety Code Sections 42352 and 42353 have been met;

    D. The continued operation in a breakdown condition will not interfere with the attainment or maintenance of the national ambient air quality standards.

14. At any time after an emergency variance has been granted, the SMAQMD Air Pollution Control Officer may request for good cause that the SMAQMD Hearing Board chairperson or designated member(s) reconsider and revoke, modify or further condition the variance. The procedures set forth in SMAQMD Rule No. 602 Section 304.1 shall govern any further proceedings conducted under this section.

15. An emergency variance shall remain in effect only for as long as necessary to repair or remedy the breakdown condition, but in no event after a properly noticed hearing to consider an interim or 90 day variance has been held, or 15 days from the date of the subject occurrence, whichever is sooner.

16. Within one week after a breakdown condition has been corrected, the owner or operator shall submit a written report to the SMAQMD Air Pollution Control Officer on forms supplied by the SMAQMD Air Pollution Control Officer describing the causes of the breakdown, corrective measures taken, estimated emissions during the breakdown and a statement that the condition has been corrected, together with the date of correction and proof of compliance. The SMAQMD Air Pollution Control Officer may, at the request of the owner or operator for good cause, extend up to 30 days the deadline for submittal of the report described in this subsection.

17. The burden of proof shall be on the owner or operator of the source to provide sufficient information to demonstrate that a breakdown condition did occur. If the owner or operator fails to provide sufficient information, the SMAQMD Air Pollution Control Officer shall undertake appropriate enforcement action.

18. Any failure to comply, or comply in a timely manner, with the reporting requirements established in SMAQMD Rule No. 602 Sections 301.1 and 401 shall constitute a separate violation of SMAQMD Rule No. 602.

19. It shall constitute a separate violation of SMAQMD Rule No. 602 for any person to file with the SMAQMD Air Pollution Control Officer a report which falsely, or without probable cause, claims that an occurrence is a breakdown condition.

NON-FEDERALLY ENFORCEABLE REQUIREMENTS - GENERAL

ARCHITECTURAL COATINGS

20. The permittee shall comply with the requirements of SMAQMD Rule No. 466 Solvent Cleaning when using volatile organic compounds for the cleanup of architectural coating application equipment.
[SMAQMD Rule No. 466 Sections 301 and 302 (09-25-2008 version)]

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

A. EQUIPMENT DESCRIPTION

The information specified under this section is enforceable by the SMAQMD, U.S. EPA and the public.

The requirements specified under the following sections apply to the following equipment:

COMBINED CYCLE POWER BLOCK

Gas Turbine

SMAQMD Rule 201 Permit to Operate No. 21738 (permit number is for reference purposes only - not federally enforceable)

Manufacturer:	Siemens
Model No.:	V84.2
Type:	Combined Cycle
Nominal Rating:	103 MW
Heat Input Rating:	1410 MMBTU/hour
Fuel:	Natural Gas

Duct Burner for Heat Recovery Steam Generator

SMAQMD Rule 201 Permit to Operate No. 14071 (permit number is for reference purposes only - not federally enforceable)

Heat Input Rating:	200 MMBTU/hour
Fuel:	Natural Gas

Air Pollution Control System - NOx

SMAQMD Rule 201 Permit to Operate No. 11458 (permit number is for reference purposes only - not federally enforceable)

Control Device:	Selective Catalytic Reduction
Manufacturer:	Nooter/Eriksen
Venting:	Gas Turbine and Duct Burner

Air Pollution Control System - ROC and CO

SMAQMD Rule 201 Permit to Operate No. 11459 (permit number is for reference purposes only - not federally enforceable)

Control Device:	Oxidation Catalyst
Manufacturer:	Nooter/Eriksen
Venting:	Gas Turbine and Duct Burner

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

B. APPLICABLE FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC: The requirements specified under this section are enforceable by the SMAQMD, U.S. EPA and the public.

RECOMMISSIONING PERIOD REQUIREMENTS

CM1. The recommissioning period is defined as follows:

"The recommissioning period shall commence when all mechanical, electrical and control systems associated with the Siemens T-3000 control system are installed and the gas turbine is first fired. The recommissioning period shall terminate 30 operating days after commencement, or when the SPA facility has successfully completed performance testing, tuning and shakedown operations and compliance is demonstrated by continuous emissions monitoring equipment, whichever occurs first. For purposes of this condition, "operating day" is defined as any calendar day during which fuel is combusted in the turbine or duct burner."
[SMAQMD Rule Nos. 201 and 202]

CM2. The facility shall record the date that the recommissioning period terminates and submit written notification of this date to the SMAQMD Air Pollution Control Officer within 3 weekdays (Monday through Friday) of such termination.
[SMAQMD Rule Nos. 201 and 202]

CM3. During the recommissioning period at the earliest feasible opportunity, in accordance with recommendations of the equipment manufacturers and the construction contractor, the gas turbine combustors shall be tuned to minimize emissions of CO and NOx.
[SMAQMD Rule Nos. 201 and 202]

CM4. During the recommissioning period, at the earliest feasible opportunity, in accordance with recommendations of the equipment manufacturers and the construction contractor, the gas turbine and duct burner shall operate with the Selective Catalytic Reduction (SCR) system. The SCR system shall be adjusted and operated to minimize emissions of NOx.
[SMAQMD Rule Nos. 201 and 202]

CM5. During the recommissioning period, compliance with NOx and CO emission limits for the gas turbine and duct burner shall be demonstrated through the use of properly operated and maintained continuous emission monitoring systems and continuous parameter monitoring systems for the following:

A. Firing hours of the gas turbine and duct burner

B. Fuel flow rates to the gas turbine and duct burner

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

C. Stack gas NOx emission concentrations

D. Stack gas CO emission concentrations

E. Stack gas O2 concentrations
[SMAQMD Rule Nos. 201 and 202]

CM6. During the recommissioning period the monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for the gas turbine and duct burner. Previously approved methods shall be used to calculate heat input rates, NOx and CO mass emission rates, and NOx and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to SMAQMD personnel upon request.
[SMAQMD Rule Nos. 201 and 202]

CM7. During the recommissioning period the continuous emission and parameter monitors shall be installed, calibrated and operational prior to firing of the gas turbine and duct burner with the new master control system. After initial firing of the gas turbine and duct burner, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of NOx and CO emission concentrations.
[SMAQMD Rule Nos. 201 and 202]

CM8. During the recommissioning period the total number of firing hours of the gas turbine and duct burner without control of NOx emissions by the SCR system shall not exceed 100 hours. Such operation of the gas turbine and duct burner shall be limited to discrete recommissioning activities that can only be properly executed without the SCR system fully operational.

A. The number of firing hours of the gas turbine and duct burner without control of NOx emissions by the SCR system shall be recorded on an hourly basis during the recommissioning period.
[SMAQMD Rule Nos. 201 and 202]

CM9. During the recommissioning period the total mass emissions of ROC, NOx, SOx, PMI0 and CO that are emitted by the gas turbine and duct burner shall accrue towards the quarterly mass emission limits in Condition No. 4.
[SMAQMD Rule Nos. 201 and 202]

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

CM10. During the recommissioning period the NOx concentration from the gas turbine and duct burner shall not exceed the following limit:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable NOx Concentration Gas Turbine and Duct Burner ppmv at 15% O2, averaged over any consecutive 3 hour period	
	Current Permit Limit	Permit Limit Applicable During the Recommissioning Period
NOx	3	No limit

CM11. During the recommissioning period hourly mass emissions from the gas turbine and duct burner shall not exceed the following limits:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable Hourly Emissions Gas Turbine and Duct Burner lb/hour, averaged over any consecutive 3 hour period	
	Current Permit Limits	Permit Limits During the Recommissioning Period
ROC	9.01	9.01 (no change)
NOx	17.76	360
SO2	0.97	0.97 (no change)
PM10	7.00	7.00 (no change)
CO	10.81	500

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

CM12. During the recommissioning period daily mass emissions from the gas turbine and duct burner shall not exceed the following limits:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable Daily Emissions Gas Turbine and Duct Burner lb/day	
	Current Permit Limits	Permit Limits During the Recommissioning Period
ROC	146.7	146.7 (no change)
NOx	384.5	1500
SO2	21.8	21.8 (no change)
PM10	142.1	142.1 (no change)
CO	326.9	1875

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

EMISSION LIMITATION REQUIREMENTS

1. The NOx concentration from the gas turbine and duct burner shall not exceed the following limit:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable NOx Concentration (A) Gas Turbine and Duct Burner ppmv at 15% O2 averaged over any consecutive 3 hour period
NOx	3

(A) Excluding start-ups, shutdowns and short term excursions as defined in Condition Nos. B.8, B.9 and B.10.

2. Mass emissions from the gas turbine and duct burner shall not exceed the following limits:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable Emissions (A) Gas Turbine and Duct Burner lb/hour averaged over any consecutive 3 hour period
ROC	9.01 (B)
NOx	17.76 (C)
SO2	0.97 (D)
PM10	7.00 (E)
CO	10.81 (F)

(A) Excluding start-ups, shutdowns and short term excursions as defined in Condition Nos. B.8, B.9 and B.10.
(B) Based on a turbine ROC emission factor of 0.00228 lb/MMBTU, duct burner ROC emission factor of 0.029 lb/MMBTU and firing at full capacity.
(C) Based on data submitted in the permit application and is monitored by the turbine's NOx CEM system.
(D) Based on a turbine and duct burner SO2 emission factor of 0.0006 lb/MMBTU and firing at full capacity.

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

(E) Based on a turbine PM10 emission factor of 0.003546 lb/MMBTU, duct burner PM10 emission factor of 0.01 lb/MMBTU and firing at full capacity.
(F) Based on data submitted in the permit application and is monitored by the turbine's CO CEM system.

3. Mass emissions from the following equipment at the facility shall not exceed the following limits:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable Emissions (A) lb/day		
	Gas Turbine and Duct Burner	Cooling Tower	Total
ROC	146.7	NA	146.7
NOx	384.5	NA	384.5
SO2	21.8	NA	21.8
PM10	142.1	9.7	151.8
CO	326.9	NA	326.9

(A) Including start-ups, shutdowns and short term excursions as defined in Condition Nos. B.8, B.9 and B.10.

4. Combined mass emissions from the following equipment at the facility shall not exceed the following limits:
[SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable Emissions (A) Combined Emissions from: Gas Turbine and Duct Burner and Cooling Tower				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
ROC	8,792	8,898	13,264	8,968	39,922
NOx	24,209	24,545	26,321	24,725	99,800
SOx	1,814	1,836	1,944	1,853	7,447

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

Pollutant	Maximum Allowable Emissions (A) Combined Emissions from: Gas Turbine and Duct Burner and Cooling Tower				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Total lb/year
PM10	11,015	10,160	12,294	11,619	45,088
CO	21,265	21,601	22,803	21,708	87,377

(A) Including start-ups, shutdowns and short term excursions as defined in Condition Nos. B.8, B.9 and B.10.

5. HAP mass emissions from the facility shall not exceed the following limits:
[SMAQMD Rule Nos. 201 and 202]

Equipment	Maximum Allowable HAP Emissions (A) tons/year	
	Single HAP	Combination of HAPs
Total facility	9.4	24.4

(A) The purpose of this limitation is to qualify the gas turbines for the non-applicability of 40 CFR 63 Subpart YYYY - National Emission Standards for Hazardous Air Pollutants for Stationary Gas Turbines.

EQUIPMENT OPERATION REQUIREMENTS

6. The duct burner shall not be operated unless the gas turbine is operating.
[SMAQMD Rule Nos. 201 and 202]

7. The turbine and/or the duct burner shall not be operated without fully functioning selective catalytic reduction and oxidizing catalyst air pollution control systems, excluding periods of start-ups and shutdowns.
[SMAQMD Rule Nos. 201 and 202]

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

8. The duration of the gas turbine's start-up period shall not exceed 60 minutes.

   A. Gas turbine start-ups are defined as the time periods commencing with the introduction of fuel to the gas turbine and ending at the time that 15-minute average NOx concentrations do not exceed 3 ppmvd at 15% O2, but in no case exceeding 60 consecutive minutes.
   [SMAQMD Rule Nos. 201 and 202]

9. Gas turbine shutdowns are defined as the 30-minute time period immediately preceding the termination of fuel to the gas turbine.
   [SMAQMD Rule Nos. 201 and 202]

10. Gas turbine short-term excursions are defined as 15-minute periods designated by the applicant that are a direct result of a diffusion mode switchover, not to exceed four consecutive 15-minute periods, when the 15-minute average NOx concentration exceeds 3 ppmvd at 15% O2.

    A. Maximum 3-hour average NOx concentration for periods that include short-term excursions shall not exceed 30 ppmvd at 15% O2.

    B. Short-term excursion periods that total in excess of 10 hours per rolling 12-month period shall not be excluded from evaluations for compliance with emission limits in Condition Nos. B.1 and B.2.
    [SMAQMD Rule Nos. 201 and 202]

11. The gas turbine and duct burner shall only combust natural gas fuel.
    [SMAQMD Rule Nos. 201 and 202]

MONITORING REQUIREMENTS

12. The permittee shall operate a continuous emission monitoring system that has been approved by the SMAQMD Air Pollution Control Officer for the gas turbine and duct burner.

    A. The continuous emission monitoring (CEM) system shall monitor and record nitrogen oxides, carbon monoxide and oxygen.

    B. For NOx and O2, the CEM system shall comply with U.S. EPA Performance Specifications in 40 CFR 75 Appendix A.

    C. For CO, the CEM system shall comply with U.S. EPA Performance Specifications in 40 CFR 60 Appendix B Performance Specification 4.
    [SMAQMD Rule Nos. 201 and 202]

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

13. The permittee shall operate a continuous parameter monitoring system that has been approved by the SMAQMD Air Pollution Control Officer that either measures or calculates and records the following:
[SMAQMD Rule Nos. 201 and 202]

Parameter to be Monitored	Units
A. Fuel consumption of the combined cycle gas turbine	MMBTU/hour of natural gas
B. Fuel consumption of the duct burner	MMBTU/hour of natural gas
C. Exhaust gas flow rate of the combined cycle gas turbine and the duct burner.	kscfh or lb/hr

RECORDKEEPING AND REPORTING REQUIREMENTS

14. The following records shall be continuously maintained on site for the most recent five-year period and shall be made available to the SMAQMD Air Pollution Control Officer upon request. Quarterly records as specified in the table below shall be made available for inspection within 30 days of the end of the quarter.
[SMAQMD Rule Nos. 201 and 202 and 40 CFR 60.7]

Frequency	Information to be Recorded
Upon occurrence	A. Record of the occurrence and duration of any start-up, shutdown or short term excursion. i. The number of consecutive 15-minute periods when the 15-minute average NOx concentration exceeded the limits of Condition No. B.1 during each short-term excursion. ii. The qualified condition(s) under which each short-term excursion occurred, pursuant to SMAQMD Rule No. 413 Section 114. iii. The maximum 6-hour average NOx concentration during the period that includes each short-term excursion. iv. The cumulative total, per calendar year, of all 15-minute periods when the 15-minute average NOx concentration exceeded the limits of Condition No. B.1.

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

Frequency	Information to be Recorded
	B. Malfunction in operation of the gas turbine. C. Measurements from the continuous emission and parameter monitoring systems. D. Monitoring device and performance testing measurements. E. All continuous monitoring system performance evaluations. F. All continuous monitoring system or monitoring device calibration checks. G. All continuous monitoring system adjustments and maintenance.
Hourly	H. Gas turbine natural gas fuel consumption (MMBTU/hr). I. Duct burner natural gas fuel consumption (MMBTU/hr). J. Indicate when each gas turbine start-up occurred. K. NOx emission concentration from the gas turbine and duct burner (ppmvd at 15% O2). L. ROC, NOx, SOx, PM10 and CO hourly emissions (lb/hour) from the gas turbine and duct burner (combined emissions). i. For those pollutants directly monitored (NOx and CO), the hourly emissions will be from the CEM system required pursuant to Condition No. B.12. ii. For those pollutants that are not directly monitored (ROC, SOx and PM10), the hourly emissions shall be calculated based on SMAQMD approved emission factors contained in the footnotes to Condition No. B.2.
Daily	M. ROC, NOx, SOx, PM10 and CO daily mass emissions from all equipment <u>separately</u> and <u>combined</u> at the facility (lb/day): i. gas turbine and duct burner (for separate reporting the gas turbine and duct burner emission are combined).

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
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APC ROC AND CO OXIDATION CATALYST SYSTEM

Frequency	Information to be Recorded
	ii. cooling tower.
Quarterly	N. ROC, NOx, SOx, PM10 and CO quarterly mass emissions from all equipment combined at the facility (lb/quarter). i. gas turbine and duct burner. ii. cooling tower.

15. Submit to the SMAQMD Air Pollution Control Officer a written report which contains the following information.
[SMAQMD Rule Nos. 201 and 202 and 40 CFR 60.7]

Frequency	Information to be Reported
Quarterly Submitted by: Jan 30 Apr 30 Jul 30 Oct 30 for the previous calendar quarter	A. Whenever the continuous emissions monitoring system is inoperative except for zero and span checks: i. Date and time of non-operation of the continuous emission monitoring system. ii. Nature of the continuous emission monitoring system repairs or adjustments. B. Whenever an emission occurs as measured by the required continuous emissions monitoring system that is in excess of any emission limitation: i. Magnitude of the emission which has been determined to be in excess. ii. Date and time of the commencement and completion of each period of excess emissions. iii. Periods of excess emissions due to startup, shutdown and malfunction shall be specifically identified. iv. The nature and cause of any malfunction (if known). v. The corrective action taken or preventive measures adopted.

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

Frequency	Information to be Reported
	C. If there are no excess emissions or the continuous monitoring system has not been inoperative, repaired or adjusted for a calendar quarter, a report shall be submitted stating such information.

EMISSION REDUCTION CREDIT (ERC) REQUIREMENTS

16. The permittee shall surrender (and has surrendered - See Condition Nos. 17, 18 and 19) ERCs to the SMAQMD Air Pollution Control Officer to offset the following amount of emissions:
[SMAQMD Rule No. 202]

Equipment - Gas Turbine Duct Burner Cooling Tower	Amount of Emission Offsets for which ERCs are to be Surrendered lb/quarter			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
ROC	1,292	1,398	5,764	1,468
NOx	24,209	24,545	26,321	24,725
PM10	11,015	10,160	12,294	11,619

17. The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the ROC emission offset requirements as stated in Condition No. 16:
[SMAQMD Rule No. 202]

ERC Certificate No.	Face Value of Emission Reduction Credit Certificates lb/quarter				IPTR (A)	Offset Ratio	Value Applied to ROC Emission Liability lb/quarter			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
SMAQMD 00-00652 Swansons	1,550	1,678	6,917	1,762	NA	1.2	1,292	1,398	5,764	1,468
Total ROC Emission Offsets							1,292	1,398	5,764	1,468

(A) IPTR = interpollutant trading ratio

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

18. The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the NOx emission offset requirements as stated in Condition No. 16: **[SMAQMD Rule No. 202]**

ERC Certificate No.	Face Value of Emission Reduction Credit Certificates lb/quarter				IPTR (A)	Offset Ratio	Value Applied to NOx Emission Liability lb/quarter			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
SMAQMD 97-00437 Campbell	23,622	13,491	31,585	20,983	NA	1.2:1	19,685	11,243	26,321	17,486
PCAQMD 98-00002 Formica (ROC)	18,096	53,208	0	28,956	2:1	2:1	4,524	13,302	0	7,239
Total NOx Emission Offsets							24,209	24,545	26,321	24,725

(A) IPTR = interpollutant trading ratio

19. The following ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the PM10 emission offset requirements as stated in Condition No. 16: **[SMAQMD Rule No. 202]**

Offset Source	Face Value of Emission Reduction credit Certificates lb/quarter				IPTR (A)	Offset Ratio	Value Applied to PM10 Emission Liability lb/quarter			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4			Qtr 1	Qtr 2	Qtr 3	Qtr 4
PCAPCD 99-00003 Sierra Pine	16,523	15,240	18,441	17,429	NA	1.5	11,015	10,160	12,294	11,619
Total PM10 Emission Offsets							11,015	10,160	12,294	11,619

(A) IPTR = interpollutant trading ratio

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

EMISSION TESTING REQUIREMENTS

20. The permittee shall perform an ROC, NOx, PM10 and CO source test and CEM accuracy (RATA) test of the gas turbine and duct burner once each calendar year.

    A. Submit a source test plan to the SMAQMD Air Pollution Control Officer for approval at least 30 days before the source test is to be performed. The source test plan shall indicate that U.S. EPA approved test methods are used for NOx and CO.

    B. Notify the SMAQMD Air Pollution Control Officer at least 7 days prior to the source testing date.

    C. During the source test the gas turbine and duct burner shall be operated at the maximum firing capacity, defined as ≥ 90% of the heat input capacity that is achievable based on ambient conditions at the time of the source test.

    D. Submit the source test results to the SMAQMD Air Pollution Control Officer within 60 days after the completion of the source test(s).

    E. The SMAQMD Air Pollution Control Officer may waive the ROC and PM10 annual source test requirement every other year if the prior annual source test result indicates that the respective hourly emissions are less than or equal to 75% of the respective hourly emission limit.

    [SMAQMD Rule Nos. 201 and 202]

PERMIT SHIELD

21. Compliance with the specified conditions of the Title V permit shall be deemed compliance with the following subsumed requirements.
    [U.S. EPA Title V White Paper Number 2 for Improved Implementation of the Part 70 Operating Permits Program]

Title V Permit Condition No.	Subsumed requirement
B.2	SMAQMD Rule No. 406 - Combustion Contaminants (adopted 12-06-1978)
B.1, B.2, B.8, B.9, B.10, B.11, B.12, B.13, B.14,	SMAQMD Rule No. 413 - Stationary Gas Turbines (adopted 03-24-2005)

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
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Title V Permit Condition No.	Subsumed requirement
B.2, B.11	SMAQMD Rule No. 420 - Sulfur Content of Fuels (adopted 08-13-1981)
B.1, B.2, B.14, B.15	40 CFR 60 Subpart Db - NSPS for Small Industrial - Commercial - Institutional Steam Generating Units (amended 06-13-2007)
B.1, B.2, B.14, B.15	40 CFR 60 Subpart GG - Standards of Performance for Stationary Gas Turbines (amended 02-24-2006)

NON-FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

C. *NON*-FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC

The requirements specified under this section are enforceable by the SMAQMD only.

EMISSION LIMITATION REQUIREMENTS

22. Concentrations of ammonia (NH3) emissions from the gas turbine and duct burner shall not exceed the following limit.
[SMAQMD Rule No. 402]

Pollutant	Maximum Allowable Ammonia Concentration ppmv at 15% O2 (measured as NH3) averaged over any consecutive 3 hour
Ammonia (NH3)	10

(A) Excluding start-ups, shutdowns and short term excursions as defined in Condition Nos. B.8, B.9 and B.10.

EMISSION TESTING REQUIREMENTS

23. The permittee shall perform an ammonia (NH3) source test of the gas turbine and duct burner once each calendar year.

A. Submit a source test plan to the SMAQMD Air Pollution Control Officer for approval at least 30 days before the source test is to be performed.

B. Notify the SMAQMD Air Pollution Control Officer at least 7 days prior to the source testing date.

C. During the source test the gas turbine and duct burner shall be operated at the maximum firing capacity, defined as ≥ 90% of the heat input capacity that is achievable based on ambient conditions at the time of the source test.

D. Submit the source test results to the SMAQMD Air Pollution Control Officer within 60 days after the completion of the source test(s).

[SMAQMD Rule No. 201]

FEDERALLY ENFORCEABLE REQUIREMENTS - TITLE IV ACID RAIN PERMIT
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

D. ACID RAIN PERMIT

The requirements specified under this subsection are issued in accordance with SMAQMD Rule No. 207 - Title V Federal Operating Permit Program and Title IV and Title V of the federal Clean Air Act, and are enforceable by the SMAQMD, the U.S. EPA and the public.

PERMIT REQUIREMENTS

24. The designated representative of each affected source and each affected unit at the source shall:

    A. Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR Part 72 in accordance with the deadlines specified in 40 CFR 72.30; and

    B. Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit.
    [40 CFR 72.9(a)(1)]

25. The owners and operators of each affected source and each affected unit at the source shall:

    A. Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and

    B. Have an Acid Rain Permit.
    [40 CFR 72.9(a)(2)]

MONITORING REQUIREMENTS

26. The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source, shall comply with the monitoring requirements as provided in 40 CFR Parts 74, 75 and 76.

    A. Sampling and analysis for fuel gas total sulfur content shall comply with the requirements of 40 CFR Part 75 Appendix D.

        i. Sampling for fuel gas total sulfur content is not required if a valid contract or tariff sheet is used to qualify the gas as pipeline natural gas, as defined in 40 CFR 72.2.

        ii. If fuel gas sampling is used to qualify the fuel gas as pipeline natural gas, a sample shall be collected and analyzed:

            a. at least once annually for fuel gas total sulfur content, and

FEDERALLY ENFORCEABLE REQUIREMENTS - TITLE IV ACID RAIN PERMIT
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b. whenever the fuel gas supply source changes.

iii. Provided that the analysis results do not exceed 0.5 grains total sulfur per 100 scf of fuel gas, the default emission rate of 0.0006 lb SO2/MMBTU shall be used to determine SO2 mass emissions for the purposes of the Acid Rain Program.

iv. If the results of the fuel gas sampling show that the fuel gas does not meet the definition of pipeline natural gas in 40 CFR 72.2, but those results are believed to be anomalous, the owner or operator may document the reasons for believing this in the monitoring plan for the unit, and may immediately perform additional sampling in accordance with of 40 CFR 75 Appendix D Section 2.3.1.4(b). In such cases, a minimum of three additional samples must be obtained and analyzed, and the results of each sample analysis must meet the definition of pipeline natural gas.

v. If the results of the annual and additional samples show that the fuel gas does not meet the definition of pipeline quality gas, the owner or operator shall reclassify the fuel as appropriate and determine the SO2 emission rate to be used in the Acid Rain Program calculations in accordance with the following:

(a) If the fuel still qualifies as natural gas under 40 CFR 75 Appendix D Section 2.3.2.4, reclassify the fuel as natural gas and determine the appropriate default SO2 emission rate for the fuel, according to 40 CFR 75 Appendix D Section 2.3.2.1.1.

[40 CFR 72.9(b)(1) and 40 CFR 75 Appendix D]

27. The emissions measurements recorded and reported in accordance with 40 CFR Part 75 shall be used to determine compliance by the source or unit, as appropriate, with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.
[40 CFR 72.9(b)(2)]

28. The requirements of 40 CFR Parts 74 and 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the federal Clean Air Act and other provisions of the operating permit for the source.
[40 CFR 72.9(b)(3)]

SULFUR DIOXIDE REQUIREMENTS

29. The owners and operators of each source and each affected unit at the source shall:

A. Hold allowances, as of the allowance transfer deadline, in the source's compliance account (after deductions under 40 CFR 73.34(c)) not less than the total annual

FEDERALLY ENFORCEABLE REQUIREMENTS - TITLE IV ACID RAIN PERMIT
GAS TURBINE
DUCT BURNER
APC NOx SCR SYSTEM
APC ROC AND CO OXIDATION CATALYST SYSTEM

emissions of sulfur dioxide for the previous calendar year from the affected units at the source; and

B. Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.
[40 CFR 72.9(c)(1)]

30 Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the federal Clean Air Act.
[40 CFR 72.9(c)(2)]

31. An affected unit shall be subject to the requirements under 40 CFR 72.9(c)(1) as follows:

A. Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or

B. Starting on or after January 1, 1995 in accordance with 40 CFR 72.41 and 72.43, an affected unit under 40 CFR 72.6(a)(2) or (3) that is a substitution or compensating unit;

C. Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2) that is not a substitution or compensating unit; or

D. Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR Part 75, an affected unit under 40 CFR 72.6(a)(3) that is not a substitution or compensating unit.
[40 CFR 72.9(c)(3)]

32. Allowances shall be held in, deducted from or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
[40 CFR 72.9(c)(4)]

33. An allowance shall not be deducted in order to comply with the requirements of 40 CFR 72.9(c)(1)(i) prior to the calendar year for which the allowance was allocated.
[40 CFR 72.9(c)(5)]

34. An allowance allocated by the U.S. EPA Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or an exemption under 40 CFR 72.7 and 72.8 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
[40 CFR 72.9(c)(6)]

35. An allowance allocated by the U.S. EPA Administrator under the Acid Rain Program does not constitute a property right.
[40 CFR 72.9(c)(7)]

FEDERALLY ENFORCEABLE REQUIREMENTS - TITLE IV ACID RAIN PERMIT
GAS TURBINE
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NITROGEN OXIDES REQUIREMENTS

36. The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

EXCESS EMISSIONS REQUIREMENTS

37. The designated representative of an affected source that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR Part 77. **[40 CFR 72.9(e)(1)]**

38. The owners and operators of an affected source that has excess emissions in any calendar year shall:

    A. Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR Part 77; and

    B. Comply with the terms of an approved offset plan, as required by 40 CFR Part 77. **[40 CFR 72.9(e)(2)]**

RECORDKEEPING AND REPORTING REQUIREMENTS

39. Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the U.S. EPA Administrator or permitting authority:

    A. The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the submission of a new certificate of representation changing the designated representative.

    B. All emissions monitoring information, in accordance with 40 CFR Part 75 provided that to the extent that 40 CFR Part 75 provides for a 3-year period for recordkeeping, the 3-year period shall apply.

    C. Copies of all reports, compliance certifications and other submissions and all records made or required under the Acid Rain Program.

FEDERALLY ENFORCEABLE REQUIREMENTS - TITLE IV ACID RAIN PERMIT
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D. Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.

E. The date that any fuel gas supply source change occurs.
(this requirement is not part of 40 CFR 72.9(f)(1))

F. The date when the fuel type changes between pipeline natural gas and natural gas as described in Condition No. D.27.
(this requirement is not part of 40 CFR 72.9(f)(1))
[40 CFR 72.9(f)(1)]

40. The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR Part 72 Subpart I and 40 CFR Part 75.
[40 CFR 72.9(f)(2)]

LIABILITY REQUIREMENTS

41. Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit or an exemption under 40 CFR 72.7 or 72.8, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to Section 113(c) of the federal Clean Air Act.
[40 CFR 72.9(g)(1)]

42. Any person who knowingly makes a false material statement in any record, submission or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to Section 113(c) of the federal Clean Air Act and 18 U.S.C. 1001.
[40 CFR 72.9(g)(2)]

43. No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
[40 CFR 72.9(g)(3)]

44. Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
[40 CFR 72.9(g)(4)]

45. Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
[40 CFR 72.9(g)(5)]

FEDERALLY ENFORCEABLE REQUIREMENTS - TITLE IV ACID RAIN PERMIT
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46. Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit.
[40 CFR 72.9(g)(6)]

47. Each violation of a provision of 40 CFR Parts 72, 73, 74, 75, 76, 77 and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the federal Clean Air Act.
[40 CFR 72.9(g)(7)]

EFFECT ON OTHER AUTHORITIES

48. No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit or an exemption under 40 CFR 72.7 or 72.8 shall be construed as:

    A. Except as expressly provided in Title IV of the federal Clean Air Act, exempting or excluding the owners and operators and, to the extent applicable, the designated representative of an affected source or affected unit from compliance with any other provision of the federal Clean Air Act, including the provisions of Title I of the federal Clean Air Act relating to applicable National Ambient Air Quality Standards or State Implementation Plans.

    B. Limiting the number of allowances a source can hold; provided, that the number of allowances held by the source shall not affect the source's obligation to comply with any other provisions of the federal Clean Air Act.

    C. Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements under such State law.

    D. Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act.

    E. Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

    [40 CFR 72.9(h)]

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
COOLING TOWER

A. EQUIPMENT DESCRIPTION

The information specified under this section is enforceable by the SMAQMD, U.S. EPA and the public.

The requirements specified under the following sections apply to the following equipment:

COOLING TOWER

P/O No. 13316	(permit number is for reference purposes only - not federally enforceable)
Manufacturer:	GEA Thermal-Dynamic Towers
Type:	Mechanical draft, counterflow, with drift eliminator
Size:	3 cell
Capacity:	45,000 gallons water/minute, 4,763,000 cfm air flowrate

B. APPLICABLE FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC

The requirements specified under this subsection are enforceable by the SMAQMD, U.S. EPA and the public.

EMISSION LIMITATION REQUIREMENTS

1. Emissions from the cooling tower shall not exceed the following:
   [SMAQMD Rule Nos. 201 and 202]

Pollutant	Maximum Allowable Emissions Cooling Tower lb/hour averaged over any consecutive 3 hour period
PM10	0.41 (A)

(A) Based on a water circulation rate of 45,000 gal/min, cooling tower drift rate of 0.0006%, and a TDS level of 3000 ppmw.

2. Emissions from the following equipment at the facility shall not exceed the following daily emission limits:
   [SMAQMD Rule Nos. 201 and 202]

See Condition No. B.3 for the Gas Turbine and Duct Burner

3. Emissions from the following equipment at the facility shall not exceed the following quarterly emission limits:
   [SMAQMD Rule Nos. 201 and 202]

See Condition No. B.4 for the Gas Turbine and Duct Burner

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
COOLING TOWER

4. The total dissolved solids content of the circulating cooling water shall not exceed 3000 ppmw, averaged over any consecutive three hour period.
[SMAQMD Rule Nos. 201 and 202]

EQUIPMENT OPERATION REQUIREMENTS

None

MONITORING REQUIREMENTS

5. The permittee shall operate a continuous parameter monitoring system, that has been approved by the SMAQMD Air Pollution Control Officer, that either measures or calculates and records the following.
[SMAQMD Rule Nos. 201 and 202]

Parameter to be Monitored	Units
A. Total dissolved solids content of the circulating water in the cooling tower	ppmw

RECORDKEEPING AND REPORTING REQUIREMENTS

6. The following records shall be continuously maintained on site for the most recent five-year period and shall be made available to the SMAQMD Air Pollution Control Officer upon request. Quarterly records shall be made available for inspection within 30 days of the end of the reporting period.
[SMAQMD Rule Nos. 201 and 202]

Frequency	Information to be Recorded
Hourly	A. Total dissolved solids content of the circulating water in the cooling tower. (ppmw) B. Cooling tower hourly PM10 mass emission rate. (lb PM10/hour) i. The hourly emissions shall be calculated based on the cooling water circulation rate multiplied by the cooling tower drift rate, density of water and the measured TDS level.
Daily	C. Cooling tower PM10 daily mass emissions. (lb/day) D. Total facility PM10 daily mass emissions. (lb/day)
Quarterly	E. Total facility PM10 quarterly mass emissions. (lb/quarter)

FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC
COOLING TOWER

EMISSION REDUCTION CREDIT (ERC) REQUIREMENTS

7. The permittee shall surrender (and has surrendered - See Condition No. 8) PM10 ERCs to the SMAQMD Air Pollution Control Officer to offset the following amount of PM10 emissions: **[SMAQMD Rule Nos. 201 and 202]**

   See Condition No. B.16 for the Gas Turbine and Duct Burner (PM10 only)

8. The following PM10 ERCs have been surrendered to the SMAQMD Air Pollution Control Officer to comply with the PM10 emission offset requirements as stated in Condition No. 7: **[SMAQMD Rule Nos. 201 and 202]**

   See Condition No. B.19 for the Gas Turbine and Duct Burner

PERMIT SHIELD

9. Compliance with the specified conditions of the Title V permit shall be deemed compliance with the following subsumed requirements.
   [U.S. EPA Title V White Paper Number 2 for Improved Implementation of the Part 70 Operating Permits Program]

Title V Permit Condition No.	Subsumed requirement
B.1	SMAQMD Rule No. No. 404 - Particulate Matter (adopted 11-20-1984)

NON-FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC COOLING TOWER

C. *NON*-FEDERALLY ENFORCEABLE REQUIREMENTS - EQUIPMENT SPECIFIC

The requirements specified under this section are enforceable by the SMAQMD only.

10. The cooling tower shall not use any chromium containing water treatment chemicals. **[State of California Air Toxic Control Measure for Chromate Treated Cooling Towers (CCR 93103)]**

INSIGNIFICANT EMISSIONS UNITS

The following systems are considered insignificant emissions units and are not subject to equipment specific requirements. However, these units are required to comply with all applicable general requirements.

Equipment Description	Basis for the Exemption
Vehicles	SMAQMD Rule No. 201 Section 111.1 Vehicles used to transport passengers or freight.
Portable pressure washer, 13 hp Portable welder, 16 hp Water treatment backup electrical generator, 18 hp, natural gas fuel	SMAQMD Rule No. 201 Section 112.1 Internal combustion engines with a manufacturer's maximum continuous rating of 50 hp or less.
Air conditioners	SMAQMD Rule No. 201 Section 115 Air conditioning systems not designed to remove air contaminants.
Aqueous ammonia storage tank Compressed gas cylinders (e.g. CO2, H2, calibration gases)	SMAQMD Rule No. 201 Section 117.1 Tanks used for the storage of liquefied or compressed gases.
Lube oil storage tanks Waste lube oil storage tanks Hydraulic oil storage tanks Water/waste oil separator	SMAQMD Rule No. 201 Section 117.2 Tanks used for the storage of unheated organic materials with a vapor pressure ≤ 5 mm Hg (0.1 psia) or initial boiling point ≥ 150 °C (302 °F).
Maintenance shop painting	SMAQMD Rule No. 201 Section 118 Surface coating operations using a combined total of one gallon per day or less of coating material or solvent.

INSIGNIFICANT EMISSIONS UNITS

Equipment Description	Basis for the Exemption
Parts washer and wipe cleaning Natural gas compressor (electric motor drive) Abrasive blasting cabinet Fugitive emissions associated with plant piping systems for fuel gas, fuel oil, lube oil and anhydrous ammonia Water treatment chemical storage tanks Brazing, soldering, welding and cutting torches for plant maintenance activities Adhesive use for plant maintenance activities	SMAQMD Rule No. 201 Section 122 Other equipment which would emit any pollutant, without the benefit of air pollution control devices, at a rate less than 2 pounds in any 24 hour period.

ACRONYMS, ABBREVIATIONS AND UNITS OF MEASURE

Acronyms, abbreviations and units of measure used in this permit are defined as follows:

ASTM
American Society for Testing and Materials

BACT
Best Available Control Technology.

CAA
The federal Clean Air Act.

CARB
California Air Resources Board.

CFC
Chloro-fluoro-carbons. A class of compounds responsible for destroying ozone in the upper atmosphere.

CFR
The Code of Federal Regulations. 40 CFR contains the implementing regulations for federal environmental statutes such as the Clean Air Act. Parts 50-99 of 40 CFR contain the requirements for air pollution programs.

CO
Carbon monoxide.

CO2
Carbon dioxide.

ERC
Emission reduction credit.

Federally Enforceable
All limitations and conditions which are enforceable by the Administrator of the U.S. EPA including those requirements developed pursuant to 40 CFR Part 51, Subpart I (NSR), Part 52.21 (PSD), Part 60 (NSPS), Part 61 (NESHAPs), Part 63 (HAP) and Part 72 (Permits Regulation, Acid Rain) including limitations and conditions contained in operating permits issued under a U.S. EPA approved program that has been incorporated into the California SIP.

NESHAP
National Emission Standards for Hazardous Air Pollutants (see 40 CFR Parts 61 and 63).

NOx
Nitrogen oxides.

ACRONYMS, ABBREVIATIONS AND UNITS OF MEASURE

NSPS
New Source Performance Standards. U.S. EPA standards for emissions from new stationary sources. Mandated by Title I, Section 111 of the federal Clean Air Act and implemented by 40 CFR Part 60 and SMAQMD Regulation 8.

NSR
New Source Review. A federal program for pre-construction review and permitting of new and modified sources of pollutants for which criteria have been established in accordance with Section 108 of the Federal Clean Air Act. Mandated by Title I of the federal Clean Air Act and implemented by 40 CFR Parts 51 and 52 and SMAQMD Rule No. 202. (Note: There are additional NSR requirements mandated by the California Clean Air Act.)

O2
Oxygen.

Offset Requirement
A New Source Review requirement to provide federally enforceable emission offsets for the emissions from a new or modified source. Applies to emissions of ROC, NOx, SO2 and PM10.

PM
Particulate matter.

PM10
Particulate matter with aerodynamic equivalent diameter of less than or equal to 10 microns.

PSD
Prevention of Significant Deterioration. A federal program for permitting new and modified sources of those air pollutants for which the SMAQMD is classified "attainment" of the National Air Ambient Quality Standards. Mandated by Title I of the federal Clean Air Act and implemented by 40 CFR Part 52.

ROC
Reactive organic compounds.

SIP
State Implementation Plan. CARB and SMAQMD programs and regulations approved by U.S. EPA and developed in order to attain the National Air Ambient Quality Standards. Mandated by Title I of the federal Clean Air Act.

SMAQMD
Sacramento Metropolitan Air Quality Management District.

SO2
Sulfur dioxide.

ACRONYMS, ABBREVIATIONS AND UNITS OF MEASURE

Title V
Title V of the federal Clean Air Act. Title V requires the SMAQMD to operate a federally enforceable operating permit program for major stationary sources and other specified sources.

TSP
Total suspended particulate.

U.S. EPA
The federal Environmental Protection Agency.

VOC
Volatile Organic Compounds.

UNITS OF MEASURE:

BTU	=	British Thermal Unit
cfm	=	cubic feet per minute
cm	=	centimeter
g	=	grams
gal	=	gallon
gpm	=	gallons per minute
hp	=	horsepower
hr	=	hour
lb	=	pound
in	=	inch
kg	=	kilogram
max	=	maximum
m2	=	square meter
min	=	minute
mm	=	millimeter
MM	=	million
ppmv	=	parts per million by volume
ppmw	=	parts per million by weight
psia	=	pounds per square inch, absolute
psig	=	pounds per square inch, gauge
quarter	=	calendar quarter
RVP	=	Reid vapor pressure
scfm	=	standard cubic feet per minute
yr	=	year

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end of report

APPENDIX E

2023 Hazardous Materials List.

CAMPBELL POWER PLANT (CERSID: 10222930)

Facility Information Submitted Oct 13, 2023

Submitted on 10/13/2023 3:15:47 PM by *Randall Blank* of SACTO POWER AUTHORITY COGENERATION (SACRAMENTO, CA)
Comments by Submitter: As of 10/13/2023 I have not received a courtesy notice for the HMBP renewal. Please ensure that randall.blank@ethosenergy.com it sent this notice.

- Business Activities
- Business Owner/Operator Identification

Hazardous Materials Inventory Submitted Oct 13, 2023

Submitted on 10/13/2023 3:15:47 PM by *Randall Blank* of SACTO POWER AUTHORITY COGENERATION (SACRAMENTO, CA)

- Hazardous Material Inventory (24)
- Site Map (Official Use Only)
  - *Campbell site map* (Adobe PDF, 225KB)

Emergency Response and Training Plans Submitted Oct 13, 2023

Submitted on 10/13/2023 3:15:47 PM by *Randall Blank* of SACTO POWER AUTHORITY COGENERATION (SACRAMENTO, CA)

- Emergency Response/Contingency Plan
  - *Campbell Emergency Response Plan* (Adobe PDF, 1313KB)
- Employee Training Plan
  - *Employee Training Plan* (Adobe PDF, 453KB)

Aboveground Petroleum Storage Act Submitted Oct 13, 2023

Submitted on 10/13/2023 3:15:47 PM by *Randall Blank* of SACTO POWER AUTHORITY COGENERATION (SACRAMENTO, CA)

- Aboveground Petroleum Storage Act Documentation
  - *Aboveground Petroleum Storage Act Documentation* (Adobe PDF, 534KB)
- APSA Facility Information

Site Identification

CAMPBELL POWER PLANT
3215 47TH AVE
SACRAMENTO, CA 95824
County
Sacramento

CERS ID
10222930
EPA ID Number
CAL000268448

Submittal Status

Submitted on 10/13/2023 by *Randall Blank* of SACTO POWER AUTHORITY COGENERATION (SACRAMENTO, CA)
Comments by submitter: As of 10/13/2023 I have not received a courtesy notice for the HMBP renewal. Please ensure that randall.blank@ethosenergy.com it sent this notice.

Hazardous Materials

Does your facility have on site (for any purpose) at any one time, hazardous materials at or above 55 gallons for liquids, 500 pounds for solids, or 200 cubic feet for compressed gases (include liquids in ASTs and USTs); or is regulated under more restrictive inventory local reporting requirements (shown below if present); or the applicable Federal threshold quantity for an extremely hazardous substance specified in 40 CFR Part 355, Appendix A or B; or handle radiological materials in quantities for which an emergency plan is required pursuant to 10 CFR Parts 30, 40 or 70?	Yes

Underground Storage Tank(s) (UST)

Does your facility own or operate underground storage tanks?	No

Hazardous Waste

Is your facility a Hazardous Waste Generator?	Yes
Does your facility treat hazardous waste on-site?	No
Is your facility's treatment subject to financial assurance requirements (for Permit by Rule and Conditional Authorization)?	No
Does your facility consolidate hazardous waste generated at a remote site?	No
Does your facility need to report the closure/removal of a tank that was classified as hazardous waste and cleaned on-site?	No
Does your facility generate in any single calendar month 1,000 kilograms (kg) (2,200 pounds) or more of federal RCRA hazardous waste, or generate in any single calendar month greater than 1 kg (2.2 pounds) of RCRA acute hazardous waste; or generate more than 100 kg (220 pounds) of spill cleanup materials contaminated with RCRA acute hazardous waste.	No
Is your facility a Household Hazardous Waste (HHW) Collection site?	No

Excluded and/or Exempted Materials

Does your facility recycle more than 100 kg/month of excluded or exempted recyclable materials (per HSC 25143.2)?	No

Aboveground Petroleum Storage

Does your facility own or operate aboveground petroleum storage tanks or containers AND: * have a total aboveground petroleum storage capacity of 1,320 gallons or more, OR * have one or more petroleum tanks in an underground area?	Yes

Regulated Substances

Does your facility have Regulated Substances stored onsite in quantities greater than the threshold quantities established by the California Accidental Release prevention Program (CalARP)?	Yes

Additional Information

Updated (5/3/23) Facility Manager contact information. Added additional 24/7 Em. Contact for Mike Von Zechlin, O & M Manager.

Facility/Site

CAMPBELL POWER PLANT
3215 47TH AVE
SACRAMENTO, CA 95824

CERS ID
10222930

Submittal Status

Submitted on 10/13/2023 by *Randall Blank* of SACTO POWER AUTHORITY COGENERATION (SACRAMENTO, CA)
Comments by submitter: As of 10/13/2023 I have not received a courtesy notice for the HMBP renewal. Please ensure that randall.blank@ethosenergy.com it sent this notice.

Identification

EthosEnergy Power Plant Services, LLC

Operator Phone	Business Phone	Business Fax	Beginning Date	Ending Date	
(916) 391-2993	(916) 391-2993				
			Dun & Bradstreet	SIC Code	Primary NAICS
				4911	

Facility/Site Mailing Address

3215 47TH Avenue
SACRAMENTO, CA 95824

Primary Emergency Contact

Doug Williamson
Title
Facility Manager

Business Phone	24-Hour Phone	Pager Number
9163912993x4	(916) 990-5969	

Owner

CAMPBELL POWER PLANT
(916) 600-7395
P O BOX 15830
SACRAMENTO, CA 95831

Secondary Emergency Contact

Campbell Power Plant Control Room
Title
On Duty Control Room Operator

Business Phone	24-Hour Phone	Pager Number
9163912993x5	9163912993x5	(916) 955-3696

Billing Contact

Veronica Rand
9163912993x1 veronica.rand@ethosenergy.com
3215 47TH Avenue
SACRAMENTO, CA 95824

Environmental Contact

Randall Blank
9163912993x2 randall.blank@ethosenergy.com
3215 47th Avenue
Sacramento, CA 95824

Name of Signer	Signer Title	Document Preparer
Douglas Williamson	Facility Manager	Randall Blank

Additional Information
Updated Primary Emergency Contact. Additional Emergency contact is Mike Von Zechlin, Operations & Maintenance Manager - 916-838-9366.(5/2/23)

Locally-collected Fields

Some or all of the following fields may be required by your local regulator(s).

Property Owner

Phone

Mailing Address

,

Assessor Parcel Number (APN)

Number of Employees
17

Facility ID
FA0013407

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT** 3215 47TH AVE , SACRAMENTO 95824	**Boiler Chemical Building**	Facility ID **FA0013407** Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Quantities Largest Cont.	Quantities Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Boiler pH Control boiler water CAS No 100-37-8	**Gallons** State Liquid Type Mixture	**50** Storage Container Aboveground Tank, Tank Inside Building Days on Site: 365	**55**	25 Pressue Ambient Temperature Ambient	0 Waste Code	- Physical Flammable - Health Acute Toxicity - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation - Health Hazard Not Otherwise Classified	2diethylaminoethanol 15 40 % Cyclohexylamine 15 40%	28% 28%		100378 108918
	Phosphate for boiler water CAS No 7601-54-9	**Gallons** State Liquid Type Mixture	**100** Storage Container Aboveground Tank, Tank Inside Building Days on Site: 365	**50**	75 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Skin Corrosion Irritation - Health Respiratory Skin Sensitization - Health Serious Eye Damage Eye Irritation	Sodium phosphate, tribasic 1 5 %	3%		7601549
	Closed Loop Corrosion Inhibitor CAS No 1310-73-2	**Gallons** State Liquid Type Mixture	**20** Storage Container Aboveground Tank, Tank Inside Building, Plastic/Non-metalic Drum Days on Site: 365	**5**	10 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation	Sodium hydroxide 0.5 1.5% Sodium tetraborate pentahydrate 1 5% Sodium molybdate 5 10%	1% 3% 8%		1310732 12179043 7631950

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT** 3215 47TH AVE , SACRAMENTO 95824	**CEMS Bottle Rack**	Facility ID **FA0013407** Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Nox Span Gas	**Cu. Feet**	**420**	**140**	280	0	- Physical Gas Under Pressure - Health Simple Asphyxiant	Nitric Oxide			10102-43-9
								Carbon Monoxide			630-08-0
								Nitrogen	100%		7727-37-9
	CAS No	State: Gas	Storage Container: Cylinder		Pressue: > Ambient	Waste Code					
		Type: Mixture	Days on Site: 365		Temperature: Ambient						

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT**	**CHEMS Bottle Rack**	Facility ID **FA0013407**
	3215 47TH AVE , SACRAMENTO 95824		Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	CO Span Gas	**Cu. Feet**	**420**	**140**	280	0	- Physical Gas Under Pressure - Health Simple Asphyxiant	Carbon Monoxide			630-08-0
								Nitrogen	100%		7727-37-9
	CAS No	State: Gas	Storage Container: Cylinder		Pressue: > Ambient	Waste Code					
		Type: Mixture	Days on Site: 365		Temperature: Ambient						

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT**	**Cooling Tower**	Facility ID **FA0013407**
	3215 47TH AVE , SACRAMENTO 95824		Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Quantities Largest Cont.	Quantities Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Biocide for cooling tower CAS No 26172-55-4	**Gallons** State Liquid Type Mixture	**400** Storage Container Aboveground Tank Days on Site: 365	**400**	300 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Skin Corrosion Irritation - Health Respiratory Skin Sensitization - Health Serious Eye Damage Eye Irritation - Health Hazard Not Otherwise Classified	5chloro2methyl4isothiazolin3one 2methyl4isothiazolin3one	0%		26172554 2682204

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. **SACTO POWER AUTHORITY COGENERATION**
Facility Name **CAMPBELL POWER PLANT**
3215 47TH AVE , SACRAMENTO 95824

Chemical Location
Cooling Tower Water Treatment Area

CERS ID **10222930**
Facility ID **FA0013407**
Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities: Max. Daily	Quantities: Largest Cont.	Quantities: Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only): Component Name	% Wt	EHS	CAS No.
	Bleach CAS No 7681-52-9	**Gallons** State Liquid Type Mixture	**3000** Storage Container Aboveground Tank Days on Site: 365	**3000**	1500 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation - Health Hazard Not Otherwise Classified	Sodium Hypochlorite	13%		7681-52-9
DOT: 8 - Corrosives (Liquids and Solids)	**Cooling water corrosion inhibitor** CAS No	**Gallons** State Liquid Type Mixture	**200** Storage Container Aboveground Tank Days on Site: 365	**200**	100 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Carcinogenicity - Health Acute Toxicity - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation	Chlorotolytriazole sodium salt Sodium 4(or 5) -methyl-1H-benzotriazolide Sodium Hydroxide Dichlorotolytriazole	20% 5% 5% 10%		202420-04-0 64665-57-2 1310-73-2
DOT: 8 - Corrosives (Liquids and Solids) Corrosive	**Chem Treat CT 775 Corrosion Inhibitor** CAS No 7664-38-2	**Gallons** State Liquid Type Pure	**200** Storage Container Aboveground Tank Days on Site: 365	**200**	100 Pressue Ambient Temperature Ambient	0 Waste Code	- Physical Corrosive To Metal - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation				
	Chem Treat CL 5428 CAS No	**Gallons** State Liquid Type Pure	**550** Storage Container Aboveground Tank Days on Site: 365	**550**	275 Pressue Ambient Temperature Ambient	Waste Code	- Health Acute Toxicity				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT** 3215 47TH AVE , SACRAMENTO 95824	**I&E shop, Aux. Transformers, Gas Bottle Rack**	Facility ID **FA0013407** Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Compressed Acetylene Gas CAS No 74-86-2	**Cu. Feet** State Gas Type Pure	**1500** Storage Container Cylinder Days on Site: 365	**300**	900 Pressue > Ambient Temperature Ambient	0 Waste Code	- Physical Flammable - Physical Gas Under Pressure - Physical Explosive - Health Simple Asphyxiant				
	COMPRESSED ARGON GAS CAS No 7440-37-1	**Cu. Feet** State Gas Type Pure	**900** Storage Container Cylinder Days on Site: 365	**300**	750 Pressue > Ambient Temperature Ambient	0 Waste Code	- Physical Gas Under Pressure - Health Simple Asphyxiant				
	Compressed Nitrogen Gas CAS No 7727-37-9	**Cu. Feet** State Gas Type Pure	**3000** Storage Container Cylinder Days on Site: 365	**300**	1200 Pressue > Ambient Temperature Ambient	0 Waste Code	- Physical Gas Under Pressure - Health Simple Asphyxiant				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT**	**MCC/PCC/Plant Vehicles**	Facility ID **FA0013407**
	3215 47TH AVE , SACRAMENTO 95824		Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Quantities Largest Cont.	Quantities Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Batteries, Lead Acid CAS No ✔EHS	**Pounds** State: Liquid Type: Mixture	**7910** Storage Container: Plastic Bottle or Jug Days on Site: 365	**180**	7910 Pressue: Ambient Temperature: Ambient	0 Waste Code	- Health Carcinogenicity - Health Acute Toxicity - Health Reproductive Toxicity - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation - Health Specific Target Organ Toxicity - Health Hazard Not Otherwise Classified	Lead Sulfuric Acid	40% 40%	 ✔	7439-92-1 7664-93-9

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location		CERS ID	**10222930**
Facility Name	**CAMPBELL POWER PLANT**	**Near HRSG Stack**		Facility ID	**FA0013407**
	3215 47TH AVE , SACRAMENTO 95824			Status	**Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Quantities Largest Cont.	Quantities Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Aqueous Ammonia CAS No: 1336-21-6 ✔ EHS	**Pounds** State: Liquid Type: Mixture Storage Container: Aboveground Tank Days on Site: 365	**30000**	**30000**	22500 Pressue: Ambient Temperature: Ambient	0 Waste Code	- Health Acute Toxicity - Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation - Health Specific Target Organ Toxicity - Health Hazard Not Otherwise Classified	AMMONIA WATER	25% 75%		1336-21-6 7732-18-5

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	SACTO POWER AUTHORITY COGENERATION	Chemical Location	CERS ID 10222930
Facility Name	CAMPBELL POWER PLANT	North Side of CTG	Facility ID FA0013407
	3215 47TH AVE , SACRAMENTO 95824		Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Liquid Carbon Dioxide CAS No 124-38-9 ✔EHS	**Pounds** State: Liquid Type: Pure	**35000** Storage Container: Aboveground Tank Days on Site: 365	**35000**	28000 Pressue: > Ambient Temperature: Cryogenic	0 Waste Code	- Physical Gas Under Pressure - Health Simple Asphyxiant				

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location		CERS ID	**10222930**
Facility Name	**CAMPBELL POWER PLANT**	**T1,T2, and UAT Transformers**		Facility ID	**FA0013407**
	3215 47TH AVE , SACRAMENTO 95824			Status	**Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Quantities Largest Cont.	Quantities Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Transformer Oil	**Gallons**	**20600**	**10980**	20600	0	- Physical Flammable - Health Carcinogenicity - Health Respiratory Skin Sensitization - Health Serious Eye Damage Eye Irritation - Health Specific Target Organ Toxicity	Solvent refined Hydrotreated Middle Distillate	85%		64742-46-7
	CAS No	State: Liquid	Storage Container: Aboveground Tank		Pressue: Ambient	Waste Code		Severely Hydrotreated Light Naphthenic Distillate	15%		64742-53-6
		Type: Mixture	Days on Site: 365		Temperature: Ambient			Butylated Hydroxy Toluene	0%		128-37-0

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT**	**Various**	Facility ID **FA0013407**
	3215 47TH AVE , SACRAMENTO 95824		Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Quantities Largest Cont.	Quantities Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Lubricating Oil	**Gallons**	**8600**	**4000**	8540	0	- Physical Flammable - Health Carcinogenicity - Health Respiratory Skin Sensitization - Health Serious Eye Damage Eye Irritation - Health Specific Target Organ Toxicity	Solvent-dexaxed heavy paraffnic pertoleum	35%		64742-65-0
	CAS No	State: Liquid	Storage Container: Aboveground Tank		Pressue: Ambient	Waste Code		Residual oils, pertoleum, hydrotreated	30%		64742-57-0
		Type: Mixture	Days on Site: 365		Temperature: Ambient			Hydrotreated heavy paraffinic petroleum	35%		64742-54-7

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org. **SACTO POWER AUTHORITY COGENERATION**
Facility Name **CAMPBELL POWER PLANT**
3215 47TH AVE , SACRAMENTO 95824

Chemical Location
Water Treatment Building

CERS ID **10222930**
Facility ID **FA0013407**
Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Caustic or Liquid Caustic Soda CAS No 1310-73-2	**Gallons** State Liquid Type Mixture	**6000** Storage Container Aboveground Tank Days on Site: 365	**6000**	4000 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Skin Corrosion Irritation - Health Serious Eye Damage Eye Irritation	Sodium Hydroxide	50%		1310-73-2
	Sulfuric Acid CAS No ✔EHS 7664-93-0	**Pounds** State Liquid Type Pure	**91800** Storage Container Aboveground Tank Days on Site: 365	**91800**	41310 Pressue Ambient Temperature Ambient	0 Waste Code	- Physical Corrosive To Metal - Health Serious Eye Damage Eye Irritation	Sulfuric Acid	93%	✔	7664-93-0
	Used Oil CAS No	**Gallons** State Liquid Type Waste	**55** Storage Container Steel Drum Days on Site: 365	**55**	10 Pressue Ambient Temperature Ambient	175 Waste Code	- Physical Flammable - Health Carcinogenicity - Health Respiratory Skin Sensitization - Health Serious Eye Damage Eye Irritation - Health Specific Target Organ Toxicity	Water	5%		7732-18-5
	Gas Turbine Compressor Cleaner CAS No	**Gallons** State Liquid Type Mixture	**80** Storage Container Carboy Days on Site: 365	**6.6**	40 Pressue Ambient Temperature Ambient	0 Waste Code	- Health Serious Eye Damage Eye Irritation	Isotridecylalcohol, ethoxylated 3-butoxypropan-2-ol Oleoyl Sarcosinic Acid Ethonol, 2,2'	30% 5% 5% 1%		9043-30-5 5131-66-8 110-25-8 80684-88-9
	CL240 CAS No	**Gallons** State Liquid Type Pure	**20** Storage Container Other Days on Site: 365	**5**	10 Pressue Ambient Temperature Ambient	0 Waste Code					

Hazardous Materials And Wastes Inventory Matrix Report

CERS Business/Org.	**SACTO POWER AUTHORITY COGENERATION**	Chemical Location	CERS ID **10222930**
Facility Name	**CAMPBELL POWER PLANT**	**Water Treatment Building, Warehouse**	Facility ID **FA0013407**
	3215 47TH AVE , SACRAMENTO 95824		Status **Submitted** on 10/13/2023 3:15 PM

DOT Code/Fire Haz. Class	Common Name	Unit	Quantities Max. Daily	Largest Cont.	Avg. Daily	Annual Waste Amount	Federal Hazard Categories	Hazardous Components (For mixture only) Component Name	% Wt	EHS	CAS No.
	Compressed Oxygen Gas	**Cu. Feet**	**2100**	**300**	900	0	- Physical Gas Under Pressure - Physical Oxidizer				
	CAS No 7782-44-7	State Gas	Storage Container Cylinder		Pressue > Ambient	Waste Code					
		Type Pure	Days on Site: 365		Temperature Ambient						

APPENDIX F

TLSN-5.

Reply | Reply All | Forward | ...

DD

Darrell Daniel <Darrell.Daniel@smud.org>

To Pedro Juarez; Laurie Johnson; Eric A. Brown

Cc Patrick M. Van Horne; Blank, Randall (EthosEnergy); Williamson, Douglas (EthosEnergy)

Thu 2/8/2024 11:30 AM

THINK SECURE: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender AND know the content is safe.

Thank you Pedro, from what the Arborist reported the trees had a basal/trunk defect and posed a risk to the substation perimeter.

DARRELL DANIEL
Program Manager, Vegetation Management - Grid Assets
ISA Certified Utility Arborist #WE-10577-AU-TRAQ
CUVMP - Certified Utility Vegetation Management Professional
TCIA-CTSP-Certified Treecare Safety Professional
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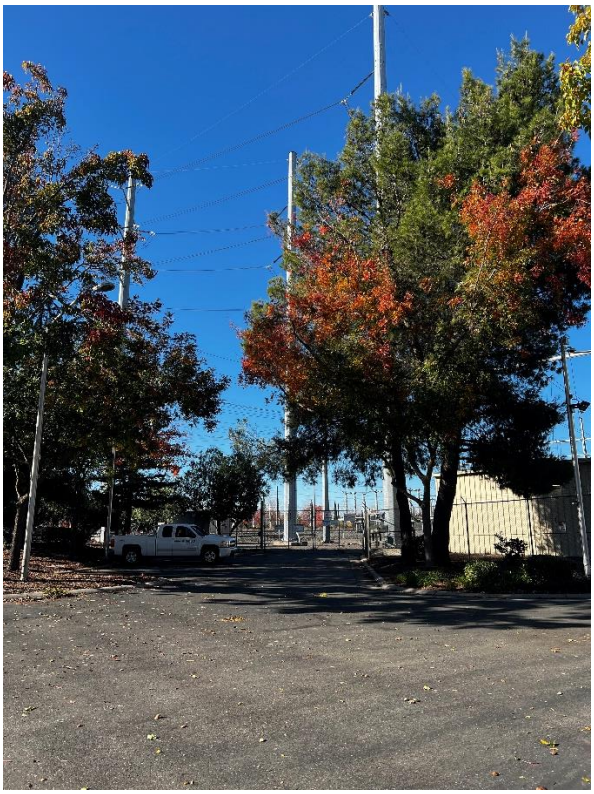
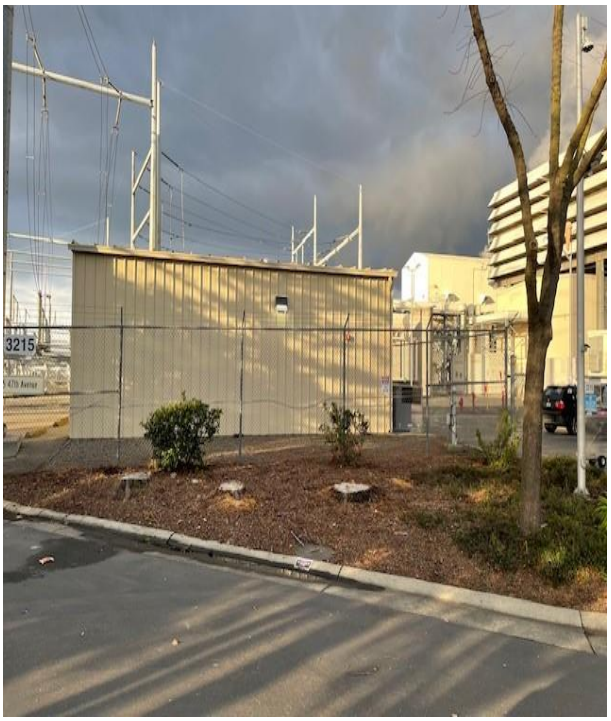
Tree Removal

Before:



After: