EMISSION TEST REPORT

Report Title	RESULTS OF VOLATILE ORGANIC COMPOUND EMISSION COMPLIANCE TESTING
Report Date	February 25, 2020
Test Dates	January 8, 2020

Facility Information	
Name Street Address City, County SRN	Atmosphere Annealing, LLC 209-1 W Mt. Hope Avenue Lansing, Ingham N2473

Facility Permit Information	
Permit to Install No.:	289-98B
Emission Unit	EU13&14OILQUENCH

Testing Contractor	
Company Mailing Address	Impact Compliance and Testing, Inc. 4180 Keller Rd., Ste. B Holt, MI 48842
Phone	(517) 268-0043
Project No.	1900223

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RESULTS OF VOLATILE ORGANIC COMPOUND
EMISSION COMPLIANCE TESTING
ATMOSPHERIC ANNEALING, LLC

LANSING, MICHIGAN

1.0 INTRODUCTION

Atmosphere Annealing, LLC (Atmospheric Annealing) operates a metal heat treating facility in Lansing, Ingham County, Michigan. The facility contains various furnaces that are used for hardening, annealing, normalizing, and tempering metal parts.

Permit to Install (PTI) 289-98B was recently issued to Atmosphere Annealing to add a quenching operation for Line 13/14. Condition V.1 in PTI 289-98B for emission unit EU13&14OILQUENCH specifies that … *Within 90 days after commencement of initial startup, the permittee shall verify VOC emission rates from EU13&14OILQUENCH through the determination of a VOC emission factor (in lbs VOC/ton of metal) by testing at the owner's expense …*

Testing was performed to determine the Line 13/14 oil quench (EU13&14OILQUENCH) volatile organic compound (VOC) mass flowrate for the emission unit.

The VOC emission testing was performed January 8, 2020 by Impact Compliance and Testing, Inc. representatives Andrew Rusnak and Clay Gaffey. The project was coordinated by Atmospheric Annealing representative Mr. Kyle Vliet and BB&E, Inc. representative Mr. Tanner Weekley.

Mr. Tom Gasloli, Ms. Lindsey Wells, Ms. Samantha Davis and Mr. Matt Karl of the EGLE-AQD were on-site to observe portions of the compliance testing. The exhaust gas sampling and analysis was performed using procedures specified in the Test Plan submitted to MDEQ-AQD dated October 17, 2019 and approved by the regulatory agency.

Appendix 1 provides a copy of the test plan approval letter issued by the MDEQ-AQD.

1.1 Project Contact Information

Questions regarding this emission test report should be directed to:

Andy Rusnak, QSTI
Technical Manager
Impact Compliance and Testing, Inc.
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Holt, MI 48842
(517) 268-0043
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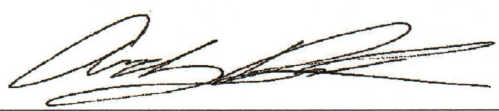
Tanner Weekley, PE
Environmental Engineer
BB&E, Inc.
235 E. Main St, Ste 107
Northville MI 48167
tweekley@bbande.com
248-489-9636 ext 304

1.2 Report Certification

This test report was prepared by Impact Compliance and Testing, Inc. based on field sampling data collected by Impact Compliance and Testing, Inc. Facility process data were collected and provided by Atmospheric Annealing employees or representatives. This test report has been reviewed by Atmospheric Annealing representatives and approved for submittal to the EGLE-AQD.

I certify that the testing was conducted in accordance with the approved test plan unless otherwise specified in this report. I believe the information provided in this report and its attachments are true, accurate, and complete.

Report Prepared By:



Andy Rusnak, QSTI
Technical Manager
Impact Compliance and Testing, Inc.

2.0 SOURCE AND SAMPLING LOCATION DESCRIPTION

2.1 Oil Quench Line

EU13&14OILQUENCH is described as *Two natural gas fired furnaces. The furnaces can be used as stand-alone normalize furnaces or can be used as an oil quench line. During oil quench operation, parts go through furnace F-13, the oil quench, a parts washer, and then through furnace F-14.*

Emissions from the oil quench section are captured by a hood and exhausted to stack SV13&14 by a blower located on the roof.

2.2 Type and Typical Quantity of Raw and Finished Materials Used in each Process

Metal parts are loaded onto trays and weighed. The trays enter and travel through the oil quench bath via a conveyor. The system operates as a batch process. The weight of the batch is dependent on the size, shape and amount of the metal parts being quenched.

2.3 Emission Control System Description

EU13&14OILQUENCH is not equipped with add-on emission controls. Air pollutant emissions are minimized by process operations and design.

2.4 Sampling Locations and Velocity Measurements

The sampling location for EU13&14OILQUENCH was the 38" x 28" capture hood exhaust stack.

Velocity traverse locations for the sampling point were determined in accordance with USEPA Method 1. A cyclonic flow check was performed for the measurement location to verify acceptability of the flow profile. Exhaust gas velocity pressure and temperature were measured at each sampling location in accordance with USEPA Method 2 using an S-type Pitot tube connected to a red-oil manometer. A K-type thermocouple mounted to the Pitot tube was used for temperature measurements. The Pitot tube and connective tubing were periodically leak-checked to verify the integrity of the measurement system.

Appendix 2 provides diagrams of the test sampling location.

3.0 SUMMARY OF RESULTS

3.1 Purpose and Objectives of the Tests

The EU13&14OILQUENCH was operated pursuant to the conditions of EGLE-AQD Permit to Install No. 289-98B, issued May 13, 2019.

Condition No. V.1. for EU13&14OILQUENCH (PTI No. 289-98B) states:

> *Within 90 days after commencement of initial startup, the permittee shall verify VOC emission rates from EU13&14OILQUENCH through the determination of a VOC emission factor (in lbs VOC/ton of metal) by testing at the owner's expense, in accordance with Department requirements..*

For the VOC mass flowrate determination the exhaust gas stream was monitored for three (3) one-hour test periods during which the VOC, oxygen (O_2) and carbon dioxide (CO_2) concentrations were determined. Moisture content for the gas stream was also determined.

3.2 Variations from Normal Sampling Procedures or Operating Conditions

The testing was performed in accordance with the Test Protocol dated October 17, 2019 and specified USEPA test methods.

No variations from the normal operating conditions occurred during the testing program.

All instrument calibrations and sampling period results satisfied the quality assurance verifications required by USEPA Methods 3A and 25A. The EGLE requested that the measured VOC test concentrations be drift corrected using the measured calibration readings and the equations contained in USEPA Method 7E.

3.3 Process Operating Conditions During the Compliance Testing

During the compliance testing metal parts weighing 388 pounds (lb) were loaded onto individual trays. Every sixteen (16) minutes three (3) trays entered the oil quench bath (and three trays exited the bath). The process operated continuously and uninterrupted throughout the testing program. The calculated metal part mass throughput rate during the compliance testing program was approximately 4,365 lb/hr.

388 lb/tray * 3 trays/16 minutes * 60 minutes/hr = 4,365 lb/hr

Table 3.1 presents a summary of the production data for the test day.

Appendix 3 provides facility production records.

3.4 Summary of Air Pollutant Sampling Results

The EU13&14OILQUENCH exhaust gas stream was monitored during three (3) one-hour test periods to determine the VOC mass flowrate exhausted from EU13&14OILQUENCH. The calculated VOC mass flowrate was 0.61 lb/hr. During the compliance testing program EU13&14OILQUENCH processed approximately 4,365 lb metal/hr (2.18 tons metal/hr). The resultant emission factor is 0.28 lb VOC/ton metal.

0.61 lb VOC/hr / 2.18 tons metal/hr = 0.28 lb VOC/ton metal

Table 3.2 presents a summary of the compliance test results.

Table 3.1 Summary of production data during January 8, 2020 test event

Parameter	Measurement	Units
Metal process rate	4,365	lb/hr

Table 3.2 Summary of VOC test results

Operating Parameter / Test Measurement	Test No.1 Results	Test No.2 Results	Test No.3 Results	Average
Emission rate (lb/hr)	0.64	0.60	0.59	0.61
Emission factor (lb/ton)	0.30	0.28	0.27	0.28

4.0 SAMPLING AND ANALYTICAL PROCEDURES

The compliance testing consisted of the determination of nonmethane hydrocarbon (NMHC) concentration and air flowrate for the gas stream exiting EU13&14OILQUENCH.

4.1 Summary of USEPA Test Methods

Impact Compliance and Testing, Inc. performed the exhaust gas and pollutant measurements in accordance with the following USEPA reference test methods:

Method 1	Velocity and sampling locations based on physical stack measurements.
Method 2	Gas flowrate determined using a type S Pitot tube.
Method 3A	Exhaust gas O_2 and CO_2 content determined using instrumental analyzers.
Method 4	Gas moisture based on the water weight gain in chilled impingers for the exhaust gas stream.
Method 25A	Total hydrocarbon concentration using a flame ionization analyzer (FIA) compared to a propane standard.

4.2 VOC Emission Rate Determination

The VOC emission rate was determined based on the sampling of the EU13&14OILQUENCH exhaust gas stream during three (3) one-hour sampling periods. Nonmethane (NMHC) concentration in the exhaust was measured by a TEI Model 55i methane/nonmethane flame ionization detector (FID) equipped with a gas chromatograph (GC) column, for methane separation, according to USEPA Method 25A as described in Section 4.4 of this document.

Gas properties for the EU13&14OILQUENCH exhaust were determined pursuant to USEPA Methods 3A and 4 using instrumental analyzers to determine CO_2/O_2 content and moisture by the chilled impinger method.

Air velocity measurements for each sampling location were performed during each one-hour test period using a type-S Pitot tube in accordance to USEPA Method 2.

4.3 Instrumental Analyzer Operating Procedures

VOC concentration in the exhaust gas stream identified in the previous section was determined by USEPA Method 25A, *Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer.* Throughout each test period, a gas sample from each measurement location was delivered to the instrument rack using a heated Teflon sample line and extractive gas sampling system. NMHC concentrations were determined using a TEI Model 55i FID instrument. The sampled gas stream was not dried prior to being introduced to the FID instrument; therefore, VOC concentration measurements correspond to standard conditions with no moisture correction.

CO_2/O_2 content for the EU13&14OILQUENCH exhaust was monitored continuously throughout the test periods using a Fuji Model ZRF and ZFK3 non-dispersion infrared (NDIR) analyzer for CO_2 and a paramagnetic sensor for O_2 in accordance with USEPA Method 3A. The sampled gas stream was dried prior to analysis using a refrigerant-based condenser equipped with a peristaltic pump to remove moisture from the sampled gas stream. Therefore, CO_2 and O_2 concentration measurements were performed on a dry gas basis.

At the conclusion of each test period, instrument calibration was verified against a mid-range (or representative up-scale) calibration gas and zero gas. The FID instrument was calibrated with certified concentrations of propane in air and zeroed using hydrocarbon-free air. The CO_2/O_2 analyzer was calibrated using certified concentrations of CO_2 and O_2 in nitrogen and zeroed using nitrogen. Concentrations measured with the instrumental analyzers were adjusted for calibration error and zero drift using the procedures in Method 7E.

The TEI Model 55i FID analyzer and Fuji CO_2/O_2 analyzer were rack-mounted in a mobile sampling trailer. Instrument response for each analyzer was recorded on an ESC Model 8816 data logging system that monitored the analog output of the instrumental analyzers continuously and logged data as one-minute averages. A STEC Model SGD-710C ten-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

4.4 Quality Assurance Procedures

Accuracy of the instrumental analyzers used to measure NMHC, O_2 and CO_2 concentration was verified prior to and at the conclusion of each test period using the calibration procedures in Methods 25A, 3A and 7E. Prior to the first test period, appropriate high-range, mid-range and low-range span gases (USEPA protocol 1 certified calibration gases) followed by a zero gas (hydrocarbon free air or nitrogen) were introduced into each sampling system to verify instrument response and sampling system integrity. The calibration gas was delivered to the sampling system through a spring-loaded check valve and a stainless steel "Tee" installed at the base of the sample probe.

The gas divider used to obtain intermediate calibration gas concentrations had been NIST-certified within the previous year with a primary flow standard in accordance with USEPA Method 205 and were verified in the field according the procedures in Method 205, Section 3.2.

The Pitot tubes used for velocity pressure measurements were inspected for mechanical integrity and physical design prior to the field measurements. The gas velocity measurement trains (Pitot tube, connecting tubing and incline manometer) were leak-checked prior to the field measurements and periodically throughout the testing period. The absence of cyclonic flow was also verified for each measurement point.

The Nutech® Model 2010 sampling console and dry gas meter, which was used to extract a metered amount of exhaust gas from the exhaust stack for moisture determination, was calibrated prior to and after the test event using the critical orifice calibration technique specified in USEPA Method 5. The digital pyrometer in the Nutech metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

Appendix 4 provides information and quality assurance data for the equipment and instrumental analyzers used for the destruction and capture efficiency test periods (calibration data, copies of calibration gas certificates, gas divider certification, Pitot tube integrity inspection sheets, and meter box critical orifice calibration records).

5.0 TEST RESULTS AND DISCUSSION

Appendix 5 provides calculations and field data sheets used to determine exhaust gas conditions and volumetric flowrates for each test period.

Appendix 6 provides records of the instrumental analyzer response raw data.

5.1 Test Results and Allowable Emission Limits

Process operating data and air pollutant emission measurement results for each one-hour test period are presented in Table 5.1.

The measured VOC concentrations and emission rates for EU13&14OILQUENCH result in annual emissions (2.7 TpY VOC) that are less than the allowable limits specified in PTI No. 289-98B (calculated by applying the measured hourly emission rate to 8,760 hours of annual operation).

EU13&14OILQUENCH Permitted VOC Emission Limit

- 16.6 TpY

The measured VOC mass emission rate results in a calculated VOC emission factor of 0.28 lb VOC/ton metal processed.

Table 5.1 Measured gas conditions and results for the VOC emission test periods

Date	1/8/20	1/8/20	1/8/20	
Test Times	929-1029	1049-1149	1210-1310	
Test Number	Test 1	Test 2	Test 3	Avg
Operating Data				
Metal Processed (TpH)	2.18	2.18	2.18	2.18
Exhaust Gas Properties				
Temperature (°F)	91	102	98	97
Flowrate (scfm)	21,108	19,799	20,849	20,585
O_2 Concentration (%)	21.0	21.1	21.1	21.0
CO_2 Concentration (%)	0.06	0.12	0.13	0.10
Moisture Concentration (%)	0.46	0.50	0.44	0.47
VOC Emission Test Results				
Concentration (ppmv)	4.45	4.40	4.13	4.33
Calculated emission rate (lb/hr)	0.64	0.60	0.59	0.61
Calculated emission factor (lb VOC /ton metal)	0.30	0.28	0.27	0.28
Annual VOC emissions[1] (TpY)	2.82	2.62	2.59	2.68
Permitted Limit				
Annual VOC emissions (TpY)	-	-	-	16.6

Table 5.1 Notes
1. Based on continuous annual operation (8,760 hours per year).

APPENDIX 1

Test Plan Approval Letter

STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
LANSING

GRETCHEN WHITMER
GOVERNOR

LIESL EICHLER CLARK
DIRECTOR

November 27, 2019

Mr. Tanner Weekley
BB&E, Inc.
235 East Main Street, Suite 107
Northville, Michigan 48167-2661

Dear Mr. Weekley:

SUBJECT: Atmosphere Annealing, LLC, Lansing, EU-13&14OILQUENCH, VOC Emission Testing, Permit No.: 289-98B; SRN: N2473

The Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD) has reviewed the protocol for testing at Atmosphere Annealing, LLC in Lansing. The oil quench line (EU-13&14OILQUENCH) will be tested for VOC emissions from which a VOC emission factor will be determined. This testing is required by Permit No. 289-98B.

Testing will be performed in accordance with Title 40 of the Code of Federal Regulations, Part 60, Appendix A, Methods 1, 2, 4, and 25A. Three 60-minute runs will be performed at the SV13&14 exhaust stack (SV13&14). A flow rate traverse and a moisture train will be performed with each gas run. Emissions will be reported as pounds VOC/ton of metal.

All requirements and specifications of the above methods apply; any modifications of the test methods onsite must be approved by the AQD.

The following process data will be recorded during each run:

- Amount of oil quenched metal processed (as tons).

Provide sufficient process data to demonstrate that the process is operating at normal maximum load.

The test report will include:

- The gas analyzer calibration error, system bias, zero and calibration drift data, and run data, all in tabular format;
- All pre-test and post-test meter box calibration, pitot tube calibration, and field data sheets; and
- The process data listed above.

All aborted or failed runs must be included in the report. A complete copy of the test report should be sent to the following locations:

Ms. Samantha Davis
EGLE, Air Quality Division
525 West Allegan Street, 1st Floor South
Lansing, Michigan 48933

Ms. Karen Kajiya-Mills
EGLE, Air Quality Division
525 West Allegan Street, 2nd Floor South
Lansing, Michigan 48933

Testing is scheduled for December 18, 2019. Please provide notification of any change in the test date to Ms. Samantha Davis of the Lansing District Office, at 517-282-1373, and to me. If you have any questions regarding this letter, please contact me by telephone or e-mail at wellsl8@michigan.gov.

Sincerely,

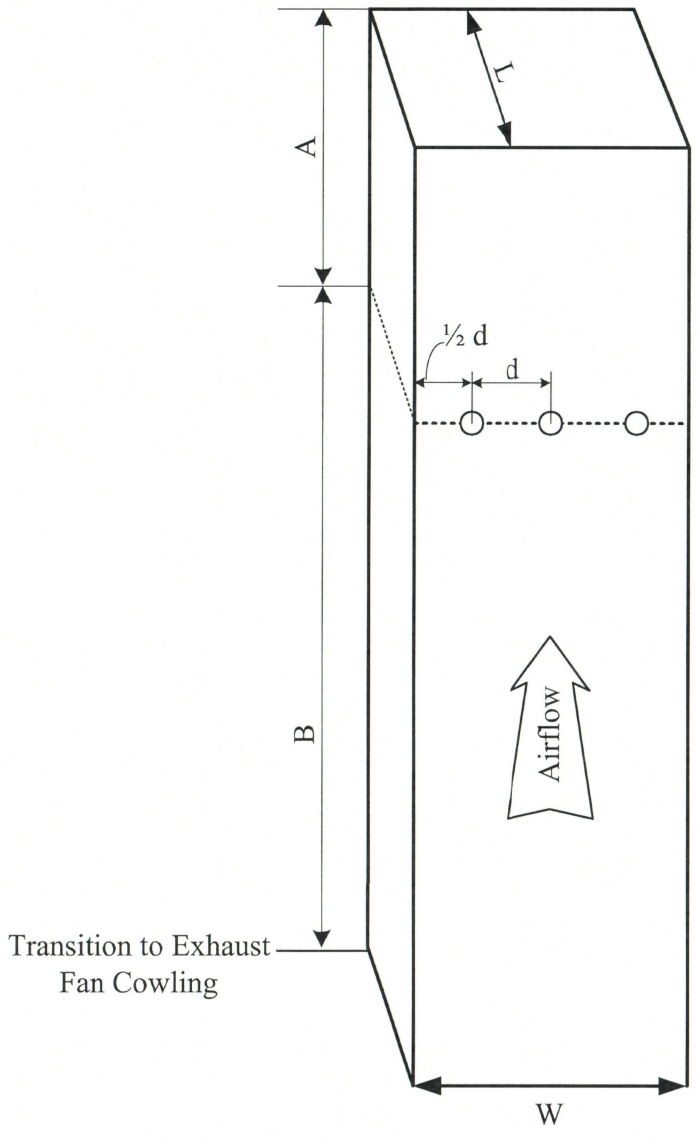
Lindsey Wells
Technical Programs Unit
Field Operations Section
EGLE, Air Quality Division
517-282-2345

cc: Mr. Robert Harvey, Impact Compliance & Testing, Inc.
Mr. Brad Myott, EGLE
Ms. Samantha Davis, EGLE

APPENDIX 2

Sample Diagram

Impact Compliance and Testing, Inc.



ID	L	W	A	B	d
Line 13/14 Exhaust	38"	28"	17"	63"	9.3"

Sample Point	Distance from Stack Wall
1	3.2"
2	9.5"
3	15.8"
4	22.2"
5	28.5"
6	34.8"

2/3/20 ALR	**Atmospheric Annealing, Inc.** **Line 13/14 Exhaust Sampling Location**		
	Scale None	Sheet 1 of 1	Impact Comp. & Testing Dwg No. AA-1