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Organization:	Heorot Power Management
Submitter Role:	Applicant
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MALBURG GENERATING STATION
4963 Soto Street
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28 January 2021

Mr. Anwar Ali
Compliance Project Manager
California Energy Commission
Energy Facilities Siting Division
1516 9th Street, MS 2000
Sacramento, CA 95814-5512

Subject: Malburg Generating Station
2020 Q4 Compliance Report

Dear Mr. Ali:

On behalf of the owner of the Malburg Generating Station, Bicent (California) Malburg LLC, Colorado Energy has compiled the attached Quarterly Compliance Report per the California Energy Commission's Decision 01-AFC-25C – Petition to Amend.

Please contact me at (303) 607-5590 or kmccormack@coloradoenergy.com if you have any questions or need additional information.

Sincerely,

Kyle McCormack
Sr. Manager of Environmental

Attachments:
MGS 2020 Q4 CEC Report

MALBURG GENERATING STATION
4963 Soto Street
Vernon, CA 90058
Telephone: (323) 476-3610
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QUARTERLY COMPLIANCE REPORT
(Fourth Quarter 2020)

MALBURG GENERATING STATION
4963 SOTO STREET, VERNON, CA 90058

SUBMITTED TO:

CALIFORNIA ENERGY COMMISSION

1516 9TH STREET, SACRAMENTO, CA 95814

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LIST OF TABLES

LIST OF APPENDICES

SECTION 1
INTRODUCTION

This Quarterly Compliance Report (QCR) has been prepared to meet the California Energy Commission (CEC) requirements for the Malburg Generating Station (MGS). This QCR fulfills various Conditions of Certifications as described in the California Energy Commission's Petition to Amend License, June 20, 2019.

1.1 PROJECT LOCATION AND DESCRIPTION

The Malburg Generating Station is located at 4963 Soto Street on approximately 3.4 acres, in an industrial land use area. MGS is located near the geographic center of metropolitan Los Angeles County. MGS consists of two Alstom GTX-100 frame type natural gas combustion turbine generators (CTGs); two heat recovery steam generators (HRSG); a steam turbine-generator (STG); a cooling tower, a diesel fuel fired emergency firewater pump and support equipment.

The commissioning of MGS was completed in October 2005 and the power plant began Commercial Operation on October 17, 2005.

1.2 ORGANIZATION OF THE QUARTERLY COMPLIANCE REPORT

A summary of each condition of certification and required means of verification are provided in Section 2. Each sub-section also contains a description of the method used by MGS to demonstrate compliance with the verification requirements and references to Appendices, Figures and Tables as appropriate.

SECTION 2
COMPLIANCE DETAILS

The compliance details for various conditions of certification are provided below.

2.1 CONDITION OF CERTIFICATION AQ-C6

As per the Condition of Certification Number AQ-C6, MGS shall determine the Total Dissolved Solids (TDS) levels in the blowdown water by independent laboratory testing prior to initial operation and periodically thereafter.

For verification of the above condition of certification, the CEC requires MGS to submit weekly TDS reports for the blowdown water as part of the quarterly emission report to the Compliance Project Manager (CPM) for approval.

As demonstration of compliance, the weekly TDS results are provided in Table 2-1, and the weekly sample reports during operation are provided in Appendix A.

2.2 CONDITION OF CERTIFICATION AQ-C7

As per the Condition of Certification Number AQ-C7, particulate matter of diameter less than 10 microns (PM_{10}) emissions from the cooling tower shall not exceed 6.2 lb/day.

Compliance with the PM_{10} daily emission limit shall be demonstrated as follows:

PM_{10} lb/day = A*B*C*D

Where:

A = circulating water recirculation rate

B = total dissolved solids concentration in the blowdown water to be updated on a weekly basis

C = design drift rate

D = correction factor

For verification of the above condition of certification, the CEC requires the project owner to calculate the daily PM_{10} emissions from the cooling tower and submit all calculations and results on a quarterly basis in the quarterly emissions reports to the CPM for approval.

As demonstration of compliance, the daily PM_{10} emissions from the cooling tower are provided in Tables 2-2 through 2-4.

2.3 CONDITION OF CERTIFICATION AQ-C8

As per the Condition of certification Number AQ-C8, the project owner shall refrain from testing the firewater pump during the same hour as either gas fired combustion turbines is in start up or shut down as defined by Condition of Certification AQ-C9.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all testing times and results of the diesel fired emergency firewater pump in the quarterly emissions report.

As demonstration of compliance, the testing times for the diesel fired emergency firewater pump are provided in Table 2-5. MGS refrained from testing the diesel fired

emergency firewater pump on the same hour the combustion turbines were either started or shutdown.

2.4 CONDITION OF CERTIFICATION AQ-C9

As per the Condition of certification Number AQ-C9, MGS shall use the provided definitions to determine compliance with startup, shutdown and any related emission or operational limitations.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval, a record of all startups and shutdowns including duration and date of occurrence on a quarterly basis as part of the quarterly emission report.

As demonstration of compliance, the startup and shutdown details are provided in Table 2-14.

2.5 CONDITION OF CERTIFICATION AQ-C10

The condition of certification number AQ-C10 has been deleted.

2.6 CONDITION OF CERTIFICATION AQ-C11

As per the Condition of Certification Number AQ-C11, MGS shall submit a quarterly emissions report on a quarterly basis to the CPM for approval. The quarterly emissions report shall generally report all ammonia, NO_X, SO_X, CO, PM_{10} and VOC emissions from the MGS as necessary to demonstrate compliance with all emission limits. The fourth quarter emission report shall include an annual summary of all emissions of ammonia, NO_X, SO_X, CO, PM_{10} and VOC as necessary to demonstrate compliance with all annual emission limits.

For verification of the above condition of certification, the CEC requires MGS to submit the quarterly emissions report no less than 30 days after the end of each calendar quarter.

2.7 CONDITION OF CERTIFICATION AQ-2

As per the Condition of Certification Number AQ-2, MGS shall not use diesel oil containing sulfur compounds in excess of 15 ppm by weight as supplied by the supplier.

For verification of the above condition of certification, the CEC requires MGS to submit fuel purchase records for approval to the CPM on a quarterly basis in the quarterly emissions report.

Low sulfur diesel fuel was purchased February 19, 2020.

2.8 CONDITION OF CERTIFICATION AQ-3

As per the Condition of Certification Number AQ-3, MGS shall keep records, in a manner approved by the District, for the following parameter(s) or item(s): Purchase records of fuel oil and sulfur content of the fuel.

For verification of the above condition of certification, the CEC requires MGS to submit fuel purchase records for approval to the CPM on a quarterly basis in the quarterly emissions report.

Low sulfur diesel fuel was purchased February 19, 2020.

2.9 CONDITION OF CERTIFICATION AQ-5

As per the condition of certification number AQ-5, MGS shall limit the emissions from both gas-fired combustion turbine-heat recovery steam generator train exhaust stacks as follows:

Contaminant Emissions Limit

- CO 7,633 lbs in any one month
- PM_{10} 4,876 lbs in any one month
- $PM_{2.5}$ 4,876 lbs in any one month
- VOC 3,236 lbs in any one month
- SO_x 227 lbs in any one month

For verification of the above condition of certification, the CEC requires the MGS to submit all emission calculations, fuel use and a summary demonstrating compliance of all emission limits stated in this condition for approval to the CPM on a quarterly basis in the quarterly emissions report.

As demonstration of compliance, the monthly emissions of CO, PM_{10}, VOC, and SOx are presented in Tables 2-11 through 2-13. In addition, the fuel usage for the two turbine-duct burner pairs is provided in Table 2-15. MGS calculates the emission limit(s) for CO based on readings from the certified CEMS. In the event the CO CEMS is not operating or the emissions exceed the valid upper range of the analyzer, the emissions are calculated in accordance with the approved CEMS Plan. MGS calculates the emission limit(s) by using the monthly fuel use data and the following emission factors:- $PM_{10,}$ $PM_{2.5}$: 6.014 lb/mmscf, VOC: 1.54 lb/mmscf & SOx: 0.28lb/mmscf.

2.10 CONDITION OF CERTIFICATION AQ-6

As per the condition of certification numbers AQ-6; following commissioning, start-ups shall not exceed 120 minutes during a cold start-up without a trip, and 150 minutes during a cold start-up with a trip. Cold start-ups with or without a trip shall not exceed the following limits: NOx 122.8 lbs, CO 204.8 lbs and VOC 1.75 lbs.

Start-ups shall not exceed 90 minutes during a non-cold start-up without a trip or 120 minutes during a non-cold start-up with a trip. Non-cold start-ups shall not exceed the following limits: NOx 51.3 lbs, CO 59.9 lbs, and VOC 1.55 lbs.

Shut-downs shall not exceed 30 minutes. Shut-downs shall not exceed the following limits: NOx 4.5 lbs, CO 10.8 lbs, and VOC 0.71 lbs.

The number of startups shall not exceed two per day per turbine.

For verification of the above condition of certification, the CEC requires the MGS to submit a record of all startups and shutdowns including duration and date of occurrence on a quarterly basis as part of the quarterly emission report.

As demonstration of compliance, the startup and shutdown details are provided in Table 2-14. Additionally, quarterly excess emission reports from the DAHS are provided in Appendix B.

2.11 CONDITION OF CERTIFICATION AQ-8

The Condition of Certification Number AQ-8 has been deleted.

2.12 CONDITION OF CERTIFICATION AQ-9

As per the Condition of Certification Number AQ-9, the 2.0 ppmv oxides of nitrogen (NO_X) emissions limit(s) are averaged over 1 hour at 15 percent oxygen, dry basis, during the normal operation of the MGS combustion turbine generators.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all emissions and emission calculations on a quarterly basis as part of the quarterly emissions report.

NO_X emission for MGS Units 1 and 2 are measured using the CEMS. A review of CEMS NOx emission data indicated that the maximum corrected NOx emissions concentration for both MGS combustion turbines during normal operations was 1.9 ppmv, which is lower than the emission concentration limit of 2.0 ppmv. All CEMS data for MGS combustion turbines are stored electronically at MGS. The quarterly excess emission reports from the DAHS are provided in Appendix B.

2.13 CONDITION OF CERTIFICATION AQ-10

As per the Condition of Certification Number AQ-10 the 2.0 ppmv carbon monoxide (CO) emissions limit(s) are averaged over 1 hour at 15 percent oxygen, dry basis, during the normal operation of the MGS combustion turbine generators.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all emissions and emission calculations on a quarterly basis as part of the quarterly emissions report.

CO emission for MGS Units 1 and 2 are measured using the CEMS. A review of CEMS CO emission data indicated that maximum CO emission concentration for both MGS combustion turbines was 0.7 ppmv, which is lower than the emission concentration limit of 2.0 ppmv. All CEMS data for MGS combustion turbines are stored electronically at MGS. As demonstration of compliance, quarterly excess emission reports from the DAHS are provided in Appendix B.

2.14 CONDITION OF CERTIFICATION AQ-11

As per the Condition of Certification Number AQ-11, the 2.0 ppmv VOC emission limit(s) are averaged over 1 hour at 15 percent oxygen, dry basis.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all emissions and emission calculations on a quarterly basis as part of the quarterly emissions report.

2.15 CONDITION OF CERTIFICATION AQ-12

As per the Condition of Certification Number AQ-12, the 5 ppm ammonia (NH_3) emission limit(s) are averaged over 1 hour at 15 percent oxygen, dry basis. MGS shall calculate and continuously record the ammonia slip concentration using the following:

NH_3 (ppmv) = [a-(b*c/1,000,000)]*(1,000,000*d/b) where

a = ammonia injection rate (lbs/hr)/17 (lbs/lb-mole)

b = dry exhaust gas flow rate (lbs/hr)/29 (lbs/lb-mole)

c = change in measured NO_X across the SCR (ppmv dry basis)

d = correction derived by comparing the measured and calculated NH3 slip concentrations during annual compliance testing.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all emissions and emission calculations on a quarterly basis as part of the quarterly emissions report.

NH_3 emissions are calculated via the CEMS on an hourly basis but compliance with 5 ppm limit is demonstrated from source tests. The last NH3 compliance source test, performed in March 2020, indicated compliance with the emission limits for both CT1 and for CT2.

2.16 CONDITION OF CERTIFICATION AQ-13

As per the Condition of Certification Number AQ-13, for the purpose of determining compliance with District Rule 475, combustion contaminant emissions may exceed the concentration limit or the mass emission limit listed, but not both emission limits at the same time.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all emissions and emission calculations on a quarterly basis as part of the quarterly emissions report.

Rule 475 limits emission of combustion contaminants from electric generating equipment to no more than 5 kilograms (11 pounds) per hour or 23 milligrams per cubic meter (0.01 gr/SCF) calculated at three percent oxygen on a dry basis averaged over 15 consecutive minutes or any other averaging time specified by the Executive Officer.

The results of the last compliance source tests performed in August 2019 indicated compliance with the particulate matter emission limits for both CT1 and CT2.

2.17 CONDITION OF CERTIFICATION AQ-14

As per the Condition of Certification Number AQ-14, MGS shall only use diesel fuel containing the following specified compounds:

Sulfur less than or equal to 15 ppm by weight.

For verification of the above condition of certification, the CEC requires MGS to submit fuel purchase records to the CPM on a quarterly basis as part of the quarterly emissions report.

MGS uses CARB Ultra Low Sulfur Diesel for the diesel fire pump (D48). This is an ash less oil. As demonstration of compliance, detailed specifications of CARB Ultra Low Sulfur Diesel are provided in Appendix C.

2.18 CONDITION OF CERTIFICATION AQ-15

As per the condition of certification number AQ-15, MGS will limit the operating time to no more than 200 hours each in any one year.

Operations for maintenance and testing as defined in Rule 1470 shall not exceed 50 hours in any one calendar year. The total annual operating time includes all operations including maintenance and testing.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all testing times and results of the diesel fired emergency firewater pump in the quarterly emissions report.

As demonstration of compliance, the testing times for the diesel fired emergency firewater pump are provided in Table 2-5.

2.19 CONDITION OF CERTIFICATION NUMBER AQ-27

As per the Condition of Certification Number AQ-27, MGS shall limit the fuel usage of each turbine-duct burner pair to no more than 405 MM cubic feet per month.

For verification of the above condition of certification, the CEC requires MGS to submit to the CPM for approval all emissions and emission calculations on a quarterly basis as part of the quarterly emissions report.

As demonstration of compliance, the fuel usage for the two turbine-duct burner pairs is provided in Table 2-15.

Table 2-1

Malburg Generating Station
Cooling Tower TDS Sampling Results
Quarter 4, 2020

Starting	Ending	TDS (ppm)	
9/27/2020	10/3/2020	4290	
10/4/2020	10/10/2020	4680	
10/11/2020	10/17/2020	4420	
10/18/2020	10/24/2020	4370	
10/25/2020	10/31/2020	4540	
11/1/2020	11/7/2020		*
11/8/2020	11/14/2020	4030	
11/15/2020	11/21/2020	4120	
11/22/2020	11/28/2020	3920	
11/29/2020	12/5/2020	4380	
12/6/2020	12/12/2020	4350	
12/13/2020	12/19/2020	4360	
12/20/2020	12/26/2020	4170	

Outage

Table 2-2

Malburg Generating Station
Cooling Tower Daily PM10 Emissions During Oct. 2020

PM_{10} = A x B x C x D **A = Circulation Rate** **B = TDS**
PM_{10} Limit is 6.2 lbs/day **C = Drift Factor** **D = Correction Factor**

Date	Circulation Rate (gal/day)	TDS (ppm)	PM_{10} (lbs/day)
1	38,811,456	4290	**1.39**
2	38,811,456	4290	**1.39**
3	38,811,456	4290	**1.39**
4	38,811,456	4680	**1.51**
5	38,811,456	4680	**1.51**
6	38,811,456	4680	**1.51**
7	38,811,456	4680	**1.51**
8	38,811,456	4680	**1.51**
9	38,811,456	4680	**1.51**
10	38,811,456	4680	**1.51**
11	38,811,456	4420	**1.43**
12	38,811,456	4420	**1.43**
13	38,811,456	4420	**1.43**
14	38,811,456	4420	**1.43**
15	38,811,456	4420	**1.43**
16	38,811,456	4420	**1.43**

Date	Circulation Rate (gal/day)	TDS (ppm)	PM_{10} (lbs/day)
17	38,811,456	4420	**1.43**
18	38,811,456	4370	**1.41**
19	38,811,456	4370	**1.41**
20	38,811,456	4370	**1.41**
21	38,811,456	4370	**1.41**
22	38,811,456	4370	**1.41**
23	38,811,456	4370	**1.41**
24	38,811,456	4370	**1.41**
25	38,811,456	4540	**1.47**
26	38,811,456	4540	**1.47**
27	38,811,456	4540	**1.47**
28	38,811,456	4540	**1.47**
29	38,811,456	4540	**1.47**
30	38,811,456	4540	**1.47**
31	38,811,456	4540	**1.47**

Table 2-3

Malburg Generating Station
Cooling Tower Daily PM10 Emissions During Nov. 2020

PM_{10} = A x B x C x D **A = Circulation Rate** **B = TDS**
PM_{10} Limit is 6.2 lbs/day **C = Drift Factor** **D = Correction Factor**

Date	Circulation Rate (gal/day)	TDS (ppm)	PM_{10} (lbs/day)
1	0	0	**0.00**
2	0	0	**0.00**
3	0	0	**0.00**
4	0	0	**0.00**
5	0	0	**0.00**
6	0	0	**0.00**
7	0	0	**0.00**
8	38,811,456	4030	**1.30**
9	38,811,456	4030	**1.30**
10	38,811,456	4030	**1.30**
11	38,811,456	4030	**1.30**
12	38,811,456	4030	**1.30**
13	38,811,456	4030	**1.30**
14	38,811,456	4030	**1.30**
15	38,811,456	4120	**1.33**
16	38,811,456	4120	**1.33**

Date	Circulation Rate (gal/day)	TDS (ppm)	PM_{10} (lbs/day)
17	38,811,456	4120	**1.33**
18	38,811,456	4120	**1.33**
19	38,811,456	4120	**1.33**
20	38,811,456	4120	**1.33**
21	38,811,456	4120	**1.33**
22	38,811,456	3920	**1.27**
23	38,811,456	3920	**1.27**
24	38,811,456	3920	**1.27**
25	38,811,456	3920	**1.27**
26	38,811,456	3920	**1.27**
27	38,811,456	3920	**1.27**
28	38,811,456	3920	**1.27**
29	38,811,456	4380	**1.42**
30	38,811,456	4380	**1.42**

Fall outage from November 1 to November 7

Table 2-4

Malburg Generating Station
Cooling Tower Daily PM10 Emissions During Dec. 2020

PM_{10} = A x B x C x D **A = Circulation Rate** **B = TDS**
PM_{10} Limit is 6.2 lbs/day **C = Drift Factor** **D = Correction Factor**

Date	Circulation Rate (gal/day)	TDS (ppm)	PM_{10} (lbs/day)
1	38,811,456	4380	**1.42**
2	38,811,456	4380	**1.42**
3	38,811,456	4380	**1.42**
4	38,811,456	4380	**1.42**
5	38,811,456	4380	**1.42**
6	38,811,456	4350	**1.41**
7	38,811,456	4350	**1.41**
8	38,811,456	4350	**1.41**
9	38,811,456	4350	**1.41**
10	38,811,456	4350	**1.41**
11	38,811,456	4350	**1.41**
12	38,811,456	4350	**1.41**
13	38,811,456	4360	**1.41**
14	38,811,456	4360	**1.41**
15	38,811,456	4360	**1.41**
16	38,811,456	4360	**1.41**

Date	Circulation Rate (gal/day)	TDS (ppm)	PM_{10} (lbs/day)
17	38,811,456	4360	**1.41**
18	38,811,456	4360	**1.41**
19	38,811,456	4360	**1.41**
20	38,811,456	4170	**1.35**
21	38,811,456	4170	**1.35**
22	38,811,456	4170	**1.35**
23	38,811,456	4170	**1.35**
24	38,811,456	4170	**1.35**
25	38,811,456	4170	**1.35**
26	38,811,456	4170	**1.35**
27	38,811,456	4220	**1.36**
28	38,811,456	4220	**1.36**
29	38,811,456	4220	**1.36**
30	38,811,456	4220	**1.36**
31	38,811,456	4220	**1.36**

Table 2-5

Heorot Power Management
Malburg Generating Station
Diesel Fuel Fired Emergency Firewater Pump Testing Times
During Quarter 4, 2020

Date	Time	Main / Test Emerg.	Hours of Operation	Fuel Used (gals)	Initials
Oct. 04, 2020	18:09	Testing	0.5	5.6	JAFO
Oct. 11, 2020	20:14	Testing	0.6	6.7	ACFO
Oct. 18, 2020	22:35	Testing	0.5	5.6	ACFO
Oct. 25, 2020	20:42	Testing	0.5	5.6	JAFO
Oct. 30, 2020	18:04	Testing	0.5	5.6	JAFO
Nov. 15, 2020	20:35	Testing	0.5	5.6	JAFO
Nov. 23, 2020	00:30	Testing	0.5	5.6	ACFO
Nov. 29, 2020	19:27	Testing	0.5	5.6	STFO
Dec. 06, 2020	23:40	Testing	0.5	5.6	RRFO
Dec. 13, 2020	20:41	Testing	0.5	5.6	ACFO
Dec. 20, 2020	19:42	DNR	0.0	0.0	JAFO

Table 2-11

Malburg Generating Station
Total Monthly Emissions
Oct-2020

Contaminant	Gas Turbines (2)
CO lbs	1,021
PM10 lbs	2,799
PM2.5 lbs	2,799
VOC lbs	717
SOx lbs	130

Table 2-12

Malburg Generating Station
Total Monthly Emissions
Nov-2020

Contaminant	Gas Turbines (2)
CO lbs	763
PM10 lbs	1,758
PM2.5 lbs	1,758
VOC lbs	450
SOx lbs	82

Table 2-13

Malburg Generating Station
Total Monthly Emissions
Dec-2020

Contaminant	Gas Turbines (2)
CO lbs	1,041
PM10 lbs	2,441
PM2.5 lbs	2,441
VOC lbs	625
SOx lbs	114

Table 2-14

Malburg Generating Station
Combustion Turbines Startup and Shutdown Events

During Quarter 4, 2020

CT1

Date	Event Type	Event Start	Event End	Duration (hrs:min)
10/04/2020	Shutdown	06:46	06:53	0:07
10/04/2020	Warm Startup	14:09	14:59	:50
11/01/2020	Shutdown	00:00	00:08	:08
11/09/2020	Cold Startup	14:49	16:15	1:26
11/20/2020	Shutdown/trip	12:34		:00
11/22/2020	Warm Startup	05:28	06:38	1:10
12/24/2020	Shutdown	22:47	23:04	:17
12/25/2020	Warm Startup	06:02	06:57	:55
12/25/2020	Shutdown	23:03	23:10	:07
12/27/2020	Warm Startup	19:35	20:45	1:10
12/31/2020	Shutdown	22:08	22:16	:08

CT2

11/01/2020	Shutdown	00:00	00:08	:08
11/09/2020	Cold Startup	18:04	19:29	1:25
12/24/2020	Shutdown	22:47	23:04	:17
12/25/2020	Warm Start	04:26	05:34	1:08
12/25/2020	Shutdown	23:03	23:10	:07
12/27/2020	Warm Start	16:36	18:08	1:32
12/31/2020	Shutdown	22:08	22:16	:08

Table 2-15

Malburg Generating Station
Combustion Turbines and Duct Burner Gas Usage
During Quarter 4, 2020

Month	CT-1 / DB-1 Gas Usage (mmscf)	CT-2 / DB-2 Gas Usage (mmscf)
Oct-20	229.98	235.50
Nov-20	137.30	155.06
Dec-20	200.98	204.90

Appendix A

Cooling Tower Blowdown Reports

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

October 13, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2010025
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on October 06, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

File #:74548
Report Date: 10/13/20
Submitted: 10/06/20
PLS Report No.: 2010025

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2010025-01) Sampled: 10/06/20 08:10 Received: 10/06/20 08:10

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4680**		1	mg/L	5.0	- SM 2540C	10/08/20	10/09/20	dd	BJ00905

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BJ00905 - -										
Blank	**Prepared: 10/08/20 Analyzed: 10/09/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 10/08/20 Analyzed: 10/09/20**									
Total Dissolved Solids	48.0	5.0	mg/L	50.00		96.0	80-120			
Duplicate **Source: 2010024-01**	**Prepared: 10/08/20 Analyzed: 10/09/20**									
Total Dissolved Solids	1110	5.0	mg/L		1100			0.150	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Rick Owen Parlier

Authorized Signature(s)

113418

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 10'6'20 PAGE 1 OF 1

LOG BOOK NO. _____ FILE NO. _____ LAB NO. 2010025

CLIENT NAME: CEM Project Name/No. Mt Poso Cogeneration Station - weekly P.O. NO.

ADDRESS:

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

SAMPLER NAME: Tom Barnhart (Printed) (Signature)

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

AIRBILL NO: _____

COOLER TEMP: 1.5°C

PRESERVATIVE:

REMARKS:

ANALYSES REQUESTED:

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE	ANALYSES REQUESTED	SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		10620	0810	Cooling Tower Blowdown	X				N	1	P	Y	
2													
3													
4													
5													
6													
7													
8													
9													
10													

Relinquished By: (Signature and Printed Name) Tom Barnhart — Received By: (Signature and Printed Name) J. Gutierrez — Date: 10.6.20 — Time: 1010

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:
1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

October 16, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2010081
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on October 12, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 10/16/20
Submitted: 10/12/20
PLS Report No.: 2010081

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2010081-01) Sampled: 10/12/20 07:45 Received: 10/12/20 07:45

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4420**		1	mg/L	5.0	- SM 2540C	10/15/20	10/16/20	dd	BJ01604

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BJ01604 - -										
Blank	**Prepared: 10/15/20 Analyzed: 10/16/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 10/15/20 Analyzed: 10/16/20**									
Total Dissolved Solids	48.0	5.0	mg/L	50.00		96.0	80-120			
Duplicate Source: 2010081-01	**Prepared: 10/15/20 Analyzed: 10/16/20**									
Total Dissolved Solids	4620	5.0	mg/L		4420			4.42	5	
Duplicate Source: 2010101-01	**Prepared: 10/15/20 Analyzed: 10/16/20**									
Total Dissolved Solids	1060	5.0	mg/L		1020			4.00	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Authorized Signature(s)

113719

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

CHAIN OF CUSTODY AND ANALYSIS REQUEST

DATE: 10-12-20 PAGE 1 OF 1

LOG BOOK NO. ____ FILE NO. ____ LAB NO. 2010091

CLIENT NAME: CEM Project Name/No. Malburg Generating Station - weekly P.O. NO.

AIRBILL NO: ____

ADDRESS:

ANALYSES REQUESTED:

COOLER TEMP: 0.8°C

PROJECT MANAGER: Jon Barnhart PHONE NO: FAX NO:

PRESERVATIVE:

SAMPLER NAME: Jonn Bare (Printed) [signature] (Signature)

REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, 0 = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX				TAT	CONTAINER		TDS								SAMPLE CONDITION/ CONTAINER /COMMENTS:
					WATER	SOIL	SLUDGE	OTHER		#	TYPE									
1		10-12-20	0745	Cooling Tower Blowdown	✓				N	1	P	✓								
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished By: (Signature and Printed Name)	Received By: (Signature and Printed Name)	Date:	Time:
J. Barber	[signature] J. Gutierrez	10-12-20	0930
Relinquished By: (Signature and Printed Name)	Received By: (Signature and Printed Name)	Date:	Time:
Relinquished By: (Signature and Printed Name)	Received By: (Signature and Printed Name)	Date:	Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:

1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: ________ days

By ________ Date ________

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

October 26, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2010212
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on October 20, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 10/26/20
Submitted: 10/20/20
PLS Report No.: 2010212

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2010212-01) Sampled: 10/20/20 08:40 Received: 10/20/20 08:40

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4370**		1	mg/L	5.0	- SM 2540C	10/20/20	10/21/20	dd	BJ02141

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BJ02141 - -										
Blank	**Prepared: 10/20/20 Analyzed: 10/21/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 10/20/20 Analyzed: 10/21/20**									
Total Dissolved Solids	49.0	5.0	mg/L	50.00		98.0	80-120			
Duplicate **Source: 2010187-01**	**Prepared: 10/20/20 Analyzed: 10/21/20**									
Total Dissolved Solids	3660	5.0	mg/L		3550			3.01	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Authorized Signature(s)

113737

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 10.20.20 PAGE 1 OF 1
LOG BOOK NO. _____ FILE NO. _____ LAB NO. 201042

CLIENT NAME: CEM Project Name/No. Moiling Generating Station P.O. NO.

ADDRESS:

PROJECT MANAGER: Tom Bernhart PHONE NO: FAX NO:

SAMPLER NAME: Jon Bain (Printed) (Signature)

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

AIRBILL NO: _____

COOLER TEMP: 13°c

PRESERVATIVE:

REMARKS:

ANALYSES REQUESTED:

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE								SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		10.20.20	0840	Cooling Tower Blowdown	Y				N	1	P	Y							
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Relinquished By: (Signature and Printed Name) Jon Bain — Received By: (Signature and Printed Name) Guadalupe Tanaka — Date: 10.20.20 — Time: 1032

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:

1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

November 02, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2010258
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on October 26, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 11/02/20
Submitted: 10/26/20
PLS Report No.: 2010258

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2010258-01) Sampled: 10/26/20 08:00 Received: 10/26/20 08:00

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4540**		1	mg/L	5.0	- SM 2540C	10/29/20	10/30/20	dd	BJ03010

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BJ03010 - -										
Blank	**Prepared: 10/29/20 Analyzed: 10/30/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 10/29/20 Analyzed: 10/30/20**									
Total Dissolved Solids	48.0	5.0	mg/L	50.00		96.0	80-120			
Duplicate **Source: 2010258-01**	**Prepared: 10/29/20 Analyzed: 10/30/20**									
Total Dissolved Solids	4700	5.0	mg/L		4540			3.57	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Rick Daren Parker

Authorized Signature(s)

113915

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 10-26-20 PAGE 1 OF 1
LOG BOOK NO. _____ FILE NO. _____ LAB NO. 2010288

CLIENT NAME: CEM
Project Name/No. Moorpark Generating Station
P.O. NO.
AIRBILL NO: _____

ADDRESS:
ANALYSES REQUESTED:
COOLER TEMP: 0.3°C

PROJECT MANAGER: Tom Barnhart
PHONE NO:
FAX NO:
PRESERVATIVE:

SAMPLER NAME: John Bade (Printed) (Signature)
REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE								SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		10/26/20	0830	Cooling Tower Blowdown	X				N	1	P	X							
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Relinquished By: (Signature and Printed Name) John Bade — Received By: (Signature and Printed Name) Guadalupe Tanaka — Date: 10/26/20 — Time: 0910

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:
1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE
LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

November 24, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2011132
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on November 17, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 11/24/20
Submitted: 11/17/20
PLS Report No.: 2011132

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2011132-01) Sampled: 11/17/20 09:35 Received: 11/17/20 09:35

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4120**		1	mg/L	5.0	- SM 2540C	11/18/20	11/19/20	dd	BK01916

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BK01916 - -										
Blank	**Prepared: 11/18/20 Analyzed: 11/19/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 11/18/20 Analyzed: 11/19/20**									
Total Dissolved Solids	53.0	5.0	mg/L	50.00		106	80-120			
Duplicate **Source: 2011132-01**	**Prepared: 11/18/20 Analyzed: 11/19/20**									
Total Dissolved Solids	4160	5.0	mg/L		4120			0.966	5	
Duplicate **Source: 2011141-11**	**Prepared: 11/18/20 Analyzed: 11/19/20**									
Total Dissolved Solids	5750	5.0	mg/L		5660			1.55	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Authorized Signature(s)

113947

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 11/7/20 PAGE 1 OF 1

LOG BOOK NO. _____ FILE NO. _____ LAB NO: 201132

CLIENT NAME: CAM Project Name/No. Melburg Generating Station - weekly P.O. NO.

AIRBILL NO: _____

ADDRESS:

ANALYSES REQUESTED:

COOLER TEMP: 19°C

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

PRESERVATIVE:

SAMPLER NAME: Tom Barnhart (Printed) (Signature)

REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# _____

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE	PCB							SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		11/7/20	0935	Courtesy Brandon	X				N	1	P	X							
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Relinquished By: (Signature and Printed Name) Tom Barnhart — Received By: (Signature and Printed Name) Guadalupe Tanaka — Date: 11/7/20 — Time: 1025

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

Relinquished By: (Signature and Printed Name) — Received By: (Signature and Printed Name) — Date: — Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:

1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

December 01, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2011207
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on November 23, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

File #:74548
Report Date: 12/01/20
Submitted: 11/23/20
PLS Report No.: 2011207

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2011207-01) Sampled: 11/23/20 08:20 Received: 11/23/20 08:20

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**3920**		1	mg/L	5.0	- SM 2540C	11/23/20	11/24/20	dd	BK02428

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BK02428 - -										
Blank	**Prepared: 11/23/20 Analyzed: 11/24/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 11/23/20 Analyzed: 11/24/20**									
Total Dissolved Solids	53.0	5.0	mg/L	50.00		106	80-120			
Duplicate Source: 2011207-01	**Prepared: 11/23/20 Analyzed: 11/24/20**									
Total Dissolved Solids	3990	5.0	mg/L		3920			1.69	5	
Duplicate Source: 2011167-01	**Prepared: 11/23/20 Analyzed: 11/24/20**									
Total Dissolved Solids	4050	5.0	mg/L		3960			2.29	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Authorized Signature(s)

113805

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 11-23-20 PAGE 1 OF 1

LOG BOOK NO. ______ FILE NO. ______ LAB NO. 2011207

CLIENT NAME: CEM Project Name/No. Mandalay Generating Station P.O. NO.

AIRBILL NO: ______

ADDRESS:

ANALYSES REQUESTED:

COOLER TEMP: 0.8°C

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

PRESERVATIVE:

SAMPLER NAME: Tom Barnhart (Printed) (Signature)

REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, 0 = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	MATRIX: SOIL	MATRIX: SLUDGE	MATRIX: OTHER	TAT	CONTAINER: #	CONTAINER: TYPE	TDS								SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		11-23-20	0820	Cooling Tower Blowdown	x				N	1	P	x								
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished By: (Signature and Printed Name)	Received By: (Signature and Printed Name)	Date:	Time:
[signature] Tom Barnhart	[signature] Guadalupe Tanaka	11-23-20	0925

SAMPLE DISPOSITION:

1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: ______ days

By ______ Date ______

SPECIAL INSTRUCTIONS:

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

December 07, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2011248
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on November 30, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 12/07/20
Submitted: 11/30/20
PLS Report No.: 2011248

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2011248-01) Sampled: 11/30/20 08:20 Received: 11/30/20 08:20

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4380**		1	mg/L	5.0	- SM 2540C	12/03/20	12/04/20	dd	BL00403

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BL00403 - -										
Blank	**Prepared: 12/03/20 Analyzed: 12/04/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 12/03/20 Analyzed: 12/04/20**									
Total Dissolved Solids	54.0	5.0	mg/L	50.00		108	80-120			
Duplicate **Source: 2011248-01**	**Prepared: 12/03/20 Analyzed: 12/04/20**									
Total Dissolved Solids	4410	5.0	mg/L		4380			0.607	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Rick Owen Parker

Authorized Signature(s)

113814

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 113020 PAGE 1 OF 1

LOG BOOK NO. _____ FILE NO. _____ LAB NO. 2011248

CLIENT NAME: CEM Project Name/No. Melbourne Generating Station P.O. NO.

ADDRESS:

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

SAMPLER NAME: Tom Barnhart (Printed) _____ (Signature)

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# _____

AIRBILL NO: _____

COOLER TEMP: 1.3°c

PRESERVATIVE:

REMARKS:

ANALYSES REQUESTED: FDY

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE	SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		113020	09:20	Cooling Tower Blowdown	X				N	1	P	X
2												
3												
4												
5												
6												
7												
8												
9												
10												

Relinquished By: (Signature and Printed Name) _____ Received By: (Signature and Printed Name) Guadalupe Tanaka Date: 11.30.20 Time: 1540

Relinquished By: (Signature and Printed Name) _____ Received By: (Signature and Printed Name) _____ Date: _____ Time: _____

Relinquished By: (Signature and Printed Name) _____ Received By: (Signature and Printed Name) _____ Date: _____ Time: _____

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:
1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

December 15, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2012074
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on December 08, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 12/15/20
Submitted: 12/08/20
PLS Report No.: 2012074

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2012074-01) Sampled: 12/08/20 08:50 Received: 12/08/20 08:50

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4350**		1	mg/L	5.0	- SM 2540C	12/10/20	12/11/20	dd	BL01116

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BL01116 - -										
Blank	**Prepared: 12/10/20 Analyzed: 12/11/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 12/10/20 Analyzed: 12/11/20**									
Total Dissolved Solids	49.0	5.0	mg/L	50.00		98.0	80-120			
Duplicate **Source: 2012074-01**	**Prepared: 12/10/20 Analyzed: 12/11/20**									
Total Dissolved Solids	4330	5.0	mg/L		4350			0.538	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Rick Owen Parker

Authorized Signature(s)

113895

POSITIVE LAB SERVICE

CHAIN OF CUSTODY AND ANALYSIS REQUEST

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

DATE: 12-9-20 PAGE 1 OF 1

LOG BOOK NO. _____ FILE NO. _____ LAB NO. 2002074

CLIENT NAME: COM Project Name/No. Moberly Generating Station P.O. NO.

AIRBILL NO: _____

ADDRESS:

ANALYSES REQUESTED:

COOLER TEMP: 1.5°C

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

PRESERVATIVE:

SAMPLER NAME: Tom Barnhart (Printed) _____ (Signature)

REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE	TRS							SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		12820	0850	Loading Tons Blended	✓				N	1	P	✓							
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Relinquished By: (Signature and Printed Name) Tom Barnhart Received By: (Signature and Printed Name) Guadalupe Tanaka Date: 12-9-20 Time: 1005

Relinquished By: (Signature and Printed Name) Received By: (Signature and Printed Name) Date: Time:

Relinquished By: (Signature and Printed Name) Received By: (Signature and Printed Name) Date: Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:

1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

December 21, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2012159
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on December 14, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 12/21/20
Submitted: 12/14/20
PLS Report No.: 2012159

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2012159-01) Sampled: 12/14/20 08:20 Received: 12/14/20 08:20

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4360**		1	mg/L	5.0	- SM 2540C	12/17/20	12/18/20	dd	BL01802

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BL01802 - -										
Blank	**Prepared: 12/17/20 Analyzed: 12/18/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 12/17/20 Analyzed: 12/18/20**									
Total Dissolved Solids	47.0	5.0	mg/L	50.00		94.0	80-120			
Duplicate **Source: 2012159-01**	**Prepared: 12/17/20 Analyzed: 12/18/20**									
Total Dissolved Solids	4260	5.0	mg/L		4360			2.32	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Authorized Signature(s)

113909

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

CHAIN OF CUSTODY AND ANALYSIS REQUEST

DATE: 12/14/20 PAGE 1 OF 1

LOG BOOK NO. ________ FILE NO. ________ LAB NO. 202159

CLIENT NAME: LCM Project Name/No. Malburg Generating Station P.O. NO.

AIRBILL NO: ________

ADDRESS:

ANALYSES REQUESTED:

COOLER TEMP: 1.0°C

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

PRESERVATIVE:

SAMPLER NAME: Tom Bone (Printed) T (Signature)

REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, 0 = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE	[illegible]								SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		12/14/20	0820	Cooling Tower Blowdown	X				N	1	P	X								
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished By: (Signature and Printed Name)	Received By: (Signature and Printed Name)	Date:	Time:
T. Bone	[signature] Guadalupe Tanaka	12/14/20	1100

SAMPLE DISPOSITION:
1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: ____________ days

By ____________ Date ________

SPECIAL INSTRUCTIONS:

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

December 30, 2020

Tom Barnhart
Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Report No.: 2012244
Project Name: Malburg Generating Station Weekly

Dear Tom Barnhart,

This report contains the analytical results for the sample(s) received under chain of custody(s) by Positive Lab Service on December 22, 2020.

The test results in this report are performed in compliance with ELAP accreditation requirements for the certified parameters. The laboratory report may not be produced, except in full, without the written approval of the laboratory.

The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary data should not be used for regulatory purposes. Authorized signature(s) is provided on final report only.

If you have any questions in reference to this report, please contact your Positive Lab Service coordinator.

Project Manager

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

Certificate of Analysis

Colorado Energy Management
4963 Soto St.
Vernon, CA 90058

Attn: Tom Barnhart Phone: (323) 476-3626 FAX:(323) 476-3640

File #:74548
Report Date: 12/30/20
Submitted: 12/22/20
PLS Report No.: 2012244

Project: Malburg Generating Station Weekly

Sample ID: Cooling Tower Blowdown Water (2012244-01) Sampled: 12/22/20 08:10 Received: 12/22/20 08:10

Analyte	Results	Flag	D.F.	Units	PQL	Prep/Test Method	Prepared	Analyzed	By	Batch
Total Dissolved Solids	**4170**		1	mg/L	5.0	- SM 2540C	12/29/20	12/30/20	dd	BL03015

Quality Control Data

Analyte	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch BL03015 - -										
Blank	**Prepared: 12/29/20 Analyzed: 12/30/20**									
Total Dissolved Solids	ND	5.0	mg/L							
LCS	**Prepared: 12/29/20 Analyzed: 12/30/20**									
Total Dissolved Solids	47.0	5.0	mg/L	50.00		94.0	80-120			
Duplicate **Source: 2012280-01**	**Prepared: 12/29/20 Analyzed: 12/30/20**									
Total Dissolved Solids	4140	5.0	mg/L		4220			1.91	5	

Notes and Definitions

NA	Not Applicable
ND	Analyte NOT DETECTED at or above the detection limit
NR	Not Reported
MDL	Method Detection Limit
PQL	Practical Quantitation Limit

Environmental Laboratory Accreditation Program Certificate No. 1131, Mobile Lab No. 2534, LACSD No. 10138

Rick Owen Parker

Authorized Signature(s)

115697

POSITIVE LAB SERVICE

781 East Washington Blvd., Los Angeles, CA 90021
(213) 745-5312 FAX (213) 745-6372

CHAIN OF CUSTODY AND ANALYSIS REQUEST

DATE: 12/22/20 PAGE 1 OF

LOG BOOK NO. _____ FILE NO. _____ LAB NO. 2012244

CLIENT NAME: CEM Project Name/No. Malibu Generating Station - Weekly P.O. NO.

AIRBILL NO: _____

ADDRESS:

ANALYSES REQUESTED:

COOLER TEMP: 1.4°C

PROJECT MANAGER: Tom Barnhart PHONE NO: FAX NO:

PRESERVATIVE:

SAMPLER NAME: Tom Barnhart (Printed) (Signature)

REMARKS:

TAT (Analytical Turn Around Time): 0 = Same Day; 1 = 1 Day; 2 = 2 Days; 3 = 3 Days; N = Normal (5-7 Working Days)

CONTAINER TYPES: B = Brass, E = Encore, G = Glass, P = Plastic, V = VOA Vial, O = Other:

UST Project: Y N - Global ID# ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

	SAMPLE NO.	DATE SAMPLED	TIME SAMPLED	SAMPLE DESCRIPTION	MATRIX: WATER	SOIL	SLUDGE	OTHER	TAT	CONTAINER: #	TYPE	TPH								SAMPLE CONDITION/ CONTAINER /COMMENTS:
1		12/22/20	0810	Cooling Tower Blowdown	X				1	1	P	X								
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Relinquished By: (Signature and Printed Name) Received By: (Signature and Printed Name) Date: Time:

Relinquished By: (Signature and Printed Name) Received By: (Signature and Printed Name) Guadalupe Tanaka 12-22-20 1130

Relinquished By: (Signature and Printed Name) Received By: (Signature and Printed Name) Date: Time:

SPECIAL INSTRUCTIONS:

SAMPLE DISPOSITION:

1. Samples returned to client? YES NO
2. Samples will not be stored over 30 days, unless additional storage time is requested.
3. Storage time requested: _____ days

By _____ Date _____

PRESERVATIVE: 1-HNO_3, 2-H_2SO_4, 3-HCL, 4-Zinc Acetate, 5-NaOH, 6-NH_4 Buffer, 7-Other

LAB COPY

Appendix B

Excess Emission Reports

Startup/Shutdown Excess Emissions Report

U1 CO Startup/Shutdown

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station

Generated: 01/22/2021 08:56 **Location:** Vernon, California

Tag Name: U1_CO_LbPerHr_1M

SI = SampleInvalid, * = Excess Emission

Total Operating Time: 1,899.13 Hours

Non-Operating Time: 308.87 Hours Report Time: 2,208.00 Hours

Unit Operation

Event Period				Reason	Action
Begin/End	Duration in Minute(s)	Lb/Event	Limit	Code - Description	Code - Description
12/24/2020 22:35 12/24/2020 23:04 Shutdown	30	14.9 *	10.8	3 - Process Problems	106 - Shutdown troubleshooting

Total Duration of Excess Emission	**30**	**Minute(s)**
Time of Excess Emission as a percentage of operating time	**0.03**	**%**
Time in compliance as percentage of operating time	**99.97**	**%**

Startup/Shutdown Excess Emissions Report

U1 NOx Startup/Shutdown

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station

Generated: 01/22/2021 08:57 **Location:** Vernon, California

Tag Name: U1_NOxRECLM_LbPerHr_1M

SI = SampleInvalid, * = Excess Emission

Total Operating Time: 1,899.13 Hours

Non-Operating Time: 308.87 Hours Report Time: 2,208.00 Hours

Unit Operation

Event Period				Reason	Action
Begin/End	Duration in Minute(s)	Lb/Event	Limit	Code - Description	Code - Description
12/24/2020 22:35 12/24/2020 23:04 Shutdown	30	5.40 *	4.50	3 - Process Problems	106 - Shutdown troubleshooting

Total Duration of Excess Emission	**30**	**Minute(s)**
Time of Excess Emission as a percentage of operating time	**0.03**	**%**
Time in compliance as percentage of operating time	**99.97**	**%**

Startup/Shutdown Excess Emissions Report

U1 VOC Startup/Shutdown

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station

Generated: 01/22/2021 07:53 **Location:** Vernon, California

Tag Name: U1_VOC_LbPerHr_1M

SI = SampleInvalid, * = Excess Emission

Total Operating Time: 1,899.13 Hours

Non-Operating Time: 308.87 Hours Report Time: 2,208.00 Hours

Unit Operation

Event Period				Reason	Action
Begin/End	Duration in Minute(s)	Lb/Event	Limit	Code - Description	Code - Description

No excess emissions were found in the reporting period.

Excess Emission Report

Unit 1 - CO ppmvdc 1-hour during Normal Operation

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/21/2021 13:38 **Location:** Vernon, California

Tag Name: U1_CONormal_Ppmvdc_1H
Total Operating Time: 1,905.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 303.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,905.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Excess Emission Report

Unit 1 - NOx ppmvdc 1-hour during Normal Operation

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/21/2021 13:36 **Location:** Vernon, California

Tag Name: U1_NOxNormal_Ppmvdc_1H
Total Operating Time: 1,905.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 303.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,905.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Excess Emission Report

Unit 1 - VOC ppmvdc 1-hour during Normal Operation

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 07:52 **Location:** Vernon, California

Tag Name: U1_VOCNormal_Ppmvdc_1H
Total Operating Time: 1,905.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 303.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,905.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Quad K Excess Emissions Report

U1 NOX 4-Hour Events

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 07:50 **Location:** Vernon, California

Tag Name: U1_NOx4H_Ppmvdc_1H
Total Operating Time: 1,905.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 303.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,905.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Startup/Shutdown Event Report

U2 CO Startup/Shutdown Events

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 07:55 **Location:** Vernon, California
Tag Name: U2_CO_LbPerHr_1M
SI = SampleInvalid, * = Excess Emission

Total Operating Time: 1,948.58 Hours
Non-Operating Time: 259.42 Hours Report Time: 2,208.00 Hours

Unit Operation

Event Period				Reason	Action
Begin/End	Duration in Minute(s)	Lb/Event	Limit	Code - Description	Code - Description

No excess emissions were found in the reporting period.

Startup/Shutdown Excess Emissions Report

U2 NOx Startup/Shutdown

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station

Generated: 01/22/2021 08:58 **Location:** Vernon, California

Tag Name: U2_NOxRECLM_LbPerHr_1M

SI = SampleInvalid, * = Excess Emission

Total Operating Time: 1,948.58 Hours

Non-Operating Time: 259.42 Hours Report Time: 2,208.00 Hours

Unit Operation

Event Period				Reason	Action
Begin/End	Duration in Minute(s)	Lb/Event	Limit	Code - Description	Code - Description
12/24/2020 22:35 12/24/2020 23:04 Shutdown	30	4.9 *	4.5	3 - Process Problems	106 - Shutdown troubleshooting

Total Duration of Excess Emission	**30**	**Minute(s)**
Time of Excess Emission as a percentage of operating time	**0.03**	**%**
Time in compliance as percentage of operating time	**99.97**	**%**

Startup/Shutdown Event Report

U2 VOC Startup/Shutdown Events

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 08:04 **Location:** Vernon, California
Tag Name: U2_VOC_LbPerHr_1M
SI = SampleInvalid, * = Excess Emission

Total Operating Time: 1,948.58 Hours
Non-Operating Time: 259.42 Hours Report Time: 2,208.00 Hours

Unit Operation

Event Period				Reason	Action
Begin/End	Duration in Minute(s)	Lb/Event	Limit	Code - Description	Code - Description

No excess emissions were found in the reporting period.

Excess Emission Report

Unit 2 - CO ppmvdc 1-hour during Normal Operation

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 07:57 **Location:** Vernon, California

Tag Name: U2_CONormal_Ppmvdc_1H
Total Operating Time: 1,953.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 255.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,953.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Excess Emission Report

Unit 2 - NOx ppmvdc 1-hour during Normal Operation

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 07:56 **Location:** Vernon, California

Tag Name: U2_NOxNormal_Ppmvdc_1H
Total Operating Time: 1,953.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 255.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,953.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Excess Emission Report

Unit 2 - VOC ppmvdc 1-hour during Normal Operation

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 07:56 **Location:** Vernon, California

Tag Name: U2_VOCNormal_Ppmvdc_1H
Total Operating Time: 1,953.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 255.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,953.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Quad K Excess Emissions Report

U2 NOX 4-Hour Events

From: 10/01/2020 00:00 **To:** 12/31/2020 23:59 **Facility Name:** Malburg Generating Station
Generated: 01/22/2021 08:05 **Location:** Vernon, California

Tag Name: U2_NOx4H_Ppmvdc_1H
Total Operating Time: 1,953.00 Hour(s) **No Exclusions Allowed**
Non-Operating Time: 255.00 Hour(s) Report Time: 2,208.00 Hour(s)

No incidents have been reported for this reporting period. Data is 100% in compliance.

Total Operating Time:	**1,953.00 Hour(s)**
Total Duration (Online only):	**0.00 Hour(s)**
Time in exceedance as a percentage of operating time:	**0.00 %**
Time in compliance as a percentage of operating time:	**100.00 %**

Appendix C

Diesel Fuel Oil Specifications

Purchase Order

Purchase Order #	MGS18808	Colorado Energy - Malburg Generating Station	
Revision Number	1	**Supplier**	Southern Counties Oil Co., A California Limited Partnership
All previous revisions are no longer valid.		**Address**	
Order Date	Feb 25, 2020		
P.O. Due Date	Feb 25, 2020	**Telephone**	
		Fax No.	
Delivery Address	Colorado Energy Management, LLC Malburg Generating Station 4963 Soto Street Vernon, CA 90058 323-476-3620 Fax:	**Invoice Address**	Colorado Energy Management, LLC Malburg Generating Station 4963 Soto Street Vernon, CA 90058
		E-Mail Address	

Line	Part Number	Qty (UOP)	UOM	Price	Tax	Line Total
10	MGS-06210 | 422D055 Description: UN1202, Diesel Fuel, 422D055, CAR Ultra L.S. Dyed Diesel, GLI	110	GLI	4.43	46.29	533.59
				Total	**46.29**	**533.59**

Purchase Order Terms

Ship Via		
Payment Terms	NET30	Net 30 Days
Freight Terms	PPA	Prepaid and Add Freight
FOB Point		

Grand Total $533.59

SC Fuels
Order# 1592103
All fees will be paid upon invoicing.

Upon delivery, please see that used drums are picked up/returned and drum deposit is applied to our account, thank you!

3b

Invoice

SC Commercial LLC DBA SC Fuels
1800 West Katella Ave, Suite 400, P.O. Box 4159, Orange, CA 92863-4159
PLEASE REMIT ALL PAYMENTS TO:
P.O. BOX 14237
ORANGE, CA 92863-1237
Ph: (800) 659-5823 Credit Inquiries: (888) SCFUELS Ext.6017

SHIP TO: 1L **CUST NO: 01-0001084**
COLORADO ENERGY MGMT-VERNON
4963 SOTO STREET
VERNON, CA 90058

INVOICE 1592103-IN	**DUE DATE** 3/27/2020
INVOICE DATE 2/26/2020	**SHIP DATE** 2/26/2020
ORDER DATE 2/19/2020	**SHIP VIA** 826
CUSTOMER PO MGS18808	**ORDER NUMBER** 1592103
TERMS N30	**SALESMAN** Todd Cripps 714-938-5714

ACCT NO (Bill-to): **01-0001084**
COLORADO ENERGY MANAGEMENT LLC
ATTN: ACCOUNTS PAYABLE
4963 S. SOTO STREET
VERNON, CA 90058
(323) 476-3622

ITEM CODE	ITEM DESCRIPTION	QUANTITY ORDERED	QUANTITY DELIVERED	PACKAGE DESCRIPTION	EXTENDED QTY	UNIT PRICE	EXT PRICE
422D055	DYED CARB ULS DIESEL (RED)	2	2.00	55 GAL DRM	110.00	4.43000	487.30
	Whse: 101						
	UN1202, DIESEL FUEL, 3, PG III - NONTAXABLE USE ONLY, PENALITY FOR TAXABLE USE						
	Federal Lust					0.00100	0.11
	Federal Oil Spill					0.00214	0.24
	CA - AB 32 - DSL					0.00704	0.77
						4.44018	488.42
DRUMDEPOSITC001	DRUM FEE	2	2.00	MISC CHRG	2.00	25.00000	50.00
	Whse: 101						
/FUELCH	FUEL SURCHARGE						9.92
/RCF	REGULATORY COMPLIANCE FEE						12.95
MSRTNDRMC001	RETURN DRUM	0	-2.00	MISC CHRG	2.00-	15.00000	30.00-
	Whse: 101						

Save time, pay online! View invoices, make payments and more.
Sign up for the Customer Portal today. Email: creditinquiries@scfuels.com or Call 888-SCFuels Ext. 6017 or login to Customer Portal: https://customerportal.scfuels.com
24-hour Emergency Response Call CHEMTREC: 800-424-9300

Net Invoice:	531.29
Less Discount:	0.00
Freight:	0.00
Sales Tax:	48.57
Invoice Total:	579.86

- IN THE EVENT THAT THE ABOVE CHARGES ARE NOT PAID WHEN DUE, SC COMMERCIAL, LLC d.b.a SC FUELS RESERVES THE RIGHT TO REFUSE FURTHER CHARGES TO THE ACCOUNT. A SERVICE CHARGE OF 1.5% PER MONTH(A.P.R. 18%) WILL APPLY TO ALL PAST DUE INVOICES.
- ERRORS IN PRICE, EXTENSION, AND ADDITION SUBJECT TO CORRECTION.
- It is the purchaser's responsibility to verify that all applicable taxes are being charged in accordance with fedral and state laws.
- Prices shown on this invoice reflect discounts received for Payment by Cash, Check, or Electronic Funds Transfer(EFT). Payment by other

3C

ox 14237
nge, CA 92863-1237
el: 800-659-5823
Fax: 714-992-7377
Credit Inquiries: 888-364-0121

SC FUELS®

DELIVERY TICKET

Order#: 1592103
Order Date: 2/19/2020
Delv Req Date: 2/26/2020
Sales Person: 0177 - Todd Cripps

SOLD TO: 01-0001084
COLORADO ENERGY MANAGEMENT LLC
ATTN: ACCOUNTS PAYABLE
4963 S. SOTO STREET
VERNON, CA 90058
(323) 476-3622

SHIP TO: 1L
COLORADO ENERGY MGMT-VERNON
4963 SOTO STREET
VERNON, CA 90058
(323) 476-3632

Confirm To: ASHLEY HURD
Customer PO: MGS18808 Ship Via: Whse: 101 Terms: N30

HM	Product Code / Desc / Svc Type	Qty Ordered / Package Desc	Ext Qty Ordered	Qty Delivered	Unit Price	Extended Amoun
X	UN1202, DIESEL FUEL, 3, PG III - NONTAXABLE USE ONLY, PENALITY FOR TAXABLE USE					
	422D055 30 DYED CARB ULS DIESEL (RED)	2.00 55 GAL DRM	110.00 GALS	2 Drums		
	DRUMDEPOSITC001 30 DRUM FEE	2.00 MISC CHRG	2.00 EACH	2 Drums		
	/FUELCH 30 FUEL SURCHARGE		0.00			
	/RCF 30 REGULATORY COMPLIANCE FEE		0.00			

Rec'd by [signature] Date 2/26/2020
Print Name Ethan Sluter
Driver's Signature [signature]

Received in INFOR
2/26/20
M. Gordon

ARRIVED LOAD POINT	AM PM	DATE		COMPLETED LOADING	AM PM	DATE	TRUCK # 826	B/L #	FOR COMPANY USE ONLY RT ☐ TF ☐ OP ☐
ARRIVED DESTINATION 840	AM PM	DATE 2/26/2020		COMPLETED UNLOADING	AM PM	DATE 2/26/2020	D.O.T. HAZARDOUS MATERIALS PLACARD PROVIDED BY SHIPPER ☐ CARRIER ☐		
END TANK	GAS	DIESEL	OTHER	WATER DETECTED ? ☐ YES ☐ NO		GRAVITY	THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIEI DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FO TRANSPORTATION ACCORDING TO APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.		
BEGINNING TANK	GAS	DIESEL	OTHER	DRUM DEPOSIT 2 Drums		DRUM CREDIT	IN THE EVENT OF A HAZARDOUS MATERIALS INCIDENT - CALL 1-800-424-9300		

FOR CHEMICAL EMERGENCY
Spill, Leak, Fire Exposure or Accident
CALL CHEMTREC - DAY OR NIGHT
800-424-9300

CHEVRON GST® OILS

ISO 32, 46, 68, 100

CUSTOMER BENEFITS

Chevron GST Oils deliver value through:

- **Superior oxidation stability** for long service life at elevated temperatures.
- **Rust and corrosion protection**
- **High viscosity index** assures minimum viscosity change when variations in temperature occur.
- **Minimum foam** prevents sump overflow or erratic governor operation.
- **Fast air release** minimizes possibility of pump cavitation in systems with high circulation rates and small reservoirs.
- **Superior thermal stability** minimizes deposit formation.
- **Rapid water separation** keeps water in oil to a minimum.
- **Hydraulic fluid service** — Chevron GST Oils ISO 32, 46, and 68 are excellent hydraulic fluids in low pressure systems up to 1000 psi.
- **Air compressor** lubricant when OEM recommends R&O type oil.
- **Environmental benefits** — All grades are ashless. This facilitates reclaiming and recycling of the used oils. Chevron GST Oils are not expected to be harmful to aquatic organisms.

FEATURES

Chevron GST Oils are designed to meet the critical demands of:

- gas, steam, and hydroelectric turbine bearing lubrication
- reduction gear lubrication in marine operations

They are an excellent recommendation for many other industrial applications including air compression.

Chevron GST Oils are formulated with ISOSYN® base stocks.

Higher temperatures in advanced gas and steam turbines require a circulating system oil with exceptional high temperature stability. Chevron GST Oils have outstanding **thermal and oxidation stability**.

Nonvolatile **oxidation inhibition** minimizes the evaporative loss of the inhibitors, a common problem with turbine oils where bearing temperatures are high and system capacities are limited. With retained oxidation resistance for long periods under high temperature conditions, Chevron GST Oils have proven they will provide longer oil service life and reduced turbine down time.

Corrosion inhibition protects costly turbine shafts and gears from corrosion and rusting.

Chevron GST Oils have excellent demulsibility characteristics which allow these oils to maintain a high film strength coating on critical wear points of bearings and gear reducers and assure fast removal of water contamination.

Foam inhibition prevents sump overflow and erratic governor operation.

APPLICATIONS

Chevron GST Oils are recommended for use in turbines of all types including gas, steam, and hydroelectric turbines, and marine gear turbine sets.

The following viscosity grades are formulated to meet the specified OEM requirements:

Chevron GST Oil ISO 32

- meets and exceeds
  - — **General Electric** GEK-32568f, GEK 28143A, GEK-46506D, GEK-27070
  - — **Ingersoll Rand** specification for Centac Centrifugal Compressors
  - — **Solar** ES 9 224 requirements for gas turbine oils
  - — **ASTM D4304**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- is approved by
  - — **Cincinnati Machine** P-38
  - — **Alstom Power** HTGD 90117
  - — **Siemens Westinghouse** M spec 55125Z3
  - — **Siemens** TLV 901304

Chevron GST Oil ISO 46

- meets
  - — **General Electric** and **Westinghouse** requirements for marine gas turbine system oils. Recommended by Siemens Westinghouse for reactor coolant pump motor bearings.
  - — **Siemens** TLV 901304
  - — **Solar** ES 9 224 requirements for gas turbine oils
  - — **ASTM D4304**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- is approved by
  - — **Cincinnati Machine** P 55
  - — **Alstom Power** HTGD 90117

Chevron GST Oil ISO 68

- meets
  - — meets **General Electric**, **Alstom**, **Westinghouse**, and other OEM requirements for hydroelectric turbines, land and marine steam turbines, and associated reduction gears
  - — **ASTM D4304**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment
- is approved by
  - — **Cincinnati Machine** P-54

Chevron GST Oil ISO 100

- meets
  - — meets **General Electric**, **Alstom**, **Westinghouse**, and other OEM requirements for hydroelectric turbines, land and marine steam turbines, and associated reduction gears
  - — **ASTM D4304**, **British Standard 489**, and **DIN 51515** standard organization requirements for new lubricants used in gas and steam turbines and auxiliary equipment

Chevron GST Oils ISO 32, 46, 68, and 100 are registered with NSF and are acceptable as lubricants where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Do not use in high pressure systems in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Do not use in breathing air apparatus or medical equipment.

TYPICAL TEST DATA

ISO Grade	32	46	68	100
CPS Number	*253026*	*253027*	*253028*	*253029*
MSDS Number	*6710*	*6710*	*6710*	*6710*
AGMA Grade	—	1	2	3
API Gravity	32.7	32.0	31.7	31.4
Viscosity, Kinematic cSt at 40°C cSt at 100°C	 30.4 5.2	 43.7 6.6	 64.6 8.5	 95.0 11.0
Viscosity, Saybolt SUS at 100°F SUS at 210°F	 157 43.8	 225 48.2	 334 54.8	 495 63.9
Viscosity Index	102	101	102	100
Flash Point,°C(°F)	222(432)	224(435)	245(473)	262(504)
Pour Point, °C(°F)	-36(-33)	-36(-33)	-33(-27)	-30(-22)
Oxidation Stability ASTM D 943[1] ASTM D 2272[2]	 17,000 1700	 12,000 1400	 11,000 1400	 11,000 1400
FZG, Pass stage, DIN 51354	—	—	—	—

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

1 Hours to 2.0 mg KOH/g acid number modified D943
2 Minutes to 25 psi pressure drop

Appendix D

Cooling Tower PM10 Guidance

SPX Cooling Technologies

Balcke | Hamon Dry Cooling | Marley

COOLING TOWER DRIFT MASS DISTRIBUTION
Excel Drift Eliminators

The following table represents the predicted mass distribution of drift particle size for cooling tower drift dispersed from Marley TU10 and TU12 Excel Drift Eliminators properly installed in a cooling tower.

Mass in Particles (%)		Droplet Size (Microns)
0.2	Larger Than	525
1.0	Larger Than	375
5.0	Larger Than	230
10.0	Larger Than	170
20.0	Larger Than	115
40.0	Larger Than	65
60.0	Larger Than	35
80.0	Larger Than	15
88.0	Larger Than	10

How to read table: Example – 0.2% of the drift will have particle sizes larger than 525 microns.

Marley guarantees the data above for properly installed, undamaged drift eliminators in 'like-new' condition.

SPX COOLING TECHNOLOGIES

PREFERRED COOLING TOWER WATER CONDITION LIMITS

NOTE: Biological treatment and control of Legionella and other potentially health-threatening bacteria is essential. Consult a competent water treatment expert or service company.

pH	6.5 to 9.0 (special materials may be required beyond these limits)
Temperature	125° F (51.7° C) typical maximum; higher temperatures possible with special materials
Langelier Saturation Index	0.0 to 1.0 recommended; higher allowed if scale is controllable.
M-Alkalinity	100 to 500 ppm as $CaCO_3$
Silica	150 ppm as SiO_2 maximum (scale formation)
Iron	3 ppm maximum (staining and scale contributor)
Manganese	0.1 ppm maximum (staining and scale contributor)
Sulfides	Greater than 1 ppm can be corrosive to copper alloys, iron, steel, and galvanized steel. See table below for limits with film fill.
Ammonia	50 ppm maximum if copper alloys present; lower limits apply for film fill - see table.
Chlorine / bromine	1 ppm free residual intermittently (shock), or 0.4 ppm continuously maximum. Excess can attack sealants, accelerate corrosion, increase drift, and embrittle PVC.
Organic solvents	These can attack plastics and promote bio-growth. Trace amounts may be acceptable, depending on the solvent.
TDS	Over 5000 ppm may require thermal performance derate.

Individual Ions:		MAXIMUM:
Cations:	**Calcium**	800 ppm as $CaCO_3$ preferred, (300 ppm with MX fills in arid climate).
	Magnesium	Depends on pH and silica level (for magnesium silicate scale).
	Sodium	No limit.
Anions:	**Chlorides**	450 ppm as Cl^- (300 for galvanized towers). upgrades are required for higher chloride levels.
	Sulfates	800 ppm as $CaCO_3$ preferred if calcium is also high ($CaSO_4$ scale).
	Nitrates	300 ppm as NO_3 (bacteria nutrient).
	Carbonates/Bicarbonates	300 ppm as $CaCO_3$ preferred for wood or galvanized steel tower.

Fouling Contaminant Limits - based on fouling load of 2.5 pounds per cubic foot

Bacteria counts listed below relate to maintaining fill thermal efficiency only.
Biocidal treatment is required for all cooling tower installations. (see NOTE above).

Fill Type	Aerobic Bacteria Heterotrophic Plate Count	Total Suspended Solids (TSS)	Oil and Grease	Sulfides	Ammonia
MC75, MC120	10,000 CFU/ml	50 ppm	1 ppm	0.5 ppm	10 ppm
FB20, MX75 and MX625 (crossflow)	100,000 CFU/ml with TSS up to 50 ppm, or 10,000 CFU/ml with TSS up to 150 ppm		1 ppm	1.0 ppm	15 ppm
DF254, MCR16	100,000 CFU/ml	150 ppm	5 ppm	1.5 ppm	25 ppm
DF381 with 1' MC75 overlay	1,000,000 CFU/ml with TSS up to 50 ppm, or 100,000 CFU/ml with TSS up to 150 ppm		5 ppm	1.5 ppm	25 ppm
DF381, MVC20, AAFNCS ('Cleanflow') MCR12, Tricklebloc	1,000,000 CFU/ml	250 ppm	10 ppm	2.0 ppm	25 ppm
Splash bar or grid fill	1,000,000 CFU/ml target	No specific limit	10 ppm	N/A	N/A

Note: Any amount of oil or grease is likely to adversely affect thermal performance. Sulfides and ammonia promote bacterial growth which can cause fill fouling; conformance to the limits above will assist in controlling bacteria to the recommended levels.

Drift Effects:

Certain contaminants or treatment chemicals such as surfactants, glycols, biodispersants and antifoams may increase drift rate. When minimizing drift is vital, the circulating water shall have a surface tension of at least 65 dynes/cm and a total organic carbon (TOC) level below 25 ppm. *Reclaim or re-use waters in particular may contain contaminants which increase drift rate either directly or by necessitating the use of treatment chemicals which increase drift rate.*

Miscellaneous Solids and Nutrients

Avoid high efficiency fill (MC75) with water containing bacteria nutrients such as alcohols, nitrates, ammonia, fats, glycols, phosphates, black liquor, or TOC greater than 50 ppm. Clog-resistant fills may be considered for contaminated water, case by case.
For all film fills, avoid fibrous, oily, greasy, fatty, or tarry contaminants, which can plug fill.
In general, do not use film fill in Steel Plants, Pulp & Paper Mills, Food Processing Operations, or similar applications unless leaks and contamination by airborne or waterborne particulates, oil, or fibers are extremely unlikely. If film fill is used, biological-growth control must be stringent and diligent.

Calculating Realistic PM_{10} Emissions from Cooling Towers

Abstract No. 216 Session No. AM-1b

Joel Reisman and Gordon Frisbie
Greystone Environmental Consultants, Inc., 650 University Avenue, Suite 100, Sacramento, California 95825

ABSTRACT

Particulate matter less than 10 micrometers in diameter (PM_{10}) emissions from wet cooling towers may be calculated using the methodology presented in EPA's AP-42[1] , which assumes that all total dissolved solids (TDS) emitted in "drift" particles (liquid water entrained in the air stream and carried out of the tower through the induced draft fan stack.) are PM_{10}. However, for wet cooling towers with medium to high TDS levels, this method is overly conservative, and predicts significantly higher PM_{10} emissions than would actually occur, even for towers equipped with very high efficiency drift eliminators (e.g., 0.0006% drift rate). Such over-prediction may result in unrealistically high PM_{10} modeled concentrations and/or the need to purchase expensive Emission Reduction Credits (ERCs) in PM_{10} non-attainment areas. Since these towers have fairly low emission points (10 to 15 m above ground), over-predicting PM_{10} emission rates can easily result in exceeding federal Prevention of Significant Deterioration (PSD) significance levels at a project's fenceline. This paper presents a method for computing realistic PM_{10} emissions from cooling towers with medium to high TDS levels.

INTRODUCTION

Cooling towers are heat exchangers that are used to dissipate large heat loads to the atmosphere. Wet, or evaporative, cooling towers rely on the latent heat of water evaporation to exchange heat between the process and the air passing through the cooling tower. The cooling water may be an integral part of the process or may provide cooling via heat exchangers, for example, steam condensers. Wet cooling towers provide direct contact between the cooling water and air passing through the tower, and as part of normal operation, a very small amount of the circulating water may be entrained in the air stream and be carried out of the tower as "drift" droplets. Because the drift droplets contain the same chemical impurities as the water circulating through the tower, the particulate matter constituent of the drift droplets may be classified as an emission. The magnitude of the drift loss is influenced by the number and size of droplets produced within the tower, which are determined by the tower fill design, tower design, the air and water patterns, and design of the drift eliminators.

AP-42 METHOD OF CALCULATING DRIFT PARTICULATE

EPA's AP-42[1] provides available particulate emission factors for wet cooling towers, however, these values only have an emission factor rating of "E" (the lowest level of confidence acceptable). They are also rather high, compared to typical present-day manufacturers' guaranteed drift rates, which are on the order of 0.0006%. (Drift emissions are typically

expressed as a percentage of the cooling tower water circulation rate). AP-42 states that "a *conservatively high* PM_{10} emission factor can be obtained by (a) multiplying the total liquid drift factor by the TDS fraction in the circulating water, and (b) assuming that once the water evaporates, all remaining solid particles are within the PM_{10} range." (Italics per EPA).

If TDS data for the cooling tower are not available, a source-specific TDS content can be estimated by obtaining the TDS for the make-up water and multiplying it by the cooling tower cycles of concentration. [The cycles of concentration is the ratio of a measured parameter for the cooling tower water (such as conductivity, calcium, chlorides, or phosphate) to that parameter for the make-up water.]

Using AP-42 guidance, the total particulate emissions (PM) (after the pure water has evaporated) can be expressed as:

$$PM = \text{Water Circulation Rate} \times \text{Drift Rate} \times TDS \qquad [1]$$

For example, for a typical power plant wet cooling tower with a water circulation rate of 146,000 gallons per minute (gpm), drift rate of 0.0006%, and TDS of 7,700 parts per million by weight (ppmw):

$$PM = 146{,}000 \text{ gpm} \times 8.34 \text{ lb water/gal} \times 0.0006/100 \times 7{,}700 \text{ lb solids}/10^6 \text{ lb water} \times 60 \text{ min/hr} = \underline{3.38 \text{ lb/hr}}$$

On an annual basis, this is equivalent to almost 15 tons per year (tpy). Even for a state-of-the-art drift eliminator system, this is not a small number, especially if assumed to all be equal to PM_{10}, a regulated criteria pollutant. However, as the following analysis demonstrates, only a very small fraction is actually PM_{10}.

COMPUTING THE PM_{10} FRACTION

Based on a representative drift droplet size distribution and TDS in the water, the amount of solid mass in each drop size can be calculated. That is, for a given initial droplet size, assuming that the mass of dissolved solids condenses to a spherical particle after all the water evaporates, and assuming the density of the TDS is equivalent to a representative salt (e.g., sodium chloride), the diameter of the final solid particle can be calculated. Thus, using the drift droplet size distribution, the percentage of drift mass containing particles small enough to produce PM_{10} can be calculated. This method is conservative as the final particle is assumed to be perfectly spherical; hence as small a particle as can exist.

The droplet size distribution of the drift emitted from the tower is critical to performing the analysis. Brentwood Industries, a drift eliminator manufacturer, was contacted and agreed to provide drift eliminator test data from a test conducted by Environmental Systems Corporation (ESC) at the Electric Power Research Institute (EPRI) test facility in Houston, Texas in 1988 (Aull[2], 1999). The data consist of water droplet size distributions for a drift eliminator that achieved a tested drift rate of 0.0003 percent. As we are using a 0.0006 percent drift rate, it is reasonable to expect that the 0.0003 percent drift rate would produce smaller droplets, therefore,

this size distribution data can be assumed to be conservative for predicting the fraction of PM_{10} in the total cooling tower PM emissions.

In calculating PM_{10} emissions the following assumptions were made:

- Each water droplet was assumed to evaporate shortly after being emitted into ambient air, into a single, solid, spherical particle.
- Drift water droplets have a density (ρ_w) of water; $1.0\ g/cm^3$ or $1.0 * 10^{-6}\ \mu g/\mu m^3$.
- The solid particles were assumed to have the same density (ρ_{TDS}) as sodium chloride, (i.e., 2.2 g/cm^3).

Using the formula for the volume of a sphere, $V = 4\pi r^3/3$, and the density of pure water, $\rho_w = 1.0\ g/cm^3$, the following equations can be used to derive the solid particulate diameter, D_p, as a function of the TDS, the density of the solids, and the initial drift droplet diameter, D_d :

Volume of drift droplet = $(4/3)\pi(D_d/2)^3$ [2]

Mass of solids in drift droplet = (TDS)(ρ_w)(Volume of drift droplet) [3]

substituting,

Mass of solids in drift = (TDS)(ρ_w) $(4/3)\pi(D_d/2)^3$ [4]

Assuming the solids remain and coalesce after the water evaporates, the mass of solids can also be expressed as:

Mass of solids = (ρ_{TDS}) (solid particle volume) = (ρ_{TDS})$(4/3)\pi(D_p/2)^3$ [5]

Equations [4] and [5] are equivalent:

$(\rho_{TDS})(4/3)\pi(D_p/2)^3 = (TDS)(\rho_w)(4/3)\pi(D_d/2)^3$ [6]

Solving for D_p:

$D_p = D_d\ [(TDS)(\rho_w/\rho_{TDS})]^{1/3}$ [7]

Where,

TDS is in units of ppmw
D_p = diameter of solid particle, micrometers (μm)
D_d = diameter of drift droplet, μm

Using formulas [2] – [7] and the particle size distribution test data, Table 1 can be constructed for drift from a wet cooling tower having the same characteristics as our example; 7,700 ppmw TDS and a 0.0006% drift rate. The first and last columns of this table are the particle size distribution derived from test results provided by Brentwood Industries. Using straight-line interpolation for a solid particle size 10 μm in diameter, we conclude that approximately 14.9 percent of the mass emissions are equal to or smaller than PM_{10}. The balance of the solid

particulate are particulate greater than 10 μm. Hence, PM_{10} emissions from this tower would be equal to PM emissions x 0.149, or 3.38 lb/hr x 0.149 = 0.50 lb/hr. The process is repeated in Table 2, with all parameters equal except that the TDS is 11,000 ppmw. The result is that approximately 5.11 percent are smaller at 11,000 ppm. Thus, while total PM emissions are larger by virtue of a higher TDS, overall PM_{10} emissions are actually lower, because more of the solid particles are larger than 10 μm.

Table 1. Resultant Solid Particulate Size Distribution (TDS = 7700 ppmw)

EPRI Droplet Diameter (μm)	Droplet Volume (μm^3) [2][1]	Droplet Mass (μg) [3]	Particle Mass (Solids) (μg) [4]	Solid Particle Volume (μm^3)	Solid Particle Diameter (μm) [7]	EPRI % Mass Smaller
10	524	5.24E-04	4.03E-06	1.83	1.518	0.000
20	4189	4.19E-03	3.23E-05	14.66	3.037	0.196
30	14137	1.41E-02	1.09E-04	49.48	4.555	0.226
40	33510	3.35E-02	2.58E-04	117.29	6.073	0.514
50	65450	6.54E-02	5.04E-04	229.07	7.591	1.816
60	113097	1.13E-01	8.71E-04	395.84	9.110	5.702
70	179594	1.80E-01	1.38E-03	628.58	10.628	21.348
90	381704	3.82E-01	2.94E-03	1335.96	13.665	49.812
110	696910	6.97E-01	5.37E-03	2439.18	16.701	70.509
130	1150347	1.15E+00	8.86E-03	4026.21	19.738	82.023
150	1767146	1.77E+00	1.36E-02	6185.01	22.774	88.012
180	3053628	3.05E+00	2.35E-02	10687.70	27.329	91.032
210	4849048	4.85E+00	3.73E-02	16971.67	31.884	92.468
240	7238229	7.24E+00	5.57E-02	25333.80	36.439	94.091
270	10305995	1.03E+01	7.94E-02	36070.98	40.994	94.689
300	14137167	1.41E+01	1.09E-01	49480.08	45.549	96.288
350	22449298	2.24E+01	1.73E-01	78572.54	53.140	97.011
400	33510322	3.35E+01	2.58E-01	117286.13	60.732	98.340
450	47712938	4.77E+01	3.67E-01	166995.28	68.323	99.071
500	65449847	6.54E+01	5.04E-01	229074.46	75.915	99.071
600	113097336	1.13E+02	8.71E-01	395840.67	91.098	100.000

[1] Bracketed numbers refer to equation number in text.

The percentage of PM_{10}/PM was calculated for cooling tower TDS values from 1000 to 12000 ppmw and the results are plotted in Figure 1. Using these data, Figure 2 presents predicted PM_{10} emission rates for the 146,000 gpm example tower. As shown in this figure, the PM emission rate increases in a straight line as TDS increases, however, the PM_{10} emission rate increases to a maximum at around a TDS of 4000 ppmw, and then begins to decline. The reason is that at higher TDS, the drift droplets contain more solids and therefore, upon evaporation, result in larger solid particles for any given initial droplet size.

CONCLUSION

The emission factors and methodology given in EPA's AP-42[1] Chapter 13.4 *Wet Cooling Towers*, do not account for the droplet size distribution of the drift exiting the tower. This is a critical factor, as more than 85% of the mass of particulate in the drift from most cooling towers will result in solid particles larger than PM_{10} once the water has evaporated. Particles larger than PM_{10} are no longer a regulated air pollutant, because their impact on human health has been shown to be insignificant. Using reasonable, conservative assumptions and a realistic drift

droplet size distribution, a method is now available for calculating realistic PM_{10} emission rates from wet mechanical draft cooling towers equipped with modern, high-efficiency drift eliminators and operating at medium to high levels of TDS in the circulating water.

Table 2. Resultant Solid Particulate Size Distribution (TDS = 11000 ppmw)

EPRI Droplet Diameter (μm)	Droplet Volume (μm^3) [2][1]	Droplet Mass (μg) [3]	Particle Mass (Solids) (μg) [4]	Solid Particle Volume (μm^3)	Solid Particle Diameter (μm) [7]	EPRI % Mass Smaller
10	524	5.24E-04	5.76E-06	2.62	1.710	0.000
20	4189	4.19E-03	4.61E-05	20.94	3.420	0.196
30	14137	1.41E-02	1.56E-04	70.69	5.130	0.226
40	33510	3.35E-02	3.69E-04	167.55	6.840	0.514
50	65450	6.54E-02	7.20E-04	327.25	8.550	1.816
60	113097	1.13E-01	1.24E-03	565.49	10.260	5.702
70	179594	1.80E-01	1.98E-03	897.97	11.970	21.348
90	381704	3.82E-01	4.20E-03	1908.52	15.390	49.812
110	696910	6.97E-01	7.67E-03	3484.55	18.810	70.509
130	1150347	1.15E+00	1.27E-02	5751.73	22.230	82.023
150	1767146	1.77E+00	1.94E-02	8835.73	25.650	88.012
180	3053628	3.05E+00	3.36E-02	15268.14	30.780	91.032
210	4849048	4.85E+00	5.33E-02	24245.24	35.909	92.468
240	7238229	7.24E+00	7.96E-02	36191.15	41.039	94.091
270	10305995	1.03E+01	1.13E-01	51529.97	46.169	94.689
300	14137167	1.41E+01	1.56E-01	70685.83	51.299	96.288
350	22449298	2.24E+01	2.47E-01	112246.49	59.849	97.011
400	33510322	3.35E+01	3.69E-01	167551.61	68.399	98.340
450	47712938	4.77E+01	5.25E-01	238564.69	76.949	99.071
500	65449847	6.54E+01	7.20E-01	327249.23	85.499	99.071
600	113097336	1.13E+02	1.24E+00	565486.68	102.599	100.000

Figure 1: Percentage of Drift PM that Evaporates to PM10

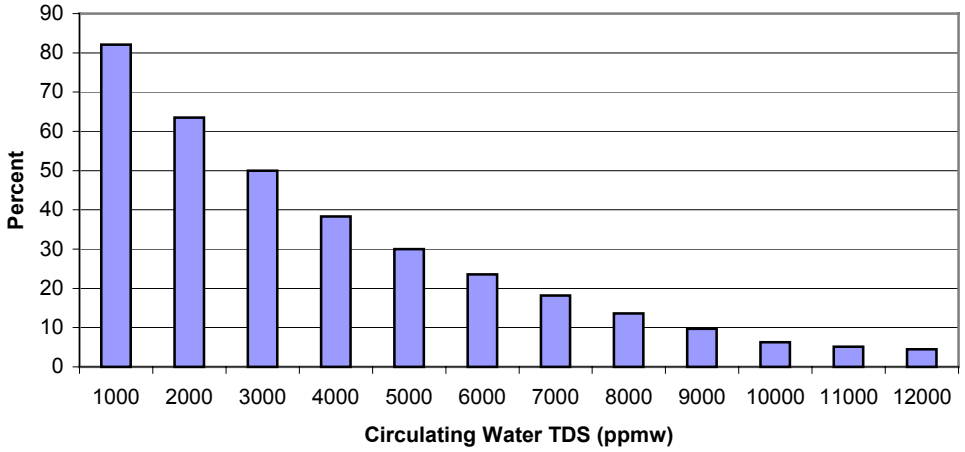
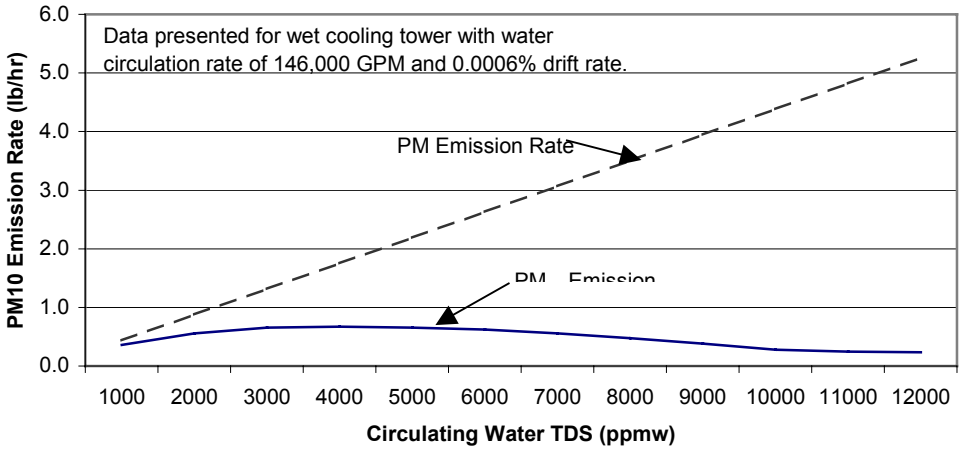


Figure 2: PM_{10} Emission Rate vs. TDS



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KEY WORDS

Drift
Drift eliminators
Cooling tower
PM_{10} emissions
TDS