EMISSION TECHNOLOGIES, INC.
ENVIRONMENTAL EQUIPMENT & SERVICES

HM Pacific Northwest
Kenmore Hot Mix Asphalt Plant

Performance Tests for Particulate Matter, Opacity, Nitrogen Oxides, Carbon Monoxide and Volatile Organic Compounds

Test Date: **August 15-16, 2023**
Report Number: **3204-23**

Prepared for:

Heidelberg Kenmore.
6431 NE 175th, St.
Kenmore, WA 98028

Prepared by:

Emission Technologies, Inc.
3642 Tree Farm Ct.
Bellingham, WA 98226

Report Certification

The emission testing for this report was carried out under my direction and supervision. In addition, I have reviewed all analysis and test results, and certify that the test and report meet EPA requirements and that, to the best of my knowledge, this test report is authentic and accurate.

Date: September 10, 2023 Signed: _____

Project Manager,

Rob Wilson

I have reviewed all analysis and test results, and certify that, to the best of my knowledge, this test report is authentic and accurate.

Date: September 10, 2023 Signed: _____

Quality Assurance,

Danny Dizon, P.E.

Reproducing portions of this test report may omit critical substantiating documentation or be taken out of context so due care must be exercised in this regard.

Test Date: August 15-16, 2023

Date Issued: September 10, 2023

Revision Log

Revision No.	Revision Date	Revised Sections	Notes	Initials

pscleanair.org
Puget Sound Clean Air Agency

Emission Test Summary

Source Name:	Kenmore Hot Mix Asphalt Plant
Test performed by:	Emission Technologies, Inc.
Emission/Process Unit:	Hot Mix Asphalt Plant
List Operational Parameters recorded during testing (e.g., Btu input, gallons loaded, steam production, % capacity, fuel feed rate, control device parameters, etc.):	See Report Section 5.0 for Operational Parameters Data During Testing
Regulation requiring test: ---------- Required frequency of test:	Puget Sound Clean Air Agency (PSCAA) ---------- Every 3 years
Proposed Test Date(s): ---------- Actual Test Date(s):	August 15, 2023 ---------- August 15 and 16, 2023

For *each emission limit*, use a separate row in the table below: Add rows as needed.

Pollutant	**Test Method(s)***	**Standard/Limit (Include units)**	**Actual Emissions (Include units)**
Total Particulate	EPA Method 5 w/PSCAA 540	0.0116 gr/dscf @ 7% O_2	0.0037 gr/dscf @ 7%O_2
Filterable Particulate	EPA Method 5	0.0029 gr/dscf @ 7% O_2	0.0019 gr/dscf @ 7% O_2
NO_x	EPA Method 1, 3A, 4 & 7E	32 ppmvd @ 7% O_2	18.1 ppmvd @ 7% O_2
CO	EPA Method 1, 3A, 4 & 10	311.0 ppmvd @ 7% O_2	161.5 ppmvd @ 7% O_2
Opacity AC Oil loading	WDOE Method 9A	20%	0 %
Opacity Outlet Stack	WDOE Method 9A	5%	0 %
VOC	EPA Method 1, 3A, 4 & 25A	0.032 lb. of VOC/TON of asphalt produced	0.0064 lb. of VOC/TON of asphalt produced

*Briefly describe *any* modification to the listed methods.

1. N/A
2.N/A

INVOLVED PARTIES

HM Pacific Northwest

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1. REPORT TEXT

1.1 Purpose

Emission Technologies, Inc. (ETI) was contracted by HM Pacific Northwest to perform air quality testing on the Kenmore Hot Mix Asphalt Plant located in Kenmore, WA. The testing protocol was developed by ETI following the respective PSCAA Notice of Construction No.11861. The testing methods used met both United States Environmental Protection Agency (EPA), Department of Ecology (DOE), and Puget Sound Clean Air Authority (PSCAA) rules, regulations, and guidelines.

1.2 Test Overview

On August 15-16, 2023, ETI provided personnel and equipment to perform the required air emission measurements. Table 1.1 outlines the emission sampling protocol that was employed.

Table 1.1 Test Protocol

Parameters	Test Method	Sample Series	Time per Run
Sample Port Location	EPA Method 1	Pre-Test Activity	Pre-Test Activity
Flows and Moisture	EPA Method 2, 3A, and 4	3 runs	60 minutes
Particulate (PM)	EPA Method 5 with PSCAA Resolution No. 540	3 runs	60 minutes
Opacity AC Oil loading, %	WDOE Method 9A	1 run	60 minutes
Opacity BH Stack exit, %	WDOE Method 9A	3 runs	60 minutes
Oxide of Nitrogen (NO_X)	EPA Method 7E	3 runs	60 minutes
Carbon Monoxide (CO)	EPA Method 10	3 runs	60 minutes
VOC	EPA Method 25A (Per NOC - NMNEVOC)	3 runs	60 minutes

The following notes were made by the project manager in the field to assist in the basic understanding of the field sampling protocol. Testing was conducted on the Asphalt plant exhaust outlet. Gas samples were extracted from three different points (16.7, 50.0, and 83.3 percent of the stack along a traverse across the diameter of the stack during stable operating conditions.) No significant variations in pollutant concentrations were observed among the points, therefore a single point in the center of the stack was utilized as per EPA 40 CFR 60 Methods 7E and 25A. Note that a standard EPA Method 5 with 202 for condensable is not utilized in the jurisdiction of PSCAA, rather a unique method is used (listed above), therefore no trip blanks etc. are performed. The option for purging the samples in the mentioned PSCAA method was not utilized as interference from SO_2 would not be expected at this source. As suggested in EPA 40 CFR 1065.365 the hydrocarbon (HC) analyzer was set to read as C1, which is divided by 3 to derive the as propane value. The mentioned methodology refers to methane, ethane, and propane as C1, C2, and C3 respectively, to avoid confusion, in respect to what the output of the analyzer is reading. All aspects of the required HC cutter EPA Protocol QA/QC was performed prior to, during and after testing.

1.3 Overview of the Sampling Methods

A brief description of each sampling method is given below. A complete method text from the Environmental Protection Agency (EPA) can be found at the following web site:
http://www.epa.gov/ttn/emc/.
Calculations are performed retaining at least five significant figures for intermediate results. The final number is rounded according to EPA "Performance Test Calculation Guidelines".

EPA Methods 3A, 7E and 10 for the Determination of O_2, NO_x and CO

The testing methodology for O_2, NO_x and CO utilizes continuously operated gas analyzers. Sample gases are extracted through a heated probe/glass fiber filter assembly. A calibration gas purge valve is fitted ahead of the filter assembly for introducing calibration gases to the analyzer system. The samples are transported through Teflon sample lines to a portable unit containing the analyzers. Each of the samples is conditioned while a constant sample extraction rate is maintained. The analyzers detect the concentration of analyte gas within the sample and produced an electrical output signal proportional to the analyte gas concentration. The electrical signal is recorded on a digital data acquisition system.

Instrument calibrations (zero and span checks) and linearity determinations are accomplished as described in EPA Method 7E, by sending EPA Protocol 1 calibration gases to a location ahead of the filter assembly. A 3-point analyzer calibration error check (±2% of calibration span) is made before the first test run and any time there was a failed system bias test or drift test. System bias and drift checks (≤5% and ≤3% of calibration span respectively) are carried out before and after each run. A NO_2-NO conversion efficiency (≥90% of certified test gas concentration) is conducted. Calibration span means the upper limit of the analyzer's calibration that is set by the choice of high-level calibration gas.

All components of the gas sampling and calibration system are constructed of Teflon, 316 stainless steel, or glass. The sample vacuum/pressure pump head are constructed of 316 stainless steel, Viton O-rings, and a Teflon coated diaphragm.

A stratification test is performed to determine the appropriate number of sample traverse points. Three points on a line passing through the stack centroidal area are used. The points are spaced at

16.7, 50.0, and 83.3 percent of the measurement line. The diluent or the pollutant concentration are evaluated to determine potential stratification of the stack gasses. If the concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±5.0 percent of the mean concentration; or ±0.5 ppm (whichever is less restrictive), the gas stream is considered unstratified and samples may be collected from a single point. If the 5.0 percent or 0.5 ppm criterion is not met, but the concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±10.0 percent of the mean; or ±1.0 ppm (whichever is less restrictive), the gas stream is considered to be minimally stratified, samples may be taken from the three points. If the gas stream is found to be stratified, because the 10.0 percent or 1.0 ppm criterion for a 3-point test is not met twelve traverse points are utilized for the test in accordance with Method 1.

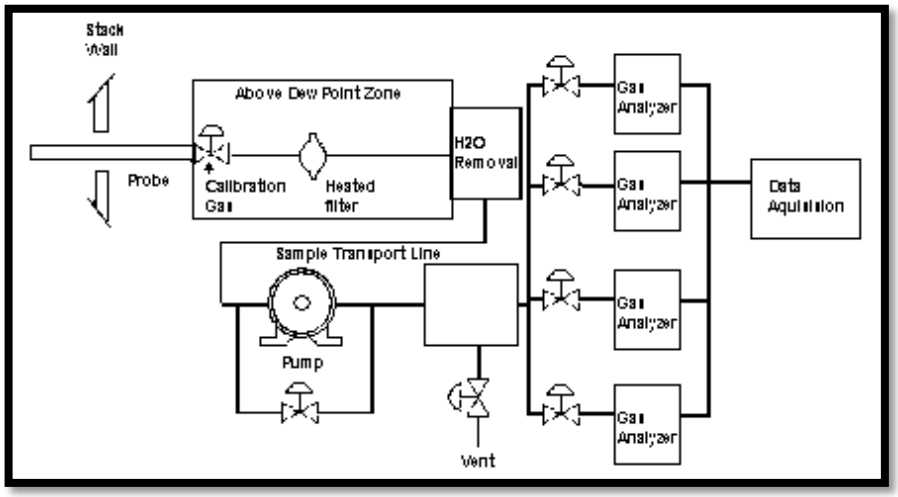


Figure 1.1 Gas Sampling Diagram

EPA Method 5 - Determination of Particulate with PSCAA Resolution 540

Particulate matter was withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature in the range of 248° ± 25° F. The particulate mass, which includes any material that condenses at or above the filtration temperature, was determined gravimetrically after removal of uncombined water. The sampling train used for these tests consisted of a heated borosilicate glass nozzle/probe assembly, a glass filter holder inside a heated filter box, glass impingers, umbilical cords, the control box and the sampling pump. Before and after each Method 5 test run, the probe and nozzle were washed. The weight of the particulate collected in the probe and nozzle wash was added to the weight collected on the filter to obtain front half particulate levels. The condensable particulate matter (CPM), back half fraction, is the material that condenses after passing through the filter and is analyzed using EPA Method 5 modified by PSCAA Board

Resolution 540. The method uses a Method 5 sampling train with the impinger contents recovered and impingers rinsed with acetone - the organic and inorganic fractions of the recovered impinger liquid are separated. The organic, inorganic and acetone wash fractions are then taken to dryness and residues weighed. The total of all back half fractions represent the condensable particulate.

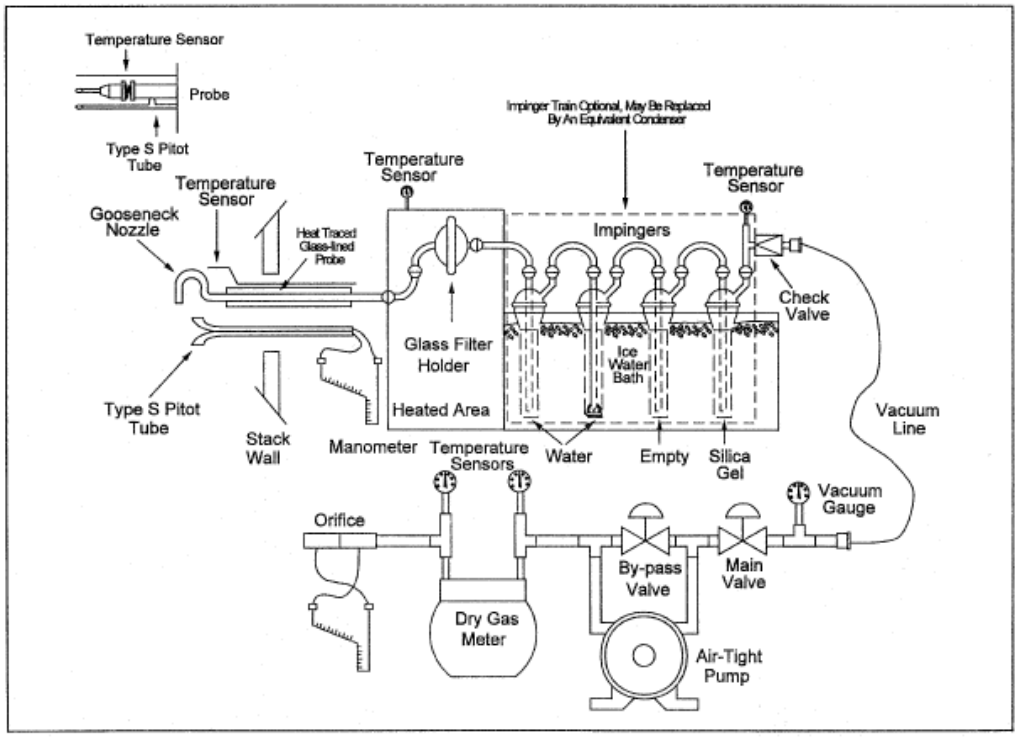


Figure 1.2 EPA Method 5 Sampling Train Diagram

WDOE Method 9A - Visual Determination of Opacity

This method is applicable for the determination of the opacity of emissions from stationary sources by a qualified observer. The method includes procedures for the training and certification of observers and procedures to be used in the field for determination of plume opacity. The opacity of emissions from stationary sources is determined at the point of greatest opacity in that portion of the plume where water vapor is not present. The observer does not look at the plume continuously, but instead observes the plume momentarily at 15-second intervals. Opacity is determined as an average of 24 consecutive observations recorded at 15-second intervals.

EPA Method 25A – Determination of Total Gaseous Organic Concentration using a FID

This method is applicable for the determination of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate organic reference gas) or in terms of carbon.

The sample probe is a stainless steel, or equivalent, three-hole rake type. Sample holes are 4 mm (0.16-in.) in diameter or smaller and located at 16.7, 50, and 83.3 percent of the equivalent stack diameter. Alternatively, a single opening probe may be used so that a gas sample is collected from the centrally located 10 percent area of the stack cross-section.

Exhaust gas is continuously withdrawn at a known sampling rate through a filter assembly and a heated Teflon sampling line to an analyzer using a flame ionization detector (FID). The analyzer detects the concentration of analyte gas from the sample stream and produces an output electrical signal proportional to analyte gas concentration. The electrical signal is recorded on a digital data acquisition system. Instrument calibrations (zero and span checks) are performed after each run. A calibration gas purge valve fitted ahead of the filter assembly will allow the introduction of calibration gases to the analyzer system.

Methane can be determined by using FID based instrument equipped with a catalytic nonmethane cutter (40 CFR 1065.265) in conjunction with EPA Method 25A to provide real-time differential measurement of total hydrocarbons, methane and by difference nonmethane hydrocarbons. A catalytic nonmethane cutter is a device consisting of catalyst in a reactor controlled by temperature to combust all non-methane hydrocarbons and leave only methane. 40 CFR 1065.265 is followed to ensure the nonmethane cutter and the FID analyzer performs to EPA specifications.

1.4 Results

Table 1.2 Performance Test Results

Parameter	Test Result Average
TOTAL PM gr/dscf @ 7% O2	0.0037 gr/dscf @ 7%O2
PM Filterable gr/dscf @ 7% O2	0.0019 gr/dscf @ 7%O2
NO_x ppmvd @ 7% O_2	18.1 ppmvd @ 7% O_2
CO ppmvd @ 7% O_2	161.5 ppmvd @ 7% O_2
Opacity AC Oil loading, %	0 %
Opacity BH Stack exit, %	0 %
VOC, lb. of VOC/ton of asphalt produced	0.0064 lb. of VOC/TON of asphalt produced

1.5 Anomalies

There were no anomalies during the test.

1.6 Process Overview

Figure 1.3 below illustrates a conceptual diagram of the testing arrangement. A manlift was used for stack sampling.

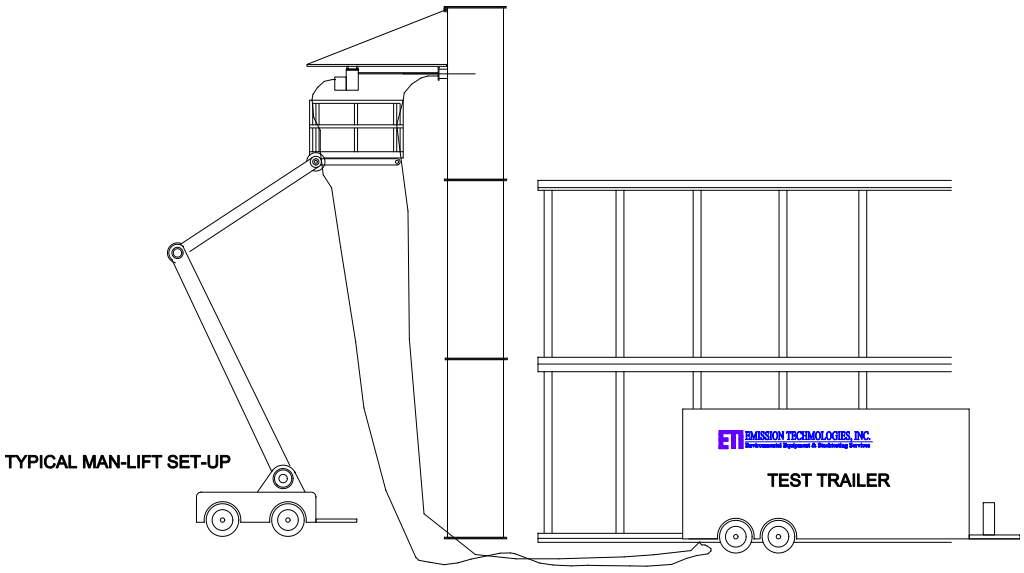


Figure 1.3 **Typical Test arrangement**

1.7 Participants

The following participants were involved for ETI with the testing program:

- Mr. Rob Wilson, Project Manager
- Mr. Robert Howell, Field Technician
- Mr. Cal Loomis, P.E. QSTI Tests 1-3
- Mr. Danny Dizon, P.E. Quality Assurance

The following participant(s) from Heidelberg Kenmore LLC, were involved with the testing program:

- Coleman Hoyt

2. SUMMARY

Table 2.1 Gas Summary

Client: HM Pacific Northwest				**Date:** 08/16/23
Site: Kenmore Hot Mix Asphalt Plant				**ETI Job No:** 3204-23
O_2	**Run Number**			**Average**
	1	**2**	**3**	
Percent	15.45	14.72	14.87	**15.02**
CO_2	**Run Number**			**11**
	1	**2**	**3**	
Percent	5.12	5.78	5.92	**5.61**
NO_X	**Run Number**			**Average**
	1	**2**	**3**	
ppmvd	7.7	7.4	7.8	**7.6**
ppmvd @ 7% O_2	19.6	16.8	18.0	**18.1**
NO_X emission limit = 32.0 ppmvd @ 7% O_2				
CO	**Run Number:**			
	1	**2**	**3**	**Average**
ppmvd	67.3	66.6	70.7	**68.2**
ppmvd @ 7% O_2	171.6	149.8	163.1	**161.5**
CO emission limit = 311 ppmvd @ 7% O2				
VOC	**Run Number:**			
As Propane	**1**	**2**	**3**	**Average**
ppmvd	10.3	10.4	9.9	**10.2**
lb/hr	1.150	1.174	1.147	**1.157**
lb/ton	0.0062	0.0066	0.0064	**0.0064**
VOC emission limit = 0.032 lb of VOC/Ton of asphalt produced				

Table 2.2 Particulate M5 Summary

Client: HM Pacific Northwest **Date:** 08/16/23

Unit: Kenmore Hot Mix Asphalt Plant **ETI Job Number:** 3204-23

Filterable Catch	**Run Number**			
	1	**2**	**3**	**Average**
P&N Acetone wash, mg	0.6	0.8	0.5	**0.63**
Acetone Blank	0.0	0.0	0.0	
Filter, mg	1.1	0.9	1.5	**1.17**
Blank Filter	0.0	0.0	0.0	
mg (Filterable)	1.7	1.7	2.0	**1.80**
Condensable Catch	**Run Number**			
	1	**2**	**3**	**Average**
Organic Fraction				
mg	0.6	1.1	0.8	**0.83**
Blank, mg	0.0	0.0	0.0	
Inorganic Fraction				
mg	0.7	0.8	0.4	**0.63**
Inorganic Blank, mg	0.4	0.4	0.4	
Acetone Wash - PSCAA				
Impinger Acetone Wash, mg	0.7	0.6	0.8	**0.70**
Acetone Blank, mg	0.0	0.0	0.0	
mg (Condensable)	1.6	2.1	1.6	**1.77**

Total Front Half	**Run Number**				
	1	**2**	**3**	**Average**	**Limit**
mg	1.7	1.7	2.0	**1.80**	
gr/dscf	0.0008	0.0007	0.0008	**0.0008**	
gr/dscf @ 7%O_2	0.0020	0.0016	0.0019	**0.0019**	**0.0029**
Total Back Half	**Run Number**				
	1	**2**	**3**	**Average**	
mg	1.6	2.1	1.6	**1.77**	
gr/dscf	0.0007	0.0009	0.0007	**0.0008**	
gr/dscf @ 7%O_2	0.0019	0.0020	0.0015	**0.0018**	
Total Particulate	**Run Number**				
	1	**2**	**3**	**Average**	
mg	3.3	3.8	3.6	**3.57**	
gr/dscf	0.0015	0.0016	0.0015	**0.0015**	
gr/dscf @ 7%O_2	0.0039	0.0037	0.0034	**0.0037**	**0.0116**

Table 2.3 Opacity Stack Exit -Summary

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

Opacity EPA 9 Run 1 - Number of Observations = 240										Opacity EPA 9 Run 2 - Number of Observations = 240										Opacity EPA 9 Run 3 - Number of Observations = 240									
1	0	0	0	0	31	0	0	0	0	1	0	0	0	0	31	0	0	0	0	1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0	2	0	0	0	0	32	0	0	0	0	2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0	3	0	0	0	0	33	0	0	0	0	3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0	4	0	0	0	0	34	0	0	0	0	4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0	5	0	0	0	0	35	0	0	0	0	5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0	6	0	0	0	0	36	0	0	0	0	6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0	7	0	0	0	0	37	0	0	0	0	7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0	8	0	0	0	0	38	0	0	0	0	8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0	9	0	0	0	0	39	0	0	0	0	9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0	10	0	0	0	0	40	0	0	0	0	10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0	11	0	0	0	0	41	0	0	0	0	11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0	12	0	0	0	0	42	0	0	0	0	12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0	13	0	0	0	0	43	0	0	0	0	13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0	14	0	0	0	0	44	0	0	0	0	14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0	15	0	0	0	0	45	0	0	0	0	15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0	16	0	0	0	0	46	0	0	0	0	16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0	17	0	0	0	0	47	0	0	0	0	17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0	18	0	0	0	0	48	0	0	0	0	18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0	19	0	0	0	0	49	0	0	0	0	19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0	20	0	0	0	0	50	0	0	0	0	20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0	21	0	0	0	0	51	0	0	0	0	21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0	22	0	0	0	0	52	0	0	0	0	22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0	23	0	0	0	0	53	0	0	0	0	23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0	24	0	0	0	0	54	0	0	0	0	24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0	25	0	0	0	0	55	0	0	0	0	25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0	26	0	0	0	0	56	0	0	0	0	26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0	27	0	0	0	0	57	0	0	0	0	27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0	28	0	0	0	0	58	0	0	0	0	28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0	29	0	0	0	0	59	0	0	0	0	29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0	30	0	0	0	0	60	0	0	0	0	30	0	0	0	0	60	0	0	0	0
Opacity Sum					**0.0%**					**Opacity Sum**					**0.0%**					**Opacity Sum**					**0.0%**				
Opacity Average					**0.0%**					**Opacity Average**					**0.0%**					**Opacity Average**					**0.0%**				
																				Opacity Average of 3 Runs					**0.0%**				

Table 2.4 Opacity AC OIL LOADING TO TANKS - Summary

Client:	HM Pacific Northwest				**AC OIL LOADING TO TANK**					**Date:**	08/15/23
Site:	Kenmore Hot Mix Asphalt Plant									**ETI Job No:**	3204-23
Opacity EPA 9											
Run 1 - Number of Observations = 240											
1	0	0	0	0	31	0	0	0	0		
2	0	0	0	0	32	0	0	0	0		
3	0	0	0	0	33	0	0	0	0		
4	0	0	0	0	34	0	0	0	0		
5	0	0	0	0	35	0	0	0	0		
6	0	0	0	0	36	0	0	0	0		
7	0	0	0	0	37	0	0	0	0		
8	0	0	0	0	38	0	0	0	0		
9	0	0	0	0	39	0	0	0	0		
10	0	0	0	0	40	0	0	0	0		
11	0	0	0	0	41	0	0	0	0		
12	0	0	0	0	42	0	0	0	0		
13	0	0	0	0	43	0	0	0	0		
14	0	0	0	0	44	0	0	0	0		
15	0	0	0	0	45	0	0	0	0		
16	0	0	0	0	46	0	0	0	0		
17	0	0	0	0	47	0	0	0	0		
18	0	0	0	0	48	0	0	0	0		
19	0	0	0	0	49	0	0	0	0		
20	0	0	0	0	50	0	0	0	0		
21	0	0	0	0	51	0	0	0	0		
22	0	0	0	0	52	0	0	0	0		
23	0	0	0	0	53	0	0	0	0		
24	0	0	0	0	54	0	0	0	0		
25	0	0	0	0	55	0	0	0	0		
26	0	0	0	0	56	0	0	0	0		
27	0	0	0	0	57	0	0	0	0		
28	0	0	0	0	58	0	0	0	0		
29	0	0	0	0	59	0	0	0	0		
30	0	0	0	0	60	0	0	0	0		
Opacity Sum					**0.0%**						
Opacity Average					**0.0%**						

3. CALIBRATION DATA

Table 3.1 Analyzer and Calibration Gas Information

Client: HM Pacific Northwest **Date:** 8/16/2023

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

Instrument Information:

Instrument	Channel	Make	Model	Serial No.
O2	1	CAI	700	1902018
CO2	2	Horiba	VIA 510	41522310053
NOx	4	CAI	700	1902018
CO	5	Teco	48I	622117815
HCs	6	CAI	600	54786-301

Calibration Information:

Instrument	Units	Zero	Span	Range	Gas Cyl. No.	Gas Flow (L/min)
O_2	%	N_2	11.99	20.90	EB0087486	4.0
O_2	%	N_2	20.90	20.90	EB0001897	4.0
CO_2	%	N_2	11.76	20.5	EB0087486	4.0
CO_2	%	N_2	20.5	20.5	EB0001897	4.0
NO_x	ppm	N_2	53.2	94.6	SX63432	4.0
NO_x	ppm	N_2	94.6	94.6	Sx63497	4.0
CO	ppm	N_2	51.4	93.4	Sx63497	4.0
CO	ppm	N_2	93.4	93.4	EB0037328	4.0
Methane	ppm	N_2	89.9	89.9	EB0086319	4.0
Methane	ppm	N_2	1112	1112	EB0024858	4.0
			Target	Actual		
Methane	ppm	N_2	30	29.9	EB0024858	4.0
Methane	ppm	N_2	50	49.84	EB0024858	4.0
Methane	ppm	N_2	85	87.00	EB0024858	4.0
Air	zero air	Air	0		CC736951	4.0
Ethane	ppm	N_2	**10**		EB0056233	

Table 3.2 O_2 Analyzer Calibration Data

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

3-Point Linearity Check (Internal Cal)	Direct Calibration Mode			
	Cylinder Value (ppmdv)	Calibration Response (ppmdv)	Difference from Cylinder Value 0.5%	Difference (% of Calibration Span) ≤2.0%
Zero Gas	0.00	0.02	0.02	0.1%
Mid-Range Gas	11.99	11.92	0.07	0.3%
High-Range Gas	20.90	20.85	0.05	0.2%

40 CFR 60 Method 3A-13.0
Analyzer calibration error ≤2.0% of calibration span or 0.5% absolute difference
System Bias must be ≤5.0% of calibration span or 0.5% absolute difference
Calibration Drift must be ≤3.0% of calibration span or 0.5% absolute difference
Calibration Span = High-Range Gas Cylinder Value
Upscale Gas = mid 11.99

System Bias and Calibration Drift Assessments	Run	Analyzer Calibration Response (ppmdv)		Direct - System Difference	Pre - Post System Response	System Bias ≤5.0%	Calibration Drift ≤3.0%
		Direct	System				
Zero Gas	**Pre**	0.02	0.02	0.00		0.0%	
Upscale Gas		11.92	11.90	0.02		0.1%	
Zero Gas	**1**	0.02	0.02	0.00	0.00	0.0%	0.0%
Upscale Gas		11.92	11.95	0.03	0.05	0.1%	0.2%
Zero Gas	**2**	0.02	0.03	0.01	0.01	0.0%	0.0%
Upscale Gas		11.92	11.98	0.06	0.03	0.3%	0.1%
Zero Gas	**3**	0.02	0.10	0.08	0.07	0.4%	0.3%
Upscale Gas		11.92	11.90	0.02	0.08	0.1%	0.4%

Table 3.3 CO_2 Analyzer Calibration Data

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

3-Point Linearity Check (Internal Cal)	Direct Calibration Mode			
	Cylinder Value (ppmdv)	Calibration Response (ppmdv)	Difference from Cylinder Value 0.5%	Difference (% of Calibration Span) ≤2.0%
Zero Gas	0.00	0.01	0.01	0.0%
Mid-Range Gas	11.76	11.70	0.06	0.3%
High-Range Gas	20.50	20.41	0.09	0.4%

40 CFR 60 Method 3A-13.0
Analyzer calibration error ≤2.0% of calibration span or 0.5% absolute difference
System Bias must be ≤5.0% of calibration span or 0.5% absolute difference
Calibration Drift must be ≤3.0% of calibration span or 0.5% absolute difference
Calibration Span = High-Range Gas Cylinder Value
Upscale Gas = Mid 11.76

System Bias and Calibration Drift Assessments	Run	Analyzer Calibration Response (ppmdv)		Direct - System Difference	Pre - Post System Response	System Bias ≤5.0%	Calibration Drift ≤3.0%
		Direct	System				
Zero Gas	**Pre**	0.01	0.02	0.01		0.0%	
Upscale Gas		11.70	11.80	0.10		0.5%	
Zero Gas	**1**	0.01	0.01	0.00	0.01	0.0%	0.0%
Upscale Gas		11.70	11.84	0.14	0.04	0.7%	0.2%
Zero Gas	**2**	0.01	0.05	0.04	0.04	0.2%	0.2%
Upscale Gas		11.70	11.85	0.15	0.01	0.7%	0.0%
Zero Gas	**3**	0.01	0.02	0.01	0.03	0.0%	0.1%
Upscale Gas		11.70	11.80	0.10	0.05	0.5%	0.2%

Table 3.4 NO_x Analyzer Calibration Data

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

3-Point Linearity Check (Internal Cal)	Direct Calibration Mode			
	Cylinder Value (ppmdv)	Calibration Response (ppmdv)	Difference from Cylinder Value	Difference (% of Calibration Span)
Zero Gas	0.0	0.1	0.1	0.1%
Mid-Range Gas	53.2	53.0	0.2	0.2%
High-Range Gas	94.6	95.0	0.4	0.4%

40 CFR 60 Method 7E-13.0
Analyzer calibration error ≤2.0% of calibration span or 0.5 ppmv absolute difference
System Bias must be ≤5.0% of calibration span or 0.5 ppmv absolute difference
Calibration Drift must be ≤3.0% of calibration span or 0.5 ppmv absolute difference
Calibration Span = High-Range Gas Cylinder Value
Upscale Gas = Mid 53.2

System Bias and Calibration Drift Assessments	Run	Analyzer Calibration Response (ppmdv)		Direct - System Difference	Pre - Post System Response	System Bias	Calibration Drift
		Direct	System				
Zero Gas	**Pre**	0.1	0.2	0.1		0.1%	
Upscale Gas		53.0	52.5	0.5		0.5%	
Zero Gas	**1**	0.1	0.1	0.0	0.1	0.0%	0.1%
Upscale Gas		53.0	52.0	1.0	0.5	1.1%	0.5%
Zero Gas	**2**	0.1	0.1	0.0	0.0	0.0%	0.0%
Upscale Gas		53.0	52.8	0.2	0.8	0.2%	0.8%
Zero Gas	**3**	0.1	0.2	0.1	0.1	0.1%	0.1%
Upscale Gas		53.0	53.0	0.0	0.2	0.0%	0.2%

Table 3.5 CO Analyzer Calibration Data

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

3-Point Linearity Check (Internal Cal)	Direct Calibration Mode			
	Cylinder Value (ppmdv)	Calibration Response (ppmdv)	Difference from Cylinder Value	Difference (% of Calibration Span)
Zero Gas	0.0	0.5	0.5	0.5%
Mid Range Gas	51.4	51.2	0.2	0.2%
High-Range Gas	93.4	93.0	0.4	0.4%

40 CFR 60 Method 7E-13.0
Analyzer calibration error ≤2.0% of calibration span or 0.5 ppmv absolute difference
System Bias must be ≤5.0% of calibration span or 0.5 ppmv absolute difference
Calibration Drift must be ≤3.0% of calibration span or 0.5 ppmv absolute difference
Calibration Span = High-Range Gas Cylinder Value
Upscale Gas = Mid 51.4

System Bias and Calibration Drift Assessments	93.4	Analyzer Calibration Response (ppmdv)		Direct - System Difference	Pre - Post System Response	System Bias	Calibration Drift
		Direct	System				
Zero Gas	**Pre**	0.5	0.3	0.2		0.2%	
Upscale Gas		51.2	51.8	0.6		0.6%	
Zero Gas	**1**	0.5	0.5	0.0	0.2	0.0%	0.2%
Upscale Gas		51.2	51.8	0.6	0.0	0.6%	0.0%
Zero Gas	**2**	0.5	0.4	0.1	0.1	0.1%	0.1%
Upscale Gas		51.2	51.4	0.2	0.4	0.2%	0.4%
Zero Gas	**3**	0.5	0.2	0.3	0.2	0.3%	0.2%
Upscale Gas		51.2	51.0	0.2	0.4	0.2%	0.4%

Table 3.6 HC Analyzer Calibration Data

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

3-Point Linearity Check (Internal Cal)	Direct Calibration Mode			
	Cylinder Value (ppmdv)	Calibration Response (ppmdv)	Difference from Cylinder Value	Difference (% of Calibration Span)
Zero Gas	0.0	0.1	0.1	0.1%
Low-Range Gas	29.9	29.0	0.9	1.0%
Mid-Range Gas	49.8	50.0	0.2	0.2%
High-Range Gas	87.0	88.0	1.0	1.1%

40 CFR 60 Method 7E-13.0
Analyzer calibration error ≤2.0% of calibration span or 0.5 ppmv absolute difference
System Bias must be ≤5.0% of calibration span or 0.5 ppmv absolute difference
Calibration Drift must be ≤3.0% of calibration span or 0.5 ppmv absolute difference
Calibration Span = 100 ppm
Upscale Gas = Mid 49.84

System Bias and Calibration Drift Assessments	Run	Analyzer Calibration Response (ppmdv)		Direct - System Difference	Pre - Post System Response	System Bias	Calibration Drift
		Direct	System				
Zero Gas	**Pre**	0.1	0.3	0.2		0.2%	
Upscale Gas		50.0	49.0	1.0		1.0%	
Zero Gas	**1**	0.1	0.2	0.1	0.1	0.1%	0.1%
Upscale Gas		50.0	50.0	0.0	1.0	0.0%	1.1%
Zero Gas	**2**	0.1	0.2	0.1	0.0	0.1%	0.0%
Upscale Gas		50.0	50.5	0.5	0.5	0.5%	0.6%
Zero Gas	**3**	0.1	-0.1	0.2	0.3	0.2%	0.3%
Upscale Gas		50.0	49.0	1.0	1.5	1.0%	1.7%

4. ETI FIELD TEST DATA

Table 4.1 Field Data – Gases Run 1

Client: HM Pacific Northwest ETI RUN 1 **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

	Source:	Outlet	Outlet	Outlet	Outlet		Outlet	
	Component:	O_2	CO_2	NO_x	CO	THC	THC	THC
	Units:	%	%	ppmdv	ppmdv	Raw	as Methane	as Propane
Raw Emission Data:								
	Measurement Time	O_2	CO_2	NO_x	CO	VOC	VOC	VOC
Start Time	7:15	15.6	4.9	8.0	58.6	35.7	20.7	15.0
	7:16	15.6	4.9	8.0	58.3	35.9	20.1	15.8
	7:17	15.6	4.9	7.9	60.0	38.0	19.3	21.6
	7:18	15.6	4.9	8.0	59.2	36.9	18.6	19.6
	7:19	15.6	4.9	8.1	58.3	35.0	18.9	19.1
	7:20	15.6	4.9	8.0	57.1	35.7	18.1	28.0
	7:21	15.5	5.0	7.9	59.9	35.7	17.4	28.4
	7:22	15.4	5.1	8.0	59.5	36.0	18.4	24.0
	7:23	15.4	5.1	8.0	59.7	36.0	19.2	27.4
	7:24	15.4	5.1	7.9	61.0	35.1	19.0	27.1
	7:25	15.4	5.1	7.9	60.6	34.8	17.7	25.2
	7:26	15.4	5.1	8.0	59.3	33.5	17.3	28.3
	7:27	15.4	5.1	8.1	56.9	33.6	14.6	28.5
	7:28	15.4	5.1	8.1	57.0	33.5	12.3	27.6
	7:29	15.4	5.1	8.0	56.9	33.9	10.9	20.9
	7:30	15.4	5.1	8.1	57.6	36.5	11.2	22.3
	7:31	15.4	5.1	8.1	60.8	35.0	8.6	22.3
	7:32	15.3	5.2	8.0	60.5	36.5	7.7	23.1
	7:33	15.3	5.2	8.0	60.5	36.7	9.4	26.1
	7:34	15.3	5.2	7.9	61.8	36.4	8.3	29.1
	7:35	15.3	5.2	7.9	61.3	35.5	5.6	27.0
	7:36	15.3	5.2	7.9	60.3	35.0	14.8	27.9
	7:37	15.3	5.2	7.9	59.8	37.0	17.7	24.8
	7:38	15.2	5.3	7.9	60.2	35.9	15.4	20.1
	7:39	15.2	5.3	7.9	59.0	33.8	13.2	21.4
	7:40	15.2	5.3	7.9	60.2	34.7	15.2	15.6
	7:41	15.2	5.3	7.9	60.7	34.4	14.5	16.8
	7:42	15.2	5.3	7.9	60.5	34.5	16.6	18.0
	7:43	15.2	5.3	7.9	59.7	35.5	18.3	19.4
	7:44	15.2	5.3	7.9	60.4	35.3	13.7	21.6
	7:45	15.2	5.3	8.0	60.9	35.4	15.8	21.9
	7:46	15.2	5.3	8.0	59.7	32.4	13.3	25.4
	7:47	15.4	5.1	7.5	68.1	45.3	17.3	22.2
	7:48	15.5	5.0	7.3	83.3	50.9	22.5	22.0
	7:49	15.5	5.0	7.3	83.9	49.6	25.6	24.0
	7:50	15.5	5.0	7.3	83.8	49.7	22.3	27.4
	7:51	15.6	4.9	7.4	84.5	48.9	21.8	27.1
	7:52	15.5	5.0	7.3	81.9	49.9	24.7	25.2
	7:53	15.5	5.0	7.3	87.2	54.5	26.2	28.3
	7:54	15.5	5.0	7.3	89.6	54.0	25.5	28.5
	7:55	15.5	5.0	7.5	87.8	49.4	21.8	27.6
	7:56	15.5	5.0	7.8	71.9	43.3	22.4	20.9
	7:57	15.5	5.0	7.6	68.0	44.4	22.1	22.3
	7:58	15.4	5.1	7.5	69.9	46.1	23.8	22.3
	7:59	15.4	5.1	7.5	71.0	45.1	22.0	23.1
	8:00	15.4	5.1	7.5	70.9	47.8	21.7	26.1
	8:01	15.4	5.1	7.5	75.8	48.4	19.3	29.1
	8:02	15.5	5.0	7.5	79.4	51.9	24.9	27.0
	8:03	15.5	5.0	7.5	88.3	54.2	26.3	27.9
	8:04	15.3	5.2	7.7	87.3	48.5	23.7	24.8
	8:05	15.1	5.4	8.2	79.0	39.3	19.2	20.1
	8:06	15.0	5.5	8.3	72.4	36.7	15.3	21.4
	8:07	15.0	5.5	8.4	68.6	34.0	18.4	15.6
	8:08	15.1	5.4	8.4	65.8	36.1	19.3	16.8
	8:09	15.1	5.4	8.4	70.0	39.7	21.7	18.0
	8:10	15.3	5.2	7.9	71.0	41.6	22.2	19.4
	8:11	15.3	5.2	7.9	71.2	43.6	22.0	21.6
	8:12	15.3	5.2	7.9	72.9	45.6	23.7	21.9
	8:13	15.2	5.3	7.9	74.3	46.5	21.1	25.4
End Time	8:14	15.2	5.3	7.9	75.7	44.7	22.5	22.2
	Raw Avg:	**15.3617**	**5.14**	**7.8**	**67.7**	**40.3**	**18.4**	**23.3**
Bias Corrected Emissions:								
	Average:	**15.45**	**5.12**	**7.7**	**67.3**			

NMHC as C_1 Wet, (calculated per 40 CFR 1065.660, ppmvw) =	**23.40**
NMHC as C_1 Dry (ppmwv / 1-B_{ws} = ppmvd) =	**30.99**
VOC as Propane (NMHC as C_1 / 3) =	**10.33**

Table 4.2 Field Data – Gases Run 2

Client: HM Pacific Northwest ETI RUN 2 **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

	Source:	Outlet	Outlet	Outlet	Outlet		Outlet	
	Component:	O_2	CO_2	NO_x	CO	THC	THC	THC
	Units:	%	%	ppmdv	ppmdv	Raw	as Methane	as Propane
Raw Emission Data:								
	Measurement Time	O_2	CO_2	NO_x	CO	VOC	VOC	VOC
Start Time	10:15	14.8	5.7	7.5	73.1	36.5	21.4	15.1
	10:16	14.8	5.7	7.5	76.6	36.7	20.4	16.3
	10:17	14.8	5.7	7.5	79.1	38.8	22.1	16.7
	10:18	14.7	5.8	7.5	81.5	37.7	24.3	13.4
	10:19	14.6	5.9	8.0	79.5	35.8	21.7	14.1
	10:20	14.5	6.0	7.8	78.0	36.5	18.3	18.2
	10:21	14.4	6.1	8.1	73.9	36.5	16.3	20.2
	10:22	14.4	6.1	7.9	70.2	36.8	11.6	25.2
	10:23	14.4	6.1	8.0	69.9	36.8	12.5	24.3
	10:24	14.4	6.1	8.1	69.6	35.9	15.3	20.6
	10:25	14.3	6.2	8.0	69.7	35.6	18.3	17.3
	10:26	14.3	6.2	7.9	72.0	34.3	15.2	19.1
	10:27	14.3	6.2	7.9	69.5	34.4	13.2	21.2
	10:28	14.3	6.2	7.9	71.4	34.3	13.6	20.7
	10:29	14.4	6.1	8.7	71.9	34.7	12.8	21.9
	10:30	14.4	6.1	8.2	70.6	37.3	15.6	21.7
	10:31	14.4	6.1	8.1	69.2	35.8	14.3	21.5
	10:32	14.4	6.1	8.2	67.7	37.3	16.1	21.2
	10:33	14.2	6.3	8.5	70.8	37.5	15.2	22.3
	10:34	14.2	6.3	8.0	70.4	37.2	12.2	25.0
	10:35	14.5	6.0	7.5	69.3	36.3	11.0	25.3
	10:36	14.5	6.0	7.5	68.7	35.8	10.6	25.2
	10:37	14.4	6.1	8.0	75.2	37.8	11.4	26.4
	10:38	14.3	6.2	8.1	77.2	36.7	14.2	22.5
	10:39	14.3	6.2	8.4	81.6	34.6	13.9	20.7
	10:40	14.4	6.1	8.2	78.5	35.5	12.2	23.3
	10:41	14.5	6.0	7.7	73.4	35.2	12.4	22.8
	10:42	14.5	6.0	7.6	73.7	35.3	12.0	23.3
	10:43	14.6	5.9	8.0	76.2	36.3	11.4	24.9
	10:44	14.5	6.0	7.7	71.9	36.1	11.1	25.0
	10:45	14.5	6.0	7.7	68.7	36.2	9.8	26.4
	10:46	14.5	6.0	7.8	69.3	33.2	8.3	24.9
	10:47	14.5	6.0	7.8	66.4	46.1	14.2	31.9
	10:48	14.5	6.0	7.8	64.9	51.7	22.6	29.1
	10:49	14.6	5.9	7.7	65.4	50.4	26.7	23.7
	10:50	14.6	5.9	7.6	67.7	50.5	25.3	25.2
	10:51	14.5	6.0	7.8	67.5	49.7	24.9	24.8
	10:52	14.8	5.7	7.3	64.7	50.7	25.8	24.9
	10:53	15.0	5.5	7.0	58.5	55.3	26.2	29.1
	10:54	15.1	5.4	7.0	57.9	54.8	24.7	30.1
	10:55	15.1	5.4	7.0	54.4	50.2	23.1	27.1
	10:56	15.1	5.4	6.9	53.1	44.1	21.6	22.5
	10:57	15.2	5.3	6.9	55.8	45.2	19.4	25.8
	10:58	15.1	5.4	6.9	57.3	46.9	18.6	28.3
	10:59	15.1	5.4	6.9	56.2	45.9	18.3	27.6
	11:00	15.0	5.5	7.0	57.5	48.6	19.7	28.9
	11:01	15.0	5.5	7.0	59.2	49.2	18.5	30.7
	11:02	15.0	5.5	7.0	60.4	52.7	22.0	30.7
	11:03	15.0	5.5	6.8	60.7	55.0	22.3	32.7
	11:04	15.1	5.4	7.0	59.1	49.3	22.9	26.4
	11:05	15.1	5.4	7.0	61.4	40.1	25.7	14.4
	11:06	15.0	5.5	7.0	59.0	37.5	17.5	20.0
	11:07	15.0	5.5	7.0	59.9	34.8	16.3	18.5
	11:08	15.1	5.4	7.0	58.7	36.9	17.1	19.8
	11:09	15.0	5.5	7.0	57.5	40.5	18.3	22.2
	11:10	15.0	5.5	7.0	59.2	42.4	19.3	23.1
	11:11	15.0	5.5	7.0	60.4	44.4	17.2	27.2
	11:12	15.0	5.5	6.8	60.7	46.4	17.8	28.6
	11:13	15.1	5.4	7.0	59.1	47.3	16.5	30.8
End Time	11:14	15.1	5.4	7.0	61.4	45.5	19.4	26.1
	Raw Avg:	**14.69**	**5.81**	**7.5**	**67.0**	**41.1**	**17.5**	**23.6**
Bias Corrected Emissions:								
	Average:	**14.72**	**5.78**	**7.4**	**66.6**			
		NMHC as C_1 Wet, (calculated per 40 CFR 1065.660, ppmvw) =				**23.73**		
		NMHC as C_1 Dry (ppmwv / 1-B_{WS} = ppmvd) =				**31.22**		
		VOC as Propane (NMHC as C_1 / 3) =				**10.41**		

Table 4.3 Field Data – Gases Run 3

Client: HM Pacific Northwest ETI RUN 3 **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

	Source:	Outlet	Outlet		Outlet	Outlet		Outlet	
	Component:	O_2	CO_2		NO_x	CO	THC	THC	THC
	Units:	%	%		ppmdv	ppmdv	Raw	as Methane	as Propane
Raw Emission Data:									
	Measurement Time	O_2	CO_2		NO_x	CO	VOC	VOC	VOC
Start Time	12:16	14.5	6.1		8.1	73.9	36.4	16.3	20.1
	12:17	14.4	6.1		7.9	70.2	35.9	19.3	16.6
	12:18	14.4	6.1		8.0	69.9	37.9	22.0	15.9
	12:19	14.4	6.1		8.1	69.6	36.8	22.5	14.3
	12:20	14.5	6.2		8.0	69.7	34.7	22.0	12.7
	12:21	14.4	6.2		7.9	72.0	35.6	24.7	10.9
	12:22	14.6	6.2		7.9	69.5	35.3	18.3	17.0
	12:23	14.8	6.2		7.9	71.4	35.4	14.3	21.1
	12:24	14.9	6.1		8.7	71.9	36.4	16.9	19.5
	12:25	14.9	6.1		8.2	70.6	36.2	19.2	17.0
	12:26	14.9	6.1		8.1	69.2	36.3	22.9	13.4
	12:27	14.9	6.1		8.2	67.7	33.3	23.7	9.6
	12:28	14.9	6.2		8.4	81.6	46.2	22.2	24.0
	12:29	14.9	6.1		8.2	78.5	51.8	22.8	29.0
	12:30	14.9	6.0		7.7	73.4	50.5	23.7	26.8
	12:31	14.9	6.0		7.6	73.7	50.6	23.9	26.7
	12:32	14.9	5.9		8.0	76.2	49.8	22.0	27.8
	12:33	14.9	6.0		7.7	71.9	50.8	22.2	28.6
	12:34	14.9	6.0		7.7	68.7	55.4	22.5	32.9
	12:35	14.9	6.0		7.8	69.3	50.5	22.9	27.6
	12:36	14.8	6.0		7.8	66.4	50.6	24.8	25.8
	12:37	14.8	6.0		7.8	64.9	49.8	21.4	28.4
	12:38	14.8	5.9		7.7	65.4	50.8	20.2	30.6
	12:39	14.8	5.9		7.6	67.7	55.4	18.4	37.0
	12:40	14.8	6.0		7.8	67.5	54.9	19.9	35.0
	12:41	14.8	5.7		7.3	64.7	50.3	21.4	28.9
	12:42	14.8	5.5		7.0	58.5	44.2	18.6	25.6
	12:43	14.8	5.5		8.3	72.4	45.3	17.4	27.9
	12:44	14.8	5.5		8.4	68.6	47.0	12.6	34.4
	12:45	14.8	5.4		8.4	65.8	37.0	14.7	22.3
	12:46	14.8	6.0		7.7	68.7	42.9	18.5	24.4
	12:47	14.8	6.0		7.8	69.3	42.9	22.0	20.9
	12:48	14.9	6.0		7.8	66.4	42.9	22.7	20.2
	12:49	14.8	6.2		8.4	81.6	37.4	21.3	16.1
	12:50	14.8	6.1		8.2	78.5	35.9	21.8	14.1
	12:51	14.8	6.0		7.7	73.4	37.4	19.3	18.1
	12:52	14.8	6.0		7.6	73.7	37.6	18.4	19.2
	12:53	14.9	5.9		8.0	76.2	37.3	17.3	20.0
	12:54	14.9	6.0		7.7	71.9	36.4	15.8	20.6
	12:55	14.9	6.0		7.7	68.7	35.9	18.4	17.5
	12:56	14.8	6.0		7.8	69.3	37.9	19.4	18.5
	12:57	14.8	6.0		7.8	66.4	36.8	14.6	22.2
	12:58	14.8	6.3		8.5	70.8	34.7	15.1	19.6
	12:59	14.8	6.3		8.0	70.4	35.6	14.9	20.7
	13:00	14.8	6.0		7.5	69.3	35.3	18.6	16.7
	13:01	14.8	5.5		8.3	72.4	35.4	19.3	16.1
	13:02	14.8	5.5		8.4	68.6	36.4	25.0	11.4
	13:03	14.8	5.4		8.4	65.8	36.2	23.6	12.6
	13:04	14.7	5.4		8.4	70.0	36.3	14.7	21.6
	13:05	14.7	5.2		7.9	71.0	33.3	11.4	21.9
	13:06	14.8	5.2		7.9	71.2	46.2	16.3	29.9
	13:07	14.8	6.3		8.5	70.8	51.8	18.2	33.6
	13:08	14.8	6.3		8.0	70.4	50.5	21.9	28.6
	13:09	14.8	6.0		7.5	69.3	50.6	21.4	29.2
	13:10	14.8	6.0		7.5	68.7	45.3	19.5	25.8
	13:11	14.9	6.1		8.0	75.2	47.0	19.1	27.9
	13:12	14.9	6.2		8.1	77.2	46.0	19.9	26.1
	13:13	15.0	6.2		8.4	81.6	48.7	22.4	26.3
	13:14	15.0	6.1		8.2	78.5	49.3	24.6	24.7
End Time:	13:15	15.0	6.0		7.7	73.4	52.8	17.3	35.5
	Raw Avg:	**14.80**	**5.96**	-	**8.0**	**71.0**	**42.6**	**19.8**	**22.8**
Bias Corrected Emissions:									
	Average:	**14.87**	**5.92**	-	**7.8**	**70.7**			
		NMHC as C_1 Wet, (calculated per 40 CFR 1065.660, ppmvw) =					**22.90**		
		NMHC as C_1 Dry (ppmwv / 1-B_{WS} = ppmvd) =					**29.80**		
		VOC as Propane ppmvd (NMHC as C_1 ppmvd/ 3) =					**9.93**		

Table 4.4 Field Data – Particulate Run 1

Location: Heidelberg Kenmore Hot Mix Asphalt | **Start Time:** 7:15 AM | **RUN No.** Run 1
Date: 08/16/23 | **End Time:** 8:32 AM | **JOB No.** 3204-23

Standard Temperature	68 °F	Standard Pressure	29.92 in Hg	IMPINGERS		FINAL WT
STACK DATA		**EQUIPMENT**	**ESTIMATES**	902.3	764.9	137.4
% Moisture:	20.00 % est.	METER BOX: HFL	Est. Tm: 85 °F	711.7	645.2	66.5
Barometric:	29.57 in Hg	Y: 0.995	Est. Ts: 300 °F	672.7	656.9	15.8
Static Press:	-0.30 in H_2O	ΔH@: 1.75 in H_2O	Est. dP: 1.2 in H_2O	862.9	854.8	8.1
Stack Press:	29.55 in Hg	PITOT: ETI Gr-21-1	Est. Dn: 0.229 inches	Post	Pre	FINAL WT
%CO2:	5.00 %	Cp: 0.84	**LEAK CHECKS**			**FINAL CATCH**
%O2:	15.00 %	NOZZLE: ETI SS B-1-03	Post Pitot Leak Check	good 4.5"	in.H2O	Liquid Vol. (ml)
%N2/CO:	80.00 %	Dn: 0.236 in				227.8
Md:	29.40 lb/lb-mole	Stack Area:	Post Leak Rate	0.005	cfm	Note: (Stack ID, Static)
Ms:	27.12 lb/lb-mole	# of Points: 24 points	Vacuum	15.000	in. Hg	

Sample Point	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot ΔP (in. H_2O)	Gas Temperatures (°F) DGM Inlet	Outlet	Stack	Orifice Press. ΔH (in H_2O) Ideal	Actual	Pump Vac. (in Hg)	Gas Temps (°F) Probe	Filter	K FACTOR = 1.605 Imp. Exit	% ISO	Vs (fps)
12	0.00	2.50	199.602	0.540	71.0	71.0	238	0.921	0.980	2	249	250	62	94.9	49.25
11	2.50	5.00	200.900	0.550	71.0	71.0	240	0.936	0.980	2	250	250	60	101.5	49.78
10	5.00	7.50	202.300	0.450	72.0	71.0	238	0.769	0.800	2	250	251	58	106.4	44.96
9	7.50	10.00	203.630	0.550	72.0	71.0	238	0.939	1.000	2	249	250	56	97.0	49.70
8	10.00	12.50	204.970	0.600	72.0	71.0	238	1.025	1.000	2	250	251	56	103.9	51.91
7	12.50	15.00	206.470	0.500	75.0	72.0	238	0.857	0.900	2	250	238	58	100.5	47.39
6	15.00	17.50	207.800	0.530	76.0	73.0	238	0.911	0.900	2	250	245	58	95.3	48.79
5	17.50	20.00	209.100	0.540	76.0	73.0	238	0.928	0.900	2	250	250	59	101.6	49.25
4	20.00	22.50	210.500	0.550	78.0	73.0	238	0.947	0.900	2	250	251	60	107.7	49.70
3	22.50	25.00	212.000	0.480	78.0	73.0	239	0.825	0.900	2	251	250	60	100.0	46.47
2	25.00	27.50	213.300	0.500	78.0	74.0	238	0.861	0.900	2	251	250	59	97.8	47.39
1	27.50	30.00	214.600	0.490	79.0	74.0	238	0.845	0.900	2	250	250	58	106.3	46.92
12	30.00	32.50	216.000	0.550	79.0	74.0	238	0.948	0.900	2	251	250	64	107.5	49.70
11	32.50	35.00	217.500	0.540	80.0	77.0	232	0.943	1.000	2	250	261	55	93.3	49.04
10	35.00	37.50	218.800	0.520	80.0	77.0	235	0.904	0.900	2	250	255	51	102.6	48.23
9	37.50	40.00	220.200	0.520	81.0	78.0	240	0.899	0.900	2	251	253	52	102.8	48.40
8	40.00	42.50	221.600	0.520	81.0	78.0	242	0.897	0.900	2	251	253	52	102.9	48.47
7	42.50	45.00	223.000	0.570	83.0	78.0	246	0.979	1.000	2	250	252	50	105.5	50.89
6	45.00	47.50	224.500	0.540	83.0	78.0	246	0.927	1.000	2	249	251	57	108.3	49.53
5	47.50	50.00	226.000	0.520	83.0	78.0	246	0.893	0.900	2	250	250	55	103.0	48.61
4	50.00	52.50	227.400	0.540	84.0	79.0	246	0.929	0.990	2	250	250	58	100.9	49.53
3	52.50	55.00	228.800	0.620	84.0	80.0	247	1.066	1.100	2	250	251	59	100.9	53.11
2	55.00	57.50	230.300	0.610	86.0	82.0	247	1.100	1.100	2	250	249	59	94.6	52.68
1	57.50	60.00	231.700	0.620	86.0	80.0	247	1.068	1.100	2	251	250	60	107.5	53.11
		Final DGM:	233.300												

RESULTS		Vm	ΔP (H_2O)	Tm	Ts	Max	ΔH (H_2O)	Technician
Run Time		0.954 m^3	18.644 mm	25.0 °C	115.8 °C	Vac.	24.183 mm	RW, BH
60.00	min	33.698 ft^3	0.734 in	77.0 °F	240.5 °F	2	0.952 in	

Table 4.5 Field Data – Particulate Run 2

Location: Heidelberg Kenmore Hot Mix Asphalt | **Start Time:** 10:15 AM | **RUN No.** Run 2
Date: 08/16/23 | **End Time:** 11:32 AM | **JOB No.** 3204-23

Standard Temperature	68 °F	Standard Pressure	29.92 in Hg	IMPINGERS		FINAL WT
STACK DATA		**EQUIPMENT**	**ESTIMATES**	872.7	733.9	138.8
% Moisture:	20.00 % est.	METER BOX: HFL	Est. Tm: 85 °F	832.3	758.2	74.1
Barometric:	29.60 in Hg	Y: 0.995	Est. Ts: 300 °F	679.8	666.1	13.7
Static Press:	-0.30 in H_2O	ΔH@: 1.75 in H_2O	Est. dP: 1.2 in H_2O	829.2	815.4	13.8
Stack Press:	29.58 in Hg	PITOT: ETI Gr-21-2	Est. Dn: 0.229 inches	Post	Pre	FINAL WT
%CO2:	5.00 %	Cp: 0.84	**LEAK CHECKS**			**FINAL CATCH**
%O2:	15.00 %	NOZZLE: ETI SS B-1-15	Post Pitot Leak Check	good 4.5"	in.H2O	Liquid Vol. (ml)
%N2/CO:	80.00 %	Dn: 0.246 in				240.4
Md:	29.40 lb/lb-mole	Stack Area: ft^2	Post Leak Rate	0.003	cfm	Note: (Stack ID, Static)
Ms:	27.12 lb/lb-mole	# of Points: 24 points	Vacuum	15.000	in. Hg	

Sample Point	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot ΔP (in. H_2O)	Gas Temperatures (°F) DGM Inlet	Outlet	Stack	Orifice Press. ΔH (in H_2O) Ideal	Actual	Pump Vac. (in Hg)	Gas Temps (°F) Probe	Filter	Imp. Exit	% ISO	Vs (fps)
														K FACTOR =	1.895
1	0.00	2.50	233.771	0.620	84.0	84.0	230	1.293	1.300	2	251	255	65	100.6	52.44
2	2.50	5.00	235.420	0.740	84.0	84.0	230	1.543	1.600	2	249	271	61	97.2	57.29
3	5.00	7.50	237.160	0.660	84.0	84.0	239	1.359	1.400	2	249	266	59	109.5	54.46
4	7.50	10.00	239.000	0.600	85.0	85.0	240	1.236	1.300	2	250	259	57	99.8	51.96
5	10.00	12.50	240.600	0.600	86.0	84.0	241	1.234	1.300	2	250	254	58	99.8	52.00
6	12.50	15.00	242.200	0.500	87.0	84.0	240	1.032	1.100	2	250	253	58	102.3	47.44
7	15.00	17.50	243.700	0.510	87.0	84.0	240	1.052	1.100	2	250	253	58	104.7	47.91
8	17.50	20.00	245.250	0.530	89.0	85.0	242	1.093	1.100	2	250	253	59	109.2	48.91
9	20.00	22.50	246.900	0.550	89.0	85.0	245	1.129	1.180	2	251	252	59	97.6	49.93
10	22.50	25.00	248.400	0.500	89.0	85.0	245	1.027	1.000	2	250	254	60	97.6	47.60
11	25.00	27.50	249.830	0.540	90.0	85.0	250	1.102	1.150	2	251	252	55	100.1	49.65
12	27.50	30.00	251.350	0.540	91.0	86.0	252	1.101	1.200	2	250	250	50	108.6	49.72
1	30.00	32.50	253.000	0.500	88.0	87.0	238	1.038	1.100	2	250	240	52	97.0	47.37
2	32.50	35.00	254.430	0.480	89.0	87.0	244	0.989	1.000	2	251	250	48	96.6	46.61
3	35.00	37.50	255.820	0.450	90.0	87.0	243	0.930	0.980	2	250	251	46	102.1	45.10
4	37.50	40.00	257.245	0.480	90.0	87.0	238	0.999	1.000	2	250	248	46	98.8	46.41
5	40.00	42.50	258.675	0.680	91.0	88.0	268	1.358	1.400	2	249	247	45	98.7	56.41
6	42.50	45.00	260.340	0.680	92.0	88.0	264	1.367	1.400	2	248	250	46	101.5	56.26
7	45.00	47.50	262.060	0.530	93.0	88.0	265	1.065	1.100	2	250	250	45	100.9	49.70
8	47.50	50.00	263.570	0.520	94.0	89.0	261	1.053	1.100	2	251	252	46	96.0	49.09
9	50.00	52.50	265.000	0.540	95.0	89.0	259	1.097	1.150	2	251	254	47	98.6	49.96
10	52.50	55.00	266.500	0.480	94.0	89.0	258	0.976	1.000	2	250	253	49	104.6	47.07
11	55.00	57.50	268.000	0.500	95.0	89.0	256	1.020	1.100	2	250	251	49	102.3	47.97
12	57.50	60.00	269.500	0.600	96.0	90.0	254	1.230	1.300	2	250	250	49	94.1	52.48
		Final DGM:	271.017												

RESULTS		Vm	ΔP (H_2O)	Tm	Ts	Max	ΔH (H_2O)	Technician
Run Time		1.055 m^3	18.889 mm	31.1 °C	119.8 °C	Vac.	30.014 mm	RW, BH
60.00	min	37.246 ft^3	0.744 in	88.0 °F	247.6 °F	2	1.182 in	

Table 4.6 Field Da ta – Particulate Run 3

Location:	Kenmore Hot Mix Asphalt		**Start Time:**	12:16 PM	**RUN No.**	Run 3			
Date:	08/16/23		**End Time:**	1:32 PM	**JOB No.**	3196-23			

Standard Temperature	68	°F	Standard Pressure	29.92	in Hg	**IMPINGERS**		**FINAL WT**
STACK DATA			**EQUIPMENT**			**ESTIMATES**	852.2	712.4	139.8
% Moisture:	20.00	% est.	**METER BOX:**	HFL		Est. Tm: 85 °F	855.3	784.2	71.1
Barometric:	29.63	in Hg	**Y:**	0.995		Est. Ts: 300 °F	738.4	721.6	16.8
Static Press:	-0.30	in H_2O	**ΔH@:**	1.75	in H_2O	Est. dP: 1.2 in H_2O	823.1	812.4	10.7
Stack Press:	29.61	in Hg	**PITOT:**	ETI Gr-21-1		Est. Dn: 0.229 inches	Post	Pre	FINAL WT
%CO2:	5.00	%	**Cp:**	0.84		**LEAK CHECKS**			**FINAL CATCH**
%O2:	15.00	%	**NOZZLE:**	ETI SS B-1-10		Post Pitot Leak Check	good 4.5"	in.H2O	**Liquid Vol. (ml)**
%N2/CO:	80.00	%	**Dn:**	0.246	in				238.4
Md:	29.40	lb/lb-mole	**Stack Area:**	9.62	ft^2	Post Leak Rate	0.003	cfm	**Note: (Stack ID, Static)**
Ms:	27.12	lb/lb-mole	**# of Points:**	24	points	Vacuum	15.000	in. Hg	

Sample Point	Sample Time (minutes) Begin	End	Dry Gas Meter Reading (ft^3)	Pitot ΔP (in. H_2O)	Gas Temperatures (°F) DGM Inlet	Outlet	Stack	Orifice Press. ΔH (in H_2O) Ideal	Actual	Pump Vac. (in Hg)	Gas Temps (°F) Probe	Filter	Imp. Exit	% ISO	K FACTOR = 1.895 Vs (fps)
1	0.00	2.50	283.992	0.750	106.0	105.0	246	1.588	1.700	2	250	250	60	108.6	58.31
2	2.50	5.00	286.000	0.720	107.0	105.0	247	1.524	1.600	2	250	250	59	104.7	57.18
3	5.00	7.50	287.899	0.670	108.0	106.0	248	1.419	1.500	2	250	250	59	102.3	55.19
4	7.50	10.00	289.690	0.630	109.0	107.0	249	1.335	1.400	2	250	250	58	109.4	53.56
5	10.00	12.50	291.550	0.590	111.0	107.0	250	1.251	1.300	2	250	250	58	103.2	51.87
6	12.50	15.00	293.250	0.520	111.0	108.0	250	1.104	1.200	2	250	250	58	100.1	48.69
7	15.00	17.50	294.800	0.520	112.0	108.0	251	1.103	1.200	2	250	250	57	109.7	48.73
8	17.50	20.00	296.500	0.520	113.0	109.0	253	1.102	1.200	2	250	250	55	109.7	48.80
9	20.00	22.50	298.200	0.540	114.0	110.0	255	1.143	1.200	2	250	250	54	101.3	49.80
10	22.50	25.00	299.800	0.520	114.0	111.0	256	1.101	1.100	2	250	250	54	100.6	48.90
11	25.00	27.50	301.360	0.530	115.0	111.0	256	1.123	1.200	2	250	250	57	104.7	49.37
12	27.50	30.00	303.000	0.540	115.0	112.0	254	1.148	1.100	2	250	250	57	94.6	49.76
1	30.00	32.50	304.500	0.600	112.0	111.0	257	1.265	1.300	2	250	250	59	102.4	52.56
2	32.50	35.00	306.200	0.610	111.0	110.0	257	1.284	1.300	2	250	250	60	99.9	53.00
3	35.00	37.50	307.870	0.600	110.0	110.0	259	1.259	1.300	2	250	250	62	98.5	52.64
4	37.50	40.00	309.500	0.600	110.0	110.0	259	1.259	1.300	2	250	250	61	102.8	52.64
5	40.00	42.50	311.200	0.620	110.0	110.0	259	1.300	1.400	2	250	250	59	107.1	53.51
6	42.50	45.00	313.000	0.600	110.0	109.0	259	1.258	1.300	2	250	250	57	108.9	52.64
7	45.00	47.50	314.800	0.580	109.0	109.0	258	1.216	1.300	2	250	250	55	104.6	51.72
8	47.50	50.00	316.500	0.560	109.0	109.0	257	1.176	1.200	2	250	250	55	93.9	50.78
9	50.00	52.50	318.000	0.540	110.0	109.0	257	1.135	1.200	2	250	250	55	95.5	49.87
10	52.50	55.00	319.500	0.520	109.0	108.0	258	1.090	1.200	2	250	250	54	97.6	48.97
11	55.00	57.50	321.000	0.500	110.0	108.0	258	1.049	1.100	2	250	250	57	106.0	48.02
12	57.50	60.00	322.600	0.500	110.0	108.0	257	1.050	1.100	2	250	250	59	102.9	47.98
	Final DGM:		324.154		5.0										

RESULTS		Vm	ΔP (H_2O)	Tm	Ts	Max	ΔH (H_2O)	Technician
Run Time		1.137 m^3	19.287 mm	43.2 °C	123.7 °C	Vac.	32.491 mm	RW, BH
60.00	min	40.162 ft^3	0.759 in	109.7 °F	254.6 °F	2	1.279 in	

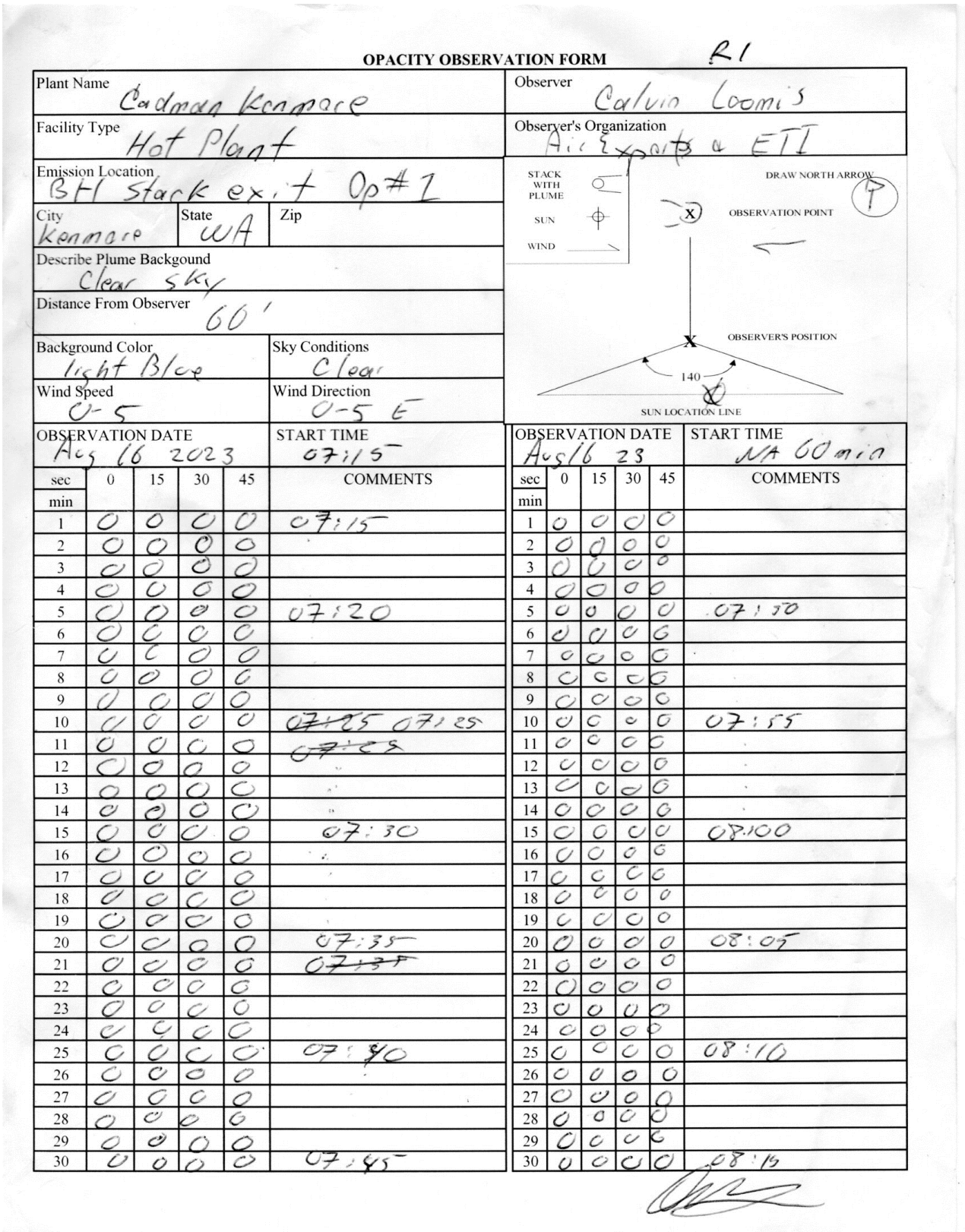
Table 4.7 Field Data – Particulate M5 Summary

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

		Run Number		
		1	2	3
Field Data:		**8/16/2023**	**8/16/2023**	**8/16/2023**
	Start Time	7:15	10:15	12:16
	End Time	8:32	11:32	13:32
q	Sample Time, minutes	60.0	60.0	60.0
	Stack Shape (Circle or Rectangle):		Circle	
V_m	Volume of dry gas sampled, cf	33.698	37.246	40.232
Y	Meter box calibration factor	0.995	0.995	0.995
P_{bar}	Barometric pressure, inches Hg	30.00	30.00	30.00
P_{static}	Stack static pressure, inches H_2O	-0.30	-0.30	-0.30
DH	Differential meter press, inches H_2O	0.952	1.182	1.279
T_m	Meter temperature, degrees F	77.0	88.0	109.7
V_{lc}	Volume of H_2O collected, ml	227.8	240.4	238.4
$\%O_2$	Percent of oxygen in stack gas	15.45	14.72	14.87
$\%CO_2$	Percent carbon dioxide in stack gas	5.12	5.78	5.92
C_p	Type-S pitot tube coefficient	0.84	0.84	0.84
$\sqrt{\Delta P_{avg}}$	Ave. square root of pitot readings, (inches H_2O)	0.734	0.744	0.759
T_s	Stack temperature, degrees F	240.5	247.6	254.6
D_s	Stack diameter, feet - CIRCLE		3.500	
L_s, W_s	Stack dimensions, feet - RECTANGLE			
D_n	Nozzle diameter, inches	0.236	0.246	0.246
A_n	Nozzle area, ft^2	0.000304	0.000330	0.000330
Calculated Values:				
$V_{m(std)}$	Meter corrected volume,dscf)	33.133	35.906	37.317
$V_{w(std)}$	Volume of water vapor,dscf	10.741	11.335	11.241
B_{ws}	Fraction of H_2O vapor	0.2448	0.2399	0.2315
$\%N_2$	Percent nitrogen in stack gas	79.43	79.49	79.20
M_d	Dry molecular weight of stack gas, lb/lb-mole	29.44	29.51	29.54
M_w	Wet molecular weight of stack gas, lb/lb-mole	26.64	26.75	26.87
A_d	Cross sectional area of stack, ft^2	9.62	9.62	9.62
P_s	Absolute stack gas pressure, inches Hg	29.98	29.98	29.98
V_s	Average stack gas velocity, ft/sec	49.37	50.19	51.34
Q_{std}	Wet stack volumetric flowrate, scfm	21,522	21,660	21,939
Q_{std}	Average stack volumetric flowrate, dscfm	16,253	16,463	16,861
I	Percent Isokinetic Sampling, %	107.7	106.0	107.6

Table 4.8 Field Data Opacity Run 1



OPACITY OBSERVATION FORM R1

Plant Name: Cadman Kenmore	Observer: Calvin Loomis
Facility Type: Hot Plant	Observer's Organization: Air Experts & ETI
Emission Location: BTI Stack ex. + Op#1	
City: Kenmore / State: WA / Zip:	
Describe Plume Backgound: Clear sky	
Distance From Observer: 60'	
Background Color: light Blue	Sky Conditions: Clear
Wind Speed: 0-5	Wind Direction: 0-5 E

STACK WITH PLUME · SUN · WIND · DRAW NORTH ARROW · OBSERVATION POINT · OBSERVER'S POSITION · 140 · SUN LOCATION LINE

OBSERVATION DATE: Aug 16 2023	START TIME: 07:15

sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	07:15
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	07:20
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	~~07:25~~ 07:25
11	0	0	0	0	~~07:25~~
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	07:30
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	07:35
21	0	0	0	0	~~07:35~~
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	07:40
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	07:45

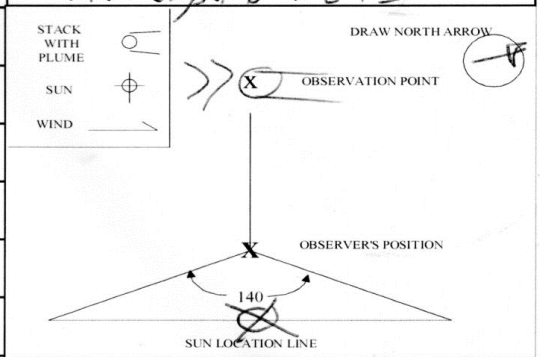
OBSERVATION DATE: Aug 16 23	START TIME: NA 60 min

sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	07:50
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	07:55
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	08:00
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	08:05
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	08:10
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	08:15

Table 4.9 Field Data Opacity Run 2

OPACITY OBSERVATION FORM R2

Plant Name: Cadman Kenmore	Observer: Calvin Loomis
Facility Type: Hot Plant	Observer's Organization: Air Experts & ETI
Emission Location: BH stack exit OP#2	
City: Kenmore / State: WA / Zip:	
Describe Plume Backgound: Sky	
Distance From Observer: ~60'	
Background Color: Blue	Sky Conditions: Clear
Wind Speed: 0-5	Wind Direction: 0-5 E



OBSERVATION DATE: Aug 16 2023	START TIME: 10:15 - 11:15

sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	10:15
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	10:25
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	10:35
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	10:45

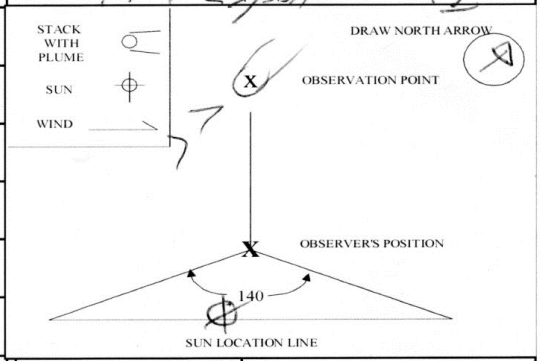
OBSERVATION DATE: Aug 16 '23	START TIME: NA

sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	10:50
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	11:00
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	11:10
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	11:15

Table 4.10 Field Data Opacity Run 3

OPACITY OBSERVATION FORM R3

Plant Name: Cadman Kenmore	Observer: Calvin Loomis
Facility Type: Hot Plant	Observer's Organization: Air Experts & ETI
Emission Location: BH stack exit OP# 3	
City: Kenmore / State: WA / Zip:	
Describe Plume Backgound: Sky	
Distance From Observer: ~60'	
Background Color: Blue	Sky Conditions: Clear
Wind Speed: 4 ~ 5	Wind Direction: S



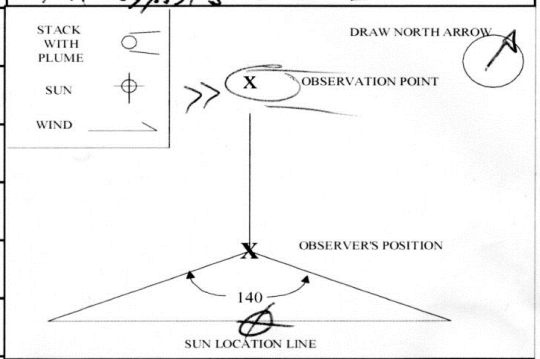
OBSERVATION DATE: Aug 16 23	START TIME: 12:15				
sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	12:20
6	0	0	0	0	12:20
7	0	0	0	0	*
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	12:30
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	12:35
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	12:40
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	12:45

OBSERVATION DATE: Aug 16 23	START TIME: NA				
sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	12:50
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	12:55
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	13:00
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	13:05
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	13:10
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	13:15

Table 4.11 Field Data Opacity AC RUN

OPACITY OBSERVATION FORM Oil

Plant Name: Cadman Kenmore	Observer: Colin Lewis
Facility Type: Hot Plant	Observer's Organization: Air Experts & ETI
Emission Location: AC Oil loading to tanks	
City: Kenmore ~~Lynnwood~~ State: WA Zip:	
Describe Plume Backgound: Green Trees	
Distance From Observer: ~40'	
Background Color: Green	Sky Conditions: Clear
Wind Speed: 0-5	Wind Direction: W



OBSERVATION DATE: Aug 15/2023 START TIME: 15:40 – 16:42

sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	Start 15:40
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	1st tank
28	0	0	0	0	Stop loading Line Flush
29	0	0	0	0	
30					

OBSERVATION DATE: START TIME:

sec / min	0	15	30	45	COMMENTS
1	0	0	0	0	Start 2nd tank
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0		
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	0
29	0	0	0	0	
30	0	0	0	0	1442 End Tank 2 Flush

41 0 0 0 0

5. OPERATING PARAMETERS

Kenmore Emissions Test August 16, 2023

Section 4 Data:

Parameter		Notes	Run 1	Run 2	Run 3
Standard cubic feet of fuel combusted (CCF)		Hand Recorded for Each Test Run	338 CCF	336 CCF	333 CCF
Meter Read	Start		6983 CCF	7397 CCF	7782 CCF
		Time Start	07:15	10:15	12:16
	Finish		7321 CCF	7733 CCF	8115 CCF
		Time End	08:32	11:32	13:32
Aggregate moisture percentage (%)			Sample taken at: 07:00	Sample taken at: 10:00	Sample taken at: 12:30
	5/8" x 3/8"	Detailed information attached	2.3%	2.2%	1.7%
	3/8" #4		2.8%	3.9%	4.0%
	#4 x 0		3.8%	3.5%	4.2%
	Sand		4.0%	4.3%	4.0%
Asphalt cement content percentage		From QC Report	5.39%	4.96%	4.95%
Baghouse Pressure Drop (inches of water column)		Hand Recorded for Each Test Run	2.0wc	2.1wc	2.1wc
Baghouse Fan Speed (%)		Hand Recorded for Each Test Run	55%	58%	56%
Baghouse Pulse Cycle (seconds)		This feature is automatic in the process	15 s - Cannot be independently controlled.		
Flue Damper Setting as Percent of Total Opening		Hand Recorded for Each Test Run	Cannot be independently controlled. The flue damper is tied to the Baghouse Fan Speed		
Product specification produced during the run, a copy of the specification, and maximum temp allowed by specification		Please see the detailed sheets provided by QC for the specification – Max mixing temperature of PG58-22 is 400 F.	½" HMA	½" HMA	½" HMA
			Sample taken at: 08:31	Sample taken at: 11:11	Sample taken at: 13:05
Plant Throughput (tph)			185 tph	178tph	180tph

6. QUALITY ASSURANCE/QUALITY CONTROL

Emission Technologies, Inc. continued success is an example of their pride taken in quality testing.

Analytical procedures and environmental measurement data are structured with a quality assurance program which equals or exceeds the minimum QA/QC requirements set forth by the U.S. Environmental Protection Agency (EPA) for each applicable method.

ETI executes the following topics through every test project to ensure valid measurement data:

* Preventable Maintenance
* Pre-test and Post-test Calibration
* Blanks and Spiked Samples
* Field System Checks
* QA/QC Matrix Tables
* Employment of QA/QC Officer

The following table is an activity matrix for Method 8 from the EPA Quality Assurance Handbook for Air Pollution Measurement Systems. By diligently following such activity matrix tables, Emission Technologies, Inc. reports justifiable, valid measurement data.

TABLE 1.1 ACTIVITY MATRIX FOR PROCUREMENT OF APPARATUS & SUPPLIES

APPARATUS	ACCEPTANCE LIMITS	FREQUENCY AND METHOD OF MEASUREMENT	ACTION IF REQUIREMENTS ARE NOT MET
Sampling			
Sampling probe with heating system	Capable of 100° C (212° F) exit air at flow rate of 20 L/min	Visually check; run heating system checkout	Repair, return to supplier, or reject
Probe nozzle	Stainless steel (316); sharp, tapered, leading edge (angle ≤30°); difference between measured ID's ≤0.1 mm (0.004 in.); no nicks, dents, or corrosion. uniquely identified (Meth. 5, Sec. 3.4.2)	Visually check before each test; use a micrometer to measure ID before field use after each repair	Reshape and sharpen, return to the supplier, or reject
Pitot tube	Type-S (Meth. 2, Sec. 3.1.2); attached to probe with impact (high pressure) opening plane even with or above nozzle entry plane	Calibrate according to Meth. 2, Sec. 3.1.2	Repair or return to supplier

TABLE 1.1 (CONTINUED)

APPARATUS	ACCEPTANCE LIMITS	FREQUENCY AND METHOD OF MEASUREMENT	ACTION IF REQUIREMENTS ARE NOT MET
Differential pressure gauge (manometer)	Criteria in Meth. 2, Sec. 3.1.2; agree within 5% of gauge-oil manometer used to calibrate	Check against gauge-oil manometer at a minimum of three points: [0.64(0.025), 12.7(0.5), 25.4(1.0)] mm (in.) H_20	As above
Vacuum gauge	0-760 mm Hg range; $\pm$25 mm (1 in.) Hg accuracy at 380 mm (15 in.) Hg	Check against a mercury U-tube manometer upon receipt	Adjust or return to supplier
Vacuum pump	Capable of maintaining a flow rate of 0.03-0.05 m^3/ min (1-1.7 ft^3/ min) for pump inlet vacuum of 380 mm (15 in.) Hg with pump out-let at 760 mm (29.92 in.) Hg; leak free at 380 mm (15 in.) Hg	Check upon receipt for leaks and capacity	Repair or return to supplier
Orifice meter	ΔH @ of 46.74 $\pm$6.35 mm (1.84 $\pm$0.25 in.) (recommended)	Visually check upon receipt for damage; calibrate against wet test meter	Repair, if possible. otherwise, return to supplier
Impingers	Standard stock glass; pressure drop across impingers not excessive	Visually check upon receipt, check pressure drop (Method 8, Sec. 3.7.1)	Return to supplier
Filter holder	Leak free (Method 8, Sec. 3.7.1)	Visually check before use	As above
Filters	Glass fiber without organic binder designed to remove 99.95% ($\leq$0.05% penetration) of 0.3-μm dioctyl phthalate smoke particles	Manufacture's guarantee that filters meet ASTM standard method D2986-71. observe under light for defects	Return to supplier and replace

TABLE 1.1 (CONTINUED)

APPARATUS	ACCEPTANCE LIMITS	FREQUENCY AND METHOD OF MEASUREMENT	ACTION IF REQUIREMENTS ARE NOT MET
Hydrogen peroxide	30% H_2O_2 reagent grade or certified ACS	Upon receipt, check label for grade or certification	Replace or return to supplier
Potassium iodide	KI reagent grade or certified ACS	As above	As above
Thorin indicator	1-(o-arsonophenylazo)-2-naphthol-3,6 disulfonic acid disodium salt, reagent grade or certified ACS	Upon receipt, check label for grade or certification	As above
Barium perchlorate trihydrate solution	$Ba(ClO_4)_2$ -$3H_20$, - reagent grade or certified ACS	As above	As above
Sulfuric acid solution	H_2SO_4, 0.0100N $\pm$ 0.0002N	Certified by manufacturer, or standardize against 0.0100N NaOH previously standardized against potassium acid phthalate (primary standard grade)	As above
NO_x Chemiluminescence Analyzer	NO_x to NO conversion efficiency $\geq$ 90%	Before each field test; Introduce a concentration of 40-60 ppm NO_2 to the analyzer in direct cal mode. Calculate converter efficiency: $\text{Eff}_{NO_2} = \frac{C_{Dir}}{C_V} \times 100$	Repair

6.1 Laboratory Scale Values – Per PSCAA Res. 540 with Blanks

Client	HM Pacific Northwest	ETI FORM N‹	LabSht.015-2000
Project No.	3204-23	TECHNICIAI	RW
Site	HOT MIX ASPHALT PLANT	TEST DATE	16-Aug-23

CLIENT/RUN	Sample ID	(TARE) PRE TEST DATA					USE	(FINAL) POST TEST DATA					USE	VARIANCE
		Date	Time	Temp	Humidity	WEIGHT (mg)	TARE WT.	Date	Time	Temp	Humidity	WEIGHT (mg)	FINAL WT	GAIN
Heidelberg Kenmore Hot Mix Asphalt Plant Run 1	A3-3204 Filter	8/3/2023	7:21	72	16 / 16	0.3374	0.3365	8/18/2023	4:38	71	16 / 16	0.3388	0.3376	0.0011
		8/3/2023	17:13	71	16 / 16	0.3368		8/18/2023	10:58	70	16 / 17	0.3380		
		8/4/2023	9:45	72	16 / 16	0.3361		8/18/2023	17:52	72	16 / 16	0.3376		
		8/4/2023	17:18	71	16 / 16	0.3365								
Heidelberg Kenmore Hot Mix Asphalt Plant Run 2	A8-3204 Filter	8/3/2023	7:21	72	16 / 16	0.3358	0.3340	8/18/2023	4:38	71	16 / 16	0.3353	0.3349	0.0009
		8/3/2023	17:13	71	16 / 16	0.3350		8/18/2023	10:58	70	16 / 17	0.3349		
		8/4/2023	9:45	72	16 / 16	0.3343								
		8/4/2023	17:18	71	16 / 16	0.3340								
Heidelberg Kenmore Hot Mix Asphalt Plant Run 3	A6-3204 Filter	8/3/2023	7:21	72	16 / 16	0.3356	0.3339	8/18/2023	4:38	71	16 / 16	0.3363	0.3354	0.0015
		8/3/2023	17:13	71	16 / 16	0.3350		8/18/2023	10:58	70	16 / 17	0.3356		
		8/4/2023	9:45	72	16 / 16	0.3342		8/18/2023	17:52	72	16 / 16	0.3354		
		8/4/2023	17:18	71	16 / 16	0.3339								
Heidelberg Kenmore Hot Mix Asphalt Plant Field Blank	A7-3204 Filter	8/3/2023	7:21	72	16 / 16	0.3334	0.3332	8/18/2023	4:38	71	16 / 16	0.3340	0.3332	0.0 (ND)
		8/3/2023	17:13	71	16 / 16	0.3332		8/18/2023	10:58	70	16 / 17	0.3333		
								8/18/2023	17:52	72	16 / 16	0.3332		
Heidelberg Kenmore Hot Mix Asphalt Plant R-1	P1-3204 Probe & Nozzel	8/18/2023	4:50	72	17 / 17	110.2268	110.2263	8/22/2023	13:55	71	16 / 16	110.2274	110.2269	0.0006
		8/18/2023	11:13	70	17 / 17	110.2263		8/22/2023	20:35	72	16 / 16	110.2269		
		8/18/2023	17:56	72	16 / 16	110.2263								
Heidelberg Kenmore Hot Mix Asphalt Plant R-2	P2-3204 Probe & Nozzel	8/18/2023	4:50	72	17 / 17	103.9355	103.9351	8/22/2023	13:56	71	16 / 16	103.9363	103.9359	0.0008
		8/18/2023	11:13	70	17 / 17	103.9351		8/22/2023	20:36	72	16 / 16	103.9359		
Heidelberg Kenmore Hot Mix Asphalt Plant R-3	P3-3204 Probe & Nozzel	8/18/2023	4:50	72	17 / 17	102.8154	102.8153	8/22/2023	13:56	71	16 / 16	102.8162	102.8158	0.0005
		8/18/2023	11:13	70	17 / 17	102.8153		8/22/2023	20:36	72	16 / 16	102.8158		
Heidelberg Kenmore Hot Mix Asphalt Plant R-1	Acetone Wash-PSCAA 504	8/18/2023	4:55	72	17 / 17	75.1612	75.1610	8/22/2023	13:59	71	16 / 16	75.1618	75.1617	0.0007
		8/18/2023	11:18	70	17 / 17	75.1610		8/22/2023	20:45	72	16 / 16	75.1617		
Heidelberg Kenmore Hot Mix Asphalt Plant R-2	Acetone Wash-PSCAA 504	8/18/2023	4:55	72	17 / 17	72.4643	72.4642	8/22/2023	13:59	71	16 / 16	72.4651	72.4648	0.0006
		8/18/2023	11:18	70	17 / 17	72.4642		8/22/2023	20:45	72	16 / 16	72.4648		
Heidelberg Kenmore Hot Mix Asphalt Plant R-3	Acetone Wash-PSCAA 504	8/18/2023	4:55	72	17 / 17	68.3544	68.354	8/22/2023	13:59	71	16 / 16	68.3549	68.3548	0.0008
		8/18/2023	11:18	70	17 / 17	68.3540		8/22/2023	20:45	72	16 / 16	68.3548		

Client	HM Pacific Northwest	ETI FORM No.	LabSht.015-2000
Project No.	3204-23	TECHNICIAN	RW
Site	HOT MIX ASPHALT PLANT	TEST DATE	16-Aug-23

CLIENT/RUN	Sample ID	(TARE) PRE TEST DATA					USE	(FINAL) POST TEST DATA					USE	VARIANCE
		Date	Time	Temp	Humidity	WEIGHT (mg)	TARE WT.	Date	Time	Temp	Humidity	WEIGHT (mg)	FINAL WT	GAIN
Heidelberg Kenmore Hot Mix Asphalt Plant Run 1	C1-3204 Inorganic	8/18/2023	4:46	72	17 / 17	65.5321	65.5315	8/25/2023	12:35	71	16 / 16	65.5329	65.5322	0.0007
		8/18/2023	11:10	70	17 / 17	65.5315		8/25/2023	19:55	72	16 / 16	65.5323		
		8/18/2023	17:56	72	16 / 16	65.5312		8/26/2023	5:10	70	16 / 17	65.5322		
Heidelberg Kenmore Hot Mix Asphalt Plant Run 2	C2-3204 Inorganic	8/18/2023	4:46	72	17 / 17	64.0012	64.0013	8/25/2023	12:35	71	16 / 16	64.0025	64.0021	0.0008
		8/18/2023	11:10	70	17 / 17	64.0018		8/25/2023	19:55	72	16 / 16	64.0021		
		8/19/2023	17:56	72	16 / 16	64.0013								
Heidelberg Kenmore Hot Mix Asphalt Plant Run 3	C3-3204 Inorganic	8/18/2023	4:46	72	17 / 17	76.6071	76.6070	8/25/2023	12:35	71	16 / 16	76.6078	76.6074	0.0004
		8/18/2023	11:10	70	17 / 17	76.6070		8/25/2023	19:55	72	16 / 16	76.6074		
Heidelberg Kenmore Hot Mix Asphalt Plant R-1	C4-3204 Organic	8/18/2023	4:42	72	17 / 17	73.0111	73.0105	8/25/2023	12:40	71	16 / 16	73.0114	73.0111	0.0006
		8/18/2023	11:05	70	17 / 17	73.0105		8/25/2023	19:59	72	16 / 16	73.0111		
		8/18/2023	18:01	72	16 / 16	73.0105								
Heidelberg Kenmore Hot Mix Asphalt Plant R-2	C5-3204 Organic	8/18/2023	4:42	72	17 / 17	76.7011	76.7001	8/25/2023	12:40	71	16 / 16	76.7016	76.7012	0.0011
		8/18/2023	11:05	70	17 / 17	76.7003		8/25/2023	19:59	72	16 / 16	76.7012		
		8/18/2023	18:01	72	16 / 16	76.7001								
Heidelberg Kenmore Hot Mix Asphalt Plant R-3	C6-3204 Organic	8/18/2023	4:42	72	17 / 17	65.4964	65.9962	8/25/2023	12:40	71	16 / 16	65.9962	65.9970	0.0008
		8/18/2023	11:05	70	17 / 17	65.9962		8/25/2023	19:59	72	16 / 16	65.9969		
								8/26/2023	5:10	70	16 / 17	65.9970		
Heidelberg Kenmore Hot Mix Asphalt Plant Acetone Blank	A1-3204	8/18/2023	4:42	72	99	63.0582	63.0580	8/25/2023	12:43	71	16 / 16	63.0583	63.0581	0.0001
		8/18/2023	11:05	70	86	63.0580		8/25/2023	20:03	72	16 / 16	63.0581		
Heidelberg Kenmore Hot Mix Asphalt Plant Dioclormethane Blank	A2-3204	8/18/2023	4:46	72	99	63.4121	63.4122	8/25/2023	12:43	71	16 / 16	63.4125	63.4127	0.0005
		8/18/2023	11:10	70	86	63.4122		8/25/2023	20:03	72	16 / 16	63.4127		
Heidelberg Kenmore Hot Mix Asphalt Plant Water Blank	A5-3204	8/18/2023	4:46	72	99	59.0021	59.0019	8/25/2023	12:43	71	16 / 16	59.0022	59.0019	0.0 (ND)
		8/18/2023	11:10	70	86	59.0019		8/25/2023	20:03	72	16 / 16	59.0019		

6.2 Laboratory Data

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job Number:** 3204-23

PARTICULATE LABORATORY DATA:

Front Half	**Run Number:**		
	1	**2**	**3**
Filter Wt.			
Final weight, g:	0.3376	0.3349	0.3354
Tare weight, g:	0.3365	0.3340	0.3339
	0.0011	0.0009	0.0015
Blank, weight, g	0.0000	0.0000	0.0000
Weight gain, g:	0.0011	0.0009	0.0015
Probe and nozzle			
Final weight, g:	110.2269	103.9359	102.8158
Tare weight, g:	110.2263	103.9351	102.8153
	0.0006	0.0008	0.0005
Blank, Acetone wash, g:	0.0000	0.0000	0.0000
Weight gain, g:	0.0006	0.0008	0.0005
TOTAL FRONT HALF PARTICULA	**0.0017**	**0.0017**	**0.0020**

Back Half	**Run Number:**		
	1	**2**	**3**
Organic:			
Final weight, g:	73.0111	76.7012	65.9970
Tare weight, g:	73.0105	76.7001	65.9962
	0.0006	0.0011	0.0008
Organic Blank, g. :	0.0000	0.0000	0.0000
Weight gain, g:	0.0006	0.0011	0.0008
Inorganic:			
Final weight, g:	65.5322	64.0021	76.6074
Tare weight, g:	65.5315	64.0013	76.6070
	0.0007	0.0008	0.0004
Inorganic impinger Wash, g. :	0.0004	0.0004	0.0004
Weight gain, g:	0.0003	0.0004	0.0000
PSCAA Acetone Wash	0.0007	0.0006	0.0008
Acetone blank	0.0000	0.0000	0.0000
TOTAL BACK HALF PARTICULAT	**0.0016**	**0.0021**	**0.0016**
TOTAL PARTICULATE, g:	**0.0033**	**0.0038**	**0.0036**

6.3 Sample Site Stratification Check

Client: HM Pacific Northwest **Statification Check Gas** **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

Traverse Point	% of Diameter Distance		O_2 or CO_2 Conc. (%)	O_2 or CO_2 Conc. % diff. of mean			NO_x Conc. ppmdv	NO_x Conc. % diff. of mean		TIME
1	0.0		15.6	0.0%			8.0	0.0%		
2	0.0		15.6	0.0%			8.0	0.0%		
3	0.0		15.6	0.0%			8.0	0.0%		
		Mean:	15.60			Mean:	8.0			

Stack Depth (inches): 42
# of Traverse Pts. 3

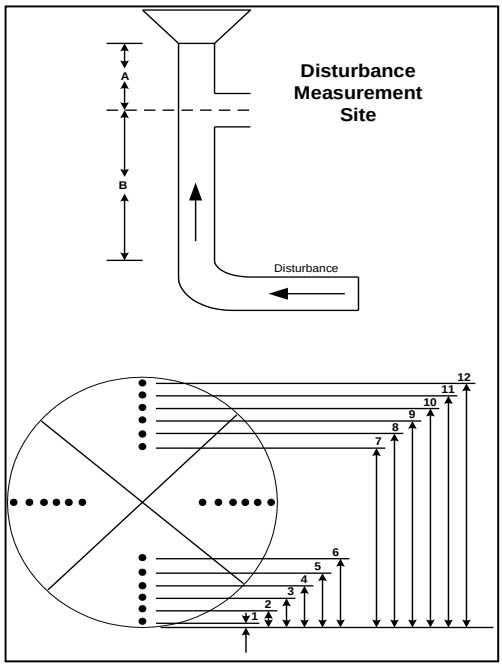
3 point sample: ≤10% or ±1 ppm of mean
1 point sample: ≤5% or ±0.5 ppm of mean

No Stratification
No Cyclonic Flow

6.4 Sample Point Selection Particulate

Client: HM Pacific Northwest **Date:** 08/16/23
Unit: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

Traverse Point	% of Diameter Distance	Actual Distance	O_2 or CO_2 Conc. (%)	O_2 or CO_2 Conc. % diff. of mean	SO_2 Conc. ppmdv	SO_2 Conc.% diff. of mean	NO_x Conc. ppmdv	NO_x Conc. % diff. of mean	CO Conc. ppmdv	CO Conc. % diff. of mean
1	2.1	3.9	15.60	0.6%	-	-	8.0	0.0%		
2	6.7	5.8	15.60	0.6%	-	-	8.0	0.0%		
3	11.8	8.0	15.60	0.6%	-	-	8.0	0.0%		
4	17.7	10.4	15.40	-0.6%	-	-	7.9	-1.3%	-	-
5	25	13.5	15.40	-0.6%	-	-	8.0	0.0%	-	-
6	35.6	18.0	15.40	-0.6%	-	-	8.1	1.3%	-	-
7	64.4	30.0	15.40	-0.6%	-	-	8.1	1.3%	-	-
8	75	34.5	15.40	-0.6%	-	-	8.0	0.0%	-	-
9	82.3	37.6	15.40	-0.6%	-	-	7.9	-1.3%	-	-
10	88.2	40.0	15.60	0.6%	-	-	8.0	0.0%	-	-
11	93.3	42.2	15.60	0.6%	-	-	8.0	0.0%	-	-
12	97.9	44.1	15.60	0.6%	-	-	8.0	0.0%	-	-
		Mean:	15.50		-		8.00			



Traverse Type: gaseous Flow Straighteners? N
Stack Shape: Circle Stack Extensions? N
Stack Construction: steel Sample Orientation: Horizontal
Stack Dimension (inches), 42" dia

Number of Test Ports: 2
Stack Equivalent Diameter: (inches): 42
Port Length (inches): 3

# of Traverse Pts. (Particulates): 12
# of Traverse Pts. (Flows): 3

Distance Downstream From Flow Disturbance (inches): 84
Distance Upstream From Flow Disturbance (inches): 84
Stack Diameters Downstream: 42.0
Stack Diameters Upstream: 42.0

Cyclonic Flow: N
Does stack Meet EPA Method 1 Criteria? Y

6.5 Calibration Gas Certificates

RED BALL TECHNICAL GAS SERVICES

PJLA Calibration and Testing Accreditation #62754

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12020

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0087486	Certification Date:	09/11/2020
Product ID Number:	126889	Expiration Date:	09/09/2028
Cylinder Pressure:	1900 PSIG	MFG Facility:	- Shreveport - LA
COA #	EB0087486.20200826-0	Lot Number:	EB0087486.20200826
Customer PO. NO.:		Tracking Number:	083083529
Customer:		Previous Certification Dates:	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	11.76 %	±0.08 %	NDIR	09/11/2020
Oxygen	11.99 %	±0.06 %	MPA	09/08/2020
Nitrogen	Balance			

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
EB0006119	EB0006119.20190327	06/18/2027	GMIS	N2	CO2	9.51 %	0.191	C1579010.02
EB0041474	EB0041474.20180504	07/21/2026	GMIS	N2	O2	24 %	0.497	071001
EB0059422	EB0059422.20191017	01/07/2028	GMIS	N2	O2	12.02 %	0.139	SRM 2659a
EB0097897	EB0097897.20171018	02/06/2026	GMIS	N2	CO2	24.9 %	0.398	C1309410.01

Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
O2	MPA	Thermo	410i	1162980025	08/24/2020
CO2	NDIR	Thermo	410i	1162980025	09/10/2020

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Jasmine Godfrey
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17

RED BALL TECHNICAL GAS SERVICES

PJLA Calibration and Testing
Accreditation #62754

Red Ball Technical Gas Service
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150
PGVP Vendor ID # G12020

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0001897	**Certification Date:**	09/08/2020
Product ID Number:	128863	**Expiration Date:**	09/06/2028
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	- Shreveport - LA
COA #	EB0001897.20200826-0	**Lot Number:**	EB0001897.20200826
Customer PO. NO.:		**Tracking Number:**	3379460
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle	Assayed On
Carbon Dioxide	**20.5 %**	±0.18 %	NDIR	09/03/2020
Oxygen	**20.9 %**	±0.11 %	MPA	09/08/2020

Nitrogen Balance

Analytical Measurement Data Available Online.

Reference Standard(s)

Serial Number	Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
CC722672	CC722672.20190610	11/24/2027	GMIS	N2	CO2	19.61 %	0.306	C1579010.02
EB0041474	EB0041474.20180504	07/21/2026	GMIS	N2	O2	24 %	0.497	071001
EB0089906	EB0089906.20190405	12/03/2027	GMIS	N2	O2	20 %	0.498	2659a
EB0097897	EB0097897.20171018	02/06/2026	GMIS	N2	CO2	24.9 %	0.398	C1309410.01

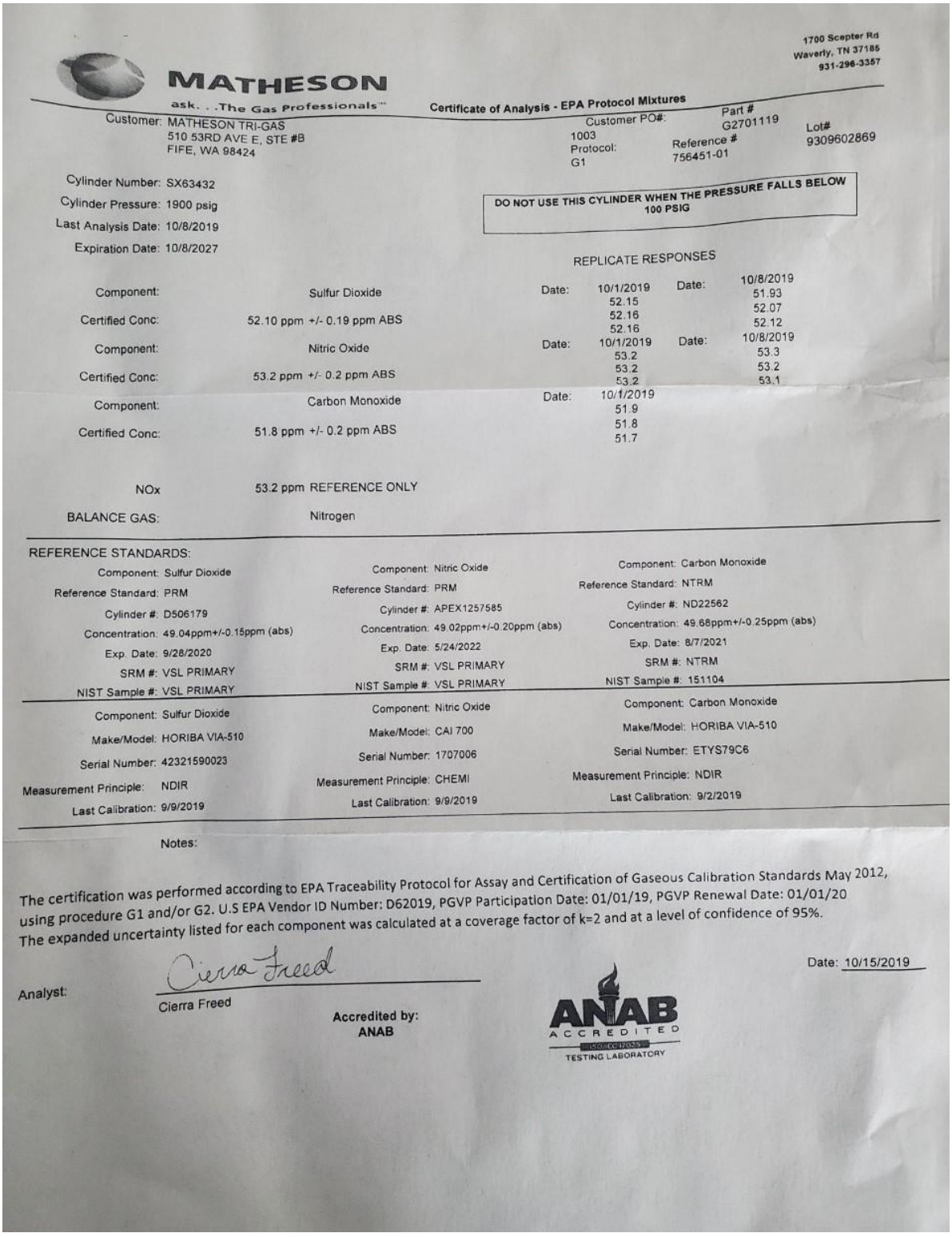
Analytical Instrumentation

Component	Principle	Make	Model	Serial	MPC Date
CO2	NDIR	Thermo	410i	1162980025	08/03/2020
O2	MPA	Thermo	410i	1162980025	08/24/2020

SMART-CERT

This is to certify the gases referenced have been calibrated/tested, and verified to meet the defined specifications. This calibration/test was performed using Gases or Scales that are traceable through National Institute of Standards and Technology (NIST) to the International System of Units (SI). The basis of compliance stated is a comparison of the measurement parameters to the specified or required calibration/testing process. The expanded uncertainties use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from Red Ball Technical Gas Services. If not included, the uncertainty of calibrations are available upon request and were taken into account when determining pass or fail.

Jasmine Godfrey
Analytical Chemist
Assay Laboratory: Red Ball TGS
Version 02-J, Revised on 2018-09-17



MATHESON
ask. . .The Gas Professionals™

1700 Scepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer: MATHESON TRI-GAS
510 53RD AVE E, STE #B
FIFE, WA 98424

Customer PO#: 1003
Part # G2701119
Lot# 9309602869
Protocol: G1
Reference # 756451-01

Cylinder Number: SX63432
Cylinder Pressure: 1900 psig
Last Analysis Date: 10/8/2019
Expiration Date: 10/8/2027

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

REPLICATE RESPONSES

		Date:	10/1/2019	Date:	10/8/2019
Component:	Sulfur Dioxide		52.15		51.93
Certified Conc:	52.10 ppm +/- 0.19 ppm ABS		52.16		52.07
			52.16		52.12
Component:	Nitric Oxide	Date:	10/1/2019	Date:	10/8/2019
Certified Conc:	53.2 ppm +/- 0.2 ppm ABS		53.2		53.3
			53.2		53.2
			53.2		53.1
Component:	Carbon Monoxide	Date:	10/1/2019		
Certified Conc:	51.8 ppm +/- 0.2 ppm ABS		51.9		
			51.8		
			51.7		

NOx 53.2 ppm REFERENCE ONLY

BALANCE GAS: Nitrogen

REFERENCE STANDARDS:

Component: Sulfur Dioxide	Component: Nitric Oxide	Component: Carbon Monoxide
Reference Standard: PRM	Reference Standard: PRM	Reference Standard: NTRM
Cylinder #: D506179	Cylinder #: APEX1257585	Cylinder #: ND22562
Concentration: 49.04ppm+/-0.15ppm (abs)	Concentration: 49.02ppm+/-0.20ppm (abs)	Concentration: 49.68ppm+/-0.25ppm (abs)
Exp. Date: 9/28/2020	Exp. Date: 5/24/2022	Exp. Date: 8/7/2021
SRM #: VSL PRIMARY	SRM #: VSL PRIMARY	SRM #: NTRM
NIST Sample #: VSL PRIMARY	NIST Sample #: VSL PRIMARY	NIST Sample #: 151104
Component: Sulfur Dioxide	Component: Nitric Oxide	Component: Carbon Monoxide
Make/Model: HORIBA VIA-510	Make/Model: CAI 700	Make/Model: HORIBA VIA-510
Serial Number: 42321590023	Serial Number: 1707006	Serial Number: ETYS79C6
Measurement Principle: NDIR	Measurement Principle: CHEMI	Measurement Principle: NDIR
Last Calibration: 9/9/2019	Last Calibration: 9/9/2019	Last Calibration: 9/2/2019

Notes:

The certification was performed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA Vendor ID Number: D62019, PGVP Participation Date: 01/01/19, PGVP Renewal Date: 01/01/20
The expanded uncertainty listed for each component was calculated at a coverage factor of k=2 and at a level of confidence of 95%.

Analyst: Cierra Freed
Cierra Freed

Date: 10/15/2019

Accredited by:
ANAB

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

MATHESON
ask. . .The Gas Professionals
1700 Scepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer: MATHESON TRI-GAS
510 53RD AVE E, STE #B
FIFE, WA 98424

Customer PO#:	Part #	
1003	G2701120	
Protocol:	Reference #	Lot#
G1	756451-02	9309602871

Cylinder Number: SX63497
Cylinder Pressure: 1900 psig
Last Analysis Date: 10/8/2019
Expiration Date: 10/8/2027

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

REPLICATE RESPONSES

Component:	Sulfur Dioxide	Date:	10/1/2019	Date:	10/8/2019
			94.1		94.1
Certified Conc:	94.2 ppm +/- 0.5 ppm ABS		94.2		94.2
			94.2		94.2
Component:	Nitric Oxide	Date:	10/1/2019	Date:	10/8/2019
			94.7		94.6
Certified Conc:	94.6 ppm +/- 0.6 ppm ABS		94.6		94.6
			94.5		94.5
Component:	Carbon Monoxide	Date:	10/1/2019		
			93.6		
Certified Conc:	93.4 ppm +/- 0.3 ppm ABS		93.4		
			93.1		

NOx 94.6 ppm REFERENCE ONLY

BALANCE GAS: Nitrogen

REFERENCE STANDARDS:

Component:	Sulfur Dioxide	Nitric Oxide	Carbon Monoxide
Reference Standard:	PRM	PRM	NTRM
Cylinder #:	D506179	APEX1257585	ND22562
Concentration:	49.04ppm+/-0.15ppm (abs)	49.02ppm+/-0.20ppm (abs)	49.68ppm+/-0.25ppm (abs)
Exp. Date:	9/28/2020	5/24/2022	8/7/2021
SRM #:	VSL PRIMARY	VSL PRIMARY	NTRM
NIST Sample #:	VSL PRIMARY	VSL PRIMARY	151104

Component:	Sulfur Dioxide	Nitric Oxide	Carbon Monoxide
Make/Model:	HORIBA VIA-510	CAI 700	HORIBA VIA-510
Serial Number:	42321590023	1707006	ETYS79C6
Measurement Principle:	NDIR	CHEMI	NDIR
Last Calibration:	9/9/2019	9/9/2019	9/2/2019

Notes:

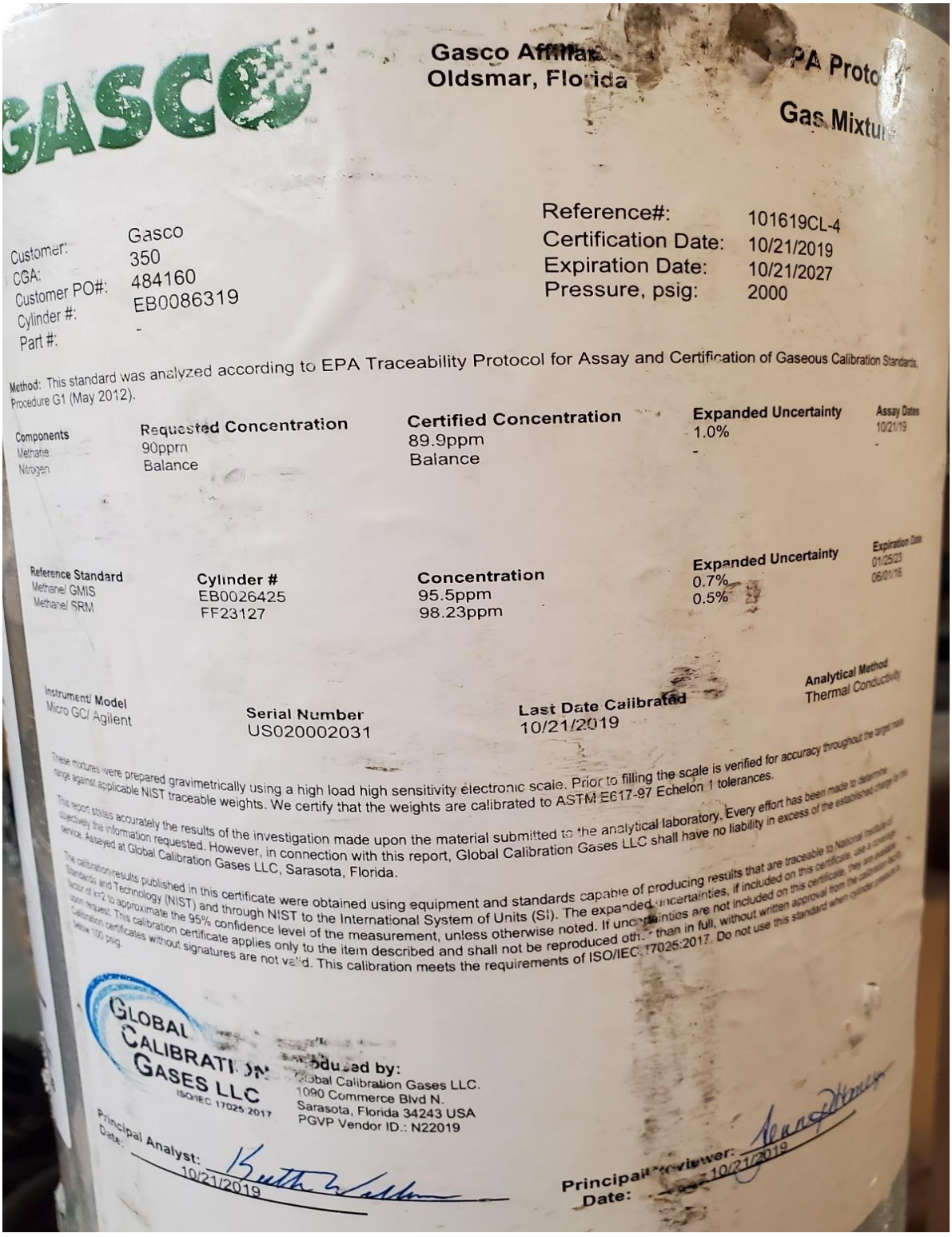
The certification was performed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA Vendor ID Number: D62019, PGVP Participation Date: 01/01/19, PGVP Renewal Date: 01/01/20
The expanded uncertainty listed for each component was calculated at a coverage factor of k=2 and at a level of confidence of 95%.

Analyst: Cierra Freed
Cierra Freed

Date: 10/15/2019

Accredited by:
ANAB

ANAB ACCREDITED TESTING LABORATORY



GASCO

Gasco Affiliate
Oldsmar, Florida

EPA Protocol
Gas Mixture

Customer:	Gasco
CGA:	350
Customer PO#:	484160
Cylinder #:	EB0086319
Part #:	-

Reference#:	101619CL-4
Certification Date:	10/21/2019
Expiration Date:	10/21/2027
Pressure, psig:	2000

Method: This standard was analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, Procedure G1 (May 2012).

Components	Requested Concentration	Certified Concentration	Expanded Uncertainty	Assay Dates
Methane	90ppm	89.9ppm	1.0%	10/21/19
Nitrogen	Balance	Balance	-	-

Reference Standard	Cylinder #	Concentration	Expanded Uncertainty	Expiration Date
Methane/ GMIS	EB0026425	95.5ppm	0.7%	01/25/23
Methane/ SRM	FF23127	98.23ppm	0.5%	06/01/16

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
Micro GC/ Agilent	US020002031	10/21/2019	Thermal Conductivity

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights. We certify that the weights are calibrated to ASTM E617-97 Echelon 1 tolerances.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for the service. Assayed at Global Calibration Gases LLC, Sarasota, Florida.

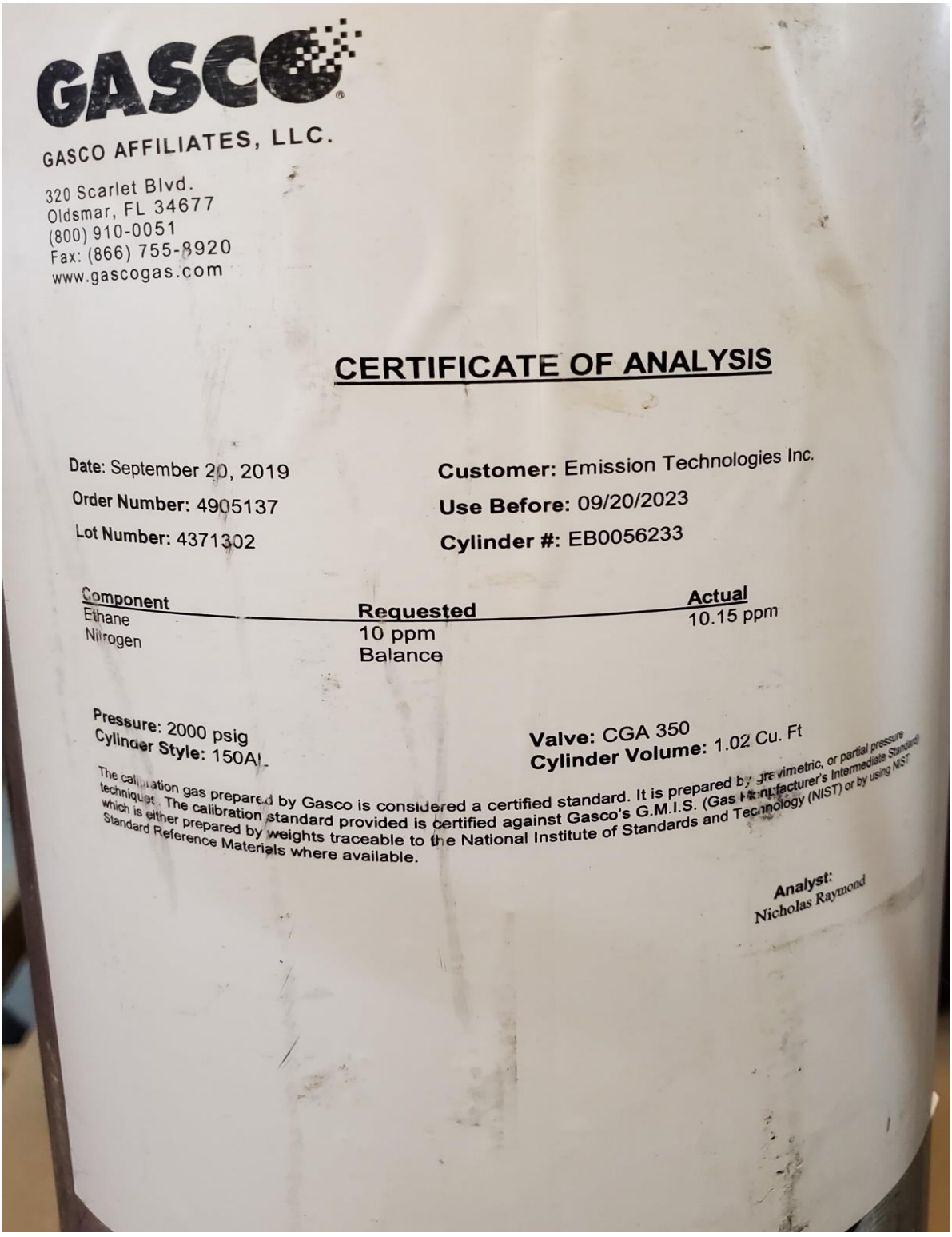
The calibration results published in this certificate were obtained using equipment and standards capable of producing results that are traceable to National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI). The expanded uncertainties, if included on this certificate, use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. If uncertainties are not included on this certificate, they are available upon request. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from the calibration facility. Calibration certificates without signatures are not valid. This calibration meets the requirements of ISO/IEC 17025:2017. Do not use this standard when cylinder pressure is below 100 psig.

GLOBAL CALIBRATION GASES LLC
ISO/IEC 17025:2017

Produced by:
Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243 USA
PGVP Vendor ID.: N22019

Principal Analyst:
Date: 10/21/2019

Principal Reviewer:
Date: 10/21/2019



GASCO

GASCO AFFILIATES, LLC.

320 Scarlet Blvd.
Oldsmar, FL 34677
(800) 910-0051
Fax: (866) 755-8920
www.gascogas.com

CERTIFICATE OF ANALYSIS

Date: September 20, 2019
Order Number: 4905137
Lot Number: 4371302

Customer: Emission Technologies Inc.
Use Before: 09/20/2023
Cylinder #: EB0056233

Component	Requested	Actual
Ethane	10 ppm	10.15 ppm
Nitrogen	Balance	

Pressure: 2000 psig
Cylinder Style: 150AL

Valve: CGA 350
Cylinder Volume: 1.02 Cu. Ft

The calibration gas prepared by Gasco is considered a certified standard. It is prepared by gravimetric, or partial pressure techniques. The calibration standard provided is certified against Gasco's G.M.I.S. (Gas Manufacturer's Intermediate Standard) which is either prepared by weights traceable to the National Institute of Standards and Technology (NIST) or by using NIST Standard Reference Materials where available.

Analyst:
Nicholas Raymond


GASCO
Gasco Affiliates
Oldsmar, Florida
EPA Protocol
Gas Mixture
Gasco
350
484160
EB0024858
Reference#: 101619CL-5
Certification Date: 10/21/2019
Expiration Date: 10/21/2027
Pressure, psig: 2000
analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration
Requested Concentration
1100ppm
Balance
Certified Concentration
1112ppm
Balance
Expanded Uncertainty
1.0%
Cylinder #
Concentration
4970 ppm
4.014%
Expanded Uncertainty
0.6%
0.2%
Serial Number
Last Date Calibrated
10/21/2019

6.6 Methane Calibration Gasses –Diluter Information

STEC, INC.

Type	**SGD-710C**
Serial Number:	2225694
Calibration Date	**4/3/2023**

Gasses:	**PPM**		**Expiration**	
CH_4	89.9	EB0086319	Oct-27	Mid-Level Supply Gas
CH_4	1112	EB0086319	Oct-27	High-Level Supply Gas

Sample < 50 x 2 = Range 0-100

Target C_1 Blends:

CH_4	30	Actual	29.9
CH_4	50	Actual	49.84
CH_4	85	Actual	87.00

6.7 Hand Calculations

METHOD 5 CALCULATIONS

CLIENT: HEIDELBERG MATERIALS, LLC

SITE LOCATION: KENMORE - HOT MIX ASPHALT PLANT OUTLET

PROJECT #: 3204-23 **Run #:** 1

Nomenclature:

A_d = cross-sectional area of stack, ft.^{2}
A_n = cross-sectional area of nozzle, ft^2
B_{ws} = water vapor in the gas stream, proportion by volume
C_p = pitot tube coefficient, dimensionless
D_s = diameter of stack, ft^2
I = percent isokinetic
K_p = pitot tube constant = $85.49 \text{ ft/sec} \sqrt{\frac{(\text{lb/lb-mole})(\text{inches Hg})}{(^\circ\text{R})(\text{inches } H_2O)}}$
M_d = molecular weight of stack gas, dry basis, lb./lb.-mole
M_w = molecular weight of stack gas, wet basis, lb./lb.-mole
$= M_d(1 - B_{ws}) + 18(B_{ws})$
ΔH = differential meter pressure, inches H_2O
$\%CO_2$ = percent by volume of carbon dioxide in stack gas
$\%N_2$ = percent by volume of nitrogen in stack gas
$\%O_2$ = percent by volume of oxygen in stack gas
P_{bar} = barometric pressure, inches Hg
$\sqrt{\Delta P}_{avg}$ = average velocity head of stack gas, $\sqrt{\text{inches } H_2O}$
P_s = absolute stack gas pressure, inches Hg
P_{static} = static pressure of the stack, inches H_2O
P_{std} = standard absolute pressure, 29.92 inches Hg
Q_{std} = stack flow rate, dscfm
θ = sample time, minutes
T_m = meter temperature, °F
T_s = average stack temperature, °F
T_{std} = standard absolute temperature, 528°R
$T_{s(avg)}$ = Average absolute stack temperature,°R = 460 + T_s
V_{mstd} = corrected meter volume, dscf
V_S = average stack gas velocity, ft./sec.
V_{lc} = volume of water gain in the impingers, ml
Y = dry gas meter calibration factor
7000 = conversion from grains to pounds; divide by

Volume of metered sample gas at standard conditions:

$$P_{meter} = P_{bar} + \frac{\Delta H}{13.6} = \underline{\quad 80.0 \quad} + \frac{0.952}{13.6} = \underline{\quad 80.07 \quad} \text{ inches Hg}$$

$$V_{m(std)} = \frac{(V_m)\times(T_{std})\times(P_{meter})\times(Y)}{(T_m + 460)\times(P_{std})}$$

$$V_{m(std)} = \frac{(33.698)\times(528)\times(\ 30.07\ )\times(\ 0.995)}{(\ \ 77.0\ \ + 460)\times(29.92)} = \underline{\quad 33,133 \quad} \text{ dscf}$$

Moisture Content:

$$V_{w(std)} = (0.04715\ \text{ft}^3/\text{gram water})\times(V_{lc}) \qquad \text{1 gram water} \equiv \text{1 ml water}$$

$$V_{w(std)} = (0.04715)\times(\ 227.8\ ) = \underline{\quad 10.741 \quad} \text{ scf}$$

$$B_{ws} = \frac{V_{w(std)}}{(V_{w(std)} + V_{m(std)})}$$

$$B_{ws} = \frac{(\ \ 10.741\ \ )}{(\ 10.741\ \ + \ 33,133\ )} = \underline{\quad 0.2448 \quad} \text{ water vapor fraction}$$

Molecular Weight:

Dry:

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

$$\%N_2 = 100 - (\ 15.45\ ) - (\ 5.12\ ) = \underline{\quad 79.43 \quad} \%N_2$$

$$M_d = (0.44\times\%CO_2) + (0.32\times\%O_2) + (0.28\times\%N_2)$$

$$M_d = (0.44\times\ 5.12\ ) + (0.32\times\ 15.45) + (0.28\times\ 79.43\ ) = \underline{\quad 29.99 \quad} \text{lb/lb-mole}$$

Wet:

$$M_w = M_d\times(1 - B_{ws}) + (18\times B_{ws})$$

$$M_w = (\ 29.44\ )\times(1 - \ 0.2448\ ) + (18\times\ 0.2448\ ) = \underline{\quad 26.69 \quad} \text{lb/lb-mole}$$

Average Velocity of Stack Gas:

$$V_s = K_p \times C_p \times \sqrt{\Delta P_{avg}} \times \sqrt{\frac{T_{s(avg)}}{M_w \times P_s}} \qquad P_s = P_{bar} + \frac{P_{static}}{13.6}$$

$$P_s = (\underline{30.0}) + \frac{(\underline{-0.3})}{13.6} = \underline{29.97794}$$

$$V_s = 85.49 \times \underline{0.84} \times \underline{0.739} \times \sqrt{\frac{(\underline{240.5} + 460)}{\underline{24.69} \times \underline{29.97794}}} = \underline{49.37}\ \text{ft/sec}$$

Volume Flow Rate:

$$Q_{std} = 60 \times (1 - B_{ws}) \times V_s \times A_d \times \frac{T_{std} \times P_s}{T_{s(avg)} \times P_{std}}$$

$$Q_{std} = 60 \times (1 - \underline{0.2448}) \times \underline{49.37} \times \underline{9.62} \times \frac{528 \times}{(\underline{240.5} + 460) \times 29.92} = \underline{16,253}\ \text{dscfm}$$

Percent Isokinetic:

$$I = \frac{0.0945 \times (T_s + 460) \times V_{m(std)}}{P_s \times V_s \times A_n \times \theta \times (1 - B_{ws})}$$

$$I = \frac{0.0945 \times (\underline{240.5} + 460) \times (\underline{33.133})}{\underline{29.97794} \times \underline{49.37} \times \underline{0.000304} \times \underline{60} \times (1 - \underline{0.2448})} = \underline{107.7}\ \%$$

Particulate (Total) Calculations:

M_{FH} = weight of front half particulate matter, g
M_{pn} = mass of probe& nozzle rinse, g
M_F = mass of filter, g
Mb = mass of field total cpm blank (shall not exceed 2 mg), g
M_{IO} = mass of back half inorganic fraction
M_O = mass of back half organic fraction
M_R = mass of back half acetone rinse
0.0154 = conversion of mg to grains (gr)
1/7000 = conversion of grains to pounds
M_n = weight of particulate in mg

Blank Correction:

$M_{FH} = M_{pn} + M_F - M_b$ $= (0.0006) + (0.0011) - (\ 0\ ) = 0.0017$ g

Weight of Total Particulate

$M_n = (M_{FH} + M_{IO} + M_O + M_R) \times 1000$

$M_n = [(0.0017) + (0.0003) + (0.0006) + (0.0007)] \times 1000 = 3.3$ mg

As gr/dscf:

$E_1 = \frac{0.0154 \times M_n}{V_{m(std)}} = \frac{0.0154 \times (\ 3.3\ )}{(\ 33.133\ )} = 0.001534$ gr / dscf

As gr/dscf @ 7% O_2:

$E_2 = \frac{(E_1) \times (20.9 - 7)}{(20.9 - O_{2measured})} = \frac{(0.001534) \times 13.9}{(20.9 - \ 15.45\ )} = 0.0039$ gr / dscf

Technician Signature _____

HAND CALCULATIONS - GASES

CLIENT: HM Northwest Pacific

SITE LOCATION: Kenmore Hot Mix Asphalt Plant

PROJECT #: 5204-23 Run 1

System Bias Calibrations

$$C_{gas} = \frac{(C - C_0)}{(C_m - C_0)} \times C_{ma}$$

where: C_{gas} = gas concentration, dry basis ppm
C = average gas concentration indicated by the analyzer
C_o = average of initial and final system bias responses for the zero gas
C_m = average of initial and final system bias responses for the upscale gas
C_{ma} = actual concentration of the upscale calibration gas, ppm

Gas: O2

$$C_0 = \frac{(C_{pre-zero} + C_{post-zero})}{2} = \frac{(0.02 + 0.02)}{2} = 0.02$$

$$C_m = \frac{(C_{pre-span} + C_{post-span})}{2} = \frac{(11.95 + 11.9)}{2} = 11.925$$

$$C_{gas} = \frac{(15.36 - 0.02)}{(11.925 - 0.02)} \times 11.99 = 15.45$$

Gas: CO2

$$C_0 = \frac{(0.2 + 0.1)}{2} = 0.15 \qquad C_m = \frac{(11.84 + 11.80)}{2} = 11.82$$

$$C_{gas} = \frac{(5.14 - 0.15)}{(11.82 - 0.15)} \times 11.76 = 5.12$$

Gas: NOx

$$C_0 = \frac{(0.2 + 0.1)}{2} = 0.15 \qquad C_m = \frac{(52.5 + 52.0)}{2} = 52.25$$

$$C_{gas} = \frac{(7.8 - 0.15)}{(52.25 - 0.15)} \times 53.2 = 7.7$$

Gas: CO

$C_0 = \frac{(0.3 + 0.5)}{2} = 0.4$ $C_m = \frac{(51.8 + 51.8)}{2} = 51.8$

$C_{gas} = \frac{(67.7 - 0.4)}{(51.8 - 0.4)} \times 51.4 = 67.3$

Parts per million corrected to 7% O_2

$$C_{ppm} = C_{ppm} \times \frac{13.9}{(20.9\% - O_2\%)}$$

NOx

$C_{ppm} = (7.7) \times \frac{13.9}{(20.9\% - 15.45)} = 19.6\ ppm$

CO

$C_{ppm} = (67.3) \times \frac{13.9}{(20.9\% - 15.45)} = 171.6\ ppm$

Technician Signature _____

Calculation VOC ppmd to VOC (RUN 1)

VOC as Propane ppmdv

RUN	VALUE
Run 1	10.3
Run 2	10.4
Run 3	9.9

Conversion from ppm to lbs/dscf

$C_d = C_{ppm} \times C_F$ (For HC as Propane 1.142×10^{-7}, see below)

As Propane: $C_d = (\ 10.3\ ) \times 1.142 \times 10^{-7} =$ 1.18×10^{-6}

Conversion from lbs/dscf to lbs/hour

$E_1 = C_d \times Q_{std} \times 60$

As Propane: $E_1 = (\ 1.18 \times 10^{-6}\ ) \times (\ 16.253\ ) \times 60 =$ 1,150 lb/hr

Where: Qstd = flow rate in standard dry cubic ft per hr
60 is to convert minutes to hours

Conversion from llbs/hour to lb of VOC/TON of processed Soil

THC as Methane :

$E_1/TON\ of\ processed\ soil =$ 1,150 / 185 = 0.0062 lb/TON

Where: TON of processed Soil = 185 TONS/hr (FROM PROCESS DATA)

Technician Signature _____

6.8 NO_x Converter Check

EPA Method 7E - NOx Analyzer Converter Efficiency Check

Make: CAI
Model: ZRE/M&C
S/N: AOA6534T

Date: 09/04/23
Performed By: Rob Wilson

Zero NO Calibration Gas

Cylinder Conc.:	0.0 ppm	
Cylinder S/N:	EB0047257	
Analyzer Response:	0.0 ppm	
ACE:	0.02% %	**PASS**
	Eq. 7E-1	

Mid NO Calibration Gas

Cylinder Conc.:	25.0 ppm	
Cylinder S/N:	CC702109	
Analyzer Response:	24.8 ppm	
ACE:	-0.35%	**PASS**
	Eq. 7E-1	

High NO Calibration Gas

Cylinder Conc.:	53.2 ppm	
Cylinder S/N:	SX63432	
Analyzer Response:	53 ppm	
ACE:	-0.38% %	**PASS**
	Eq. 7E-1	

NO_2 Calibration Gas

Cylinder Conc.:	45.5 ppm	
Cylinder S/N:	CC509582	
Analyzer Response:	45.1 ppm	
Converter Efficiency:	99.1% %	**PASS**
	Eq. 7E-7	

I certify that the above listed analyzer meets the requirements set forth in EPA Method 7E for converting NO_2 to NO.

Robert Wilson

Signature

6.9 Non-Methane Cutter Penetration Factors and NMHC Calculations

Client: HM Pacific Northwest **Date:** 08/16/23

Site: Kenmore Hot Mix Asphalt Plant **ETI Job No:** 3204-23

EPA 40 CFR 1065.365, Calculating Ethane and Methane Penatration Factors (PF)

Ethane Calibration Gas	10.15 ppm
Methane Calibration Gas	89.9 ppm
Ethane Response with NMC	0.1 ppm
Ethane Response with THC	21.1 ppm
Methane Response with NMC	89.6 ppm
Methane Response with THC	90.6 ppm

Penetration Factors:

Ethane Penetration Factor	= 0.10/20.08	0.004739336	0.004739336 **(< 0.02 pass)**
Methane Penetration Factor	= 89.5/90.5	0.988962472	0.988962472 **(> 0.85 pass)**

		Run Number 1	2	3
Raw Values NMHC:	ppmvw	23.29	23.62	22.79
B_{ws}		0.24	0.24	0.23
EPA 40 CFR 1065.660, NMHC Concentration corrected (ppm) WET	ppmvw	23.40	23.73	22.90
Correction to Dry Concentration, ppmvd = ppmvw/(1-B_{WS})	ppmvd	30.99	31.22	29.80
VOC as Propane (NMHC C_1 ppmvd/3)	ppmdv	10.33	10.41	9.93

Where

EPA 40 CFR 1065.660, Calculating NMHC Concentration (ppm)

Run 1 NMHC Wet =	((Raw Values, ppmvw Run 1) * Methane PF)/(Methane PF-Ethane PF)
Run 2 NMHC Wet =	((Raw Values, ppmvw Run 2) * Methane PF)/(Methane PF-Ethane PF)
Run 3 NMHC Wet =	((Raw Values, ppmvw Run 3) * Methane PF)/(Methane PF-Ethane PF)

EPA 40 CFR 60 - Correction to Dry Concentration, ppmvd = ppmvw/(1-B_{WS})

Run 1 NMHC Dry =	Run 1 NMHC Wet/(1-$B_{ws\ run\ 1}$)
Run 2 NMHC Dry =	Run 2 NMHC Wet/(1-$B_{ws\ run\ 2}$)
Run 3 NMHC Dry =	Run 3 NMHC Wet/(1-$B_{ws\ run\ 3}$)

VOC as Propane (NMHC C_1 ppmvd/3)

Run 1 VOC Dry =	Run 1 VOC Dry = Run 1 NMHC Dry/3
Run 2 VOC Dry =	Run 2 VOC Dry = Run 2 NMHC Dry/3
Run 3 VOC Dry =	Run 3 VOC Dry = Run 3 NMHC Dry/3

6.10 Dry Gas Meter Calibrations

Pre-Test Meter Calibration

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

Quality - Service - Reliability

DATE: 3/1/2023 | METER SERIAL #: HF-L-22 | BAROMETRIC PRESSURE (in Hg): INITIAL 29.92, FINAL 29.93, AVG (P_{bar}) 29.925
METER PART #: HF-L | CRITICAL ORIFICE SET SERIAL #: 1543s | 3PM

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH ($in H_2O$)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
30	1	0.83	16	452.976	458.231	5.255	40	41	41	40	40	40.500	5.00	3.7	5.5963	5.5556	0.993		1.80
30	2	0.83	16	458.231	463.496	5.265	40	41	40	42	41	41.000	5.00	3.7	5.6013	5.5556	0.992		1.79
30	3	0.83	16	463.496	468.741	5.245	40	42	44	43	48	44.250	5.00	3.7	5.5441	5.5556	1.002		1.78
																AVG =	0.996	0.1	
22	1	0.6169	16	468.741	474.221	5.480	40	44	46	41	45	44.000	7.00	2	5.7714	5.7809	1.002		1.74
22	2	0.6169	16	474.221	479.711	5.490	40	48	50	40	41	44.750	7.00	2	5.7733	5.7809	1.001		1.73
22	3	0.6169	16	479.711	485.191	5.4800	40	50	52	41	42	46.250	7.00	2	5.7457	5.7809	1.006		1.73
																AVG =	1.003	0.84	
19	1	0.5079	16	485.191	491.777	6.586	40	52	53	45	46	49.000	10.00	1.35	6.8571	6.7993	0.992		1.71
19	2	0.5079	16	491.777	498.207	6.430	40	53	54	46	47	50.000	10.00	1.35	6.6815	6.7993	1.018		1.71
19	3	0.5079	16	498.207	504.831	6.624	40	54	54	47	49	51.000	10.00	1.35	6.8696	6.7993	0.990		1.70
																AVG =	1.000	0.50	
16	1	0.4313	16	504.831	510.461	5.630	40	55	56	49	50	52.500	10.00	1	5.8167	5.7738	0.993		1.74
16	2	0.4313	16	510.461	516.111	5.650	40	56	57	50	51	53.500	10.00	1	5.8260	5.7738	0.991		1.74
16	3	0.4313	16	516.111	521.791	5.680	40	56	56	51	51	53.500	10.00	1	5.8569	5.7738	0.986		1.74
																AVG =	0.990	-0.49	
11	1	0.3177	16	521.791	528.051	6.260	40	55	55	51	51	53.000	15.00	0.55	6.4541	6.3796	0.988		1.76
11	2	0.3177	16	528.051	534.341	6.290	40	55	55	51	51	53.000	15.00	0.55	6.4851	6.3796	0.984		1.76
11	3	0.3177	16	534.341	540.6410	6.30	39	55	54	52	52	53.250	15.00	0.55	6.4922	6.3860	0.984		1.76
																AVG =	0.985	-0.94	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.995

AVERAGE $\Delta H_@$ = 1.75

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$ = Net volume of gas sample passed through DGM, corrected to standard conditions
K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr(std)}}\right)^2 \Delta H \left(\frac{V_{m(std)}}{V_m}\right)$$

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions
T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$ = DGM calibration factor

Post-Test Meter Calibration

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

Quality - Service - Reliability

DATE: 8/18/2023 | METER SERIAL #: HF-L-22 | BAROMETRIC PRESSURE (in Hg): INITIAL 29.92, FINAL 29.93, AVG (P_{bar}) 29.925
METER PART #: HF-L | CRITICAL ORIFICE SET SERIAL #: 1543s | 3PM

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH ($in H_2O$)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
11	1	0.3177	16	329.564	335.757	6.193	58	63	64	62	63	63.000	15.00	0.55	6.2629	6.2677	1.001		1.79
11	2	0.3177	16	335.757	342.012	6.255	59	62	64	64	62	63.000	15.00	0.55	6.3256	6.2616	0.990		1.80
11	3	0.3177	16	342.012	348.2240	6.212	59	62	63	65	61	62.750	15.00	0.55	6.2851	6.2616	0.996		1.80
																AVG =	0.996	0.00	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.996

AVERAGE $\Delta H_@$ = 1.79

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$ = Net volume of gas sample passed through DGM, corrected to standard conditions
K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr(std)}}\right)^2 \Delta H \left(\frac{V_{m(std)}}{V_m}\right)$$

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions
T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

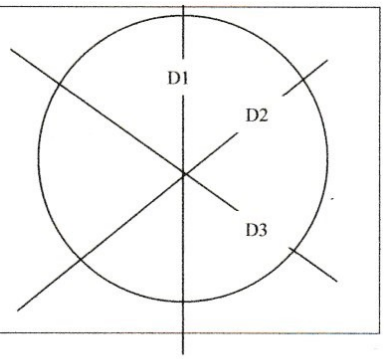
(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$ = DGM calibration factor

6.11 Nozzle Calibrations

EMISSION TECHNOLOGIES, INC.
ENVIRONMENTAL EQUIPMENT & SERVICES

NOZZLE CALIBRATION

Date:	8/15/23
Operator:	BH
Nozzle Type:	SS
Nozzle ID:	ET-SSB-1-03
Ambient Temperature:	75 DEG F

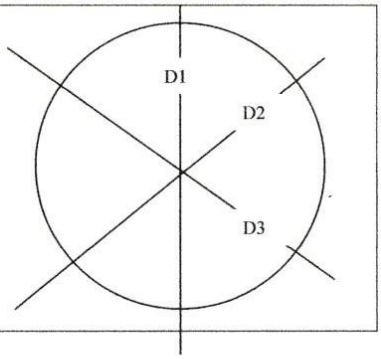


Measured Nozzle Diameters	Pre-test 8/15/23
Ambient Temperature:	75 °F
D1	0.236
D2	0.236
D3	0.237
AVERAGE	0.236
COMMENTS: No change in dimensions, No observed physical damage!	
Technician	BH

EMISSION TECHNOLOGIES, INC.
ENVIRONMENTAL EQUIPMENT & SERVICES

NOZZLE CALIBRATION

Date:	8/15/23
Operator:	BH
Nozzle Type:	SS
Nozzle ID:	ET-SSB-1-15
Ambient Temperature:	75 DEG F



Measured Nozzle Diameters	Pre-test 8/15/23
Ambient Temperature:	77 oF
D1	0.246
D2	0.246
D3	0.247
AVERAGE	0.246
COMMENTS: No change in dimensions, No observed physical damage!	
Technician	BH

6.12 Pitot Tube Calibrations – Method 2, 10.1

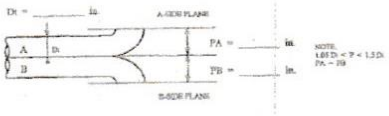
RUN1 PITOT ID NUMBER: ETI GR-21-1, PROBE: ETI-SSP60-A

EMISSION TECHNOLOGIES, INC.
ENVIRONMENTAL EQUIPMENT & SERVICES

S-Type Pitot Tube Calibration Sheet

Pitot I. D.:	ETI GR-21-1	Calibrated By:	BH
Pitot C_p =	0.84	Make:	S/S
Tube Diameter (D_t)=	0.375"		

Calibration Date:	Pre-test	Post test
	7/8/2023	8/16/2022



Is $1.05D_t \leq P_{a \text{ or } b} \leq 1.5D_t$

P_a=	0.469	P_a=	0.469
P_b=	0.469	P_b=	0.469
P_t=	0.938	P_t=	0.938
$P_a + P_b = P_t$			
Result		Result	
Pass	YES	Pass	YES

Transverse tube

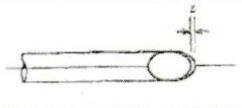
α 1 = _____ degrees (10°)
α 2 = _____ degrees (10°)

α_1	0	α_1	0
α_2	0	α_2	0
Limit	< 5°	Limit	< 5°
Result		Result	
Pass	YES	Pass	YES

Longitudinal Tube

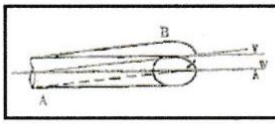
β 1 = _____ degrees (5°)
β 2 = _____ degrees (5°)

β_1	0	β_1	0
β_2	1	β_2	0
Limit	< 5°	Limit	< 5°
Result		Result	
Pass	YES	Pass	YES



Z = _____ in. (1/8")

z - angle		z - angle	
z	0	z	0
Limit	< 0.125"	Limit	< 0.125"
Result		Result	
Pass	YES	Pass	YES



W = _____ in. (1/32")

w - angle		w - angle	
w	0	w	0
Limit	< 0.03125"	Limit	< 0.03125"
Result		Result	
Pass	YES	Pass	YES

Comments/Recommendations:

There were no change in appearance and dimensions after the test

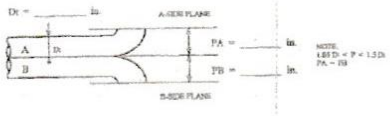
RUN1 PITOT ID NUMBER: ETI GR-21-2, PROBE: ETI-SSP60-B

EMISSION TECHNOLOGIES, INC.
ENVIRONMENTAL EQUIPMENT & SERVICES

S-Type Pitot Tube Calibration Sheet

Pitot I. D.:	ETI GR-21-2	Calibrated By:	BH
Pitot C_p =	0.84	Make:	S/S
Tube Diameter (D_t)=	0.375"		

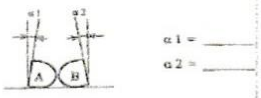
	Pre-test	Post test
Calibration Date:	7/8/2023	8/16/2022



Is $1.05D_t \leq P_{a \text{ or } b} \leq 1.5D_t$

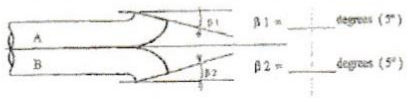
P_a=	0.471	P_a=	0.471
P_b=	0.471	P_b=	0.471
P_t=	0.942	P_t=	0.942
$P_a + P_b = P_t$			
Result		Result	
Pass	YES	Pass	YES

Transverse tube

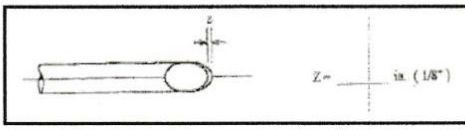


α_1	0	α_1	0
α_2	0	α_2	0
Limit	$< 5^o$	Limit	$< 5^o$
Result		Result	
Pass	YES	Pass	YES

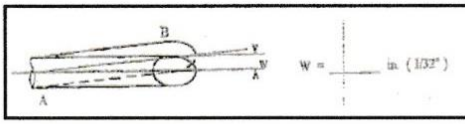
Longitudinal Tube



β_1	0	β_1	0
β_2	1	β_2	1
Limit	$< 5^o$	Limit	$< 5^o$
Result		Result	
Pass	YES	Pass	YES



	z - angle		z - angle
z	0	z	0
Limit	< 0.125"	Limit	< 0.125"
Result		Result	
Pass	YES	Pass	YES



	w - angle		w - angle
w	0	w	0
Limit	< 0.03125"	Limit	< 0.03125"
Result		Result	
Pass	YES	Pass	YES

Comments/Recommendations:

There were no change in appearance and dimensions after the test

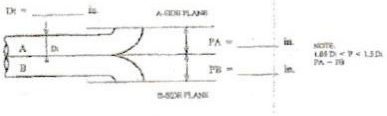
RUN3 PITOT ID NUMBER: ETI GR-21-3, PROBE: ETI-SSP60-C

EMISSION TECHNOLOGIES, INC.
ENVIRONMENTAL EQUIPMENT & SERVICES

S-Type Pitot Tube Calibration Sheet

Pitot I. D.:	ETI GR-21-3	Calibrated By:	BH
Pitot C_p =	0.84	Make:	S/S
Tube Diameter (D_t)=	0.375"		

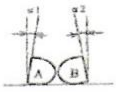
Calibration Date:	Pre-test: 7/8/2023	Post test: 8/16/2022



Is $1.05D_t \leq P_{a \text{ or } b} \leq 1.5D_t$

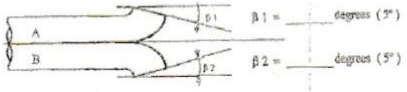
Pre-test		Post test	
P_a=	0.468	P_a=	0.468
P_b=	0.468	P_b=	0.468
P_t=	0.936	P_t=	0.936
$P_a + P_b = P_t$			
Result		Result	
Pass	YES	Pass	YES

Transverse tube



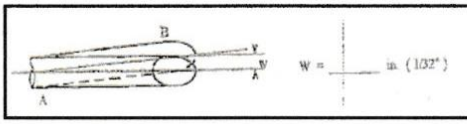
Pre-test		Post test	
α_1	0	α_1	0
α_2	0	α_2	0
Limit	< 5°	Limit	< 5°
Result		Result	
Pass	YES	Pass	YES

Longitudinal Tube



Pre-test		Post test	
β_1	0	β_1	0
β_2	0	β_2	0
Limit	< 5°	Limit	< 5°
Result		Result	
Pass	YES	Pass	YES

Pre-test		Post test	
z - angle		z - angle	
z	0	z	0
Limit	< 0.125"	Limit	< 0.125"
Result		Result	
Pass	YES	Pass	YES



Pre-test		Post test	
w - angle		w - angle	
w	0	w	0
Limit	< 0.03125"	Limit	< 0.03125"
Result		Result	
Pass	YES	Pass	YES

Comments/Recommendations:

There were no change in appearance and dimensions after the test

6.13 Thermocouple Calibrations

Client	Heidelberg Kenmore, LLC	ETI FORM No.	TC -CAL 2020
Project No.	3204-23	TECHNICIAN/OPERATOR	BH
Site	HOT MIX ASPHALT PLANT	TEST DATE	16-Aug-23

PROBE THERMOCOUPLE CALIBRATION

PROBE 1		PITOT		
ID	ETI SSP60-A	ID	ETI-GR-21-1	
Make	Stainless	Make	Stainless	
Length	60 INCHES	Attachment	Schwage	
liner	Stainless	NOZZLE ATTACHMENT	ID ETI-SS-B-1-03	DIAMETER 0.236"
Attachment	ball			

THERMOCOUPLE (PRE-TEST DATA)					PRE-TEST DATE: JULY 15, 2023						
Therm. ID #	TYPE	Ref. Set Point in Degrees C			Thermocouple Response			Difference in %			REMARKS
		Ice	Ambient	Boiling	In Degrees C			Ice	Ambient	Boiling	
Stack T-35	K	1	63	100	1	64	101	0.000	-0.298	-0.268	PASS
Probe G-103	K	1	63	100	1	64	101	0.000	-0.298	-0.268	PASS
THERMOCOUPLE (POST-TEST DATA)					POST-TEST DATE			16-Aug-23			
Therm. ID #	TYPE	Ref. Set Point in Degrees C			Thermocouple Response			Difference in %			REMARKS
		Ice	Ambient	Boiling	In Degrees C			Ice	Ambient	Boiling	
Stack T-35	K		63			64			-0.298		PASS
Probe G-103	K		63			63			0.000		PASS

should be less than 2%

Client	Heidelberg Kenmore, LLC	ETI FORM No.	TC -CAL 2020
Project No.	3204-23	TECHNICIAN/OPERATOR	BH
Site	HOT MIX ASPHALT PLANT	TEST DATE	16-Aug-23

PROBE THERMOCOUPLE CALIBRATION

PROBE 2		PITOT		
ID	ETI SSP60-B	ID	ETI-GR-21-2	
Make	Stainless	Make	Stainless	
Length	60 INCHES	Attachment	Schwage	
liner	Stainless	NOZZLE ATTACHMENT	ID ETI-SS-B-1-04	DIAMETER 0.246"
Attachment	ball			

THERMOCOUPLE (PRE-TEST DATA)					PRE-TEST DATE: JULY 15, 2023						
Therm. ID #	TYPE	Ref. Set Point in Degrees C			Thermocouple Response			Difference in %			REMARKS
		Ice	Ambient	Boiling	In Degrees C			Ice	Ambient	Boiling	
Stack T-36	K	1	63	100	1	64	101	0.000	-0.298	-0.268	PASS
Probe G-108	K	1	63	100	1	64	101	0.000	-0.298	-0.268	PASS
THERMOCOUPLE (POST-TEST DATA)					POST-TEST DATE			16-Aug-23			
Therm. ID #	TYPE	Ref. Set Point in Degrees C			Thermocouple Response			Difference in %			REMARKS
		Ice	Ambient	Boiling	In Degrees C			Ice	Ambient	Boiling	
Stack T-36	K		63			64			-0.298		PASS
Probe G-108	K		63			63			0.000		PASS

should be less than 2%

Client	Heidelberg Kenmore, LLC	ETI FORM No.	TC -CAL 2020
Project No.	3204-23	TECHNICIAN/OPERATOR	BH
Site	HOT MIX ASPHALT PLANT	TEST DATE	16-Aug-23

PROBE THERMOCOUPLE CALIBRATION

PROBE 3		PITOT		
ID	ETI SSP60-C	ID	ETI-GR-21-3	
Make	Stainless	Make	Stainless	
Length	60 INCHES	Attachment	Schwage	
liner	Stainless	NOZZLE ATTACHMENT	ID: ETI-SS-B-1-05	DIAMETER: 0.246"
Attachment	ball			

THERMOCOUPLE (PRE-TEST DATA)					PRE-TEST DATE: JULY 15, 2023						
Therm. ID #	TYPE	Ref. Set Point in Degrees F			Thermocouple Response			Difference in %			REMARKS
		Ice	Ambient	Boiling	In Degrees F			Ice	Ambient	Boiling	
Stack T-45	K	32	63	212	32	63	214	0.000	0.000	-0.412	PASS
Probe G-113	K	32	63	212	32	63	212	0.000	0.000	0.000	PASS

THERMOCOUPLE (POST-TEST DATA)					POST-TEST DATE			16-Aug-23			
Therm. ID #	TYPE	Ref. Set Point in Degrees C			Thermocouple Response			Difference in %			REMARKS
		Ice	Ambient	Boiling	In Degrees C			Ice	Ambient	Boiling	
Stack T-45	K		63			64			-0.298		PASS
Probe G-113	K		63			63			0.000		PASS

should be less than 2%

END OF DOCUMENT