BOILER NUMBER ONE
EMISSIONS TEST REPORT

L'ANSE WARDEN ELECTRIC COMPANY, LLC.
157 South Main Street
L'Anse, Michigan 49946

November 2015

W.O. No. 14464.007.003

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: L'Anse Warden Electric Company LLC County: Baraga

Source Address: 157 S. Main Street City: L'Anse

AQD Source ID (SRN): B4260 ROP No.: MI-ROP-B4260-2011 ROP Section No.:

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From _____ To _____

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Emissions Test Report

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

James R. Richardson	Technical Manager	907-885-7187
Name of Responsible Official (print or type)	Title	Phone Number
James R. Richardson		11/20/15
Signature of Responsible Official		Date

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1. INTRODUCTION

Weston Solutions, Inc. (WESTON) was retained by L'Anse Warden Electric Company, LLC (LWEC) to perform a compliance emissions testing program on the Boiler No. 1 exhaust duct at the LWEC facility located in L'Anse, Baraga County, Michigan. Boiler No. 1 was previously a coal, oil, and gas-fired steam generating station and has been converted to burn biomass.

The facility has historically operated under the State of Michigan Renewable Operating Permit (ROP) Number MI-ROP-B4260-2004, which was transferred to LWEC effective 5 July 2007. A revised ROP, number MI-ROP-B4260-2004a, was issued on 19 February 2008. Construction activities were authorized under Permit to Install (PTI) 168-07, issued on 29 October 2007. PTI 168-07 was replaced by PTI 168-07A on 30 May 2008. The facility received PTI 168-07B, issued on 15 April 2010, which modified certain emission limits and material throughput rates and governed operations through 31 December 2010. PTI 168-07C was issued on 26 October 2011 (to allow the boiler to use up to 0.25 tons per hour of penta wood in addition to the current fuel mix), and PTI 168-07D was approved on 25 October 2012 to incorporate the existing wood chipping process into the ROP and revise the next required performance testing date. Boiler Number 1 is identified as EUBOILER #1 in the PTI. On 28 October 2010, ROP #MI-ROP-B4260-2011 was issued and took effect on 1 January 2011.

This report provides a detailed description of the boiler operating conditions, emissions testing methods, analytical procedures and continuous monitoring parameters that were collected or employed during the tests.

1.1 PLANT INFORMATION

L'Anse Warden Electric Company, LLC
157 South Main Street
L'Anse, Michigan 49946
Mr. JR Richardson
Phone: 906-885-7187

1.2 TESTING FIRM INFORMATION

Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380
Mr. Ken Hill
Phone: 610-701-3043

1.3 COMPLIANCE TEST PARAMETERS

Table 1-1 provides a summary of the compliance test parameters, associated test methods, and respective emission limits.

Table 1-1

Summary of Compliance Test Parameters

Analytical Parameters and Test Method	Reporting Units	Limit
PM/HCl (EPA 5 and 26A)	gr/dscf, ppmvd, lb/MMBtu, lb/hr	PM 0.06 lb/MMBtu, 19.2 lb/hr, HCl 2.17 lb/hr
PM_{10} (EPA 201A-202)	gr/dscf, lb/hr	15.4 lb/hr
Lead (EPA 12)	ug/m^3, lb/hr	0.02 lb/hr
O_2/CO_2 (EPA 3/3A)	%	N/A
NOx (EPA 7E)	ppmvd, lb/hr	145 lb/hr
SO_2 (EPA 6C)	ppmvd, lb/hr	290 lb/hr
VOC (EPA 18 and 25A)	ppmvd @ 7% O_2 (measured as methane), lb/hr	50 ppmvd @ 7% O_2, 9.1 lb/hr

Following this Introduction, a summary of the test results can be found in Section 2. Section 3 provides a description of the process and sampling locations. Section 4 provides a description of the sampling and analytical procedures, and Section 5 provides the quality assurance and quality control procedures used throughout the test program. Detailed test results, raw test data, operating data, laboratory reports, example calculations, and quality control data can be found in Appendices A-F, respectively.

2. SUMMARY OF TEST RESULTS

WESTON performed the emissions testing program on Boiler No. 1 on 23-24 September 2015 and 3-5 November 2015. Three test runs were performed for each parameter while the unit was operating at maximum normal load.

A summary of the test results and emissions limits are presented in Table 2-1. Preliminary data from the September 2015 test event indicated HCl emissions may have been in excess of permitted emission limitations. Accordingly, a second HCl test program was conducted on 3-5 November 2015 during two separate conditions. Testing was performed following the guidelines set forth in the previously approved test protocol (dated April 2015) and respective Michigan Department of Environmental Quality (MDEQ) correspondence letter. The HCl results from the November test program demonstrate compliance with the permitted emission limit. At the time of this writing, LWEC is in the process of preparing a separate letter report of findings explaining the reasons believed to contribute to the higher HCl results reported from the September test program. All other test results from the September test program were within the allowable criteria.

Additionally, upon final review of the field data, WESTON discovered an error in the PM_{10} isokinetic sampling program for Run 2. Specifically, an incorrect pitot tube calibration factor (0.840 vs. 0.758) was inadvertently entered into the sampling program setup page. After correcting the pitot calibration factor data entry, the resulting isokinetic sampling rate and ΔP minimum velocity (ideal for the selected sampling nozzle) did not meet the acceptable criteria as per EPA Method 201A. Despite the error WESTON believes the PM_{10} results reported for Run 2 are still representative of the boiler emissions considering the filterable PM_{10} fraction tracks closely with the EPA Method 5 PM results (within 0.5 lb/hr) sampled concurrently with the PM_{10} test runs. The test results for all three PM_{10} runs were well below the allowable emission limit, with an average compliance margin of 73%.

There were no other operational or sampling complications during the field testing that impacted the test results. All test data are believed to be representative of the emissions encountered during the test periods.

All sample analyses were performed by Maxxam Analytical Services at their Burlington, Ontario laboratories. Additionally, audit samples for HCl (for both the September and November test

program) and lead were obtained from a Stationary Source Audit Sample (SSAS) provider. The audit sample results (provided in Appendix D) indicate all reported values for both test programs were within the acceptable limits of the known value.

Table 2-1
Boiler No. 1 Compliance Test Results Summary

Parameter	Date	Reporting Units[1]	Run Number			Average	Emission Limit
			1	2	3		
PM	9/24/15	lb/MMBtu lb/hr	0.005 1.54	0.005 1.42	0.009 2.79	0.006 1.92	0.06 19.2
HCl	9/24/15	lb/hr	4.10	6.75	4.73	5.19	2.17
HCl (Condition 1)	11/3-4/15	lb/hr	1.30	1.44	1.11	1.28	2.17
HCl (Condition 2)	11/5/15	lb/hr	1.45	1.63	1.72	1.60	2.17
PM_{10}	9/24/15	lb/hr	4.36	3.62	4.66	4.21	15.4
Lead	9/23-24/15	lb/hr	0.005	0.003	0.001	0.003	0.02
SO_2	9/24/15	lb/hr	124	114	124	121	290
NOx	9/24/15	lb/hr	63.8	64.0	67.5	65.1	145
VOC	9/24/15	ppmvd @ 7% O_2 lb/hr	1.4 0.24	1.8 0.31	0.7 0.12	1.3 0.22	50 9.1

3. DESCRIPTION OF PROCESS AND SAMPLING LOCATIONS

3.1 PROCESS OVERVIEW

LWEC is a cogeneration facility, consisting of a single boiler generating process steam and electric power. The facility fires biomass, with limited natural gas use for startup and stabilization.

3.1.1 BASIC OPERATING PARAMETERS

The fuel feed to the boiler was regulated to meet process steam and electrical generation requirements. Excess air was regulated to meet boiler performance requirements. The fuel blend may be modified to improve combustion characteristics. Adjustments to air, fuel blend or load were made as necessary to conform to emissions monitoring limits.

3.1.2 PROCESS CAPACITY

The hourly boiler operating limit is 324 million British thermal units (MMBtu). The maximum annual heat input is 2,656,800 MMBtu, based on 8,200 hours of operation per year.

3.2 AIR POLLUTION CONTROL EQUIPMENT

Particulate emissions are controlled with a single chamber, three-field electrostatic precipitator (ESP).

3.2.1 OPERATING PARAMETERS

The precipitator electrical controls and rapping sequence, intensity and frequency are set for optimum performance and are not generally modified after this optimization exercise unless emissions issues are observed.

3.2.2 RATED CAPACITY AND EFFICIENCY

The original design specifications for the precipitator were: 98.1% efficiency at 110,000 actual cubic feet per minute (ACFM) at a temperature of 370°F.

3.3 REFERENCE METHOD TEST LOCATION

The reference method sample ports (two sets) are located on a section of rectangular ductwork that runs horizontally from the exit of the ESP prior to the exhaust stack. The rectangular ductwork is six feet by six feet six inches (6’ x 6½’) and has a straight run of fifty-seven feet (57’). All dimensions and port locations were verified prior to testing.

Additionally, a third set of sample ports are located on top of the ESP outlet ductwork. These ports may also be used for sampling (reference method CEMS probe, for example).

Figure 3-1 presents a diagram of the CEMS and reference method test location.

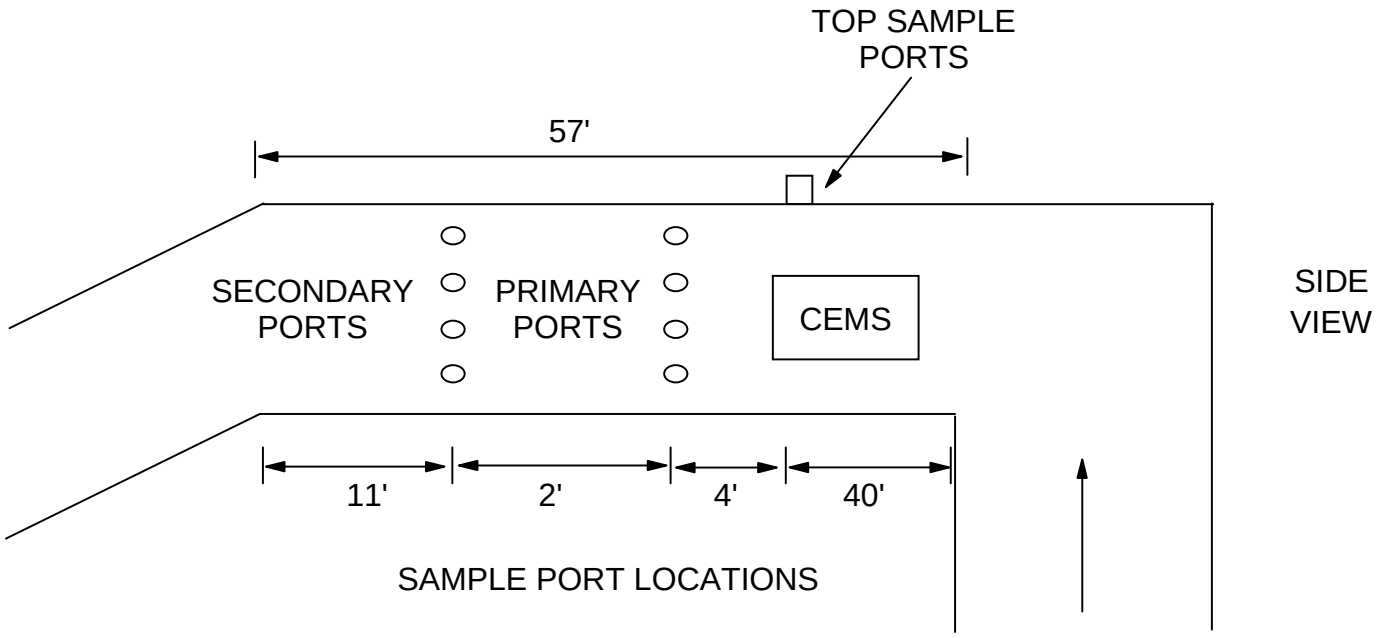
3.3.1 FLUE GAS PARAMETERS

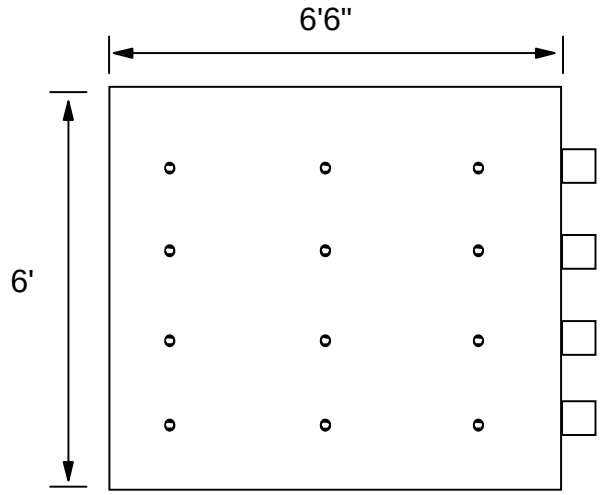
The expected flue gas parameters at this location are as follows:

Temperature: approximately 370 °F

Moisture: approximately 15% v/v

Volumetric Flow Rate: Up to about 125,000 ACFM





Reference Method Traverse Point Number	Distance From Inside Near Wall
1	13"
2	39"
3	65"

DRAWING NOT TO SCALE

FIGURE 3-1
CEMS AND REFERENCE METHOD TEST LOCATION

4. SAMPLING AND ANALYTICAL PROCEDURES

The purpose of this section is to detail the stack sampling and analytical procedures utilized during the test program.

4.1 PRE-TEST DETERMINATIONS

Preliminary test data was obtained at the sampling location. Geometry measurements were measured and recorded, and traverse point distances verified. A preliminary velocity traverse was performed utilizing a calibrated "S" type pitot tube and an inclined manometer to determine velocity profiles. Flue gas temperatures were measured with a calibrated direct readout pyrometer equipped with a chromel-alumel thermocouple. Water vapor content (for the pre-test determinations) was based on previous test data.

A check for the presence or absence of cyclonic flow was conducted at the test location. An average cyclonic flow check angle of < 20° verifies the suitability of the test site for obtaining representative samples.

Preliminary test data was used for nozzle sizing and sampling rate determinations for isokinetic sampling procedures.

Pre-test calibration of probe nozzles, pitot tubes, metering systems, and temperature measurement devices were performed as specified in Section 5 of EPA Method 5 test procedures.

4.2 PARTICULATE AND HYDROGEN CHLORIDE SAMPLING METHOD – EPA METHODS 5 AND 26A

The sampling train utilized to perform the particulate and hydrogen chloride sampling was a combined EPA Reference Method 5 and 26A sampling train (see Figure 4-1).

Particulate and Hydrogen Chloride Sampling Train

A calibrated glass nozzle was attached to a heated (>260°F) borosilicate probe. The probe was connected to a heated (>260°F) borosilicate filter holder containing a tared 9-cm quartz filter. The filter holder was connected to the first of six impingers by means of rigid glass connectors. The first moisture knockout impinger contained 50 ml of 0.1 normal sulfuric acid. The second and third impingers each contained 100 ml of 0.1 normal sulfuric acid. The fourth impinger was empty and the fifth impinger contained 100 ml of 0.1 normal sodium hydroxide. The sixth impinger contained 300 grams of dry silica gel. The second and third impingers were a standard Greenburg-Smith type; all other impingers were of a modified design. The first impinger was of a modified design with a shortened stem. All impingers were maintained in an ice bath. A control console with a leakless vacuum pump, a calibrated dry gas meter, a calibrated orifice, and inclined manometers were connected to the final impinger via an umbilical cord to complete the train. Flue gas velocities were measured with a calibrated "S" type pitot tube fastened alongside the sampling probe. Flue gas temperatures were monitored with a calibrated direct readout digital pyrometer equipped with a chromel-alumel thermocouple positioned near the sampling nozzle.

Filter box and impinger exit gas temperatures were monitored with a calibrated direct readout digital pyrometer equipped with chromel-alumel thermocouples positioned in the heated filter chamber and in the sample gas stream after the last impinger.

Particulate Sample Recovery

At the conclusion of each test, the sampling train was dismantled, the openings sealed, and the components transported to the field laboratory.

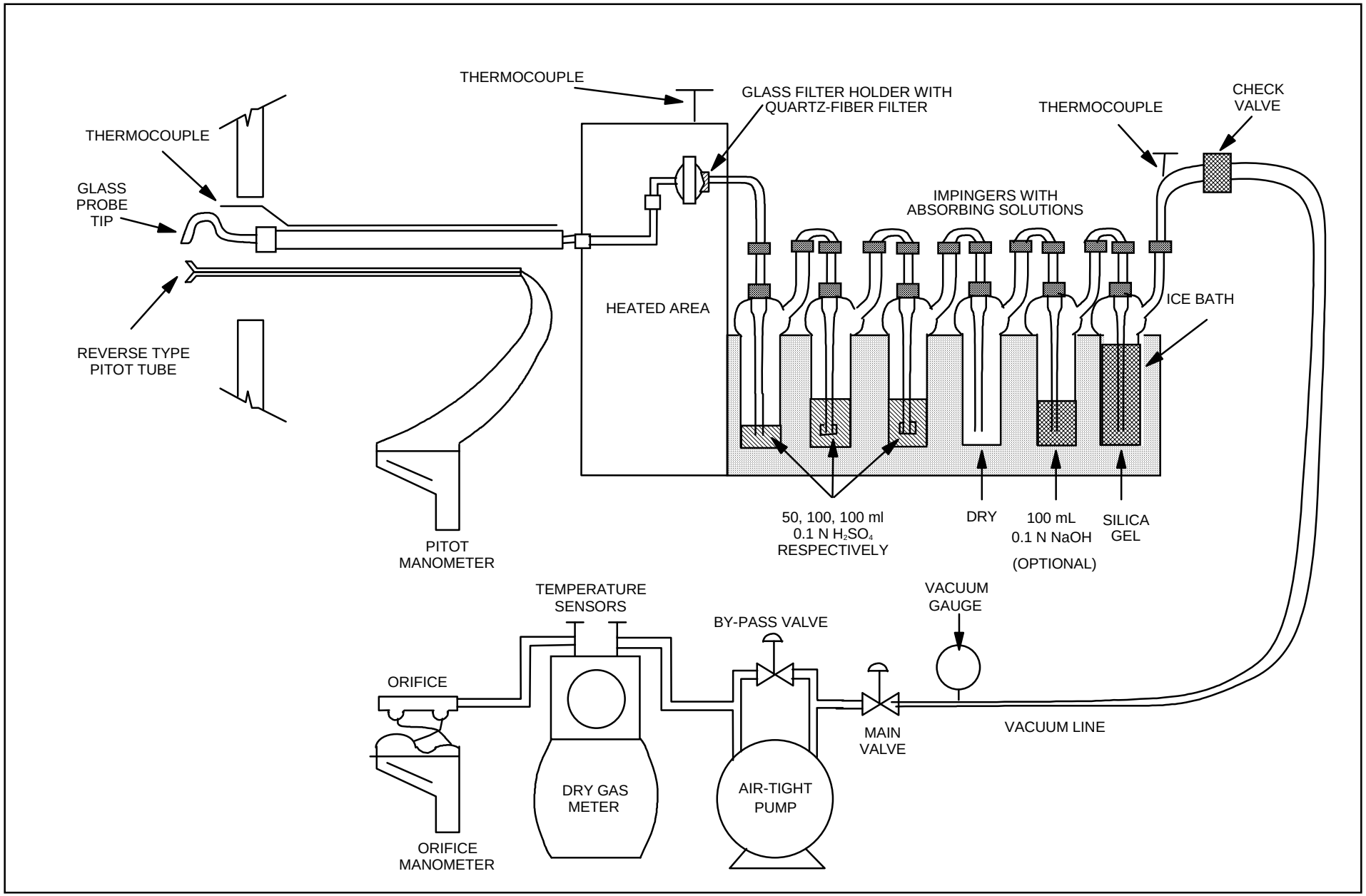


FIGURE 4-1
EPA METHOD 5 & 26A
PARTICULATE MATTER AND HYDROCHLORIC ACID SAMPLING TRAIN

A consistent procedure was employed for sample recovery as follows:

- The quartz fiber filter(s) was removed from its holder with tweezers and placed in its original container (petri dish), along with any loose particulate and filter fragments (Sample type 1).
- The probe and nozzle were separated and the particulate rinsed with acetone into a borosilicate container with a Teflon-lined closure while brushing a minimum of three times. Particulate adhering to the brush was rinsed with acetone into the same container. The front-half of the filter holder and connecting glassware were rinsed with acetone while brushing a minimum of three times. The rinses were combined (Sample type 2).
- Acetone and filter samples were retained for blank analysis.

Each sample bottle was labeled to clearly identify its contents. The height of the fluid level was marked on each bottle. Sample integrity was assured by maintaining chain-of-custody records.

Particulate Analysis

The particulate analysis proceeded as follows:

- The filters (Sample type 1) and any loose fragments were desiccated for 24-hours and weighed to the nearest 0.1 milligram to a constant (± 0.5 mg) weight.
- The front-half acetone wash samples (Sample type 2) and an acetone blank were evaporated at ambient temperature and pressure in tared beakers then desiccated and weighed to constant 0.1-mg weight.

The total weight of material measured in the acetone-rinse fraction plus the weight of material collected on the quartz filter represents the total filterable particulate catch. Blank acetone corrections were made where appropriate for all sample weights.

Hydrogen Chloride Sample Recovery

A consistent procedure was employed for sample recovery as follows:

- The contents of the first four impingers were measured to the nearest milliliter and the value recorded. The liquid along with a distilled water rinse of the impingers and glass connectors were placed into two separate (impingers 1 and 2, impingers 3 and 4) polyethylene sample containers, the height of liquid was marked on the bottle, and secured under documented chain-of-custody (sample type 1).

- The contents of the fifth impinger (sodium hydroxide) were measured to the nearest milliliter and the value recorded. The sample was retained; however, no analysis of this sample was performed.

- The silica gel was removed from the last impinger and immediately weighed to the nearest 0.5 g.

- Samples of 0.1N H_2SO_4 and distilled water were retained for blank analysis.

Each sample bottle was labeled to clearly identify its contents. The height of the fluid level was marked on each bottle. Sample integrity was assured by maintaining chain-of-custody records.

Hydrogen Chloride Analysis

Each sample was analyzed for chloride (Cl^-) utilizing ion chromatography.

4.3 PARTICULATE MATTER ≤ 10 MICRON SAMPLING TRAIN

The PM_{10} sampling was performed using EPA Method 201A combined with EPA Method 202 (see Figure 4-2).

The sampling train consisted of the following components:

- A stainless steel nozzle with an inside diameter sized to sample isokinetically connected to a PM_{10} cyclone separator.

- A heated borosilicate probe equipped with a calibrated thermocouple to measure flue gas temperature and a calibrated S-type pitot tube to measure flue gas velocity pressure.

- A heated (at stack temperature) borosilicate filter holder containing a tared quartz fiber filter followed by a water cooled coil condenser.

- An impinger train consisting of four impingers. The first and second impingers were empty and the third impinger contained 100 ml of distilled water. The fourth impinger contained 300 grams of 6-16 mesh dry silica gel. The first impinger had a shortened stem and served as a moisture drop out. The second, third, and fourth impingers were of a modified design. A glass filter holder containing a Teflon filter was placed between the second and third impingers. The filter exit temperature was monitored and maintained at 65°F to 85°F.

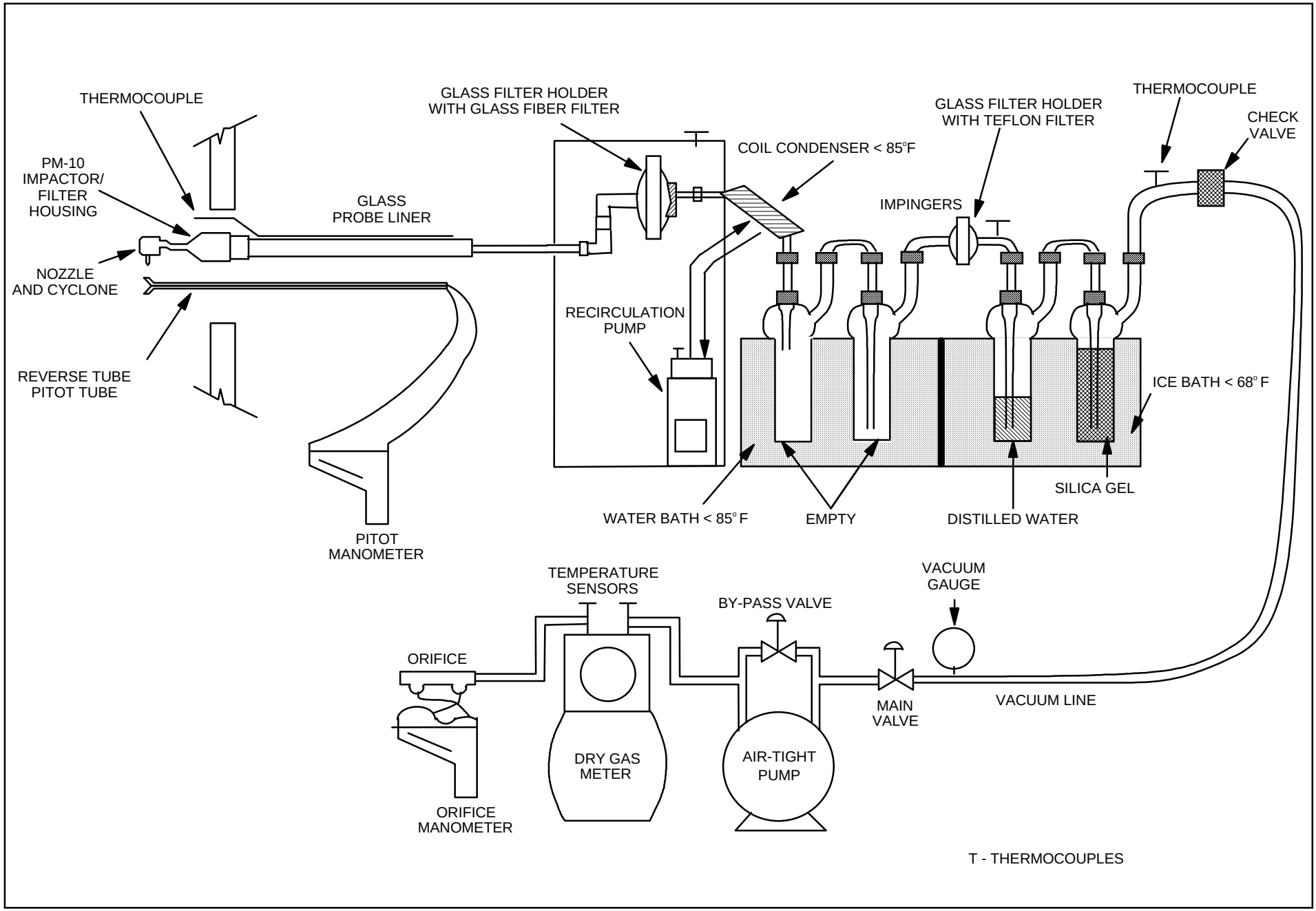


FIGURE 4-2
EPA METHOD 201A/202
PARTICULATE / CONDENSIBLES SAMPLING TRAIN

- A vacuum hose with adapter to connect the outlet of the impinger train to a control module.
- A control module containing a 3-cfm carbon vane vacuum pump, a calibrated dry gas meter (sample gas volume measurement device), a calibrated orifice (sample gas flow rate monitor), and inclined manometers (orifice and gas stream pressure indicators).
- A switchable calibrated digital pyrometer to monitor flue and sample gas temperatures.

Leak checks of the entire sampling train were performed prior to sampling. At test completion, a final leak check was performed at the sample probe inlet. Per EPA 201A procedures, no leak check of the PM_{10} cyclone was performed at test completion. This minimized particle bypass through the cyclone during the leak check.

4.3.1 PM_{10} Sample Recovery

At the conclusion of each PM_{10} test, the sampling train was dismantled. The openings were sealed and the components transported to the field laboratory.

Following test completion and prior to the start of sample recovery, the condenser and impinger portion of the EPA 202 train was purged with ultra-high purity nitrogen for one hour at a rate of 20 liters per minute to expel dissolved sulfur dioxide. Prior to the purge, the short stem impinger in the moisture dropout was replaced with a long stem impinger and if necessary a known volume of DI water was added so that the water level was at least 1 cm above the impinger tip.

A consistent procedure was employed for sample recovery:

1. The pre-weighed quartz fiber filter was removed from the borosilicate filter housing with tweezers and placed in original containers (petri dish) along with any loose particulate and filter fragments (sample type 1).
2. The particulate adhering to the internal surfaces of the nozzle and cyclone inlet were rinsed with acetone into a borosilicate container while brushing a minimum of three times with acetone until no visible particulate remained. Particulate adhering to the brush was rinsed with acetone into the same container. The container was sealed with a Teflon lined closure (sample type 2 – front half acetone No. 1).

3. The particulate adhering to the internal surfaces of the cyclone to filter holder connecting tube (cyclone exit) and filter holder were rinsed with acetone into a borosilicate container while brushing a minimum of three times until no visible particulate remained. Particulate adhering to the brush was rinsed with acetone into the same container. The container was sealed with a Teflon lined closure (sample type 3 – front half acetone No. 2).

4. Following completion of the nitrogen purge, the total liquid content of impingers one, two and three were measured volumetrically and the sample placed in a borosilicate container (sample type 4).

5. The condenser, first and second impingers, front half of the Teflon filter holder, and connectors were rinsed two times with degassed (with nitrogen) distilled water. The rinsate was added to sample type 4.

6. Following the water rinses, the condenser, first and second impingers, front half of the Teflon filter holder, and connectors were rinsed once with acetone and then two times with hexane. The rinses were placed in a borosilicate container (sample type 5).

7. The silica gel was removed from the last impinger and immediately weighed to the nearest one-tenth g. The weight gain was recorded.

8. Acetone, PM_{10} filter, Teflon filter, distilled water and hexane blank samples were placed into a borosilicate/Teflon container or petri dish and sealed for gravimetric analysis.

In addition and as required by EPA 202, a blank train was set up, recovered and analyzed with the source samples.

Each container was labeled to clearly identify its contents. The height of the fluid level was marked on the container of each liquid sample to determine whether leakage occurred during transport.

4.3.2 PM_{10} Sample Analysis

1. The filters and any loose fragments were desiccated for 24 hours and weighed to the nearest 0.1 mg to a constant weight of no more than 0.5 mg between 2 consecutive weighings with no less than six hours of desiccation time between weighings. As an alternative, the filters were heated to 105°C and desiccated prior to the first weighing. This option is an alternative procedure per EPA Method 5.

2. The front-half acetone wash samples (nozzle/cyclone rinse and cyclone exit/filter holder rinse) were evaporated at ambient temperature and pressure in tared

beakers and then desiccated to constant weight to the nearest 0.1 mg. Since the acetone No. 1 sample collects particulate greater than PM_{10}, analysis of this sample is optional.

3. The contents of sample type 4 were mixed with approximately 30 ml of hexane in a separatory funnel. After mixing, the organic phase was removed and retained in a tared beaker. Two separate additions of 30 ml of hexane were added to the separatory funnel and removed (following mixing and separation) to the tared beaker. The organic extract from Sample Type 4 was combined with the organic train rinse in sample type 4. The organic fraction was evaporated at room temperature (not to exceed 85°F) to approximately 10 ml. The resulting liquid was transferred to a preweighed tin, evaporated to dryness at room temperature (not to exceed 85°F), desiccated for 24 hours and weighed to a constant ± 0.5 mg to the nearest 0.1 mg.

4. The resulting water (inorganic fraction) was placed in a tared beaker and taken to near dryness (~ 50 ml) on a hot plate and then evaporated to not less than 10 ml in an oven at 105°C. The sample was then allowed to evaporate to dryness at room temperature. After obtaining dryness, the residue was redissolved in 100 ml distilled water. The sample was titrated to a pH of 7.0 using NH_4OH (of known normality). The volume of titrant was recorded. The solution was then evaporated to approximately 10 ml. The resulting liquid was transferred to a preweighed tin, evaporated to dryness at room temperature (not to exceed 85°F), desiccated for 24 hours and weighed to a constant ± 0.5 mg to the nearest 0.1 mg.

5. The water soluble condensable particulate matter from the Teflon filter was extracted from the filter using ultra-filtered water in an extraction tube and sonication bath. The aqueous extract was combined with the contents of Sample Type 4. The organic soluble condensable particulate matter from the Teflon filter was extracted from the filter using hexane in an extraction tube and sonication bath. The organic extract was combined with the contents of Sample Type 5.

6. The field blank train and blank samples of acetone, distilled water and hexane were analyzed as described above.

The total of the organic and inorganic fractions represents the condensable particulate catch. The PM_{10} includes the filterable PM_{10} particulate catch (front-half acetone sample No. 2 and filter) plus the organic and inorganic condensable.

4.4 LEAD SAMPLING METHOD – EPA METHOD 12

The sampling train utilized to perform lead sampling was assembled pursuant to EPA Method 12 (see Figure 4-3). A calibrated borosilicate nozzle was attached to a heated borosilicate probe. The probe was connected to a heated (~250°F) borosilicate filter holder containing a low metals quartz fiber filter.

The filter holder was connected to the first of four impingers by a rigid borosilicate connector or flexible Teflon line. The first and second impingers each contained 100 ml of 0.1 N nitric acid (HNO_3), the third impinger was dry and the fourth impinger contained 300 grams of dry preweighed silica gel. The second impinger is a standard Greenburg-Smith type, all other impingers are of a modified design. All impingers were maintained in a crushed ice bath. A control console with a leakless vacuum pump, a calibrated dry gas meter, a calibrated orifice, and inclined manometers were connected to the final impinger via an umbilical cord to complete the train.

Probe, filter chamber and impinger exit gas temperatures were monitored with a calibrated direct readout pyrometer equipped with chromel-alumel thermocouples positioned in the probe exit, heated filter chamber and in the sample gas stream after the last impinger. Flue gas velocities were measured with a calibrated "S" type pitot tube fastened along side the sampling probe. Flue gas temperatures were monitored with a calibrated direct readout pyrometer equipped with a chromel-alumel thermocouple positioned near the sampling nozzle.

Leak checks were performed on the sampling apparatus according to reference method instruction, prior to and following each run.

Lead Sample Recovery

At the conclusion of each test, the sampling train was dismantled, the openings sealed, and the components transported to the field laboratory.

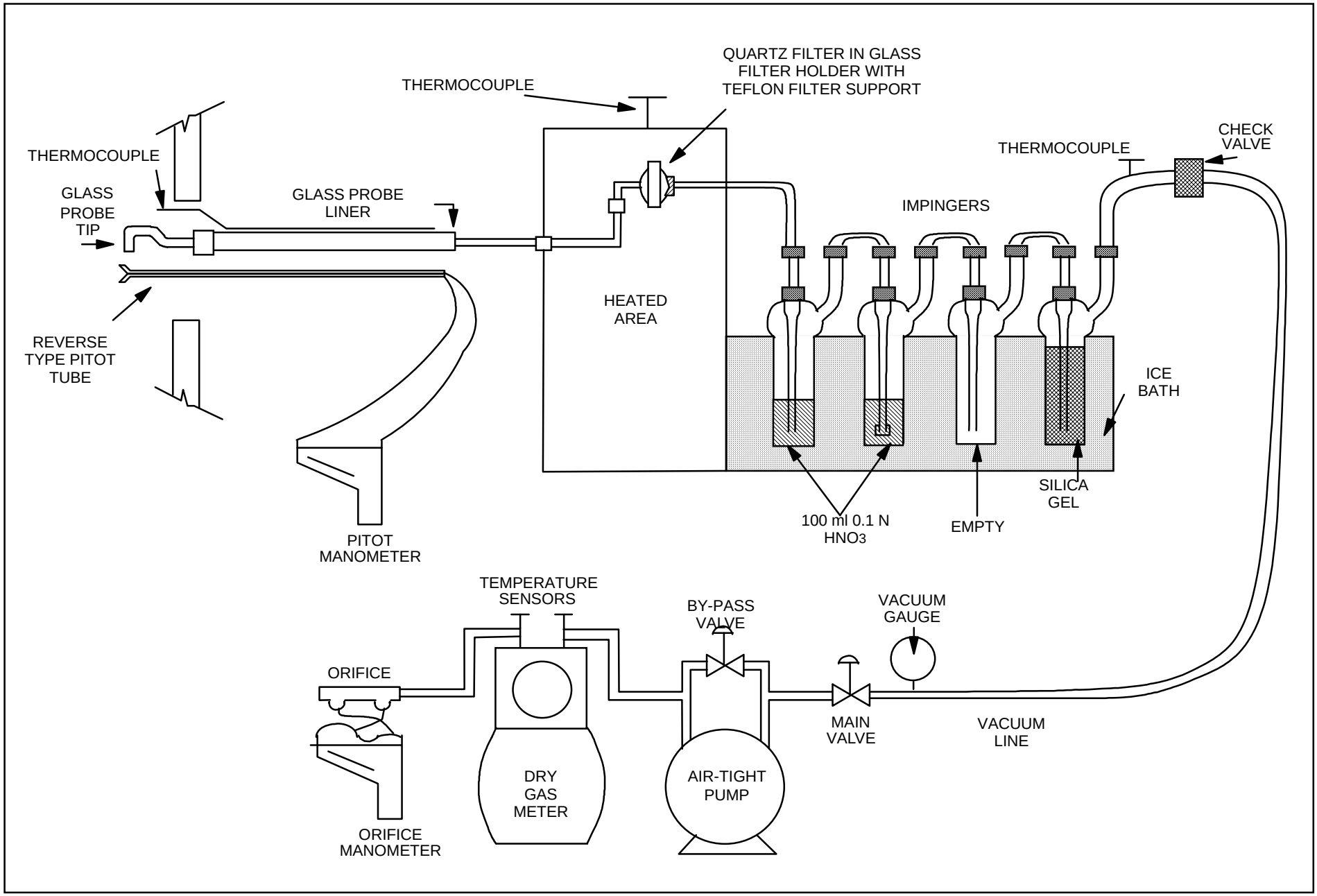


FIGURE 4-3
EPA METHOD 12
LEAD SAMPLING TRAIN

A consistent procedure was employed for sample recovery as follows:

1. The quartz fiber filter(s) was removed from its holder with tweezers and placed in a borosilicate sample bottle, along with any loose particulate and filter fragments (Sample type 1).

2. The internal surfaces of the nozzle, probe and front half of the filter holder were rinsed with 0.1 N HNO_3 into a borosilicate container while brushing a minimum of three times with a non-metallic (Teflon) brush. The brush was rinsed with 0.1 N HNO_3 into the same container. The container was sealed with a Teflon-lined closure (sample type 2).

3. The total volume of HNO_3 and condensate in impingers 1, 2 and 3 were measured to the nearest milliliter and the value recorded. The liquid was then placed in a borosilicate container along with a 0.1 N HNO_3 rinse (performed a minimum of two times) of the impingers, connectors, and back-half of the filter holder. The container was sealed with a Teflon lined closure (sample type 3).

4. The silica gel was removed from the last impinger and immediately weighed to the nearest tenth gram. The weight gain was recorded.

5. Nitric acid and filter blank samples were placed into borosilicate containers for analysis.

Each container was labeled to clearly identify its contents. The height of the fluid level was marked on the container of each liquid sample to determine whether or not leakage occurred during transport.

EPA Method 12 - Lead Analysis

Samples collected for lead analysis were contained in four different media:

- Front Half Nitric Acid
- Filter
- Back Half Nitric Acid

Following preparation of the filter, the lab combined the filter, front half nitric, and back half nitric acid impinger samples. The lead was solubilized by the addition of nitric acid and 30 percent hydrogen peroxide. Sample volumes were reduced to 50 ml on a hot plate. The sample was filtered and brought to a final volume and analyzed by Inductively Coupled Plasma/Mass Spectrophotometer (ICP/MS).

Results were reported in total µg of lead. The source lead values were site blank corrected per Section 12.4 of EPA Method 12.

4.5 VOC, NO_X, SO_2, AND O_2/CO_2 CONTINUOUS EMISSIONS MONITORING SYSTEM

A diagram of the reference method sampling Continuous Emissions Monitoring System (CEMS) used to measure VOC, NO_x, SO_2 and O_2/CO_2 is presented in Figure 4-4. The system conformed to the requirements of EPA Reference Methods 25A, 7E, 6C, and 3A. A flame ionization analyzer was used to measure VOC (measured as methane) concentrations. A chemiluminescent analyzer was used to measure NO_x concentrations and a non-dispersive, ultraviolet light detection analyzer was used to measure SO_2 concentrations. A combination non-dispersive infrared (NDIR) and paramagnetic analyzer was used to measure CO_2 and O_2 concentrations, respectively.

Stack gas was withdrawn from the stack through a heated stainless steel probe and heated filter via a heated sample line maintaining a temperature of 250°F. The probe was inserted into a dedicated sample port at a single point in the gas stream. The outlet of the heated filter enclosure was connected to a sample conditioning system for moisture removal. The clean, dried sample was then transported to the analyzers via a Teflon® sample line. A separate Teflon® line was connected into the probe outlet for introduction of VOC, NO_x, SO_2, and O_2/CO_2 bias gases.

4.5.1 VOC, NO_x, SO_2, and O_2/CO_2 Monitoring Procedures

The VOC, NO_x, SO_2, and O_2/CO_2 analyzers were calibrated daily by direct introduction of EPA Protocol calibration gases to the analyzers. These gases are prepared with a balance of nitrogen and nitrogen is also used as the zero gas. After the analyzer calibration, a system bias check was conducted by introducing the zero gas and one selected VOC, NO_x, SO_2, and O_2/CO_2 calibration gas to the sample probe outlet.

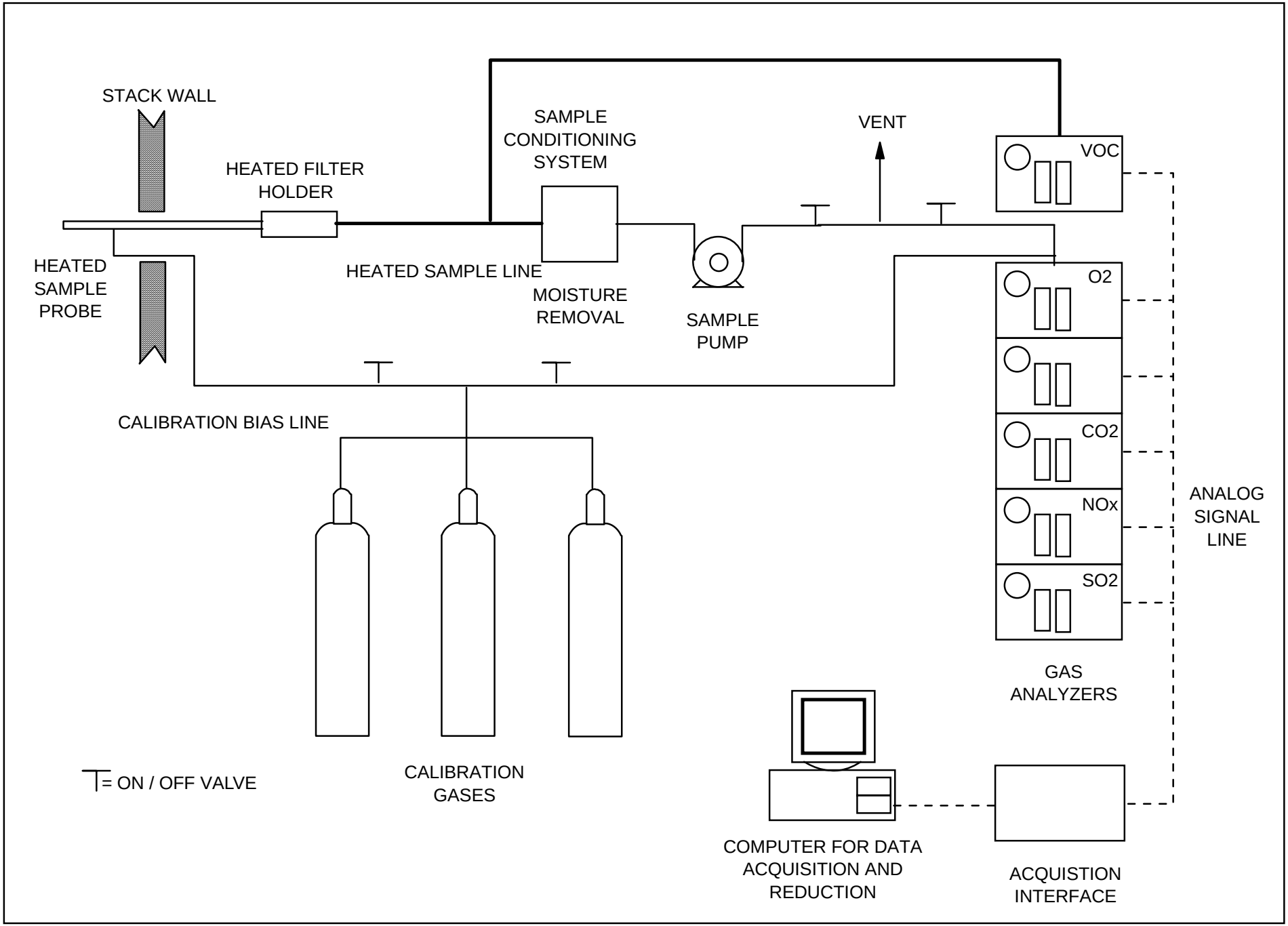


FIGURE 4-4
REFERENCE METHOD SAMPLING SYSTEM

Q1_LWEC001_Opactiy_003758

IASDATA\LWEC\14464.007.003\FIGURE 4-4 REFERENCE METHOD SAMPLING SYSTEM

Pursuant to EPA Reference Method 7E, an interference check and NO_2 to NO conversion efficiency demonstration is required. As per Section 8.2.7 of EPA Reference Method 7E, the interference check on WESTON's instrumental analyzers were previously performed (December 2014) and were not repeated for this test program. A NOx analyzer NO_2 to NO converter efficiency demonstration was performed prior to and after the test effort in accordance with Section 8.2.4.1 of EPA Reference Method 7E.

Additionally, an O_2 stratification check was conducted prior to the formal test runs in accordance with EPA Method 7E – Section 8.1.2.

Three formal test runs of one hour or longer were performed and coincided with the isokinetic sample runs. The bias check was repeated at the end of each test run to determine sampling system bias and instrument drift for each analyzer.

The output from the analyzers was directed to a data acquisition system and recorded by a computer equipped with data reduction software designed by WESTON. The software calculated the average one-minute measured concentrations which were used to compute an average concentration for the test run.

5. QUALITY ASSURANCE/QUALITY CONTROL

5.1 QUALITY CONTROL PROCEDURES

As part of the compliance test, WESTON implemented a QA/QC program. QA and QC are defined as follows:

- Quality Control: The overall system of activities whose purpose is to provide a quality product or service: for example, the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.
- Quality Assurance: A system of activities whose purpose is to provide assurance that the overall quality control is being done effectively. Further,

The field team manager for stack sampling was responsible for implementation of field QA/QC procedures. Individual laboratory managers were responsible for implementation of analytical QA/QC procedures. The overall project manager oversees all QA/QC procedures to ensure that sampling and analyses meet the QA/QC requirements and that accurate data results from the test program.

5.2 GAS STREAM SAMPLING QA PROCEDURES

General QA checks that were conducted during testing and apply to all methods include the following:

- Performance of leak checks.
- Use of standardized forms, labels and checklists.
- Maintenance of sample traceability.
- Collection of appropriate blanks.
- Use of calibrated instrumentation.
- Review of data sheets in the field to verify completeness.
- Use of validated spreadsheets for calculation of results.

The following section details specific QA procedures applied to the isokinetic methods.

5.2.1 Stack Gas Velocity/Volumetric Flow Rate QA Procedures

The QA procedures followed for velocity/volumetric flow rate determinations followed guidelines set forth by EPA Method 2. Incorporated into this method, are sample point determinations by EPA Method 1, and gas moisture content determination by EPA Method 4. QA procedures for Methods 1 and 2 are discussed below.

Volumetric flow rates were determined during the isokinetic flue gas tests. The following QC steps were followed during these tests:

- The S-type pitot tube was visually inspected before sampling.
- Both legs of the pitot tube were leak checked before sampling.
- Proper orientation of the S-type tube was maintained while making measurements. The yaw and pitch axes of the S-type pitot tube were maintained at 90° to the flow.
- The manometer oil was leveled and zeroed before each run.
- Pitot tube coefficients were determined based on physical measurement techniques as delineated in Method 2.

5.2.2 Moisture and Sample Gas Volume QA Procedures

Gas stream moisture was determined as part of the isokinetic test trains. The following QA procedures were followed in determining the volume of moisture collected:

- Preliminary impinger train tare weights are weighed or measured volumetrically to the nearest 0.1 g or 1.0 ml.
- The balance is leveled and placed in a clean, motionless, environment for weighing.
- The indicating silica gel is fresh for each run and periodically inspected and replaced during runs if needed.
- The silica gel impinger gas temperature is maintained below 68°F.

The QA procedures that are followed in regards to accurate sample gas volume determination was:

- The dry gas meter is fully calibrated annually using an EPA approved intermediate standard device.

- Pre-test, port-change, and post-test leak-checks are completed (must be less than 0.02 cfm or 4 percent of the average sample rate).
- The gas meter is read to the thousandth of a cubic foot for all initial and final readings.
- Readings of the dry gas meter, meter orifice pressure (Delta H) and meter temperatures are taken at every sampling point.
- Accurate barometric pressures are recorded at least once per day.
- Pre- and Post-test dry gas meter checks are completed to verify the accuracy of the meter calibration constant (Y).

5.2.3 Isokinetic Sampling Train QA Procedures

The Quality Assurance procedures outlined in this section are designed to ensure collection of representative, high quality test parameter (HCl/HF) concentrations and mass emissions data. The sampling QA procedures followed to ensure representative measurements are:

- All glassware was prepared per reference method procedures.
- The sample rates must be within ± 10 percent of the true isokinetic (100 percent) rate.
- All sampling nozzles were manufactured and calibrated according to EPA standards.
- Recovery procedures are completed in a clean environment.
- Sample containers for liquids and filters were constructed of borosilicate or polyethylene with Teflon®-lined lids.
- At least one reagent blank of each type of solution or filter was retained and analyzed.
- All test train components from the nozzle through the last impinger are constructed of glass (with the exception of the filter support pad which is Teflon®).
- All recovery equipment (i.e., brushes, graduated cylinders, etc.) were non-metallic.

5.2.4 Sample Identification and Custody

Sample custody procedures for this program are based on EPA recommended procedures. Since samples are analyzed at remote laboratories, the custody procedures emphasize careful documentation of sample collection and field analytical data and the use of chain-of-custody records for samples being transferred. These procedures are discussed below.

The Field Team Manager is responsible for ensuring that all stack samples taken are accounted for and that all proper custody and documentation procedures are followed for the field sampling and field analytical efforts. The Field Team Manager is assisted in this effort by key sampling personnel involved in sample recovery.

Following sample collection, all stack samples are given a unique sample identification code. Stack sample labels are completed and affixed to the sample container. The sample volumes are determined and recorded and the liquid levels on each bottle are marked. Sample bottle lids are sealed on the outside with Teflon® tape to prevent leakage. Additionally, the samples were stored in a secure area until they were shipped.

As the samples are packed for travel, chain-of-custody forms are completed for each shipment. The chain-of-custody forms specifying the treatment of each sample are also enclosed in the sample shipment container.

5.2.5 Data Reduction and Validation QC Checks

All data and/or calculations for flow rates, moisture contents, and isokinetic rates, are made using a computer software program validated by an independent check. In addition, all calculations are spot checked for accuracy and completeness by the Field Team Leader.

In general, all measurement data are validated based on the following criteria:

- Process conditions during sampling or testing.
- Acceptable sample collection procedures.
- Consistency with expected or other results.
- Adherence to prescribed QC procedures.

Any suspect data is flagged and identified with respect to the nature of the problem and potential effect on the data quality.

5.3 REFERENCE METHOD CEMS QA/QC CHECKS

- Continuous emissions monitoring system (probe to sample conditioner) was checked for leaks prior to the testing.

- Pre and post-test calibration bias tests were performed as required by the reference methods.
- A permanent data record of analyzer response was made using computer software designed by WESTON.
- All calibration gases used met EPA Protocol standards.

APPENDIX A
DETAILED TEST RESULTS

SEPTEMBER TEST PROGRAM

L'Anse Warden Electric Company
Boiler No. 1
Summary of Particulate and Hydrogen Chloride Test Data and Test Results

TEST DATA			
Test run number	1	2	3
Location		Boiler No. 1	
Test date	9/24/15	9/24/15	9/24/15
Test time period	1135-1330	1513-1657	1756-1919
F-Factor	9561	9561	9561
SAMPLING DATA			
Sampling duration, min.	72	72	72
Barometric pressure, in. Hg	29.78	29.74	29.74
Avg. orifice press. diff., in H2O	1.65	1.65	1.75
Avg. dry gas meter temp., deg F	80.8	82.8	79.9
Avg. abs. dry gas meter temp., deg. R	541	543	540
Total liquid collected by train, ml	147.7	159.3	181.4
Std. vol. of H2O vapor coll., cu.ft.	6.953	7.499	8.540
Dry gas meter calibration factor	1.0017	1.0017	1.0017
Sample vol. at meter cond., dcf	46.030	45.851	47.060
Sample vol. at std. cond., dscf (1)	44.968	44.568	46.002
Percent of isokinetic sampling	98.8	98.7	100.6
GAS STREAM COMPOSITION DATA			
CO2, % by volume, dry basis	10.8	10.9	11.5
O2, % by volume, dry basis	9.2	9.1	8.7
N2, % by volume, dry basis	80.0	80.0	79.8
Molecular wt. of dry gas, lb/lb mole	30.10	30.11	30.19
H2O vapor in gas stream, prop. by vol.	0.134	0.144	0.157
Mole fraction of dry gas	0.866	0.856	0.843
Molecular wt. of wet gas, lb/lb mole	28.48	28.36	28.28
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA			
Static pressure, in. H2O	-12.60	-12.30	-12.30
Static pressure, in. Hg	-0.926	-0.904	-0.904
Absolute pressure, in. Hg	28.85	28.84	28.84
Avg. temperature, deg. F	382	376	384
Avg. absolute temperature, deg.R	842	836	844
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	12	12	12
Avg. gas stream velocity, ft./sec.	66.9	66.6	69.1
Stack/duct cross sectional area, sq.ft.	39.000	39.000	39.000
Avg. gas stream volumetric flow, wacf/min.	156484	155831	161695
Avg. gas stream volumetric flow, dscf/min.	81908	81199	82216
PARTICULATE LABORATORY REPORT DATA			
Front half acetone rinse, g	0.0029	0.0012	0.0056
Filter, g	0.0035	0.0047	0.0062
Total catch, g	0.0064	0.0059	0.0118
PARTICULATE EMISSIONS			
Conc., gr/dscf	0.0022	0.0020	0.0040
Mass rate, lb/hr	1.54	1.42	2.79
Mass rate, lb/MMBtu(2)	0.005	0.005	0.009
HCl LABORATORY REPORT DATA			
Total HCl, mg	17.00	28.00	20.00
HCl EMISSIONS			
Concentration, lb/dscf	8.33E-07	1.39E-06	9.58E-07
Concentration, ppm/v	8.81	14.64	10.13
Mass rate, lb/hr	4.10	6.75	4.73

(1) Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 inches Hg (760mm Hg).
(2) Based on an F-factor (Fd) of 9561 scf/MMBtu.

L'Anse Warden Electric Company
Boiler No. 1
Summary of PM_{10} Test Data and Test Results

TEST DATA:				
Test run number	1	2	3	
Location		Boiler No. 1		
Test date	9/24/15	9/24/15	9/24/15	
Test time period	1126-1307	1448-1609	1752-1933	
SAMPLING DATA:				
Avg Sqrt Delta P, sqrt(inches H2O)	0.99315	0.90042	0.96375	
Sampling duration, min.	96.5	80.0	96.0	
Nozzle diameter, in.	0.173	0.173	0.173	
Cross sectional nozzle area, sq.ft.	0.000163	0.000163	0.000163	
Barometric pressure, in. Hg	29.78	29.74	29.74	
Avg. orifice press. diff., in H_2O	0.49	0.49	0.49	
Avg. dry gas meter temp., deg F	72.17	77.6	76.0	
Avg. abs. dry gas meter temp., deg. R	532	538	536	
Total liquid collected by train, ml	108.2	102.9	111.6	
Std. vol. of H_2O vapor coll., cu.ft.	5.09	4.84	5.25	
Dry gas meter calibration factor	1.0050	1.0050	1.0050	
Sample vol. at meter cond., dcf	34.300	30.148	33.565	
Sample vol. at std. cond., dscf (1)	34.069	29.600	33.056	
Percent of isokinetic sampling	104.6	122.2	106.6	
Particle Diam. with 50% penetration, um (PM_{10} cyclone)	10.18	9.71	10.24	
Cyclone flow rate (actual), cfm	0.661	0.704	0.659	
Delta P minimum, in H2O	0.545	0.623	0.533	
Delta P maximum, in H2O	1.707	1.904	1.672	
GAS STREAM COMPOSITION DATA:				
CO_2, % by volume, dry basis	10.9	10.6	11.5	
O_2, % by volume, dry basis	9.2	9.3	8.7	
N_2, % by volume, dry basis	79.9	80.1	79.8	
Molecular wt. of dry gas, lb/lb mole	30.11	30.07	30.19	
H_20 vapor in gas stream, prop. by vol.	0.130	0.141	0.137	
Mole fraction of dry gas	0.870	0.859	0.863	
Molecular wt. of wet gas, lb/lb mole	28.54	28.37	28.52	
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:				
Static pressure, in. H_2O	-9.60	-12.10	-12.30	
Absolute pressure, in. Hg	29.07	28.85	28.84	
Avg. temperature, deg. F	375.68	371.9	380.1	
Avg. absolute temperature, deg.R	836	832	840	
Pitot tube coefficient	0.758	0.758	0.758	
Total number of traverse points	12	12	12	
Avg. gas stream velocity, ft./sec.	64.6	58.8	63.1	
Stack/duct cross sectional area, sq.ft.	39.00	39.00	39.00	
Avg. gas stream volumetric flow, wacf/min.	151141	137652	147713	
Avg. gas stream volumetric flow, dscf/min. (1)	80693	72362	77171	
LABORATORY REPORT DATA				
Acetone rinse less than PM10, g	0.0023	0.0015	0.0019	
Filter, g	0.0055	0.0045	0.0050	
H_2O Impinger (inorganic) residue, g	0.0061	0.0052	0.0082	
Solvent Impinger (organic) residue, g	<0.0010	<0.0010	<0.0010	
Total PM_{10} catch, g (2)	0.0139	0.0112	0.0151	
				Average
TOTAL PM_{10} EMISSIONS (2)				
Total PM_{10} Conc., gr/dscf	0.0063	0.0058	0.0070	0.0064
Filterable PM_{10} Conc., gr/dscf	0.0035	0.0031	0.0032	
Condensible PM_{10} Conc., gr/dscf	0.0028	0.0027	0.0038	
Filterable PM_{10} Emission rate, lb/hr	2.444	1.940	2.131	
Condensible PM_{10} Emission rate, lb/hr	1.911	1.681	2.532	
Total PM_{10} Emission rate, lb/hr	4.355	3.622	4.663	4.213

(1) Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 inches Hg (760mm Hg).
(2) Nondetect values are labeled as "<". Nondetect values are not total catch weights or emissions calculations.

L'Anse Warden Electric Company
Boiler No. 1
Summary of EPA Method 12 (Lead) Test Data and Test Results

TEST DATA:				
Test run number	1	2	3	
Test date	09/23/15	09/23/15	09/24/15	
Test time period	1513-1623	1657-1808	0828-0940	
SAMPLING DATA:				
Sampling duration, min.	60	60	72	
Nozzle diameter, in.	0.235	0.235	0.235	
Cross sectional nozzle area, sq.ft.	0.000301	0.000301	0.000301	
Barometric pressure, in. Hg	29.58	29.58	29.78	
Avg. orifice press. diff., in H2O	1.36	1.57	1.63	
Avg. dry gas meter temp., deg F	73.9	75.5	65.2	
Avg. abs. dry gas meter temp., deg. R	534	536	525	
Total liquid collected by train, ml	133.8	130.6	139.6	
Std. vol. of H2O vapor coll., cu.ft.	6.3	6.1	6.6	
Dry gas meter calibration factor	1.0017	1.0017	1.0017	
Sample vol. at meter cond., dcf	35.908	37.180	44.056	
Sample vol. at std. cond., dscf [(1)]	35.271	36.431	44.321	
Percent of isokinetic sampling	94.8	99.0	94.9	
GAS STREAM COMPOSITION DATA:				
CO2, % by volume, dry basis	10.7	11.0	11.1	
O2, % by volume, dry basis	9.2	9.1	9.1	
N2, % by volume, dry basis	80.1	79.9	79.8	
Molecular wt. of dry gas, lb/lb mole	30.08	30.12	30.14	
H2O vapor in gas stream, prop. by vol.	0.152	0.144	0.129	
Mole fraction of dry gas	0.848	0.856	0.871	
Molecular wt. of wet gas, lb/lb mole	28.2	28.4	28.6	
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA:				
Static pressure, in. H2O	-12.60	-12.60	-12.40	
Static pressure, in. Hg	-0.926	-0.926	-0.912	
Absolute pressure, in. Hg	28.65	28.65	28.87	
Avg. temperature, deg. F	369.8	370.4	369.3	
Avg. absolute temperature, deg.R	830	830	829	
Pitot tube coefficient	0.84	0.84	0.84	
Total number of traverse points	12	12	12	
Avg. gas stream velocity, ft./sec.	66.4	65.2	67.1	
Stack/duct cross sectional area, sq.ft.	39.00	39.00	39.00	
Avg. gas stream volumetric flow, wacf/min.	155371	152518	157130	
Avg. gas stream volumetric flow, dscf/min.[(1)]	80296	79429	84032	
LABORATORY REPORT DATA				
Lead, ug	15.90	9.60	5.30	
LEAD EMISSIONS				**Average**
Concentration, lb/dscf	9.94E-10	5.81E-10	2.64E-10	6.13E-10
Mass Rate, lb/hr	0.005	0.003	0.001	0.003

(1) Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 inches Hg (760mm Hg).

L'Anse Warden Electric Company
Boiler No. 1
Summary of VOC, NOx, and SO_2 Test Results

Run No.	Date	Time	Volumetric Flow	Stack Moisture	CONCENTRATIONS AND EMISSION RATES								
					O_2	CO_2	Total VOC (as methane)				NOx		SO_2	
			(dscfm)[1]	(%)[1]	(%)	(%)	(ppmvw)	(ppmvd)	(ppmvd @ 7% O_2)	(lb/hr)	(ppmvd)	(lb/hr)	(ppmvd)	(lb/hr)
1	24-Sep-15	0828-0940	84,032	12.9	9.1	11.1	1.0	1.1	1.4	0.24	106	63.8	148	124
2	24-Sep-15	1135-1330	81,908	13.4	9.2	10.8	1.3	1.5	1.8	0.31	109	64.0	140	114
3	24-Sep-15	1513-1657	81,199	14.4	9.1	10.9	0.5	0.6	0.7	0.12	116	67.5	153	124
Average			**82,380**	**13.6**	**9.1**	**10.9**	**0.9**	**1.1**	**1.3**	**0.22**	**110**	**65.1**	**147**	**121**
			Allowable				**---**	**---**	**50**	**9.1**	**---**	**145**	**---**	**290**

[1] Volumetric flow and moisture content derived from the corresponding EPA Method 12 sample train for Run 1 and from the corresponding EPA Method 5/26A sampling train for Runs 2 and 3.

NOVEMBER TEST PROGRAM

L'Anse Warden Electric Company
Boiler No. 1
Summary of Particulate and Hydrogen Chloride Test Data and Test Results
Condition 1

TEST DATA			
Test run number	C1-1	C1-2	C1-3
Location		Boiler No. 1	
Test date	11/3/2015	11/3/2015	11/4/2015
Test time period	1502-1614	1650-1756	0912-1020
F-Factor	9561	9561	9561
SAMPLING DATA			
Sampling duration, min.	60	60	60
Barometric pressure, in. Hg	29.51	29.51	29.44
Avg. orifice press. diff., in H2O	1.45	1.40	1.37
Avg. dry gas meter temp., deg F	79.8	72.3	66.0
Avg. abs. dry gas meter temp., deg. R	540	532	526
Total liquid collected by train, ml	157.6	142.7	148.5
Std. vol. of H2O vapor coll., cu.ft.	7.419	6.718	6.991
Dry gas meter calibration factor	0.9912	0.9912	0.9912
Sample vol. at meter cond., dcf	37.932	36.476	36.618
Sample vol. at std. cond., dscf (1)	36.393	35.478	35.958
Percent of isokinetic sampling	103.4	98.9	100.0
GAS STREAM COMPOSITION DATA			
CO2, % by volume, dry basis	8.9	8.9	9.3
O2, % by volume, dry basis	11.4	11.6	11.1
N2, % by volume, dry basis	79.7	79.5	79.6
Molecular wt. of dry gas, lb/lb mole	29.88	29.89	29.93
H2O vapor in gas stream, prop. by vol.	0.169	0.159	0.163
Mole fraction of dry gas	0.831	0.841	0.837
Molecular wt. of wet gas, lb/lb mole	27.87	28.00	27.99
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA			
Static pressure, in. H2O	-12.50	-12.50	-12.80
Static pressure, in. Hg	-0.919	-0.919	-0.941
Absolute pressure, in. Hg	28.59	28.59	28.50
Avg. temperature, deg. F	411	412	398
Avg. absolute temperature, deg.R	871	872	858
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	12	12	12
Avg. gas stream velocity, ft./sec.	67.5	68.1	67.6
Stack/duct cross sectional area, sq.ft.	39.000	39.000	39.000
Avg. gas stream volumetric flow, wacf/min.	158004	159327	158222
Avg. gas stream volumetric flow, dscf/min.	76005	77443	77639
HCl LABORATORY REPORT DATA			
Total HCl, mg	4.70	5.00	3.90
HCl EMISSIONS			
Concentration, lb/dscf	2.85E-07	3.11E-07	2.39E-07
Concentration, ppm/v	3.01	3.28	2.53
Mass rate, lb/hr	1.30	1.44	1.11

(1) Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 inches Hg (760mm Hg).
(2) Based on an F-factor (Fd) of 9561 scf/MMBtu.

L'Anse Warden Electric Company
Boiler No. 1
Summary of Particulate and Hydrogen Chloride Test Data and Test Results
Condition 2

TEST DATA			
Test run number	C2-1	C2-2	C2-3
Location		Boiler No. 1	
Test date	11/5/2015	11/5/2015	11/5/2015
Test time period	1057-1204	1225-1333	1400-1515
F-Factor	9561	9561	9561
SAMPLING DATA			
Sampling duration, min.	60	60	60
Barometric pressure, in. Hg	29.26	29.18	29.09
Avg. orifice press. diff., in H2O	1.38	1.37	1.36
Avg. dry gas meter temp., deg F	69.6	73.9	75.2
Avg. abs. dry gas meter temp., deg. R	530	534	535
Total liquid collected by train, ml	152.0	131.9	138.4
Std. vol. of H2O vapor coll., cu.ft.	7.156	6.209	6.515
Dry gas meter calibration factor	0.9912	0.9912	0.9912
Sample vol. at meter cond., dcf	36.923	36.872	36.988
Sample vol. at std. cond., dscf (1)	35.793	35.356	35.275
Percent of isokinetic sampling	100.5	98.2	99.5
GAS STREAM COMPOSITION DATA			
CO2, % by volume, dry basis	11.3	11.2	11.2
O2, % by volume, dry basis	8.9	9.0	9.1
N2, % by volume, dry basis	79.8	79.8	79.7
Molecular wt. of dry gas, lb/lb mole	30.16	30.15	30.16
H2O vapor in gas stream, prop. by vol.	0.167	0.149	0.156
Mole fraction of dry gas	0.833	0.851	0.844
Molecular wt. of wet gas, lb/lb mole	28.14	28.34	28.26
GAS STREAM VELOCITY AND VOLUMETRIC FLOW DATA			
Static pressure, in. H2O	-12.70	-12.60	-12.50
Static pressure, in. Hg	-0.934	-0.926	-0.919
Absolute pressure, in. Hg	28.33	28.25	28.17
Avg. temperature, deg. F	398	400	407
Avg. absolute temperature, deg.R	858	860	867
Pitot tube coefficient	0.84	0.84	0.84
Total number of traverse points	12	12	12
Avg. gas stream velocity, ft./sec.	67.7	67.4	67.6
Stack/duct cross sectional area, sq.ft.	39.000	39.000	39.000
Avg. gas stream volumetric flow, wacf/min.	158351	157771	158099
Avg. gas stream volumetric flow, dscf/min.	76839	77751	76489
HCl LABORATORY REPORT DATA			
Total HCl, mg	5.10	5.60	6.00
HCl EMISSIONS			
Concentration, lb/dscf	3.14E-07	3.49E-07	3.75E-07
Concentration, ppm/v	3.32	3.69	3.96
Mass rate, lb/hr	1.45	1.63	1.72

(1) Standard conditions = 68 deg. F. (20 deg. C.) and 29.92 inches Hg (760mm Hg).
(2) Based on an F-factor (Fd) of 9561 scf/MMBtu.

APPENDIX B
RAW TEST DATA

SEPTEMBER TEST PROGRAM

Sample and Velocity Traverse Point Data Sheet - Method 1

Client: Raven Power
Location/Plant: C.P. Crane
Source: Auziliary BoilerNo. 3
Operator:
Date:
W.O. Number:

Duct Type	☐	Circular	☑ Rectangular Duct	Indicate appropriate type
Traverse Type	☐	Particulate Traverse	☐ Velocity Traverse	

Distance from far wall to outside of port (in.) = C	90.0
Port Depth (in.) = D	12.0
Depth of Duct, diameter (in.) = C-D	78
Area of Duct (ft^2)	39.00
Total Traverse Points	12
Total Traverse Points per Port	3

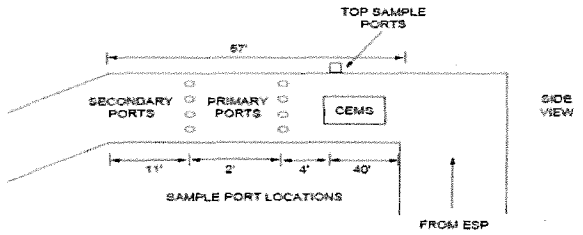
Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	72
Total Ports (rectangular duct only)	4

Traverse Point Locations

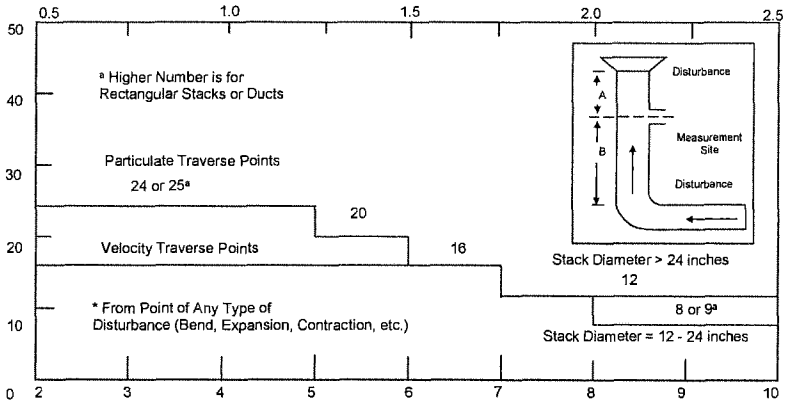
Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	16.67	13.00	25
2	50.00	39.00	51
3	83.33	65.00	77
4			
5			
6			
7			
8			
9			
10			
11			
12			

Flow Disturbances	
Upstream - A (ft)	11.0
Downstream - B (ft)	44.0
Upstream - A (duct diameters)	1.8
Downstream - B (duct diameters)	7.1

Stack Diagram



Duct Diameters Upstream from Flow Disturbance* (Distance A)



Equivalent Diameter = (2*L*W)/(L+W)

Duct Diameters Downstream from Flow Disturbance* (Distance B)

Traverse Point Location Percent of Stack -Circular

Traverse Point	Number of Traverse Points											
	1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

Traverse Point	Number of Traverse Points											
	1	2	3	4	5	6	7	8	9	10	11	12
1		25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2		75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3			83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4				87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5					90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6						91.7	78.6	68.8	61.1	55.0	50.0	45.8
7							92.9	81.3	72.2	65.0	59.1	54.2
8								93.8	83.3	75.0	68.2	62.5
9									94.4	85.0	77.3	70.8
10										95.0	86.4	79.2
11											95.5	87.5
12												95.8

Rectangular Stack Points & Matrix

9 - 3 x 3
12 - 4 x 3
16 - 4 x 4
20 - 5 x 4
25 - 5 x 5
30 - 6 x 5
36 - 6 x 6
42 - 7 x 6
49 - 7 x 7

WESTON SOLUTIONS

Q1_LWEC001_Opactiy_003776

Sample and Velocity Traverse Point Data Sheet - Method 1

Client: LWEC | Operator: Mills
Location/Plant: L'Anse, MI | Date: 13-Jul-09
Source: ESP Outlet | W.O. Number:

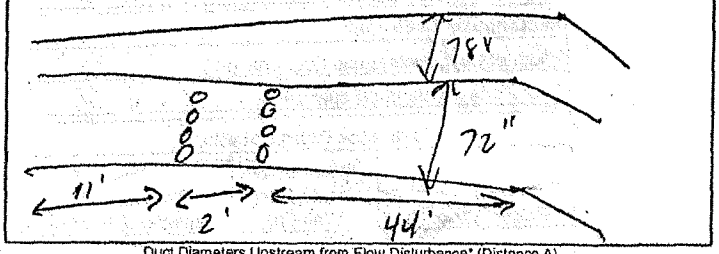
Duct Type	☐ Circular	☑ Rectangular Duct	Indicate appropriate type
Traverse Type	☐ Particulate Traverse	☐ Velocity Traverse	**3 pt CEM Traverse**

Distance from far wall to outside of port (in.) = C	90.0
Port Depth (in.) = D	12.0
Depth of Duct, diameter (in.) = C-D	78.0
Area of Duct (ft^2)	39.00
Total Traverse Points	12
Total Traverse Points per Port	3

Rectangular Ducts Only	
Width of Duct, rectangular duct only (in.)	72
Total Ports (rectangular duct only)	4

Flow Disturbances	
Upstream - A (ft)	11.00
Downstream - B (ft)	44.0
Upstream - A (duct diameters)	1.8
Downstream - B (duct diameters)	7.1

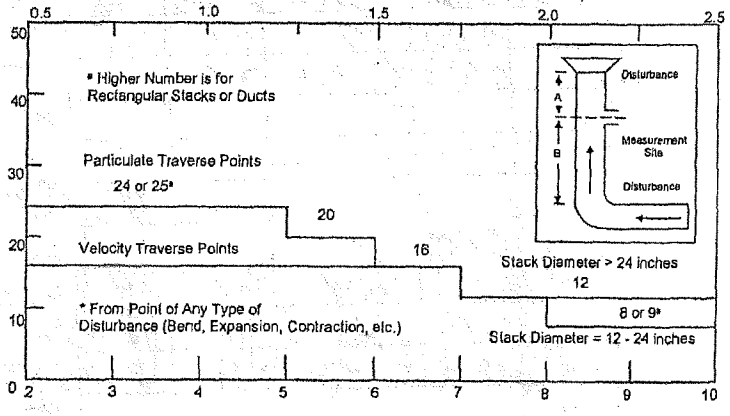
Stack Diagram



Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in)	Distance from Outside of Port (in)
1	16.70	13.03	25.03
2	50.00	39.00	51.00
3	83.30	64.97	76.97

Duct Diameters Upstream from Flow Disturbance* (Distance A)



Equivalent Diameter = (2*L*W)/(L+W)

Duct Diameters Downstream from Flow Disturbance* (Distance B)

Traverse Point Location Percent of Stack -Circular

Traverse Point Location	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		14.6		6.7		4.4		3.2		2.6		2.1
2		85.4		25		14.6		10.5		8.2		6.7
3				75		29.6		19.4		14.6		11.8
4				93.3		70.4		32.3		22.6		17.7
5						85.4		67.7		34.2		25
6						95.6		80.6		65.8		35.6
7								89.5		77.4		64.4
8								96.8		85.4		75
9										91.8		82.3
10										97.4		88.2
11												93.3
12												97.9

Traverse Point Location Percent of Stack -Rectangular

Traverse Point Location	Number of Traverse Points: 1	2	3	4	5	6	7	8	9	10	11	12
1		25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2		75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3			83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.8
4				87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5					90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6						91.7	78.6	68.8	61.1	55.0	50.0	45.8
7							92.9	81.3	72.2	65.0	59.1	54.2
8								93.8	83.3	75.0	68.2	62.5
9									94.4	85.0	77.3	70.8
10										95.0	86.4	79.2
11											95.5	87.5
12												95.8

Rectangular Stack Points & Matrix
9 - 3 x 3
12 - 4 x 3
16 - 4 x 4
20 - 5 x 4
25 - 5 x 5
30 - 6 x 5
36 - 6 x 6
42 - 7 x 6
49 - 7 x 7

Q1_LWEC001_Opactiy_003777

L'Anse Warden Electric Company
Particulate and Hydrogen Chloride Test Data Inputs

Test Data			
Run number	1	2	3
Location		Boiler No. 1	
Date	9/24/15	9/24/15	9/24/15
Time period	1135-1330	1513-1657	1756-1919
Operator	KH	BB	BB
Inputs For Calcs.			
Sq. rt. delta P	0.91981	0.91748	0.94598
Delta H	1.6467	1.6475	1.7450
Stack temp. (deg.F)	382.2	375.6	383.8
Meter temp. (deg.F)	80.8	82.8	79.9
Sample volume (act.)	46.030	45.851	47.060
Barometric press. (in.Hg)	29.78	29.74	29.74
Volume H2O imp. (ml)	133.0	146.0	163.0
Weight change sil. gel (g)	14.7	13.3	18.4
% CO2	10.8	10.9	11.5
% O2	9.2	9.1	8.7
% N	80.0	80.0	79.8
Area of stack (sq.ft.)	39.000	39.000	39.000
Sample time (min.)	72	72	72
Static pressure (in.H2O)	-12.60	-12.30	-12.30
Nozzle dia. (in.)	0.235	0.235	0.235
Meter box cal.	1.0017	1.0017	1.0017
Cp of pitot tube	0.84	0.84	0.84
Traverse Points	12	12	12
Particulate Laboratory Report Data			
Front half acetone rinse, g	0.0029	0.0012	0.0056
Filter, g	0.0035	0.0047	0.0062
Total catch, g	0.0064	0.0059	0.0118
HCl Laboratory Report Data			
HCl, mg	17.00	28.00	20.00
Total HCl, mg	17.00	28.00	20.00

ISOKINETIC FIELD DATA SHEET

EPA Method 5/26A - Part/HCl

Page 1 of 1

			Stack Conditions					
Client	LWEC		Assumed	Actual	Meter Box ID	26		
W.O.#					Meter Box Y	1.00017		
Project ID	LWEC	% Moisture	15		Meter Box Del H	2.1714	Leak Checks	Initial / Mid-Point / Final
Mode/Source ID	Gas	Impinger Vol (ml)		133	Probe ID / Length		Sample Train (ft³)	.005 / .006 / .006
Samp. Loc. ID	ESP OUT	Silica gel (g)		14.4	Probe Material	Boro	Leak Check @ (in Hg)	15 / 15 / 10
Run No.ID	1	CO2, % by Vol	12	10.5	Pitot / Thermocouple ID	P131	Pitot good	yes / no / yes / no / yes / no
Test Method ID	M5/26A	O2, % by Vol	7	9.2	Pitot Coefficient	0.84	Orsat good	yes / no / yes / no / yes / no
Date ID	24SEP2015	Temperature (°F)	320		Nozzle ID		Temp Check	Pre-Test Set / Post-Test Set
Source/Location	ESP Outlet	Meter Temp (°F)	85		Avg Nozzle Dia (in)	0.235	Meter Box Temp	68 / 70
Sample Date	9/24/15	Static Press (in H_2O)	-12.6	-24.6	Area of Stack (ft²)	39	Reference Temp	68.5 / 71.0
Baro. Press (in Hg)	29.78				Sample Time	72	Pass/Fail (+/- 2°)	Pass / Fail / Pass / Fail
Operator	KL	Ambient Temp (°F)	N66		Total Traverse Pts	12	Temp Change Response	yes / no / yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1135			588.566									
A 1	6		1.1	2.06	592.7	377		82	251	257	60	4.0		
2	12		1.3	2.43	597.4	381		82	250	252	59	4.5		
3	18		1.1	2.12	601.610	385		82	250	251	66	4.5		
														broke Nozzle & Replaced w/ good
C	0	1220			602.002									
1	6		0.75	1.45	606.6	379		81	252	255	64	4.0	(KW)	
2	12		0.78	1.51	609.3	387		81	260	260	61	~~4.5~~	4.6	
3	18		0.76	1.47	613.395	389		81	260	260	60	4.0		
D	0		~~0.66~~ (KW)		613.395									
1	6		0.66	1.27	616.5	379		80	260	261	62	3.0		
2	12		0.60	1.16	619.9	383		80	260	260	61	3.0		
3	18	1304	0.55	1.06	622.905	324		80	260	261	61	3.0		
B	0	1312			622.975									
1	6		0.84	1.62	626.7	375		80	260	259	66	4.0		
2	12	0.92	~~0.88~~ 0.92	~~1.78~~ 1.88	630.7	379		80	261	267	64	4.5		
3	18	1330	0.95	1.83	634.988	388		81	259	258	64	4.5		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts		Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			0.85917	1.64666	46.050	382.16	NA	80.83	259/261	251/267	66	4.5		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.91981	1.27406										

WESTON SOLUTIONS

EPA 5/26A from 40CFR Part 60 App A

ISOKINETIC FIELD DATA SHEET

EPA Method 5/26A - Part/HCl

			Stack Conditions	
Client	LWEC		Assumed	Actual
W.O.#		% Moisture	15	
Project ID	LWEC	Impinger Vol (ml)		133 146
Mode/Source ID	Gas	Silica gel (g)		14.7 13
Samp. Loc. ID	ESP OUT	CO2, % by Vol	10.9	10.8 10.5
Run No.ID	2	O2, % by Vol	9.2	9.1
Test Method ID	M5/26A	Temperature (°F)	375	
Date ID	24SEP2015	Meter Temp (°F)	85	
Source/Location	ESP Outlet	Static Press (in H_2O)	-12.1	-12.3
Sample Date	9/24/15			
Baro. Press (in Hg)	29.94			
Operator	RBS	Ambient Temp (°F)	~68	

Meter Box ID	26
Meter Box Y	1.0017
Meter Box Del H	2.1714
Probe ID / Length	P686
Probe Material	Boro
Pitot / Thermocouple ID	
Pitot Coefficient	0.84
Nozzle ID	0.235
Avg Nozzle Dia (in)	
Area of Stack (ft^2)	39
Sample Time	72
Total Traverse Pts	12

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft^3)	.010	.012	.008
Leak Check @ (in Hg)	15	7	7
Pitot good	yes / no	yes no	yes / no
Orsat good	~~yes / no~~	~~yes / no~~	~~yes / no~~

K Factor 1.93

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp	69	67
Reference Temp	69.8	67.6
Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1513			637.477									
D 1	6	1	0.51	0.98	640.5	366	NA	80	259	259	68	2		
2	12		0.60	1.15	643.8	351		81	261	254	63	2		
3	18	1531	0.58	1.12	647.080	369		81	259	264	61	2		PAUSE for RUN 10 TRAIN
	0	1553	—	—	647.142	—		—	—	—	—	—		
C	06	1	.75	1.44	650.7	376		82	259	261	68	3		
	12		.77	1.48	654.4	381		83	261	259	68	3		
	18	1611	.80	1.54	658.116	380		83	261	257	62	3		
	18	X												
					~~656.116~~									
B	0	1617			658.116	—		—	—	—	—	—		
	6	1	.90	1.73	662.3	375		83	265	259	64	4		
	12	1	.96	1.85	666.1	379		84	261	258	59	4		
	18	1635	1.00	1.93	670.300	385		84	260	263	60	4		
A	0	1639	—	—	670.300	—		—	—	—	—	—		
	6	1	1.10	2.12	674.6	370		84	255	260	64	4		
	12	1	1.20	2.31	678.9	376		84	260	250	65	4		
	18	1657	1.10	2.12	683.385	379		85	256	250	66	4		
			Avg Sqrt Delta P: .91748	Avg Delta H: 1.64750	Total Volume: 45.051	Avg Ts: 375.58	Avg Tm: NA	82.83	Min/Max: 255/265	Min/Max: 250/264	Max Temp: 68	Max Vac: 4	Max Temp	
			AVG .85583	Avg Sqrt Del H: 1.27289	Comments:									

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ISOKINETIC FIELD DATA SHEET

EPA Method 5/26A - Part/HCl

			Stack Conditions	
Client	LWEC		Assumed	Actual
W.O.#		% Moisture	15	
Project ID	LWEC	Impinger Vol (ml)		163
Mode/Source ID	Gas	Silica gel (g)		18.4
Samp. Loc. ID	OUT	CO2, % by Vol	12	11.5
Run No.ID	3	O2, % by Vol	9	8.7
Test Method ID	M5/26A	Temperature (°F)	370	
Date ID	24SEP2015	Meter Temp (°F)	83	
Source/Location	ESP Outlet	Static Press (in H_2O)	-12.5	-13.2
Sample Date	9/24/15			
Baro. Press (in Hg)	29.74			
Operator	SS	Ambient Temp (°F)	67	

Meter Box ID	26		
Meter Box Y	1.0017		
Meter Box Del H	2.1714	**Leak Checks**	Initial / Mid-Point / Final
Probe ID / Length	131	Sample Train (ft^3)	.012 / — / .008
Probe Material	Boro	Leak Check @ (in Hg)	15 / — / 7
Pitot / Thermocouple ID		Pitot good	yes no / — / yes no
Pitot Coefficient	0.84	Orsat good	— / — / —
Nozzle ID		**Temp Check**	Pre-Test Set / Post-Test Set
Avg Nozzle Dia (in)	.235	Meter Box Temp	67 / 64
Area of Stack (ft^2)	39	Reference Temp	67.5 / 65.3
Sample Time	77	Pass/Fail (+/- 2°)	Pass / Fail / Pass / Fail
Total Traverse Pts	12	Temp Change Response	yes / no / yes / no

K Factor 1.93

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1756			693.685									
A 1	6	1	1.1	2.12	688.2	375	NA	80	255	260	65	5		
2	12	1	1.2	2.31	692.7	385		80	261	260	66	5		
3	18	1814	1.1	2.12	697.003	386		80	258	252	66	5		
		—	—	—		—		—	—	—	—	—		V=13.323
	0	1818	—	—	697.008	—		—	—	—	—	—		
B 1	6	1	.90	1.73	701.2	372		~~79~~	265	257	68	5		
2	12	1	1.00	1.93	705.1	385		80	262	259	66	5		
3	18	1835	1.10	2.12	709.432	386		80	257	259	63	5		
		—	—	—		—		—	—	—	—	—		V=12.424
	0	1840	—	—	709.432	—		—	—	—	—	—		
C 1	6	1	.95	1.64	713.3	387		80	260	259	64	4		
2	12	1	.85	1.64	717.1	389		80	260	256	63	4		
3	18	1857	.87	1.67	720.983	387		80	261	262	65	4		
		—	—	—		—		—	—	—	—	—		V=11.551
	0	1901	—	—	720.983	—		—	—	—	—	—		
D 1	6	1	.55	1.06	724.1	383		80	261	259	66	4		
2	12	1	.65	1.25	727.4	395		80	262	261	66	4		
3	18	1919	.70	1.35	730.745	~~385~~		80	259	260	64	4		V=9.762
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.94597	1.7450	47.060	383.75	NA	79.1	255/265	252/261	66	5		
			AVG .9 05833	Avg Sqrt Del H 1.31296	Comments:									

WESTON SOLUTIONS

EPA 5/26A from 40CFR Part 60 App A

SAMPLE RECOVERY FIELD DATA

EPA Method 5/26A - Part/HCl

Client: LWEC | W.O. #:
Location/Plant: L'Anse, MI | Source & Location: ESP Outlet

Run No. 7 | Sample Date 9/24/15 | Recovery Date 9/24/15 9/22/2015

Sample I.D. LWEC - Gas - OUT - 1 - M5/26A | Analyst FS | Filter Number 610

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	0.1 H2SO4	0.1 H2SO4	0.1 H2SO4	~~Empty~~					Silica Gel	
Final	142	136	107	102 ~~100~~	100 96				314.7	
Initial	50	100	100	100	100			200	300	
Gain	92	36	7	2	-4			133	14.7	

Impinger Color: clear, tea | Labeled? ✓
Silica Gel Condition: Blue | Sealed? ✓

Run No. 2 | Sample Date 9/24/15 | Recovery Date 9/24/15

Sample I.D. LWEC - Gas - OUT - 2 - M5/26A | Analyst FS | Filter Number 611

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	0.1 H2SO4	0.1 H2SO4	0.1 H2SO4	~~Empty~~					Silica Gel	
Final	157	134	106	102	97				313.3	
Initial	50	100	100	100	100			200 ✓	300	
Gain	107	34	6	2	-3			146	13.3 ✓	

Impinger Color: clear | Labeled? ✓
Silica Gel Condition: Blue | Sealed? ✓

Run No. 3 | Sample Date 9/24/15 | Recovery Date 9/24/15 9/23/2015

Sample I.D. LWEC - Gas - OUT - 3 - M5/26A | Analyst FS | Filter Number 612

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	0.1 H2SO4	0.1 H2SO4	0.1 H2SO4	~~Empty~~					Silica Gel	
Final	166	141	110	100	94				318.4	
Initial	50	100	100	100	100			200 ✓	300 ✓	
Gain	116	41	10	0	-6			163	18.4	

Impinger Color: clear | Labeled? ✓
Silica Gel Condition: Blue | Sealed? ✓

Check COC for Sample IDs of Media Blanks

WESTON SOLUTIONS

RUN SUMMARY

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 11:35 to 13:30

Run Averages

	9.2	10.7

Pre-run Bias at 09:45

Zero Bias	0.0	0.0
Span Bias	11.9	8.6
Span Gas	12.0	8.8

Post-run Bias at 13:48

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	9.2	10.8

*No Correction

RUN SUMMARY

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 15:13 to 16:57

Run Averages

	9.1	10.8

Pre-run Bias at 13:48

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Post-run Bias at 17:02

Zero Bias	0.0	0.1
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	9.1	10.9

*No Correction

RUN SUMMARY

Number 4

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 17:56 to 19:19

Run Averages

8.7	11.4

Pre-run Bias at 17:02

Zero Bias	0.0	0.1
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Post-run Bias at 19:36

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

8.7	11.5

*No Correction

SOURCE ID:	Boiler No. 1		CLIENT:	L'Anse Warden Ele
DATE:	9/24/15		FACILITY:	L'Anse, Mi
TEST CONDITION:			RUN:	1

PM10-INPUT DATA FOR CALCULATIONS

	RUN	1	
	TEST PERIOD	1126-1307	
Y	Meter Box y	1.0050	
Delta H@	Meter Box Delta H@	2.3615	
VM	Meter volume, ft^3	34.300	
CO2	CO2 concentration, %	10.9	
O2	Oxygen concentration, %	9.2	
	Nozzle diameter, inches	0.173	
A	Stack Area, sq. ft.	39.000	
Pb	Barometric Pressure, inches Hg	29.78	
Pg	Static Pressure, inches H2O	-9.6	
	Impinger water collected, g	99	
	Silica Gel collected, g	9.2	
	Total Imp catch	108.2	
Cp	Pitot Coeff	0.758	
Delta P	Avg Sqrt Delta P, sqrt(inches H2O)	0.9932	
	Sample Time, min	96.5	
Ts	Average Stack Temp.deg F	375.68	
Ts	Average Stack Temp.deg R	835.68	
Tm	Meter temperature	72.17	
Delta H	Avg Delta H, inches H2O	0.49	
O2(wet)	Oxygen concentration--WET	8.0	
	Nitrogen(+ CO) concentration	79.9	
Bws	Fraction moisture content	0.130	(Ex. 4% = 0.04)
	Moisture percentage	13.007	
Md	Mole fraction of wet gas	0.870	
MWd	Molecular Weight(Dry)	30.11	
MW	Molecular Weight(Wet)	28.54	
Ps	Absolute Stack Pressure	29.07	in.Hg
MwPs/Ts	Intermediate Calc	0.993	
Ts/MwPs	Intermediate Calc	1.007	
(Vmstd)	Standard Meter Volume, cu.ft	34.069	
Qs	Cyclone flowrate (actual), cfm	0.661	
Us2.5	Viscosity of Stack gas	238.53	micropoise
Dn	Nozzle diameter	0.173	inches
Vn	Nozzle Velocity	67.521	ft/sec
R min.	minimum R	0.711	
R max.	maximum R	1.258	
V min	minimum velocity	47.99	ft/sec
V max	maximum velocity	84.95	ft/sec
Delta p min.	0.545	in.H2O	
Delta p max.	1.707	in.H2O	
FRONT HALF ANALYTICAL DATA			
Mass >PM 10 (front half cyclone I0) >PM10, g (FHA1)		0.0053	
Mass PM 10 (cyclone 10 exit tube) <PM10, g (FHA2)		0.0023	
Mass (filter)<PM10, g		0.0055	
BACK HALF ANALYTICAL DATA			
H2O (inorganic) residue, g		0.0061	
MeCl (organic) residue, g		<0.0010	

SOURCE ID:	Boiler No. 1		CLIENT:	L'Anse Warden
DATE:	9/24/15		FACILITY:	L'Anse, Mi
TEST CONDITION:			RUN:	2

PM10-INPUT DATA FOR CALCULATIONS

	RUN	2	
	TEST PERIOD	1448-1609	
Y	Meter Box y	1.0050	
Delta H@	Meter Box Delta H@	2.3615	
VM	Meter volume, ft^3	30.148	
CO2	CO2 concentration, %	10.6	
O2	Oxygen concentration, %	9.3	
	Nozzle diameter, inches	0.173	
A	Stack Area, sq. ft.	39.000	
Pb	Barometric Pressure, inches Hg	29.74	
Pg	Static Pressure, inches H2O	-12.1	
	Impinger water collected, g	85	
	Silica Gel collected, g	17.9	
	Total Imp catch	102.9	
Cp	Pitot Coeff	0.758	
Delta P	Avg Sqrt Delta P, sqrt(inches H2O)	0.9004	
	Sample Time, min	80	
Ts	Average Stack Temp.deg F	371.93	
Ts	Average Stack Temp.deg R	831.93	
Tm	Meter temperature	77.64	
Delta H	Avg Delta H, inches H2O	0.49	
O2(wet)	Oxygen concentration--WET	8.0	
	Nitrogen(+ CO) concentration	80.1	
Bws	Fraction moisture content	0.141	(Ex. 4% = 0.04)
	Moisture percentage	14.066	
Md	Mole fraction of wet gas	0.859	
MWd	Molecular Weight(Dry)	30.07	
MW	Molecular Weight(Wet)	28.37	
Ps	Absolute Stack Pressure	28.85	in.Hg
MwPs/Ts	Intermediate Calc	0.984	
Ts/MwPs	Intermediate Calc	1.016	
(Vmstd)	Standard Meter Volume, cu.ft	29.600	
Qs	Cyclone flowrate (actual), cfm	0.704	
Us2.5	Viscosity of Stack gas	236.82	micropoise
Dn	Nozzle diameter	0.173	inches
Vn	Nozzle Velocity	71.869	ft/sec
R min.	minimum R	0.717	
R max.	maximum R	1.254	
V min	minimum velocity	51.54	ft/sec
V max	maximum velocity	90.15	ft/sec
Delta p min.	0.623	in.H2O	
Delta p max.	1.904	in.H2O	
FRONT HALF ANALYTICAL DATA			
Mass >PM 10 (front half cyclone I0) >PM10, g (FHA1)		0.0050	
Mass PM 10 (cyclone 10 exit tube) <PM10, g (FHA2)		0.0015	
Mass (filter)<PM10, g		0.0045	
BACK HALF ANALYTICAL DATA			
H2O (inorganic) residue, g		0.0052	
MeCl (organic) residue, g		<0.0010	

SOURCE ID:	Boiler No. 1		CLIENT:	L'Anse Warden I
DATE:	9/24/15		FACILITY:	L'Anse, Mi
TEST CONDITION:			RUN:	3

PM10-INPUT DATA FOR CALCULATIONS

	RUN	3	
	TEST PERIOD	1752-1933	
Y	Meter Box y	1.0050	
Delta H@	Meter Box Delta H@	2.3615	
VM	Meter volume, ft^3	33.565	
CO2	CO2 concentration, %	11.5	
O2	Oxygen concentration, %	8.7	
	Nozzle diameter, inches	0.173	
A	Stack Area, sq. ft.	39.000	
Pb	Barometric Pressure, inches Hg	29.74	
Pg	Static Pressure, inches H2O	-12.3	
	Impinger water collected, g	94	
	Silica Gel collected, g	17.6	
	Total Imp catch	111.6	
Cp	Pitot Coeff	0.758	
Delta P	Avg Sqrt Delta P, sqrt(inches H2O)	0.9638	
	Sample Time, min	96	
Ts	Average Stack Temp.deg F	380.09	
Ts	Average Stack Temp.deg R	840.09	
Tm	Meter temperature	76.00	
Delta H	Avg Delta H, inches H2O	0.49	
O2(wet)	Oxygen concentration--WET	7.5	
	Nitrogen(+ CO) concentration	79.8	
Bws	Fraction moisture content	0.137	(Ex. 4% = 0.04)
	Moisture percentage	13.715	
Md	Mole fraction of wet gas	0.863	
MWd	Molecular Weight(Dry)	30.19	
MW	Molecular Weight(Wet)	28.52	
Ps	Absolute Stack Pressure	28.84	in.Hg
MwPs/Ts	Intermediate Calc	0.979	
Ts/MwPs	Intermediate Calc	1.022	
(Vmstd)	Standard Meter Volume, cu.ft	33.056	
Qs	Cyclone flowrate (actual), cfm	0.659	
Us2.5	Viscosity of Stack gas	238.64	micropoise
Dn	Nozzle diameter	0.173	inches
Vn	Nozzle Velocity	67.299	ft/sec
R min.	minimum R	0.710	
R max.	maximum R	1.258	
V min	minimum velocity	47.80	ft/sec
V max	maximum velocity	84.68	ft/sec
Delta p min.	0.533	in.H2O	
Delta p max.	1.672	in.H2O	
FRONT HALF ANALYTICAL DATA			
	Mass >PM 10 (front half cyclone I0) >PM10, g (FHA1)	0.0066	
	Mass PM 10 (cyclone 10 exit tube) <PM10, g (FHA2)	0.0019	
	Mass (filter)<PM10, g	0.0050	
BACK HALF ANALYTICAL DATA			
	H2O (inorganic) residue, g	0.0082	
	MeCl (organic) residue, g	<0.0010	

ISOKINETIC FIELD DATA SHEET

EPA Method 201A/202 - PM10

Page ____ of ____

		Stack Conditions					
Client	LWEC		Assumed	Actual	Meter Box ID	23	
W.O.#					Meter Box Y	1.0058	
Project ID	LWEC	% Moisture	15		Meter Box Del H	2.3615	**Leak Checks**
Mode/Source ID	Gas	Impinger Vol (ml)			Probe ID / Length	P891	Sample Train (ft^3)
Samp. Loc. ID	OUT	Silica gel (g)			Probe Material	Boro	Leak Check @ (in Hg)
Run No.ID	1	CO2, % by Vol	11	10.9	Pitot / Thermocouple ID	P591	Pitot good
Test Method ID	TPM10	O2, % by Vol	9.1	9.2	Pitot Coefficient	~~.84~~ .758	Orsat good N/A
Date ID	24SEP2015	Temperature (°F)	370		Nozzle ID		**Temp Check**
Source/Location	ESP Outlet	Meter Temp (°F)	70		Avg Nozzle Dia (in)	.173	Meter Box Temp
Sample Date	9/24/15	Static Press (in H_2O)	-12.6	-.46	Area of Stack (ft^2)	39	Reference Temp
Baro. Press (in Hg)	29.78				Sample Time	96.5	Pass/Fail (+/- 2°)
Operator	SR	Ambient Temp (°F)	65		Total Traverse Pts	12	Temp Change Response

K Factor	Initial	Mid-Point	Final
	.016		.004
	15		6
	yes / no	yes / no	yes / no
	~~yes / no~~	~~yes / no~~	~~yes / no~~
	Pre-Test Set		Post-Test Set
	66		68
	65.4		67.9
	Pass / Fail		Pass / Fail
	yes / no		yes / no

TRAVERSE POINT NO.		SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	COND FILTER Temp OUT (F) 65-85 F	COMMENTS
		0	1126			96.074									
D	1	3.25		.65	.49	98.3	366	N/A	67	256	257	61	1.0	69	
	1	6.5		.65	.49	99.4	~~385~~ 375		68	253	254	59	1.0	69	
	2	9.75		.70	.49	100.5	378		69	256	252	58	1.0	70	
	2	13.0		.70	.49	101.6	378		69	255	253	57	1.0	70	
	3	16.25		.70	.49	102.7	380		70	252	249	56	1.0	69	
	3	19.5	1146	.70	.49	103.824	381		70	253	251	55	1.0	69	
			1148	—	—		—		—	—	—	—	—	—	
C	1	23		.80	.49	105.9	377		70	255	253	55	1.0	71	
	1	26.50		.80	.49	105.6	378		71	254	254	55	1.0	70	
	2	30		.90	.49	106.7	379		72	252	253	54	1.0	70	
	2	33.50		.90	.49	107.7	379		72	255	252	54	1.0	69	
	3	37.0		.94	.49	108.9	380		72	256	254	54	1.0	70	
	3	40.5	1210	.94	.49	110.6	382		72	254	253	54	1.0	70	
B	1	45.25	1211	1.1	.49	112.4	376		73	255	254	55	1.0	69	
	1	50.0		1.1	.49	114.0	376		73	254	255	56	1.0	70	
	2	54.75		1.2	.49	115.9	376		73	256	256	55	1.0	70	
	2	59.5		1.2	.49	117.6	376		73	254	255	56	1.0	70	
	3	64		1.0	.49	119.0	381		73	252	256	55	1.0	69	
	3	69.5	1238	1.0	.49	121.3	381		74	253	253	57	1.0	71	
A	1	73	1239	1.0	.49	122.3	370		74	254	256	57	1.0	69	
	1	77.5		1.0	.49	123.9	371		74	252	254	57	1.0	70	
	2	82.25		1.3	.49	125.4	370		74	256	254	57	1.0	69	
	2	87		1.3	.49	127.0	369		74	253	253	58	1.0	71	
	3	91.75		1.3	.49	128.6	372		74	252	254	59	1.0	72	
	3	96.50	1307	1.3	.49	130.374	372		74	253	253	60	1.0	72	
				Avg Delta P .9656	Avg Delta H .49	Total Volume 34.300	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
				Avg Sqrt Delta P .9985	Avg Sqrt Del H	Comments:									

WESTON SOLUTIONS

EPA 201A and 202 from 40CFR Part 60 App A

ISOKINETIC FIELD DATA SHEET

EPA Method 201A/202 - PM10

		Stack Conditions							
Client	LWEC		Assumed	Actual	Meter Box ID	23			
W.O.#					Meter Box Y	1.005			
Project ID	LWEC	% Moisture	15		Meter Box Del H	2.3615	**Leak Checks**	Initial	Mid-Point	Final
Mode/Source ID	Gas	Impinger Vol (ml)			Probe ID / Length	1891	Sample Train (ft^3)	.018		.012
Samp. Loc. ID	OUT	Silica gel (g)			Probe Material	Boro	Leak Check @ (in Hg)	15		5
Run No.ID	2	CO2, % by Vol		~~10.9~~ 10.6	Pitot / Thermocouple ID	1891	Pitot good	yes / no	yes / no	yes / no
Test Method ID	TPM10	O2, % by Vol		~~8.2~~ 9.3	Pitot Coefficient	~~0.84~~ .758	Orsat good	NA		
Date ID	24SEP2015	Temperature (°F)	375		Nozzle ID		**Temp Check**	Pre-Test Set		Post-Test Set
Source/Location	ESP Outlet	Meter Temp (°F)	75		Avg Nozzle Dia (in)	.173	Meter Box Temp	75		79
Sample Date	9/24/15	Static Press (in H_2O)	-	-12.9	Area of Stack (ft^2)	39.0	Reference Temp	74		79.8
Baro. Press (in Hg)	~~SR 29.78~~ 29.74				Sample Time	80	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	SR	Ambient Temp (°F)			Total Traverse Pts	12	Temp Change Response	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	COND FILTER Temp OUT (F) 65-85 F	COMMENTS
	0	1446			133.836									
A 1	4.5		1.1	.49	~~135.5~~	370	NA	75	264	~~264~~ 246	~~250~~ 260	1.0	72	
1	9		1.1	.49	137.1	~~380~~		76	260	255	60	1.0	73	
2	13.75		~~1.0~~ 1.2	.49	138.7	371		76	~~255~~	254	63	1.0	72	
2	18.5		~~1.0~~ 1.2	.49	140.4	371		76	255	252	64	1.0	72	
3	22		.83	.49	141.5	370		77	253	252	64	1.0	74	
3	25.5	1513	.83	.49	143.1	371		77	254	256	64	1.0	73	
1	29	1514	.86	.49	144.1	370		77	252	254	63	1.0	72	
B 1	32.5		.86	.49	146.3	364		77	251	253	64	1.0	73	
2	36		.85	.49	148.0	374		78	254	256	65	1.0	72	
2	39.5		.85	.49	~~148.6~~	378		78	252	254	65	1.0	69	
3	42.75		.70	.49	149.2	~~378~~		78	254	256	64	1.0	70	
3	46	1544	.76	.49	150.1	377		78	254	252	64	1.0	71	
C 1	51	1544	.50	.49	151.2	365		78	~~76~~ 253	255	65	1.0	71	
2	53.25		.55	.49	152.3	374		78	253	251	64	1.0	70	
2	55.5		.55	.49	~~153.9~~	374		79	253	253	64	1.0	69	
3	58.75		.63	.49	154.2	378		79	254	252	63	1.0	69	
3	62	1552	.63	.49	155.1	376		79	252	251	63	1.0	69	
1	64.25	1552	.58	.49	156.1	374		79	251	252	64	1.0	70	
1	66.5		58	.49	~~156.0~~	373		77	252	253	64	1.0	70	
2	69.75		.75	.49	158.3	369		79	254	254	64	1.0	70	
2	73		.75	.49	160.2	371		79	250	252	61	1.0	77	
3	76.5		.82	.49	~~162.0~~	372		79	251	252	60	1.0	75	
3	80	1609	.82	.49	~~163.984~~	373		79	250	254	61	1.0	74	
					163.984									
			Avg Sqrt Delta P	Avg Delta H	Total Volume 30.148	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
				Avg Sqrt Del H	Comments: 30.148 ✓									

WESTON SOLUTIONS

EPA 201A and 202 from 40CFR Part 60 App A

ISOKINETIC FIELD DATA SHEET

EPA Method 201A/202 - PM10

		Stack Conditions	Assumed	Actual				
Client	LWEC				Meter Box ID	23		
W.O.#					Meter Box Y	1.0050		
Project ID	LWEC	% Moisture	15		Meter Box Del H	2.3615	**Leak Checks**	
Mode/Source ID	Gas	Impinger Vol (ml)			Probe ID / Length	P891	Sample Train (ft^3)	
Samp. Loc. ID	OUT	Silica gel (g)			Probe Material	Boro	Leak Check @ (in Hg)	
Run No.ID	3	CO_2, % by Vol	11	11.5	Pitot / Thermocouple ID	P891	Pitot good	
Test Method ID	TPM10	O_2, % by Vol	9.2	8.7	Pitot Coefficient	0.84 758	Orsat good	NA
Date ID	24SEP2015	Temperature (°F)	375		Nozzle ID		**Temp Check**	
Source/Location	ESP Outlet	Meter Temp (°F)	77		Avg Nozzle Dia (in)	.173	Meter Box Temp	
Sample Date	9/24/15	Static Press (in H_2O)	-12.1	-12.3	Area of Stack (ft^2)	39.6	Reference Temp	
Baro. Press (in Hg)	29.74				Sample Time	96	Pass/Fail (+/- 2°)	
Operator	SR	Ambient Temp (°F)	65		Total Traverse Pts	12	Temp Change Response	

K Factor	Initial	Mid-Point	Final
	.016		.008
	15		6
	yes / no	yes / no	yes / no
	yes / no	yes / no	yes / no
Pre-Test Set			Post-Test Set
	69		72
	683		71.4
	Pass / Fail		Pass / Fail
	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)	COND FILTER Temp OUT (F) 65-85 F	COMMENTS
	0	1752			165.300									
D 1	3.25		.64	.49	166.7	364	NA	76	252	253	62	1.0	71	
1	6.50		.64	.49	167.8	371		76	250	252	62	1.0	72	
2	10.0		.70	.49	168.9	380		76	256	254	64	1.0	72	
2	13.5		.70	.49	170.0	380		76	254	252	65	1.0	71	
3	16.75		.67	.49	171.1	382		76	253	254	65	1.0	71	
SA 3	20.0	1812	.67	.49	172.2	382		76	257	254	66	1.0	72	
B C 1	23.5	1812	.75	.49	173.4	372		76	255	253	65	1.0	71	
1	27.0		.75	.49	174.6	373		76	252	251	64	1.0	70	
2	30.5		.88	.49	175.9	382		76	251	253	65	1.0	69	
2	34		.88	.49	176.9	382		76	252	254	65	1.0	69	
3	37.5		.82	.49	178.3	384		76	254	252	66	1.0	69	
3	41	1833	.82	.49	179.485	384		76	254	253	66	1.0	70	
B 1	44.5	1838	.72	.49	180.7	376		76	255	254	64	1.0	72	
1	48.0		.72	.49	182.0	378		76	252	251	63	1.0	71	
2	52.75		1.1	.49	183.7	381		76	251	253	63	1.0	70	
2	57.5		1.1	.49	185.2	381		76	254	252	63	1.0	71	
3	62.25		1.2	.49	186.9	385		76	254	253	64	1.0	72	
3	67.00	1905	1.2	.49	188.6	385		76	253	254	66	1.0	72	
A 1	71.75	1905	1.1	.49	189.9	386		76	256	253	65	1.0	71	
1	76.50		1.1	.49	191.5	385		76	255	253	64	1.0	73	
2	81.50		1.3	.49	193.4	378		76	254	256	64	1.0	72	
2	86.50		1.3	.49	195.3	380		76	254	254	62	1.0	71	
3	91.25		1.0	.49	197.0	381		76	252	253	62	1.0	72	
3	96	1933	1.0	.49	198.865	381		76	254	252	61	1.0	71	
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm		Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			.94555	.49	33.565	379	76							
			.9067	Avg Sqrt Del H	Comments:									

WESTON SOLUTIONS

EPA 201A and 202 from 40CFR Part 60 App A

SAMPLE RECOVERY FIELD DATA

EPA Method 201A/202 - PM10

Client: LWEC | W.O. #:
Location/Plant: L'Anse, MI | Source & Location: ESP Outlet

Run No. 1 | Sample Date 9/24/15 | Recovery Date 9/24/15 ~~9/23/2015~~

Sample I.D. LWEC - Gas - OUT - 1 - TPM10 | Analyst FS | Filter Number 605

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	Empty	Di H20						Silica Gel	
Final	102	2	95	~~30~~					308.2	
Initial	0	0	100	0				200	300	
Gain	102	2	-5				✓	99	9.2	108.2

Impinger Color: clear | Labeled? ✓

Silica Gel Condition: Blue | Sealed? ✓

Run No. 2 | Sample Date 9/24/15 | Recovery Date 9/24/15

Sample I.D. LWEC - Gas - OUT - 2 - TPM10 | Analyst FS | Filter Number 606

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	Empty	Di H20						Silica Gel	
Final	89	0	96						312.9	
Initial	0	0	100	0				200	300	
Gain	89	0	-4					85	12.9	102.9

Impinger Color: clear | Labeled? ✓

Silica Gel Condition: Blue | Sealed? ✓

Run No. 3 | Sample Date 9/24/15 | Recovery Date 9/24/15 ~~9/23/2015~~

Sample I.D. LWEC - Gas - OUT - 3 - TPM10 | Analyst FS | Filter Number 607

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	Empty	Empty	Di H20						Silica Gel	
Final	94	0	100						317.6	
Initial	0	0	100	0				200	300	
Gain	94	0	0					94	17.6	

Impinger Color: Clear | Labeled? ✓

Silica Gel Condition: Blue | Sealed? ✓

Check COC for Sample IDs of Media Blanks

WESTON SOLUTIONS

RUN SUMMARY

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 11:26 to 13:07

Run Averages

	9.1	10.7

Pre-run Bias at 09:45

Zero Bias	0.0	0.0
Span Bias	11.9	8.6
Span Gas	12.0	8.8

Post-run Bias at 13:48

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	9.2	10.9

*No Correction

RUN SUMMARY

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 14:48 to 16:09

Run Averages

	9.3	10.5

Pre-run Bias at 13:48

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Post-run Bias at 17:02

Zero Bias	0.0	0.1
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	9.3	10.6

*No Correction

RUN SUMMARY

Number 4

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 17:52 to 19:33

Run Averages

	8.7	11.3

Pre-run Bias at 17:02

Zero Bias	0.0	0.1
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Post-run Bias at 19:36

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	8.7	11.5

*No Correction

L'Anse Warden Electric Company
Boiler No. 1
EPA Method 12 (Lead) Test Data Inputs

Test Data			
Run number	1	2	3
Date	09/23/15	09/23/15	09/24/15
Time period	1513-1623	1657-1808	0828-0940
Operator	TB	TB	SR
Inputs For Calcs.			
Sq. rt. delta P	0.91318	0.89806	0.93259
Delta H	1.35500	1.56583	1.63458
Stack temp. (deg.F)	369.8	370.4	369.3
Meter temp. (deg.F)	73.9	75.5	65.2
Sample volume (act.)	35.908	37.180	44.056
Barometric press. (in.Hg)	29.58	29.58	29.78
Volume H2O imp. (ml)	125	122	131
Weight change sil. gel (g)	8.8	8.6	8.6
% CO2	10.7	11.0	11.1
% O2	9.2	9.1	9.1
% N	80.1	79.9	79.8
Area of stack (sq.ft.)	39.000	39.000	39.000
Sample time (min.)	60	60	72
Static pressure (in.H2O)	-12.60	-12.60	-12.40
Nozzle dia. (in.)	0.235	0.235	0.235
Meter box cal.	1.0017	1.0017	1.0017
Dry gas meter DH@	2.1714	2.1714	2.1714
Cp of pitot tube	0.84	0.84	0.84
Traverse Points	12	12	12
Laboratory Report Data			
Lead, ug	15.900	9.600	5.300
Site Blank Lead, ug	<0.200	<0.200	<0.200
Total Lead, ug	15.90	9.60	5.30

ISOKINETIC FIELD DATA SHEET

EPA Method 12 - Lead

Page 1 of 1

		Stack Conditions	Assumed	Actual						
Client	LWEC				Meter Box ID	W.C. 26			K Factor	1.6
W.O.#					Meter Box Y	1.0017				
Project ID	LWEC	% Moisture	15		Meter Box Del H	2.1714	**Leak Checks**	Initial	Mid-Point	Final
Mode/Source ID	Gas	Impinger Vol (ml)		125	Probe ID / Length	7'	Sample Train (ft^3)	.008	.004	.004
Samp. Loc. ID	STK	Silica gel (g)		8.8	Probe Material	Boro	Leak Check @ (in Hg)	15	8	10
Run No.ID	1	CO2, % by Vol	11	10.7	Pitot / Thermocouple ID	D-154 / D-154	Pitot good	yes / no	yes / no	yes / no
Test Method ID	M12	O2, % by Vol	9	9.2	Pitot Coefficient	0.84	Orsat good	yes / no	yes / no	yes / no
Date ID	23SEP2015	Temperature (°F)	378		Nozzle ID	~~.235~~ .255	**Temp Check**	Pre-Test Set		Post-Test Set
Source/Location	ESP Stack	Meter Temp (°F)	80		Avg Nozzle Dia (in)	~~.235~~ .255	Meter Box Temp	71		73
Sample Date	9/23/15	Static Press (in H_2O)	-9.6	-12.6	Area of Stack (ft^2)	39	Reference Temp	726		734
Baro. Press (in Hg)	29.58				Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	TB	Ambient Temp (°F)			Total Traverse Pts	12	Temp Change Response	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1513			470.925									
C 1	5		.69	1.10	473.6	369	NA	74	250	250	55	2.0		
2	10		.79	1.26	476.1	376		74	251	250	54	2.0		
3	15	1528	.82	1.31	479.041	379		74	252	249	56	2.0		
	0	1530			479.041									
D 1	5		.62	.99	481.8	361		74	255	252	58	2.0		
2	10		.55	.88	484.1	360		74	250	249	56	2.0		
3	15		.66	1.06	486.965	377		73	249	249	55	2.0		
	0	1549			487.041									
A 1	5		.96	1.55	490.3	364		73	258	253	58	2.0		
2	10		1.2	1.93	493.6	366		73	252	250	57	3.0		
3	15	1604	1.0	1.61	496.759	375		74	250	251	58	2.5		
	0	1608			496.759									
B 1	5		.84	1.35	500.2	367		74	259	251	60	2.0		
2	10		1.0	1.61	503.2	369		75	253	250	60	2.0		
3	15	1623	1.0	1.61	506.409	375		75	252	250	56	2.0		
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp		
			.91318 ✓	1.355 ✓	35.908 ✓	369.83 ✓	73.92 ✓	249/259	249/252	60	3.0			
			.844 ✓	Avg Sqrt Del H ✓	Comments:									
				1.15677										

WESTON SOLUTIONS

EPA Method 8 from 40CFR Appendix A

JBA

ISOKINETIC FIELD DATA SHEET

EPA Method 12 - Lead

		Stack Conditions	Assumed	Actual				Leak Checks	Initial	Mid-Point	Final
Client	LWEC				Meter Box ID	W.C 26			K Factor 1.9		
W.O.#					Meter Box Y	1.0017					
Project ID	LWEC	% Moisture			Meter Box Del H	2.1714					
Mode/Source ID	Gas	Impinger Vol (ml)		182	Probe ID / Length	P686	7'	Sample Train (ft^3)	.010	.004	.004
Samp. Loc. ID	STK	Silica gel (g)		8.6	Probe Material	Bore		Leak Check @ (in Hg)	15	12	12
Run No.ID	2	CO2, % by Vol		11	Pitot / Thermocouple ID			Pitot good	yes / no	yes / no	yes / no
Test Method ID	M12	O2, % by Vol		9.1	Pitot Coefficient	0.84		Orsat good	yes / no	yes / no	yes / no
Date ID	23SEP2015	Temperature (°F)			Nozzle ID	.235		**Temp Check**	Pre-Test Set		Post-Test Set
Source/Location	ESP Stack	Meter Temp (°F)			Avg Nozzle Dia (in)	.235		Meter Box Temp	74		73
Sample Date	9/23/15	Static Press (in H_2O)		-12.6	Area of Stack (ft^2)	390		Reference Temp	75		74
Baro. Press (in Hg)	29.58				Sample Time	60		Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	TB	Ambient Temp (°F)			Total Traverse Pts	12		Temp Change Response	yes / no		yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1657			506.765									
A 1	5		1.0	1.9	509.9	364	NA	75	251	251	61	3.0		
2	10		1.2	2.29	513.4	372		75	254	252	58	3.5		
3	15	1712	1.1	2.09	517.030	378		75	252	250	52	3.0		
	0	1716			517.030									
B 1	5		.94	1.79	520.7	362		75	255	250	58	3.0		
2	10		.85	1.62	524.1	373		75	252	250	53	3.0		
3	15	1731	.92	1.75	527.275	379		75	250	250	52	3.0		
	0	1735			527.275									
C 1	5		.71	1.35	530.4	381		76	257	250	55	2.5		
2	10		.72	1.37	532.9	366		76	253	250	54	2.5		
3	15	1750	.75	1.43	535.751	377		76	250	251	52	2.5		
	0	1753			535.751									
D 1	5		.56	1.1	538.4	363		76	260	251	55	2.5		
2	10		.53	1.0	541.5	368		76	254	250	55	2.0		
3	15	1808	.56	1.1	543.945	382		76	251	250	55	2.0		
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp		
			.8980	1.5658	37.18	370.42	75.5	250/261	250/252	61	3.5			
			.82	Avg Sqrt Del H	Comments:									
				1.2413										

WESTON SOLUTIONS

EPA Method 8 from 40CFR Appendix A

Q1_LWEC001_Opactiy_003798

ISOKINETIC FIELD DATA SHEET

Method Method 12 - Lead

Page 1 of 2

		Stack Conditions	Assumed	Actual					
Client	LWEC				Meter Box ID	WC 26		K Factor	1.87
W.O.#					Meter Box Y	1.00 17			
Project ID	LWEC	% Moisture	15		Meter Box Del H	2.1714	**Leak Checks**	Initial	Mid-Point / Final
Mode/Source ID	Gas	Impinger Vol (ml)		131	Probe ID / Length	P131	Sample Train (ft^3)	.008	.064
Samp. Loc. ID	STK	Silica gel (g)		8.6	Probe Material		Leak Check @ (in Hg)	15	6
Run No.ID	3	CO2, % by Vol	11	11.1	Pitot / Thermocouple ID	P131	Pitot good	yes / no	yes / no / yes / no
Test Method ID	M12	O2, % by Vol	9.1	9.1	Pitot Coefficient		Orsat good	~~yes / no~~ N/A	~~yes / no~~ / ~~yes / no~~
Date ID	9-24-15	Temperature (°F)	370		Nozzle ID		**Temp Check**	Pre-Test Set	Post-Test Set
Source/Location	ESI Stack	Meter Temp (°F)	60		Avg Nozzle Dia (in)	.235	Meter Box Temp	60.0	68
Sample Date	9-24-15	Static Press (in H_2O)	-19.6	-12.4	Area of Stack (ft^2)	39	Reference Temp	60.4	69.1
Baro. Press (in Hg)	29.78				Sample Time	~~12~~	Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Operator	SR	Ambient Temp (°F)	55		Total Traverse Pts	12	Temp Change Response ?	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	0828			544.212									
A 1	3		1.0	1.87	546.1	366	NA	58	250	252	51	2.5		
1	6		1.1	2.04	548.0	367		58	250	249	50	3.0		
2 A	9		1.0	1.87	550.2	370		58	250	252	50	2.5		
2	12		1.1	2.04	552.4	369		59	252	251	51	3.0		
3	15		1.1	2.04	554.2	373		59	251	253	51	3.0		
B 3	18	0846	1.1	2.04	556.543	370		60	252	251	53	3.6		
2	0	0846			556.543									
B 1	3		.90	1.68	558.345	364		62	255	252	54	2.5		
1	6		.92	1.72	560.2	366		63	256	251	54	2.5		
2	9		.90	1.68	562.5	369		63	252	251	55	2.5		
C 2	12		.86	1.61	564.0	372		63	253	252	56	2.5		
3 2	15		1.0	1.87	565.6	370		64	251	251	56	3.0		
3 3	18	904	1.0	1.87	567.642	375		65	249	250	56	3.0		
	0	904			567.642									
C 1	3		.80	1.50	569.0	362		67	255	251	57	2.5		
D 1	6		.80	1.50	570.8	366		68	255	252	57	2.5		
2	9		.82	1.53		369		68	251	250	57	2.5		
2 3	12		.82	1.53	574.4	368		68	252	249	57	2.5		
3	15		0.85	1.59	576.4	370		69	251	252	57	2.5		
3	18	922	0.85	1.59	578.5	370		69	251	250	57	2.5		
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts		Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac		Max Temp
			.93759	1.63458	414.050	360	SR	~~66.5~~	249/255	249/255	59	30		
			.8758	Avg Sqrt Del H	Comments:	369.25		65.17						
				1.27413										

WESTON MANAGERS DESIGNERS/CONSULTANTS

ISOKINETIC FIELD DATA SHEET

Method 12 lead

Client: LWEC
Operator: KH/SR
Source: No. 1 Boiler
Run No.: 3
Sample Loc.:
Date:
K Factor:

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	0922			578.5									
D 1	3	~~0.70~~	0.70	1.31	580.2	370	NA	71	255	254	57	2.5		
1	6		0.70	1.31	582.1	370		71	255	254	57	2.5		
2	9		0.65	1.21	583.4	365		72	251	250	58	2.5		
2	12		0.65	1.21	585.1	365		72	251	250	58	2.5		
3	15		0.70	1.31	586.9	368		72	252	249	58	2.5		
3	18	0940	0.70	1.31	588.266	379		77	252	250	59	2.5		

Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp
~~.93259~~	~~1.26~~ SR								
~~.976~~ SR	Avg Sqrt Del H	Comments:							

WESTON MANAGERS DESIGNERS/CONSULTANTS

SAMPLE RECOVERY FIELD DATA

EPA Method 12 - Lead

Client	LWEC	W.O. #	
Location/Plant	L'Anse MI	Source & Location	ESP Stack

Run No. 1 — Sample Date 9/23/15 — Recovery Date 9/23/15

Sample I.D. LWEC - Gas - STK - 1 - M12 - — Analyst TB — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	0.1HNO3	0.1HNO3	Empty						Silica Gel	
Final	180	140	5						308.8	
Initial	100	100	0						300	
Gain	80	40	5					125 ✓	8.8 ✓	

Impinger Color Clear — Labeled? ✓

Silica Gel Condition Mostly Blue — Sealed? ✓

Run No. 2 — Sample Date 9/23/6 — Recovery Date 9/23/15

Sample I.D. LWEC - Gas - STK - 2 - M12 - — Analyst TB — Filter Number N/A

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	0.1HNO3	0.1HNO3	Empty						Silica Gel	
Final	204	112	6						308.6	
Initial	100	100	0						300	
Gain	104	12	6					122 ✓	8.6 ✓	

Impinger Color Clear — Labeled? ✓

Silica Gel Condition Mostly Blue — Sealed? ✓

Run No. 3 — Sample Date 9/24/15 — Recovery Date 9/24/15

Sample I.D. LWEC - Gas - STK - 3 - M12 - — Analyst TB — Filter Number —

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	0.1HNO3	0.1HNO3	Empty						Silica Gel	
Final	206	123	0						308.6	
Initial	100	100	2						300	
Gain	106	23	2					131 ✓	8.6	139.6

Impinger Color Clear — Labeled? ✓

Silica Gel Condition Mostly Blue — Sealed? ✓

Check COC for Sample IDs of Media Blanks

WESTON SOLUTIONS

DA

Source Gas Analysis Data Sheet - Modified Method 3/3A

Client _____ Analyst FJS

Location/Plant L'ANSE, MI Date 9/23/15

Source ESP Out Analyzer Make & Model Servomex 4900

W.O. Number _____

Calibration _____

Analysis Number	Span	Calibration Gas Value O_2 (%)	Calibration Gas Value CO_2 (%)	Analyzer Response O_2 (%)	Analyzer Response CO_2 (%)
1	Zero	0	0	0.0	0.0
2	Mid	12.0	8.8	12.1	8.6
3	High	21.6	16.6	21.6	16.6
	Average				

Run Number	Analysis Time	Analyzer Response O_2 (%)	Analyzer Response CO_2 (%)
1	1910	9.2	10.7
2	1915	9.1	11.0
3			
	Average		

Run Number	Analysis Time	Analyzer Response O_2 (%)	Analyzer Response CO_2 (%)
1			
2			
3			
	Average		

Span	Cylinder ID
Mid	CC 333446
High	CC 45-2229

**Report all values to the nearest 0.1 percent

RUN SUMMARY

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 08:28 to 09:40

Run Averages

	9.1	10.9

Pre-run Bias at 07:45

Zero Bias	0.0	0.0
Span Bias	12.1	8.6
Span Gas	12.0	8.8

Post-run Bias at 09:45

Zero Bias	0.0	0.0
Span Bias	11.9	8.6
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	9.1	11.1

*No Correction

METHODS AND ANALYZERS

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

File: C:\DATA\LWEC\LWEC 092415.cem
Program Version: 2.0, built 4 Dec 2014 **File Version:** 2.02
Computer: WSWCAIRSERVICES **Trailer:** 27
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.6**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**20.0**
Span Concentration, %	**16.6**

Channel 4

Analyte	**NO_x**
Method	**EPA 7E**, Using Bias
Analyzer Make, Model & Serial No.	**Thermo 42i**
Full-Scale Output, mv	**10000**
Analyzer Range, ppm	**500**
Span Concentration, ppm	**433**

Channel 5

Analyte	**SO_2**
Method	**EPA 6C**, Using Bias
Analyzer Make, Model & Serial No.	**Ametek 9000**
Full-Scale Output, mv	**5000**
Analyzer Range, ppm	**500**
Span Concentration, ppm	**451**

Channel 6

Analyte	**THC**
Method	**EPA 20**, Using Bias
Analyzer Make, Model & Serial No.	**JUM3-300A**
Full-Scale Output, mv	**10000**
Analyzer Range, ppm	**55.0**
Span Concentration, ppm	**55.0**

CALIBRATION DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

O_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
12.0	CC333446
21.6	CC452229

Calibration Results

Zero	18 mv
Span, 21.6 %	8205 mv

Curve Coefficients

Slope	Intercept
378.2	18

CO_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
8.8	CC333446
16.6	CC452229

Calibration Results

Zero	24 mv
Span, 16.6 %	8375 mv

Curve Coefficients

Slope	Intercept
502.2	24

CALIBRATION DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

NO_x

Method: EPA 7E

Calibration Type: Linear Zero and High Span

Calibration Standards

ppm	Cylinder ID
253	CC352229
433	CC137964

Calibration Results

Zero	27 mv
Span, 433 ppm	8679 mv

Curve Coefficients

Slope	Intercept
20.00	27

SO_2

Method: EPA 6C

Calibration Type: Linear Zero and High Span

Calibration Standards

ppm	Cylinder ID
252	CC366152
451	CC409079

Calibration Results

Zero	4 mv
Span, 451 ppm	4526 mv

Curve Coefficients

Slope	Intercept
10.02	4

CALIBRATION DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

THC

Method: EPA 20

Calibration Type: Linear Zero and High Span

Calibration Standards

ppm	Cylinder ID
15.3	CC308182
25.4	CC452183
45.2	XC03100B

Calibration Results

Zero	1 mv
Span, 45.2 ppm	4516 mv

Curve Coefficients

Slope	Intercept
99.85	1

CALIBRATION ERROR DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

O_2
Method: EPA 3A
Span Conc. 21.6 %
Slope 378.2 **Intercept** 18.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
12.0	12.1	0.1	0.5	Pass
21.6	21.6	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.6 %
Slope 502.2 **Intercept** 24.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.8	8.6	-0.2	-1.2	Pass
16.6	16.6	0.0	0.0	Pass

NO_x
Method: EPA 7E
Span Conc. 433 ppm
Slope 20.00 **Intercept** 27

Standard ppm	Result ppm	Difference ppm	Error %	Status
Zero	0	0	0.0	Pass
253	254	1	0.2	Pass
433	433	0	0.0	Pass

CALIBRATION ERROR DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

SO_2
Method: EPA 6C
Span Conc. 451 ppm
Slope 10.02 **Intercept** 4

Standard ppm	Result ppm	Difference ppm	Error %	Status
Zero	0	0	0.0	Pass
252	252	0	0.0	Pass
451	451	0	0.0	Pass

THC
Method: EPA 20
Span Conc. 55.0 ppm
Slope 99.85 **Intercept** 1.0

Standard ppm	Result ppm	Difference ppm	Error %	Status
Zero	0.0	0.0	0.0	Pass
15.3	15.3	0.0	0.0	Pass
25.4	25.4	0.0	0.0	Pass
45.2	45.2	0.0	0.0	Pass

BIAS
Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

O_2
Method: EPA 3A
Span Conc. 21.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	12.1	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.6	0.0	0.0	Pass

NO_x
Method: EPA 7E
Span Conc. 433 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	0	0	0.0	Pass
Span	254	253	-1	-0.2	Pass

BIAS

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 07:45

SO_2

Method: EPA 6C
Span Conc. 451 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	0	0	0.0	Pass
Span	252	245	-7	-1.6	Pass

THC

Method: EPA 20
Span Conc. 55.0 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0.0	0.4	0.4	0.7	Pass
Span	25.4	25.5	0.1	0.2	Pass

RUN DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
		Start Strat Check			
		Response Time 94 sec			
		Start Run 3 M12			
		Strat Point 2			
08:29	9.2	10.8	104	136	4.2
08:30	9.1	11.0	104	123	1.2
08:31	9.3	10.7	104	130	1.1
08:32	9.2	10.8	105	128	1.3
08:33	9.3	10.7	103	133	1.2
08:34	9.3	10.7	105	126	1.1
08:35	9.2	10.8	106	134	1.2
08:36	9.3	10.8	106	128	1.2
08:37	9.3	10.7	107	131	1.0
		Point 1			
08:38	9.4	10.7	107	121	1.0
08:39	9.2	10.7	104	128	1.7
08:40	9.1	11.0	104	120	1.2
08:41	9.0	10.9	105	127	1.0
08:42	9.1	11.0	108	126	1.0
08:43	9.4	10.6	108	133	1.0
08:44	9.2	10.8	107	131	1.0
08:45	9.1	10.8	105	138	1.3
08:46	9.2	10.9	106	126	0.9
		Point 3			
08:47	9.1	10.9	105	131	1.4
08:48	9.0	11.2	104	126	0.9
08:49	9.2	10.7	105	132	0.9
08:50	9.0	11.0	104	128	0.8
08:51	9.4	10.6	104	135	1.2
08:52	9.2	10.9	104	133	1.0
08:53	9.1	10.9	105	146	1.7
08:54	9.2	10.8	104	141	1.2
08:55	9.1	10.8	103	151	1.9
08:56	9.1	11.0	105	144	1.0
08:57	9.4	10.6	106	146	0.9
08:58	9.0	11.0	106	146	1.0
08:59	9.2	10.7	106	149	1.0
09:00	9.1	10.9	107	148	0.8
09:01	9.1	10.8	107	152	1.2
09:02	8.9	11.1	107	153	1.0
09:03	9.3	10.6	107	151	0.8
09:04	9.1	10.9	106	158	0.8

* STRAT CHECK PASS ✓ (KW)

RUN DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
09:05	9.0	10.8	109	168	0.7
09:06	9.4	10.5	108	168	0.9
09:07	9.3	10.6	109	171	1.1
09:08	9.0	11.0	109	179	0.8
09:09	9.1	10.8	109	173	0.8
09:10	9.0	11.0	108	178	0.7
09:11	9.2	10.6	107	165	1.2
09:12	9.0	11.0	106	174	0.9
09:13	9.2	10.7	107	164	0.8
09:14	9.1	10.8	107	177	0.8
09:15	9.1	10.7	106	163	0.9
09:16	8.9	11.1	105	172	0.9
09:17	9.2	10.7	104	151	0.9
09:18	9.0	11.0	105	164	1.2
09:19	9.1	10.8	105	152	1.3
09:20	9.0	11.0	104	167	1.5
09:21	9.1	10.8	105	155	0.6
09:22	8.9	11.1	107	171	0.8
09:23	9.2	10.8	109	151	0.6
09:24	8.7	11.3	108	172	3.2
09:25	9.0	11.0	108	146	0.6
09:26	8.9	11.2	107	158	0.7
09:27	9.1	10.9	107	135	1.3
09:28	8.8	11.2	104	147	2.1
09:29	8.8	11.2	105	137	1.4
09:30	8.9	11.1	106	150	1.6
09:31	9.2	10.7	107	132	0.6
09:32	9.0	11.1	105	147	1.3
09:33	9.2	10.9	105	127	0.6
09:34	8.8	11.2	103	142	2.0
09:35	9.0	11.1	104	126	1.1
09:36	8.8	11.3	103	135	1.9
09:37	8.9	11.2	100	118	2.3
09:38	8.8	11.2	100	128	1.3
09:39	8.9	11.2	102	118	0.9
09:40	8.9	11.1	101	131	1.1
Avgs	**9.1**	**10.9**	**106**	**144**	**1.2**

RUN SUMMARY

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2	NO_x	SO_2	THC
Method	EPA 3A	EPA 3A	EPA 7E	EPA 6C	EPA 20
Conc. Units	%	%	ppm	ppm	ppm
Time: 08:28 to 09:40					
Run Averages					
	9.1	10.9	106	144	1.2
Pre-run Bias at 07:45					
Zero Bias	0.0	0.0	0	0	0.4
Span Bias	12.1	8.6	253	245	25.5
Span Gas	12.0	8.8	253	252	25.4
Post-run Bias at 09:45					
Zero Bias	0.0	0.0	1	3	0.0
Span Bias	11.9	8.6	251	244	25.0
Span Gas	12.0	8.8	253	252	25.4
Averages corrected for the average of the pre-run and post-run bias					
	9.1	11.1	106	148	1.0
		*No Correction			

WESTON SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 09:45

O_2

Method: EPA 3A
Span Conc. 21.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	11.9	-0.2	-0.9	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	11.9	-0.2	-0.9	Pass

*Bias No. 1

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.6	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.6	0.0	0.0	Pass

*Bias No. 1

BIAS AND CALIBRATION DRIFT

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 09:45

NO_x

Method: EPA 7E
Span Conc. 433 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	1	1	0.2	Pass
Span	254	251	-3	-0.7	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	0	1	1	0.2	Pass
Span	253	251	-2	-0.5	Pass

*Bias No. 1

SO_2

Method: EPA 6C
Span Conc. 451 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	3	3	0.7	Pass
Span	252	244	-8	-1.8	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	0	3	3	0.7	Pass
Span	245	244	-1	-0.2	Pass

*Bias No. 1

BIAS AND CALIBRATION DRIFT

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 09:45

THC
Method: EPA 20
Span Conc. 55.0 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	25.4	25.0	-0.4	-0.7	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	25.4	25.0	-0.4	-0.7	Pass

*Cal No. 1

RUN DATA

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
		Cems probe port c pt2			
11:36	8.9	11.2	108	117	1.1
11:37	9.0	11.1	107	121	0.4
11:38	8.9	11.0	106	114	1.2
11:39	8.8	11.3	105	125	0.5
11:40	9.0	11.1	106	117	0.5
11:41	8.9	11.0	105	128	0.4
11:42	8.9	11.1	106	121	0.6
11:43	9.0	11.1	106	129	0.6
11:44	9.0	11.0	107	120	0.6
11:45	9.0	10.8	106	125	0.5
11:46	9.3	10.7	107	116	0.3
11:47	9.1	10.8	106	128	0.4
11:48	9.3	10.6	105	117	0.3
11:49	9.0	10.9	105	126	0.3
11:50	9.0	10.9	106	118	0.5
11:51	8.8	11.1	103	129	0.5
11:52	8.9	11.0	102	119	0.4
11:53	9.0	10.8	104	130	0.4
11:54	9.2	10.6	107	126	0.4
11:55	9.1	10.8	107	139	0.3
11:56	9.1	10.8	107	129	0.3
11:57	9.1	10.8	106	139	0.3
11:58	9.1	10.7	108	129	0.4
11:59	9.0	10.9	108	142	0.3
12:00	9.0	10.9	108	129	0.6
12:01	9.0	10.8	107	136	0.7
12:02	9.0	10.9	108	130	1.0
12:03	9.1	10.7	108	135	1.1
12:04	9.0	10.8	108	127	1.3
12:05	9.1	10.9	107	131	1.5
12:06	9.2	10.7	105	124	1.5
12:07	9.1	10.8	105	137	1.6
12:08	9.2	10.7	106	131	1.6
12:09	9.1	10.7	107	142	1.6
12:10	9.2	10.7	107	131	1.7
12:11	9.0	10.9	107	136	1.7
12:12	9.0	11.0	106	127	1.6
12:13	9.1	10.8	107	136	1.7
12:14	9.0	10.9	107	132	1.6
12:15	11.3	8.9	106	110	1.8

RUN DATA

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
		cems at point A 2			
12:16	9.8	10.1	81	128	1.7
12:17	9.4	10.5	99	137	1.5
12:18	9.1	10.7	103	139	1.4
12:19	9.3	10.5	103	140	1.4
12:20	9.2	10.7	102	134	1.4
12:21	9.2	10.7	102	132	1.3
12:22	9.0	10.9	103	132	1.8
12:23	9.2	10.7	103	129	1.6
12:24	9.1	10.7	104	129	1.6
12:25	9.3	10.5	105	127	1.4
12:26	9.2	10.7	105	130	2.2
12:27	9.1	10.7	105	131	2.0
12:28	9.3	10.6	104	132	1.5
12:29	9.2	10.6	105	132	1.4
12:30	9.1	10.8	106	133	1.4
12:31	9.3	10.6	108	126	1.5
12:32	9.2	10.7	107	127	1.3
12:33	9.3	10.5	108	128	1.2
12:34	9.2	10.6	109	138	1.6
12:35	9.2	10.7	109	142	1.3
12:36	9.2	10.6	110	148	1.1
12:37	9.3	10.5	110	142	1.2
12:38	9.3	10.6	109	149	1.3
12:39	9.1	10.6	108	141	1.3
12:40	9.1	10.8	107	146	1.3
12:41	9.2	10.7	106	133	1.3
12:42	9.3	10.6	106	137	1.3
12:43	9.4	10.5	108	126	1.4
12:44	9.1	10.8	108	135	1.2
12:45	9.2	10.7	110	132	1.2
12:46	9.1	10.6	111	146	1.1
12:47	9.2	10.6	112	151	1.1
12:48	9.4	10.3	111	165	1.0
12:49	9.3	10.3	111	159	1.0
12:50	9.1	10.6	111	172	1.1
12:51	9.0	10.7	110	161	1.2
12:52	9.1	10.7	109	163	1.1
12:53	9.2	10.5	110	145	1.1
12:54	9.1	10.7	110	153	1.1
12:55	9.3	10.5	111	137	1.2
12:56	9.0	10.8	110	147	1.7

RUN DATA

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
12:57	9.1	10.7	111	137	1.2
12:58	9.2	10.5	110	145	1.3
12:59	9.3	10.4	111	140	1.1
13:00	9.1	10.7	111	155	1.1
13:01	9.3	10.4	112	150	1.1
13:02	9.2	10.6	111	160	1.1
13:03	9.2	10.5	111	148	1.1
13:04	9.1	10.6	110	155	1.0
13:05	9.2	10.6	111	141	1.0
13:06	9.2	10.6	109	148	1.5
13:07	9.2	10.5	110	140	2.0
13:08	9.2	10.5	110	152	2.1
13:09	9.2	10.6	110	145	2.0
13:10	9.3	10.4	110	155	2.0
13:11	9.3	10.4	111	144	1.9
13:12	9.2	10.6	110	150	2.3
13:13	9.1	10.6	109	138	2.1
13:14	9.0	10.8	110	149	1.9
13:15	9.2	10.6	111	141	1.7
13:16	9.3	10.4	112	150	1.9
13:17	9.3	10.5	111	143	1.8
13:18	9.0	10.7	111	158	1.7
13:19	9.1	10.6	111	153	1.7
13:20	9.3	10.4	112	160	1.9
13:21	9.3	10.4	112	149	1.5
13:22	9.3	10.5	113	155	1.4
13:23	9.3	10.4	112	143	1.4
13:24	9.0	10.6	112	153	1.8
13:25	9.3	10.4	111	142	1.3
13:26	9.2	10.6	112	152	1.3
13:27	9.5	10.3	112	141	1.2
13:28	9.3	10.4	113	153	1.7
13:29	9.2	10.6	112	145	1.2
13:30	9.2	10.5	111	152	1.2
Avgs	**9.2**	**10.7**	**108**	**138**	**1.2**

RUN SUMMARY

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2	NO_x	SO_2	THC
Method	EPA 3A	EPA 3A	EPA 7E	EPA 6C	EPA 20
Conc. Units	%	%	ppm	ppm	ppm
Time: 11:35 to 13:30					
Run Averages					
	9.2	10.7	108	138	1.2
Pre-run Bias at 09:45					
Zero Bias	0.0	0.0	1	3	0.0
Span Bias	11.9	8.6	251	244	25.0
Span Gas	12.0	8.8	253	252	25.4
Post-run Bias at 13:48					
Zero Bias	0.0	0.0	0	3	-0.1
Span Bias	11.9	8.7	248	249	25.2
Span Gas	12.0	8.8	253	252	25.4
Averages corrected for the average of the pre-run and post-run bias					
	9.2	10.8	109	140	1.3

*No Correction

WESTON SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 13:48

O_2
Method: EPA 3A
Span Conc. 21.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	11.9	-0.2	-0.9	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

*Bias No. 2

CO_2
Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.7	0.1	0.6	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.7	0.1	0.6	Pass

*Bias No. 2

BIAS AND CALIBRATION DRIFT

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 13:48

NO_x
Method: EPA 7E
Span Conc. 433 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	0	0	0.0	Pass
Span	254	248	-6	-1.4	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	1	0	-1	-0.2	Pass
Span	251	248	-3	-0.7	Pass

*Bias No. 2

SO_2
Method: EPA 6C
Span Conc. 451 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	3	3	0.7	Pass
Span	252	249	-3	-0.7	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	3	3	0	0.0	Pass
Span	244	249	5	1.1	Pass

*Bias No. 2

BIAS AND CALIBRATION DRIFT

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 13:48

THC
Method: EPA 20
Span Conc. 55.0 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0.0	-0.1	-0.1	-0.2	Pass
Span	25.4	25.2	-0.2	-0.4	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	0.0	-0.1	-0.1	-0.2	Pass
Span	25.4	25.2	-0.2	-0.4	Pass

*Cal No. 1

WESTON SOLUTIONS

RUN DATA

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
		Start Run 2 PM/HCl/ PM10			
15:14	9.4	10.4	100	160	0.3
15:15	9.3	10.5	101	157	0.3
15:16	9.4	10.4	101	155	1.1
15:17	9.4	10.2	99	161	0.5
15:18	9.4	10.4	99	160	0.3
15:19	9.6	10.1	100	160	0.3
15:20	9.4	10.4	98	170	0.3
15:21	9.9	9.8	100	167	0.3
15:22	9.6	10.2	99	178	0.4
15:23	9.6	10.1	100	183	0.3
15:24	9.5	10.1	102	194	0.2
15:25	9.6	9.8	104	198	0.3
15:26	9.7	10.0	104	205	0.3
15:27	9.5	10.1	105	199	0.3
15:28	9.7	9.9	106	203	0.2
15:29	9.6	10.1	105	191	0.6
15:30	9.3	10.5	103	199	0.4
15:31	9.5	10.2	104	181	0.3
15:32	9.1	10.7	103	188	0.5
15:33	9.3	10.5	103	176	0.9
15:34	9.2	10.6	101	178	0.5
15:35	9.5	10.2	105	162	0.4
15:36	9.3	10.6	105	175	1.3
15:37	9.3	10.5	108	168	0.4
15:38	9.2	10.6	109	176	0.3
15:39	9.2	10.3	111	166	0.6
15:40	9.1	10.7	111	168	0.3
15:41	9.0	10.8	114	154	0.4
15:42	9.0	10.8	113	161	1.0
15:43	9.2	10.5	114	148	0.4
15:44	9.0	10.8	114	155	0.5
15:45	9.1	10.6	115	142	0.6
15:46	8.8	11.0	112	154	2.0
15:47	9.2	10.5	113	140	0.4
15:48	9.1	10.7	116	150	0.3
15:49	9.1	10.7	120	141	0.3
15:50	8.9	10.9	122	155	0.5
15:51	9.0	10.8	121	142	0.4
15:52	9.1	10.7	119	149	0.4
15:53	9.1	10.7	119	134	0.4
15:54	8.9	11.0	120	143	0.4

RUN DATA

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
15:55	8.9	10.8	120	133	0.3
15:56	8.8	11.0	118	141	1.1
15:57	9.3	10.6	116	126	0.3
15:58	9.0	10.7	116	137	1.7
15:59	9.2	10.7	114	127	0.6
16:00	9.2	10.6	114	134	0.4
16:01	9.0	10.7	114	130	0.3
16:02	9.1	10.7	112	135	0.5
16:03	8.9	10.9	115	130	0.4
16:04	9.1	10.6	116	134	0.3
16:05	9.0	10.8	117	129	1.0
16:06	8.8	11.0	117	136	1.6
16:07	8.8	11.1	118	128	1.4
16:08	9.0	10.8	119	132	0.9
16:09	8.7	11.1	120	129	0.7
16:10	8.8	11.0	117	133	0.6
		Port Change			
16:11	8.8	11.1	120	130	0.5
16:14	9.4	10.6	43	120	0.6
16:15	8.8	11.1	118	123	0.3
16:16	8.8	11.2	120	130	0.7
16:17	8.7	11.3	118	130	1.0
16:18	9.0	10.9	119	139	0.3
16:19	8.9	11.0	119	138	0.3
16:20	8.9	11.0	118	148	0.2
16:21	8.9	11.1	118	140	0.2
16:22	9.1	10.8	119	145	0.3
16:23	8.8	11.2	120	143	0.3
16:24	9.0	11.0	122	147	0.2
16:25	8.8	11.3	122	142	0.4
16:26	8.8	11.2	122	144	0.5
16:27	8.6	11.4	121	142	0.2
16:28	9.0	10.9	123	147	0.8
16:29	8.9	11.1	122	145	0.2
16:30	8.9	10.8	123	152	0.3
16:31	8.8	11.2	123	149	0.4
16:32	8.8	11.1	123	157	0.4
16:33	8.7	11.2	123	155	0.2
16:34	8.9	11.1	124	153	0.3
16:35	8.9	11.1	123	148	0.2
16:36	9.0	10.9	122	145	0.4
16:37	8.8	11.3	120	146	0.3

RUN DATA

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %	NO_x ppm	SO_2 ppm	THC ppm
16:38	8.8	11.1	120	139	0.2
16:39	8.8	11.3	118	144	0.2
16:40	9.0	11.0	118	137	0.4
16:41	8.9	11.2	115	141	0.2
16:42	9.0	10.8	116	137	0.4
16:43	8.8	11.3	116	144	0.2
16:44	8.9	11.0	117	138	0.6
16:45	8.7	11.2	117	147	0.5
16:46	8.7	11.2	118	140	0.3
16:47	8.9	11.1	119	145	0.2
16:48	9.1	10.8	120	137	0.8
16:49	8.6	11.5	121	157	0.5
16:50	8.8	11.1	122	145	0.4
16:51	9.0	10.9	122	155	0.4
16:52	9.1	10.8	120	145	0.4
16:53	8.8	11.2	119	164	0.7
16:54	8.8	11.1	121	151	0.4
16:55	8.9	11.0	122	166	0.5
16:56	9.1	10.7	121	146	0.2
16:57	8.9	11.1	120	161	0.3
Avgs	**9.1**	**10.8**	**114**	**152**	**0.5**

RUN SUMMARY

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2	NO_x	SO_2	THC
Method	EPA 3A	EPA 3A	EPA 7E	EPA 6C	EPA 20
Conc. Units	%	%	ppm	ppm	ppm
Time: 15:13 to 16:57					
Run Averages					
	9.1	10.8	114	152	0.5
Pre-run Bias at 13:48					
Zero Bias	0.0	0.0	0	3	-0.1
Span Bias	11.9	8.7	248	249	25.2
Span Gas	12.0	8.8	253	252	25.4
Post-run Bias at 17:02					
Zero Bias	0.0	0.1	0	3	0.1
Span Bias	11.9	8.7	249	246	24.9
Span Gas	12.0	8.8	253	252	25.4
Averages corrected for the average of the pre-run and post-run bias					
	9.1	10.9	116	153	0.5

*No Correction

WESTON SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 4

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 17:02

O_2

Method: EPA 3A
Span Conc. 21.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	11.9	-0.2	-0.9	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

*Bias No. 3

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.6	8.7	0.1	0.6	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.7	8.7	0.0	0.0	Pass

*Bias No. 3

BIAS AND CALIBRATION DRIFT

Number 4

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 17:02

NO_x
Method: EPA 7E
Span Conc. 433 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	0	0	0.0	Pass
Span	254	249	-5	-1.2	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	0	0	0	0.0	Pass
Span	248	249	1	0.2	Pass

*Bias No. 3

SO_2
Method: EPA 6C
Span Conc. 451 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0	3	3	0.7	Pass
Span	252	246	-6	-1.3	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	3	3	0	0.0	Pass
Span	249	246	-3	-0.7	Pass

*Bias No. 3

BIAS AND CALIBRATION DRIFT

Number 4

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 17:02

THC
Method: EPA 20
Span Conc. 55.0 ppm

Bias Results

Standard Gas	Cal. ppm	Bias ppm	Difference ppm	Error %	Status
Zero	0.0	0.1	0.1	0.2	Pass
Span	25.4	24.9	-0.5	-0.9	Pass

Calibration Drift

Standard Gas	Initial* ppm	Final ppm	Difference ppm	Drift %	Status
Zero	0.0	0.1	0.1	0.2	Pass
Span	25.4	24.9	-0.5	-0.9	Pass

*Cal No. 1

RUN DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
11:27	8.6	11.5
11:28	8.8	11.2
Cems probe port c pt2		
11:29	8.9	11.1
11:30	9.0	10.8
11:31	8.8	11.2
11:32	9.0	11.0
11:33	8.8	11.3
11:34	8.9	11.1
11:35	8.7	11.3
11:36	8.9	11.2
11:37	9.0	11.1
11:38	8.9	11.0
11:39	8.8	11.3
11:40	9.0	11.1
11:41	8.9	11.0
11:42	8.9	11.1
11:43	9.0	11.1
11:44	9.0	11.0
11:45	9.0	10.8
11:46	9.3	10.7
11:47	9.1	10.8
11:48	9.3	10.6
11:49	9.0	10.9
11:50	9.0	10.9
11:51	8.8	11.1
11:52	8.9	11.0
11:53	9.0	10.8
11:54	9.2	10.6
11:55	9.1	10.8
11:56	9.1	10.8
11:57	9.1	10.8
11:58	9.1	10.7
11:59	9.0	10.9
12:00	9.0	10.9
12:01	9.0	10.8
12:02	9.0	10.9
12:03	9.1	10.7
12:04	9.0	10.8
12:05	9.1	10.9
12:06	9.2	10.7
12:07	9.1	10.8

RUN DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
12:08	9.2	10.7
12:09	9.1	10.7
12:10	9.2	10.7
12:11	9.0	10.9
12:12	9.0	11.0
12:13	9.1	10.8
12:14	9.0	10.9
12:15	11.3	8.9
cems at point A 2		
12:16	9.8	10.1
12:17	9.4	10.5
12:18	9.1	10.7
12:19	9.3	10.5
12:20	9.2	10.7
12:21	9.2	10.7
12:22	9.0	10.9
12:23	9.2	10.7
12:24	9.1	10.7
12:25	9.3	10.5
12:26	9.2	10.7
12:27	9.1	10.7
12:28	9.3	10.6
12:29	9.2	10.6
12:30	9.1	10.8
12:31	9.3	10.6
12:32	9.2	10.7
12:33	9.3	10.5
12:34	9.2	10.6
12:35	9.2	10.7
12:36	9.2	10.6
12:37	9.3	10.5
12:38	9.3	10.6
12:39	9.1	10.6
12:40	9.1	10.8
12:41	9.2	10.7
12:42	9.3	10.6
12:43	9.4	10.5
12:44	9.1	10.8
12:45	9.2	10.7
12:46	9.1	10.6
12:47	9.2	10.6
12:48	9.4	10.3

RUN DATA

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
12:49	9.3	10.3
12:50	9.1	10.6
12:51	9.0	10.7
12:52	9.1	10.7
12:53	9.2	10.5
12:54	9.1	10.7
12:55	9.3	10.5
12:56	9.0	10.8
12:57	9.1	10.7
12:58	9.2	10.5
12:59	9.3	10.4
13:00	9.1	10.7
13:01	9.3	10.4
13:02	9.2	10.6
13:03	9.2	10.5
13:04	9.1	10.6
13:05	9.2	10.6
13:06	9.2	10.6
13:07	9.2	10.5
Avgs	**9.1**	**10.7**

RUN SUMMARY

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 11:26 to 13:07

Run Averages

	9.1	10.7

Pre-run Bias at 09:45

Zero Bias	0.0	0.0
Span Bias	11.9	8.6
Span Gas	12.0	8.8

Post-run Bias at 13:48

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

	9.2	10.9

*No Correction

RUN DATA

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
Start Run 2 PM/HCl/ PM10		
14:49	9.4	10.5
14:50	9.5	10.4
14:51	9.5	10.3
14:52	9.7	10.1
14:53	9.6	10.2
14:54	9.6	10.3
14:55	9.5	10.2
14:56	9.4	10.3
14:57	9.4	10.4
14:58	9.5	10.3
14:59	9.6	10.3
15:00	9.5	10.4
15:01	9.4	10.3
15:02	9.3	10.5
15:03	9.5	10.2
15:04	9.4	10.4
15:05	9.7	10.1
15:06	9.3	10.5
15:07	9.4	10.3
15:08	9.3	10.5
15:09	9.4	10.3
15:10	9.4	10.3
15:11	9.5	10.1
15:12	9.4	10.2
15:13	9.7	10.1
15:14	9.4	10.4
15:15	9.3	10.5
15:16	9.4	10.4
15:17	9.4	10.2
15:18	9.4	10.4
15:19	9.6	10.1
15:20	9.4	10.4
15:21	9.9	9.8
15:22	9.6	10.2
15:23	9.6	10.1
15:24	9.5	10.1
15:25	9.6	9.8
15:26	9.7	10.0
15:27	9.5	10.1
15:28	9.7	9.9
15:29	9.6	10.1

RUN DATA

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
15:30	9.3	10.5
15:31	9.5	10.2
15:32	9.1	10.7
15:33	9.3	10.5
15:34	9.2	10.6
15:35	9.5	10.2
15:36	9.3	10.6
15:37	9.3	10.5
15:38	9.2	10.6
15:39	9.2	10.3
15:40	9.1	10.7
15:41	9.0	10.8
15:42	9.0	10.8
15:43	9.2	10.5
15:44	9.0	10.8
15:45	9.1	10.6
15:46	8.8	11.0
15:47	9.2	10.5
15:48	9.1	10.7
15:49	9.1	10.7
15:50	8.9	10.9
15:51	9.0	10.8
15:52	9.1	10.7
15:53	9.1	10.7
15:54	8.9	11.0
15:55	8.9	10.8
15:56	8.8	11.0
15:57	9.3	10.6
15:58	9.0	10.7
15:59	9.2	10.7
16:00	9.2	10.6
16:01	9.0	10.7
16:02	9.1	10.7
16:03	8.9	10.9
16:04	9.1	10.6
16:05	9.0	10.8
16:06	8.8	11.0
16:07	8.8	11.1
16:08	9.0	10.8
16:09	8.7	11.1
Port Change		
Avgs	**9.3**	**10.5**

RUN SUMMARY

Number 2

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 14:48 to 16:09

Run Averages

9.3	10.5

Pre-run Bias at 13:48

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Post-run Bias at 17:02

Zero Bias	0.0	0.1
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

9.3	10.6

*No Correction

RUN DATA

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
17:53	8.6	11.4
17:54	8.7	11.4
17:55	8.6	11.5
17:56	8.7	11.2
17:57	8.2	11.9
17:58	8.3	11.7
17:59	8.4	11.7
18:00	8.8	11.2
18:01	9.0	11.0
18:02	8.8	11.2
18:03	8.6	11.5
18:04	8.7	11.3
18:05	8.3	11.7
18:06	8.5	11.5
18:07	8.4	11.6
18:08	8.5	11.5
18:09	8.6	11.4
18:10	8.6	11.5
18:11	8.6	11.4
18:12	8.6	11.4
18:13	8.7	11.4
18:14	8.6	11.3
18:15	8.8	11.2
18:16	9.0	10.9
18:17	8.9	11.0
18:18	9.2	10.7
18:19	9.0	11.0
18:20	9.1	10.8
18:21	8.7	11.3
18:22	8.8	11.1
18:23	8.6	11.3
18:24	8.8	11.1
18:25	8.5	11.5
18:26	8.7	11.3
18:27	8.5	11.5
18:28	8.6	11.5
18:29	8.6	11.4
18:30	8.6	11.4
18:31	8.5	11.5
18:32	8.9	11.0
18:33	8.6	11.4
18:34	8.6	11.4

WESTON SOLUTIONS

RUN DATA

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
18:35	8.5	11.5
	Port Change	
18:38	8.4	11.5
18:39	8.4	11.6
18:40	8.6	11.5
18:41	8.6	11.4
18:42	8.6	11.5
18:43	8.6	11.4
18:44	8.7	11.4
18:45	8.4	11.6
18:46	8.7	11.4
18:47	8.7	11.3
18:48	8.7	11.3
18:49	8.7	11.4
18:50	8.6	11.5
18:51	8.5	11.3
18:52	8.5	11.6
18:53	8.6	11.5
18:54	8.5	11.5
18:55	8.4	11.6
18:56	8.6	11.3
18:57	8.8	11.2
18:58	8.8	11.3
18:59	8.6	11.3
19:00	8.6	11.5
19:01	8.6	11.4
19:02	8.6	11.5
19:03	8.7	11.3
19:04	8.6	11.6
19:05	8.5	11.5
19:06	8.5	11.6
19:07	8.6	11.4
19:08	8.8	11.1
19:09	8.9	11.1
19:10	8.8	11.2
19:11	8.8	11.2
19:12	8.8	11.3
19:13	8.7	11.3
19:14	8.7	11.4
19:15	8.9	11.0
19:16	8.7	11.3
19:17	8.8	11.2

RUN DATA

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	O_2 %	CO_2 %
19:18	8.9	11.1
19:19	8.8	11.1
19:20	8.7	11.4
19:21	8.9	11.1
19:22	8.6	11.4
19:23	8.5	11.5
19:24	8.3	11.8
19:25	8.6	11.4
19:26	8.7	11.3
19:27	8.6	11.4
19:28	8.7	11.3
19:29	8.9	11.1
19:30	8.9	11.1
19:31	8.9	11.1
19:32	8.5	11.5
19:33	8.8	11.1
Avgs	**8.7**	**11.3**

RUN SUMMARY

Number 3

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 17:52 to 19:33

Run Averages

8.7	11.3

Pre-run Bias at 17:02

Zero Bias	0.0	0.1
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Post-run Bias at 19:36

Zero Bias	0.0	0.0
Span Bias	11.9	8.7
Span Gas	12.0	8.8

Averages corrected for the average of the pre-run and post-run bias

8.7	11.5

*No Correction

BIAS AND CALIBRATION DRIFT

Number 5

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 19:36

O_2

Method: EPA 3A
Span Conc. 21.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	12.1	11.9	-0.2	-0.9	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

*Bias No. 4

CO_2

Method: EPA 3A
Span Conc. 16.6 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.6	8.7	0.1	0.6	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.1	0.0	-0.1	-0.6	Pass
Span	8.7	8.7	0.0	0.0	Pass

*Bias No. 4

NOVEMBER TEST PROGRAM

L'Anse Warden Electric Company
Particulate and Hydrogen Chloride Test Data Inputs
Condition 1

Test Data			
Run number	C1-1	C1-2	C1-3
Location		Boiler No. 1	
Date	11/3/2015	11/3/2015	11/4/2015
Time period	1502-1614	1650-1756	0912-1020
Operator	JM	JM	JM
Inputs For Calcs.			
Sq. rt. delta P	0.89937	0.90819	0.90801
Delta H	1.4542	1.3967	1.3742
Stack temp. (deg.F)	410.9	412.4	397.8
Meter temp. (deg.F)	79.8	72.3	66.0
Sample volume (act.)	37.932	36.476	36.618
Barometric press. (in.Hg)	29.51	29.51	29.44
Volume H2O imp. (ml)	148.0	134.0	140.0
Weight change sil. gel (g)	9.6	8.7	8.5
% CO2	8.9	8.9	9.3
% O2	11.4	11.6	11.1
% N	79.7	79.5	79.6
Area of stack (sq.ft.)	39.000	39.000	39.000
Sample time (min.)	60	60	60
Static pressure (in.H2O)	-12.50	-12.50	-12.80
Nozzle dia. (in.)	0.235	0.235	0.235
Meter box cal.	0.9912	0.9912	0.9912
Cp of pitot tube	0.84	0.84	0.84
Traverse Points	12	12	12
HCl Laboratory Report Data			
HCl, mg	4.70	5.00	3.90
Total HCl, mg	4.70	5.00	3.90

ISOKINETIC FIELD DATA SHEET

148 (9m)

Method M26A – H/CL

Page 1 of 1

		Stack Conditions					
Client	LWEC		Assumed	Actual	Meter Box ID	WC 31	
W.O.#					Meter Box Y	0.9912	K Factor 1.79
Project ID		% Moisture	14.5		Meter Box Del H	2.0323	**Leak Checks** Initial / Mid-Point / Final
Mode/Source ID		Impinger Vol (ml)		1468 (M)	Probe ID / Length	7'	Sample Train (ft^3)	0.002		0.002
Samp. Loc. ID		Silica gel (g)		9.0	Probe Material	PSA	Leak Check @ (in Hg)	13		6
Run No.ID	C1-R1	CO2, % by Vol	12	8.9	Pitot / Thermocouple ID		Pitot good	(yes) / no	yes / no	(yes) / no
Test Method ID	M26A	O2, % by Vol	9	11.4	Pitot Coefficient	0.84	Orsat good	yes / no	yes / no	yes / no
Date ID		Temperature (°F)	580		Nozzle ID		**Temp Check** NA	**Pre-Test Set**		**Post-Test Set**
Source/Location	EF OUTLET	Meter Temp (°F)			Avg Nozzle Dia (in)	0.235	Meter Box Temp	64		63
Sample Date	11/3/15	Static Press (in H_2O)	-10.5	-12.5	Area of Stack (ft^2)	39	Reference Temp	64		62
Baro. Press (in Hg)	29.51				Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Operator	M. ILS	Ambient Temp (°F)			Total Traverse Pts	12	Temp Change Response ?	(yes) / no		(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1502			722.953									
A	5		0.92	1.65	726.5	410	NA	79	253	261	56	4		
	10		0.97	1.74	730.0	409		79	256	261	62-5	4		
	15	1517	0.94	1.68	733.346	398		79	256	261	52	4		
	0	1522	—	1.48	733.346	—		—	—	—	—	—		
B	5		0.82	(M) 1.45	736.6	409		79	255	262	57	4		
	10		0.84	1.50	739.8	412		79	254	262	56	4		
	15	1537	0.88	1.57	743.114	409		80	253	261	56	4		
	0	1540	—	—	743.114	—		—	—	—	—	—		
C	5		0.84	1.50	746.3	416		80	254	260	57	4		
	10		0.80	1.43	749.5	417		81	256	261	57	4		
	15	1555	0.77	1.38	752.616	411		81	262	260	57	4		
	0	1559	—	—	752.616	—		—	—	—	—	—		
D	5		0.70	(M) 1.25	755.6	415		80	255	257	58	4		
	10		0.65	(M) 1.16	758.3	417		80	256	261	62	4		
	15	1614	0.62	1.11	760.915	410		80	254	260	60	3.5		
			Avg Sqrt Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp		
			0.89937	1.4541	37.932	410.92	79.75	253/262	251/262	62	4			
				Avg Sqrt Del H	Comments:									
				1.2037										

WESTON MANAGERS DESIGNERS/CONSULTANTS

AVG 0.8125

I = 103.3
m = 16.9

76010
36.396

Q1_LWEC001_Opactiy_003846

ISOKINETIC FIELD DATA SHEET

EPA Method 26A - HCl & Cl2

		Stack Conditions	Assumed	Actual
Client	LWEC			
W.O.#	14464			
Project ID	LWEC	% Moisture	16.5	
Mode/Source ID	C1	Impinger Vol (ml)		
Samp. Loc. ID		Silica gel (g)		
Run No.ID	2	CO2, % by Vol	9	8.9
Test Method ID	M26A	O2, % by Vol	11.5	11.6
Date ID	3NOV2015	Temperature (°F)	410	
Source/Location	LWEC Stack	Meter Temp (°F)	73	
Sample Date	11/3/15	Static Press (in H_2O)		-.125
Baro. Press (in Hg)	29.51			
Operator	Mills	Ambient Temp (°F)		

		Leak Checks	Initial	Mid-Point	Final
Meter Box ID	W.C 31				
Meter Box Y	.991C				
Meter Box Del H	2.0323				
Probe ID / Length	7'	Sample Train (ft^3)	0.002		0.002
Probe Material	Boro	Leak Check @ (in Hg)	✓		✓
Pitot / Thermocouple ID	PS24	Pitot good	yes / no	yes / no	yes / no
Pitot Coefficient	0.84	Orsat good	yes / no	yes / no	yes / no
Nozzle ID		**Temp Check**	Pre-Test Set		Post-Test Set
Avg Nozzle Dia (in)	.235	Meter Box Temp	59		54
Area of Stack (ft^2)	39.00	Reference Temp	58		53
Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Total Traverse Pts	12	Temp Change Response	yes / no		yes / no

K Factor ~~1.77~~ 1.65

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1650			761.010									
A 1	5		0.98	1.75	764.3	410	NA	75	255	260	59	4.5		
2	10		1.1	1.97	767.7	412		75	256	261	55	5		
3	15	1705	1.0	1.65	771.185	406		75	259	260	53	4.5		
	0	1707			771.185									
B 1	5		0.96	1.57	774.4	414		74	257	259	53	4.5		
2	10		0.95	1.57	777.8	417		73	254	261	52	4.5		
3	15	1722	0.87	1.44	780.865	409		73	257	260	52	4.0		
	0	1724			780.865									
C 1	5		0.76	1.25	783.8	417		72	253	261	53	4.0		
2	10		0.78	1.28	786.7	416		72	256	260	53	4.0		
3	15	1739	0.73	1.20	789.460	412		71	260	261	52	3.5		
	0	1741			789.460									
D 1	5		0.66	1.09	792.3	414		70	257	260	56 53	3.5		
2	10		0.61	1.00	794.9	412		69	256	260	53	3.0		
3	15	1750	0.60	0.99	797.486	410		69	263	260	53	3.0		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp		
			0.8325	1.39667	36.476	411.42	72.33	253/163	259/261	59	5			
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments									
			0.90818	1.17506										

EPA 26A from 40CFR Part 60 App A

I = 98.93 M = 15.92

Qs = 77406 %C 35.47

Q1_LWEC001_Opactiy_003847

ISOKINETIC FIELD DATA SHEET

EPA Method 26A - HCl & Cl2

		Stack Conditions	Assumed	Actual
Client	LWEC			
W.O.#	14464			
Project ID	LWEC	% Moisture	15	
Mode/Source ID	C1	Impinger Vol (ml)		140
Samp. Loc. ID		Silica gel (g)		8.5
Run No.ID	3	CO2, % by Vol	9	
Test Method ID	M26A	O2, % by Vol	11.5	
Date ID	3NOV2015	Temperature (°F)	410	
Source/Location	LWEC Stack	Meter Temp (°F)	75	
Sample Date	11/4/15	Static Press (in H_2O)	-12.5	-12.8
Baro. Press (in Hg)	29.44			
Operator	M.LLS	Ambient Temp (°F)	65	

Meter Box ID	MC3
Meter Box Y	0.9912
Meter Box Del H	2.0323
Probe ID / Length	
Probe Material	Boro
Pitot / Thermocouple ID	PST4
Pitot Coefficient	0.84
Nozzle ID	
Avg Nozzle Dia (in)	0.235
Area of Stack (ft^2)	39.00
Sample Time	60
Total Traverse Pts	12

Leak Checks

	Initial	Mid-Point	Final
Sample Train (ft^3)	0.002		0.002
Leak Check @ (in Hg)	15		15
Pitot good	yes / no	yes / no	yes / no
Orsat good	~~yes / no~~	~~yes / no~~	~~yes / no~~

NA

Temp Check

K Factor 1.65

	Pre-Test Set	Post-Test Set
Meter Box Temp	60	63
Reference Temp	59	63
Pass/Fail (+/- 2°)	Pass / Fail	Pass / Fail
Temp Change Response	yes / no	yes / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	0912			797.623									
A 1	5		1.05	1.73	801.2	393	NA	58	257	260	57	4		
2	10		1.05	1.73	804.5	394		59	258	262	47	4		
3	15	0927	1.00	1.65	807.863	383		60	264	260	48	4		
	0	0930	—	—	807.863	—		—	—	—	—	—		
B 1	5		0.95	1.57	811.1	400		63	261	262	53	4		
2	10		0.95	1.57	814.3	404		65	259	261	52	4		
3	15	0945	0.83	1.37	817.307	402		66	265	261	53	4		
	0		—	—	817.307	—		—	—	—	—	—		
C 1	5	0948	0.80	1.32	820.2	401		67	259	261	56	3.5		
2	10		0.78	1.29	823.2	403		68	260	259	53	3.5		
3	15	1003	0.75	1.24	826.145	387		69	258	262	53	3.5		
	0		—	—	826.145	—		—	—	—	—	—		
D 1	5	1005	0.64	1.06	828.9	403		71	257	260	56	3.0		
2	10		0.60	0.99	831.4	404		73	261	260	56	3.0		
3	15	1020	0.59	0.97	834.241	399		73	259	260	56	3.0		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts		Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			0.8325	1.37417	36.618	349.75		66.00	257/264	259/262	57	4		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.908011	1.1666										

EPA 26A from 40CFR Part 60 App A

A 1 2 3

D 1 2 3

SAMPLE RECOVERY FIELD DATA

EPA Method 26A - HCl & Cl2

Client	LWEC	W.O. #	14464
Location/Plant	L'Anse, MI	Source & Location	LWEC Stack

Run No. 1 — Sample Date 11/3/15 — Recovery Date 11/3/15

Sample I.D. LWEC - C1 - - 1 - M26A - — Analyst — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H2SO4	H2SO4	H2SO4	NaOH	NaOH				Silica Gel	
Final	150	130	118						309.6	
Initial	50	100	100	100	100				300	
Gain	100	30	18					148	9.6	

TSV 460

Impinger Color Clear — Labeled? ✓

Silica Gel Condition 3/4 Blue — Sealed? ✓

Run No. 2 — Sample Date 11/3/15 — Recovery Date 11/3/15

Sample I.D. LWEC - C1 - - 2 - M26A - — Analyst — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H2SO4	H2SO4	H2SO4	NaOH	NaOH				Silica Gel	
Final	154	134	96						308.7	
Initial	50	100	100	100	100				300	
Gain	104	34	-4					134	8.7	

TSV 484

Impinger Color Clear — Labeled? ✓

Silica Gel Condition 3/4 Blue — Sealed? ✓

Run No. 3 — Sample Date 11/4/15 — Recovery Date 11/4/15

Sample I.D. LWEC - C1 - - 3 - M26A - — Analyst — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H2SO4	H2SO4	H2SO4	NaOH	NaOH				Silica Gel	
Final	170	134	86						308.5	
Initial	50	100	100	100	100				300	
Gain	120	34	-14					140	8.5	

TSV 490

Impinger Color Clear — Labeled? ✓

Silica Gel Condition 3/4 Blue — Sealed? ✓

Check COC for Sample IDs of Media Blanks

L'Anse Warden Electric Company
Particulate and Hydrogen Chloride Test Data Inputs
Condition 2

Test Data			
Run number	C2-1	C2-2	C2-3
Location		Boiler No. 1	
Date	11/5/2015	11/5/2015	11/5/2015
Time period	1057-1204	1225-1333	1400-1515
Operator	JM	JM	JM
Inputs For Calcs.			
Sq. rt. delta P	0.90816	0.90576	0.90158
Delta H	1.3758	1.3683	1.3600
Stack temp. (deg.F)	398.2	400.3	407.0
Meter temp. (deg.F)	69.6	73.9	75.2
Sample volume (act.)	36.923	36.872	36.988
Barometric press. (in.Hg)	29.26	29.18	29.09
Volume H2O imp. (ml)	138.0	120.0	128.0
Weight change sil. gel (g)	14.0	11.9	10.4
% CO2	11.3	11.2	11.2
% O2	8.9	9.0	9.1
% N	79.8	79.8	79.7
Area of stack (sq.ft.)	39.000	39.000	39.000
Sample time (min.)	60	60	60
Static pressure (in.H2O)	-12.70	-12.60	-12.50
Nozzle dia. (in.)	0.235	0.235	0.235
Meter box cal.	0.9912	0.9912	0.9912
Cp of pitot tube	0.84	0.84	0.84
Traverse Points	12	12	12
HCl Laboratory Report Data			
HCl, mg	5.10	5.60	6.00
Total HCl, mg	5.10	5.60	6.00

ISOKINETIC FIELD DATA SHEET

EPA Method 26A - HCl & Cl2

		Stack Conditions	Assumed	Actual
Client	LWEC			
W.O.#	14464			
Project ID	LWEC	% Moisture	15.5	
Mode/Source ID	C2	Impinger Vol (ml)		138
Samp. Loc. ID	STK	Silica gel (g)		14
Run No.ID	1	CO2, % by Vol	10	
Test Method ID	M26A	O2, % by Vol	9	
Date ID	3NOV2015	Temperature (°F)	400	
Source/Location	ESP Stack	Meter Temp (°F)	62	
Sample Date	11/5/15	Static Press (in H_2O)	-12.5	-12.7
Baro. Press (in Hg)	29.26			
Operator	MJS	Ambient Temp (°F)		

Meter Box ID	W.C. 31
Meter Box Y	.9912
Meter Box Del H	2.0323
Probe ID / Length	7' / 7'
Probe Material	Boro
Pitot / Thermocouple ID	P524
Pitot Coefficient	0.84
Nozzle ID	
Avg Nozzle Dia (in)	.235
Area of Stack (ft^2)	39.0
Sample Time	60
Total Traverse Pts	12

K Factor

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft^3)	0.004		6.002
Leak Check @ (in Hg)	18		8
Pitot good	(yes) / no	yes / no	(yes) / no
Orsat good	NA yes / no	yes / no	yes / no

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp	66	68
Reference Temp	66	67
Pass/Fail (+/- 2°)	(Pass) / Fail	(Pass) / Fail
Temp Change Response	(yes) / no	(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1057			834,355									
A 1	5		1.05	1.73	838.0	400	NA	68	260	268	66	5		
2	10		1.10	1.81	841.7	401		69	262	264	60	5		
3	15	1112	1.05	1.73	845,144	396		69	264	265	58	5		
	0	1115			845,144									
B 1	5		0.95	1.57	848.4	402	NA	69	262	267	62	4.5		
2	10		0.94	1.55	851.7	405		70	260	268	60	4.5		
3	15	1130	0.80	1.32	854,672	394		70	263	262	61	4.0		
	0	1132			854,672									
C 1	5		0.83	1.37	857.8	401	NA	70	259	266	63	4.0		
2	10		0.79	1.30	860.8	404		70	263	269	63	4.0		
3	15	1147	0.76	1.25	863,742	396		70	262	266	64	4.0		
	0	1149			863,742									
D 1	5		0.65	1.07	866.5	395	NA	70	258	267	64	3.5		
2	10		0.56	0.92	869.0	393		70	256	265	64	3.0		
3	15	1204	0.54	0.89	871,478	391		70	260	261	66	3.0		
			Avg Delta P	Avg Delta H	Total Volume	Avg Ts		Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp	
			0.83500	1.3750	36,923	398.16		69.58	256/264	261/269	66	5		
			Avg Sqrt Delta P	Avg Sqrt Del H	Comments:									
			0.90815	1.1657										

WESTON SOLUTIONS

EPA 26A from 40CFR Part 60 App A

T=100 M=16.6

77072 35,793

A 3 Q1_LWEC001_Opactiy_003851

D

ISOKINETIC FIELD DATA SHEET

EPA Method 26A - HCl & Cl2

Field	Value
Client	LWEC
W.O.#	14464
Project ID	LWEC
Mode/Source ID	C2
Samp. Loc. ID	STK
Run No.ID	2
Test Method ID	M26A
Date ID	3NOV2015
Source/Location	ESP Stack
Sample Date	11/5/15
Baro. Press (in Hg)	29.18
Operator	Mills

Stack Conditions

	Assumed	Actual
% Moisture		
Impinger Vol (ml)		120
Silica gel (g)		11.9
CO2, % by Vol		
O2, % by Vol		
Temperature (°F)	400	
Meter Temp (°F)	70	
Static Press (in H_2O)	-12.7	-12.6
Ambient Temp (°F)		

Field	Value
Meter Box ID	W.C. 31
Meter Box Y	.9912
Meter Box Del H	2.0323
Probe ID / Length	7' / 7'
Probe Material	Boro
Pitot / Thermocouple ID	P524
Pitot Coefficient	0.84
Nozzle ID	
Avg Nozzle Dia (in)	.235
Area of Stack (ft²)	39
Sample Time	60
Total Traverse Pts	12

K Factor 1.65

Leak Checks	Initial	Mid-Point	Final
Sample Train (ft³)	0.002		0.002
Leak Check @ (in Hg)	13		8
Pitot good	(yes) / no	yes / no	(yes) / no
Orsat good (NA)	~~yes / no~~	~~yes / no~~	~~yes / no~~

Temp Check	Pre-Test Set	Post-Test Set
Meter Box Temp	69	72
Reference Temp	68	71
Pass/Fail (+/- 2°)	(Pass) / Fail	(Pass) / Fail
Temp Change Response	(yes) / no	(yes) / no

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft³)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPING EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1225			871.588									
A 1	5		1.05	1.73	875.0	398	NA	70	256	262	66	5.0		
2	10		1.15	1.89	878.6	398	↓	71	261	266	58	5.0		
3	15	1240	1.05	1.73	882.041	394	↓	71	261	262	57	5.0		
	0	1243			882.041									
B 1	5		0.95	1.57	885.4	403	NA	73	264	263	65	4.5		
2	10		0.93	1.53	888.7	405	↓	74	259	267	60	4.5		
3	15	1258	0.78	1.29	891.660	402	↓	74	262	260	60	4		
	0	1301			891.660									
C 1	5		0.79	1.30	894.8	398	NA	74	258	258	66	4		
2	10		0.76	1.25	897.6	400	↓	76	260	266	64	4		
3	15	1316	0.73	1.20	900.588	396	↓	76	261	262	63	4		
	0	1318			900.588									
D 1	5	1318	0.63	1.04	903.3	401	NA	76	257	268	67	4		
2	10		0.59	0.97	905.9	404	↓	76	260	263	64	3.5		
3	15	1333	0.56	0.92	908.460	404	↓	76	262	268	63	3.5		

WESTON SOLUTIONS

Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp
0.83083 ✓	1.36833 ✓	36.872 ✓	400.25 ✓	73.92 ✓					

Avg Sqrt Delta P	Avg Sqrt Del H
0.90576 ✓	1.16238 ✓

Comments:

EPA 26A from 40CFR Part 60 App A

I = 97.94 m = 14.9 Q9 77918 35.357

I 2. 3. A 8 8 D 8

Q1_LWEC001_Opactiy_003852

ISOKINETIC FIELD DATA SHEET

EPA Method 26A - HCl & Cl2

		Stack Conditions	Assumed	Actual
Client	LWEC			
W.O.#	14464			
Project ID	LWEC	% Moisture	16	
Mode/Source ID	C2	Impinger Vol (ml)		128
Samp. Loc. ID	STK	Silica gel (g)		10.4
Run No.ID	3	CO2, % by Vol		
Test Method ID	M26A	O2, % by Vol		
Date ID	3NOV2015	Temperature (°F)	400	
Source/Location	ESP Stack	Meter Temp (°F)	75	
Sample Date	11/5/15	Static Press (in H_2O)	-12.7	-12.5
Baro. Press (in Hg)	29.09			
Operator	Mills / Young	Ambient Temp (°F)		

		Leak Checks	Initial	Mid-Point	Final
Meter Box ID	W.C. 31				
Meter Box Y	.9912	K Factor	1.65		
Meter Box Del H	2.0323				
Probe ID / Length	7' 7'	Sample Train (ft^3)	0.002		0.002
Probe Material	Boro	Leak Check @ (in Hg)	16		9
Pitot / Thermocouple ID	PS24	Pitot good	yes / no	yes / no	yes / no
Pitot Coefficient	0.84	Orsat good	yes / no	yes / no	yes / no
Nozzle ID		**Temp Check**	Pre-Test Set		Post-Test Set
Avg Nozzle Dia (in)	0.235	Meter Box Temp	73		70
Area of Stack (ft^2)	39	Reference Temp	72		69
Sample Time	60	Pass/Fail (+/- 2°)	Pass / Fail		Pass / Fail
Total Traverse Pts	12	Temp Change Response	yes / no		yes / no

NA

TRAVERSE POINT NO.	SAMPLE TIME (min)	CLOCK TIME (plant time)	VELOCITY PRESSURE Delta P (in H2O)	ORIFICE PRESSURE Delta H (in H2O)	DRY GAS METER READING (ft^3)	STACK TEMP (°F)	DGM INLET TEMP (°F)	DGM OUTLET TEMP (°F)	PROBE TEMP (°F)	FILTER BOX TEMP (F)	IMPINGER EXIT TEMP (°F)	SAMPLE TRAIN VAC (in Hg)		COMMENTS
	0	1400			908.585									
A 1	5		1.05	1.73	912.0	402	NA	77	257	262	68	5.0		
2	10		1.15	1.89	915.7	402		77	259	266	59	5.0		
3	15	1415	1.05	1.73	919.214	395		77	261	263	54	5.0		
	0	1418			919.214									
B 1	5		0.95	1.57	922.5	405	NA	76	263	270	64	4.5		
2	10		0.97	1.60	926.1	409		76	262	271	56	5.0	4.5	
3	15	1433	0.86	1.42	928.924	407		76	263	266	54	4.5		
	0	1440			928.924									
C 1	5		0.76	1.25	932.1	411	NA	75	256	264	65	4.0		
2	10		0.74	1.22	935.1	412		74	259	264	58	4.0		
3	15	1455	0.74	1.22	937.957	406		74	259	270	58	4.0		
	0	1500			937.957									
D 1	5		0.53	0.87	940.4	411	NA	73	257	265	64	3.5		
2	10		0.56	0.92	943.0	414		74	259	261	61	3.5		
3	15	1515	0.55	0.91	945.573	410		73	260	268	62	3.5		

Avg Delta P	Avg Delta H	Total Volume	Avg Ts	Avg Tm	Min/Max	Min/Max	Max Temp	Max Vac	Max Temp
0.82583	1.3600	36,988	407.0	75.17	256/263	261/271	68	5.0	
Avg Sqrt Delta P	Avg Sqrt Del H	Comments:							
0.90157	1.15700								

EPA 26A from 40CFR Part 60 App A

1.3
1.3
A 0
8
0
D

SAMPLE RECOVERY FIELD DATA

EPA Method 26A - HCl & Cl2

Client	LWEC	W.O. #	14464
Location/Plant	L'Anse, MI	Source & Location	ESP Stack

Run No. 1 — Sample Date 11/5/2015 ~~Recovery Date~~ /

Sample I.D. LWEC - C2 - STK - 1 - M26A - — Analyst KH — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H2SO4	H2SO4	H2SO4	NaOH	NaOH				Silica Gel	
Final	180	90	118					388	314.0	
Initial	50	100	100	100	100			250	300	
Gain	130	-10	18					138	14.0	

Impinger Color: clear, sl blue — Labeled? ✓ — TSV = 428

Silica Gel Condition: sl blue — Sealed? ✓

Run No. 2 — Sample Date 11/5/15 ~~Recovery Date~~ /

Sample I.D. LWEC - C2 - STK - 2 - M26A - — Analyst KH — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H2SO4	H2SO4	H2SO4	NaOH	NaOH				Silica Gel	
Final	150	120	100					370	311.8	
Initial	50	100	100	100	100			250	300	
Gain	100	20	0					120	11.9	

Impinger Color: clear — Labeled? ✓ ✓ — TSV = 470

Silica Gel Condition: sl blue — Sealed? ✓

Run No. 3 — Sample Date 11/5/15 ~~Recovery Date~~ /

Sample I.D. LWEC - C2 - STK - 3 - M26A - — Analyst KH — Filter Number NA

	Impinger									
	1	2	3	4	5	6	7	Imp.Total	8	Total
Contents	H2SO4	H2SO4	H2SO4	NaOH	NaOH				Silica Gel	
Final	154	120	104					378	310.4	
Initial	50	100	100	100	100			250	300	
Gain	104	20	4					128	10.4	

Impinger Color: clear, sl blue — Labeled? ✓ ✓ — Imp 1/2 TSV = Imp 3 TSV =

Silica Gel Condition: sl blue — Sealed?

Check COC for Sample IDs of Media Blanks

METHODS AND ANALYZERS

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Project Number:
Operator: **TB**
Date: **3 Nov 2015**

File: C:\DATA\LWEC\3 November 2015.cem
Program Version: 2.0, built 7 Sep 2011 **File Version:** 2.02
Computer: WSWCHILLFIELD **Trailer:** 28
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.3**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**20.0**
Span Concentration, %	**16.5**

CALIBRATION DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Project Number:
Operator: **TB**
Date: **3 Nov 2015**

Start Time: 13:21

O_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
11.8	CC158735
21.3	CC287635

Calibration Results

Zero	3 mv
Span, 21.3 %	8557 mv

Curve Coefficients

Slope	Intercept
401.8	3

CO_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
8.7	CC158735
16.5	CC287635

Calibration Results

Zero	4 mv
Span, 16.5 %	6626 mv

Curve Coefficients

Slope	Intercept
401.3	4

CALIBRATION ERROR DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number:
Operator: **TB**
Date: **3 Nov 2015**

Start Time: 13:21

O_2
Method: EPA 3A
Span Conc. 21.3 %
Slope 401.8 **Intercept** 3.0

Standard %	Response mv	Result %	Difference %	Error %	Status
Zero	3	0.0	0.0	0.0	Pass
11.8	4813	12.0	0.2	0.9	Pass
21.3	8557	21.3	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.5 %
Slope 401.3 **Intercept** 4.0

Standard %	Response mv	Result %	Difference %	Error %	Status
Zero	4	0.0	0.0	0.0	Pass
8.7	3483	8.7	0.0	0.0	Pass
16.5	6626	16.5	0.0	0.0	Pass

BIAS

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number:
Operator: **TB**
Date: **3 Nov 2015**

Start Time: 14:52

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Response mv	Bias %	Difference %	Error %	Status
Zero	0.0	75	0.2	0.2	0.9	Pass
Span	12.0	4843	12.0	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Response mv	Bias %	Difference %	Error %	Status
Zero	0.0	19	0.0	0.0	0.0	Pass
Span	8.7	3319	8.3	-0.4	-2.4	Pass

RUN DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Conditon1 Run-1**
Operator: **TB**
Date: **3 Nov 2015**

Time	O_2 %	CO_2 %
1510-1522 -Servomex locked up		
15:23	11.4	8.8
15:24	11.4	8.8
15:25	11.7	8.8
15:26	11.9	8.6
15:27	11.9	8.3
15:28	11.7	8.4
15:29	11.5	8.6
15:30	11.4	8.7
15:31	11.3	8.8
15:32	11.4	8.9
15:33	11.6	8.8
15:34	11.7	8.6
15:35	11.6	8.5
15:36	11.5	8.6
15:37	11.4	8.7
15:38	11.4	8.8
15:39	11.6	8.8
15:40	11.7	8.6
15:41	11.5	8.5
15:42	11.4	8.6
15:43	11.3	8.8
15:44	11.4	8.9
15:45	11.5	8.9
15:46	11.4	8.7
15:47	11.5	8.7
15:48	11.5	8.7
15:49	11.6	8.6
15:50	11.7	8.5
15:51	11.9	8.5
15:52	11.7	8.3
15:53	11.5	8.5
15:54	11.3	8.6
15:55	11.6	8.8
15:56	11.6	8.6
15:57	11.8	8.5
15:58	11.4	8.5
15:59	11.2	8.8
16:00	11.1	8.9
16:01	11.5	9.0
16:02	11.7	8.6
16:03	11.7	8.5

RUN DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Conditon1 Run-1**
Operator: **TB**
Date: **3 Nov 2015**

Time	O_2 %	CO_2 %
16:04	11.4	8.6
16:05	11.3	8.8
16:06	11.2	8.9
16:07	11.3	9.0
16:08	11.4	9.0
16:09	11.4	8.9
16:10	11.3	8.9
16:11	11.4	8.9
16:12	11.5	8.8
16:13	11.6	8.7
16:14	11.3	8.7
Avgs	**11.5**	**8.7**

RUN SUMMARY

Number 1

Client: **LWEC**		Project Number:	**Conditon1 Run-1**
Location: **Boiler No. 1**		Operator:	**TB**
Source: **ESP Outlet**	Calibration **1**	Date:	**3 Nov 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 15:22 to 16:14

Run Averages

11.5	8.7

Pre-run Bias at 14:52

Zero Bias	0.2	0.0
Span Bias	12.0	8.3
Span Gas	11.8	8.7

Post-run Bias at 18:36

Zero Bias	0.2	0.3
Span Bias	11.8	8.5
Span Gas	11.8	8.7

Averages corrected for the average of the pre-run and post-run bias

11.4	9.0

RUN DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-2**
Operator: **TB**
Date: **3 Nov 2015**

Time	O_2 %	CO_2 %
16:51	11.3	8.9
16:52	11.4	8.8
16:53	11.6	8.8
16:54	11.6	8.6
16:55	11.6	8.5
16:56	11.6	8.5
16:57	11.5	8.6
16:58	11.4	8.7
16:59	11.5	8.8
17:00	11.6	8.8
17:01	11.7	8.6
17:02	11.6	8.5
17:03	11.5	8.6
17:04	11.7	8.7
17:05	11.8	8.5
17:06	11.8	8.4
17:07	11.9	8.4
17:08	11.8	8.2
17:09	11.8	8.5
17:10	11.8	8.5
17:11	11.8	8.4
17:12	11.7	8.4
17:13	11.7	8.5
17:14	11.6	8.5
17:15	11.6	8.6
17:16	11.5	8.6
17:17	11.7	8.7
17:18	11.7	8.6
17:19	11.7	8.6
17:20	11.5	8.6
17:21	11.6	8.7
17:22	11.8	8.7
17:23	11.9	8.4
17:24	11.7	8.4
17:25	11.5	8.6
17:26	11.6	8.7
17:27	11.7	8.7
17:28	12.0	8.6
17:29	11.7	8.3
17:30	11.7	8.5
17:31	11.7	8.5
17:32	11.9	8.5

RUN DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-2**
Operator: **TB**
Date: **3 Nov 2015**

Time	O_2 %	CO_2 %
17:33	11.9	8.3
17:34	11.8	8.2
17:35	11.6	8.3
17:36	11.5	8.5
17:37	11.6	8.7
17:38	11.7	8.6
17:39	11.6	8.5
17:40	11.5	8.5
17:41	11.5	8.6
17:42	11.4	8.6
17:43	11.7	8.7
17:44	11.8	8.5
17:45	11.9	8.3
17:46	11.8	8.2
17:47	11.6	8.3
17:48	11.7	8.5
17:49	11.8	8.4
17:50	11.8	8.4
17:51	11.7	8.4
17:52	11.7	8.5
17:53	11.5	8.5
17:54	11.6	8.6
17:55	11.7	8.5
17:56	11.8	8.4
Avgs	**11.7**	**8.5**

RUN SUMMARY

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-2**
Operator: **TB**
Date: **3 Nov 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 16:50 to 17:56

Run Averages

	11.7	8.5

Pre-run Bias at 14:52

Zero Bias	0.2	0.0
Span Bias	12.0	8.3
Span Gas	11.8	8.7

Post-run Bias at 18:36

Zero Bias	0.2	0.3
Span Bias	11.8	8.5
Span Gas	11.8	8.7

Averages corrected for the average of the pre-run and post-run bias

	11.6	8.9

BIAS AND CALIBRATION DRIFT

Number 2

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number:
Operator: **TB**
Date: **3 Nov 2015**

Start Time: 18:36

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Response mv	Bias %	Difference %	Error %	Status
Zero	0.0	103	0.2	0.2	0.9	Pass
Span	12.0	4738	11.8	-0.2	-0.9	Pass

Calibration Drift

Standard Gas	Initial* %	Final mv	Final %	Difference %	Drift %	Status
Zero	0.2	103	0.2	0.0	0.0	Pass
Span	12.0	4738	11.8	-0.2	-0.9	Pass

*Bias No. 1

CO_2
Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Response mv	Bias %	Difference %	Error %	Status
Zero	0.0	116	0.3	0.3	1.8	Pass
Span	8.7	3404	8.5	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final mv	Final %	Difference %	Drift %	Status
Zero	0.0	116	0.3	0.3	1.8	Pass
Span	8.3	3404	8.5	0.2	1.2	Pass

*Bias No. 1

METHODS AND ANALYZERS

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Project Number: **Condition1 Run-3**
Operator: **TB**
Date: **4 Nov 2015**

File: C:\DATA\LWEC\4 November 2015.cem
Program Version: 2.0, built 7 Sep 2011 **File Version:** 2.02
Computer: WSWCHILLFIELD **Trailer:** 28
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.3**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**20.0**
Span Concentration, %	**16.5**

CALIBRATION DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Project Number: **Condition1 Run-3**
Operator: **TB**
Date: **4 Nov 2015**

Start Time: 08:41

O_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
11.8	CC158735
21.3	CC287635

Calibration Results

Zero	-1 mv
Span, 21.3 %	8449 mv

Curve Coefficients

Slope	Intercept
396.9	-1

CO_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
8.7	CC158735
16.5	CC287635

Calibration Results

Zero	14 mv
Span, 16.5 %	6579 mv

Curve Coefficients

Slope	Intercept
397.9	14

CALIBRATION ERROR DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-3**
Operator: **TB**
Date: **4 Nov 2015**

Start Time: 08:41

O_2

Method: EPA 3A
Span Conc. 21.3 %
Slope 396.9 **Intercept** -1.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
11.8	12.1	0.3	1.4	Pass
21.3	21.3	0.0	0.0	Pass

CO_2

Method: EPA 3A
Span Conc. 16.5 %
Slope 397.9 **Intercept** 14.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.7	8.7	0.0	0.0	Pass
16.5	16.5	0.0	0.0	Pass

BIAS

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-3**
Operator: **TB**
Date: **4 Nov 2015**

Start Time: 09:03

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	12.1	11.9	-0.2	-0.9	Pass

CO_2
Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.7	8.5	-0.2	-1.2	Pass

RUN DATA

Number 3

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-3**
Operator: **TB**
Date: **4 Nov 2015**

Time	O_2 %	CO_2 %
09:13	9.8	10.5
09:14	9.7	10.2
09:15	9.5	10.5
09:16	9.2	10.6
09:17	9.3	10.9
09:18	9.5	10.7
09:19	9.8	10.5
09:20	9.9	10.3
09:21	10.0	10.2
09:22	9.7	10.2
09:23	9.4	10.7
09:24	9.2	10.8
09:25	9.1	11.0
09:26	9.2	11.0
09:27	9.6	10.7
09:28	9.8	10.5
09:29	9.8	10.4
09:30	9.3	10.7
09:31	9.1	11.1
09:32	9.2	11.1
09:33	9.6	10.7
09:34	9.8	10.5
09:35	9.5	10.5
09:36	9.3	10.7
09:37	9.2	10.9
09:38	8.9	11.1
09:39	9.0	11.2
09:40	9.3	11.2
09:41	9.8	10.6
09:42	10.0	10.4
09:43	9.5	10.5
09:44	9.2	11.1
09:45	9.2	11.0
09:46	9.5	10.9
09:47	9.6	10.6
09:48	9.3	10.8
09:49	8.7	11.3
09:50	8.8	11.6
09:51	9.3	11.2
09:52	10.1	10.5
09:53	10.0	9.9
09:54	9.5	10.8

RUN DATA

Number 3

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition1 Run-3**
Operator: **TB**
Date: **4 Nov 2015**

Time	O_2 %	CO_2 %
09:55	9.3	10.6
09:56	9.2	11.0
09:57	9.1	10.9
09:58	9.3	11.1
09:59	9.3	10.8
10:00	9.6	10.8
10:01	9.4	10.5
10:02	9.2	10.9
10:03	9.0	11.0
10:04	9.2	11.1
10:05	9.2	11.0
10:06	9.4	10.9
10:07	9.3	10.8
10:08	9.3	10.9
10:09	9.1	10.9
10:10	9.2	11.1
10:11	9.0	11.1
10:12	9.0	11.2
10:13	9.0	11.3
10:14	9.3	11.1
10:15	9.4	10.9
10:16	9.4	10.9
10:17	9.1	11.0
10:18	8.9	11.2
10:19	9.1	11.3
10:20	9.7	10.6
Avgs	**9.4**	**10.8**

RUN SUMMARY

Number 3

Client: **LWEC**		Project Number:	**Condition1 Run-3**
Location: **Boiler No. 1**		Operator:	**TB**
Source: **ESP Outlet**	Calibration **1**	Date:	**4 Nov 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 09:12 to 10:20

Run Averages

	9.4	10.8

Pre-run Bias at 09:03

Zero Bias	0.1	0.1
Span Bias	11.9	8.5
Span Gas	11.8	8.7

Post-run Bias at 17:01

Zero Bias	0.1	0.1
Span Bias	11.9	8.6
Span Gas	11.8	8.7

Averages corrected for the average of the pre-run and post-run bias

	9.3	11.1

METHODS AND ANALYZERS

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Project Number: **Condition-2**
Operator: **TB**
Date: **5 Nov 2015**

File: C:\DATA\LWEC\5 November 2015.cem
Program Version: 2.0, built 7 Sep 2011 **File Version:** 2.02
Computer: WSWCHILLFIELD **Trailer:** 28
Analog Input Device: Keithley KUSB-3108

Channel 1

Analyte	**O_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**25.0**
Span Concentration, %	**21.3**

Channel 2

Analyte	**CO_2**
Method	**EPA 3A**, Using Bias
Analyzer Make, Model & Serial No.	**Servomex 4900**
Full-Scale Output, mv	**10000**
Analyzer Range, %	**20.0**
Span Concentration, %	**16.5**

CALIBRATION DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Project Number: **Condition-2**
Operator: **TB**
Date: **5 Nov 2015**

Start Time: 07:57

O_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
11.8	CC158735
21.3	CC287635

Calibration Results

Zero	2 mv
Span, 21.3 %	8541 mv

Curve Coefficients

Slope	Intercept
401.1	2

CO_2

Method: EPA 3A
Calibration Type: Linear Zero and High Span

Calibration Standards

%	Cylinder ID
8.7	CC158735
16.5	CC287635

Calibration Results

Zero	2 mv
Span, 16.5 %	6627 mv

Curve Coefficients

Slope	Intercept
401.5	2

CALIBRATION ERROR DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2**
Operator: **TB**
Date: **5 Nov 2015**

Start Time: 07:57

O_2
Method: EPA 3A
Span Conc. 21.3 %
Slope 401.1 **Intercept** 2.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
11.8	11.9	0.1	0.5	Pass
21.3	21.3	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.5 %
Slope 401.5 **Intercept** 2.0

Standard %	Result %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	Pass
8.7	8.7	0.0	0.0	Pass
16.5	16.5	0.0	0.0	Pass

BIAS
Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2**
Operator: **TB**
Date: **5 Nov 2015**

Start Time: 08:14

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

CO_2
Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.7	8.5	-0.2	-1.2	Pass

RUN DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-1**
Operator: **TB**
Date: **5 Nov 2015**

Time	O_2 %	CO_2 %
1100-1107 invalid data due to signal cable failure		
11:08	8.9	11.1
11:09	8.7	11.1
11:10	7.9	11.8
11:11	8.0	12.0
11:12	8.0	12.0
11:13	9.1	11.2
11:14	9.0	10.7
11:15	9.2	10.9
11:16	8.8	10.8
11:17	8.8	11.2
11:18	8.3	11.5
11:19	9.0	11.2
11:20	9.5	10.7
11:21	9.5	10.4
11:22	8.3	11.4
11:23	8.4	11.8
11:24	9.0	11.3
11:25	9.2	10.8
11:26	8.9	11.3
11:27	9.0	11.0
11:28	8.7	11.1
11:29	8.9	11.0
11:30	8.8	11.0
11:31	9.0	11.0
11:32	9.2	10.9
11:33	9.2	10.8
11:34	8.8	11.1
11:35	8.9	11.1
11:36	9.4	10.8
11:37	9.5	10.5
11:38	9.8	10.4
11:39	9.2	10.5
11:40	8.5	11.4
11:41	7.8	11.9
11:42	8.4	12.0
11:43	9.7	10.6
11:44	10.4	9.6
11:45	9.7	10.0
11:46	8.9	10.9
11:47	8.6	11.3
11:48	8.9	11.2

RUN DATA

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-1**
Operator: **TB**
Date: **5 Nov 2015**

Time	O_2 %	CO_2 %
11:49	8.8	11.0
11:50	8.8	11.1
11:51	8.6	11.3
11:52	9.1	11.2
11:53	9.3	10.5
11:54	9.1	10.7
11:55	8.8	10.9
11:56	8.9	11.1
11:57	9.5	10.8
11:58	9.9	10.0
11:59	9.1	10.6
12:00	9.3	10.9
12:01	9.3	10.3
12:02	8.7	11.1
12:03	8.6	11.2
12:04	9.0	11.2
Avgs	**9.0**	**11.0**

RUN SUMMARY

Number 1

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-1**
Operator: **TB**
Date: **5 Nov 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 11:07 to 12:04

Run Averages

	9.0	11.0

Pre-run Bias at 08:14

Zero Bias	0.0	0.0
Span Bias	11.9	8.5
Span Gas	11.8	8.7

Post-run Bias at 12:12

Zero Bias	0.0	0.0
Span Bias	11.9	8.5
Span Gas	11.8	8.7

Averages corrected for the average of the pre-run and post-run bias

	8.9	11.3

BIAS AND CALIBRATION DRIFT

Number 2

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-1**
Operator: **TB**
Date: **5 Nov 2015**

Start Time: 12:12

O_2

Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	11.9	11.9	0.0	0.0	Pass

*Bias No. 1

CO_2

Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.7	8.5	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.0	0.0	0.0	Pass
Span	8.5	8.5	0.0	0.0	Pass

*Bias No. 1

RUN DATA

Number 2

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-2**
Operator: **TB**
Date: **5 Nov 2015**

Time	O_2 %	CO_2 %
12:26	8.7	11.1
12:27	8.9	11.2
12:28	9.0	11.1
12:29	9.0	10.9
12:30	8.9	11.0
12:31	9.1	11.0
12:32	9.1	10.8
12:33	9.1	10.9
12:34	8.7	11.4
12:35	8.7	11.3
12:36	8.4	11.6
12:37	9.0	11.2
12:38	9.4	10.8
12:39	9.8	10.3
12:40	9.6	10.3
12:41	9.0	10.6
12:42	8.6	11.5
12:43	9.1	10.9
12:44	9.4	10.8
12:45	9.7	10.2
12:46	9.2	10.5
12:47	8.7	11.0
12:48	8.8	11.6
12:49	9.5	10.4
12:50	9.6	10.3
12:51	9.3	10.4
12:52	9.0	10.8
12:53	8.6	11.2
12:54	9.1	11.1
12:55	9.3	10.6
12:56	9.4	10.5
12:57	8.9	10.8
12:58	8.7	11.2
12:59	8.9	11.1
13:00	9.1	11.0
13:01	9.3	10.5
13:02	9.2	10.7
13:03	9.3	10.5
13:04	9.4	10.5
13:05	8.8	10.8
13:06	8.7	11.2
13:07	9.2	11.1

RUN DATA

Number 2

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-2**
Operator: **TB**
Date: **5 Nov 2015**

Time	O_2 %	CO_2 %
13:08	9.9	10.3
13:09	9.4	10.2
13:10	8.7	11.1
13:11	8.5	11.4
13:12	9.1	11.0
13:13	9.5	10.5
13:14	9.8	10.3
13:15	9.2	10.3
13:16	8.9	11.2
13:17	9.2	10.8
13:18	9.1	10.7
13:19	9.1	10.7
13:20	8.8	10.7
13:21	8.4	11.4
13:22	8.9	11.2
13:23	9.5	10.7
13:24	9.7	10.1
13:25	9.0	10.7
13:26	8.7	11.0
13:27	8.8	11.2
13:28	9.4	10.8
13:29	9.4	10.4
13:30	9.1	10.5
13:31	8.6	11.4
13:32	8.9	11.3
13:33	9.2	10.9
Avgs	**9.1**	**10.8**

RUN SUMMARY

Number 2

Client: **LWEC**		Project Number:	**Condition-2 Run-2**
Location: **Boiler No. 1**		Operator:	**TB**
Source: **ESP Outlet**	Calibration **1**	Date:	**5 Nov 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 12:25 to 13:33

Run Averages

	9.1	10.8

Pre-run Bias at 12:12

Zero Bias	0.0	0.0
Span Bias	11.9	8.5
Span Gas	11.8	8.7

Post-run Bias at 13:38

Zero Bias	0.2	0.2
Span Bias	11.8	8.5
Span Gas	11.8	8.7

Averages corrected for the average of the pre-run and post-run bias

	9.0	11.2

BIAS AND CALIBRATION DRIFT

Number 3

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-2**
Operator: **TB**
Date: **5 Nov 2015**

Start Time: 13:38

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	0.9	Pass
Span	11.9	11.8	-0.1	-0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.2	0.2	0.9	Pass
Span	11.9	11.8	-0.1	-0.5	Pass

*Bias No. 2

CO_2
Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.2	0.2	1.2	Pass
Span	8.7	8.5	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.0	0.2	0.2	1.2	Pass
Span	8.5	8.5	0.0	0.0	Pass

*Bias No. 2

RUN DATA

Number 3

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-3**
Operator: **TB**
Date: **5 Nov 2015**

Time	O_2 %	CO_2 %
14:01	9.2	10.9
14:02	9.1	10.8
14:03	9.3	10.9
14:04	9.5	10.4
14:05	9.5	10.7
14:06	8.9	10.8
14:07	8.8	11.5
14:08	9.5	10.3
14:09	9.6	10.3
14:10	9.3	10.3
14:11	9.2	10.7
14:12	9.0	10.8
14:13	9.3	11.0
14:14	9.2	10.8
14:15	8.7	11.1
14:16	8.6	11.3
14:17	9.3	11.2
14:18	9.7	10.1
14:19	9.3	10.5
14:20	8.6	11.2
14:21	8.5	11.6
14:22	8.9	11.3
14:23	9.7	10.6
14:24	10.0	9.8
14:25	9.8	9.9
14:26	8.9	10.7
14:27	9.3	10.9
14:28	9.6	10.1
14:29	9.8	10.1
14:30	9.2	10.4
14:31	9.2	10.6
14:32	8.8	10.8
14:33	9.2	10.9
14:34	9.6	10.2
14:35	9.3	10.3
14:36	9.0	10.8
14:37	9.0	10.8
14:38	8.8	10.8
14:39	9.0	11.1
14:40	9.0	10.9
14:41	9.3	10.9
14:42	8.7	11.1

RUN DATA

Number 3

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-3**
Operator: **TB**
Date: **5 Nov 2015**

Time	O_2 %	CO_2 %
14:43	8.8	11.2
14:44	8.8	11.2
14:45	9.2	11.0
14:46	9.1	10.7
14:47	9.5	10.7
14:48	9.1	10.5
14:49	8.5	11.0
14:50	8.0	12.0
14:51	8.4	11.8
14:52	8.8	11.4
14:53	9.3	10.8
14:54	8.9	10.8
14:55	8.7	11.1
14:56	8.4	11.6
14:57	8.8	11.4
14:58	9.1	11.1
14:59	9.5	10.7
15:00	9.4	10.5
15:01	9.0	10.7
15:02	8.7	11.4
15:03	8.7	11.2
15:04	9.0	11.1
15:05	9.4	10.7
15:06	9.5	10.5
15:07	9.3	10.5
15:08	9.0	11.0
15:09	8.9	10.9
15:10	8.9	11.1
15:11	9.4	10.7
15:12	9.8	10.4
15:13	9.4	10.5
15:14	8.9	11.0
15:15	8.9	10.9
Avgs	**9.1**	**10.8**

RUN SUMMARY

Number 3

Client: **LWEC**		Project Number:	**Condition-2 Run-3**
Location: **Boiler No. 1**		Operator:	**TB**
Source: **ESP Outlet**	Calibration **1**	Date:	**5 Nov 2015**

	O_2	CO_2
Method	EPA 3A	EPA 3A
Conc. Units	%	%

Time: 14:00 to 15:15

Run Averages

	9.1	10.8

Pre-run Bias at 13:38

Zero Bias	0.2	0.2
Span Bias	11.8	8.5
Span Gas	11.8	8.7

Post-run Bias at 15:20

Zero Bias	0.1	0.1
Span Bias	11.8	8.5
Span Gas	11.8	8.7

Averages corrected for the average of the pre-run and post-run bias

	9.1	11.2

BIAS AND CALIBRATION DRIFT

Number 4

Client: **LWEC**
Location: **Boiler No. 1**
Source: **ESP Outlet**

Calibration **1**

Project Number: **Condition-2 Run-3**
Operator: **TB**
Date: **5 Nov 2015**

Start Time: 15:20

O_2
Method: EPA 3A
Span Conc. 21.3 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.5	Pass
Span	11.9	11.8	-0.1	-0.5	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.2	0.1	-0.1	-0.5	Pass
Span	11.8	11.8	0.0	0.0	Pass

*Bias No. 3

CO_2
Method: EPA 3A
Span Conc. 16.5 %

Bias Results

Standard Gas	Cal. %	Bias %	Difference %	Error %	Status
Zero	0.0	0.1	0.1	0.6	Pass
Span	8.7	8.5	-0.2	-1.2	Pass

Calibration Drift

Standard Gas	Initial* %	Final %	Difference %	Drift %	Status
Zero	0.2	0.1	-0.1	-0.6	Pass
Span	8.5	8.5	0.0	0.0	Pass

*Bias No. 3

APPENDIX C
OPERATING DATA

SEPTEMBER TEST PROGRAM

LWEC Compliance Testing Fuel Usage Summary Page

Test Date	Time	Wood TPH	Railroad Tie TPH	Tire-Derived Fuel TPH	Penta TPH
9/23/2015 - Lead					
Test #1	15:13 - 16:23	7.28	14.57	1.65	0.24
Test #2	16:57 - 18:08	7.39	14.78	1.65	0.24
9/24/2015 - Lead					
Test #3	08:28 - 09:40	7.89	15.78	1.84	0.24
9/24/2015 - Particulate, PM10, Hcl, SO2, Nox					
Test #1	11:26 - 13:30	7.55	15.1	1.83	0.24
Test #2	14:48 - 16:57	7.22	14.43	1.84	0.24
Test #3	17:52 - 19:35	7.82	15.64	1.83	0.24

Test Start Time 1513 **Test End Time** 1623

Test Description LEAD TESTING #1

Fuel in Bins >>

R/R TIES / PENTA	WOOD CHIPS	R/R TIES

Tires

Date: 9-23-15

Run No	Reclaimers				TDF	MAIN FUEL BELT SCALE ~~Bin 1~~	Bin 2	Bin 3				
15 Min	Time	Rake speed Bin # 1	Rake speed Bin # 2	Rake speed Bin # 3	Screw Speed	~~John~~ Visual	John Visual	John Visual	Stm Flow	O2	lb/mmbtu CO	Opacity
1	1513	8	11	8	18	337.00			193 KPPH	7.2	.148	1.6
2	1530	8	10	8	18	342.36			193	7.0	.140	1.8
3	1545	8	9	12	18	347.89			193	7.3	.118	1.6
4	1600	13	13	9	18	351.10			194	7.0	.190	1.5
5	1615	9	9	8	18	359.00			195	7.1	.217	1.7
6	1630	8	8	8	18	364.80			193	7.5	.087	1.6
7	1645	8	12	8	18	370.44			193	7.5	.094	2.0
8	1700	8	11	8	18	376.70			194	7.3	.178	1.7
9												
10												
11												
12												
13												
14												
15												
16												

Comments:

05/06/10

SEPT 23, 2015

TEST START @ 1513

TEST FINISH @ 1808

L'Anse Warden Electric Co. Compliance Testing - Week of ~~June 22, 2015~~

Must be completed within 36 hours of start time.

Hour	ESP Data	Primary Current	Primary Voltage	Precipitator Kilovolts	Precipitator Milliamps	Spark Rate
1513 ~~:00 a.m.~~	#1	262		36	650	3
~~:00 a.m.~~	#2	238		32	648	3
~~:00 a.m.~~	#3	264	84	29	414	3
1600 ~~:00 a.m.~~	#1	216		32	300	11
~~:00 a.m.~~	#2	258		34	650	5
~~:00 p.m.~~	#3	218	101	30	466	8
1700 ~~:00 p.m.~~	#1	260		35	644	8
~~:00 p.m.~~	#2	218		29	640	2
1513 ~~:00 p.m.~~	#3	216	104	30	528	2
1806 ~~:00 p.m.~~	#1	244		33	640	18
~~:00 p.m.~~	#2	204		28	396	26
~~:00 p.m.~~	#3	208	102	29	526	12
1900 ~~:00 p.m.~~	#1	254		35	616	9
~~:00 p.m.~~	#2	218		29	644	4
~~:00 p.m.~~	#3	218	100	30	514	1
~~:00 p.m.~~						
~~:00 p.m.~~						

Targets - See attached

SEPT 23, 2015

L'Anse Warden Electric Co. Compliance Testing - ~~Week of June 22, 2015~~

Must be completed within 36 hours of start time.

#1 TEST START @ 1513
TEST FINISH @ 1623

#2 TEST START 1657
TEST FINISH 1808

Hour	Wood Ton/Hr	Ties Ton/Hr	Penta Ties Ton/Hr	Tires Ton/Hr	Opacity %	CO #/MMBtu	Excess O_2
:00 a.m.							
:00 a.m.							
:00 a.m.							
0:00 a.m.							
1:00 a.m.							
2:00 p.m.							
:00 p.m.							
:00 p.m.							
:00 p.m.							
1600 :00 p.m.	6.69	13.39	0.24	~~1.72~~ 1.76	1.7	.155	7.0
1700 :00 p.m.	7.87	15.74	0.24	1.74	1.6	.151	7.2
1800 :00 p.m.	6.90	13.81	0.24	1.74	1.7	.118	7.2
1900 :00 p.m.	7.55	15.10	0.24	1.72	1.7	.103	7.6
:00 p.m.							
:00 p.m.							
0:00 p.m.							
1:00 p.m.							

argets - See attached

ompliance Test: 3 two-hour runs

ne pound sample of each fuel every two hours during test (once per run)

LEAD TESTING

SEPT 23, 2015

#1 TEST START @ 1513
TEST FINISH @ 1623
#2 TEST START @ 1657
TEST FINISH @ 1808

L'Anse Warden Electric Co. Compliance Testing - Week of ~~June 22, 2015~~

Sampling for O_2, CO_2, PM, SO_2, NOx, Pb, VOC, Hcl, PM10

Hour	MCF Usage/hr	Steam Load #/hr	MW/Hr	% Boiler Load	ID Fan Load	Air Flow	Flue Gas Temp	Weston Testing Yes or No
7:00 a.m.							PRECIP GAS OUT.	
8:00 a.m.								
9:00 a.m.								
10:00 a.m.								
11:00 a.m.								
12:00 p.m.								
1:00 p.m.								
2:00 p.m.								
1513 3:00 p.m.		193 KPPH	18.3		82.4%	65.7%	372°	YES
1600 4:00 p.m.		193	18.3		80.3%	60.2%	371°	YES
1700 5:00 p.m.		193	18.3		79.3%	64.4%	374°	YES
1800 6:00 p.m.		193	17.7		80.7%	63.6%	374°	YES
1900 7:00 p.m.		191	17.2		81.2%	64.1%	373°	NO
8:00 p.m.								
9:00 p.m.								
10:00 p.m.								
11:00 p.m.								

Targets
NOx numbers: below .190#s/MMBTU
SO2: .01#s/MMBTU
PM: .010#s/MMBTU

Test Start Time 1657 **Test End Time** 1808

Test Description LEAD TESTING #2

Fuel in Bins >>

R/R TIES	WOOD CHIPS	R/R TIES

Tires

Date: 9-23-15

Run No

Reclaimers

15 Min	Time	Rake speed Bin # 1	Rake speed Bin # 2	Rake speed Bin # 3	TDF Screw Speed	~~John~~ MAIN FUEL BELT SCALE ~~Bin 1~~ Visual	Bin 2 John Visual	Bin 3 John Visual	Stm Flow	O2	lb/mmbtu CO	Opacity
1	1657	8	11	8	18	376.70			194	7.3	.178	1.7
2	1715	8	8	8	18	382.98			193	7.2	.095	1.9
3	1730	8	8	9	18	387.20			193	7.0	.075	1.6
4	1745	8	8	9	18	392.60			195	6.9	.133	1.7
5	1800	10	9	9	18	399.36			193	7.2	.118	1.7
6	1815	10	9	9	18	405.41			192	7.0	.124	1.8
7	1830	12	10	10	18	411.28			191	7.3	.098	1.6
8	1845	8	10	12	18	416.91			192	7.2	.079	1.5
9	1900	8	10	11	18	423.96			191	7.6	.103	1.7
10												
11												
12												
13												
14												
15												
16												

Comments:
05/06/10

Sept 23. 2015

L'Anse Warden Electric Co. Compliance Testing - ~~Week of June~~ 22, 2015

Sampling for O_2, CO_2, PM, SO_2, NOx, Pb, VOC, Hcl, PM10

Hour	MCF Usage/hr	Steam Load #/hr	MW/Hr	% Boiler Load	ID Fan Load	Air Flow	Flue Gas Temp	Weston Testing Yes or No
7:00 a.m.		196	16.7		100	66.2	373	NO
8:00 a.m.		197	16.7		97.2	64.5	368	NO
9:00 a.m.		195	16.6		83.5	65.6	371	YES
10:00 a.m.		194	16.6		99.4	66.7	374	NO
11:00 a.m.		194	16.6		99.8	66.2	376	NO
12:00 p.m.		193	16.7		95.0	66.3	374	YES
1:00 p.m.		193	16.7		83.3	64.7	375	YES
2:00 p.m.		191	16.7		84.1	66.4	377	NO
3:00 p.m.		192	16.7		90.7	66.8	377	YES
4:00 p.m.		193	16.7		98.7	66.9	377	YES
5:00 p.m.		193	16.7		83.0	66.4	380	YES
6:00 p.m.		193	16.7		96.9	65.6	380	YeS
7:00 p.m.		192	16.7		99.8	64.3	382	YeS
8:00 p.m.								
9:00 p.m.								
10:00 p.m.								
11:00 p.m.								

#1 TEST START @ 0828 } LEAD TEST
TEST FINISH @ 0940 }

#2 TEST START @ 1126 } PARTICULATE/PM10/CO/~~VOCs~~/~~SO2~~
FINISH @ 1330 }

#3 TEST START @ 1448 } HCl/PM/PARTICULATE/CO/SO_2/NOX
TEST FINISH @ 1657 }

#4 TEST START @ 1752
Test Finish @ 1935

Targets
NOx numbers: below .190#s/MMBTU
SO2: .01#s/MMBTU
PM: .010#s/MMBTU

NERIC PROCESS OPERATING DATA LOG SHEET FOR EMISSIONS TESTING

WER BOILERS--RECOMENDED EVERY 15 MINUTES; START 15 MIN B4 TEST, AND CONTINUE 15 MIN AFTER TEST

6/20/11	Start Time	Stop Time	FUEL STORAGE BUILDING									TDF BIN			Oxygen Levels		Production Rates		Main Belt	
	0828		Bin #1 Fuel in place	Rake Speed	TPH	Bin #2 Fuel in place	Rake Speed	TPH	Bin #3 Fuel in place	Rake Speed	TPH	Screw Speed	Totalizer	TPH Rate (if TDF)	BOILER O2	STACK O2, if known from CEM	STEAMING RATE	MW (specify gross or net)	Main Fuel belt	
int	DATE	TIME (use military time)	Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		SPECIFY UNITS			% (specify wet or dry)	% (specify wet or dry)	KPPH		Totalizer	
EC	9/24/2015	800	R/R TIES	13	6.69	WOOD CHIPS	16	6.69	R/R TIES	13	6.69	18	12.68	1.78	7.3		196	16.7	163.40	
EC	9/24/2015	815																		
EC	9/24/2015	830		11			16			12		18	13.58		6.8		194	16.6	177.30	
EC	9/24/2015	845		9			12			9		18	14.04		7.2		194	16.6	184.05	
EC	9/24/2015	900		8	7.89		11	7.89		8	7.89	18	14.52	1.84	7.5		195	16.6	188.91	
EC	9/24/2015	915		9			12			9		18	14.98		7.3		195	16.7	193.66	
EC	9/24/2015	930		11			13			11		18	15.46		7.4		195	16.7	200.58	
EC	9/24/2015	945		10			8			12		18	15.90		7.6		194	16.6	206.40	
EC	9/24/2015	1000		12	6.90		14	6.90		16	6.90	18	16.34	1.82	7.5		194	16.6	211.45	
EC	9/24/2015	1015		12			13			15		18	16.84		7.2		194	16.6	217.41	
EC	9/24/2015	1030		12			16			17		18	17.32		7.3		194	16.6	224.47	
EC	9/24/2015	1045		12			13			14		18	17.72		7.5		194	16.6	230.57	
EC	9/24/2015	1100		12	7.60		12	7.60		16	7.60	18	18.18	1.84	7.4		194	16.6	236.10	
EC	9/24/2015	1115		12			16			21		18	18.66		7.3		194	16.6	242.62	
EC	9/24/2015	1130		12			16			21		18	19.10		7.4		195	16.6	249.55	
EC	9/24/2015	1145		12			14			21		18	19.56		7.3		195	16.6	255.31	
EC	9/24/2015	1200		12	7.86		13	7.86		21	7.86	18	20.02	1.84	7.8		194	16.7	261.54	
EC	9/24/2015	1215		12			12			12		18	20.48		7.9		193	16.7	268.10	
EC	9/24/2015	1230		11			12			10		18	20.94		7.6		193	16.7	275.10	
EC	9/24/2015	1245		11			12			10		18	21.40		7.6		193	16.7	280.54	
EC	9/24/2015	1300		8	7.24		12	7.24		15	7.24	18	21.84	1.82	7.7		193	16.7	285.10	
EC	9/24/2015	1315		8			14			15		18	22.34		7.6		192	16.7	290.73	
EC	9/24/2015	1330		8			15			15		18	22.76		7.6		191	16.7	296.17	
EC	9/24/2015	1345		8			15			15		18	23.22		7.6		192	16.7	303.10	
EC	9/24/2015	1400		8	7.46		13	7.46		12	7.46	18	23.66	1.82	7.7		191	16.7	309.30	
EC	9/24/2015	1415		8			13			12		18	24.14		7.8		192	16.7	315.16	
EC	9/24/2015	1430		12			13			8		18	24.60		7.6		193	16.7	320.64	
EC	9/24/2015	1445		12			13			8		18	25.06		7.9		191	16.7	326.12	
EC	9/24/2015	1500		10	7.26		14	7.26		8	7.26	18	25.50	1.84	7.9		192	16.7	332.93	
EC	9/24/2015	1515		8			13			8		18	25.98		7.6		193	16.7	337.37	
EC	9/24/2015	1530		8			15			8		18	26.44		7.8		194	16.7	342.39	
EC	9/24/2015	1545		9			16			9		18	26.90		7.2		192	16.7	348.68	
EC	9/24/2015	1600		9	6.95		13	6.95		9	6.95	18	27.32	1.82	7.3		192	16.7	355.40	
EC	9/24/2015	1615		8			12			8		18	27.80		7.2		192	16.7	362.65	
EC	9/24/2015	1630		8			11			8		18	28.26		7.5		193	16.7	368.38	
EC	9/24/2015	1645		8			11			8		18	28.70		7.5		193	16.7	373.70	
EC	9/24/2015	1700		8	7.44		9	7.44		12	7.44	18	29.18	1.86	7.6		192	16.7	379.80	
EC	9/24/2015	1715		8			9			12		18	29.66		7.5		192	16.7	385.96	
EC	9/24/2015	1730	CHIPS	12		CHIPS	10		R/R TIES	12		18	30.08		7.5		193	16.7	390.71	
EC	9/24/2015	1745		13			12			10		18	30.52		7.6		194	16.7	397.39	
EC	9/24/2015	1800		10	8.28		9	8.28		10	8.28	19	31.02	1.84	7.3		193	16.7	406.48	
EC	9/24/2015	1815		8			9			10		18	31.46		7.1		192	16.7	411.61	
EC	9/24/2015	1830		8			9			10		18	31.88		7.6		194	16.7	417.32	
EC	9/24/2015	1845		8			8			12		19	32.36		7.1		193	16.7	423.70	
EC	9/24/2015	1900		8	7.36		8	7.36		12	7.36	18	32.84	1.82	7.3		192	16.7	430.38	
EC	9/24/2015	1915		9			8			10		18	33.28		7.2		193	16.7	437.50	
EC	9/24/2015	1930		8			9			9		18	33.78		7.2		192	16.7	443.80	
EC	9/24/2015	1945																		
EC	9/24/2015	2000																		

PM/CO/HAPS TEST

LOW NOx TEST

PARTICULATE/CO TEST

GENERIC PROCESS OPERATING DA

POWER BOILERS--RECOMENDED E\

06/20/11	Start Time	Stop Time	Stack Monitors		ESP POWER DATA (IF AVAILABLE)				ESP POWER DATA (IF AVAILABLE)				ESP POWER DATA (IF AVAILABLE)			
	0828		OPACITY	CO	ESP Field 1 (Inlet)	ESP Field 1 (Inlet)	Spark Rate	Primary	ESP Field 2 (Center)	ESP Field 2 (Center)	Spark Rate	Primary	ESP Field 3 (Outlet)	ESP Field 3 (Outlet)	Spark Rate	Primary
Plant	DATE	TIME (use military time)	%	lb/mmbtu	Secondary mA	Secondary kV	SPM	Voltage	Secondary mA	Secondary kV	SPM	Voltage	Secondary mA	Secondary kV	SPM	Voltage
LWEC	9/24/2015	800	1.8	.142	470	32	13	232	556	32	20	248	418	29	12	204
LWEC	9/24/2015	815	1.5	.137												
LWEC	9/24/2015	830	1.7	.106												
LWEC	9/24/2015	845	1.6	.216	~~370~~											
LWEC	9/24/2015	900	1.9	.117	310	31	2	216	646	34	0	252	536	30	1	216
LWEC	9/24/2015	915	1.5	.122	644	35	5	258								
LWEC	9/24/2015	930	1.6	.129												
LWEC	9/24/2015	945	1.7	.156												
LWEC	9/24/2015	1000	1.8	.162	644	35	5	258	488	30	26	224	528	30	7	210
LWEC	9/24/2015	1015	1.7	.125												
LWEC	9/24/2015	1030	2.0	.116												
LWEC	9/24/2015	1045	2.2	.103												
LWEC	9/24/2015	1100	1.7	.132	584	36	0	262	630	30	0	228	526	29	6	216
LWEC	9/24/2015	1115	1.7	.160												
LWEC	9/24/2015	1130	1.6	.305												
LWEC	9/24/2015	1145	2.2	.137												
LWEC	9/24/2015	1200	1.7	.102	634	37	4	272	644	32	2	238	522	29	4	212
LWEC	9/24/2015	1215	1.7	.110												
LWEC	9/24/2015	1230	2.5	.136												
LWEC	9/24/2015	1245	1.7	.088												
LWEC	9/24/2015	1300	1.5	.076	640	34	6	248	648	36	15	224	456	29	5	208
LWEC	9/24/2015	1315	1.8	.114												
LWEC	9/24/2015	1330	1.9	.082												
LWEC	9/24/2015	1345	1.7	.152												
LWEC	9/24/2015	1400	1.6	.101	650	35	7	260	644	33	0	248	434	29	3	202
LWEC	9/24/2015	1415	1.6	.133												
LWEC	9/24/2015	1430	1.6	.107												
LWEC	9/24/2015	1445	1.7	.126												
LWEC	9/24/2015	1500	1.3	.094	644	36	3	272	650	33	6	246	532	36	4	218
LWEC	9/24/2015	1515	1.8	.105												
LWEC	9/24/2015	1530	1.7	.081												
LWEC	9/24/2015	1545	1.6	.092												
LWEC	9/24/2015	1600	2.5	.135	640	31	22	234	622	32	54	240	526	31	0	220
LWEC	9/24/2015	1615	1.6	.119												
LWEC	9/24/2015	1630	1.6	.086												
LWEC	9/24/2015	1645	1.7	.155												
LWEC	9/24/2015	1700	2.2	.070	540	36	8	258	644	34	6	252	532	30	2	220
LWEC	9/24/2015	1715	1.6	.067												
LWEC	9/24/2015	1730	1.6	.072												
LWEC	9/24/2015	1745	1.9	.115												
LWEC	9/24/2015	1800	1.8	.140	620	37	5	274	650	32	24	244	526	32	0	224
LWEC	9/24/2015	1815	1.6	.145												
LWEC	9/24/2015	1830	1.7	.101												
LWEC	9/24/2015	1845	1.7	.169												
LWEC	9/24/2015	1900	1.8	.227	648	36	3	272	626	31	0	234	542	31	0	224
LWEC	9/24/2015	1915	1.6	.133												
LWEC	9/24/2015	1930	1.7	.161												
LWEC	9/24/2015	1945														
LWEC	9/24/2015	2000														

Steam & Controls
L'Anse Warden

Created: 11/18/15 15:15
EU BOILER # 1

Daily Emission Report
For 9/23/2015

Hour	PROCESS 1-Hr Avg	Stat	STEAM FLOW KLB/HR 1-Hr Avg	Stat	CO PPM 1-Hr Avg	Stat	O2 % 1-Hr Avg	Stat	Fd FACTOR SCF/mmBTU 1-Hr Avg	Stat	CO LB/mmBTU 1-Hr Avg	Stat
0	1.00	SVC	288.0	SVC	83.8	SVC	9.9	SVC	9561.0	SVC	0.111	SVC
1	1.00	SVC	289.3	SVC	82.3	SVC	9.5	SVC	9561.0	SVC	0.105	SVC
2	1.00	SVC	287.3	SVC	106.2	SVC	9.6	SVC	9561.0	SVC	0.136	SVC
3	1.00	SVC	288.9	SVC	116.1	SVC	9.6	SVC	9561.0	SVC	0.149	SVC
4	1.00	SVC	287.9	SVC	130.8	SVC	9.9	SVC	9561.0	SVC	0.173	SVC
5	1.00	SVC	289.6	SVC	99.3	SVC	9.5	SVC	9561.0	SVC	0.126	SVC
6	1.00	SVC	294.6	SVC	103.3	SVC	9.5	SVC	9561.0	SVC	0.132	SVC
7	1.00	SVC	293.9	SVC	120.9	SVC	9.4	SVC	9561.0	SVC	0.153	SVC
8	1.00	SVC	290.5	SVC	157.9	SVC	9.8	SVC	9561.0	SVC	0.207	SVC
9	1.00	SVC	294.3	SVC	127.9	SVC	9.5	SVC	9561.0	SVC	0.163	SVC
10	1.00	SVC	293.7	SVC	154.2	SVC	9.3	SVC	9561.0	SVC	0.193	SVC
11	1.00	SVC	294.1	SVC	135.5	SVC	9.1	SVC	9561.0	SVC	0.167	SVC
12	1.00	SVC	294.1	SVC	125.1	SVC	9.3	SVC	9561.0	SVC	0.157	SVC
13	1.00	SVC	293.6	SVC	144.9	SVC	9.2	SVC	9561.0	SVC	0.180	SVC
14	1.00	SVC	294.2	SVC	124.6	SVC	9.2	SVC	9561.0	SVC	0.155	SVC
15	1.00	SVC	293.8	SVC	127.1	SVC	9.1	SVC	9561.0	SVC	0.156	SVC
16	1.00	SVC	294.0	SVC	119.3	SVC	9.4	SVC	9561.0	SVC	0.151	SVC
17	1.00	SVC	294.8	SVC	114.4	SVC	8.9	SVC	9561.0	SVC	0.138	SVC
18	1.00	SVC	293.4	SVC	100.1	SVC	9.0	SVC	9561.0	SVC	0.122	SVC
19	1.00	SVC	292.1	SVC	131.4	SVC	9.5	SVC	9561.0	SVC	0.167	SVC
20	1.00	SVC	292.8	SVC	104.2	SVC	9.5	SVC	9561.0	SVC	0.133	SVC
21	1.00	SVC	291.9	SVC	99.9	SVC	9.2	SVC	9561.0	SVC	0.124	SVC
22	1.00	SVC	293.5	SVC	93.7	SVC	9.1	SVC	9561.0	SVC	0.115	SVC
23	1.00	SVC	301.3	SVC	137.3	SVC	8.8	SVC	9561.0	SVC	0.165	SVC

* CEM DAS reported steam rate not verified for accuracy or used by control room operators in running the boiler

----------Explanation for Status Code----------
SVC = MONITOR IN SERVICE

Daily Emission Report
For 9/24/2015

Hour	PROCESS 1-Hr Avg	Stat	STEAM FLOW KLB/HR 1-Hr Avg	Stat	CO PPM 1-Hr Avg	Stat	O2 % 1-Hr Avg	Stat	Fd FACTOR SCF/mmBTU 1-Hr Avg	Stat	CO LB/mmBTU 1-Hr Avg	Stat
0	1.00	SVC	300.9	SVC	122.5	SVC	9.4	SVC	9561.0	SVC	0.155	SVC
1	1.00	SVC	298.6	SVC	125.2	SVC	9.2	SVC	9561.0	SVC	0.155	SVC
2	1.00	SVC	299.1	SVC	116.0	SVC	9.2	SVC	9561.0	SVC	0.144	SVC
3	1.00	SVC	299.8	SVC	111.9	SVC	9.1	SVC	9561.0	SVC	0.138	SVC
4	1.00	SVC	299.4	SVC	96.7	SVC	9.4	SVC	9561.0	SVC	0.122	SVC
5	1.00	SVC	299.1	SVC	84.3	SVC	9.1	SVC	9561.0	SVC	0.104	SVC
6	1.00	SVC	297.8	SVC	103.9	SVC	9.2	SVC	9561.0	SVC	0.129	SVC
7	1.00	SVC	292.9	SVC	124.2	SVC	9.3	SVC	9561.0	SVC	0.155	SVC
8	1.00	SVC	297.4	SVC	114.9	SVC	9.9	SVC	9561.0	SVC	0.152	SVC
9	1.00	SVC	297.1	SVC	117.7	SVC	9.2	SVC	9561.0	SVC	0.146	SVC
10	1.00	SVC	296.2	SVC	110.1	SVC	9.2	SVC	9561.0	SVC	0.137	SVC
11	1.00	SVC	295.8	SVC	105.3	SVC	9.2	SVC	9561.0	SVC	0.131	SVC
12	1.00	SVC	293.7	SVC	71.8	SVC	9.4	SVC	9561.0	SVC	0.091	SVC
13	1.00	SVC	293.0	SVC	83.1	SVC	9.2	SVC	9561.0	SVC	0.103	SVC
14	1.00	SVC	293.3	SVC	83.5	SVC	9.4	SVC	9561.0	SVC	0.105	SVC
15	1.00	SVC	293.8	SVC	88.7	SVC	9.2	SVC	9561.0	SVC	0.110	SVC
16	1.00	SVC	294.0	SVC	86.3	SVC	9.1	SVC	9561.0	SVC	0.106	SVC
17	1.00	SVC	294.3	SVC	96.6	SVC	8.8	SVC	9561.0	SVC	0.116	SVC
18	1.00	SVC	294.2	SVC	124.4	SVC	8.7	SVC	9561.0	SVC	0.148	SVC
19	1.00	SVC	294.4	SVC	116.5	SVC	8.8	SVC	9561.0	SVC	0.140	SVC
20	1.00	SVC	294.4	SVC	108.1	SVC	9.0	SVC	9561.0	SVC	0.132	SVC
21	1.00	SVC	294.5	SVC	120.9	SVC	8.7	SVC	9561.0	SVC	0.144	SVC
22	1.00	SVC	294.7	SVC	105.5	SVC	8.7	SVC	9561.0	SVC	0.126	SVC
23	1.00	SVC	293.1	SVC	106.4	SVC	8.8	SVC	9561.0	SVC	0.128	SVC

*CEM DAS reported steam rate not verified for accuracy or used by control room operators in running the boiler

----------Explanation for Status Code----------
SVC = MONITOR IN SERVICE

Daily Opacity Report
For 9/23/2015

Hour	Opac. % Minutes 0 - 5	Opac. % Minutes 6 - 11	Opac. % Minutes 12 - 17	Opac. % Minutes 18 - 23	Opac. % Minutes 24 - 29	Opac. % Minutes 30 - 35	Opac. % Minutes 36 - 41	Opac. % Minutes 42 - 47	Opac. % Minutes 48 - 53	Opac. % Minutes 54 - 59
0	1.5 SVC	1.8 SVC	1.7 SVC	1.5 SVC	1.6 SVC	1.5 SVC	1.9 SVC	1.7 SVC	1.6 SVC	1.6 SVC
1	1.9 SVC	1.7 SVC	1.7 SVC	1.5 SVC	1.6 SVC	1.9 SVC	1.6 SVC	1.6 SVC	1.7 SVC	1.8 SVC
2	1.7 SVC	1.7 SVC	1.6 SVC	1.6 SVC	1.9 SVC	1.6 SVC	1.6 SVC	1.8 SVC	1.9 SVC	1.7 SVC
3	1.6 SVC	1.6 SVC	1.7 SVC	2.0 SVC	1.7 SVC	1.7 SVC	2.0 SVC	2.1 SVC	1.8 SVC	1.7 SVC
4	1.7 SVC	1.8 SVC	1.8 SVC	1.6 SVC	1.6 SVC	2.1 SVC	1.7 SVC	1.8 SVC	1.6 SVC	1.6 SVC
5	1.9 SVC	1.8 SVC	1.6 SVC	1.7 SVC	1.9 SVC	1.8 SVC	1.6 SVC	1.5 SVC	1.5 SVC	1.9 SVC
6	1.7 SVC	1.6 SVC	1.8 SVC	2.3 SVC	2.0 SVC	1.8 SVC	1.7 SVC	1.6 SVC	2.0 SVC	1.8 SVC
7	1.7 SVC	1.9 SVC	2.1 SVC	1.8 SVC	1.7 SVC	1.6 SVC	1.7 SVC	2.0 SVC	1.8 SVC	1.8 SVC
8	1.9 SVC	2.1 SVC	1.8 SVC	1.7 SVC	1.8 SVC	1.9 SVC	2.2 SVC	1.7 SVC	1.7 SVC	2.1 SVC
9	2.1 SVC	1.8 SVC	1.7 SVC	1.7 SVC	1.8 SVC	2.0 SVC	1.8 SVC	1.7 SVC	2.0 SVC	1.9 SVC
10	1.8 SVC	1.8 SVC	1.7 SVC	2.0 SVC	1.9 SVC	1.7 SVC	1.7 SVC	2.1 SVC	1.9 SVC	1.7 SVC
11	1.7 SVC	1.7 SVC	2.1 SVC	1.8 SVC	1.7 SVC	1.8 SVC	2.0 SVC	1.8 SVC	1.7 SVC	1.7 SVC
12	1.6 SVC	1.9 SVC	1.6 SVC	1.6 SVC	1.7 SVC	1.9 SVC	1.7 SVC	1.7 SVC	1.7 SVC	1.7 SVC
13	2.1 SVC	14.2 NSA	1.8 SVC	2.3 SVC	2.3 SVC	2.0 SVC	1.9 SVC	1.7 SVC	1.8 SVC	2.1 SVC
14	1.7 SVC	1.7 SVC	2.5 SVC	2.7 SVC	2.2 SVC	1.9 SVC	1.7 SVC	1.9 SVC	2.1 SVC	1.7 SVC
15	1.6 SVC	2.6 SVC	1.9 SVC	1.7 SVC	1.7 SVC	1.6 SVC	1.9 SVC	1.9 SVC	1.7 SVC	1.9 SVC
16	2.3 SVC	1.9 SVC	1.7 SVC	1.8 SVC	1.8 SVC	2.2 SVC	1.9 SVC	1.6 SVC	1.8 SVC	2.2 SVC
17	1.6 SVC	1.6 SVC	1.6 SVC	1.6 SVC	2.4 SVC	1.7 SVC	1.7 SVC	1.8 SVC	2.0 SVC	1.8 SVC
18	1.7 SVC	1.6 SVC	1.6 SVC	2.1 SVC	1.6 SVC	1.6 SVC	1.8 SVC	2.0 SVC	1.8 SVC	1.7 SVC
19	1.8 SVC	1.9 SVC	2.1 SVC	1.7 SVC	1.8 SVC	2.1 SVC	2.0 SVC	1.9 SVC	1.8 SVC	1.7 SVC
20	1.9 SVC	2.1 SVC	1.8 SVC	1.7 SVC	2.1 SVC	2.0 SVC	1.8 SVC	1.7 SVC	1.6 SVC	1.9 SVC
21	1.9 SVC	1.6 SVC	1.6 SVC	1.9 SVC	1.8 SVC	1.6 SVC	1.6 SVC	1.6 SVC	1.9 SVC	1.9 SVC
22	1.6 SVC	1.7 SVC	1.9 SVC	1.8 SVC	1.6 SVC	1.6 SVC	1.6 SVC	2.2 SVC	1.7 SVC	2.0 SVC
23	2.2 SVC	2.2 SVC	1.9 SVC	1.8 SVC	1.6 SVC	1.7 SVC	2.1 SVC	1.7 SVC	1.7 SVC	2.0 SVC

The average opacity period average for the day was 1.8% for 239 periods of valid data.

The Fan was in operation for 240 periods.

The maximum opacity period average for the day was 2.7%.

There was 1 period of invalid data.

Status Code Definitions

NSA = NO SAMPLE AVAILABLE SVC = MONITOR IN SERVICE

Steam & Controls
L'Anse Warden

Created: 11/19/15 09:13
EU BOILER # 1

Daily Opacity Report
For 9/24/2015

Hour	Opac. % Minutes 0 - 5	Opac. % Minutes 6 - 11	Opac. % Minutes 12 - 17	Opac. % Minutes 18 - 23	Opac. % Minutes 24 - 29	Opac. % Minutes 30 - 35	Opac. % Minutes 36 - 41	Opac. % Minutes 42 - 47	Opac. % Minutes 48 - 53	Opac. % Minutes 54 - 59
0	2.1 SVC	1.9 SVC	1.7 SVC	1.7 SVC	1.7 SVC	2.1 SVC	1.7 SVC	1.7 SVC	2.2 SVC	2.3 SVC
1	1.9 SVC	1.8 SVC	1.7 SVC	2.0 SVC	2.0 SVC	1.7 SVC	1.8 SVC	2.6 SVC	2.2 SVC	1.9 SVC
2	1.8 SVC	1.7 SVC	1.9 SVC	2.0 SVC	1.7 SVC	1.7 SVC	2.6 SVC	1.9 SVC	1.9 SVC	1.7 SVC
3	1.7 SVC	2.2 SVC	2.0 SVC	1.8 SVC	1.9 SVC	2.7 SVC	2.1 SVC	1.9 SVC	1.7 SVC	1.7 SVC
4	2.2 SVC	1.7 SVC	1.7 SVC	1.9 SVC	2.3 SVC	1.7 SVC	1.8 SVC	1.7 SVC	1.8 SVC	2.2 SVC
5	1.7 SVC	1.8 SVC	2.0 SVC	2.0 SVC	1.9 SVC	1.9 SVC	1.7 SVC	1.8 SVC	2.2 SVC	1.7 SVC
6	1.6 SVC	1.9 SVC	2.2 SVC	1.8 SVC	1.7 SVC	1.7 SVC	1.9 SVC	2.1 SVC	1.6 SVC	1.7 SVC
7	2.3 SVC	2.1 SVC	1.9 SVC	1.9 SVC	2.0 SVC	2.2 SVC	2.0 SVC	1.7 SVC	1.8 SVC	2.5 SVC
8	1.9 SVC	1.8 SVC	1.6 SVC	1.6 SVC	1.9 SVC	1.6 SVC	1.6 SVC	1.7 SVC	1.9 SVC	1.9 SVC
9	1.9 SVC	1.8 SVC	1.8 SVC	2.1 SVC	1.8 SVC	1.6 SVC	1.8 SVC	2.0 SVC	1.9 SVC	1.9 SVC
10	1.7 SVC	1.8 SVC	2.2 SVC	1.7 SVC	1.6 SVC	1.8 SVC	1.8 SVC	1.7 SVC	1.8 SVC	1.7 SVC
11	1.8 SVC	2.1 SVC	1.7 SVC	1.7 SVC	1.9 SVC	1.9 SVC	1.8 SVC	1.8 SVC	1.7 SVC	1.8 SVC
12	2.1 SVC	1.7 SVC	1.7 SVC	1.8 SVC	1.8 SVC	1.7 SVC	1.6 SVC	1.7 SVC	1.9 SVC	1.8 SVC
13	1.8 SVC	14.5 NSA	2.3 SVC	1.9 SVC	1.8 SVC	1.7 SVC	1.7 SVC	2.0 SVC	1.8 SVC	1.7 SVC
14	1.9 SVC	2.0 SVC	1.9 SVC	1.8 SVC	1.8 SVC	1.8 SVC	2.2 SVC	1.8 SVC	1.6 SVC	1.9 SVC
15	2.2 SVC	2.0 SVC	1.9 SVC	2.0 SVC	1.8 SVC	2.2 SVC	1.7 SVC	1.7 SVC	1.9 SVC	1.9 SVC
16	1.9 SVC	1.7 SVC	1.7 SVC	1.8 SVC	2.1 SVC	1.8 SVC	1.7 SVC	2.4 SVC	2.2 SVC	1.9 SVC
17	1.8 SVC	1.8 SVC	1.9 SVC	2.1 SVC	1.7 SVC	1.7 SVC	1.9 SVC	1.9 SVC	1.6 SVC	1.6 SVC
18	1.6 SVC	2.0 SVC	2.2 SVC	1.8 SVC	1.8 SVC	2.1 SVC	1.9 SVC	1.9 SVC	1.9 SVC	1.8 SVC
19	2.2 SVC	1.8 SVC	1.8 SVC	1.7 SVC	1.9 SVC	1.8 SVC	1.9 SVC	1.8 SVC	1.9 SVC	2.2 SVC
20	1.9 SVC	1.9 SVC	2.1 SVC	2.1 SVC	2.0 SVC	1.9 SVC	1.9 SVC	1.9 SVC	2.2 SVC	1.8 SVC
21	1.9 SVC	2.0 SVC	2.0 SVC	1.9 SVC	1.9 SVC	1.8 SVC	1.8 SVC	2.1 SVC	1.7 SVC	1.7 SVC
22	2.0 SVC	1.9 SVC	1.9 SVC	1.7 SVC	1.7 SVC	1.9 SVC	2.0 SVC	1.8 SVC	1.8 SVC	2.3 SVC
23	2.2 SVC	1.9 SVC	1.8 SVC	1.7 SVC	2.0 SVC	1.9 SVC	1.7 SVC	2.0 SVC	2.1 SVC	1.9 SVC

The average opacity period average for the day was 1.9% for 239 periods of valid data.

The Fan was in operation for 240 periods.

The maximum opacity period average for the day was 2.7%.

There was 1 period of invalid data.

Status Code Definitions

NSA = NO SAMPLE AVAILABLE

SVC = MONITOR IN SERVICE

NOVEMBER TEST PROGRAM

LWEC Compliance Testing Fuel Usage Summary Page

Test Date	Time	Wood TPH	Railroad Tie TPH	Tire-Derived Fuel TPH	Penta TPH
11/3/2015 - Hcl					
Test #1	18:02 - 16:14	15.88	7.94	1.76	0
Test #2	16:50 - 17:56	17.56	8.78	1.82	0
11/4/2015 - Hcl					
Test #3	09:12 - 10:20	16.45	8.23	1.83	0
11/5/2015 - Hcl					
Test #1	10:05 - 12:04	12.62	12.47	1.76	0.24
Test #2	12:25 - 13:33	12.58	12.59	1.94	0.24
Test #3	14:03 - 15:15	12.72	12.72	1.83	0.24

GENERIC PROCESS OPERATING DA

POWER BOILERS--RECOMENDED E\

11/03/15	Start Time	Stop Time	Stack Monitors			ESP POWER DATA (IF AVAILABLE)					ESP POWER DATA (IF AVAILABLE)					ESP POWER DATA (IF AVAILABLE)				
			OPACITY	CO	Flue Gas Temp	ESP Field 1 (Inlet)	ESP Field 1 (Inlet)	Spark Rate	Primary	Primary	ESP Field 2 (Center)	ESP Field 2 (Center)	Spark Rate	Primary	Primary	ESP Field 3 (Outlet)	ESP Field 3 (Outlet)	Spark Rate	Primary	Primary
Plant	DATE	TIME (use military time)	%	lb/mmbtu	(Precip Gas Out)	Secondary mA	Secondary kV	SPM	Current	Voltage	Secondary mA	Secondary kV	SPM	Current	Voltage	Secondary mA	Secondary kV	SPM	Current	Voltage
LWEC	11/3/2015	800																		
LWEC	11/3/2015	815																		
LWEC	11/3/2015	830																		
LWEC	11/3/2015	845																		
LWEC	11/3/2015	900																		
LWEC	11/3/2015	915																		
LWEC	11/3/2015	930																		
LWEC	11/3/2015	945																		
LWEC	11/3/2015	1000																		
LWEC	11/3/2015	1015																		
LWEC	11/3/2015	1030																		
LWEC	11/3/2015	1045																		
LWEC	11/3/2015	1100																		
LWEC	11/3/2015	1115																		
LWEC	11/3/2015	1130																		
LWEC	11/3/2015	1145																		
LWEC	11/3/2015	1200																		
LWEC	11/3/2015	1215																		
LWEC	11/3/2015	1230																		
LWEC	11/3/2015	1245																		
LWEC	11/3/2015	1300																		
LWEC	11/3/2015	1315																		
LWEC	11/3/2015	1330																		
LWEC	11/3/2015	1345																		
LWEC	11/3/2015	1400																		
LWEC	11/3/2015	1415																		
LWEC	11/3/2015	1430																		
LWEC	11/3/2015	1445																		
LWEC	11/3/2015	1500	2.4	131	405	35	2504	~~266~~	0/	23.4/40	~~244~~ 34	~~2~~ 645	~~244~~ 1	6	20.7KV	26	144	13	156	31
LWEC	11/3/2015	1515	2.1	199	408	32	625	~~252~~	6/	22.1	33	640	8	32	150	26	159	11	140	29
LWEC	11/3/2015	1530	1.7	161	402	33	522	5	260	6	32	6119	7	244	0	26	166	14	170	48
LWEC	11/3/2015	1545	2.1	222	406	36	621	14	264	6	33	648	8	241	0	26	184	13	148	27
LWEC	11/3/2015	1600	1.4	123	406	37	640	6	256	0	33	460	5	256	0	27	174	13	154	32
LWEC	11/3/2015	1615	1.9	228	408	35	658	9	234	6	33	569	11	248	0	26	202	13	156	36
LWEC	11/3/2015	1630	1.5	173	407	36	630	17	272	0	33	646	5	240	0	27	216	13	170	44
LWEC	11/3/2015	1645	1.7	187	408	36	651	11	272	6	33	644	9	248	0	26	194	14	160	37
LWEC	11/3/2015	1700	1.6	233	406	32	644	21	241	0	32	622	22	244	0	25	178	13	160	40
LWEC	11/3/2015	1715	2.0	143	406	35	644	15	260	6	32	644	5	258	0	26	150	12	160	41
LWEC	11/3/2015	1730	1.9	165	405	33	648	15	262	6	33	648	4	244	0	25	164	14	156	40
LWEC	11/3/2015	1745	1.7	249	406	36	649	3	274	0	33	648	1	~~248~~	0	27	164	13	162	39
LWEC	11/3/2015	1800	1.6	151	405	~~34~~	~~994~~	11	2511	0	33	644	3	246	0	~~26~~	~~80~~	11	140	21
LWEC	11/3/2015	1815	1.7	167	405	36	644	10	266	0	32	568	7	234	0	26	116	13	~~146~~	~~28~~
LWEC	11/3/2015	1830																		
LWEC	11/3/2015	1845																		
LWEC	11/3/2015	1900																		
LWEC	11/3/2015	1915																		
LWEC	11/3/2015	1930																		
LWEC	11/3/2015	1945																		
LWEC	11/3/2015	2000																		

GENERIC PROCESS OPERATING DATA LOG SHEET FOR EMISSIONS TESTING

POWER BOILERS--RECOMENDED EVERY 15 MINUTES; START 15 MIN B4 TEST, AND CONTINUE 15 MIN AFTER TEST

11/03/15	Start Time	Stop Time	FUEL STORAGE BUILDING									TDF BIN			Main Belt	Oxygen Levels		Production Rates		Fan	Air
2 = 1650 1 = 1552		1756 1614	Bin #1 Fuel in place	Rake Speed	TPH	Bin #2 Fuel in place	Rake Speed	TPH	Bin #3 Fuel in place	Rake Speed	TPH	Screw Speed	Totalizer	TPH Rate (if TDF)	Main Fuel belt	BOILER O2	STACK O2, if known from CEM	STEAMING RATE	MW (specify gross or net)	ID Fan Load	Air Flow
Plant	DATE	TIME (use military time)	Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		SPECIFY UNITS			Totalizer	% (specify wet or dry)	% (specify wet or dry)	KPPH		%	%
LWEC	11/3/2015	800																			
LWEC	11/3/2015	815																			
LWEC	11/3/2015	830																			
LWEC	11/3/2015	845																			
LWEC	11/3/2015	900																			
LWEC	11/3/2015	915																			
LWEC	11/3/2015	930																			
LWEC	11/3/2015	945																			
LWEC	11/3/2015	1000																			
LWEC	11/3/2015	1015																			
LWEC	11/3/2015	1030																			
LWEC	11/3/2015	1045																			
LWEC	11/3/2015	1100																			
LWEC	11/3/2015	1115																			
LWEC	11/3/2015	1130																			
LWEC	11/3/2015	1145																			
LWEC	11/3/2015	1200																			
LWEC	11/3/2015	1215																			
LWEC	11/3/2015	1230																			
LWEC	11/3/2015	1245																			
LWEC	11/3/2015	1300																			
LWEC	11/3/2015	1315																			
LWEC	11/3/2015	1330																			
LWEC	11/3/2015	1345																			
LWEC	11/3/2015	1400																			
LWEC	11/3/2015	1415																			
LWEC	11/3/2015	1430																			
LWEC	11/3/2015	1445			381.70																
LWEC	11/3/2015	1500	Chips	14		Chips	10		Tires	15		18	27.38		382.15	6.5		183	16.5	100	68.7
LWEC	11/3/2015	1515		12			8			15		19	27.60		385.85	6.3		187	16.5	100	67.2
LWEC	11/3/2015	1530		1			8			15		18	28.24		395.47	6.0		190	16.5	100	68.0
LWEC	11/3/2015	1545		8			12			15		18	28.72		400.70	6.1		190	16.5	100	65.5
LWEC	11/3/2015	1600		9	7.94		13	7.94		11	7.94	18	29.14	1.76	405.89	6.1		191	16.5	100	66.3
LWEC	11/3/2015	1615		8			12			16		14	29.68		413.24	5.8		193	16.5	100	66.9
LWEC	11/3/2015	1630		10			10			20		18	30.08		419.20	5.8		193	16.5	100	67.2
LWEC	11/3/2015	1645		10			10			20		18	30.52		425.14	5.8		193	16.5	100	68.5
LWEC	11/3/2015	1700		11	8.55		11	8.55		18	8.55	14	30.96	1.84	431.59	5.9		192	16.5	100	72.0
LWEC	11/3/2015	1715		11			11			17		14	31.42		438.68	6.1		190	16.2	100	68.8
LWEC	11/3/2015	1730		10			10			13		14	31.88		445.29	6.0		190	16.2	100	64.5
LWEC	11/3/2015	1745		10			10			13		19	32.34		451.60	5.9		189	16.2	100	66.2
LWEC	11/3/2015	1800		10	9.01		10	9.01		13	9.01	18	32.78	1.80	458.64	6.0		190	16.2	100	65.7
LWEC	11/3/2015	1815		10			12			13		18	33.26		463.79	5.8		191	16.2	100	68.2
LWEC	11/3/2015	1830																			
LWEC	11/3/2015	1845																			
LWEC	11/3/2015	1900																			
LWEC	11/3/2015	1915																			
LWEC	11/3/2015	1930																			
LWEC	11/3/2015	1945																			
LWEC	11/3/2015	2000																			

GENERIC PROCESS OPERATING DA

POWER BOILERS--RECOMENDED E\

11/03/15	Start Time	Stop Time	Stack Monitors			ESP POWER DATA (IF AVAILABLE)					ESP POWER DATA (IF AVAILABLE)					ESP POWER DATA (IF AVAILABLE)				
			OPACITY	CO	Flue Gas Temp	ESP Field 1 (Inlet)	ESP Field 1 (Inlet)	Spark Rate	Primary	Primary	ESP Field 2 (Center)	ESP Field 2 (Center)	Spark Rate	Primary	Primary	ESP Field 3 (Outlet)	ESP Field 3 (Outlet)	Spark Rate	Primary	Primary
Plant	DATE	TIME (use military time)	%	lb/mmbtu	(Precip Gas Out)	Secondary mA	Secondary kV	SPM	Current	Voltage	Secondary mA	Secondary kV	SPM	Current	Voltage	Secondary mA	Secondary kV	SPM	Current	Voltage
LWEC	11/4/2015	800																		
LWEC	11/4/2015	815	1.7	137	389	36	640	24	266	0	34	594	45	224	0	25	126	12	152	29
LWEC	11/4/2015	830	1.8	100	388	36	644	19	266	0	32	640	27	244	0	24	170	12	150	46
LWEC	11/4/2015	845	1.7	105	388	33	548	13	268	0	36	640	10	240	0	25	168	13	154	41
LWEC	11/4/2015	900	1.7	92	389	33	654	9	248	0	32	630	11	244	0	25	156	14	142	37
LWEC	11/4/2015	915	1.7	103	390	36	648	20	266	0	32	650	10	232	0	26	162	12	166	46
LWEC	11/4/2015	930	1.8	120	392	34	658	14	272	0	32	616	5	244	0	26	206	13	162	42
LWEC	11/4/2015	945	2.0	158	393	32	584	30	246	0	32	648	13	240	0	26	174	14	164	42
LWEC	11/4/2015	1000	2.1	161	394	32	452	16	262	0	33	650	15	240	0	26	248	13	166	48
LWEC	11/4/2015	1015	2.3	154	392	37	538	9	268	0	33	644	0	248	0	26	268	12	166	48
LWEC	11/4/2015	1030	1.9	123	397	37	640	28	274	0	33	648	3	258	0	26	254	12	166	44
LWEC	11/4/2015	1045	1.7	161	398	34	648	8	252	0	33	650	1	246	0	26	220	14	168	45
LWEC	11/4/2015	1100	1.9	170	399	34	470	17	268	0	32	634	13	240	0	26	178	14	166	41
LWEC	11/4/2015	1115	2.3	170	401	36	648	16	268	0	31	548	26	238	0	26	146	13	148	30
LWEC	11/4/2015	1130	2.3	168	401	30	512	27	248	0	32	568	25	240	0	26	154	13	154	37
LWEC	11/4/2015	1145	1.9	110	399	34	644	15	258	0	31	640	28	220	0	25	150	13	150	39
LWEC	11/4/2015	1200	1.7	109	396	32	248	7	168	6	33	640	26	246	0	26	178	12	152	29
LWEC	11/4/2015	1215	2.0	94	399	36	630	17	276	0	31	630	25	234	6	26	150	13	152	32
LWEC	11/4/2015	1230	2.3	87	398	35	644	32	258	0	30	602	34	230	0	25	140	12	148	28
LWEC	11/4/2015	1245	2.2	83	397	36	650	20	234	0	31	542	7	234	0	25	140	13	146	32
LWEC	11/4/2015	1300	2.6	94	395	29	206	26	170	6	31	250	38	220	6	25	130	14	146	32
LWEC	11/4/2015	1315	2.3	67	395	36	634	28	272	0	32	648	14	230	0	26	136	14	152	32
LWEC	11/4/2015	1330	1.8	128	396	37	644	21	276	0	32	648	19	238	0	25	164	13	148	37
LWEC	11/4/2015	1345	2.2	105	396	37	650	31	276	0	32	630	11	240	0	25	178	13	156	37
LWEC	11/4/2015	1400	2.1	89	397	33	458	23	246	0	32	648	18	238	0	25	150	12	154	36
LWEC	11/4/2015	1415	1.7	96	397	34	218	21	216	0	32	624	19	246	0	26	156	11	154	32
LWEC	11/4/2015	1430	2.1	84	397	38	650	25	280	0	32	622	15	241	0	26	168	13	152	36
LWEC	11/4/2015	1445	1.9	123	397	36	650	17	258	0	32	584	12	232	0	26	152	14	150	34
LWEC	11/4/2015	1500	1.7	123	397	34	634	19	264	0	31	532	4	208	0	26	140	14	148	36
LWEC	11/4/2015	1515	1.8	155	398	3	640	24	262	0	32	650	13	244	0	27	150	13	148	29
LWEC	11/4/2015	1530	2.3	144	398	37	644	1	274	0	33	650	1	246	0	26	156	12	148	31
LWEC	11/4/2015	1545	1.6	123	398	31	284	29	240	0	33	622	4	254	0	27	176	13	162	43
LWEC	11/4/2015	1600	1.8	214	399	31	650	12	252	0	33	640	0	252	0	27	188	15	176	43
LWEC	11/4/2015	1615	1.6	212	401	36	640	10	244	6	33	646	3	250	6	27	192	14	170	38
LWEC	11/4/2015	1630	2.5	195	401	38	310	13	272	6	33	640	5	252	0	26	136	11	166	38
LWEC	11/4/2015	1645	1.7	175	402	40	222	9	246	6	34	650	4	246	6	26	158	11	156	29
LWEC	11/4/2015	1700	1.9	254	403	27	170	25	216	6	33	648	17	220	6	27	164	13	162	43
LWEC	11/4/2015	1715	2.1	256	404	36	346	25	210	0	31	490	18	234	0	25	148	11	138	36
LWEC	11/4/2015	1730	2.7	244	403	37	640	5	208	0	32	586	20	240	0	27	168	14	142	28
LWEC	11/4/2015	1745	1.7	294	404	33	474	32	238	0	33	648	10	246	0	26	170	12	162	35
LWEC	11/4/2015	1800																		
LWEC	11/4/2015	1815																		
LWEC	11/4/2015	1830																		
LWEC	11/4/2015	1845																		
LWEC	11/4/2015	1900																		
LWEC	11/4/2015	1915																		
LWEC	11/4/2015	1930																		
LWEC	11/4/2015	1945																		
LWEC	11/4/2015	2000																		

GENERIC PROCESS OPERATING DATA LOG SHEET FOR EMISSIONS TESTING

POWER BOILERS--RECOMENDED EVERY 15 MINUTES; START 15 MIN B4 TEST, AND CONTINUE 15 MIN AFTER TEST

11/03/15	Start Time	Stop Time	FUEL STORAGE BUILDING									TDF BIN			Main Belt	Oxygen Levels		Production Rates		Fan	Air
			Bin #1 Fuel in place	Rake Speed	TPH	Bin #2 Fuel in place	Rake Speed	TPH	Bin #3 Fuel in place	Rake Speed	TPH	Screw Speed	Totalizer	TPH Rate (if TDF)	Main Fuel belt	BOILER O2	STACK O2, if known from CEM	STEAMING RATE	MW (specify gross or net)	ID Fan Load	Air Flow
Plant	DATE	TIME (use military time)	Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		SPECIFY UNITS			Totalizer	% (specify wet or dry)	% (specify wet or dry)	KPPH		%	%
LWEC	11/4/2015	800	Chips	13		Chips	13		RR Ties	15		18									
LWEC	11/4/2015	815		13			13			15		18	15.06		215.20	6.1		180	17.1	99.5	66.4
LWEC	11/4/2015	830		13			13			14		18	15.50		221.02	7.0		181	17.1	100	67.4
LWEC	11/4/2015	845		13			13			14		18	15.96		227.42	6.8		181	17.1	100	67.2
LWEC	11/4/2015	900		14			13			10		18	16.42		233.42	6.7		181	17.1	100	67.5
LWEC	11/4/2015	915		10	7.9		3	7.9		10	7.9	18	16.88	1.82	239.16	6.5		181	17.1	100	67.7
LWEC	11/4/2015	930		10			14			10		18	17.44		246.71	5.9		181	17.1	100	66.7
LWEC	11/4/2015	945		14			13			10		18	17.80		251.94	5.9		182	17.1	100	67.3
LWEC	11/4/2015	1000		14	8.55		13	8.55		11	8.55	18	18.26	1.84	258.07	6.5		180	17.1	100	67.2
LWEC	11/4/2015	1015		12			18			11		18	18.72		264.87	6.9		182	17.1	100	65.0
LWEC	11/4/2015	1030		11			17			11		18	19.14		270.31	7.1		181	17.1	100	67.0
LWEC	11/4/2015	1045	Rafters	12			9			9		18	19.60		276.82	6.9		182	17.1	100	68.3
LWEC	11/4/2015	1100		14	8.59		10	8.59		16	8.59	18	20.06	1.8	283.84	7.3		182	17.1	100	68.2
LWEC	11/4/2015	1115		15			11			11		18	20.50		289.46	7.1		180	17.1	100	67.0
LWEC	11/4/2015	1130		14			10			11		18	20.98		297.40	7.5		181	17.1	100	65.6
LWEC	11/4/2015	1145		14			6779			11		18	21.44		303.72	7.1		180	17.1	100	68.5
LWEC	11/4/2015	1200		10	8.42		8	8.42		12	8.42	22	21.94	1.88	310.11	6.8		181	17.1	100	65.9
LWEC	11/4/2015	1215		11 44			9			10		22	22.50		315.36	7.0		182	17.1	100	67.3
LWEC	11/4/2015	1230		11			9			11		22	23.06		321.54	7.2		181	17.1	100	66.9
LWEC	11/4/2015	1245																			
LWEC	11/4/2015	1300		11	7.32		13	7.32		11	7.32	24	24.22	2.28	332.08	6.7		182	17.1	100	68.6
LWEC	11/4/2015	1315		12			14			12		24	24.86		339.66	7.0		181	17.1	100	69.6
LWEC	11/4/2015	1330		10			12			10		24	25.38		346.81	6.1		182	17.1	100	67.8
LWEC	11/4/2015	1345		9			11			9		24	26.02		350.30	7.2		180	17.1	100	66.8
LWEC	11/4/2015	1400		10	7.47		8	7.47		11	7.47	24	26.56	2.28	356.31	5.5		181	17.1	100	68.4
LWEC	11/4/2015	1415		12			8			14		24	27.16		359.74	7.2		181	17.1	99.8	66.4
LWEC	11/4/2015	1430		12			8			10		24	27.76		365.33	6.9		181	17.1	100	66.5
LWEC	11/4/2015	1445		18			18			12		24	28.40		372.02	6.9		180	17.1	100	68.0
LWEC	11/4/2015	1500		13	8.2		14	8.2		0	8.2	24	29.02	2.36	379.13	5.5		182	17.1	100	67.1
LWEC	11/4/2015	1515					14			12		24	29.54		384.71	6.1		181	17.1	100	68.9
LWEC	11/4/2015	1530	Ch 105	12			10			14		18	30.14		390.81	6.1		182	17.16	100	64.8
LWEC	11/4/2015	1545		10			10			12		18	30.60		396.85	6.6		182	16.6	100	66.4
LWEC	11/4/2015	1600		16	8.38		10	8.38		12	8.38	18	31.00	2.08	401.27	5.8		182	16.6	100	66.7
LWEC	11/4/2015	1615		8 Bk			8			13		18	31.48		411.85	4.9		192	16.2	100	67.4
LWEC	11/4/2015	1630		9			9			14		18	31.90		415.21	5.9		189	16.2	100	68.1
LWEC	11/4/2015	1645		13			12			10		18	32.34		421.57	6.2		187	16.2	100	68.4
LWEC	11/4/2015	1700		10	8.16		12	8.16		10	8.16	18	32.80	1.8	428.16	5.9		185	16.2	100	67.6
LWEC	11/4/2015	1715		12			10			12		14	33.32		438.41	5.1		185	16.2	100	68.3
LWEC	11/4/2015	1730		12			10			12		14	33.72		440.61	5.7		185	16.2	100	68.3
LWEC	11/4/2015	1745		12			12			12		18	34.16		447.97	5.7		185	16.2	100	67.8
LWEC	11/4/2015	1800																			
LWEC	11/4/2015	1815																			
LWEC	11/4/2015	1830																			
LWEC	11/4/2015	1845																			
LWEC	11/4/2015	1900																			
LWEC	11/4/2015	1915																			
LWEC	11/4/2015	1930																			
LWEC	11/4/2015	1945																			
LWEC	11/4/2015	2000																			

ENERIC PROCESS OPERATING DATA LOG SHEET FOR EMISSIONS TESTING

OWER BOILERS--RECOMENDED EVERY 15 MINUTES; START 15 MIN B4 TEST, AND CONTINUE 15 MIN AFTER TEST

11/03/15	Start Time	Stop Time	FUEL STORAGE BUILDING									TDF BIN			Main Belt	Oxygen Levels		Production Rates		Fan	Air
			Bin #1 Fuel in place	Rake Speed	TPH	Bin #2 Fuel in place	Rake Speed	TPH	Bin #3 Fuel in place	Rake Speed	TPH	Screw Speed	Totalizer	TPH Rate (if TDF)	Main Fuel belt	BOILER O2	STACK O2, if known from CEM	STEAMING RATE	MW (specify gross or net)	ID Fan Load	Air Flow
lant	DATE	TIME (use military time)	Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		Type of Fuel	SPECIFY UNITS		SPECIFY UNITS			Totalizer	% (specify wet or dry)	% (specify wet or dry)	KPPH		%	%
NEC	11/5/2015	800	Chips			Chips			RRTis												
NEC	11/5/2015	815																			
NEC	11/5/2015	830																			
NEC	11/5/2015	845																			
NEC	11/5/2015	900																			
NEC	11/5/2015	915																			
NEC	11/5/2015	930		12			14			12		18	17.36		242.91	6.0		186		100	70.4
NEC	11/5/2015	945		12			10			16		18	17.86		249.41	7.6		186		100	66.8
NEC	11/5/2015	1000		11			9			16		18	18.30		253.04	7.1		186		100	67.9
NEC	11/5/2015	1015		13			11			14		18	18.74		266.41	6.5		184		100	69.5
NEC	11/5/2015	1030		14			10			12		18	19.22		267.69	5.4		187		100	66.2
NEC	11/5/2015	1045		15			12			15		18	19.68		272.64	5.2		186		100	65.9
NEC	11/5/2015	1100		12	5.92		12	5.96		17	11.93	18	20.12	1.82	275.90	5.9		187		100	66.5
NEC	11/5/2015	1115		12			13			13		18	20.72		288.50	5.9		185		100	66.8
NEC	11/5/2015	1130		13			13			13		18	21.04		293.50	5.8		187		100	67.2
NEC	11/5/2015	1145		14			11			12		18	21.66		302.07	5.9		188		100	65.4
NEC	11/5/2015	1200		15	6.66		12	6.66		13	13	18	21.92	1.7	305.56	6.2		187		100	70.0
NEC	11/5/2015	1215		11			11			14		18	22.42	1.7	312.80	6.7		186		100	67.2
NEC	11/5/2015	1230		16			11			13		18	22.86		318.79	6.5		186		100	66.0
NEC	11/5/2015	1245		16			10			15		18	23.32		324.89	6.7		187		100	69.9
NEC	11/5/2015	1300		10	6.29		12	6.29		14	12.59	18	23.76	1.94	330.74	6.4		187		100	68.7
NEC	11/5/2015	1315		13			12			14		18	24.24		336.64	6.4		185		99.8	69.4
NEC	11/5/2015	1330		10			10			14		18	24.76		344.04	6.7		186		100	67.8
NEC	11/5/2015	1345		11			10			15		18	25.14		349.05	6.3		185		100	71.5
NEC	11/5/2015	1400		11	6.47		12	6.47		15	12.94	18	25.62	1.86	355.52	6.2		186		100	67.6
NEC	11/5/2015	1415		13			9			12		18	26.10		363.57	6.2		186		100	66.8
NEC	11/5/2015	1430		13			11			14		18	26.62		369.64	6.3		187		99.6	67.3
NEC	11/5/2015	1445		11			11			14		18	27.04		376.25	6.6		186		100	72.3
NEC	11/5/2015	1500		11	6.25		11	6.23		15	12.49	18	27.42	1.8	381.60	6.4		184		100	78.5
NEC	11/5/2015	1515		11			11			15		18	27.90		388.75	6.1		187		100	64.5
NEC	11/5/2015	1530																			
NEC	11/5/2015	1545																			
NEC	11/5/2015	1600																			
NEC	11/5/2015	1615																			
NEC	11/5/2015	1630																			
NEC	11/5/2015	1645																			
NEC	11/5/2015	1700																			
NEC	11/5/2015	1715																			
NEC	11/5/2015	1730																			
NEC	11/5/2015	1745																			
NEC	11/5/2015	1800																			
NEC	11/5/2015	1815																			
NEC	11/5/2015	1830																			
NEC	11/5/2015	1845																			
NEC	11/5/2015	1900																			
NEC	11/5/2015	1915																			
NEC	11/5/2015	1930																			
NEC	11/5/2015	1945																			
NEC	11/5/2015	2000																			

GENERIC PROCESS OPERATING DA

POWER BOILERS--RECOMENDED E\

11/03/15	Start Time	Stop Time	Stack Monitors			ESP POWER DATA (IF AVAILABLE)					ESP POWER DATA (IF AVAILABLE)					ESP POWER DATA (IF AVAILABLE)				
			OPACITY	CO	Flue Gas Temp	ESP Field 1 (Inlet)	ESP Field 1 (Inlet)	Spark Rate	Primary	Primary	ESP Field 2 (Center)	ESP Field 2 (Center)	Spark Rate	Primary	Primary	ESP Field 3 (Outlet)	ESP Field 3 (Outlet)	Spark Rate	Primary	Primary
Plant	DATE	TIME (use military time)	%	lb/mmbtu	(Precip Gas Out)	Secondary mA	Secondary kV	SPM	Current	Voltage	Secondary mA	Secondary kV	SPM	Current	Voltage	Secondary mA	Secondary kV	SPM	Current	Voltage
LWEC	11/5/2015	800																		
LWEC	11/5/2015	815																		
LWEC	11/5/2015	830																		
LWEC	11/5/2015	845																		
LWEC	11/5/2015	900																		
LWEC	11/5/2015	915																		
LWEC	11/5/2015	930	1.8	65	353	31	654	16	257	0	33	648	8	246	0	26	202	14	168	40
LWEC	11/5/2015	945	2.3	128	395	34	450	11	262	0	32	650	11	238	0	26	222	15	162	50
LWEC	11/5/2015	1000	1.9	223	396	36	648	21	286	0	33	634	10	248	6	26	202	13	166	52
LWEC	11/5/2015	1015	1.8	169	397	36	649	26	274	0	32	640	15	240	0	25	206	14	167	45
LWEC	11/5/2015	1030	1.9	269	398	33	648	11	244	0	32	640	5	244	0	26	212	14	174	50
LWEC	11/5/2015	1045	2.1	200	397	35	644	1	226	6	31	648	1	238	0	26	218	13	174	50
LWEC	11/5/2015	1100	1.9	128	357	35	636	4	244	0	33	626	1	259	0	26	192	13	154	46
LWEC	11/5/2015	1115	1.9	280	396	33	648	16	248	0	33	646	5	240	6	26	204	13	165	48
LWEC	11/5/2015	1130	1.6	212	397	33	644	14	248	0	31	640	13	236	0	24	198	13	166	40
LWEC	11/5/2015	1145	2.1	142	395	321	640	17	268	0	32	642	5	238	0	25	150	13	142	32
LWEC	11/5/2015	1200	1.9	96	391	36	648	3	266	6	32	640	6	238	6	25	184	14	152	39
LWEC	11/5/2015	1215	2.2	162	391	35	654	11	240	0	31	648	12	230	0	25	198	13	152	35
LWEC	11/5/2015	1230	1.9	146	399	36	658	4	252	6	32	644	1	240	0	26	204	13	160	44
LWEC	11/5/2015	1245	2.4	172	393	35	648	11	260	0	31	644	7	234	0	26	196	15	152	33
LWEC	11/5/2015	1300	1.8	67	394	36	642	9	240	0	32	556	7	252	0	26	196	13	162	28
LWEC	11/5/2015	1315	2.0	149	394	31	470	10	248	6	31	648	30	234	0	26	196	11	160	41
LWEC	11/5/2015	1330	2.2	21	356	35	620	24	260	0	32	648	5	240	0	26	230	13	162	46
LWEC	11/5/2015	1345	1.7	117	398	35	648	6	260	0	31	644	8	234	0	25	220	14	162	45
LWEC	11/5/2015	1400	1.7	154	396	32	640	10	244	6	32	644	17	240	0	27	240	13	160	52
LWEC	11/5/2015	1415	1.9	176	398	33	648	3	248	0	31	648	18	240	0	27	226	13	162	52
LWEC	11/5/2015	1430	2.1	96	397	33	636	12	262	6	31	560	21	240	0	26	168	14	156	35
LWEC	11/5/2015	1445	1.8	145	398	36	640	5	252	0	32	636	3	240	0	26	216	13	174	55
LWEC	11/5/2015	1500	1.8	286	401	34	650	3	252	0	33	648	3	240	0	25	226	13	174	48
LWEC	11/5/2015	1515	2.1	161	401	38	650	1	242	0	32	650	0	240	0	28	256	12	176	50
LWEC	11/5/2015	1530																		
LWEC	11/5/2015	1545																		
LWEC	11/5/2015	1600																		
LWEC	11/5/2015	1615																		
LWEC	11/5/2015	1630																		
LWEC	11/5/2015	1645																		
LWEC	11/5/2015	1700																		
LWEC	11/5/2015	1715																		
LWEC	11/5/2015	1730																		
LWEC	11/5/2015	1745																		
LWEC	11/5/2015	1800																		
LWEC	11/5/2015	1815																		
LWEC	11/5/2015	1830																		
LWEC	11/5/2015	1845																		
LWEC	11/5/2015	1900																		
LWEC	11/5/2015	1915																		
LWEC	11/5/2015	1930																		
LWEC	11/5/2015	1945																		
LWEC	11/5/2015	2000																		

Daily Emission Report
For 11/3/2015

Hour	PROCESS 1-Hr Avg	Stat	STEAM FLOW KLB/HR 1-Hr Avg	Stat	CO PPM 1-Hr Avg	Stat	O2 % 1-Hr Avg	Stat	Fd FACTOR SCF/mmBTU 1-Hr Avg	Stat	CO LB/mmBTU 1-Hr Avg	Stat
0	1.00	SVC	281.4	SVC	112.7	SVC	9.9	SVC	9561.0	SVC	0.149	SVC
1	1.00	SVC	283.1	SVC	115.3	SVC	9.4	SVC	9561.0	SVC	0.146	SVC
2	1.00	SVC	286.9	SVC	129.9	SVC	9.2	SVC	9561.0	SVC	0.161	SVC
3	1.00	SVC	288.9	SVC	139.6	SVC	9.1	SVC	9561.0	SVC	0.172	SVC
4	1.00	SVC	289.6	SVC	144.8	SVC	9.6	SVC	9561.0	SVC	0.186	SVC
5	1.00	SVC	290.1	SVC	134.6	SVC	9.2	SVC	9561.0	SVC	0.167	SVC
6	1.00	SVC	289.4	SVC	135.2	SVC	9.1	SVC	9561.0	SVC	0.166	SVC
7	1.00	SVC	284.3	SVC	130.1	SVC	9.2	SVC	9561.0	SVC	0.161	SVC
8	1.00	SVC	285.7	SVC	59.8	SVC	13.3	SVC	9561.0	SVC	0.114	SVC
9	1.00	SVC	287.1	SVC	123.0	SVC	9.0	SVC	9561.0	SVC	0.150	SVC
10	1.00	SVC	287.2	SVC	162.6	SVC	8.7	SVC	9561.0	SVC	0.194	SVC
11	1.00	SVC	286.7	SVC	331.3	SVC	8.5	SVC	9561.0	SVC	0.388	SVC
12	1.00	SVC	285.3	SVC	328.1	SVC	8.8	SVC	9561.0	SVC	0.394	SVC
13	1.00	SVC	283.6	SVC	145.2	SVC	8.8	SVC	9561.0	SVC	0.174	SVC
14	1.00	SVC	281.3	SVC	127.5	SVC	8.8	SVC	9561.0	SVC	0.153	SVC
15	1.00	SVC	289.2	SVC	173.5	SVC	8.4	SVC	9561.0	SVC	0.202	SVC
16	1.00	SVC	293.9	SVC	344.0	SVC	8.5	SVC	9561.0	SVC	0.403	SVC
17	1.00	SVC	289.7	SVC	173.8	SVC	8.6	SVC	9561.0	SVC	0.205	SVC
18	1.00	SVC	289.2	SVC	180.0	SVC	8.6	SVC	9561.0	SVC	0.213	SVC
19	1.00	SVC	288.4	SVC	332.0	SVC	8.7	SVC	9561.0	SVC	0.395	SVC
20	1.00	SVC	285.5	SVC	116.9	SVC	9.4	SVC	9561.0	SVC	0.148	SVC
21	1.00	SVC	285.9	SVC	118.4	SVC	9.0	SVC	9561.0	SVC	0.144	SVC
22	1.00	SVC	282.2	SVC	140.5	SVC	9.0	SVC	9561.0	SVC	0.171	SVC
23	1.00	SVC	264.9	SVC	79.1	SVC	9.8	SVC	9561.0	SVC	0.103	SVC

* CEM DAS reported steam rate not verified for accuracy or used by control room operators in running the boiler

----------Explanation for Status Code----------
SVC = MONITOR IN SERVICE

Daily Emission Report
For 11/4/2015

Hour	PROCESS 1-Hr Avg	Stat	STEAM FLOW KLB/HR 1-Hr Avg	Stat	CO PPM 1-Hr Avg	Stat	O2 % 1-Hr Avg	Stat	Fd FACTOR SCF/mmBTU 1-Hr Avg	Stat	CO LB/mmBTU 1-Hr Avg	Stat
0	1.00	SVC	275.7	SVC	122.0	SVC	9.7	SVC	9561.0	SVC	0.158	SVC
1	1.00	SVC	278.1	SVC	158.1	SVC	9.3	SVC	9561.0	SVC	0.198	SVC
2	1.00	SVC	276.0	SVC	137.6	SVC	9.3	SVC	9561.0	SVC	0.172	SVC
3	1.00	SVC	276.1	SVC	132.0	SVC	9.4	SVC	9561.0	SVC	0.167	SVC
4	1.00	SVC	276.3	SVC	106.3	SVC	9.6	SVC	9561.0	SVC	0.137	SVC
5	1.00	SVC	276.6	SVC	109.0	SVC	9.4	SVC	9561.0	SVC	0.138	SVC
6	1.00	SVC	276.7	SVC	111.6	SVC	9.4	SVC	9561.0	SVC	0.141	SVC
7	1.00	SVC	272.4	SVC	105.2	SVC	9.4	SVC	9561.0	SVC	0.133	SVC
8	1.00	SVC	275.2	SVC	76.3	SVC	9.9	SVC	9561.0	SVC	0.101	SVC
9	1.00	SVC	276.3	SVC	126.7	SVC	9.2	SVC	9561.0	SVC	0.157	SVC
10	1.00	SVC	276.3	SVC	177.7	SVC	9.0	SVC	9561.0	SVC	0.217	SVC
11	1.00	SVC	276.7	SVC	123.2	SVC	9.4	SVC	9561.0	SVC	0.156	SVC
12	1.00	SVC	276.5	SVC	77.0	SVC	9.8	SVC	9561.0	SVC	0.101	SVC
13	1.00	SVC	276.1	SVC	85.0	SVC	9.5	SVC	9561.0	SVC	0.108	SVC
14	1.00	SVC	276.3	SVC	91.8	SVC	9.4	SVC	9561.0	SVC	0.116	SVC
15	1.00	SVC	277.1	SVC	143.9	SVC	9.1	SVC	9561.0	SVC	0.177	SVC
16	1.00	SVC	284.7	SVC	388.5	SVC	9.0	SVC	9561.0	SVC	0.474	SVC
17	1.00	SVC	281.7	SVC	402.0	SVC	8.8	SVC	9561.0	SVC	0.482	SVC
18	1.00	SVC	276.3	SVC	342.9	SVC	9.0	SVC	9561.0	SVC	0.418	SVC
19	1.00	SVC	273.7	SVC	142.4	SVC	9.3	SVC	9561.0	SVC	0.178	SVC
20	1.00	SVC	277.8	SVC	168.9	SVC	9.2	SVC	9561.0	SVC	0.210	SVC
21	1.00	SVC	277.2	SVC	363.8	SVC	8.8	SVC	9561.0	SVC	0.437	SVC
22	1.00	SVC	272.6	SVC	327.4	SVC	9.1	SVC	9561.0	SVC	0.403	SVC
23	1.00	SVC	272.6	SVC	139.6	SVC	9.4	SVC	9561.0	SVC	0.176	SVC

* CEM DAS reported steam rate not verified for accuracy or used by control room operators in running the boiler

----------Explanation for Status Code----------

SVC = MONITOR IN SERVICE

Daily Emission Report
For 11/5/2015

Hour	PROCESS 1-Hr Avg	Stat	STEAM FLOW KLB/HR 1-Hr Avg	Stat	CO PPM 1-Hr Avg	Stat	O2 % 1-Hr Avg	Stat	Fd FACTOR SCF/mmBTU 1-Hr Avg	Stat	CO LB/mmBTU 1-Hr Avg	Stat
0	1.00	SVC	279.3	SVC	134.0	SVC	9.4	SVC	9561.0	SVC	0.169	SVC
1	1.00	SVC	280.6	SVC	178.7	SVC	9.0	SVC	9561.0	SVC	0.218	SVC
2	1.00	SVC	280.2	SVC	162.8	SVC	9.1	SVC	9561.0	SVC	0.200	SVC
3	1.00	SVC	280.7	SVC	158.2	SVC	9.1	SVC	9561.0	SVC	0.195	SVC
4	1.00	SVC	281.6	SVC	307.1	SVC	9.5	SVC	9561.0	SVC	0.391	SVC
5	1.00	SVC	278.7	SVC	136.6	SVC	9.2	SVC	9561.0	SVC	0.170	SVC
6	1.00	SVC	285.6	SVC	123.5	SVC	8.9	SVC	9561.0	SVC	0.149	SVC
7	1.00	SVC	282.3	SVC	119.5	SVC	9.0	SVC	9561.0	SVC	0.146	SVC
8	1.00	SVC	279.8	SVC	102.8	SVC	11.0	SVC	9561.0	SVC	0.151	SVC
9	1.00	SVC	284.2	SVC	129.0	SVC	9.0	SVC	9561.0	SVC	0.157	SVC
10	1.00	SVC	284.6	SVC	171.5	SVC	8.7	SVC	9561.0	SVC	0.204	SVC
11	1.00	SVC	283.8	SVC	140.0	SVC	8.8	SVC	9561.0	SVC	0.168	SVC
12	1.00	SVC	283.5	SVC	104.9	SVC	9.4	SVC	9561.0	SVC	0.132	SVC
13	1.00	SVC	283.4	SVC	116.5	SVC	8.9	SVC	9561.0	SVC	0.141	SVC
14	1.00	SVC	283.3	SVC	129.1	SVC	8.8	SVC	9561.0	SVC	0.155	SVC
15	1.00	SVC	276.8	SVC	157.7	SVC	8.8	SVC	9561.0	SVC	0.189	SVC
16	1.00	SVC	282.0	SVC	165.7	SVC	9.2	SVC	9561.0	SVC	0.206	SVC
17	1.00	SVC	281.8	SVC	172.2	SVC	8.8	SVC	9561.0	SVC	0.207	SVC
18	1.00	SVC	282.3	SVC	171.0	SVC	8.8	SVC	9561.0	SVC	0.205	SVC
19	1.00	SVC	283.2	SVC	307.1	SVC	8.7	SVC	9561.0	SVC	0.366	SVC
20	1.00	SVC	283.5	SVC	138.5	SVC	9.2	SVC	9561.0	SVC	0.172	SVC
21	1.00	SVC	281.0	SVC	139.9	SVC	8.8	SVC	9561.0	SVC	0.168	SVC
22	1.00	SVC	278.0	SVC	177.1	SVC	8.7	SVC	9561.0	SVC	0.211	SVC
23	1.00	SVC	275.4	SVC	162.9	SVC	8.9	SVC	9561.0	SVC	0.197	SVC

* CEM DAS reported steam rate not verified for accuracy or used by control room operators in running the boiler

----------Explanation for Status Code----------
SVC = MONITOR IN SERVICE

Steam & Controls
L'Anse Warden

Created: 11/04/15 00:05
EU BOILER # 1

Daily Opacity Report
For 11/3/2015

Hour	Opac. % Minutes 0 - 5	Opac. % Minutes 6 - 11	Opac. % Minutes 12 - 17	Opac. % Minutes 18 - 23	Opac. % Minutes 24 - 29	Opac. % Minutes 30 - 35	Opac. % Minutes 36 - 41	Opac. % Minutes 42 - 47	Opac. % Minutes 48 - 53	Opac. % Minutes 54 - 59
0	2.3 SVC	2.3 SVC	2.5 SVC	2.4 SVC	2.5 SVC	2.9 SVC	2.4 SVC	2.1 SVC	2.5 SVC	3.2 SVC
1	2.4 SVC	2.2 SVC	2.4 SVC	2.2 SVC	2.9 SVC	2.7 SVC	2.5 SVC	2.4 SVC	2.6 SVC	2.2 SVC
2	2.2 SVC	2.3 SVC	2.4 SVC	2.8 SVC	2.1 SVC	2.1 SVC	2.2 SVC	2.3 SVC	2.1 SVC	2.3 SVC
3	1.9 SVC	1.8 SVC	3.6 SVC	1.9 SVC	2.1 SVC	2.1 SVC	2.4 SVC	1.9 SVC	1.9 SVC	1.9 SVC
4	2.2 SVC	2.9 SVC	3.7 SVC	2.0 SVC	2.7 SVC	2.1 SVC	2.6 SVC	2.0 SVC	2.2 SVC	2.5 SVC
5	2.7 SVC	2.1 SVC	2.3 SVC	2.7 SVC	2.5 SVC	2.3 SVC	2.3 SVC	2.3 SVC	2.6 SVC	3.1 SVC
6	2.5 SVC	2.2 SVC	2.7 SVC	2.4 SVC	2.3 SVC	2.3 SVC	2.2 SVC	2.7 SVC	2.1 SVC	2.1 SVC
7	2.2 SVC	2.7 SVC	2.5 SVC	2.4 SVC	2.2 SVC	2.2 SVC	2.9 SVC	2.2 SVC	2.1 SVC	2.2 SVC
8	2.2 SVC	2.4 SVC	2.4 SVC	2.3 SVC	2.2 SVC	3.5 SVC	1.9 SVC	2.1 SVC	2.3 SVC	2.5 SVC
9	2.3 SVC	2.3 SVC	2.3 SVC	2.7 SVC	3.1 SVC	2.5 SVC	2.3 SVC	2.4 SVC	2.2 SVC	2.1 SVC
10	2.1 SVC	2.0 SVC	2.6 SVC	2.4 SVC	2.0 SVC	2.4 SVC	3.1 SVC	2.4 SVC	2.0 SVC	1.9 SVC
11	1.9 SVC	2.3 SVC	2.5 SVC	2.5 SVC	2.2 SVC	2.3 SVC	2.2 SVC	2.6 SVC	1.9 SVC	1.8 SVC
12	2.3 SVC	9.4 NSA	2.0 SVC	2.2 SVC	2.3 SVC	1.9 SVC	1.8 SVC	1.7 SVC	1.8 SVC	2.5 SVC
13	1.9 SVC	1.7 SVC	2.1 SVC	2.2 SVC	1.8 SVC	1.8 SVC	1.8 SVC	2.0 SVC	2.4 SVC	1.9 SVC
14	2.0 SVC	2.1 SVC	2.4 SVC	2.6 SVC	2.0 SVC	1.9 SVC	1.9 SVC	2.4 SVC	1.8 SVC	2.1 SVC
15	1.9 SVC	2.2 SVC	1.7 SVC	2.0 SVC	1.8 SVC	2.1 SVC	2.2 SVC	2.0 SVC	2.2 SVC	2.7 SVC
16	2.1 SVC	1.9 SVC	2.1 SVC	2.3 SVC	2.1 SVC	2.1 SVC	2.0 SVC	2.2 SVC	2.6 SVC	2.1 SVC
17	1.9 SVC	1.8 SVC	1.7 SVC	2.7 SVC	2.1 SVC	2.1 SVC	2.0 SVC	2.4 SVC	1.9 SVC	2.0 SVC
18	1.9 SVC	1.8 SVC	2.7 SVC	2.4 SVC	1.8 SVC	2.2 SVC	2.3 SVC	2.4 SVC	2.0 SVC	2.1 SVC
19	1.9 SVC	2.9 SVC	2.0 SVC	2.1 SVC	2.3 SVC	2.1 SVC	2.2 SVC	2.2 SVC	2.3 SVC	2.0 SVC
20	2.4 SVC	1.7 SVC	1.8 SVC	2.5 SVC	2.2 SVC	1.9 SVC	1.9 SVC	1.8 SVC	2.6 SVC	2.8 SVC
21	2.0 SVC	2.2 SVC	2.4 SVC	2.9 SVC	1.9 SVC	1.9 SVC	1.9 SVC	2.3 SVC	2.2 SVC	1.9 SVC
22	1.9 SVC	2.0 SVC	2.1 SVC	2.1 SVC	1.8 SVC	1.8 SVC	2.5 SVC	1.9 SVC	2.0 SVC	2.1 SVC
23	1.9 SVC	1.6 SVC	1.8 SVC	2.1 SVC	1.6 SVC	2.6 SVC	1.9 SVC	2.0 SVC	1.9 SVC	1.9 SVC

The average opacity period average for the day was 2.2% for 239 periods of valid data.

The Fan was in operation for 240 periods.

The maximum opacity period average for the day was 3.7%.

There was 1 period of invalid data.

Status Code Definitions

NSA = NO SAMPLE AVAILABLE

SVC = MONITOR IN SERVICE

Steam & Controls
L'Anse Warden

Created: 11/05/15 00:05
EU BOILER # 1

Daily Opacity Report
For 11/4/2015

Hour	Opac. % Minutes 0 - 5	Opac. % Minutes 6 - 11	Opac. % Minutes 12 - 17	Opac. % Minutes 18 - 23	Opac. % Minutes 24 - 29	Opac. % Minutes 30 - 35	Opac. % Minutes 36 - 41	Opac. % Minutes 42 - 47	Opac. % Minutes 48 - 53	Opac. % Minutes 54 - 59
0	1.7 SVC	1.7 SVC	1.8 SVC	2.5 SVC	2.5 SVC	1.9 SVC	1.8 SVC	2.2 SVC	2.0 SVC	1.8 SVC
1	2.2 SVC	1.9 SVC	2.0 SVC	2.9 SVC	1.9 SVC	2.1 SVC	2.7 SVC	2.1 SVC	1.8 SVC	1.8 SVC
2	1.7 SVC	1.9 SVC	2.1 SVC	2.3 SVC	1.8 SVC	2.0 SVC	1.8 SVC	1.7 SVC	1.8 SVC	1.9 SVC
3	2.0 SVC	2.1 SVC	1.7 SVC	2.4 SVC	2.0 SVC	2.2 SVC	1.8 SVC	1.8 SVC	1.8 SVC	2.3 SVC
4	2.1 SVC	1.8 SVC	1.8 SVC	2.2 SVC	2.0 SVC	2.0 SVC	2.0 SVC	1.8 SVC	2.7 SVC	2.1 SVC
5	2.1 SVC	2.4 SVC	2.4 SVC	3.6 SVC	2.6 SVC	2.0 SVC	2.1 SVC	2.7 SVC	2.1 SVC	2.0 SVC
6	2.5 SVC	2.2 SVC	2.2 SVC	2.2 SVC	1.8 SVC	2.1 SVC	2.5 SVC	1.9 SVC	2.0 SVC	2.0 SVC
7	2.2 SVC	2.1 SVC	2.1 SVC	2.4 SVC	2.8 SVC	2.5 SVC	2.1 SVC	2.2 SVC	2.1 SVC	2.0 SVC
8	1.9 SVC	2.1 SVC	2.1 SVC	2.2 SVC	2.7 SVC	2.3 SVC	2.5 SVC	2.3 SVC	2.1 SVC	2.1 SVC
9	2.0 SVC	2.1 SVC	2.9 SVC	2.7 SVC	2.2 SVC	2.2 SVC	2.4 SVC	2.4 SVC	2.8 SVC	2.4 SVC
10	2.1 SVC	2.5 SVC	2.0 SVC	2.0 SVC	2.4 SVC	2.3 SVC	1.9 SVC	2.0 SVC	2.2 SVC	2.5 SVC
11	3.8 SVC	3.2 SVC	2.4 SVC	2.3 SVC	2.5 SVC	2.3 SVC	2.1 SVC	2.4 SVC	2.2 SVC	3.0 SVC
12	2.4 SVC	SPN	3.7 SVC	3.4 SVC	3.7 SVC	2.3 SVC	2.1 SVC	2.6 SVC	2.5 SVC	2.8 SVC
13	3.3 SVC	3.9 SVC	2.9 SVC	2.1 SVC	2.5 SVC	2.7 SVC	3.7 SVC	2.9 SVC	2.5 SVC	2.3 SVC
14	3.1 SVC	2.7 SVC	2.9 SVC	2.4 SVC	5.1 SVC	3.1 SVC	3.0 SVC	2.5 SVC	3.1 SVC	2.4 SVC
15	2.2 SVC	2.0 SVC	2.3 SVC	2.4 SVC	4.1 SVC	2.4 SVC	2.1 SVC	1.8 SVC	2.2 SVC	2.0 SVC
16	2.0 SVC	2.1 SVC	2.3 SVC	3.1 SVC	2.4 SVC	2.1 SVC	2.3 SVC	2.6 SVC	1.9 SVC	2.0 SVC
17	1.8 SVC	1.8 SVC	2.3 SVC	2.0 SVC	3.5 SVC	2.7 SVC	2.2 SVC	2.0 SVC	1.8 SVC	1.8 SVC
18	1.9 SVC	2.1 SVC	1.9 SVC	2.1 SVC	2.7 SVC	2.4 SVC	1.9 SVC	1.8 SVC	1.8 SVC	2.1 SVC
19	2.0 SVC	2.3 SVC	1.8 SVC	1.8 SVC	2.5 SVC	2.2 SVC	2.2 SVC	2.3 SVC	2.3 SVC	2.0 SVC
20	1.7 SVC	1.8 SVC	2.2 SVC	2.2 SVC	2.4 SVC	2.0 SVC	2.0 SVC	2.4 SVC	2.0 SVC	1.8 SVC
21	1.9 SVC	2.2 SVC	1.8 SVC	1.8 SVC	1.8 SVC	1.7 SVC	2.3 SVC	1.7 SVC	2.0 SVC	2.0 SVC
22	2.2 SVC	2.1 SVC	2.0 SVC	1.9 SVC	2.9 SVC	3.3 SVC	2.1 SVC	2.2 SVC	2.5 SVC	2.3 SVC
23	1.8 SVC	1.8 SVC	1.8 SVC	2.3 SVC	2.2 SVC	1.9 SVC	2.2 SVC	2.1 SVC	2.0 SVC	2.0 SVC

The average opacity period average for the day was 2.3% for 239 periods of valid data.

The Fan was in operation for 240 periods.

The maximum opacity period average for the day was 5.1%.

There was 1 period of invalid data.

Status Code Definitions

SPN = SPAN CALIBRATION

SVC = MONITOR IN SERVICE

Steam & Controls
L'Anse Warden

Created: 11/06/15 00:05
EU BOILER # 1

Daily Opacity Report
For 11/5/2015

Hour	Opac. % Minutes 0 - 5	Opac. % Minutes 6 - 11	Opac. % Minutes 12 - 17	Opac. % Minutes 18 - 23	Opac. % Minutes 24 - 29	Opac. % Minutes 30 - 35	Opac. % Minutes 36 - 41	Opac. % Minutes 42 - 47	Opac. % Minutes 48 - 53	Opac. % Minutes 54 - 59
0	2.1 SVC	1.9 SVC	2.6 SVC	2.0 SVC	2.3 SVC	2.1 SVC	2.0 SVC	1.8 SVC	2.0 SVC	1.8 SVC
1	1.9 SVC	2.2 SVC	2.0 SVC	1.8 SVC	2.3 SVC	2.0 SVC	2.0 SVC	1.8 SVC	1.8 SVC	1.9 SVC
2	2.5 SVC	1.9 SVC	2.0 SVC	2.0 SVC	2.6 SVC	2.1 SVC	1.9 SVC	1.9 SVC	2.1 SVC	2.4 SVC
3	2.1 SVC	2.0 SVC	2.2 SVC	2.0 SVC	2.1 SVC	2.1 SVC	1.9 SVC	2.2 SVC	2.1 SVC	2.0 SVC
4	2.1 SVC	2.3 SVC	1.9 SVC	2.0 SVC	2.0 SVC	1.8 SVC	2.3 SVC	2.0 SVC	1.8 SVC	2.0 SVC
5	2.3 SVC	2.0 SVC	2.0 SVC	1.9 SVC	1.9 SVC	2.8 SVC	1.8 SVC	1.9 SVC	1.9 SVC	1.9 SVC
6	1.9 SVC	2.0 SVC	2.0 SVC	2.0 SVC	2.4 SVC	1.8 SVC	1.9 SVC	1.9 SVC	2.0 SVC	1.8 SVC
7	1.7 SVC	1.7 SVC	1.8 SVC	2.1 SVC	1.7 SVC	1.9 SVC	2.1 SVC	1.8 SVC	1.8 SVC	1.9 SVC
8	1.8 SVC	1.9 SVC	2.3 SVC	2.0 SVC	1.9 SVC	2.1 SVC	1.9 SVC	1.8 SVC	1.8 SVC	1.7 SVC
9	2.3 SVC	1.9 SVC	1.9 SVC	2.0 SVC	2.4 SVC	2.1 SVC	1.9 SVC	1.8 SVC	2.1 SVC	2.4 SVC
10	2.0 SVC	2.1 SVC	2.3 SVC	2.4 SVC	2.2 SVC	2.1 SVC	1.9 SVC	2.1 SVC	2.8 SVC	2.0 SVC
11	2.0 SVC	2.0 SVC	2.1 SVC	2.0 SVC	1.9 SVC	2.1 SVC	1.8 SVC	2.7 SVC	1.9 SVC	2.1 SVC
12	2.3 SVC	22.0 NSA	2.0 SVC	1.9 SVC	1.8 SVC	2.3 SVC	2.5 SVC	2.0 SVC	2.1 SVC	2.3 SVC
13	2.2 SVC	2.1 SVC	2.1 SVC	2.1 SVC	2.4 SVC	2.5 SVC	2.1 SVC	2.1 SVC	2.0 SVC	1.9 SVC
14	1.8 SVC	2.0 SVC	1.8 SVC	2.3 SVC	2.2 SVC	2.4 SVC	2.0 SVC	2.0 SVC	1.9 SVC	1.7 SVC
15	1.9 SVC	2.0 SVC	2.3 SVC	1.9 SVC	1.9 SVC	2.1 SVC	2.1 SVC	2.2 SVC	3.1 SVC	2.6 SVC
16	2.0 SVC	2.6 SVC	2.1 SVC	2.0 SVC	2.0 SVC	2.1 SVC	1.9 SVC	1.9 SVC	1.9 SVC	1.9 SVC
17	2.4 SVC	1.9 SVC	2.0 SVC	2.2 SVC	2.5 SVC	1.9 SVC	1.9 SVC	1.8 SVC	1.8 SVC	2.2 SVC
18	2.0 SVC	1.9 SVC	2.0 SVC	1.9 SVC	1.9 SVC	1.8 SVC	1.8 SVC	2.4 SVC	2.8 SVC	1.9 SVC
19	1.8 SVC	2.0 SVC	2.0 SVC	1.9 SVC	1.9 SVC	2.0 SVC	2.2 SVC	2.0 SVC	1.9 SVC	2.0 SVC
20	2.4 SVC	1.9 SVC	2.0 SVC	1.8 SVC	1.9 SVC	2.5 SVC	2.0 SVC	1.9 SVC	1.9 SVC	2.1 SVC
21	2.1 SVC	1.9 SVC	1.8 SVC	1.8 SVC	2.3 SVC	2.0 SVC	2.0 SVC	2.1 SVC	2.3 SVC	1.9 SVC
22	1.9 SVC	2.1 SVC	2.1 SVC	2.7 SVC	2.0 SVC	2.0 SVC	2.3 SVC	2.3 SVC	2.0 SVC	2.1 SVC
23	1.7 SVC	1.8 SVC	2.3 SVC	2.2 SVC	2.0 SVC	2.2 SVC	2.1 SVC	1.9 SVC	1.8 SVC	1.8 SVC

The average opacity period average for the day was 2.0% for 239 periods of valid data.

The Fan was in operation for 240 periods.

The maximum opacity period average for the day was 3.1%.

There was 1 period of invalid data.

Status Code Definitions

NSA = NO SAMPLE AVAILABLE SVC = MONITOR IN SERVICE

APPENDIX D
LABORATORY RESULTS

SEPTEMBER TEST PROGRAM

Maxxam
A Bureau Veritas Group Company

Your Project #: LWEC, L'ANSE, MI

Attention:Ken Hill

Weston Solutions Inc
1400 Weston Way
West Chester, PA
USA 19380

Report Date: 2015/10/19
Report #: R3725827
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B5K2062
Received: 2015/10/02, 23:55

Sample Matrix: Stack Sampling Train
Samples Received: 29

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Anions in Water by Ion Chromatography (1)	1	N/A	2015/10/08	BRL SOP-00105	EPA 300.0 m
Extractable Condensables (M202)	7	2015/10/09	2015/10/16	BRL SOP-00118	EPA 202 m
Non Extractable Condensibles (M202)	6	2015/10/14	2015/10/19	BRL SOP-00118 / BRL SOP-00109	EPA 202 m
Hydrogen Halides in H2SO4 Imp.	5	2015/10/08	2015/10/08	BRL SOP-00108	EPA 26A m
>10um Particulates in Rinse	3	2015/10/08	2015/10/15	BRL SOP-00109	EPA M201A/OTM-027 m
2.5-10um Particulates in Rinse	3	2015/10/08	2015/10/15	BRL SOP-00109	EPA M201A/OTM-027 m
2.5 um Particulates on Filter	4	N/A	2015/10/09	BRL SOP-00109	EPA M201A/OTM-027 m
Particulates/Acetone Rinse (M5/315/M201)	5	2015/10/08	2015/10/15	BRL SOP-00109	EPA 5/315 m
Particulates/Filter (M5/315/NJATM1/M201)	4	N/A	2015/10/08	BRL SOP-00109	EPA 5/315/NJATM1 m
Lead in Filter by ICPMS (M12mod) (2)	7	2015/10/13	2015/10/14	BRL SOP-00103	EPA 12 m
Final Volume of Acetone Probe Rinse	8	N/A	2015/10/14	BRL SOP-00109	
Volume of Sulfuric Acid Impinger	5	N/A	2015/10/08		
Weight of Solvent from Impingers	6	N/A	2015/10/16		
Weight of Water from Impingers	5	N/A	2015/10/16		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) SCC/CAEAL
(2) EPA Method 12 Modification - The analysis for the lead was completed using ICPMS instead of flame AA.

Encryption Key

Clayton Johnson
19 Oct 2015 17:44:01 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

EPA M12 - LEAD DETERMINATION BY ICPMS (STACK SAMPLING TRAIN)

Maxxam ID		BCJ099	BCJ106		BCJ107	BCJ107	BCJ108			
Sampling Date		2015/09/23	2015/09/23		2015/09/23	2015/09/23	2015/09/24			
	UNITS	**M12-BLANK-FILTER**	**M12-BLANK-HNO3**	**RDL**	**M12-R1**	**M12-R1 Lab-Dup**	**M12-R2**	**RDL**	**MDL**	**QC Batch**
Inorganic Lead (Pb)	ug	<0.2	<0.2	0.2	15.9	15.6	9.6	0.5	N/A	4227244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		BCJ109			
Sampling Date		2015/09/24			
	UNITS	**M12-R3**	**RDL**	**MDL**	**QC Batch**
Inorganic Lead (Pb)	ug	5.3	0.5	N/A	4227244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

EPA M201A - PARTICULATES (STACK SAMPLING TRAIN)

Maxxam ID		BCM093	BCM158	BCM159	BCM160			
Sampling Date		2015/09/24	2015/09/24	2015/09/24	2015/09/24			
	UNITS	**M201A-SB-FILTER**	**M201A-R1**	**M201A-R2**	**M201A-R3**	**RDL**	**MDL**	**QC Batch**
> 10 Particulate Weight in Acetone Rinse	mg	N/A	5.3	5.0	6.6	0.5	0.1	4222791
2.5 - 10 Particulate Weight in Acetone Rinse	mg	N/A	2.3	1.5	1.9	0.5	0.5	4222788
< 2.5 Particulate Weight on Filter	mg	0.60	5.50	4.50	5.00	0.30	0.30	4222784

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam
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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

EPA M202 CONDENSIBLE PM (STACK SAMPLING TRAIN)

Maxxam ID		BCM170	BCM209	BCM217	BCM218	BCM221	BCM222			
Sampling Date		2015/09/24	2015/09/24	2015/09/24	2015/09/24	2015/09/24	2015/09/24			
	UNITS	**M202-BT**	**M202-SB-DI**	**M202/201A-SB-ACE**	**M202-SB-HEX**	**M202-R1**	**M202-R2**	**RDL**	**MDL**	**QC Batch**
Weight	g	220	380	N/A	N/A	190	180	0.1	0.1	4226558
Weight of Solvent	g	160	N/A	150	250	130	110	0.1	N/A	4226551
Inorganic Condensibles	mg	1.1	<0.5	N/A	N/A	6.1	5.2	0.5	0.1	4228971
Organic Condensibles	mg	<1.0	N/A	<1.0	<1.0	<1.0	<1.0	1.0	0.20	4226510

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		BCM223			
Sampling Date		2015/09/24			
	UNITS	**M202-R3**	**RDL**	**MDL**	**QC Batch**
Weight	g	180	0.1	0.1	4226558
Weight of Solvent	g	140	0.1	N/A	4226551
Inorganic Condensibles	mg	8.2	0.5	0.1	4228971
Organic Condensibles	mg	<1.0	1.0	0.20	4226510

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

EPA M26A HYDROGEN HALIDES AND HALOGENS (STACK SAMPLING TRAIN)

Maxxam ID		BCI790	BCI791	BCI794	BCI794			
Sampling Date		2015/09/24	2015/09/24	2015/09/24	2015/09/24			
	UNITS	**M26A-H2SO4-BLANK**	**M26A-DI H2O -BLANK**	**M26A-H2SO4-R1**	**M26A-H2SO4-R1 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	431	395	489	N/A	1	1	4223418
Hydrochloric Acid	ug	<250	<250	17000	17000	250	75	4223423

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		BCI795	BCI796			
Sampling Date		2015/09/24	2015/09/24			
	UNITS	**M26A-H2SO4-R2**	**M26A-H2SO4-R3**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	482	564	1	1	4223418
Hydrochloric Acid	ug	28000	20000	250	75	4223423

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam
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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

EPA M5 PARTICULATE MATTER (PM)

Maxxam ID		BCI786	BCI787	BCI788	BCI789			
Sampling Date		2015/09/24	2015/09/24	2015/09/24	2015/09/24			
	UNITS	**M5-SB**	**M5-R1**	**M5-R2**	**M5-R3**	**RDL**	**MDL**	**QC Batch**
Acetone Rinse Particulate Weight in Acetone Rinse	mg	<0.5	2.9	1.2	5.6	0.5	0.1	4222712
Front Half Particulate Weight on Filter	mg	0.30	3.50	4.70	6.20	0.30	0.060	4222711
Acetone Rinse Volume	ml	250	300	300	320	1	1	4222716

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam
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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		BCI829	BCM158	BCM159	BCM160			
Sampling Date			2015/09/24	2015/09/24	2015/09/24			
	UNITS	**AUDIT-PEA1941**	**M201A-R1**	**M201A-R2**	**M201A-R3**	**RDL**	**MDL**	**QC Batch**
Acetone Rinse Volume (10)	ml	N/A	85	67	82	1	N/A	4226736
Acetone Rinse Volume (2.5 - 10)	ml	N/A	330	350	320	1	N/A	4226736
Chloride (Cl)	mg/L	24	N/A	N/A	N/A	0.3	0.06	4224757

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		BCM217	BCM219			
Sampling Date		2015/09/24	2015/09/24			
	UNITS	**M202/201A-SB-ACE**	**M202-SB-FILT**	**RDL**	**MDL**	**QC Batch**
Acetone Rinse Particulate Weight in Acetone Rinse	mg	<0.5	N/A	0.5	0.1	4231099
Acetone Rinse Volume	ml	100	N/A	1	1	4226736
Inorganic Condensibles	mg	N/A	<0.5	0.5	0.1	4228971
Organic Condensibles	mg	N/A	<1.0	1.0	0.20	4226510

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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ELEMENTS BY ICP/MS (STACK SAMPLING TRAIN)

Maxxam ID		BCL977		BCL981			
Sampling Date							
	UNITS	**AUDIT-PEA1945**	**RDL**	**AUDIT-PEA1948**	**RDL**	**MDL**	**QC Batch**
Inorganic Lead (Pb)	ug	21.2	0.5	0.209	0.005	N/A	4227244

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BCI786
Sample ID: M5-SB
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4222712	2015/10/08	2015/10/15	Mohammad Tariq
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4222711	N/A	2015/10/08	Brenda Moore
Final Volume of Acetone Probe Rinse		4222716	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCI787
Sample ID: M5-R1
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4222712	2015/10/08	2015/10/15	Mohammad Tariq
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4222711	N/A	2015/10/08	Brenda Moore
Final Volume of Acetone Probe Rinse		4222716	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCI788
Sample ID: M5-R2
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4222712	2015/10/08	2015/10/15	Mohammad Tariq
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4222711	N/A	2015/10/08	Brenda Moore
Final Volume of Acetone Probe Rinse		4222716	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCI789
Sample ID: M5-R3
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4222712	2015/10/08	2015/10/15	Mohammad Tariq
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4222711	N/A	2015/10/08	Brenda Moore
Final Volume of Acetone Probe Rinse		4222716	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCI790
Sample ID: M26A-H2SO4-BLANK
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4223423	2015/10/08	2015/10/08	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4223418	N/A	2015/10/08	Frank Mo

Maxxam ID: BCI791
Sample ID: M26A-DI H2O -BLANK
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4223423	2015/10/08	2015/10/08	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4223418	N/A	2015/10/08	Frank Mo

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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BCI794
Sample ID: M26A-H2SO4-R1
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4223423	2015/10/08	2015/10/08	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4223418	N/A	2015/10/08	Frank Mo

Maxxam ID: BCI794 Dup
Sample ID: M26A-H2SO4-R1
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4223423	2015/10/08	2015/10/08	Ann-Marie Stern

Maxxam ID: BCI795
Sample ID: M26A-H2SO4-R2
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4223423	2015/10/08	2015/10/08	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4223418	N/A	2015/10/08	Frank Mo

Maxxam ID: BCI796
Sample ID: M26A-H2SO4-R3
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4223423	2015/10/08	2015/10/08	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4223418	N/A	2015/10/08	Frank Mo

Maxxam ID: BCI829
Sample ID: AUDIT-PEA1941
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Anions in Water by Ion Chromatography	IC/EC	4224757	N/A	2015/10/08	Ann-Marie Stern

Maxxam ID: BCJ099
Sample ID: M12-BLANK-FILTER
Matrix: Stack Sampling Train

Collected: 2015/09/23
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCJ106
Sample ID: M12-BLANK-HNO3
Matrix: Stack Sampling Train

Collected: 2015/09/23
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

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TEST SUMMARY

Maxxam ID: BCJ107
Sample ID: M12-R1
Matrix: Stack Sampling Train

Collected: 2015/09/23
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCJ107 Dup
Sample ID: M12-R1
Matrix: Stack Sampling Train

Collected: 2015/09/23
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCJ108
Sample ID: M12-R2
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCJ109
Sample ID: M12-R3
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCL977
Sample ID: AUDIT-PEA1945
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCL981
Sample ID: AUDIT-PEA1948
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lead in Filter by ICPMS (M12mod)	ICP1	4227244	2015/10/13	2015/10/14	Nan Raykha

Maxxam ID: BCM093
Sample ID: M201A-SB-FILTER
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
2.5 um Particulates on Filter	BAL	4222784	N/A	2015/10/09	Brenda Moore

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TEST SUMMARY

Maxxam ID: BCM158
Sample ID: M201A-R1
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
>10um Particulates in Rinse	BAL	4222791	2015/10/08	2015/10/15	Mohammad Tariq
2.5-10um Particulates in Rinse	BAL	4222788	2015/10/08	2015/10/15	Mohammad Tariq
2.5 um Particulates on Filter	BAL	4222784	N/A	2015/10/09	Brenda Moore
Final Volume of Acetone Probe Rinse		4226736	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCM159
Sample ID: M201A-R2
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
>10um Particulates in Rinse	BAL	4222791	2015/10/08	2015/10/15	Mohammad Tariq
2.5-10um Particulates in Rinse	BAL	4222788	2015/10/08	2015/10/15	Mohammad Tariq
2.5 um Particulates on Filter	BAL	4222784	N/A	2015/10/09	Brenda Moore
Final Volume of Acetone Probe Rinse		4226736	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCM160
Sample ID: M201A-R3
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
>10um Particulates in Rinse	BAL	4222791	2015/10/08	2015/10/15	Mohammad Tariq
2.5-10um Particulates in Rinse	BAL	4222788	2015/10/08	2015/10/15	Mohammad Tariq
2.5 um Particulates on Filter	BAL	4222784	N/A	2015/10/09	Brenda Moore
Final Volume of Acetone Probe Rinse		4226736	N/A	2015/10/14	Mohammad Tariq

Maxxam ID: BCM170
Sample ID: M202-BT
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	4228971	2015/10/14	2015/10/19	Muhammad M Rahman
Weight of Solvent from Impingers		4226551	N/A	2015/10/16	Muhammad M Rahman
Weight of Water from Impingers		4226558	N/A	2015/10/16	Muhammad M Rahman

Maxxam ID: BCM209
Sample ID: M202-SB-DI
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Non Extractable Condensibles (M202)	BAL	4228971	2015/10/14	2015/10/19	Muhammad M Rahman
Weight of Water from Impingers		4226558	N/A	2015/10/16	Muhammad M Rahman

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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BCM217
Sample ID: M202/201A-SB-ACE
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman
Particulates/Acetone Rinse (M5/315/M201)	BAL	4231099	2015/10/08	2015/10/15	Mohammad Tariq
Final Volume of Acetone Probe Rinse		4226736	N/A	2015/10/14	Mohammad Tariq
Weight of Solvent from Impingers		4226551	N/A	2015/10/16	Muhammad M Rahman

Maxxam ID: BCM218
Sample ID: M202-SB-HEX
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman
Weight of Solvent from Impingers		4226551	N/A	2015/10/16	Muhammad M Rahman

Maxxam ID: BCM219
Sample ID: M202-SB-FILT
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	4228971	2015/10/14	2015/10/19	Muhammad M Rahman

Maxxam ID: BCM221
Sample ID: M202-R1
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	4228971	2015/10/14	2015/10/19	Muhammad M Rahman
Weight of Solvent from Impingers		4226551	N/A	2015/10/16	Muhammad M Rahman
Weight of Water from Impingers		4226558	N/A	2015/10/16	Muhammad M Rahman

Maxxam ID: BCM222
Sample ID: M202-R2
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman
Non Extractable Condensibles (M202)	BAL	4228971	2015/10/14	2015/10/19	Muhammad M Rahman
Weight of Solvent from Impingers		4226551	N/A	2015/10/16	Muhammad M Rahman
Weight of Water from Impingers		4226558	N/A	2015/10/16	Muhammad M Rahman

Maxxam ID: BCM223
Sample ID: M202-R3
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Extractable Condensables (M202)	BAL	4226510	2015/10/09	2015/10/16	Muhammad M Rahman

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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BCM223
Sample ID: M202-R3
Matrix: Stack Sampling Train

Collected: 2015/09/24
Shipped:
Received: 2015/10/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Non Extractable Condensibles (M202)	BAL	4228971	2015/10/14	2015/10/19	Muhammad M Rahman
Weight of Solvent from Impingers		4226551	N/A	2015/10/16	Muhammad M Rahman
Weight of Water from Impingers		4226558	N/A	2015/10/16	Muhammad M Rahman

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GENERAL COMMENTS

FILTERS : Untared filters were received.

Sample BCI787-01 : LFT Loose filter material in the petri dish

Sample BCI788-01 : LFT Loose filter material in the petri dish

Sample BCI789-01 : LFT Loose filter material in the petri dish

Sample BCL981-01 : Data for this sample is reported in mg/l

Sample BCM170-01 : Organic Extraction : No residue noted in vial.
ORGANIC EXTRACTION : Whitish residue found in vial.

Sample BCM209-01 : ORGANIC EXTRACTION : Whitish residue found in vial.

Sample BCM217-01 : Organic Extraction : No residue noted in vial.

Sample BCM218-01 : Organic Extraction : No residue noted in vial.

Sample BCM219-01 : Organic Extraction : No residue noted in vial.
ORGANIC EXTRACTION : Whitish residue found in vial.

Sample BCM221-01 : ORGANIC EXTRACTION : Oily material found in vial.
ORGANIC EXTRACTION : Yellowish residue found in vial.

Sample BCM222-01 : ORGANIC EXTRACTION : Whitish residue found in vial.
ORGANIC EXTRACTION : Yellowish residue found in vial.

Sample BCM223-01 : ORGANIC EXTRACTION : Oily material found in vial.
ORGANIC EXTRACTION : Brownish residue found in vial.

EPA M12 - LEAD DETERMINATION BY ICPMS (STACK SAMPLING TRAIN)

Lead in Filter by ICPMS (M12mod): Post digestion duplicate and spike were done on sample BCJ107.

EPA M201A - PARTICULATES (STACK SAMPLING TRAIN)

2.5 um Particulates on Filter: Maxxam #	Filter Condition
BCM093-01R	NORMAL
BCM158-01R	*DE**LFT*
BCM159-01R	LPC
BCM160-01R	*DE**LFT*

Normal Filters received in normal condition
LPC Loose particulate material in the petri dish
LFT Loose filter material in the petri dish
DE Edges of the filter are frayed

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GENERAL COMMENTS

EPA M5 PARTICULATE MATTER (PM)

Particulates/Filter (M5/315/NJATM1/M201): Maxxam #	Filter Condition
BCI786-01R	NORMAL
BCI787-01R	LFT
BCI788-01R	LFT
BCI789-01R	LFT

Normal Filters received in normal condition
LFT Loose filter material in the petri dish

ELEMENTS BY ICP/MS (STACK SAMPLING TRAIN)

Lead in Filter by ICPMS (M12mod): Post digestion duplicate and spike were done on sample BCJ107.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4222712	MT2	Method Blank	Acetone Rinse Particulate Weight in Acetone	2015/10/15	<0.5		mg	
4222788	MT2	Method Blank	2.5 - 10 Particulate Weight in Acetone Rinse	2015/10/15	<0.5		mg	
4222791	MT2	Method Blank	> 10 Particulate Weight in Acetone Rinse	2015/10/15	<0.5		mg	
4223423	A_S	Matrix Spike(BCI794)	Hydrochloric Acid	2015/10/08		88	%	80 - 120
4223423	A_S	Spiked Blank	Hydrochloric Acid	2015/10/08		101	%	90 - 110
4223423	A_S	Method Blank	Hydrochloric Acid	2015/10/08	<200		ug	
4223423	A_S	RPD - Sample/Sample Dup	Hydrochloric Acid	2015/10/08	0.51		%	20
4226510	MOR	Spiked Blank	Organic Condensibles	2015/10/16		95	%	70 - 130
4226510	MOR	Spiked Blank DUP	Organic Condensibles	2015/10/16		96	%	70 - 130
4226510	MOR	RPD	Organic Condensibles	2015/10/16	0.52		%	20
4226510	MOR	Method Blank	Organic Condensibles	2015/10/16	<1.0		mg	
4227244	N_R	Matrix Spike(BCJ107)	Inorganic Lead (Pb)	2015/10/14		96	%	70 - 130
4227244	N_R	Matrix Spike DUP(BCJ107)	Inorganic Lead (Pb)	2015/10/14		97	%	70 - 130
4227244	N_R	MS/MSD RPD	Inorganic Lead (Pb)	2015/10/14	1.0		%	20
4227244	N_R	Spiked Blank	Inorganic Lead (Pb)	2015/10/14		102	%	85 - 115
4227244	N_R	Spiked Blank DUP	Inorganic Lead (Pb)	2015/10/14		102	%	85 - 115
4227244	N_R	RPD	Inorganic Lead (Pb)	2015/10/14	0.52		%	20
4227244	N_R	Method Blank	Inorganic Lead (Pb)	2015/10/14	<0.5		ug	
4227244	N_R	RPD - Sample/Sample Dup	Inorganic Lead (Pb)	2015/10/14	1.6		%	20
4228971	MOR	Method Blank	Inorganic Condensibles	2015/10/19	<0.5		mg	
4231099	MT2	Method Blank	Acetone Rinse Particulate Weight in Acetone	2015/10/15	<0.5		mg	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Maxxam Job #: B5K2062
Report Date: 2015/10/19

Weston Solutions Inc
Client Project #: LWEC, L'ANSE, MI

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brenda Moore

Brenda Moore, Team Lead

Frank Mo, B.Sc., Inorganic Lab. Manager

Ralph Siebert, Operations Manager - Inorganic Analyses

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NOVEMBER TEST PROGRAM

Maxxam
A Bureau Veritas Group Company

Your Project #: 14464
Site Location: LWEC, L'ANSE, MI

Attention:Ken Hill

Weston Solutions Inc
1400 Weston Way
West Chester, PA
USA 19380

Report Date: 2015/11/18
Report #: R3773862
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B5M6029
Received: 2015/11/04, 14:42

Sample Matrix: Stack Sampling Train
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Hydrogen Halides in H2SO4 Imp.	2	2015/11/18	2015/11/18	BRL SOP-00108	EPA 26A m
Volume of Sulfuric Acid Impinger	2	N/A	2015/11/04		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Encryption Key

Clayton Johnson
18 Nov 2015 18:43:29 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

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Maxxam Job #: B5M6029
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

EPA M26A HYDROGEN HALIDES AND HALOGENS (STACK SAMPLING TRAIN)

Maxxam ID		BHD014	BHD015	BHD015			
Sampling Date							
	UNITS	**M26A-SB-DIH2O**	**M26A-STK-1**	**M26A-STK-1 Lab-Dup**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	230	460	N/A	1	1	4258763
Hydrochloric Acid	ug	<250	4700	4700	250	75	4276832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam
A Bureau Veritas Group Company

Maxxam Job #: B5M6029
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BHD014
Sample ID: M26A-SB-DIH2O
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/11/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4276832	2015/11/18	2015/11/18	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4258763	N/A	2015/11/04	Frank Mo

Maxxam ID: BHD015
Sample ID: M26A-STK-1
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/11/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4276832	2015/11/18	2015/11/18	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4258763	N/A	2015/11/04	Frank Mo

Maxxam ID: BHD015 Dup
Sample ID: M26A-STK-1
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/11/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4276832	2015/11/18	2015/11/18	Ann-Marie Stern

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Maxxam
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Maxxam Job #: B5M6029
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam
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Maxxam Job #: B5M6029
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4276832	A_S	Matrix Spike(BHD015)	Hydrochloric Acid	2015/11/18		96	%	80 - 120
4276832	A_S	Spiked Blank	Hydrochloric Acid	2015/11/18		101	%	90 - 110
4276832	A_S	Method Blank	Hydrochloric Acid	2015/11/18	<250		ug	
4276832	A_S	RPD - Sample/Sample Dup	Hydrochloric Acid	2015/11/18	0.54		%	20

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Maxxam
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Maxxam Job #: B5M6029
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Frank Mo, B.Sc., Inorganic Lab. Manager

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Maxxam
A Bureau Veritas Group Company

Your Project #: 14464
Site Location: LWEC, L'ANSE, MI

Attention:Ken Hill

Weston Solutions Inc
1400 Weston Way
West Chester, PA
USA 19380

Report Date: 2015/11/18
Report #: R3773883
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5N0555
Received: 2015/11/10, 15:19

Sample Matrix: Stack Sampling Train
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Anions in Water by Ion Chromatography (1)	1	N/A	2015/11/18	BRL SOP-00105	EPA 300.0 m
Hydrogen Halides in H2SO4 Imp.	2	2015/11/18	2015/11/18	BRL SOP-00108	EPA 26A m
Volume of Sulfuric Acid Impinger	2	N/A	2015/11/18		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
(1) SCC/CAEAL

Encryption Key

Clayton Johnson
18 Nov 2015 18:42:54 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

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Maxxam
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Maxxam Job #: B5N0555
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

EPA M26A HYDROGEN HALIDES AND HALOGENS (STACK SAMPLING TRAIN)

Maxxam ID		BIB025	BIB026			
Sampling Date		2015/11/03	2015/11/04			
	UNITS	**M26A-C1-STK-R2**	**M26A-C1-STK-R3**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	484	490	1	1	4276829
Hydrochloric Acid	ug	5000	3900	250	75	4276832

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B5N0555
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		BJJ470			
Sampling Date					
	UNITS	**AUDIT-111615F-1440**	**RDL**	**MDL**	**QC Batch**
Chloride (Cl)	mg/L	11	0.1	0.02	4277309
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

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Maxxam Job #: B5N0555
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BIB025
Sample ID: M26A-C1-STK-R2
Matrix: Stack Sampling Train

Collected: 2015/11/03
Shipped:
Received: 2015/11/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4276832	2015/11/18	2015/11/18	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4276829	N/A	2015/11/18	Brenda Moore

Maxxam ID: BIB026
Sample ID: M26A-C1-STK-R3
Matrix: Stack Sampling Train

Collected: 2015/11/04
Shipped:
Received: 2015/11/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4276832	2015/11/18	2015/11/18	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		4276829	N/A	2015/11/18	Brenda Moore

Maxxam ID: BJJ470
Sample ID: AUDIT-111615F-1440
Matrix: Stack Sampling Train

Collected:
Shipped:
Received: 2015/11/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Anions in Water by Ion Chromatography	IC/EC	4277309	N/A	2015/11/18	Ann-Marie Stern

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Maxxam Job #: B5N0555
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B5N0555
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4276832	A_S	Matrix Spike	Hydrochloric Acid	2015/11/18		96	%	80 - 120
4276832	A_S	Spiked Blank	Hydrochloric Acid	2015/11/18		101	%	90 - 110
4276832	A_S	Method Blank	Hydrochloric Acid	2015/11/18	<250		ug	
4276832	A_S	RPD - Sample/Sample Dup	Hydrochloric Acid	2015/11/18	0.54		%	20

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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Maxxam
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Maxxam Job #: B5N0555
Report Date: 2015/11/18

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Brenda Moore

Brenda Moore, Team Lead

Frank Mo, B.Sc., Inorganic Lab. Manager

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Maxxam
A Bureau Veritas Group Company

Your Project #: 14464
Site Location: LWEC, L'ANSE, MI

Attention:Ken Hill

Weston Solutions Inc
1400 Weston Way
West Chester, PA
USA 19380

Report Date: 2015/11/06
Report #: R3753380
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5M8302
Received: 2015/11/06, 14:50

Sample Matrix: Stack Sampling Train
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Hydrogen Halides in H2SO4 Imp.	6	2015/11/06	2015/11/06	BRL SOP-00108	EPA 26A m
Volume of Sulfuric Acid Impinger	6	N/A	2015/11/06		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Encryption Key

Clayton Johnson
06 Nov 2015 18:14:15 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

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Maxxam
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Maxxam Job #: B5M8302
Report Date: 2015/11/06

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

EPA M26A HYDROGEN HALIDES AND HALOGENS (STACK SAMPLING TRAIN)

Maxxam ID		BHP176	BHP177	BHP181	BHP182			
Sampling Date		2015/11/03	2015/11/05	2015/11/05	2015/11/05			
	UNITS	**M26A-SB-DIH2O**	**M26A-SB-H2SO4**	**M26A-C2-R1**	**M26A-C2-R2**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	150	75	488	470	1	1	4262489
Hydrochloric Acid	ug	<250	<250	5100	5600	250	75	4262488

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		BHP183			BHP184			
Sampling Date		2015/11/05			2015/11/05			
	UNITS	**M26A-C2-R3-IMP1/2**	**RDL**	**MDL**	**M26A-C2-R3-IMP3**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	369	1	1	144	1	1	4262489
Hydrochloric Acid	ug	6000	150	45	<100	100	30	4262488

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam
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Maxxam Job #: B5M8302
Report Date: 2015/11/06

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

TEST SUMMARY

Maxxam ID: BHP176
Sample ID: M26A-SB-DIH2O
Matrix: Stack Sampling Train

Collected: 2015/11/03
Shipped:
Received: 2015/11/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4262488	2015/11/06	2015/11/06	Lang Le
Volume of Sulfuric Acid Impinger		4262489	N/A	2015/11/06	Frank Mo

Maxxam ID: BHP177
Sample ID: M26A-SB-H2SO4
Matrix: Stack Sampling Train

Collected: 2015/11/05
Shipped:
Received: 2015/11/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4262488	2015/11/06	2015/11/06	Lang Le
Volume of Sulfuric Acid Impinger		4262489	N/A	2015/11/06	Frank Mo

Maxxam ID: BHP181
Sample ID: M26A-C2-R1
Matrix: Stack Sampling Train

Collected: 2015/11/05
Shipped:
Received: 2015/11/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4262488	2015/11/06	2015/11/06	Lang Le
Volume of Sulfuric Acid Impinger		4262489	N/A	2015/11/06	Frank Mo

Maxxam ID: BHP182
Sample ID: M26A-C2-R2
Matrix: Stack Sampling Train

Collected: 2015/11/05
Shipped:
Received: 2015/11/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4262488	2015/11/06	2015/11/06	Lang Le
Volume of Sulfuric Acid Impinger		4262489	N/A	2015/11/06	Frank Mo

Maxxam ID: BHP183
Sample ID: M26A-C2-R3-IMP1/2
Matrix: Stack Sampling Train

Collected: 2015/11/05
Shipped:
Received: 2015/11/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4262488	2015/11/06	2015/11/06	Lang Le
Volume of Sulfuric Acid Impinger		4262489	N/A	2015/11/06	Frank Mo

Maxxam ID: BHP184
Sample ID: M26A-C2-R3-IMP3
Matrix: Stack Sampling Train

Collected: 2015/11/05
Shipped:
Received: 2015/11/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	4262488	2015/11/06	2015/11/06	Lang Le
Volume of Sulfuric Acid Impinger		4262489	N/A	2015/11/06	Frank Mo

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Maxxam Job #: B5M8302
Report Date: 2015/11/06

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam
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Maxxam Job #: B5M8302
Report Date: 2015/11/06

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4262488	LLE	Spiked Blank	Hydrochloric Acid	2015/11/06		100	%	90 - 110
4262488	LLE	Method Blank	Hydrochloric Acid	2015/11/06	<250		ug	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Maxxam Job #: B5M8302
Report Date: 2015/11/06

Weston Solutions Inc
Client Project #: 14464
Site Location: LWEC, L'ANSE, MI

VALIDATION SIGNATURE PAGE

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Frank Mo, B.Sc., Inorganic Lab. Manager

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Lab Tracking Number

RUSH

Chain-of-Custody Record and Work Request

WESTON SOLUTIONS

Page 1 of 1

Client	LWEC, L'Anse, MI		
Work Order Number	14464	Phone Number	610-701-3043
Contact Person	Ken Hill	Turn Around Time	RUSH

Lab ID	Field Sample ID	Sample Collection Date	Analysis	Analyses Requested/Other Info			Sample Check-off
	LWEC - C2 - STK - 1 - M26A - H2SO4		M26A	HOLD			
	[redacted]		[redacted]				
	LWEC - C2 - STK - 2 - M26A - H2SO4		M26A				
	LWEC - C2 - STK - 2 - M26A - NAOH		M26A	X			
	LWEC - C2 - STK - 3 - M26A - H2SO4 - Imp 1/2		M26A				
	[redacted]		[redacted]				
	LWEC C2 - STK - SB - M26A - H2SO4	11/3/15	M26A				
	[redacted]		[redacted]				
	LWEC - C2 - STK - SB - M26A - DIH20	11/3/15	M26A				
	LWEC-02-STK-3-H2SO4-Imp 3	11/5/15	M26A				

→ Imp 1/2 = 150 ml
Imp 3 = 100 ml

Notes: M26A - Chlorides by IC per Method 9057. Analyze samples in duplicate as per Method. Starting Impinger volumes; H2SO4 250 ml, NaOH 100 ml [redacted]
Full Data package required

WESTON Retrieved Balance of H2SO4 samples. TSU: R1 = 488 ml, R2 = 470 ml, R3 = 369 ml (Imp 1/2) 144 ml (Imp 3)

Relinquished By	Received By	Date	Time	Lab Use Only	
		11/5/15		Shipper	Air Bill #
	FATIMA SHAHID	2015/11/06	14:50	Opened By	Date/Time
				Temp °C 19.6/19.3/19.5	Condition
				Custody Seals Yes No	None N/A

Laboratory Comments:

6-Nov-15 14:50
Clayton Johnson
B5M8302

Q1_LWEC001_Opactiy_003958

SSAS

PERFORMANCE EVALUATION

SIGMA-ALDRICH RTC

Scheduled Study

SSAS107

29-Jun-2015 Through 22-Oct-2015

RT84384

RTC Labcode

EPA Labcode

Participating Laboratory:

Maxxam Analytics, Inc.
Clayton Johnson
6740 Campobello Rd
Mississauga ON L5N 2L8 CA

Thank you for participating in study SSAS107. Additional information about this study may be found online at www.sigmaaldrich.com/pt.

Sigma-Aldrich RTC Inc.
2931 Soldier Springs Road
Laramie, WY 82070 USA
1-307-742-5452
www.sigmaaldrich.com

 If you wish to appeal an evaluation listed in this report, please call our QA Supervisor at (307) 742-5452 or email RTCreports@sial.com

Sincerely,

Jennifer Duhon
Proficiency Testing Supervisor

Accreditors

Evaluations of this dataset will be sent to the accreditor(s) listed below using your laboratory's labcode listed above each accrediting agency. If any of the information listed below is incorrect, please contact RTC immediately.

RTC is accrediated to perform PT programs for the scope of accredation to ISO/IEC 17043 under ACLASS certificate AP-1469

Miscellaneous Analytes

Method:EPA Method 12 [10402161]

Analyte	Result Units	Assigned Value	Accept. Window	Z	Evaluation
Lead, Pb [1,2]	21.2 ug/filter	21	16.8 to 25.2	0.1	Acceptable
1075 / PEA1945-1EA - Lot SSAS107 /Analyst:/ Analysis Date: 2015-10-14	*Evaluation Criteria - 8* ☐*Voluntary*			*Evaluation Parameter - a:1, b:0, c:0.10, d:0*	
Lead, Pb [1,2]	0.209 ug/ml	0.2	0.15 to 0.25	0.28	Acceptable
1075 / PEA1948-1EA - Lot SSAS107 /Analyst:/ Analysis Date: 2015-10-14	*Evaluation Criteria - 8* ☐*Voluntary*			*Evaluation Parameter - a:1, b:0, c:0.125, d:0*	

Method:EPA Method 26A (2000) [10403200]

Analyte	Result Units	Assigned Value	Accept. Window	Z	Evaluation
Hydrogen chloride [1,2]	24.2 mg/L	25	22.5 to 27.5	-0.64	Acceptable
1770 / PEA1941-20ML - Lot SSAS107 /Analyst:/ Analysis Date: 2015-10-08	*Evaluation Criteria - 8* ☐*Voluntary*			*Evaluation Parameter - a:1, b:0, c:0.05, d:0*	

Group Analysis Summary

Acceptable : 3 / 3

Score : 100% - (Acceptable)

Sample Information

HYDROGEN HALIDES/HALOGENS IN IMPINGER SOLUTION

PEA1941-20ML / Lot SSAS107

Analytes	Units	Gravimetric Value	Study Mean	Study Std. Dev.
Hydrogen chloride [1,2] 1770	mg/L	25.0±0.128	0	0
Hydrogen fluoride [1,2] 1775	mg/L	25.0±0.128	0	0

METALS ON FILTER PAPER

PEA1945-1EA / Lot SSAS107

Analytes	Units	Gravimetric Value	Study Mean	Study Std. Dev.
Antimony, Sb [1,2] 1005	ug/filter	26.1±0.133	0	0
Arsenic, As [1,2] 1010	ug/filter	21.0±0.107	0	0
Barium, Ba [1,2] 1015	ug/filter	21.1±0.108	0	0
Beryllium, Be [1,2] 1020	ug/filter	11.3±0.0578	0	0
Cadmium, Cd [1,2] 1030	ug/filter	11.2±0.0572	0	0
Chromium, Cr (total) [1,2] 1040	ug/filter	16.1±0.082	0	0
Cobalt, Co [1,2] 1050	ug/filter	11.1±0.0568	0	0
Copper, Cu [1,2] 1055	ug/filter	11.2±0.0572	0	0
Lead, Pb [1,2] 1075	ug/filter	21.0±0.107	0	0
Manganese, Mn [1,2] 1090	ug/filter	11.2±0.0572	0	0
Nickel, Ni [1,2] 1105	ug/filter	21.2±0.108	0	0
Selenium, Se [1,2] 1140	ug/filter	21.0±0.107	0	0
Silver, Ag [1,2] 1150	ug/filter	31.1±0.159	0	0
Thallium, Tl [1,2] 1165	ug/filter	31.1±0.159	0	0
Zinc, Zn [1,2] 1190	ug/filter	21.0±0.107	0	0

METALS IN IMPINGER SOLUTION

PEA1948-1EA / Lot SSAS107

Analytes	Units	Gravimetric Value	Study Mean	Study Std. Dev.
Antimony, Sb [1,2] 1005	ug/ml		0	0
Arsenic, As [1,2] 1010	ug/ml		0	0
Barium, Ba [1,2] 1015	ug/ml		0	0
Beryllium, Be [1,2] 1020	ug/ml		0	0
Cadmium, Cd [1,2] 1030	ug/ml		0	0
Chromium, Cr (total) [1,2] 1040	ug/ml		0	0
Cobalt, Co [1,2] 1050	ug/ml		0	0
Copper, Cu [1,2] 1055	ug/ml		0	0
Lead, Pb [1,2] 1075	ug/ml	0.202±0.00103	0	0
Manganese, Mn [1,2] 1090	ug/ml		0	0
Nickel, Ni [1,2] 1105	ug/ml		0	0
Selenium, Se [1,2] 1140	ug/ml		0	0
Silver, Ag [1,2] 1150	ug/ml		0	0
Thallium, Tl [1,2] 1165	ug/ml		0	0
Zinc, Zn [1,2] 1190	ug/ml		0	0

Definitions and Interpretation of Statistical Analysis:

Assigned Value: Value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose. See ISO/IEC 17043 for additional information. In general the assigned value is the value used to assess proficiency and may or may not be the made to value (gravimetric value).

Accept. Window: The range of values that constitute acceptable performance for a laboratory participating in this PT study.

Z: A Z-Score tells how a single data point compares to normal data. A Z-Score says not only whether a point was above or below average, but how unusual the measurement is. Generally, a method result with a Z-Score less than |2| is considered to be in control, a Z-Score between |2| and |3| is considered 'Questionable', but still within control and a Z greater than |3| is considered not acceptable and the method is out of control. For WS studies, a z-score greater than |2| is unacceptable. Calculated as **Z = (Reported Value - Assigned Value) / Proficiency Std. Dev.**

Proficiency Std. Dev.: Standard deviation calculated based on **Evaluation Criteria.**

Study Mean: Statistical study mean calculated using a robust statisitical model (RTC employs the 'Biweight Program'). Robust statistical techniques to minimize the influence that extreme results can have on estimates of the mean and standard deviation. NOTE - These techniques assign less weight to extreme results, rather than eliminate them from a data set.

Study Std. Dev.: Standard deviation calculated from study data using robust statisicals (Biweight).

Gravimetric Value: The 'prepared to' value, determined by gravimetric means. The uncertainty associated to this value is standard uncertainty and based on RTC's gravimetric tolerances.

Evaluation Criteria:

1 - Regression Equation - Acceptance windows based on TNI adopted equation of proficiency value +/- 3 proficiency standard deviations and check limits of proficiency value +/- 2 proficiency standard deviations. Proficiency value and proficiency standard deviation are calculated from gravimetric variables a, b, c, & d as proficiency value = a * gravimetric + b and proficiency standard deviation = c * gravimetric + d.

2 - Study Robust Mean and c,d regression - Acceptance windows based on TNI adopted equation of proficiency value +/- 3 proficiency standard deviations and check limits of proficiency value +/- 2 proficiency standard deviations. Proficiency value and proficiency standard deviation calculated from robust study mean and variables c & d as proficiency value = robust mean and proficiency standard deviation = c * proficiency value + d.

3 - Fixed Limits - Acceptance windows based on span of gravimetric percentage from gravimetric as gravimetric +/- gravimetric * percentage.

4 - Adjustable Fixed Limits - Acceptance windows base on a span of gravimetric percentage from gravimetric as gravimetric +/- gravimetric * lowPercentage where gravimetric < break and gravimetric +/-

gravimetric * highPercentage where gravimetric >= break.

5 - Study Statistics - Acceptance windows based on a number of standard deviations span from the study mean as study mean +/- (deviations * standard deviation).

6 - Log Transform Statistics - Acceptance windows based on lognormal distributed data. Acceptance windows = mean(lognormal) +/- span * standard deviation(lognormal).

7 - Reserved

8 - Regression Equation 2SD - Acceptance windows based on EPA equation of proficiency value +/- 2 proficiency standard deviations. Proficiency value and proficiency standard deviation are calculated from gravimetric variables a, b, c, & d as proficiency value = a * gravimetric + b and proficiency standard deviation = c * gravimetric + d. Generally reserved for drinking water studies.

Proficiency Test Item Preparation, Homogeneity and Stability Assessment - RTC uses proprietary and published methods for the manufacture, homogeneity and stability testing of proficiency test items. RTC's proficiency test materials meet requirements of ISO Guide 34. For more information contact RTC. Additionally RTC complies with TNI Volume 3 'General Requirements for Environmental Proficiency Test Providers', EL-V3-2009, 2009 for all TNI Fields of Proficiency Testing analytes.

Metrological Traceability - All preparations are made using balances calibrated annually traceable to NIST standards. Where appropriate analytical measurements are traceable through an unbroken chain to NIST standards, or a Certified Reference Material manufactured under ISO Guide 34 in conjunction with ISO/IEC 17025.

Statistical Analysis - RTC uses robust statistics to calculate study means and standard deviations - Reference - Kafadar, K, A Biweight Approach to the One-Sample Problem, Journal of the American Statistical Association, Vol. 77, No. 378, June, 1982, pp. 416-424.

Additional Information - Go to www.rt-corp.com/reporting for additional information on summary statistics for specific methods, advice on the interpretation of the statistical analysis, and additional comments/recommendations. If you failed an analyte it may be required to perform a corrective action and/or retest. RTC recommends that you contact your accreditation body for specific instruction.

Program analyte accrediting footnotes

[1] NELAC Compliant, covered by RTC's ACLASS Proficiency Testing Provider accreditation, Cert. AP-1469

[2] ISO 17043 Accredited, covered by RTC's ACLASS Proficiency Testing Provider accreditation, Cert AP-1469

Authorizing Officer: _____ Date: 10/24/2015

Patrick Brumfield, ASQ CQA

QA Manager

This section of the report is for informational purposes only. If you are unsure about specific accreditation requirements, please contact your state coordinator.

UNACCEPTABLE ANALYTES

PASS RATE

Number of Reported Results:	3
Number of Passing Results:	3
Pass Rate:	100%

ERA

A Waters Company

November 18, 2015

Karen Kajiya-Mills
MI-DEQ-Air Quality Division (SSAS)
525 West Allegan St
3rd Floor Constitution Hall
PO Box 30437
Lansing, MI 48933

Enclosed is your final report for ERA's Stationary Source Audit Sample (SSAS) Program. Your final report includes an evaluation of all results submitted by the laboratory to ERA. Included for your convenience is a table of contact information for all parties involved in this sampling event.

Data Evaluation Protocols: All analytes in ERA's SSAS Program have been evaluated comparing the reported result to the acceptance limits generated using the criteria contained in the TNI SSAS Table.

If you have any questions, please contact our Proficiency Testing Department at 1-800-372-0122.

Sincerely,

David Kilhefner
Quality Officer

cc: Project File Number 111615F

ERA
A Waters Company

Recipient Type	Report Recipient	Contact	Project ID
Agency	MI-DEQ-Air Quality Division (SSAS) 525 West Allegan St 3rd Floor Constitution Hall PO Box 30437 Lansing, MI 48933 USA	Karen Kajiya-Mills kajiya-millsk@michigan.gov Phone: 517-335-4874	
Facility	L'Anse Warden Electric Company 157 South Main St L'Anse, MI 49946 USA	JR Richardson jr.richardson@pmpowergroup.com Phone: 907-885-7187	
Lab	Maxxam Analytics Inc 6740 Campobello Rd Mississauga, ON L5N 2L8 Canada	Clayton Johnson Sr. Project Manager cjohnson@maxxam.ca Phone: (905) 817-5769	
Tester	Weston Solutions 1400 Weston Way West Chester, PA 19341 USA	Ken Hill k.hill@westonsolutions.com Phone: 610-721-6521	LWEC HCl

ERA

A Waters Company

Final Report Results For Laboratory
Maxxam Analytics Inc

ERA

A Waters Company

SSAP Evaluation Report

Project Number: **111615F**

ERA Customer Number: **M748564**

Laboratory Name: **Maxxam Analytics Inc**

Inorganic Results

111615F Evaluation Final Complete Report

A Waters Company

Clayton Johnson
Sr. Project Manager
Maxxam Analytics Inc
6740 Campobello Rd
Mississauga, ON L5N 2L8
(905) 817-5769

EPA ID: Not Reported
ERA Customer Number: M748564
Agency ID: R0033

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Hydrogen Halides in Impinger Solution (cat# 1440, lot# 111615F) Study Dates: 11/16/15 - 11/18/15									
1770	Hydrogen Chloride	mg/L	11.2	11.2	10.1 - 12.3	Acceptable	EPA 26A 2000	11/18/2015	
1775	Hydrogen Fluoride	mg/L		16.7	15.0 - 18.4	Not Reported			

111615F Laboratory Exception Report

A Waters Company

Clayton Johnson
Sr. Project Manager
Maxxam Analytics Inc
6740 Campobello Rd
Mississauga, ON L5N 2L8
(905) 817-5769

EPA ID: **Not Reported**
ERA Customer Number: **M748564**
Agency ID:

Evaluation Checks

There are no values reported with < where the assigned value was greater than 0.

Not Acceptable Evaluations

There were no Not Acceptable evaluations for this study.

APPENDIX E
EXAMPLE CALCULATIONS

EXAMPLE CALCULATIONS FOR VELOCITY, MOISTURE, AND ISOKINETICS

1. Volume of dry gas sampled at standard conditions (68 deg F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times Vm \times \left(Pb + \frac{\text{delta H}}{13.6} \right)}{(Tm + 460)}$$

Where:

Vm(std) =	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
Vm =	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
Pb =	Barometric Pressure, in Hg.
delt H =	Average pressure drop across the orifice meter, in H_2O
Tm =	Average dry gas meter temperature , deg F.
Y =	Dry gas meter calibration factor.
17.64 =	Factor that includes ratio of standard temperature (528 deg R) to standard pressure (29.92 in. Hg), deg R/in. Hg.
13.6 =	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

Vw(std) = (0.04707 x Vwc) + (0.04715 x Wwsg)

Where:

Vw(std) =	Volume of water vapor in the gas sample corrected to standard conditions, scf.
Vwc =	Volume of liquid condensed in impingers, ml.
Wwsg =	Weight of water vapor collected in silica gel, g.
0.04707 =	Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.
0.04715 =	Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

Where:

bws =	Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

$$Md = 1 - bws$$

Where:

Md = Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$$MWd = (0.440 \times \%\ CO_2) + (0.320 \times \%\ O_2) + (0.280 \times (\%\ N_2))$$

Where:

MWd =	Dry molecular weight , lb/lb-mole.
% CO_2 =	Percent carbon dioxide by volume, dry basis.
% O_2 =	Percent oxygen by volume, dry basis.
% N_2 =	Percent nitrogen by volume, dry basis.
0.440 =	Molecular weight of carbon dioxide, divided by 100.
0.320 =	Molecular weight of oxygen, divided by 100.
0.280 =	Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

Where:

MWs =	Molecular weight of wet gas, lb/lb-mole.
18 =	Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$Vs = 85.49 \times Cp \times ((delt\ p)^{1/2})avg \times \left(\frac{Ts\ (avg)}{Ps \times MWs} \right)^{1/2}$$

Where:

Vs =	Average gas stream velocity, ft/sec.
85.49 =	Pitot tube constant, $\frac{(lb/lb\text{-}mole)(in.\ Hg)^{1/2}}{(deg\ R)(in\ H_2O)}$
Cp =	Pitot tube coefficient, dimensionless.
Ts =	Absolute gas stream temperature, deg R = Ts, deg F + 460.
Ps =	Absolute gas stack pressure, in. Hg. = $Pb + \frac{P(static)}{13.6}$
delt p =	Velocity head of stack, in. H_2O

8. Average gas stream volumetric flowrate at actual conditions, wacf/min.

$$Qs(act) = 60 \times Vs \times As$$

Where:

Qs(act) = Volumetric flowrate of wet stack gas at actual conditions, wacf/min.

As = Cross-sectional area of stack, ft^2.

60 = Conversion factor from seconds to minutes.

9. Average gas stream dry volumetric flowrate at standard conditions, dscf/min.

$$Qs(std) = 17.64 \times Md \times \frac{Ps}{Ts} \times Qs(act)$$

Where:

Qs(std) = Volumetric flowrate of dry stack gas at standard conditions, dscf/min.

10. Isokinetic variation calculated from intermediate values, percent.

$$I = \frac{17.327 \times Ts \times Vm(std)}{Vs \times O \times Ps \times Md \times (Dn)^2}$$

Where:

I = Percent of isokinetic sampling.

O = Total sampling time, minutes.

Dn = Diameter of nozzle, inches.

17.327 = Factor which includes standard temperature (528 deg R), standard pressure (29.92 in. Hg), the formula for calculating area of circle $D^{2/4}$, conversion of square feet to square inches (144), conversion of seconds to minutes (60), and conversion to percent (100),

$$\frac{(\text{in. Hg})(\text{in}^2)(\text{min})}{(\text{deg R})(\text{ft}^2)(\text{sec})}$$

EXAMPLE CALCULATIONS FOR HYDROCHLORIC ACID

1. Hydrochloric Acid concentration, lb/dscf.

$$C1(HCl) = \frac{W(HCl) \times 2.2046 \times 10^{-6}}{V_{dm}(std)}$$

Where:

W(HCl)	=	Weight of hydrochloric acid collected in sample, mg.
C1(HCl)	=	Hydrochloric acid concentration, lb/dscf.
Vdm(std)	=	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
2.2046×10^{-6}	=	Conversion factor from mg to lbs.

2. Hydrochloric acid concentration, ppmv.

$$C2(HCl) = \frac{385.35 \times 10^{6}}{MW} \times C1(HCl)$$

Where:

C2(HCl)	=	Concentration of hydrochloric acid in stack gas, parts per million by volume (dry basis).
385.35×10^{6}	=	Conversion factor from lbs/ppm.
MW	=	Molecular weight of hydrochloric acid (36.46).

3. Hydrochloric acid mass emission rate, lb/hr.

$$MR1(HCl) = C1(HCl) \times Qs(std) \times 60$$

Where:

MR1(HCl)	=	Hydrochloric acid mass emission rate, lb/hr.
Qs(std)	=	Volumetric flowrate of dry stack gas at standard conditions, dscf/min.

EXAMPLE CALCULATIONS FOR
FILTERABLE AND CONDENSIBLE PM-10 PARTICULATE MATTER

1. Filterable PM-10 particulate concentration, gr/dscf.

$$FPMC1 = 15.432 \times \frac{FPMwt}{Vm(std)}$$

Where:

FPMC1 =	Filterable particulate concentration, gr/dscf.
FPMwt =	Total weight of particulate caught on filter and probe wash adjusted for the site blank samples.
Vm(std) =	Volume of water vapor in the gas sample corrected to standard conditions, scf.
15.432 =	Conversion factor from grams to grains.

2. Filterable PM-10 particulate mass emission rate, lb/hr.

$$FPMR1 = 0.008571 \times FPMC1 \times Qs(std)$$

Where:

FPMR1 =	Filterable particulate mass emission rate, lb/hr.
Qs(std) =	Volumetric flow rate of dry stack gas at standard conditions, dscf/min.
0.008571 =	Conversion factor relating grains to pounds and minutes to hours.

3. Condensible PM-10 particulate concentration, gr/dscf.

$$CPMC1 = 15.432 \times \frac{CPMwt}{Vm(std)}$$

Where:

CPMC1 =	Condensible particulate concentration, gr/dscf.
CPMwt =	Total weight of Organic particulate plus Inorganic particulate, corrected for blank train samples.
Vm(std) =	Volume of water vapor in the gas sample corrected to standard conditions, scf.
15.432 =	Conversion factor from grams to grains.

4. Condensible PM-10 particulate mass emission rate, lb/hr.

$$CPMR1 = 0.008571 \times CPMC1 \times Qs(std)$$

Where:

CPMR1 =	Condensible particulate mass emission rate, lb/hr.
Qs(std) =	Volumetric flow rate of dry stack gas at standard conditions, dscf/min.
0.008571 =	Conversion factor relating grains to pounds and minutes to hours.

5. Total PM-10 concentration, gr/dscf.

$$TPMC1 = 15.432 \times \frac{CPMwt + FPMwt}{Vm(std)}$$

Where:

TPMC1 =	Total particulate concentration, gr/dscf.
TPMwt =	Total weight of Filterable particulate plus Condensible particulate minus blank correction.
Vm(std) =	Volume of water vapor in the gas sample corrected to standard conditions, scf.
15.432 =	Conversion factor from grams to grains.

6. Total PM-10 mass emission rate, lb/hr.

$$TMR1 = 0.008571 \times TPMC1 \times Qs(std)$$

Where:

TMR1 =	Total particulate mass emission rate, lb/hr.
Qs(std) =	Volumetric flow rate of dry stack gas at standard conditions, dscf/min.
0.008571 =	Conversion factor relating grains to pounds and minutes to hours.

EXAMPLE CALCULATIONS FOR LEAD

1. Lead concentration, lb/dscf.

$$C_1 = \frac{W \times 2.2046 \times 10^{-9}}{Vm_{(std)}}$$

Where:

W = Weight of Lead collected in sample in ug (corrected for site blanks).
C_1 = Lead concentration, lb/dscf
2.2046×10^{-9} = Conversion factor from ug to pounds.
Vm(std) = Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.

2. Lead mass emission rate, lb/hr.

$$MR1 = C_1 \times Qs(std) \times 60$$

Where:

MR1 = Lead mass emission rate, lb/hr.
60 = Conversion factor from minutes to hours.
Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min.

3. Lead concentration, ug/dscm.

$$C_2 = 35.31 \times \frac{W}{Vm_{(std)}}$$

Where:

C_2 = Lead concentration, ug/dscm.
W = Weight of Lead collected in sample in ug.
35.31 = Conversion factor from cubic feet to cubic meters.

Note: Calculations identical for all target metals

EXAMPLE CALCULATIONS FOR
BIAS CORRECTION AND MASS EMISSION RATES OF
NITROGEN OXIDES

1. Bias corrected value of Nitrogen Oxides dry basis, ppm.

$$Nox(corr) = \frac{(AVG - Zbias)}{(Sbias - Zbias)} \times SPAN\ GAS$$

Where:

AVG = Average NOx concentration for the test run.

Zbias = The average of pre and post test zero bias checks.

Sbias = The average of pre and post test span bias check.

SPAN GAS = The calibration gas closest to the gas stream concentration, which was used for the BIAS check.

NOx(corr) = Bias corrected value.

Note: Bias correction is the same for O_2, CO_2, and SO_2.

2. Nitrogen Oxides mass emission rate dry basis, lb/hr.

$$MR1(NOx) = \frac{NOx(corr) \times Qs(std) \times 46.01 \times 60\ min/hr}{385.35 \times 10\text{^}6}$$

Where:

MR1(NOx) = Nitrogen Oxides mass emission rate, lb/hr.

Qs(std) = Average volumetric gas stream flow rate at standard conditions, dscf/min.

46.01 = Molecular weight of Nox.

385.35x106 = Conversion factor from ppm to lbs.

Note: Mass rate for SO_2 is calculated using the above equation except the specific molecular weight (64.06) and measured concentration of SO_2 is used.

EXAMPLE CALCULATIONS FOR
MOISTURE, BIAS, O_2 CORRECTION, AND MASS EMISSION RATES OF
TOTAL VOC

1. Bias corrected value of total VOC as methane, dry basis (ppm/v).

$$C(corr) = \frac{AVG - ZERO}{BIAS - ZERO} \times SPAN\ GAS$$

Where:

AVG	=	Average VOC concentration for the test run as methane as reported by the analyzer.
ZERO	=	The average of pre and post test zero bias check of the complete system with "zero" air.
BIAS	=	The average of pre and post test bias check of the complete system with the calibration span gas.
SPAN GAS	=	The calibration gas closest to the gas stream concentration, which was used for a BIAS check.
C(corr)	=	The bias corrected VOC concentration as methane.

2. Moisture corrected value of VOC, dry basis (ppm/v).

$$CVOC = \frac{C(corr)}{(100 - \%\ MOISTURE) / 100}$$

Where:

C(corr)	=	The bias corrected VOC concentration as methane.
CVOC	=	The concentration of VOC, corrected for moisture, as methane.
% MOISTURE	=	The precentage of water vapor in the gas stream.

3. VOC concentration dry basis, ppm @ 7% O2.

$$VOC(corr) = \frac{CVOC x [20.9 - 7\%\ O2]}{[20.9 - O2(measured)]}$$

Where:

VOC(corr)	=	VOC concentration corrected to 7% O2.
CVOC	=	Average VOC concentration for the test run bias and moisture corrected.
O2(measured)	=	Average oxygen concentration for test run as measured, %.

4. VOC mass emission rate dry basis, lb/hr.

$$MR1(VOC) = \frac{CVOC \times Qs(std) \times 16 \times 60\ min/hr}{385.35 \times 10\text{^}6}$$

Where:

MR1(VOC)	=	VOC mass emission rate, lb/hr.
Qs(std)	=	Average volumetric gas stream flow rate at standard conditions, dscf/min.
16	=	Molecular weight of methane.
385.35x106	=	Conversion factor from ppm to lbs.

APPENDIX F
QUALITY CONTROL DATA

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	82-124502098-1
Cylinder Number:	CC333446	Cylinder Volume:	150.5 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jul 13, 2015

Expiration Date: Jul 13, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.774 %	G1	+/- 0.7% NIST Traceable	07/13/2015
OXYGEN	12.00 %	11.97 %	G1	+/- 0.4% NIST Traceable	07/13/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060626	CC413722	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019
NTRM	09060237	CC263123	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-LDH9LRNS	NDIR	Jun 17, 2015
Siemens Oxymat 6E-O2-N1-M1-0603	Paramagnetic	Jul 02, 2015

Triad Data Available Upon Request

Signature on file

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI62E15A0224	Reference Number:	82-124489131-1
Cylinder Number:	CC452229	Cylinder Volume:	157.2 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Apr 24, 2015

Expiration Date: Apr 24, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	17.00 %	16.63 %	G1	+/- 0.7% NIST Traceable	04/24/2015
OXYGEN	21.00 %	21.65 %	G1	+/- 0.6% NIST Traceable	04/24/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060739	CC414621	16.939 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 08, 2019
NTRM	09061414	CC273509	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-LDH9LRNS	NDIR	Apr 17, 2015
Siemens Oxymat 6E-O2-N1-M1-0603	Paramagnetic	Apr 10, 2015

Triad Data Available Upon Request

Signature on file

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0406	Reference Number:	82-124343564-1
Cylinder Number:	CC153655	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52012	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Nov 05, 2012

Expiration Date: Nov 05, 2020

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	90.00 PPM	87.96 PPM	G1	+/- 1% NIST Traceable	11/05/2012
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062230	CC365473	97.56 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	May 25, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Thermo 48i-TLE-CO-1133350708	NDIR	Oct 08, 2012

Triad Data Available Upon Request

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Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0080	Reference Number:	82-124502189-1
Cylinder Number:	CC17667*	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Jul 15, 2015

Expiration Date: Jul 15, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	250.0 PPM	248.1 PPM	G1	+/- 0.5% NIST Traceable	07/15/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRMplus	12060309	CC353931	249.3 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Oct 26, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Siemens Ultramat 6 N1C8180 COLOW	NDIR	Jul 01, 2015

Triad Data Available Upon Request

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E15A67B8	Reference Number:	54-124483425-1
Cylinder Number:	SG9168314BAL	Cylinder Volume:	146.2 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	590
Gas Code:	CO,BALA	Certification Date:	Apr 08, 2015

Expiration Date: Apr 08, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	550.0 PPM	555.2 PPM	G1	+/- 1.0% NIST Traceable	04/08/2015
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11060327	CC2139	988.8 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Dec 13, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO-1 HORIBA VIA-510 TKPPF7FG	NDIR	Mar 27, 2015

Triad Data Available Upon Request

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Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A3614	Reference Number:	82-124454983-1
Cylinder Number:	CC352229	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52014	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Sep 29, 2014

Expiration Date: Sep 29, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	250.0 PPM	253.0 PPM	G1	+/- 1.1% NIST Traceable	09/22/2014, 09/29/2014
NITRIC OXIDE	250.0 PPM	252.1 PPM	G1	+/- 0.8% NIST Traceable	09/22/2014, 09/29/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061934	CC367643	250.8 PPM NITRIC OXIDE/NITROGEN	+/- 0.5%	May 04, 2018
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
GMIS	124206889137	CC323703	4.449 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Aug 14, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 NO	FTIR	Sep 12, 2014
Nicolet 6700 AHR0801933 NO2	FTIR	Sep 12, 2014

Triad Data Available Upon Request

Signature on file

Approved for Release

Q1_LWEC001_Opacity_003993

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0167	Reference Number:	82-124475133-1
Cylinder Number:	CC137964.	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Jan 31, 2015

Expiration Date: Feb 10, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	450.0 PPM	432.6 PPM	G1	+/- 1.0% NIST Traceable	01/31/2015, 02/10/2015
NITRIC OXIDE	450.0 PPM	432.6 PPM	G1	+/- 1.0% NIST Traceable	01/31/2015, 02/10/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061004	CC359348	500.7 PPM NITRIC OXIDE/NITROGEN	+/- 0.5%	Feb 16, 2018
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
GMIS	124206889137	CC323703	4.449 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Aug 14, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 NO	FTIR	Feb 04, 2015
Nicolet 6700 AHR0801933 NO2	FTIR	Feb 04, 2015

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0016	Reference Number:	82-124449619-3
Cylinder Number:	CC366152	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52014	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	Aug 25, 2014

Expiration Date: Aug 25, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	250.0 PPM	252.3 PPM	G1	+/- 1.0% NIST Traceable	08/18/2014, 08/25/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11060854	CC343551	241.0 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.9%	May 13, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 SO2	FTIR	Aug 21, 2014

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Airgas

Airgas, Inc.
600 Union Landing Road
Cinnaminson, NJ 08077
856-829-7878 Fax: 856-829-6576
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0259	Reference Number:	82-124431126-1
Cylinder Number:	CC409079	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52014	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	May 07, 2014

Expiration Date: May 07, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	450.0 PPM	451.2 PPM	G1	+/- 0.8% NIST Traceable	04/29/2014, 05/07/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062932	CC407456	483.1 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Jul 18, 2018
NTRM	12062925	CC407415	483.1 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Jul 18, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 SO2	FTIR	May 01, 2014

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

Airgas, Inc.
600 Union Landing Road
Cinnaminson, NJ 08077
(856) 829-7878 Fax: (856) 829-6576
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0440	Reference Number:	82-124396834-1
Cylinder Number:	CC308182	Cylinder Volume:	146.2 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52013	Valve Outlet:	590
Gas Code:	CH4,BALA	Certification Date:	Oct 01, 2013

Expiration Date: Oct 01, 2021

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	15.00 PPM	15.26 PPM	G1	+/- 1.0% NIST Traceable	10/01/2013
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060510	CC207907	10.00 PPM METHANE/AIR	+/- 0.8%	Apr 27, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 CH4	FTIR	Sep 24, 2013

~~Triad Data Available Upon Request~~

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas, Inc.
600 Union Landing Road
Cinnaminson, NJ 08077
856-829-7878 Fax: 856-829-6576
www.airgas.com

Part Number:	E02AI99E15A0570	Reference Number:	82-124443565-1
Cylinder Number:	CC452183	Cylinder Volume:	146.2 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52014	Valve Outlet:	590
Gas Code:	CH4,BALA	Certification Date:	Jul 16, 2014

Expiration Date: Jul 16, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	25.00 PPM	25.39 PPM	G1	+/- 0.9% NIST Traceable	07/16/2014
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRMplus	100612	CC323612	53.48 PPM METHANE/AIR	+/- 0.7%	Jul 13, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 CH4	FTIR	Jul 08, 2014

Triad Data Available Upon Request

Notes:

C. Mady Cieszki

Approved for Release

2W 98 0700

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Innaminson, NJ 08077
(856) 829-7878 Fax: (856) 829-6576
www.airgas.com

Part Number:	E02AI99E15A0569	Reference Number:	82-124305015-1
Cylinder Number:	XC031000B	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52012	Valve Outlet:	590
Gas Code:	APPVD	Analysis Date:	Feb 25, 2012

Expiration Date: Feb 25, 2015

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	45.00 PPM	45.22 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	10061203	CC323618	53.48PPM METHANE/NITROGEN	Jul 13, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APW1100391 CH4	FTIR	Feb 23, 2012

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02AI99E15A1704	Reference Number:	122-124455358-1
Cylinder Number:	CC500481	Cylinder Volume:	146.2 CF
Laboratory:	ASG - Durham - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22014	Valve Outlet:	660
Gas Code:	NO2,BALA	Certification Date:	Sep 30, 2014

Expiration Date: Sep 30, 2017

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	50.00 PPM	48.70 PPM	G1	+/- 2.2%	09/23/2014, 09/30/2014
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	0207201407	CC500947	59.72 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 07, 2017
PRM	12325	APEX1099251	50.00 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Jul 26, 2014

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Ametek 9000 H2S ZA-9000-10312-1	Ultraviolet	Sep 25, 2014

Triad Data Available Upon Request

Signature on file

Approved for Release

NOx CONVERTER EFFICIENCY

Number 1

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Start Time: 08:03

NO_2 Standard: 48.7 ppm, Cylinder CC500481, Expires 9-30-2017

NO_x
Analyzer: Thermo 42i

Time	ppm	Status
08:04:05	44.4	Pass
08:04:20	44.5	Pass
08:04:35	44.6	Pass
08:04:50	44.6	Pass
Avg	**44.5**	**Pass**

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI62E15A0224	Reference Number:	82-124498006-1
Cylinder Number:	CC287635	Cylinder Volume:	157.2 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jun 17, 2015

Expiration Date: Jun 17, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	17.00 %	16.50 %	G1	+/- 0.7% NIST Traceable	06/17/2015
OXYGEN	21.00 %	21.29 %	G1	+/- 0.9% NIST Traceable	06/17/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060739	CC414621	16.939 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 08, 2019
NTRMplus	09061404	CC267783	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-LDH9LRNS	NDIR	May 19, 2015
Siemens Oxymat 6E-O2-N1-M1-0603	Paramagnetic	Jun 04, 2015

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A00E4	Reference Number:	82-124503751-1
Cylinder Number:	CC158735	Cylinder Volume:	150.5 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jul 22, 2015

Expiration Date: Jul 22, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	9.000 %	8.726 %	G1	+/- 0.7% NIST Traceable	07/22/2015
OXYGEN	12.00 %	11.83 %	G1	+/- 0.5% NIST Traceable	07/22/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060626	CC413722	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019
NTRM	09060237	CC263123	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-LDH9LRNS	NDIR	Jul 17, 2015
Siemens Oxymat 6E-O2-N1-M1-0603	Paramagnetic	Jul 02, 2015

Triad Data Available Upon Request

Signature on file

Approved for Release

RUN DATA

Number 5

Client: **LWEC**
Location: **L'Anse, MI**
Source: **ESP Out**

Calibration **1**

Project Number:
Operator: **FJS**
Date: **24 Sep 2015**

Time	CO ppm	THC ppm
Linearity Check 248 .1 ppm CO		
19:47:31	240	0.0
19:47:46	240	0.0
19:48:01	242	0.0
19:48:16	246	0.0
19:48:31	246	0.0
19:48:46	246	0.8
Linearity check w 5.071 ppm CH4 CC 23075 Exp 9/24/22		
19:53:16	9	5.2
19:53:31	47	5.3
19:53:46	37	5.2
19:54:01	6	5.2
19:54:16	1	5.2
19:54:31	0	5.2
Avgs	**130**	**2.7**

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: Servomex - O_2
Model No: 4900
Serial No: 49000-652921
Calibration Span: 21.09 %
Pollutant: 21.09% O_2 - CC418692

INTERFERENT GAS	ANALYZER RESPONSE		% OF CALIBRATION SPAN[a]
	INTERFERENT GAS RESPONSE (%)	INTERFERENT GAS RESPONSE, WITH BACKGROUND POLLUTANT (%)	
CO_2 (30.17% CC199689)	0.00	-0.01	0.00
NO (445 ppm CC346681)	0.00	0.02	0.11
NO_2 (23.78 ppm CC500749)	NA	NA	NA
N_2O (90.4 ppm CC352661)	0.00	0.05	0.24
CO (461.5 ppm XC006064B)	0.00	0.02	0.00
SO_2 (451.2 ppm CC409079)	0.00	0.05	0.23
CH_4 (453.1 ppm SG901795)	NA	NA	NA
H_2 (552 ppm ALM048043)	0.00	0.09	0.44
HCl (45.1 ppm CC17830)	0.00	0.03	0.14
NH_3 (9.69 ppm CC58181)	0.00	0.01	0.03
TOTAL INTERFERENCE RESPONSE			**1.20**
METHOD SPECIFICATION			**< 2.5%**

[a] The larger of the absolute values obtained for the interferent tested with and without the pollutant present was used in summing the interferences.

Chad Walker

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: Servomex - CO_2
Model No: 4900
Serial No: 49000-652921
Calibration Span: 16.65%
Pollutant: 16.65% CO_2 - CC418692

INTERFERENT GAS	ANALYZER RESPONSE		% OF CALIBRATION SPAN[a]
	INTERFERENT GAS RESPONSE (%)	INTERFERENT GAS RESPONSE, WITH BACKGROUND POLLUTANT (%)	
CO_2 (30.17% CC199689)	NA	NA	NA
NO (445 ppm CC346681)	0.00	0.02	0.10
NO_2 (23.78 ppm CC500749)	0.00	0.00	0.02
N_2O (90.4 ppm CC352661)	0.00	0.01	0.04
CO (461.5 ppm XC006064B)	0.00	0.01	0.00
SO_2 (451.2 ppm CC409079)	0.00	0.11	0.64
CH_4 (453.1 ppm SG901795)	0.00	0.07	0.44
H_2 (552 ppm ALM048043)	0.00	0.04	0.22
HCl (45.1 ppm CC17830)	0.10	0.06	0.60
NH_3 (9.69 ppm CC58181)	0.00	0.02	0.14
TOTAL INTERFERENCE RESPONSE			**2.19**
METHOD SPECIFICATION			**< 2.5%**

[a] The larger of the absolute values obtained for the interferent tested with and without the pollutant present was used in summing the interferences.

Chad Walker

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: Thermo Scientific - NOx
Model No: 42i
Serial No: 1010241985
Calibration Span: 89.96 ppm
Pollutant: 89.96 ppm NOx- CC280558

INTERFERENT GAS	ANALYZER RESPONSE		% OF CALIBRATION SPAN[a]
	INTERFERENT GAS RESPONSE (ppm)	INTERFERENT GAS RESPONSE, WITH BACKGROUND POLLUTANT (ppm)	
CO_2 (30.17% CC199689)	0.20	0.13	0.22
NO (445 ppm CC346681)	NA	NA	NA
NO_2 (23.78 ppm CC500749)	NA	NA	NA
N_2O (90.4 ppm CC352661)	0.30	0.28	0.33
CO (461.5 ppm XC006064B)	0.20	0.09	0.22
SO_2 (451.2 ppm CC409079)	0.40	0.49	0.54
CH_4 (453.1 ppm SG901795)	0.00	0.25	0.27
H_2 (552 ppm ALM048043)	0.10	0.05	0.11
HCl (45.1 ppm CC17830)	0.10	0.26	0.28
NH_3 (9.69 ppm CC58181)	0.20	0.16	0.22
TOTAL INTERFERENCE RESPONSE			**2.21**
METHOD SPECIFICATION			**< 2.5%**

[a] The larger of the absolute values obtained for the interferent tested with and without the pollutant present was used in summing the interferences.

Chad Walker

INTERFERENCE CHECK

Date: 12/4/14-12/5/14
Analyzer Type: AMETEK - SO2
Model No: 9000
Serial No: ZZ-9000-S743
Calibration Span: 90.00 ppm
Pollutant: 90.00 ppm SO2- CC274334

INTERFERENT GAS	ANALYZER RESPONSE		% OF CALIBRATION SPAN[a]
	INTERFERENT GAS RESPONSE (ppm)	INTERFERENT GAS RESPONSE, WITH BACKGROUND POLLUTANT (ppm)	
CO_2 (30.17% CC199689)	0.00	0.06	0.06
NO (445 ppm CC346681)	0.00	0.06	0.07
NO_2 (23.78 ppm CC500749)	0.00	0.87	0.96
N_2O (90.4 ppm CC352661)	0.00	0.11	0.12
CO (461.5 ppm XC006064B)	0.00	0.06	0.06
SO_2 (451.2 ppm CC409079)	NA	NA	NA
CH_4 (453.1 ppm SG901795)	0.00	0.11	0.12
H_2 (552 ppm ALM048043)	0.00	0.12	0.14
HCl (45.1 ppm CC17830)	0.00	0.06	0.07
NH_3 (9.69 ppm CC58181)	0.00	0.14	0.16
TOTAL INTERFERENCE RESPONSE			**1.76**
METHOD SPECIFICATION			**< 2.5%**

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[a] The larger of the absolute values obtained for the interferent tested with and without the pollutant present was used in summing the interferences.

Chad Walker

RUN

Number 1

Client: **LWEC** Project Number:

Location: **L'Anse, MI** Operator: **FJS**

Source: **ESP Out** Calibration: **1** Date: **24 Sep 2015**

Time	O2 %	CO2 %	NOx ppm	SO2 ppm	THC ppm
Response Time = 65 sec					
Point 2					
08:28	9.4	10.7	105	126	1.2
08:29	9.2	10.8	104	136	4.2
08:30	9.1	11.0	104	123	1.2
08:31	9.3	10.7	104	130	1.1
08:32	9.2	10.8	105	128	1.3
Average	**9.24**	**10.8**	**104.4**	**128.6**	**1.8**
Point 1					
08:38	9.4	10.7	107	121	1.0
08:39	9.2	10.7	104	128	1.7
08:40	9.1	11.0	104	120	1.2
08:41	9.0	10.9	105	127	1.0
08:42	9.1	11.0	108	126	1.0
Average	**9.16**	**10.9**	**105.6**	**124.4**	**1.2**
Point 3					
08:47	9.1	10.9	105	131	1.4
08:48	9.0	11.2	104	126	0.9
08:49	9.2	10.7	105	132	0.9
08:50	9.0	11.0	104	128	0.8
08:51	9.4	10.6	104	135	1.2
Average	**9.14**	**10.9**	**104.4**	**130.4**	**1.0**
Overall Average	**9.18**	**10.8**	**104.8**	**127.8**	**1.3**
5% minimum	**8.7**	**10.3**	**99.6**	**121.4**	**1.27**
5% maximum	**9.6**	**11.4**	**110.0**	**134.2**	**1.41**
10% minimum	**8.3**	**9.8**	**94.3**	**115.0**	**1.21**
10% maximum	**10.1**	**11.9**	**115.3**	**140.6**	**1.47**

Long Cal and Temperature Cal Datasheet for Standard Dry Gas Meter Console

Calibrator PM **Meter Box Number** 26 **Ambient Temp** 72

Date 13-Jul-15 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 16300942

Baro Press, in Hg (Pb)	29.69

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	429.136	73.0	74.00	74.00	74.5	13.3	1.0006	2.0077
		434.141		75.00	75.00				
		5.005		74.50	74.50				
1.0	5.0	434.141	73.0	75.00	75.00	76.0	9.6	1.0019	2.0861
		439.147		77.00	77.00				
		5.006		76.00	76.00				
1.5	10.0	439.147	73.0	77.00	77.00	78.5	16.4	1.0030	2.2725
		449.183		80.00	80.00				
		10.036		78.50	78.50				
2.0	10.0	449.183	73.0	80.00	80.00	80.5	14.1	1.0033	2.2314
		459.241		81.00	81.00				
		10.058		80.50	80.50				
3.0	10.0	459.241	73.0	81.00	81.00	82.0	11.6	0.9999	2.2591
		469.336		83.00	83.00				
		10.095		82.00	82.00				
							Average	**1.0017**	**2.1714**

Vw - Gas Volume passing through the wet test meter
Vd - Gas Volume passing through the dry gas meter
Tw - Temp of gas in the wet test meter
Tdi - Temp of the inlet gas of the dry gas meter
Tdo - Temp of the outlet gas of the dry gas meter
Td - Average temp of the gas in the dry gas meter

0 - Time of calibration run
Pb - Barometric Pressure
ΔH - Pressure differential across orifice
Y - Ratio of accuracy of wet test meter to dry gas meter

$$Y = \frac{Vw * Pb * (td + 460)}{Vd * \left[Pb + \frac{(\Delta H)}{13.6} \right] * (tw + 460)}$$

$$\Delta H = \left[\frac{0.0317 * \Delta H}{Pb * (td + 460)} \right] * \left[\frac{(tw + 460) * O}{Vw} \right]^2$$

Reference Temperature	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
Select Temperature ○ °C ◉ °F	Channel Number							
	1	2	3	4	5	6		
32	32	32	32	32	32		32.0	0.0%
212	212	212	212	212	212		212.0	0.0%
932	932	932	932	932	932		932.0	0.0%
1832	1830	1830	1830	1830	1830		1830.0	0.1%

1 - Channel Temps must agree with +/- 5°F or 3°C
2 - Acceptable Temperature Difference less than 1.5 %

$$\text{Temp Diff} = \left[\frac{(\text{Reference Temp}(°F) + 460) - (\text{Test Temp}(°F) + 460)}{\text{Reference Temp}(°F) + 460} \right]$$

Y Factor Calibration Check Calculation

METHOD 26A (PART/HCl)TEST TRAIN

METER BOX NO. 26

RUN NO. 3 9/24/15

MWd = Dry molecular weight source gas, lb/lb-mole.	
0.32 = Molecular weight of oxygen, divided by 100.	
0.44 = Molecular weight of carbon dioxide, divided by 100.	
0.28 = Molecular weight of nitrogen or carbon monoxide, divided by 100.	
% CO_2 = Percent carbon dioxide by volume, dry basis.	11.5
% O_2 = Percent oxygen by volume, dry basis.	8.7

$$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$$

$$MWd = (0.32 * 8.7) + (0.44 * 11.5) + (0.28 * (100 - (11.5 + 8.7)))$$

$$MWd = (2.78) + (5.06) + (22.34)$$

MWd = 30.19

Tma = Source Temperature, absolute(^{o}R)	
Tm = Average dry gas meter temperature , deg F.	79.9

Tma = Ts + 460

Tma = 79.92 + 460

Tma = 539.92

Ps = Absolute meter pressure, inches Hg.	
13.60 = Specific gravity of mercury.	
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	1.745
Pb = Barometric Pressure, in Hg.	29.74

Pm = Pb + (delta H / 13.6)

Pm = 29.74 + (1.745 / 13.6)

Pm = 29.87

Yqa = dry gas meter calibration check value, dimensionless.	
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.	
29.00 = dry molecular weight of air, lb/lb-mole.	
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	47.060
Y = Dry gas meter calibration factor (based on full calibration)	1.0017
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	2.1714
g SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.3130
O = Total sampling time, minutes.	72

Yqa = (O / Vm) * SQRT (0.0319 * Tma * 29) / (Delta H@ * Pm * MWd) * avg SQRT Delta H

Yqa = (72.00 / 47.06) * SQRT (0.0319 * 539.92 * 29) / (2.17 * 29.87 * 30.19) * 1.31

Yqa = 1.530 * SQRT 499.477 / 1,957.985 * 1.31

Yqa = 1.015

Diff = Absolute difference between Yqa and Y	

Diff = ((Y - Yqa) / Y) * 100

Diff = ((1.0017 - 1.015) / 1.0017) * 100

Diff = 1.33

Long Cal and Temperature Cal Datasheet for Standard Dry Gas Meter Console

Calibrator PM **Meter Box Number** 23 **Ambient Temp** 73

Date 15-Sep-15 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 15042595

Setting	Gas Volume		Temperatures					Baro Press, in Hg (Pb)	30.11
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter				Calibration Results	
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.3	53.925	73.0	78.00	78.00	78.5	14.9	1.0083	2.1949
		59.229		79.00	79.00				
		5.304		78.50	78.50				
1.0	5.0	59.229	73.0	79.00	79.00	79.0	10.2	1.0032	2.3093
		64.257		79.00	79.00				
		5.028		79.00	79.00				
1.5	10.0	64.257	73.0	79.00	79.00	80.0	17.1	1.0043	2.4294
		74.308		81.00	81.00				
		10.051		80.00	80.00				
2.0	10.0	74.308	73.0	81.00	81.00	81.5	14.9	1.0042	2.4525
		84.376		82.00	82.00				
		10.068		81.50	81.50				
3.0	10.0	84.376	73.0	82.00	82.00	82.5	12.1	1.0050	2.4216
		94.430		83.00	83.00				
		10.054		82.50	82.50				
							Average	**1.0050**	**2.3615**

Vw - Gas Volume passing through the wet test meter
Vd - Gas Volume passing through the dry gas meter
Tw - Temp of gas in the wet test meter
Tdi - Temp of the inlet gas of the dry gas meter
Tdo - Temp of the outlet gas of the dry gas meter
Td - Average temp of the gas in the dry gas meter

0 - Time of calibration run
Pb - Barometric Pressure
ΔH - Pressure differential across orifice
Y - Ratio of accuracy of wet test meter to dry gas meter

$$Y = \frac{Vw * Pb * (td + 460)}{Vd * \left[Pb + \frac{(\Delta H)}{13.6}\right] * (tw + 460)}$$

$$\Delta H = \left[\frac{0.0317 * \Delta H}{Pb * (td + 460)}\right] * \left[\frac{(tw + 460) * O}{Vw}\right]^2$$

Reference Temperature	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
Select Temperature ○ °C ◉ °F	Channel Number							
	1	2	3	4	5	6		
32	32	32	32	32	32		32.0	0.0%
212	213	213	213	213	213		213.0	-0.1%
932	933	933	933	933	933		933.0	-0.1%
1832	1830	1830	1830	1830	1830		1830.0	0.1%

1 - Channel Temps must agree with +/- 5°F or 3°C
2 - Acceptable Temperature Difference less than 1.5 %

$$\text{Temp Diff} = \left[\frac{(\text{Reference Temp}(°F) + 460) - (\text{Test Temp}(°F) + 460)}{\text{Reference Temp}(°F) + 460}\right]$$

Y Factor Calibration Check Calculation

METHOD 201A/202 (PM10) TEST TRAIN

METER BOX NO. 23

RUN NO. 3 9/24/15

MWd = Dry molecular weight source gas, lb/lb-mole.	
0.32 = Molecular weight of oxygen, divided by 100.	
0.44 = Molecular weight of carbon dioxide, divided by 100.	
0.28 = Molecular weight of nitrogen or carbon monoxide, divided by 100.	
% CO_2 = Percent carbon dioxide by volume, dry basis.	11.5
% O_2 = Percent oxygen by volume, dry basis.	8.7

$$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$$

$$MWd = (0.32 * 8.7) + (0.44 * 11.5) + (0.28 * (100 - (11.5 + 8.7)))$$

$$MWd = (2.78) + (5.06) + (22.34)$$

MWd = 30.19

Tma = Source Temperature, absolute(°R)	
Tm = Average dry gas meter temperature , deg F.	76.0

Tma = Ts + 460

Tma = 76.00 + 460

Tma = 536.00

Ps = Absolute meter pressure, inches Hg.	
13.60 = Specific gravity of mercury.	
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	0.490
Pb = Barometric Pressure, in Hg.	29.74

Pm = Pb + (delta H / 13.6)

Pm = 29.74 + (0.49 / 13.6)

Pm = 29.78

Yqa = dry gas meter calibration check value, dimensionless.	
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.	
29.00 = dry molecular weight of air, lb/lb-mole.	
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	33.565
Y = Dry gas meter calibration factor (based on full calibration)	1.0050
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	2.3615
SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	0.7000
O = Total sampling time, minutes.	96

Yqa = (O / Vm) * SQRT (0.0319 * Tma * 29) / (Delta H@ * Pm * MWd) * avg SQRT Delta H

Yqa = (96.00 / 33.57) * SQRT (0.0319 * 536.00 * 29) / (2.36 * 29.78 * 30.19) * 0.70

Yqa = 2.860 * SQRT 495.854 / 2,122.985 * 0.70

Yqa = 0.968

Diff = Absolute difference between Yqa and Y	

Diff = ((Y - Yqa) / Y) * 100

Diff = ((1.005 - 0.968) / 1.005) * 100

Diff = 3.68

Long Cal and Temperature Cal Datasheet for Standard Dry Gas Meter Console

Calibrator PM **Meter Box Number** 31 **Ambient Temp** 72

Date 16-Jan-15 **Wet Test Meter Number** P-2952 **Temp Reference Source** Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number 17485128

Baro Press, in Hg (Pb)	29.74

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	224.247	70.0	75.00	76.00	75.5	13.1	0.9950	1.9190
		229.318		75.00	76.00				
		5.071		75.00	76.00				
1.0	6.0	229.318	70.0	77.00	78.00	77.5	11.3	0.9993	1.9758
		235.392		77.00	78.00				
		6.074		77.00	78.00				
1.5	10.1	235.392	70.0	78.00	79.00	78.5	16.0	0.9940	2.0930
		245.678		78.00	79.00				
		10.286		78.00	79.00				
2.0	10.4	245.678	70.0	80.00	81.00	80.5	14.3	0.9840	2.0946
		256.403		80.00	81.00				
		10.725		80.00	81.00				
3.0	10.0	256.403	70.0	81.00	83.00	82.0	11.2	0.9837	2.0789
		266.722		81.00	83.00				
		10.319		81.00	83.00				
							Average	**0.9912**	**2.0323**

Vw - Gas Volume passing through the wet test meter
Vd - Gas Volume passing through the dry gas meter
Tw - Temp of gas in the wet test meter
Tdi - Temp of the inlet gas of the dry gas meter
Tdo - Temp of the outlet gas of the dry gas meter
Td - Average temp of the gas in the dry gas meter

0 - Time of calibration run
Pb - Barometric Pressure
ΔH - Pressure differential across orifice
Y - Ratio of accuracy of wet test meter to dry gas meter

$$Y = \frac{Vw * Pb * (td + 460)}{Vd * \left[Pb + \frac{(\Delta H)}{13.6}\right] * (tw + 460)}$$

$$\Delta H = \left[\frac{0.0317 * \Delta H}{Pb * (td + 460)}\right] * \left[\frac{(tw + 460) * O}{Vw}\right]^2$$

Reference Temperature	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
Select Temperature ○ °C ◉ °F	Channel Number							
	1	2	3	4	5	6		
32	31	31	31	31	31		31.0	0.2%
212	212	212	212	212	212		212.0	0.0%
932	932	932	932	932	932		932.0	0.0%
1832	1831	1831	1831	1831	1831		1831.0	0.0%

1 - Channel Temps must agree with +/- 5°F or 3°C
2 - Acceptable Temperature Difference less than 1.5 %

$$\text{Temp Diff} = \left[\frac{(\text{Reference Temp}(°F) + 460) - (\text{Test Temp}(°F) + 460)}{\text{Reference Temp}(°F) + 460}\right]$$

Y Factor Calibration Check Calculation

METHOD 26A (HCl)TEST TRAIN

METER BOX NO. 31

RUN NO. 3 11/5/15

MWd = Dry molecular weight source gas, lb/lb-mole.	
0.32 = Molecular weight of oxygen, divided by 100.	
0.44 = Molecular weight of carbon dioxide, divided by 100.	
0.28 = Molecular weight of nitrogen or carbon monoxide, divided by 100.	
% CO_2 = Percent carbon dioxide by volume, dry basis.	11.2
% O_2 = Percent oxygen by volume, dry basis.	9.1

$$MWd = (0.32 * O_2) + (0.44 * CO_2) + (0.28 * (100 - (CO_2 + O_2)))$$

$$MWd = (0.32 * 9.1) + (0.44 * 11.2) + (0.28 * (100 - (11.2 + 9.1)))$$

$$MWd = (2.91) + (4.93) + (22.32)$$

MWd = 30.16

Tma = Source Temperature, absolute($^{\circ}$R)	
Tm = Average dry gas meter temperature , deg F.	75.2

Tma = Ts + 460

Tma = 75.17 + 460

Tma = 535.17

Ps = Absolute meter pressure, inches Hg.	
13.60 = Specific gravity of mercury.	
delta H = Avg pressure drop across the orifice meter during sampling, in H2O	1.360
Pb = Barometric Pressure, in Hg.	29.09

Pm = Pb + (delta H / 13.6)

Pm = 29.09 + (1.36 / 13.6)

Pm = 29.19

Yqa = dry gas meter calibration check value, dimensionless.	
0.03 = (29.92/528)(0.75)2 (in. Hg/°/R) cfm2.	
29.00 = dry molecular weight of air, lb/lb-mole.	
Vm = Volume of gas sample measured by the dry gas meter at meter conditions, dcf.	36.988
Y = Dry gas meter calibration factor (based on full calibration)	0.9912
Delta H@ = Dry Gas meter orifice calibration coefficient, in. H2O.	2.0323
g SQRT Delta H = Avg SQRT press. drop across the orifice meter during sampling , in. H_2O	1.1570
O = Total sampling time, minutes.	60

Yqa = (O / Vm) * SQRT (0.0319 * Tma * 29) / (Delta H@ * Pm * MWd) * avg SQRT Delta H

Yqa = (60.00 / 36.99) * SQRT (0.0319 * 535.17 * 29) / (2.03 * 29.19 * 30.16) * 1.16

Yqa = 1.622 * SQRT 495.083 / 1,788.939 * 1.16

Yqa = 0.987

Diff = Absolute difference between Yqa and Y	

Diff = ((Y - Yqa) / Y) * 100

Diff = ((0.9912 - 0.987) / 0.9912) * 100

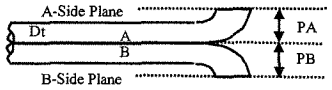
Diff = 0.42

Type S Pitot Tube Inspection Data Form

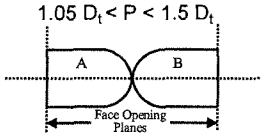
Pitot Tube Identification Number: **P-154**

If all Criteria PASS Cp is equal to 0.84

Inspection Date 1/12/15 Individual Conducting Inspection SR

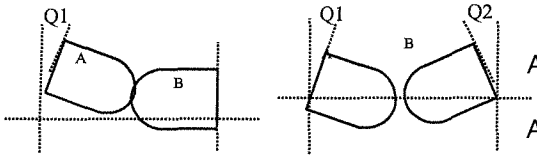


		PASS/FAIL
Distance to A Plane (PA) - inches	0.472	PASS
Distance to B Plane (PB) - inches	0.472	PASS
Pitot OD (D_t) - inches	0.375	



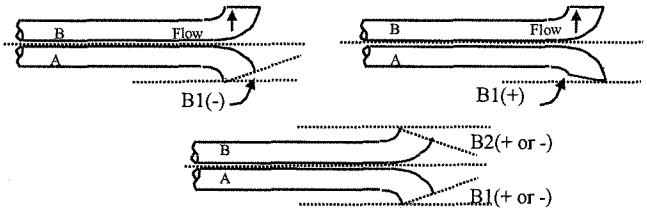
PA must Equal PB

Are Open Faces Aligned Perpendicular to the Tube Axis: ◉ YES ○ NO — PASS



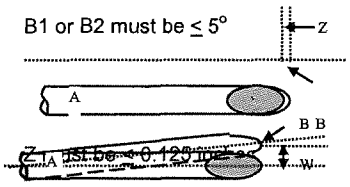
Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	1	PASS

Q1 and Q2 must be ≤ 10°



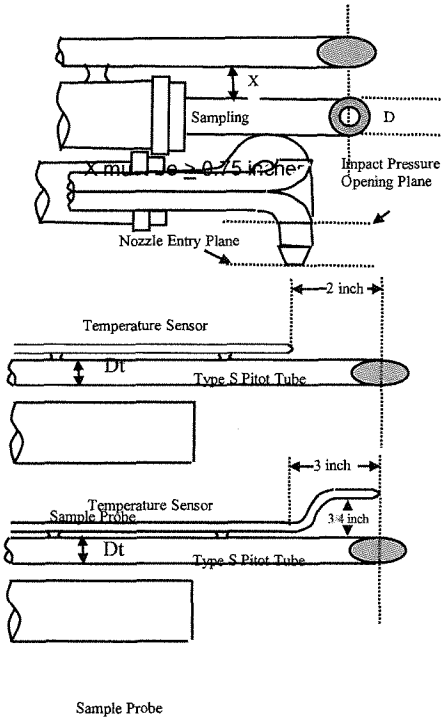
Angle of B1 from vertical A Tube- degrees (absolute)	1	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	2	PASS

B1 or B2 must be ≤ 5°



Horizontal offset between A and B Tubes (Z) - inches	0	PASS
Vertical offset between A and B Tubes (W) - inches	0.01	PASS

W must be ≤ 0.03125 inches



Distance between Sample Nozzle and Pitot (X) - inches	0.901	PASS

Impact Pressure Opening Plane is above the Nozzle Entry Plane: ◉ YES ○ NO ○ NA

Thermocouple meets the Distance Criteria in the adjacent figure: ○ YES ○ NO ◉ NA

Thermocouple meets the Distance Criteria in the adjacent figure: ◉ YES ○ NO ○ NA

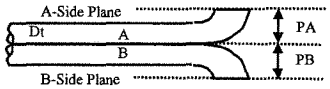
Q1_LWEC001_Opactiy_004016

Type S Pitot Tube Inspection Data Form

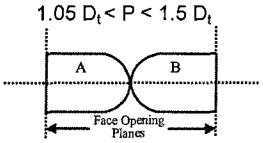
Pitot Tube Identification Number: **P-686**

If all Criteria PASS Cp is equal to 0.84

Inspection Date 1/12/15 Individual Conducting Inspection SR

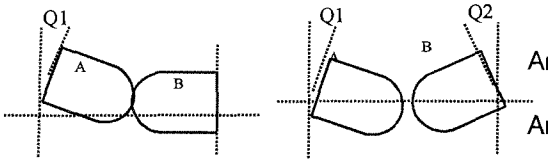


		PASS/FAIL
Distance to A Plane (PA) - inches	0.455	PASS
Distance to B Plane (PB) - inches	0.455	PASS
Pitot OD (D_t) - inches	0.375	



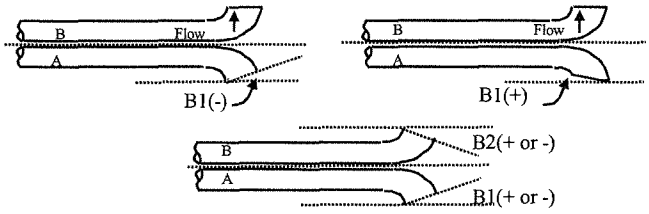
PA must Equal PB

Are Open Faces Aligned Perpendicular to the Tube Axis	◉ YES ○ NO	PASS



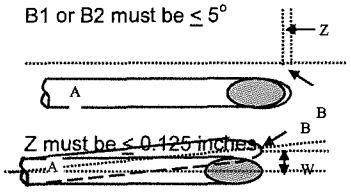
Angle of Q1 from vertical A Tube- degrees (absolute)	1	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	0	PASS

Q1 and Q2 must be ≤ 10°



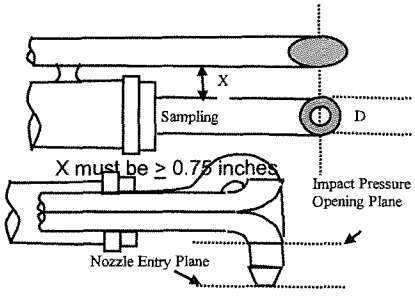
Angle of B1 from vertical A Tube- degrees (absolute)	2	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	1	PASS

B1 or B2 must be ≤ 5°



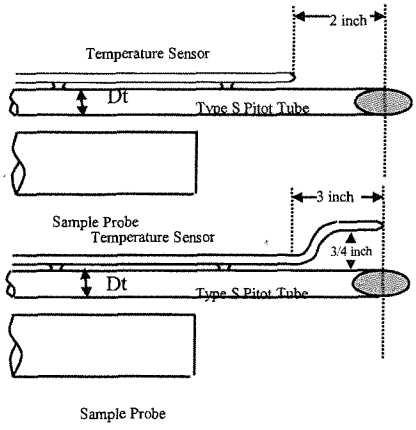
Horizontal offset between A and B Tubes (Z) - inches	0.016	PASS
Vertical offset between A and B Tubes (W) - inches	0.02	PASS

W must be ≤ 0.03125 inches



Distance between Sample Nozzle and Pitot (X) - inches	0.921	PASS

Impact Pressure Opening Plane is above the Nozzle Entry Plane	◉ YES ○ NO ○ NA	



Thermocouple meets the Distance Criteria in the adjacent figure	○ YES ○ NO ◉ NA	
Thermocouple meets the Distance Criteria in the adjacent figure	◉ YES ○ NO ○ NA	

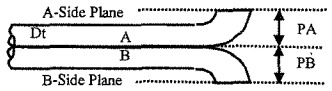
Q1_LWEC001_Opactiy_004017

Type S Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **P-131**

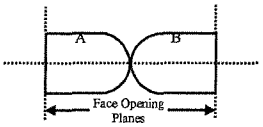
If all Criteria PASS Cp is equal to 0.84

Inspection Date 1/12/15 Individual Conducting Inspection SR

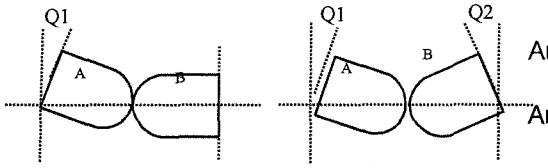


		PASS/FAIL
Distance to A Plane (PA) - inches	0.478	PASS
Distance to B Plane (PB) - inches	0.478	PASS
Pitot OD (D_t) - inches	0.375	

$1.05\ D_t < P < 1.5\ D_t$ PA must Equal PB

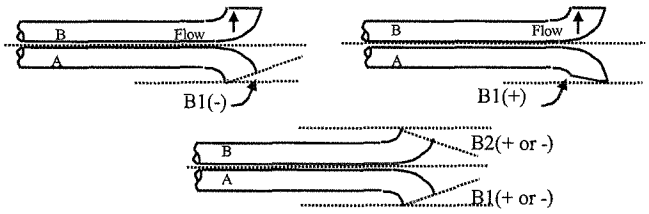


Are Open Faces Aligned Perpendicular to the Tube Axis: ◉ YES ○ NO — PASS



Angle of Q1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of Q2 from vertical B Tube- degrees (absolute)	2	PASS

Q1 and Q2 must be ≤ 10°

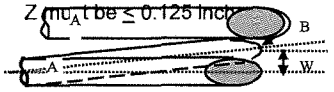


Angle of B1 from vertical A Tube- degrees (absolute)	0	PASS
Angle of B1 from vertical B Tube- degrees (absolute)	1	PASS

B1 or B2 must be ≤ 5°

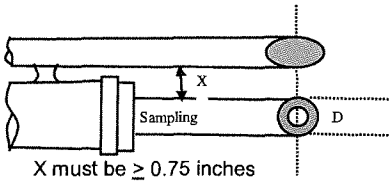
Horizontal offset between A and B Tubes (Z) - inches	0.016	PASS

Z must be ≤ 0.125 inch



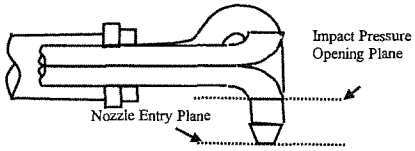
Vertical offset between A and B Tubes (W) - inches	0.02	PASS

W must be ≤ 0.03125 inches

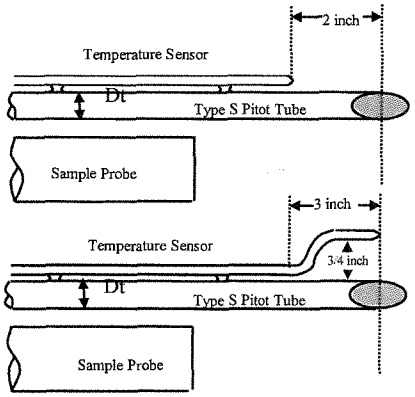


Distance between Sample Nozzle and Pitot (X) - inches	1.289	PASS

X must be ≥ 0.75 inches



Impact Pressure Opening Plane is above the Nozzle Entry Plane: ◉ YES ○ NO ○ NA



Thermocouple meets the Distance Criteria in the adjacent figure: ○ YES ○ NO ◉ NA

Thermocouple meets the Distance Criteria in the adjacent figure: ◉ YES ○ NO ○ NA

Q1_LWEC001_Opactiy_004018